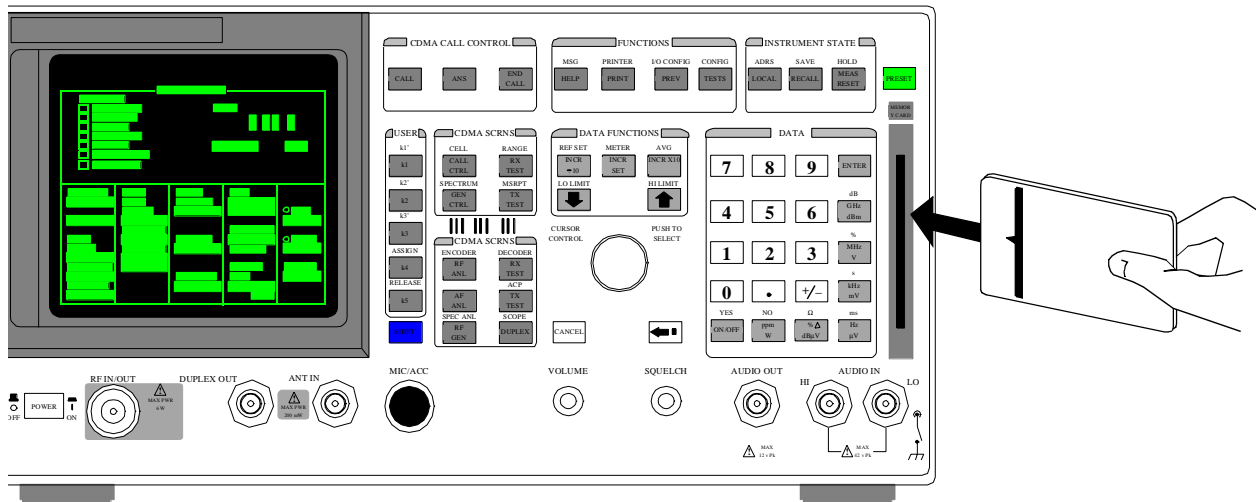


HP 83217A Option 004 PCS/CDMA/AMPS/NAMPS TESTS

Reference Guide

Software Revision A.02.01 and above



HP Part No. 83217-90007

Printed in U. S. A.

May 1998

Rev. C

Copyright © Hewlett-Packard Company 1997

Notice

Information contained in this document is subject to change without notice.

All Rights Reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

This material may be reproduced by or for the U.S. Government pursuant to the Copyright License under the clause at DFARS 52.227-7013 (APR 1988).

Hewlett-Packard Company
Learning Products Department
24001 E. Mission
Liberty Lake, WA 99019-9599
U.S.A.

Contents

1 Test Descriptions

Introduction 12

TEST_01 - CPA Registration 13

TEST_02 - CPA Page 15

TEST_03 - TXA Frequency Error 16

TEST_04 - TXA RF Power Output 17

TEST_05 - TXA Modulation Deviation Limiting 18

TEST_06 - TXA Audio Frequency Response 20

TEST_07 - TXA Audio Distortion 21

TEST_08 - TXA Signaling Tone/DST 22

TEST_09 - TXA FM Hum and Noise 23

TEST_10 - TXA SAT/DSAT 24

TEST_11 - TXA RVC Data Deviation 26

TEST_12 - TXA Compressor Response 28

TEST_13 - TXA Current Drain 30

TEST_14 - RXA Expander 32

TEST_15 - RXA Audio Frequency Response 34

TEST_16 - RXA Audio Distortion 35

TEST_17 - RXA Hum and Noise 36

TEST_18 - RXA SINAD 37

Contents

TEST_19 - RXA FVC Order Message Error Rate	39
TEST_20 - CPA Release	40
TEST_21 - CPA Origination	41
TEST_22 - OTA No Audio Functional	42
TEST_23 - TXA Quick General	44
TEST_24 - RXA Quick General	47
TEST_25 - CPA Flow Chart	49
TEST_26 - TXA Switch Channels	51
TEST_27 - CPA Hook Flash	53
TEST_28 - TXA DTMF Frequency Error	54
TEST_29 - RXA MRI	55
TEST_30 - CPD Registration	56
TEST_31 - CPD Origination	58
TEST_32 - CPD Page	60
TEST_33 - TXD Waveform Quality & Freq Acc	61
TEST_34 - TXD Open Loop Power Range	62
TEST_35 - TXD Closed Loop Power Control	64
TEST_36 - TXD Maximum RF Output Power	66
TEST_37 - TXD Minimum Controlled Output Power	68
TEST_38 - RXD Traffic Channel FER	70

Contents

TEST_39 - RXD Sensitivity & Dynamic Range	72
TEST_40 - CPD Softer Handoff	74
TEST_41 - RTD RX/TX CDMA Quick General	76
TEST_42 - CPD CDMA Voice Quality	78
TEST_43 - TXD Spectrum Emissions	79
TEST_44 - CPD CDMA Release	81
TEST_45 - CPD Digital to Analog Handoff	82
TEST_46 - CPD Talk Time	84
TEST_47 - RXD Sensitivity Level Search	85

Contents

2 Pass/Fail Limit (Specification) Descriptions

Introduction 88

Contents

3 Product Description

Software Functions 138

Software Features 139

Items Included in the HP 83217A, Option 004 Software 140

Contents

4 Parameter Descriptions

Introduction 142

Contents

Index 193

Contents

Test Descriptions

Introduction

A test is made up of a series of programming commands which configure the Test Set for a particular measurement environment. After the Test Set is properly configured the desired measurement is made and the measurement results are available to the user. One or more tests make up a procedure. While you may change the tests that make up a procedure, you may not change the measurements the test will perform. For more information about test procedures, see “[The Tests Subsystem](#)” in the *HP 83217A Test Software User’s Guide*.

Standards Used

The tests contained in this Test Package are derived from:

- TIA/EIA IS-90 Recommended Minimum Performance Standards for 800 MHz Dual-Mode Narrowband Analog Cellular Subscriber Units
- TIA/EIA IS-95A Mobile Station - Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System
- TIA/EIA IS-98A Recommended Minimum Performance Standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations
- PN-3385 Recommended Minimum Performance Requirements for 1.8 GHz to 2.0 GHz CDMA Personal Stations
- ANSI J-STD-008 Personal Station - Base Station Compatibility Requirements for 1.8 GHz to 2.0 GHz Code Division Multiple Access Personal Communications Systems.

Test Nomenclature

The prefixes used with the individual test descriptions are defined as follows:

- CPA - Call Processing, Analog tests
- CPD - Call Processing, Digital tests
- OTA - Other Tests, Analog
- RXA - Receiver, Analog tests
- RTD - Receiver/Transmitter, Digital tests
- RXD - Receiver, Digital tests
- TXA - Transmitter, Analog tests
- TXD - Transmitter, Digital tests

TEST_01 - CPA Registration

Description

This test reads and decodes the phone's Reverse Control Channel (RECC) and outputs the following registration information:

- Phone number: <decimal number>
- MIN: <hexadecimal number>
- Serial number: <decimal number>, <decimal number>, <hexadecimal number>
- Power Class: <class I, II, or III>
- Transmission: <continuous or discontinuous>
- Bandwidth: <20 MHz or 25 MHz>

NOTE:

Regarding the serial number data shown above, the numbers are as follows:

First Decimal Number: The first three digits represent the manufacturer's code. The next eight digits represent a combination of the reserve bits and the unit serial number.

Second Decimal Number: The first three digits represent the manufacturer's code. The next two digits represent the reserve bits. The next six digits represent the unit serial number.

Hexadecimal Number: A hexadecimal representation of the above two numbers.

The test works as follows:

- The test system transmits the Registration ID message repeatedly, with the value of the **REGID** field set alternately to 0 and 500. This induces the phone to register with the test system.
- If an error occurs in this test, all testing is stopped.

A CPA/CPD Registration or CPA/CPD Origination test must be run at least once before any analog tests can be run, otherwise the operator is prompted to enter the MSUT phone number during testing. After a CPA/CPD Registration or CPA/CPD Origination test is run once it does not need to be run again for the test system to be able to perform other analog tests. The registration data is remembered unless it is erased by loading new test software, registering a different radio, or executing a command in IBASIC.

Chapter 1, Test Descriptions
TEST_01 - CPA Registration

Pass/Fail Limits Used

- None

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_02 - CPA Page

Description

Initiates a call to the mobile station from the base station. Specifically, this test does the following:

1. Performs a page to the MSUT
2. Performs 3 of 5 majority voting on the Reverse Control Message
3. Performs BCH (Bose-Chaudhuri-Hocquenghem) error detection and correction of the Reverse Control Message
4. Tests each section of the page response, bit by bit
5. Sends an Initial-Voice-Channel-Designation order to the MSUT, directing it to tune to a voice channel obtained from the **Channel Information** table. If the channel number from the table has an L, M, or U suffix, the phone will be directed to a narrow voice channel. If the channel number has no suffix, the phone will be directed to a wide voice channel.
6. Sends an ALERT order to the MSUT by way of the Forward Voice Channel (FVC)
7. Makes a power measurement on the initial voice channel to verify that the voice channel was obtained. The power measurement result is not displayed in this test.

Pass/Fail Limits Used

- None

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_03 - TXA Frequency Error

Description This test measures the difference between the unmodulated carrier frequency and the assigned carrier frequency. TXA frequency error is measured on a voice channel with voice modulation off, and SAT modulation on. This test is performed at the nominal supply voltage.

This test can only be performed at the high and low supply voltage settings if an HP-IB programmable power supply is configured into the test system and [parameter 21. RT Test at Extreme Settings \[0=no 1=yes\]](#) is set to 1. See [TEST_13 - TXA Current Drain](#) for details on configuring an HP-IB programmable power supply.

The frequency error is expressed in parts-per-million (ppm).

Pass/Fail Limits Used

- [20. TXA Frequency Error \(ppm\)](#)

Parameters Used

- [1. CPA Control Channel \[1-799 or 991 -1023\]](#)
- [2. CPA DSAT Vector](#)
- [3. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [4. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [5. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\] 0](#)
- [6. CPA SAT Tone \(Hz\)](#)
- [16. RT High Supply Voltage \(Vdc\)](#)
- [17. RT Low Supply Voltage \(Vdc\)](#)
- [18. RT Nominal Supply Voltage \(Vdc\)](#)
- [21. RT Test at Extreme Settings \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [49. TXA TS Atten for Signaling \[0, 20, 40\] \(dB\)](#)

TEST_04 - TXA RF Power Output

Description

This test measures the output power of the mobile station's transmitter into a 50-ohm load. The power is measured at the antenna terminals of the mobile station. This test is performed at the nominal supply voltage.

This test can also be performed at the high and low supply voltage settings if an HP-IB programmable power supply is configured into the test system and [parameter 21. RT Test at Extreme Settings \[0=no 1=yes\]](#) is set to 1. See [TEST_13 - TXA Current Drain](#) for details on configuring an HP-IB programmable power supply.

Output power can be expressed in dBm or watts by appropriately setting [parameter 37. TX Units for Pwr Meas \[0=dBm 1=Watts\]](#).

Pass/Fail Limits Used

- [26. TXA Output Power at Level 0 \(dBm\)](#)
- [27. TXA Output Power at Level 1 \(dBm\)](#)
- [28. TXA Output Power at Level 2 \(dBm\)](#)
- [29. TXA Output Power at Level 3 \(dBm\)](#)
- [30. TXA Output Power at Level 4 \(dBm\)](#)
- [31. TXA Output Power at Level 5 \(dBm\)](#)
- [32. TXA Output Power at Level 6 \(dBm\)](#)
- [33. TXA Output Power at Level 7 \(dBm\)](#)

NOTE:

Normally, all power levels are tested; however, [parameter 44. TXA Output Power Levels Tested \[BWD #\]](#) allows you to select only the levels you want tested.

Parameters Used

- [1. CPA Control Channel \[1-799 or 991 -1023\]](#)
- [2. CPA DSAT Vector](#)
- [3. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [4. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [5. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\] 0](#)
- [6. CPA SAT Tone \(Hz\)](#)
- [16. RT High Supply Voltage \(Vdc\)](#)
- [17. RT Low Supply Voltage \(Vdc\)](#)
- [18. RT Nominal Supply Voltage \(Vdc\)](#)
- [21. RT Test at Extreme Settings \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [37. TX Units for Pwr Meas \[0=dBm 1=Watts\]](#)
- [44. TXA Output Power Levels Tested \[BWD #\]](#)
- [49. TXA TS Atten for Signaling \[0, 20, 40\] \(dB\)](#)

TEST_05 - TXA Modulation Deviation Limiting

Description

This test measures the ability of the transmitter circuits to prevent the transmitter from producing deviations in excess of rated system deviation. This test measures the Peak+ and the Peak- values of the instantaneous (INST) and steady state (SS) modulation. Symmetry is based upon the difference between positive and negative swings of the carrier at any level of modulation. .

1. The audio generator's frequency is set to 1 kHz.
2. The audio generator's level is set to produce 8 kHz deviation by the MSUT (3 kHz deviation for narrow analog operation).
3. The audio generator's level is increased by 20 dB.
4. Steps 2 and 3 are repeated 3 times, and the maximum peak frequency deviation is held and reported.
5. The audio generator's frequency is stepped from 300 Hz to 3 kHz while the audio generator's level is maintained at the 20 dB overdrive. The size of the frequency steps is obtained from the **parameter 42. TXA Frequency Deviation Step Frequency (kHz)**. If this parameter is set to 0, then the test will run at 1 kHz only. Peak frequency deviation is repeated at each step.

NOTE:

Audio connections from the radio to the test system are required for this test.

**Pass/Fail Limits
Used**

- **21. TXA Modulation Limiting (kHz)**
- **25. TXA NAMPS Modulation Limiting (kHz)**

Parameters Used

High and low supply voltages are measured only if an external power supply has been configured to be used over HP-IB by the test system and if the **parameter 21. RT Test at Extreme Settings [0=no 1=yes]** is set to 1. See **TEST_13 - TXA Current Drain** for details on configuring an HP-IB power supply.

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail] 0**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **16. RT High Supply Voltage (Vdc)**
- **17. RT Low Supply Voltage (Vdc)**
- **18. RT Nominal Supply Voltage (Vdc)**
- **21. RT Test at Extreme Settings [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **42. TXA Frequency Deviation Step Frequency (kHz)**
- **43. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_06 - TXA Audio Frequency Response

Description This test measures how closely the frequency deviation of the transmitter follows a 6 dB/octave pre-emphasis slope over a given frequency range. This test will check the audio response frequencies of 300 Hz to 3 kHz only.)

NOTE: Audio connections from the radio to the test system are required for this test.

The test results indicate the flatness of the audio output as frequency is varied. Audio frequency response is expressed in dB error from the 6 dB/octave pre-emphasis slope.

Background

- Audio frequency response is measured at 2.9 kHz peak deviation for wide voice channels and 1.5 kHz peak deviation for narrow voice channels.
- The frequency response measurement is made with the rms detector and is made with respect to a 1 kHz reference rate.

Pass/Fail Limits Used

- **12. TXA Audio Response Dev from 6 dB/oct (dB)**
- **13. TXA Audio Response Roll >2.5 kHz (dB/oct)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **38. TXA Audio Response Step Frequency (kHz)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_07 - TXA Audio Distortion

Description This test measures the level of the demodulated carrier's audio distortion.

NOTE: Audio connections from the radio to the test system are required for this test.

The test system does not have expander circuitry. If your testing conditions require correction for this situation, you must change the limits set in **pass/fail limit 11. TXA Audio Distortion (%)**, as required.

Transmitter audio distortion is expressed in percent.

Pass/Fail Limits Used

- **11. TXA Audio Distortion (%)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_08 - TXA Signaling Tone/DST

Description

If the channel is a wide voice channel, this test measures the signaling tone's frequency and peak deviation. Since the SAT tone is always on during this test, deviation is measured with the rms detector, with and without the signaling tone on. The peak deviation of the signaling tone is calculated from the two readings. Therefore, test results indicate peak deviation, not peak+ or peak-.

If the channel is a narrow voice channel, the peak deviation of the digital signaling tone (DST) is measured and the DST sequence is decoded and reported in hexadecimal.

Since this test is run in the "maintenance mode" where the base station is waiting for an answer, the operator must press the send key on the handset to exit the test.

Background

The signaling tone (ST) is a 10-kHz tone generated by the phone on a wide voice channel and is transmitted to the cell site for confirming orders (Alert, Audit, Change Power, etc.), and for signaling flash and release requests.

The digital signaling tone (DST) performs the same function on the narrow voice channel that ST performs on the wide voice channel. The DST is a 24-bit digital sequence transmitted continuously at 200 NRZ bits/second and produces an average peak deviation of 700 Hz. Each DST sequence is the logical inverse of a corresponding digital supervisory audio tone (DSAT) sequence.

Pass/Fail Limits Used

- **23. TXA NAMPS DSAT Deviation (Hz)**
- **36. TXA Signaling Tone Deviation (kHz)**
- **37. TXA Signaling Tone Frequency (kHz)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_09 - TXA FM Hum and Noise

Description This test measures the ratio of residual frequency modulation to the standard test modulation.

NOTE: Audio connections from the radio to the test system are required for this test.

The test system does not have expander circuitry. If your testing conditions require correction for this situation, you must change the limits set in the [pass/fail limit 19. TXA FM Hum and Noise \(dB\)](#), as required.

FM hum and noise is expressed in dB, from the formula:

$$-20 \times \text{Log} (\text{Reference Deviation} \div \text{Present Deviation})$$

CAUTION: An open microphone on your MSUT can affect the results of this test. If your MSUT has an open microphone, this test must be performed in a quiet environment.

Pass/Fail Limits Used

- [19. TXA FM Hum and Noise \(dB\)](#)

Parameters Used

- [1. CPA Control Channel \[1-799 or 991 -1023\]](#)
- [2. CPA DSAT Vector](#)
- [3. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [4. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [5. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\]](#)
- [6. CPA SAT Tone \(Hz\)](#)
- [15. RC Compandor is Always On \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [49. TXA TS Atten for Signaling \[0, 20, 40\] \(dB\)](#)

TEST_10 - TXA SAT/DSAT

Description

If the channel is a wide voice channel, this test measures the frequency error and peak deviation of the three SAT tones. The rms detector is used for measuring SAT deviation. The SAT deviation is then converted to a peak reading.

Also, this test uses the 6 kHz BPF.

If the channel is a narrow voice channel, the test system transmits DSAT sequence #3=25AD4D in hexadecimal. The peak deviation of the DSAT returned by the phone is measured and reported. An eye-pattern test is performed on the DSAT and the closure and phase jitter are measured and reported.

Background

The supervisory audio tones (SAT) are the 5970, 6000, and 6030 Hz tones used for signaling. One of the three tones is added to the wide channel voice transmission by a cell site. The radio then detects the tone and modulates the transmitted voice-channel carrier with a constant (relative) phase tone which is regenerated from the received tone to establish a closed loop between the mobile (cellular radio) and the cell site. Transmission of the SAT is suspended during transmission of wideband data on the reverse voice channel (RVC), but is not suspended when the signaling tone (ST) is sent.

The digital supervisory tone (DSAT) performs the same function on the narrow voice channel that the SAT performs on the wide voice channel. The DSAT is a 24-bit digital sequence transmitted continuously at 200 NRZ bits/second and produces an average peak deviation of 700 Hz. Seven different sequences are defined.

**Pass/Fail Limits
Used**

- 22. TXA NAMPS DSAT Closure
- 23. TXA NAMPS DSAT Deviation (Hz)
- 24. TXA NAMPS DSAT Phase Jitter
- 34. TXA SAT Deviation (kHz)
- 35. TXA SAT Frequency Error (Hz)

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Compandor is Always On [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_11 - TXA RVC Data Deviation

Description

This test provides three possible modes of operation, determined by:

The first method, selected by setting **parameter 48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]** to 0=tran, measures the Peak+ and Peak– frequency deviation of the data in the entire Reverse Voice Channel (RVC) burst to ensure that it is within the specified limits.

The entire burst is tested by sending the FVC message 5 times while the peak+ hold detector is on, and another 5 times while the peak– hold detector is on.

The second method, selected by setting **parameter 48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]** to 1=bth, first performs the test on just the steady state portion of the RVC data signal, followed by a test of the entire signal (described above).

The steady state portion of the test is performed by measuring the RVC data signal between 20 ms and 50 ms following the beginning of the data burst. The peak + and – results are compared to values in **pass/fail limit 38. TXA Wideband Data Deviation Steady State (kHz)**. The results of the transient portion of the test are compared to values in the **pass/fail limit 39. TXA Wideband Data Deviation Transient (kHz)**.

The third method, selected by setting **parameter 48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]** to 2=ss, performs the test on just the steady state portion of the RVC data signal (as described above).

NOTE:

In all three methods, the MSUT should blank the SAT tone before sending the RVC message; therefore, SAT deviation should not be included in the deviation measurement. If the MSUT has an open microphone, the readings may be affected by background noise. In this case, mute the handset. Using the first method, 0=tran, Hewlett-Packard Company has found that some cellular telephones fail this test because the telephones produce a carrier frequency transient, typically during the first 10 mS of the data burst. This causes the peak frequency deviation to exceed the maximum specification of $\pm 8 \text{ kHz} \pm 10\%$ (or a total of $\pm 8.8 \text{ kHz}$) specified in the TIA/EIA IS-98A Standard. This test, while conforming to the TIA/EIA IS-98A Standard, captures the peak deviation during the first 10 mS of the data burst and will indicate a failed test result if the MSUT exceeds the specified limits.

Applications

RVC data is Manchester-encoded data that is used for cellular system signaling and control. Manchester encoding is accomplished by transforming each NRZ (non-return to zero) binary one to a zero-to-one transition and each NRZ binary zero to a one-to-zero transition. The data stream is then used to modulate the transmitter carrier using direct, binary, frequency-shift keying (FSK).

On the wide voice channels, the data rate is 10 kilobytes/second and the nominal peak transmitted deviation is 8 kHz. All other modulation sources to the transmitter are inhibited when the data is transmitted (“blank and burst”).

On the narrow voice channels, the data rate is 100 bits/second and the nominal peak transmitter deviation is 700 Hz. The data words are inserted into the DSAT data stream. The transmitter is modulated simultaneously by voice audio and the data stream.

Pass/Fail Limits Used

- **23. TXA NAMPS DSAT Deviation (Hz)**
- **38. TXA Wideband Data Deviation Steady State (kHz)**
- **39. TXA Wideband Data Deviation Transient (kHz)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_12 - TXA Compressor Response

Description This test measures the compressor's zero reference deviation and operating range. For every 2 dB change in input level, there should be a nominal output level change of 1 dB.

NOTE: Audio connections from the radio to the test system are required for this test.

Compressor response is expressed in dB of tracking error over the indicated operating range.

- Compressor response to different input levels is measured.
- The deviation is set to 2.9 kHz (1.5 kHz for narrow analog) and a reference is taken with both the rms*sqr(2) and pk+ detectors.
- The input is varied from a start level equal to **parameter 38 TXA Compressor Start Level (dB)** to a stop level equal to -30 dB using the step level **parameter 39 TXA Compressor Step Level (dB)**.
- If **parameter 38 TXA Compressor Start Level (dB)** is less than **parameter 40 TXA Compressor Stop Level (dB)** then the step value retrieved from **parameter 39 TXA Compressor Step Level (dB)** is made positive. Otherwise, it is made negative. The peak deviation is measured at each step using either the rms*sqr(2) or pk+ detector and the compressor response relative to the reference is calculated using the appropriate reference value for the detector used.
- The compressor typically limits relative inputs ≥ 17.6 dB; therefore, the lower limit is calculated from the upper limit when the relative input deviation is ≥ 17.6 dB using the formula: $(8.8 - \text{upper limit}) - (\text{present input deviation} / 2)$.

Background A compressor is used in the phone's voice input circuitry to decrease the variability of the modulation due to volume changes from the talker. In combination with an expander in the cell site receiver, this provides improved signal-to-noise-ratio in the demodulated audio.

**Pass/Fail Limits
Used**

- **14 TXA Compressor Tracking Error <0dB (dB)**
- **15 TXA Compressor Tracking Error >0dB (dB)**

Parameters Used

- **1 CPA Control Channel [1-799 or 991 -1023]**
- **2 CPA DSAT Vector**
- **3 CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4 CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5 CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6 CPA SAT Tone (Hz)**
- **14 RC Compondor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **38 TXA Compressor Start Level (dB)**
- **39 TXA Compressor Step Level (dB)**
- **40 TXA Compressor Stop Level (dB)**
- **49 TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_13 - TXA Current Drain

Description

This test measures the average power supply current drawn by the MSUT when it is operating. The transmitter's current drain is expressed in amps. This test can measure current drain using two methods. The test software first looks to see if an HP-IB power supply has been configured in the **External Devices**. If one has been configured, the current drain will be measured via the programmable power supply over HP-IB. See [“To Configure a Programmable Power Supply”](#) in the “Setting Up the Test Set for External Devices” chapter of the *HP 83217A Test Software User's Guide*.

If an HP-IB power supply is not available (HP-IB power supply not configured in **External Devices**), the software measures current drain through the rear-panel dc current measurement capability of the test system, see the procedure *Configuring the Rear Panel dc-Current Measurement* that follows.

This test is not specified by TIA/EIA standards.

A Hewlett-Packard programmable dc power supply is required for this test if an HP-IB power supply is to be configured. A power supply with sufficient voltage and current capabilities from the following series must be used:

- HP 664xA
- HP 665xA
- HP 667xA
- HP 668xA

Configuring the Rear-Panel DC-Current Measurement

1. The DC-current measurement must be zeroed before the measurement. Access the test system's **TESTS** screen by pushing the TESTS key on the front panel.
2. Position the cursor at the **AF ANL** field under **To Screen** and select it.
3. Position the cursor at the **DC Current** field and select it (this should be done before any current is applied to the test system's measurement terminals). The dc-current measurement is now zeroed.
4. Use a power supply that provides the appropriate voltage and current for your MSUT.
5. Connect the positive lead of the power supply to the positive terminal (banana) of the dc-current measurement connector on the lower-left rear panel of the test system.
6. Connect the negative terminal (banana) of the dc-current measurement connector to the positive terminal of the mobile unit's supply input.
7. Connect the negative terminal of the power supply directly to the negative terminal of the mobile unit's supply input.
8. The software will automatically measure the current passing through the rear-panel connection. Be sure that there is no HP-IB power supply configured in the **External Devices** screen of the test system.

Pass/Fail Limits Used

- **16. TXA Current Drain @Levels 0-3 (Amps)**
- **17. TXA Current Drain @Levels 4-7 (Amps)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **41. TXA Current Drain Levels Tested [BWD #]**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_14 - RXA Expander

Description This test measures the expander's zero reference level and operating range. For every 1 dB change in input level, there should be a nominal output level change of 2 dB.

NOTE: Audio connections from the radio to the test system are required for this test.

Expander response is expressed in dBV for the zero reference level, and in dB for the tracking error over the indicated operating range.

- The expander response is measured at a 1 kHz rate and an RF input level of -50 dBm.
- A 2.9 kHz (1.5 kHz for narrow analog operation) deviation is applied and the "zero crossing" of the receiver is measured. This value is retained as the reference level.
- The input is varied from a high level of $+10.6$ dB above the measured reference level to a level of -21 dB below the measured reference level in steps set by **parameter 24. RXA Expander Step Level (dB)**. The rms deviation is measured and the expander response relative to the reference is calculated.
- Deviation is varied over the range and the expander response relative to the "zero crossing" point is calculated.
- The sweep will go from a high level ($+10.6$ dB) to a low level (-21 dB) if the sign of the step level set by **parameter 24. RXA Expander Step Level (dB)** is negative. The sweep will go from a low to high level if the sign of parameter 23 is positive.

Background

An expander is used to provide the complement of the compressor in the cell site transmitter. Together, the compressor and expander provide improved signal-to-noise-ratio in the demodulated audio.

Pass/Fail Limits Used

- 4. RXA Expander Tracking Error <0dB (dB)
- 5. RXA Expander Tracking Error >0dB (dB)
- 6. RXA Expander Zero Reference Level (dBV)
- 8. RXA NAMPS Expander Zero Reference Level (dBV)

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Compandor is Always On [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 24. RXA Expander Step Level (dB)
- 31. RXA Set Audio Lvl [0=no xx=level volts]
- 32. RXA Tolerance for Setting Audio Level (% error)
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_15 - RXA Audio Frequency Response

Description This test measures the ability of the receiver's audio output circuitry to follow a 6 dB/octave de-emphasis curve, as well as to follow an audio-bandpass response. An RF signal with a level specified by **parameter 22. RX RF Level for Signaling (dBm)** is applied with a constant deviation. The modulation rate is swept over the audio frequency-response range in steps determined by the **parameter 23. RXA Audio Response Step Frequency (kHz)**.

NOTE: Audio connections from the radio to the test system are required for this test.

Receiver audio frequency response is expressed in dB error from a 6 dB/octave curve.

- A -50 dBm RF signal is applied to the receiver's antenna.
- The -50 dBm RF signal is modulated to deviate to 2.9 kHz at a 1 kHz rate with a SAT tone present and a reference reading is made.
- The frequency rate is then swept over the desired range and the response measured.
- If the compandor is always on, a 2:1 correction is applied to the measured results.
- Narrow analog operation uses 1.5 kHz deviation and DSAT.

Pass/Fail Limits Used

- **2. RXA Audio Response Dev From -6 dB/oct R1 (dB)**
- **3. RXA Audio Response Dev from -6 dB/oct R2 (dB)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **23. RXA Audio Response Step Frequency (kHz)**
- **31. RXA Set Audio Lvl [0=no xx=level volts]**
- **32. RXA Tolerance for Setting Audio Level (% error)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_16 - RXA Audio Distortion

Description This test measures the distortion from the receiver when a standard test tone is applied to the radio.

NOTE: Audio connections from the radio to the test system are required for this test.
Also, this test uses the C-Message audio filter or the CCITT audio filter if it is installed in the test system.

- A -50 dBm RF signal is applied to the receiver's antenna.
- The -50 dBm RF signal is modulated to deviate to 8 kHz at a 1 kHz rate with a 6000 Hz SAT tone present.
- Narrow analog operation uses 3 kHz deviation and DSAT.

Pass/Fail Limits Used

- **1. RXA Audio Distortion (%)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **31. RXA Set Audio Lvl [0=no xx=level volts]**
- **32. RXA Tolerance for Setting Audio Level (% error)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_17 - RXA Hum and Noise

Description

This test measures the ratio, expressed in dB, of:

- The residual audio output in the absence of modulation,
- To the rated audio output.

NOTE:

Audio connections from the radio to the test system are required for this test.

- A -50 dBm RF signal is applied to the receiver's antenna.
- The -50 dBm RF signal is modulated to deviate to 8 kHz at a 1 kHz rate with a SAT tone present.
- The SAT tone is always on during this test.
- Narrow analog operation uses 3 kHz deviation and DSAT.

Pass/Fail Limits Used

- **7. RXA Hum and Noise (dB)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **31. RXA Set Audio Lvl [0=no xx=level volts]**
- **32. RXA Tolerance for Setting Audio Level (% error)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_18 - RXA SINAD

Description

This test sets and measures the ratio, expressed in dB, of:

- Signal + Noise + Distortion,
- to Noise + Distortion.

The receiver's SINAD is measured at the RF level specified by the [parameter 29. RXA RF Level for SINAD \(dBm\)](#).

NOTE:

Audio connections from the radio to the test system are required for this test.

Receiver SINAD is measured at the receiver's audio output. This measurement differs from a distortion measurement in that it is conducted at low RF input levels where the noise contribution is significant.

This test is intended to measure receiver sensitivity. Receivers are typically required to provide at least 12 dB SINAD (less than 25% noise and distortion) for RF input levels below 1 microvolt.

- The RF signal (level set by the [parameter 29. RXA RF Level for SINAD \(dBm\)](#)) is modulated to deviate to 8 kHz at a 1 kHz rate with a SAT tone present.
- The measurement is repeated at high and low supply voltages if [parameter 21. RT Test at Extreme Settings \[0=no 1=yes\]](#) is set to 1.
- Narrow analog operation uses 3 kHz deviation and DSAT.

Pass/Fail Limits Used

- **10. RXA SINAD (dB)**

Parameters Used High and low supply voltages are measured only if an external power supply has been configured to be used over HP-IB by the test system and if **parameter 21. RT Test at Extreme Settings [0=no 1=yes]** is set 1. See **TEST_13 - TXA Current Drain** for details on configuring an HP-IB power supply.

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **16. RT High Supply Voltage (Vdc)**
- **17. RT Low Supply Voltage (Vdc)**
- **18. RT Nominal Supply Voltage (Vdc)**
- **21. RT Test at Extreme Settings [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **27. RXA NAMPS RF Level for SINAD (dBm)**
- **28. RXA NAMPS RF Level for SINAD at Extremes (dBm)**
- **29. RXA RF Level for SINAD (dBm)**
- **30. RXA RF Level for SINAD at Extremes (dBm)**
- **31. RXA Set Audio Lvl [0=no xx=level volts]**
- **32. RXA Tolerance for Setting Audio Level (% error)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_19 - RXA FVC Order Message Error Rate

Description

This test simulates a Forward Voice Channel (FVC) order message being sent from a cell site to the cellular radio and measures the Order Message Error Rate.

The test works as follows:

- A Forward Voice Channel (FVC) audit message is sent 100 times and the number of acknowledgments from the MSUT is counted.
- The RF level is set by the **parameter 25. RXA FVC Message Error Rate RF Level (dBm)**.
- If the MSUT misses 10 acknowledgments in a row the test terminates.

FVC order message error rate is expressed in %.

Pass/Fail Limits Used

- **9. RXA Order Message Error Rate (OMER) (%)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **25. RXA FVC Message Error Rate RF Level (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_20 - CPA Release

Description	<p>This test provides the necessary commands to release the mobile unit.</p> <p>The test works as follows:</p> <ul style="list-style-type: none">• The mobile unit is set onto a voice channel (if not already on a voice channel).• A release message is sent from the test system.• Power is monitored continuously until the power drops below +5 dBm or until 6 seconds has passed, whichever occurs first.• The test fails if the 6 second limit is reached.
Pass/Fail Limits Used	<ul style="list-style-type: none">• None
Parameters Used	<ul style="list-style-type: none">• 1. CPA Control Channel [1-799 or 991 -1023]• 2. CPA DSAT Vector• 3. CPA Enter Ph# [0=If Needed,1=Always,Here]• 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]• 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]• 6. CPA SAT Tone (Hz)• 22. RX RF Level for Signaling (dBm)• 37. TX Units for Pwr Meas [0=dBm 1=Watts]• 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_21 - CPA Origination

Description

This test simulates a call from the cellular phone to the base station (cell site) by putting the phone in service and having the operator originate a call from the handset. Specifically, this test performs the following:

1. The test system simulates a control channel.
2. The operator is instructed to dial 123 123 4567 after the MSUT has service. (Service is indicated by the NO SERVICE light going off or the SERVICE light illuminating on the MSUT.)
3. Performs 3 of 5 majority voting on the Reverse Control Message
4. Performs BCH error detection and correction of the Reverse Control Message, Wide-band data
5. Tests each section of the origination message, bit by bit
6. Sends an Initial-Voice-Channel-Designation order to the MSUT directing it to tune to a voice channel obtained from the **Channel Information** table.
7. Makes a power measurement on the initial voice channel to verify that the voice channel was obtained. The power level measurement result is not displayed in this test.

It is not necessary to register the phone with the test set by running **TEST_01 - CPA Registration** before running this test. **TEST_21 - CPA Origination** will read the MSUT's Mobile Identification Number (MIN) and the test set will retain it for use in performing other tests.

If the channel number from the table has an L, M, or U suffix, the phone will be directed to a narrow voice channel. If the channel number has no suffix, the phone will be directed to a wide voice channel.

Pass/Fail Limits Used

- None

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_22 - OTA No Audio Functional

Description

This test contains a collection of tests designed to provide a quick evaluation of the MSUT without the need to make audio connections from the MSUT to the test system. The following tests are included:

TEST_21 - CPA Origination
TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_08 - TXA Signaling Tone/DST
TEST_10 - TXA SAT/DSAT
TEST_11 - TXA RVC Data Deviation
TEST_27 - CPA Hook Flash

RXA Tones Functional
RXA SINAD Functional
TXA Microphone Functional

The first seven tests in the above list are described individually in this chapter. The final three tests are available only as part of this test and they work as follows:

- When prompted, the operator is required to listen for tones from the receiver and then select whether the test passed or failed. The pass/fail decision is qualitative, and is usually based on whether the tones are heard clearly.
- When prompted, the operator is required to listen to a 1 kHz tone that is modulated on a low power level carrier signal. The power level of the carrier signal is set by **parameter 29. RXA RF Level for SINAD (dBm)**. The operator must select whether the test passed or failed. The pass/fail decision is qualitative and is usually based on whether the 1 kHz tone could be heard adequately among the static.
- The operator is required to whistle into the transmitter, to observe the deviation on the test system, and then select whether the test passed or failed. The pass/fail decision is qualitative, and is usually based on whether the change in deviation corresponds with the amplitude of the whistle into the transmitter.

**Pass/Fail Limits
Used**

- 20. TXA Frequency Error (ppm)
- 22. TXA NAMPS DSAT Closure
- 23. TXA NAMPS DSAT Deviation (Hz)
- 24. TXA NAMPS DSAT Phase Jitter
- 26. TXA Output Power at Level 0 (dBm)
- 27. TXA Output Power at Level 1 (dBm)
- 28. TXA Output Power at Level 2 (dBm)
- 29. TXA Output Power at Level 3 (dBm)
- 30. TXA Output Power at Level 4 (dBm)
- 31. TXA Output Power at Level 5 (dBm)
- 32. TXA Output Power at Level 6 (dBm)
- 33. TXA Output Power at Level 7 (dBm)
- 34. TXA SAT Deviation (kHz)
- 35. TXA SAT Frequency Error (Hz)
- 36. TXA Signaling Tone Deviation (kHz)
- 37. TXA Signaling Tone Frequency (kHz)
- 38. TXA Wideband Data Deviation Steady State (kHz)
- 39. TXA Wideband Data Deviation Transient (kHz)

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Compandor is Always On [0=no 1=yes]
- 16. RT High Supply Voltage (Vdc)
- 17. RT Low Supply Voltage (Vdc)
- 18. RT Nominal Supply Voltage (Vdc)
- 21. RT Test at Extreme Settings [0=no 1=yes]
-
- 22. RX RF Level for Signaling (dBm)
- 27. RXA NAMPS RF Level for SINAD (dBm)
- 29. RXA RF Level for SINAD (dBm)
- 32. RXA Tolerance for Setting Audio Level (% error)
- 37. TX Units for Pwr Meas [0=dBm 1=Watts]
- 44. TXA Output Power Levels Tested [BWD #]
- 48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_23 - TXA Quick General

Description

NOTE: Audio connections from the radio to the test system are required for this test.

These tests are designed to provide you with a quick evaluation of the cellular radio's transmitter's capabilities. See the individual tests for descriptions. The following tests are included:

- TEST_03 - TXA Frequency Error**
- TEST_04 - TXA RF Power Output**
- TEST_05 - TXA Modulation Deviation Limiting**
- TEST_06 - TXA Audio Frequency Response**
- TEST_07 - TXA Audio Distortion**
- TEST_08 - TXA Signaling Tone/DST**
- TEST_09 - TXA FM Hum and Noise**
- TEST_10 - TXA SAT/DSAT**
- TEST_11 - TXA RVC Data Deviation**
- TEST_12 - TXA Compressor Response**

**Pass/Fail Limits
Used**

- 11. TXA Audio Distortion (%)
- 12. TXA Audio Response Dev from 6 dB/oct (dB)
- 13. TXA Audio Response Roll >2.5 kHz (dB/oct)
- 19. TXA FM Hum and Noise (dB)
- 20. TXA Frequency Error (ppm)
- 21. TXA Modulation Limiting (kHz)
- 22. TXA NAMPS DSAT Closure
- 23. TXA NAMPS DSAT Deviation (Hz)
- 24. TXA NAMPS DSAT Phase Jitter
- 25. TXA NAMPS Modulation Limiting (kHz)
- 26. TXA Output Power at Level 0 (dBm)
- 27. TXA Output Power at Level 1 (dBm)
- 28. TXA Output Power at Level 2 (dBm)
- 29. TXA Output Power at Level 3 (dBm)
- 30. TXA Output Power at Level 4 (dBm)
- 31. TXA Output Power at Level 5 (dBm)
- 32. TXA Output Power at Level 6 (dBm)
- 33. TXA Output Power at Level 7 (dBm)
- 34. TXA SAT Deviation (kHz)
- 35. TXA SAT Frequency Error (Hz)
- 36. TXA Signaling Tone Deviation (kHz)
- 37. TXA Signaling Tone Frequency (kHz)
- 38. TXA Wideband Data Deviation Steady State (kHz)
- 39. TXA Wideband Data Deviation Transient (kHz)

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Compandor is Always On [0=no 1=yes]
- 16. RT High Supply Voltage (Vdc)
- 17. RT Low Supply Voltage (Vdc)
- 18. RT Nominal Supply Voltage (Vdc)
- 21. RT Test at Extreme Settings [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 32. RXA Tolerance for Setting Audio Level (% error)
- 37. TX Units for Pwr Meas [0=dBm 1=Watts]
- 38. TXA Audio Response Step Frequency (kHz)
- 40. TXA Compressor Step Level (dB)
- 42. TXA Frequency Deviation Step Frequency (kHz)
- 43. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]
- 44. TXA Output Power Levels Tested [BWD #]
- 48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_24 - RXA Quick General

Description

NOTE: Audio connections from the radio to the test system are required for this test.

These tests are designed to provide you with a quick evaluation of the cellular radio's receiver's capabilities. See the individual tests for descriptions. The following tests are performed:

TEST_14 - RXA Expander
TEST_15 - RXA Audio Frequency Response
TEST_16 - RXA Audio Distortion
TEST_17 - RXA Hum and Noise
TEST_18 - RXA SINAD

Pass/Fail Limits Used

- **1. RXA Audio Distortion (%)**
- **2. RXA Audio Response Dev From -6 dB/oct R1 (dB)**
- **3. RXA Audio Response Dev from -6 dB/oct R2 (dB)**
- **4. RXA Expander Tracking Error <0dB (dB)**
- **5. RXA Expander Tracking Error >0dB (dB)**
- **6. RXA Expander Zero Reference Level (dBV)**
- **7. RXA Hum and Noise (dB)**
- **8. RXA NAMPS Expander Zero Reference Level (dBV)**
- **10. RXA SINAD (dB)**

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Comandor is Always On [0=no 1=yes]
- 16. RT High Supply Voltage (Vdc)
- 17. RT Low Supply Voltage (Vdc)
- 18. RT Nominal Supply Voltage (Vdc)
- 21. RT Test at Extreme Settings [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 23. RXA Audio Response Step Frequency (kHz)
- 24. RXA Expandor Step Level (dB)
- 27. RXA NAMPS RF Level for SINAD (dBm)
- 28. RXA NAMPS RF Level for SINAD at Extremes (dBm)
- 29. RXA RF Level for SINAD (dBm)
- 30. RXA RF Level for SINAD at Extremes (dBm)
- 31. RXA Set Audio Lvl [0=no xx=level volts]
- 32. RXA Tolerance for Setting Audio Level (% error)
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_25 - CPA Flow Chart

Description

This test displays a flow-chart representing a cellular phone as it gains access to a system. It operates with AMPS and NAMPS phones. Once you have established a voice channel using the flow chart for AMPS and NAMPS phones, you can test cellular-radio functions including hand-offs, power level changes, SAT/DSAT changes, hook flashes, and clear the system. At each stage, reverse-channel data is displayed for analysis, along with measurements of power, frequency error, and deviation.

Running the MANUAL test procedure

1. At the beginning of this test, the test system simulates a control channel. The cellular phone must tune to this control channel and decode the data stream in order to obtain service. When the phone succeeds at obtaining service, the NO SERVICE indicator on the phone will turn-off or the SERVICE light will illuminate. If NO SERVICE continues, try changing the control channel to the other band by selecting the **Cntl Chan** field and entering the appropriate channel number.
2. When the cellular phone first obtains service, you may originate a call by dialing a phone number and pressing SEND, or you may perform a registration by pressing the softkey on the test set corresponding to register. You must originate a call, or perform a registration before paging the phone. The origination and registration provide the phone number of the MSUT to the test set.
 - To register the phone, select the **Register** field.
 - To originate a call from an AMPS or NAMPS phone, dial a phone number and press the phone's SEND.
3. You can perform a page after you register the phone or you have previously performed an origination and the phone indicates service. You can page or originate onto an analog voice channel.
 - To page an AMPS or NAMPS phone, select the **Anl Page** field.
 - To originate an AMPS or NAMPS phone, dial a number and press the phone's SEND key.
4. Once you establish a voice channel, refer to the flow-chart on the screen and the associated fields to the right of the screen for operating functions.

Analog functions

- **chnng chan** allows you to change cellular phone channels.
- **chnng pwr** allows you to change cellular phone transmit power.
- **clear ls** allows you to clear the land station (ls). This terminates the connection from the land station.
- **clear ms** allows you to clear the mobile station (ms). This terminates the connection from the mobile station.
- **Quit** allows you to exit the test.
- **chnng sat** allows you to change the Supervisory Audio Tone (SAT).
- **chnng dsat** allows you to change the digital supervisory audio tone (DSAT) for NAMPS phones.
- **DTMF** allows you to measure the frequency error of the high and low tones from the DTMF generator in the phone.
- **maintnce** allows you to run a maintenance check of the phone's signaling tone frequency and deviation.
- **Hook FLSH** allows you to transmit a hook flash number from the phone, receive it, and display it on the test system.

Pass/Fail Limits Used

- None (Since this test only monitors, there are no pass/fail limits applied to the results.)

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **37. TX Units for Pwr Meas [0=dBm 1=Watts]**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_26 - TXA Switch Channels

Description

This test measures transmitter frequency error, power, and SAT frequency error over a range of channels defined by **parameter 45. TXA Switch Channels Start Channel (Chan No.)**, **parameter 46. TXA Switch Channels Step Channel (Chan No.)**, and **parameter 47. TXA Switch Channels Stop Channel (Chan No.)**.

The test works as follows:

- The MSUT's channel number is changed over the desired range indicated by above parameters.
- The channels will all be wide voice channels or they will all be narrow voice channels as determined by the currently active entry in the **Channel Information** table.
- For each wide channel, the TX output power, RF frequency error, and SAT frequency error is measured.
- For each narrow channel, the TX output power and RF frequency error are measured and the DSAT sequence coming from the phone is decoded and displayed.
- Each time the channel is changed, the SAT frequency is changed to the next valid SAT tone or DSAT value.

Chapter 1, Test Descriptions
TEST_26 - TXA Switch Channels

**Pass/Fail Limits
Used**

- 20. TXA Frequency Error (ppm)
- 26. TXA Output Power at Level 0 (dBm)
- 27. TXA Output Power at Level 1 (dBm)
- 28. TXA Output Power at Level 2 (dBm)
- 29. TXA Output Power at Level 3 (dBm)
- 30. TXA Output Power at Level 4 (dBm)
- 31. TXA Output Power at Level 5 (dBm)
- 32. TXA Output Power at Level 6 (dBm)
- 33. TXA Output Power at Level 7 (dBm)
- 35. TXA SAT Frequency Error (Hz)

Parameters Used

- 1. CPA Control Channel [1-799 or 991 -1023]
- 2. CPA DSAT Vector
- 3. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 6. CPA SAT Tone (Hz)
- 15. RC Compandor is Always On [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 37. TX Units for Pwr Meas [0=dBm 1=Watts]
- 45. TXA Switch Channels Start Channel (Chan No.)
- 46. TXA Switch Channels Step Channel (Chan No.)
- 47. TXA Switch Channels Stop Channel (Chan No.)
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

TEST_27 - CPA Hook Flash

Description

This test verifies that the correct hook-flash number (3 digits) is correctly sent by the cellular radio.

The test works as follows:

1. A voice channel is established.
2. The operator is prompted to dial a 3-digit number and press the SEND key on the MSUT.
3. If the channel is a wide voice channel, the test detects the resulting signaling tone from the MSUT and sends a “send-called-address” order to the MSUT on the Forward Voice Channel (FVC). This step does not occur on narrow voice channels.
4. The test receives the hook-flash number from the MSUT on the Reverse Voice Channel and displays it. (The number is not compared to a specific value or number.)

Pass/Fail Limits Used

- None

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_28 - TXA DTMF Frequency Error

Description This test measures the transmitter's Dual-Tone Multifrequency (DTMF) frequency error for the phone's key pad. The low tone (LT) and high tone (HT) DTMF frequencies for each selected key are checked to make sure that the frequencies are within the DTMF frequency error limits for their nominal values. DTMF frequency error is expressed in%.

Background There are two groups of sinusoidal high and low frequencies consisting of 1209, 1336, and 1477 Hz (HT's) in one group, and 609, 770, and 941 Hz (LT's) in the other group. A DTMF signal is generated when a key is pressed on the handset. Each dialing key makes use of one assigned frequency from each group. The DTMF signal is encoded and transmitted for control purposes when dialing an origination from the phone.

Pass/Fail Limits Used

- **18. TXA DTMF Frequency Error (%)**

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **6. CPA SAT Tone (Hz)**
- **15. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_29 - RXA MRI

Description

This test sweeps the level of the RF carrier generated by the test system on a forward voice channel. The RF level is stepped from a higher level to a lower level where the step size is set by the user via the parameter table. The start and stop RF levels are hardcoded to -50 dBm and -110 dBm. At each level step, the MRI Parameter Message is sent to the MSUT with the RSSI and BER threshold fields set to zero. This induces the MSUT to report the current status of its RSSI and BER measurements via the reverse voice channel. These RSSI and BER values are then displayed.

Background

MRI stands for Mobile Reported Interference, RSSI stands for Received Signal Strength Indicator, and BER stands for Bit Error Rate. NAMPS phones are able to report RSSI and BER values to the base station on command. The BER pertains to the signaling used on narrow voice channels. This test can only be run on a narrow voice channel on an NAMPS mobile unit.

Pass/Fail Limits Used

- None

Parameters Used

- **1. CPA Control Channel [1-799 or 991 -1023]**
- **2. CPA DSAT Vector**
- **3. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **22. RX RF Level for Signaling (dBm)**
- **26. RXA MRI Step Level (dBm)**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

TEST_30 - CPD Registration

Description

This test performs a CDMA registration on the mobile station as follows:

1. An analog release is performed if the MSUT is on an analog voice channel.
2. A CDMA release is performed if the MSUT is on a digital traffic channel.
3. A standard CDMA setup for call processing is performed. The standard CDMA setup performs the following instrument functions:
 - a. Sets Sector A Power to a level set in [parameter 22. RX RF Level for Signaling \(dBm\)](#).
 - b. Sets the RF Channel to the present channel as defined in the TESTS (Channel Information) screen.
4. The MS Database is cleared to make sure the registration data is current.
5. The parameter: “CPD Registration Type (0= Tone, 1=PowerUp)” is used to determine what type of registration will be done. If zone base registration is selected then a command is sent to the Test Set to register the MSUT and wait until the MSUT has registered or the registration attempt times out (30 seconds). If Power Up registration is selected then power up registration is turned on and the software waits until the MSUT has registered or the registration attempt times out (10 minutes). If the registration times out, the operator is asked if the registration test should be repeated or aborted by selecting the appropriate softkey. The registration will continue to be repeated if the registration times out and the operator answers ‘Yes’ to the question “Select ‘Yes’ to repeat registration, ‘No’ to abort.” and will abort the test only if the operator selects ‘No’. This is done for phones that for one reason or another take a long time to go into service after testing is started.
6. The MS Database is read and the following data is displayed:
 - Phone number: <decimal number>
 - MCC: <hexadecimal number>
 - MNC: <hexadecimal number>
 - Serial number: <decimal number>, <decimal number>, <hexadecimal number>
 - Power Class: <class I, II, or III>
 - Transmission: <continuous or discontinuous>
 - Slot Class: <non-slotted or slotted>
 - Slot Index: <decimal number>
 - Dual Mode <dual mode or CDMA only>

NOTE:

Regarding the serial number data shown above, the numbers are as follows:
First Decimal Number: The first three digits represent the manufacturer's code. The next eight digits represent a combination of the reserve bits and the unit serial number.
Second Decimal Number: The first three digits represent the manufacturer's code. The next two digits represent the reserve bits. The next six digits represent the unit serial number.
Hexadecimal Number: A hexadecimal representation of the above two numbers.

Refer to the CDMA Call Control Screen for information about the Sector A Power, RF Channel, Register, MS ID, and MS Database fields.

NOTE:

A **TEST_30 - CPD Registration** or a **TEST_31 - CPD Origination** must be run at least once before any digital tests can be run. The Test Set remembers the registration data unless the power is cycled on the Test Set. If power is cycled on the Test Set, the **TEST_30 - CPD Registration** or the **TEST_31 - CPD Origination** must be run again before running other digital tests.

Pass/Fail Limits Used

- None

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**

TEST_31 - CPD Origination

Description

This test performs a CDMA MSUT-originated call as follows:

1. An analog release is performed if the MSUT is on an analog voice channel.
2. A CDMA release is performed if the MSUT is on a digital traffic channel.
3. The Answer Mode field is set to AUTO.
4. The MSUT-originated call is made. The software routine for obtaining a traffic channel performs the following tasks:
 - a. Performs a standard CDMA setup for call processing (refer to CPD Registration).
 - b. Displays a message prompting the user to enter a phone number and press the SEND key on the MSUT handset.
 - c. Wait until the call is connected or 30 seconds elapses, whichever occurs first.
 - d. Monitors the call for error conditions.
5. The following information is printed to the TESTS (IBASIC Controller) screen:
 - Phone number: <decimal number>
 - MCC: <hexadecimal number>
 - MNC: <hexadecimal number>
 - Serial number: <decimal number>, <decimal number>, <hexadecimal number>
 - Power Class: <class I, II, or III>
 - Transmission: <continuous or discontinuous>
 - Slot Class: <non-slotted or slotted>
 - Slot Index: <decimal number>
 - Dual Mode <dual mode or CDMA only>

NOTE:

Regarding the serial number data shown above, the numbers are as follows:

First Decimal Number: The first three digits represent the manufacturer's code. The next eight digits represent a combination of the reserve bits and the unit serial number.

Second Decimal Number: The first three digits represent the manufacturer's code. The next two digits represent the reserve bits. The next six digits represent the unit serial number.

Hexadecimal Number: A hexadecimal representation of the above two numbers.

This test provides an indication of the MSUT's ability to originate a CDMA call and establish a link.

Refer to the *HP 8924C Reference Guide*, CDMA Call Control Screen for information about the [Answer Mode](#) and [MS ID](#) fields.

Pass/Fail Limits Used

- None

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **20. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

TEST_32 - CPD Page

Description

This test makes a CDMA MSUT-terminated (Test Set originated) call as follows:

1. An analog release is performed if the MSUT is on an analog voice channel.
2. A CDMA release is performed if the MSUT is on a digital traffic channel.
3. The MSUT-terminated call is made. The software routine for obtaining a traffic channel performs the following tasks:
 - a. Performs a standard CDMA setup for call processing (refer to CPD Registration).
 - b. Attempts a CDMA call by sending a command that performs the remote equivalent of pressing the CALL key.
 - c. Monitors the Test Set to display a message prompting the operator to answer the phone when the Test Set call processing state is alerting.
 - d. Monitors the Test Set to indicated that the call has connected or 30 seconds has elapsed, whichever occurs first.
4. The following information is printed to the TESTS (IBASIC Controller) screen:
 - Page Successful: <Yes or No>

This test provides an indication of the MSUT's ability to be paged by a base station originated call and establish a link.

Refer to the *HP 8924C Reference Guide*, CDMA Call Control Screen for information about the [Answer Mode](#) and [MS ID](#) fields.

Pass/Fail Limits Used

- None

Parameters Used

- [9. CPD BID Number](#)
- [11. CPD NID Number](#)
- [13. CPD SID Number](#)
- [19. RT Protocol Standard \[0 thru 5\]](#)
- [20. RT Rate Set Selection \[0=9600 1=14400\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)

TEST_33 - TXD Waveform Quality & Freq Acc

Description

This test measures the CDMA waveform quality factor, ρ (rho), and a suite of related transmitter carrier measurements as follows:

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
2. Power levels are set up according to values found in TIA/EIA/IS-98A or J-STD-018 standards.
3. The Rho suite of measurements is triggered.
4. When Rho suite of measurements are returned, the call status is checked. If the call has been dropped, this test will start again. If another call is dropped, the test will end and an error message will be displayed indicating the call could not be maintained.
5. The following measurements are printed to the TESTS (IBASIC Controller) screen:
 - TXD Rho <Rho value>
 - TXD Frequency Error <frequency error in Hz>
 - TXD Static Timing Offset <timing offset in microseconds>
 - TXD Amplitude Error <amplitude error in percent>
 - TXD Phase Error <phase error in degrees>
 - TXD Carrier Feedthrough <carrier feedthrough in dB>

Pass/Fail Limits Used

- **41. TXD Frequency Error (Hz)**
- **46. TXD Rho**
- **47. TXD Timing Offset (us)**

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**

TEST_34 - TXD Open Loop Power Range

Description

This test measures the range of the MSUT's output power in response to changes in the Test Set's output power, Ior.

This test is performed as follows:

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. Power levels are set up according to values found in TIA/EIA/IS-98A or J-STD-018 standards.
3. Specification limits are set based on the MSUT power class and the parameter TXD Antenna Gain.
4. The Test Set is put in Open Loop power control mode. In this mode, the Test Set's power control subchannel does not adjust the MSUT's output power based on signal strength measurements. Instead, the Test Set's power control subchannel outputs a fixed pattern of up and down bits, holding the MSUT power level at or near its open loop estimate.
5. Three power measurements are made on the MSUT as the Test Set Ior is varied. The Channel Power measurement is used for the first two measurements and the Average Power measurement is used for the last measurement. The Test Set uses Open Loop power control mode for this test. The call drop timer is turned off for Ior=-25dBm so the call will not be dropped if the reverse link power is too low for the test set to demodulate the data.
6. The following information is printed to the TESTS (IBASIC Controller) screen:
 - TXD Open Loop Pwr @-25 dBm <Channel Power measurement>
 - TXD Open Loop Pwr @-65 dBm <Average Power measurement>
 - TXD Open Loop Pwr @-104 d.Bm <Average Power measurement>

Refer to the *HP 8924C Reference Guide* for information about the Open Loop power control mode, see the [Closed Loop Pwr Cntl](#) field description.

NOTE

Because of the long switching time of the mechanical output attenuator in the HP 83236B, the attenuator is put into the hold mode while switching Sector A power levels with the power control in open loop mode. In this mode, output power is adjusted using the electronic attenuator in the HP 8924C.

**Pass/Fail Limits
Used**

- **43. TXD Open Loop Output Power @ Ior=-104 dBm (dBm)**
- **44. TXD Open Loop Output Power @ Ior=-25dBm (dBm)**
- **45. TXD Open Loop Output Power @ Ior=-65dBm (dBm)**

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**
- **50. TXD Antenna Gain (dB)**

TEST_35 - TXD Closed Loop Power Control

Description

This test measures the range of the MSUT's output power in response to the Test Set's power control subchannel.

This test is performed as follows:

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. The forward channel power is adjusted to yield an open loop estimate power level from the MSUT of approximately -15 dBm.
3. The Test Set's "call drop" timer is disabled so that when "all down" power control bits are sent to the MSUT, the call is not dropped by the Test Set.
4. The Test Set is put in Open Loop power control mode and the actual reverse power from the MSUT is measured. This value will serve as the reference power level for determining the range of closed loop power control. In this mode, the Test Set's power control subchannel does not adjust the MSUT's output power based on signal strength measurements. Instead, the Test Set's power control subchannel outputs a fixed pattern of up and down bits, holding the MSUT power level at or near its open loop estimate.
5. The Test Set is programmed to send continuous "always up" power control bits at full data rate. This series of power control bits will increase the MSUT's power level from its open loop estimate (-15 dBm) to its maximum transmitted output power.
6. The Test Set's input attenuator is put in "Hold" mode, and the attenuation is set to its maximum value (40 dB).
7. An Average Power measurement is made while the "always up" power control bits are being sent.
8. The Closed Loop Up Range value is calculated and displayed. The Closed Loop Up Range value is calculated by taking the difference between the Average Power measurement taken while "up" power control bits were being received by the MSUT, and the reference measurement made on the MSUT's open loop estimate from step 2.
9. The Test Set is programmed to send continuous "always down" power control bits at full data rate.
10. The Test Set's input attenuator is set to its minimum value (0 dB).

11. A Channel Power measurement is made while the continuous “always down” power control bits are being sent.
12. The Closed Loop Down Range value is calculated and displayed. The Closed Loop Down Range value is calculated by taking the difference between the Channel Power measurement taken while “down” power control bits were being received by the MSUT, and the reference measurement made on the MSUT’s open loop estimate from step 2.
13. The procedure, beginning with Step 2, is repeated for half, quarter, and eighth rate data.

The following information is displayed as testing is performed:

- Closed Loop Power Control @ Full Rate <Up Range and Down Range>
- Closed Loop Power Control @ Half Rate <Up Range and Down Range>
- Closed Loop Power Control @ Quarter Rate <Up Range and Down Range>
- Closed Loop Power Control @ Eighth Rate <Up Range and Down Range>

Refer to the *HP 8924C Reference Guide* for information about the Open Loop power control mode, see the [Closed Loop Pwr Cntl](#) field description.

Refer to the *HP 8924C Reference Guide* for information about the [Input Atten](#) field and [Hold](#) mode.

**Pass/Fail Limits
Used**

- [40. TXD Closed Loop Power Control Range \(dB\)](#)

Parameters Used

- [9. CPD BID Number](#)
- [11. CPD NID Number](#)
- [13. CPD SID Number](#)
- [19. RT Protocol Standard \[0 thru 5\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)

TEST_36 - TXD Maximum RF Output Power

Description

This test measures the maximum RF output power that the mobile station transmits.

1. The Cell Site Configuration screen is set up to send the parameters in the Access Parameters Message that are specified in TIA/EIA IS-98A or J-STD-018 for this test.
2. A Service Option 2 (or 9 if [parameter 20. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
3. The forward channel power is adjusted to -104 dBm.
4. The Test Set is programmed to send continuous “always up” power control bits at full data rate. This series of power control bits will increase the MSUT’s power level from its open loop estimate to its maximum transmitted RF power.
5. An Average Power measurement is made while the “always up” power control bits are being sent.
6. The TXD Antenna Gain parameter is retrieved and used to determine the upper and lower test limits.
7. The following information is printed to the TESTS (IBASIC Controller) screen:
 - TXD Max RF Output Power <Average Power measurement>

Refer to the *HP 8924C Reference Guide* for information about the Open Loop power control mode, see the [Closed Loop Pwr Cntl](#) field description.

Refer to the *HP 8924C Reference Guide* for information about the [Input Atten](#) field and [Hold](#) mode.

Output power can be expressed in dBm or watts by appropriately setting [parameter 37. TX Units for Pwr Meas \[0=dBm 1=Watts\]](#).

**Pass/Fail Limits
Used**

The Pass/Fail limits for this test are hard-coded into the software. The values used were obtained from TIA/EIA IS-98A or PN-3385 minimum standard for the Maximum RF Output Power test.

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**
- **37. TX Units for Pwr Meas [0=dBm 1=Watts]**
- **50. TXD Antenna Gain (dB)**

TEST_37 - TXD Minimum Controlled Output Power

Description

This test measures the minimum controlled RF output power of the mobile station. The minimum controlled output power is the output power, measured at the mobile station antenna connector, when both closed loop and open loop power control indicate minimum output.

1. A Service Option 2 (or 9 if [parameter 20. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
2. The forward channel power is set to -25 dBm.
3. The Test Set’s “call drop” timer is disabled so that when “all down” power control bits are sent to the MSUT, the call is not dropped by the Test Set
4. The Test Set is programmed to send continuous “always down” power control bits at full data rate. This series of power control bits will decrease the MSUT’s power level from its open loop estimate to the minimum transmitted output power.
5. A Channel Power measurement is made while the “always down” power control bits are being sent.
6. The TXD Antenna Gain parameter is retrieved and used to determine the upper test limit.
7. The following measurement result is printed to the TESTS (IBASIC Controller) screen:
 - TXD Min RF Output Power <Channel Power measurement>

Refer to the *HP 8924C Reference Guide* for information about the Open Loop power control mode, see the [Closed Loop Pwr Cntl](#) field description.

Refer to the *HP 8924C Reference Guide* for information about the [Input Atten](#) field and [Hold](#) mode.

**Pass/Fail Limits
Used**

- **42. TXD Minimum Controlled Output Power (dBm)**

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**
- **50. TXD Antenna Gain (dB)**

TEST_38 - RXD Traffic Channel FER

Description

This test measures the performance of the mobile station when demodulating a forward traffic channel in an additive white gaussian noise (AWGN) environment (no fading or multipath). The performance of the mobile station is determined by the frame error rate (FER).

1. A Service Option 2 (or 9 if [parameter 20. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
2. Sector A Power is set to -55 dBm for cellular or -75 dBm for PCS.
3. AWGN is set to -54 dBm for cellular or -74 for PCS.
4. The RXD Maximum Frames for FER parameter is retrieved and that value is entered in the Max Frames field.
5. The FER test is turned on with a confidence limit of 95%.
6. Traffic Channel level and data rates are set up and the first test is triggered. The software waits for an HP-IB interrupt to determine when the test is done. The test times out and continues if the interrupt does not occur within a period bounded by the RXD Maximum Frames for FER parameter. If a timeout occurs, a timeout message is displayed. This process is repeated for each of the six tests specified in TIA/EIA IS-98A or J-STD-018.
7. The following measurement results are printed to the TESTS (IBASIC Controller) screen. (For each test, FER %, number of frames counted and number of errors counted is displayed):
 - Traf Chan FER w/AWGN Ec/Ior=-16.3 & Eb/Nt=3.8¹
 - Traf Chan FER w/AWGN Ec/Ior=-15.8 & Eb/Nt=4.3
 - Traf Chan FER w/AWGN Ec/Ior=-15.6 & Eb/Nt=4.5
 - Traf Chan FER w/AWGN @ 4800bps & Eb/Nt=4.0
 - Traf Chan FER w/AWGN @ 2400bps & Eb/Nt=4.5
 - Traf Chan FER w/AWGN @ 1200bps & Eb/Nt=4.6

Refer to the *HP 8924C Reference Guide* for information about the [FER](#) measurement field and the [Max Frames](#) and [Confidence](#) setting fields.

1. These measurement results are for cellular and rate set 1 only.

**Pass/Fail Limits
Used**

The Pass/Fail limits for this test are hard-coded into the software. The values used were obtained from TIA/EIA IS-98A or PN3385 minimum standard for the Demodulation of Forward Traffic Channel in Additive White Gaussian Noise test.

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **20. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **33. RXD Maximum Frames for FER**

TEST_39 - RXD Sensitivity & Dynamic Range

Description

This test measures the receiver's sensitivity by verifying that the frame error rate (FER) does not exceed 0.5% with 95% confidence level at a mobile station received power of -104 dBm.

This test measures the receiver's dynamic range by verifying that the frame error rate (FER) does not exceed 0.5% with 95% confidence level at a mobile station received power of -25 dBm.

1. A Service Option 2 (or 9 if [parameter 20. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. The RXD RF Level for Sensitivity parameter is retrieved and that value is entered in the Sector A Power field. (This is performed in two steps to prevent the call from being dropped).
3. The RXD Maximum Frames for FER parameter is retrieved and that value is entered in the Max Frames field.
4. The FER test is turned on with a confidence limit of 95%.
5. The FER Spec field is set to 0.5%.
6. Traffic Channel level and data rates are set up and the first FER measurement is triggered. The software waits for an HP-IB interrupt to determine when the test is done. The test times out and continues if the interrupt does not occur within a period bounded by the RXD Maximum Frames for FER parameter. If a timeout occurs, a timeout message is displayed and the test continues.
7. Sector A Power is set to -25 dBm/BW and another FER measurement is triggered.
8. The following information is printed to the TESTS (IBASIC Controller) screen:
 - RXD Sensitivity FER@ <RXD RF Level for Sensitivity><FER %>
 - RXD Dynamic Rng FER@ -25 dBm<FER %>

Refer to the *HP 8924C Reference Guide* for information about the [FER](#) measurement field and the [Max Frames](#) and [Confidence](#) setting fields.

**Pass/Fail Limits
Used**

The Pass/Fail limits for this test are hard-coded into the software. The values used were obtained from TIA/EIA IS-98A or J-STD-018 minimum standard for the Receiver Sensitivity and Dynamic Range test.

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**
- **33. RXD Maximum Frames for FER**
- **34. RXD RF Level for Sensitivity (dBm)**

TEST_40 - CPD Softer Handoff

NOTE:

This test will only run on the HP 8924C test set. It will not run on the HP 8924E test set because that unit does not include a Sector B source.

Description

This test measures the MSUT's ability to correctly detect Neighbor Set pilots and Candidate Set pilots.

Settings for mobile-reporting parameters include T_ADD, T_DROP and T_TDROD. These values are converted to signal strength by the following equation: $P * -0.5$ dB, where P is the mobile-reporting parameter. For example, T_ADD is set to 28, the threshold for mobile-station detection of a Neighbor Set pilot is $28 * -0.5$ dB = -14 dB.

This test is performed as follows:

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. The power levels for Sector A and Sector B pilots, and the mobile reporting parameters T_ADD and T_DROP, and T_TDROD are set up. Sector B is set to a power level much less than T_ADD ($I_{or}/I_{oc}-10$ dB) insuring that it is detected as a drop.
3. The Sector B pilot strength is gradually increased until the mobile station detects signal strength greater than T_ADD. The Sector A and Sector B signal strength settings (E_c/I_o) are displayed, along with the mobile-reported signal strength and the handoff Sector B E_c/I_o compared to T_ADD.
4. The Sector B pilot strength is increased further until the mobile station detects that it has exceeded T_COMP. Once again, the Sector A and Sector B signal strength settings are displayed, along with the mobile-reported pilot signal strengths and whether T_COMP was detected correctly.
5. A Softer Handoff is attempted, and an indication whether it was successful is displayed.
6. The Sector B pilot strength is decreased until the mobile station detects signal strength below T_DROP for a time period greater than T_TDROD. Once again, the Sector A and Sector B signal strength settings are displayed, along with the mobile-reported pilot signal strength and the handoff Sector B E_c/I_o compared to T_DROP.

7. The following information is printed to the TESTS (IBASIC Controller) screen.

For a neighbor Ec/Io=-14.5 & active Ec/Io=-10.5

- The reported neighbor pilot strength= 28
- Sector B Ec/Io for T_ADD -14.5dB

For a candidate Ec/Io=-10.5 & active Ec/Io=-12.5

- The reported candidate pilot strength= 23
- The reported active pilot strength= 27
- Softer Handoff successful: <YES/NO>

For a candidate Ec/Io=-16.5 & active Ec/Io=-10.5

- The reported candidate pilot strength= 34
- Sector B Ec/Io for T_DROP -16.5dB

Most Test Set functions used during this test are found on the CDMA Mobile Reporting screen.

**Pass/Fail Limits
Used**

- None

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**

TEST_41 - RTD RX/TX CDMA Quick General

Description

This is a CDMA quick test to verify the functionality of the mobile stations' receiver and transmitter. The test begins by making a mobile station terminated call (service option 2). It then starts a FER measurement at a mobile station received power of -104 dBm and then moves to the transmitter test screen and measures Rho and maximum power. The test then returns to the receiver test screen and reads the FER. The test concludes by releasing the call.

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. The RXD RF Level for Sensitivity parameter is retrieved and that value is entered in the Sector A Power field. (This is performed in two steps to prevent the call from being dropped).
3. The RXD Maximum Frames for FER parameter is retrieved and that value is entered in the Max Frames field.
4. The FER test is turned on with a confidence limit of 95 %.
5. The FER Spec field is set to 0.5 %.
6. An FER test is triggered.
7. A Rho measurement is triggered and the results are displayed.
8. The maximum RF output power is measured and the test results are displayed. (Refer to the TXD Maximum RF Output Power test for this procedure).
9. The software waits for an HP-IB interrupt to determine when the FER test is done. The test times out and continues if the interrupt does not occur within a period bounded by the RXD Maximum Frames for FER parameter. If a timeout occurs, a timeout message is displayed.
10. The following information is printed to the TESTS (IBASIC Controller) screen. (For each test, FER %, number of frames counted and number of errors counted is displayed):
 - TXD Rho
 - TXD Frequency Error <Hz>
 - TXD Static Timing Offset <uS>
 - TXD Amplitude Error <%>
 - TXD Phase Error <deg>
 - TXD Carrier Feedthrough <dB>
 - TXD Max RF Output Power <dBm>
 - RXD Sensitivity FER@<RXD RF Level for Sensitivity><FER %>

**Pass/Fail Limits
Used**

- 41. TXD Frequency Error (Hz)
- 46. TXD Rho
- 47. TXD Timing Offset (us)

Parameters Used

- 9. CPD BID Number
- 11. CPD NID Number
- 13. CPD SID Number
- 19. RT Protocol Standard [0 thru 5]
- 22. RX RF Level for Signaling (dBm)
- 33. RXD Maximum Frames for FER
- 34. RXD RF Level for Sensitivity (dBm)
- 50. TXD Antenna Gain (dB)

TEST_42 - CPD CDMA Voice Quality

Description	<p>This test checks the MSUT's voice quality by using the Test Set's echo mode. The operator is responsible for determining if the voice quality passes or fails.</p> <ol style="list-style-type: none">1. A Service Option 1 (or 9 if parameter 20. RT Rate Set Selection [0=9600 1=14400] is set to 1) call is attempted, unless a Service Option 1 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.2. The Data Type field is set to "Echo" mode.3. The operator is prompted to speak into the MSUT and then enter either "Pass" or "Fail" for the test.
Pass/Fail Limits Used	<ul style="list-style-type: none">• None
Parameters Used	<ul style="list-style-type: none">• 9. CPD BID Number• 10. CPD Echo Delay [0, 2 or 5] (Seconds)¹• 11. CPD NID Number• 13. CPD SID Number• 19. RT Protocol Standard [0 thru 5]• 20. RT Rate Set Selection [0=9600 1=14400]• 22. RX RF Level for Signaling (dBm)

1. The HP 8924E Echo Delay is fixed at 0 seconds.

TEST_43 - TXD Spectrum Emissions

NOTE:

This test will run on the HP 8924E test set only if the unit includes a spectrum analyzer (hardware Option 012).

Description

This test measures the level of emissions at offsets from the mobile station's carrier frequency as specified by TIA/EIA IS-98A or ANSI J-STD-018 .

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message "Failed to establish a call in test <>" will be displayed. To correct this problem, perform the CPD Registration test.
2. Sector A power is set up so that the MSUT will provide -13 dBm to the Test Set's spectrum analyzer (including path loss).
3. The trigger mode is set to repetitive and video averaging turned on.
4. The spectrum analyzer level measurement at the center frequency marker is retrieved.
5. The frequency marker is moved 900 kHz from the center frequency and a level measurement is retrieved.
6. The frequency marker is moved 1.98 MHz from the center frequency and another level measurement is retrieved.
7. A dBc value for the 900 kHz and 1.98 MHz marker levels is calculated by taking the difference between the marker levels measured in steps 5 and 6 and the reference level measured in step 4.
8. The following measurement results are printed to the TESTS (IBASIC Controller) screen:
 - TXD Spectrum Lvl @ 900 kHz <dBc/30 kHz> (TIA/EIA IS-98A)
 - TXD Spectrum Lvl @ 1.98 MHz <dBc/30 kHz> (TIA/EIA IS-98A)
 - TXD Spectrum Lvl @ 1.25 MHz <dBc/30 kHz> (J-STD-018)

Refer to the *HP 8924C Reference Guide* for information about the **Marker** fields and the **No Pk/Avg** field, (used for video averaging).

Chapter 1, Test Descriptions
TEST_43 - TXD Spectrum Emissions

Pass/Fail Limits Used The Pass/Fail limits for this test are hard-coded into the software. The values used were obtained from TIA/EIA IS-98A or PN-3385 minimum standard for the Conducted Spurious Emissions test.

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **14. CPD Spectrum Averages [10,20,50,100]**
- **19. RT Protocol Standard [0 thru 5]**
- **22. RX RF Level for Signaling (dBm)**

TEST_44 - CPD CDMA Release

Description

This test performs a CDMA Base-station-initiated release.

1. A Service Option 2 (or 9 if **parameter 20. RT Rate Set Selection [0=9600 1=14400]** is set to 1) if call is attempted, unless a call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
2. An attempt is made to end the call.
3. The average power measurement is monitored until its level reaches -45 dBm or a timer expires. If the average power measurement reaches -45 dBm or less, the call was successfully terminated.
4. The following measurement results are printed to the TESTS (IBASIC Controller) screen:
 - Land Station Clear <YES/NO>

Pass/Fail Limits Used

- None

Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **20. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

TEST_45 - CPD Digital to Analog Handoff

Description

This test performs a handoff from a CDMA digital traffic channel to an AMPS analog traffic channel.

1. A Service Option 1 call is attempted, unless a Service Option 1 call is already connected, and the operator is prompted to answer the call. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.

NOTE:

Service Option 1 is selected for this test because Service Option 2 is not defined in the AMPS/NAMPS standards. Using Service Option 1 will allow the MSUT to have analog tests performed once the handoff has completed.

2. The analog channel is retrieved from the parameter “CPD Analog Channel for D/A Handoff”.
3. The SAT tone is retrieved from the parameter “CPA SAT Tone” and converted to SAT code 0-2.
4. A handoff direction message is sent to the MSUT. This test configures the Test Set as an analog cell site, and provides several analog measurements, including SAT frequency.
5. A SAT frequency measurement is made to determine if the handoff was successful.
6. The following information is printed to the TESTS (IBASIC Controller) screen:
 - TXA SAT freq err @ 6000 Hz <Hz>
 - D/A Handoff successful: <YES/NO>

Refer to the *HP 8924C Reference Guide* for information about the [Channel](#), [SAT](#) and [Pwr Level](#) fields.

NOTE:

The analog Call Control screen, which is the primary screen for the analog Call Processing Subsystem, cannot have its Active field selected without losing the analog call that is set up during the digital to analog handoff test.

**Pass/Fail Limits
Used**

- **35. TXA SAT Frequency Error (Hz)**

Parameters Used

- **6. CPA SAT Tone (Hz)**
- **8. CPD Analog Channel for D/A Handoff**
- **9. CPD BID Number**
- **11. CPD NID Number**
- **13. CPD SID Number**
- **19. RT Protocol Standard [0 thru 5]**
- **20. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

TEST_46 - CPD Talk Time

Description	<p>This test measures the mobile station battery life/talk time by simulating the battery load conditions experienced in a typical system.</p> <ol style="list-style-type: none">1. A Service Option 2 (or 9 if parameter 20. RT Rate Set Selection [0=9600 1=14400] is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.2. The forward link power is then cycled through a statistical profile to simulate actual system use. The sector A power level is displayed at each new level.3. This is continued until the mobile station ends the call and the test software detects an HP-IB interrupt to determine when the connected state is false.4. The timer is stopped and the talk time is displayed.<ul style="list-style-type: none">• Mobile Talk Time is <talk time in minutes>
Pass/Fail Limits Used	<ul style="list-style-type: none">• None
Parameters Used	<ul style="list-style-type: none">• 20. RT Rate Set Selection [0=9600 1=14400]

TEST_47 - RXD Sensitivity Level Search

Description

This test brackets the actual receiver sensitivity by measuring the frame error rate (FER) as the mobile station received power is reduced from that specified by [parameter 34. RXD RF Level for Sensitivity \(dBm\)](#) to a level that generates and FER greater than that specified by [parameter 35. RXD Sensitivity FER Search Specification \(%\)](#). The actual sensitivity will be at some point between the last two measured mobile station received power levels.

1. A Service Option 2 (or 9 if [parameter 20. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 or 9 call is already connected. If the MSUT has not registered, the call attempt may be unsuccessful and the error message “Failed to establish a call in test <>” will be displayed. To correct this problem, perform the CPD Registration test.
2. The parameter “RXD RF Level for Sensitivity” is retrieved and that value is entered in the Sector A Power field.
3. The parameter “RXD Maximum Frames for FER” is retrieved and that value is entered in the Sector A Max Frames field.
4. The FER test is turned on with a confidence level of 95 percent.
5. The FER Spec field is set to the value specified in [parameter 35. RXD Sensitivity FER Search Specification \(%\)](#).
6. Traffic Channel level and data rates are set up and the first FER measurement is triggered. The test software waits for the HP-IB interrupt to determine when the test is complete. The test times out and continues if the interrupt does not occur within a period bounded by the value specified in [parameter 33. RXD Maximum Frames for FER](#). If a timeout occurs, a timeout message displays and the test continues.
7. Sector A Power is reduced in steps as specified in [parameter 36. RXD Sensitivity FER Search Step Level \(dB\)](#) until the measured FER is greater than that specified in [parameter 35. RXD Sensitivity FER Search Specification \(%\)](#) The test then stops.
8. The following information is printed to the TESTS (IBASIC Controller) screen for all FER measurements after the first one greater than 0.0 percent:
 - RXD Sensvtvy FER@ <current mobile received power in dBm> <FER in %>

Pass/Fail Limits Used

- None

Parameters Used

- [33. RXD Maximum Frames for FER](#)
- [34. RXD RF Level for Sensitivity \(dBm\)](#)
- [35. RXD Sensitivity FER Search Specification \(%\)](#)
- [36. RXD Sensitivity FER Search Step Level \(dB\)](#)

Chapter 1, Test Descriptions
TEST_47 - RXD Sensitivity Level Search

Pass/Fail Limit (Specification) Descriptions

Introduction

Pass/fail limits are values you enter that set limits for tests. Default values are available in the test software. They have been derived from standard methods of measurement. Pass/fail limits remain in the test system's battery-backed-up memory until you select a new procedure to run.

Set the pass/fail limits to the standards for your MSUT.

The first few capital letters in the title of each pass/fail limit indicate what the pass/fail limit refers to:

RXA = Receiver, Analog

TXA = Transmitter, Analog

TXD = Transmitter, Digital

1. RXA Audio Distortion (%)

This sets the pass/fail limits used when the receiver's audio distortion is measured while receiving the Standard RF Level. Only the upper limit is used which must be entered in %.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Audio Harmonic Distortion

Example

If you desire that the audio distortion should not exceed 5% at a normal audio output, enter 5 as the Upper Limit.

2. RXA Audio Response Dev From -6 dB/oct R1 (dB)

This sets the pass/fail limits used in [TEST_15 - RXA Audio Frequency Response](#) for the receiver's audio output circuitry, when its audio response is tested against the standard 6 dB/octave de-emphasis curve. The audio response should not deviate beyond the specification limits over the frequency range of 400 to 2400 Hz. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Voice Audio Frequency Response

Example

If your receivers are normally used with a handset or a line, and the audio response should not deviate more than +1 to -3 dB over the frequency range of 400 to 2400 Hz, enter -3 as the Lower Limit and 1 as the Upper Limit.

3. RXA Audio Response Dev from -6 dB/oct R2 (dB)

This sets the pass/fail limits used in [TEST_06 - TXA Audio Frequency Response](#) for the receiver's audio output circuitry, when its audio response is tested against the standard 6 dB/octave de-emphasis curve. The audio response should not deviate beyond the pass/fail limits in the regions of 300 to 400 Hz and 2400 to 3000 Hz. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Voice Audio Frequency Response

Example

If your receivers are normally used with a handset or a line, and the audio response should not deviate more than +1 to -6 dB over the frequency range of 300 to 400 Hz and 2400 to 3000 Hz, enter -6 as the Lower Limit and 1 as the Upper Limit.

4. RXA Expander Tracking Error <0dB (dB)

This sets the pass/fail limits used when the expander's output level is measured at input levels below the 0 dB reference level. The output voltage tolerance should be within the pass/fail limits. Lower and Upper Limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Expander

Example

If you desire the output voltage tolerance below the 0 dB reference level to be ± 2 dB, enter -2 as the Lower Limit and 2 as the Upper Limit.

5. RXA Expander Tracking Error >0dB (dB)

This sets the pass/fail limits used when the expander's output level is measured at input levels above the 0 dB reference level. The output voltage tolerance should be within the pass/fail limits. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Expander

Example

If you desire the output voltage tolerance above the 0 dB reference level to be ± 1 dB, enter **-1** as the Lower Limit and **1** as the Upper Limit.

6. RXA Expander Zero Reference Level (dBV)

This sets the pass/fail limits used when the expander's output voltage at the 0 dB reference level is measured. Upper and lower limits must be entered in dBV rms.

Pass/fail limits are determined by using any applicable standard, such as:

- MSUT Specification

The test is performed and pass/fail limits are available so that the operator can measure the RXA Expander Zero Reference Level and compare the result to specifications that meet his or her needs.

If the operator does not wish to compare the measurement results to specifications, the "check" setting for [pass/fail limit 15. TXA Compressor Tracking Error >0dB \(dB\)](#) can be set to "none." See "To Change Pass/Fail Limits" in the *HP 83217A Test Software User's Guide*.

Example

If you desire the output voltage from the receiver to be -20 dBV rms ± 1 dB, enter -21 as the Lower Limit and -19 as the Upper Limit.

7. RXA Hum and Noise (dB)

This sets the pass/fail limits used in [TEST_17 - RXA Hum and Noise](#) and [TEST_24 - RXA Quick General](#) for the hum and noise level of the receiver. Only the upper limit is used, which must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Hum and Noise

Example

If you desire the hum and noise level of the receiver to be at least 32 dB below the audio output for a 1 kHz modulated RF carrier at -50 dBm having a ± 8 kHz peak frequency deviation, enter -32 as the Upper Limit.

8. RXA NAMPS Expander Zero Reference Level (dBV)

This sets the pass/fail limits that are used when the expander's 0 dB reference level is measured on narrow voice channels. Lower and Upper Limits must be entered in dBV rms.

Pass/fail limits are determined by using any applicable standard, such as:

- MSUT Specification

RXA NAMPS Expander Zero Reference Level is not specified in the EIA/TIA standard for NAMPS phones. The test is performed and pass/fail limits are available so that the operator can measure the RXA NAMPS Expander Zero Reference Level and compare the result to specifications that meet his or her needs.

If the operator does not wish to compare the measurement results to pass/fail limits, the "check" setting for **pass/fail limit 15. TXA Compressor Tracking Error >0dB (dB)** can be set to "none." See "To Change Pass/Fail Limits" in the *HP 83217A Test Software User's Guide*.

Example

If your standard states that the output voltage from the receiver should be -20 dBV rms ± 1 dB for a given frequency deviation (to produce the 0 dB reference level as shown in the following figure), you would enter -21 as the Lower Limit and -19 as the Upper Limit. (Check both limits.)

9. RXA Order Message Error Rate (OMER) (%)

This pass/fail limit sets the limits for testing the receiver as it processes the Forward Voice Control (FVC) order message.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA Standard: FVC Order Message

Example

If your standard states that the order-message error rate should not exceed 5%, you would enter 5 as the Upper Limit. (Check upper limits.)

10. RXA SINAD (dB)

This sets the pass/fail limits used when SINAD is measured at the audio output of the receiver. Limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA Standard: RF Sensitivity

Example

If your standard defines the usable sensitivity measurement that results in 12 dB SINAD at the audio output of the receiver, you would enter **12** as the Lower Limit.

11. TXA Audio Distortion (%)

This sets the pass/fail limits used when measuring the audio distortion that is acceptable in the transmitter. Only the upper limit is used which must be entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Distortion and Noise

Example

If you desire that the transmitter distortion should not exceed 5%, enter 5 as the Upper Limit.

12. TXA Audio Response Dev from 6 dB/oct (dB)

This sets the pass/fail limits used in [TEST_06 - TXA Audio Frequency Response](#) for the degree of closeness with which the frequency deviation of the transmitter follows the prescribed 6 dB/octave pre-emphasis characteristic curve. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmit-Audio Response

Example

If you desire that from 300 to 3000 Hz the audio frequency response should not vary more than ± 2 dB from a true 6 dB/octave pre-emphasis curve, enter **-2** as the Lower Limit and **2** as the Upper Limit.

13. TXA Audio Response Roll >2.5 kHz (dB/oct)

This sets the pass/fail limits of the transmitter's audio frequency response roll-off that is acceptable when the audio input is greater than 2.5 kHz. Enter this limit as an upper limit in dB (dB/octave).

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmit-Audio Response

Example

If an audio frequency roll-off of 6 dB/octave is permissible at audio input frequencies greater than 2.5 kHz, enter **6** as the Upper Limit.

14. TXA Compressor Tracking Error <0dB (dB)

This sets the pass/fail limits used when the compressor output level is measured at input levels below the 0 dB reference level. The output voltage tolerance should be within the pass/fail limits. Lower and Upper Limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Compressor

Example

If you desire the output voltage tolerance below the 0 dB reference level to be ± 1 dB, enter **-1** as the Lower Limit and **1** as the Upper Limit.

15. TXA Compressor Tracking Error >0dB (dB)

This sets the pass/fail limits used when the compressor output level is measured at input levels above the 0 dB reference level. The output voltage tolerance should be within the pass/fail limits. Lower and Upper Limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Compressor

Example

If you desire the output voltage tolerance below the 0 dB reference level to be ± 0.5 dB, enter -0.5 as the Lower Limit and 0.5 as the Upper Limit.

16. TXA Current Drain @Levels 0-3 (Amps)

This sets the pass/fail limits for current consumption used in transmitter tests at RF output power levels 0-3. Upper and lower limits must be entered in amps.

Pass/fail limits are determined by using any applicable standard such as:

- MSUT Specification: Current Consumption, Transmit

Example

If you desire your transmitter's current consumption to be 3.0 amps \pm 0.5 amps for RF output power levels 0-3, enter **2.5** as the Lower Limit and **3.5** as the Upper Limit.

17. TXA Current Drain @ Levels 4-7 (Amps)

This sets the pass/fail limits for current consumption used in transmitter tests at RF output power levels 4-7. Upper and lower limits must be entered in amps.

Pass/fail limits are determined by using any applicable standard such as:

- MSUT Specification: Current Consumption, Transmit

Example

If your MSUT specification defines the transmitter's current consumption to be 2.5 amps \pm 0.5 amps for RF output power levels 4-7, enter **2.0** as the Lower Limit and **3.0** as the Upper Limit.

18. TXA DTMF Frequency Error (%)

This sets the pass/fail limits for the amount of frequency error allowed for the DTMF (Dual-Tone Multi-Frequency) signals. Upper and lower limits must be entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Dual Tone Multifrequency (DTMF) Signaling, Transmitted Pulse Characteristics

Example

If you desire that the seven tone frequencies in the high and low group DTMF signals should be within $\pm 1.5\%$ of their nominal values, enter **-1.5** as the Lower Limit and **1.5** as the Upper Limit.

19. TXA FM Hum and Noise (dB)

This sets the pass/fail limits for the transmitter's residual FM hum and noise. Only the upper limit is used, which must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: FM Hum and Noise

Example

If you desire that FM hum and noise should be at least 32 dB below the level of a 1 kHz tone at ± 8 kHz deviation, enter **-32** as the Upper Limit.

20. TXA Frequency Error (ppm)

This sets the pass/fail limits for the transmitter's carrier frequency error. Upper and lower limits must be entered in ppm (parts per million).

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Frequency Requirements, Frequency Stability

Example

If you desire that the carrier frequency should be maintained within ± 2.5 parts per million (ppm) of any assigned channel frequency, enter **-2.5** as the Lower Limit and **2.5** as the Upper Limit.

21. TXA Modulation Limiting (kHz)

This sets the pass/fail limits for the transmitter's peak frequency deviation. Only the upper limit is used, which is entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Deviation Limiting

Example

If the instantaneous peak and steady-state deviations of the transmitter should not exceed the rated system peak frequency deviation of ± 12 kHz, you would enter **12** as the Upper Limit.

22. TXA NAMPS DSAT Closure

This sets the pass/fail limits that are used when closure of the eye pattern is measured for the DSAT transmitted by the MSUT on a narrow voice channel.

Pass/fail limits are determined using any applicable standard, such as:

- TIA Standard: Sub-Audible Data

Example

If your standard states that the eye pattern closure must be greater than .65, you would enter **.65** as the lower limit and **1** as the upper limit.

23. TXA NAMPS DSAT Deviation (Hz)

This sets the pass/fail limits that are used for peak frequency deviation measurements of the DSAT sequence transmitted by the MSUT on a narrow voice channel.

Pass/fail limits are determined using any applicable standard, such as:

- TIA Standard: Sub-Audible Data

Example

If your standard states that the peak frequency deviation for the DSAT sequence shall be ± 700 Hz with a ± 10 % tolerance, you would enter **630** as the lower limit and **770** as the upper limit.

24. TXA NAMPS DSAT Phase Jitter

This sets the pass/fail limits that are used when phase jitter of the eye pattern is measured for the DSAT transmitted by the MSUT on a narrow voice channel.

Pass/fail limits are determined using any applicable standard, such as:

- TIA Standard: Sub-Audible Data

Example

If your standard states that the phase jitter of the eye pattern must be less than .15, you would enter **.15** as the upper limit and **0** as the lower limit.

25. TXA NAMPS Modulation Limiting (kHz)

This sets the pass/fail limits when the transmitter circuits are tested for their ability to prevent the transmitter from producing deviation in excess of the rated system deviation for narrow voice channels. Limits must be entered in kHz.

Pass/fail limits are defined by any applicable standard, such as:

- EIA Standard: Modulation Deviation Limiting

Example

If your standard states that the instantaneous peak and steady-state deviations of the transmitter should not exceed the rated system peak-frequency deviation of ± 5 kHz, you would enter 5 as the Upper Limit.

26. TXA Output Power at Level 0 (dBm)

Pass/fail limits through set the pass/fail limits for output power levels 0 through 7 measured in both analog and/or digital tests at the transmitter's output terminal. Units for this pass/fail limit are set by [parameter 37. TX Units for Pwr Meas \[0=dBm 1=Watts\]](#).

All power level limits are separate pass/fail limits and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

NOTE:

Values for power levels in the standard are for effective radiated power (ERP) and not as measured directly from the mobile unit. Power levels will be higher when measured [directly from the mobile unit](#).

Example

If you are testing Power Class I radios and you desire that the output power levels should be maintained within the range of +2 dB and -4 dB of the nominal values over a specified temperature range, enter the values in the following table for the Lower Limit and the Upper Limit for power levels of 0 through 7.

Power Level	Nominal Value (dBm)	Lower Limit(dBm)	Upper Limit (dBm)
Level 0	36	32	38
Level 1	32	28	34
Level 2	28	24	30
Level 3	24	20	26
Level 4	20	16	22
Level 5	16	12	18
Level 6	12	8	14
Level 7	8	4	10

27. TXA Output Power at Level 1 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

28. TXA Output Power at Level 2 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

29. TXA Output Power at Level 3 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

30. TXA Output Power at Level 4 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

31. TXA Output Power at Level 5 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

32. TXA Output Power at Level 6 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

33. TXA Output Power at Level 7 (dBm)

See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

34. TXA SAT Deviation (kHz)

This sets the pass/fail limits for the SAT tone's peak frequency deviation. Upper and lower limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Supervisory Audio Tone (SAT)

Example

If you desire that the peak frequency deviation of each transponded SAT should be $2 \text{ kHz} \pm 0.2 \text{ kHz}$, you would enter **1 . 8** as the Lower Limit and **2 . 2** as the Upper Limit.

35. TXA SAT Frequency Error (Hz)

This sets the pass/fail limits for the SAT tone's frequency accuracy. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Supervisory Audio Tone (SAT)

Example

If you desire that any one of the three SAT tones should not vary in frequency more than ± 1 Hz, you would enter **-1** as the lower limit and **1** as the upper limit.

36. TXA Signaling Tone Deviation (kHz)

This sets the pass/fail limits for the signaling tone's peak frequency deviation. Upper and lower limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Signaling Tone (ST)

Example

If you desire that the nominal peak frequency deviation of the carrier produced by the signaling tone should be ± 8 kHz with a $\pm 10\%$ tolerance, enter **7.2** as the Lower Limit and **8.8** as the Upper Limit.

37. TXA Signaling Tone Frequency (kHz)

This sets the pass/fail limits for the signaling tone's frequency accuracy. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Signaling Tone (ST)

Example

If you desire that the Signaling Tone frequency should be 10 kHz \pm 1 Hz, enter **9999** as the Lower Limit and **10001** as the Upper Limit.

38. TXA Wideband Data Deviation Steady State (kHz)

This sets the pass/fail limits for the Wideband Data deviation.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA Standard: Wideband Data

Example

If your standard states that the Wideband Data frequency deviation should be ± 8 kHz with a $\pm 10\%$ tolerance, you would enter **7.2** as the Lower Limit and **8.8** as the Upper Limit.

Lower and Upper Limits must be entered in kHz.

39. TXA Wideband Data Deviation Transient (kHz)

This sets the pass/fail limits for the Wideband Data deviation.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA Standard: Wideband Data

Example

If your standard states that the Wideband Data frequency deviation should be ± 8 kHz with a $\pm 10\%$ tolerance, you would enter **7.2** as the Lower Limit and **8.8** as the Upper Limit.

Lower and Upper Limits must be entered in kHz.

40. TXD Closed Loop Power Control Range (dB)

This sets the pass/fail limits for closed loop power control. Only the lower limit is used. The value must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Range of Closed Loop Power Control

Example

If you desire the closed loop power control range to be at least ± 24 dB around the open loop estimate, enter **24** as the lower limit.

41. TXD Frequency Error (Hz)

This sets the pass/fail limits for the frequency stability of the MSUT. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Frequency Tolerance For Digital Mode Operation

Example

If you desire that the carrier frequency should be maintained within ± 150 Hz of any assigned channel frequency, enter **-150** as the Lower Limit and **150** as the Upper Limit.

42. TXD Minimum Controlled Output Power (dBm)

This sets the pass/fail limits minimum controlled output power. Only the upper limit is used. The value must be entered in dBm.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Minimum Controlled Output Power

Example

If you desire the minimum controlled output power to be less than -50 dBm, enter 50 as the upper limit.

43. TXD Open Loop Output Power @ Ior=-104 dBm (dBm)

This sets the pass/fail limits for the range of open loop output power. The upper and lower limit are used. The value must be entered in dBm.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Range of Open Loop Output Power

Example

If you desire the range of open loop output power for Ior = -104 dBm to be from the minimum to the maximum allowable ERP for the mobile station class, then specify “None” for the Check field. Any numbers placed in the Lower and Upper Limit fields will be ignored if the check field is set to “None”. If you desire to specify the Lower an/or Upper limits , then enter the appropriate numbers into the Lower an/or Upper Limit fields and set the Check field to “Upper”, “Lower” or “Both”., depending on what limits you intend to specify.

44. TXD Open Loop Output Power @ I_{or}=-25dBm (dBm)

This sets the pass/fail limits for the range of open loop output power. The upper and lower limit are used. The value must be entered in dBm.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Range of Open Loop Output Power

Example

If you desire the range of open loop output power for I_{or} = -25 dBm to be -51 dBm ±9.5 dB, then enter -60.5 as the lower limit and -41.5 as the upper limit.

45. TXD Open Loop Output Power @ I_{or}=-65dBm (dBm)

This sets the pass/fail limits for the range of open loop output power. The upper and lower limit are used. The value must be entered in dBm.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Range of Open Loop Output Power

Example

If you desire the range of open loop output power for I_{or} = -65 dBm to be -11 dBm ±9.5 dB, then enter -20.5 as the lower limit and -1.5 as the upper limit.

46. TXD Rho

This sets the pass/fail limits for Rho.

Rho is the MSUT's measured waveform quality factor. It indicates the portion of the transmitted waveform that correlates with an ideal waveform modulated with the same data.

Example

If you desire that Rho pass/fail limits be $\geq 94.4\%$, enter 0.944 in the lower limit field.

47. TXD Timing Offset (us)

This sets the upper limits for timing offset. Timing offset is derived from the Rho measurement, and indicates how well the MSUT has synchronized to the pilot PN (pseudo-noise) sequence.

Example

If you would like the Timing Offset pass/fail limits to be $\pm 1 \mu\text{S}$, enter -1 in the lower limit field, and enter 1 in the upper limit field.

Product Description

The HP 83217A Option 004 Software, when used with the HP 8924C CDMA Mobile Test Set configured with an HP 83236B PCS Interface, provides parametric test capability for PCS/CDMA/AMPS/NAMPS Mobile Stations.

The HP 83217A Option 004 software can be used for the installation, maintenance, and/or repair of PCS/CDMA/AMPS/NAMPS Mobile Stations.

Software Functions

- Parametric verification of mobile station transmitter and receiver performance.
- In-depth call processing, including registration and handoffs.
- Digital to Analog Handoffs.

Software Features

- Test results and pass/fail indications are displayed on the Test Set's screen, and can be output to a printer, disk drive, memory card, PC, or HP Palmtop computer.
- Testing order, pass/fail limits, testing conditions and equipment configurations can be changed.
- RF path losses can be compensated for.
- Test procedures can be modified and saved to a memory card (included with the software).
- Tests can be executed continuously or in single steps.
- Test procedures can be secured with a password to prevent unauthorized modifications.

Items Included in the HP 83217A, Option 004 Software

- Memory cards:
 - (1) 2 Mbyte Flash (containing the HP 83217A option 004 software), part number 83217-10004.
 - (1) Uninitialized 64 Kbyte SRAM (for storage), part number HP 83230A.
- HP 83217A Introduction to Operation.
- HP 83217A Mobile Station Test Software User's Guide.
- HP 83217A Option 004 PCS/CDMA/AMPS/NAMPS Tests Reference Guide.
- HP software product license agreement.

Parameter Descriptions

Introduction

Parameters are values you enter that optimize test environment or conditions of the software. Many of the parameters are determined by examining your test needs. Other parameters are determined by performing measurements to calibrate items in your system. Default values are set into the software. Some of these values are derived from standard methods of measurement and some are derived from the radio test standards that are applicable.

For information on editing parameters, see *Using the Software*, chapter 3.

Parameters remain in battery-backed-up memory until you select a procedure to run. If you wish to prevent them from being lost when a new procedure is selected, you will have to save them in a procedure. See *Making a Procedure*.

To print the parameters list, see *Printing Test Screens*.

The first few capital letters in the title of each parameter indicate what the parameter refers to:

- CPA = Call Processing, Analog
- CPD = Call Processing, Digital
- RC = Running Conditions
- RT = Receiver and Transmitter, Analog and Digital
- RTD = Receiver and Transmitter, Digital
- RX = Receiver, Analog and Digital
- RXA = Receiver, Analog
- RXD = Receiver, Digital
- TX = Transmitter, Analog and Digital
- TXA = Transmitter, Analog
- TXD = Transmitter, Digital

1. CPA Control Channel [1-799 or 991 -1023]

This parameter is used to identify the control channel used by the MSUT. Primary control channels for System A are numbered from 313 to 333. Primary control channels for System B are numbered from 334 to 354. Some cellular phones are designed to work only on System A or only on System B. For these phones, the control channel specified by this parameter must correspond to the correct system in order to allow the phone to obtain service.

Example

If you desire to use control channel 333 to set up a call with the MSUT, enter 333 as the value.

2. CPA DSAT Vector

This parameter allows you to set the Digital Supervisory Audio Tone (DSAT) sequence to be used on narrow voice channels:

The seven valid sequences are as follows:

#0 = 2556CB
#1 = 255B2B
#2 = 256A9B
#3 = 25AD4D
#4 = 26AB2B
#5 = 26B2AD
#6 = 2969AB

Example

If you want the first sequence shown above, you would enter a **0** as the value.

3. CPA Enter Ph# [0=If Needed,1=Always,Here]

This parameter specifies from where the test will get the phone number of the MSUT. You may enter one of three options:

- 0
- 1
- the 10 digit phone number of the MSUT

Setting this parameter to **0=If Needed** tells the Test Set to prompt the user for the phone number of the MSUT if:

- The phone number is needed to perform the first test in a test sequence, AND
- A MIN was not obtained by the Test Set running a previous test procedure.

Setting this parameter to **1=Always,Here** tells the Test Set to prompt the user for the phone number of the MSUT each time the test procedure is run. (Note that if **parameter 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]** is set to **1=All 0's** indicating an all zero MIN, the user is not prompted for a phone number). Setting **parameter 3.** to anything other than **0=If Needed** or **1=Always** will cause the Test Set to use the number entered as a ten digit phone number for paging the MSUT if one of the following conditions are also true:

- **parameter 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]** is set to **2=Phone #**, indicating to the Test Set to get the MIN from the phone number.
- **parameter 4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]** is set to **0=RECC** and a MIN has not been previously entered into the Test Set by running a previous test procedure.

Example

If **parameter 3.** is set to **1231234567** and **parameter 4.** is set to **2=Phone#**, the Test Set will use a MIN corresponding to phone number 123-123-4567 to page the MSUT.

NOTE:

If a registration or an origination is performed that causes a new MIN to be entered into the test, this new MIN will then be used instead of the MIN derived from the entered phone number.

4. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]

This parameter specifies from where the Test Set will get the Mobile Identification Number (MIN) of the MSUT.

Setting **parameter 4.** to **0=RECC** causes the Test Set to get the MIN from the Reverse Control Channel (RECC) Data. The RECC Data (data sent on the control channel from the MSUT to the Test Set) sent during a registration or an origination is read by the Test Set to obtain the MIN.

Setting **parameter 4.** to **1=All 0's** causes the Test Set to use a MIN consisting of all zeros. An all zero MIN is an invalid MIN according to the IS-95A standard. Because some phones initially have an all zero MIN after being manufactured or serviced, this parameter (when set to **1=All 0's**) allows the Test Set to page phones with an all zero MIN.

NOTE:

An all zero MIN can also be entered into the Test Set by setting **parameter 4.** to **0=RECC** and getting the MIN from the RECC Data from a MSUT that has an all zero MIN.

If **parameter 4.** is set to **1=All 0's**, then **parameter 3. CPA Enter Ph# [0=If Needed,1=Always,Here]** is not used.

Setting **parameter 4.** to **2=Phone #** causes the Test Set to derive the MIN from the phone number, depending on the entry in **parameter 3. CPA Enter Ph# [0=If Needed,1=Always,Here]** described below:

- If **parameter 3.** contains a phone number, the phone number is used to derive a MIN.
- If **parameter 3.** is set to **0=If Needed** or **1=Always,Here**, the user will be prompted for a phone number if needed. This phone number will be used to derive the MIN.

NOTE:

If a registration or an origination test is performed that causes a new MIN to be entered into the Test Set, this new MIN will then be used instead of the MIN obtained as specified by **parameter 4.**

5. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]

This parameter allows you to print the Reverse Control Channel (RECC) and Reverse Voice Channel (RVC) messages to the display or printer.

The RECC message is a wideband data stream sent from the mobile station to the land station, and can consist of up to five words. The types of messages that can be transmitted over the RECC are:

- Page Response Message
- Origination Message
- Order Confirmation Message
- Order Message

The RVC message is a wideband data stream sent from the mobile station to the land station, and can consist of one or two words. The types of messages that can be transmitted over the RVC are:

- Order Confirmation Message
- Called-Address Message

6. CPA SAT Tone (Hz)

This parameter sets the frequency of the SAT (supervisory audio tone) that will be used on all analog voice channels. The supervisory audio tones are out-of-voice-band audio tones used for cell site identification. One of three frequencies may be assigned: 5970, 6000, and 6030 Hz. One of the three tones is added to the voice transmission of all call within an individual cell. The MSUT then detects the tone and modulates the transmitted voice channel carrier with a constant (relative) phase tone which is filtered or regenerated from the received tone to establish a closed loop between the mobile (MSUT) and the cell site. Transmission of the SAT by a MSUT is suspended during transmission of wideband data on the reverse voice channel, but is not suspended when the signaling tone (ST) is sent.

Example

If you want the SAT to be at 6000 Hz, you would enter **6000** as the value. All values are entered in Hz.

7. CPA SID Number

This parameter identifies the mobile station's analog System Identification (SID) number. The SID is stored as a 15-bit binary number in the mobile station's permanent security and identification memory.

This parameter should be equal to the MSUT home system ID to perform testing in a non-roaming environment. Use an ID different than the MSUT to test in a roaming environment.

Enter any number from 0 to 32767.

Example

If your MSUT's SID number is decimal 11111, you would enter **11111** as the value.

8. CPD Analog Channel for D/A Handoff

This parameter allows entry of an analog voice channel for digital-to-analog handoffs.

During a CDMA-to-analog handoff, the Test Set commands the mobile station to re-tune to this analog voice channel.

Make sure the MSUT is programmed to allow handoffs to the selected channel's system (system A or B).

Example

If the MSUT is programmed to allow calls on system B only, enter an analog channel number that is 334 or higher. For system B, enter an analog channel that is 333 or lower.

9. CPD BID Number

This parameter sets the BID (Base Station Identification) for the Test Set. The mobile station receives and stores this number from the Test Set.

Example

Entering **39** for this parameter will cause the Test Set to send the decimal value 39 as its base identification.

10. CPD Echo Delay [0, 2 or 5] (Seconds)

This parameter sets the time period between when you talk into the mobile station and when you hear your voice echoed back.

Example Entering 2 for this parameter delays your voice 2 seconds.

11. CPD NID Number

This parameter sets the mobile station's NID (Network ID) number. The mobile station receives both SID (System ID) and NID numbers from the Test Set, and compares them with its home SID/NID to determine if it is roaming. This parameter, as well as CPD SID Number, do not have to match the mobile station's programmed values to register or make a call, unless the mobile station is programmed to operate "home only".

If the SID and NID values programmed into the mobile station's NAM (number assignment module) match the values entered in the parameters CPD NID Number and CPD SID Number, the mobile station's roam indicator will not be lit after the mobile station has acquired service from the Test Set.

Example

If you want the mobile station to be tested in a non-roaming environment, enter the NID that is programmed into the mobile station's NAM into this parameter. You must also enter the corresponding SID in the parameter CPD SID Number.

If you want the mobile station to be tested in a non-roaming environment, enter the NID that is programmed into the mobile station's NAM into this parameter. You must also enter the corresponding SID in the parameter CPD SID Number.

12. CPD Registration Type [0=Zone, 1=PowerUp]

This parameter determines what type of digital registration will be done in [TEST_30 - CPD Registration](#) .

If this parameter is set to 0 (Zone), a zoned based registration is started and the operator will be prompted every 28 seconds to either continue or skip the registration if the mobile has not yet registered.

If the parameter is set to 1 (PowerUp), power up registration is enabled and the operator will be prompted every 10 minutes to continue or skip the registration if the mobile station has not yet registered. When power up registration is enable, the mobile station is supposed to register within 20 seconds of going into service. This option would be used for mobile stations that take a long time go into service and the operator does not want to have to continue the registration attempt every 28 seconds by pressing the continue softkey.

With the parameter set to either 0 or 1 the registration test will print the registration data and continue to the next test as soon as the mobile station registers.

Example

If you want the registration to be zone based, you would enter 0 as the value. The value must be either a 0 or zone based, or a 1 for power up registration.

13. CPD SID Number

This parameter sets the mobile station's SID (System ID) number. The mobile station receives both SID and NID (Network ID) numbers from the Test Set, and compares them with its home SID/NID to determine if it is roaming. This parameter, as well as CPD NID Number, do not have to match the mobile station's programmed values to register or make a call, unless the mobile station is programmed to operate "home only".

If the SID and NID values programmed into the mobile station's NAM (number assignment module) match the values entered in the parameters CPD NID Number and CPD SID Number, the mobile station's roam indicator will not be lit after the mobile station has acquired service from the Test Set.

Example

If you want the mobile station to be tested in a non-roaming environment, enter the SID that is programmed into the mobile station's NAM into this parameter. You must also enter the corresponding NID in the parameter CPD NID Number.

14. CPD Spectrum Averages [10,20,50,100]

This parameter sets the number of measurements the Test Set will use when applying video averaging to spectrum analyzer measurements.

Example

If you want spectrum analyzer measurement to be less sensitive to transient signal conditions, increase the CPD Spectrum Averages parameter to 20, 50, or 100. Increasing this parameter, however, also increases test time.

15. RC Compandor is Always On [0=no 1=yes]

This parameter allows you to indicate whether or not the compandor is always on.

If this parameter is set to **1** (Yes), the program assumes that the MSUT's compressor circuitry is located before the pre-emphasis circuitry on the transmitter, and behind the de-emphasis circuitry in the receiver.

With the compandor always "ON" (set to **1**), the effects of an "ideal expander" are removed from the test results. TEST_15 - RXA Audio Frequency Response results are reduced in half. Also, the test operator is not prompted to turn the compandor "ON" and "OFF".

If this parameter is set to **0** (No), then the test operator will be prompted to "turn the Radio compandor ON" during testing. Some manual control of the phone's compandor state is required.

Example

If you do not want the compandor always on, you would enter **0** as the value. The value must be either a **0** for no, or a **1** for yes.

16. RT High Supply Voltage (Vdc)

This parameter is used to set the MSUT to its highest specified voltage ratings. The value must be entered in Vdc with a range from 0 to 60. **Parameter 21. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 16. RT High Supply Voltage (Vdc)** to be activated.

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See **parameter 21. RT Test at Extreme Settings [0=no 1=yes] on page 163** for more information.

Example

If you desire the power supply voltage set to operate the MSUT at +20% of the normal (Nominal) supply voltage, and the Nominal Supply Voltage is 13.2 V, enter **15.8** as the value.

17. RT Low Supply Voltage (Vdc)

This parameter is used to set the MSUT to its lowest specified voltage rating. The value must be entered in Vdc with a range from 0 to 60. **Parameter 21. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 14. CPD Spectrum Averages [10,20,50,100]** to be activated.

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See **parameter 21. RT Test at Extreme Settings [0=no 1=yes]** on page 163 for more information.

Example

If you desire the power supply voltage to operate the MSUT at –20% of the normal (nominal) supply voltage, and the nominal supply voltage is 13.2 V, enter **10.6** as the parameter value.

18. RT Nominal Supply Voltage (Vdc)

This parameter is used to set the mobile unit to its nominal specified voltage rating under normal conditions. The value must be entered in Vdc with a range from 0 to 60.

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See [parameter 21. RT Test at Extreme Settings \[0=no 1=yes\] on page 163](#) for more information.

Example

If you desire the power supply voltage to operate the mobile unit at 13.2 Vdc, enter a nominal **13.2** as the value.

19. RT Protocol Standard [0 thru 5]

This parameter is used to set the Protocol field in the CDMA CALL CONTROL screen. The value must be entered as 0, 1, 2, 3, 4, or 5.

- 0 selects the IS-95 protocol.
- 1 selects the IS-95A protocol.
- 2 selects the TSB-74 protocol.
- 3 selects the J-STD-008 protocol.
- 4 selects the ARIB T-53 protocol.
- 5 selects the Korean PCS protocol.

20. RT Rate Set Selection [0=9600 1=14400]

This parameter is used to set the proper service option in the CDMA CALL CONTROL screen. Parameter 19 RT Protocol Std [0=95 1=95A 2=TSB-74] must be set to 2 (TSB-74) if this parameter is set to 1 and the user expects the software to do rate set 2 (14400) testing. If parameter 19 RT Protocol Std [0=95 1=95A 2=TSB-74] is set to 0 or 1 then this parameter is ignored by the software and rate set 1 is always used. Rate set 2 is not supported with IS-95 and IS-95A protocol standards. The value must be entered as 0 or 1:

21. RT Test at Extreme Settings [0=no 1=yes]

This parameter is used to activate all of the parameters that set extreme testing conditions for the MSUT. If this parameter is set to 1 (yes) the following parameters will be used:

Parameter 16. RT High Supply Voltage (Vdc)

Parameter 17. RT Low Supply Voltage (Vdc)

Parameter 28. RXA NAMPS RF Level for SINAD at Extremes (dBm)

Parameter 30. RXA RF Level for SINAD at Extremes (dBm)

The software offers the capability to run certain tests at extreme supply voltage conditions. Extreme supply voltage conditions are high and low supply voltages that are used while testing is conducted. In order to use the extreme testing conditions an HP-IB programmable power supply must be used. This power supply must be interfaced to the test system through an HP-IB interface cable. For more information on the types of power supplies supported by the software and how to configure the test system to control the power supply.

See “[To Configure a Programmable Power Supply](#)” in the *HP 83217A Test Software User's Guide*.

The following tests can be run at extreme testing conditions.

22. RX RF Level for Signaling (dBm)

This parameter sets the RF signal level used in all call processing tests. The RF signal level must be entered in units of dBm with a range from **-120** to **-30**.

Example

If you desire an RF level of **-50** dBm, enter **-50**.

Used in Tests

- All tests

23. RXA Audio Response Step Frequency (kHz)

This parameter is the step-size used between 300 Hz and 3 kHz to vary the audio input signal frequency in [TEST_15 - RXA Audio Frequency Response](#). The values must be entered in kHz.

Example

To step in 500 Hz increments enter 0.5.

24. RXA Expander Step Level (dB)

This parameter is the step-size used to vary the input level to the expander that is used in [TEST_14 - RXA Expander](#). The value must be entered in dB.

Example

If you desire to step the input level to the expander from high level to low level in 5 dB steps, enter -5.

25. RXA FVC Message Error Rate RF Level (dBm)

This parameter sets the RF level for testing the Forward Voice Control (FVC) order message error rate.

Example

If you want the RF level for testing the FVC order message error rate to be at -110 dBm, you would enter **-110** as the value.

26. RXA MRI Step Level (dBm)

This parameter sets the step size used by the test system to vary the level of the RF carrier output during [TEST_29 - RXA MRI](#). The level is decremented.

Example

If you want the RF level to be stepped in 5 dB steps, enter **-5** as the step level.

27. RXA NAMPS RF Level for SINAD (dBm)

This parameter sets the RF signal level for measuring SINAD on narrow voice channels at the nominal power supply voltage. The value must be entered in dBm.

Example

If you want the RF signal level to be at -118 dBm for SINAD measurements, you would enter **-118** as the value.

28. RXA NAMPS RF Level for SINAD at Extremes (dBm)

This parameter sets the RF signal level for measuring SINAD on narrow voice channels at the power supply voltage extremes. The value must be entered in dBm. **Parameter 21. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 30. RXA RF Level for SINAD at Extremes (dBm)** to be activated.

Example

If you want the RF signal level to be at –115 dBm for SINAD measurements, you would enter –115 as the value.

29. RXA RF Level for SINAD (dBm)

This parameter sets the RF signal level for measuring SINAD on wide voice channels at the nominal power supply voltage. The value must be entered in dBm.

Example

If you want the RF signal level to be at -116 dBm for SINAD measurements, you would enter **-116** as the value.

30. RXA RF Level for SINAD at Extremes (dBm)

This parameter sets the RF signal level needed at extreme conditions. The value must be entered in dBm with a range from –150 to –15. **Parameter 21. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 30. RXA RF Level for SINAD at Extremes (dBm)** to be activated.

Example

If you desire the RF signal level to be at –116 dBm, enter **–116** as the value.

31. RXA Set Audio Lvl [0=no xx=level volts]

This parameter determines whether or not screen prompts are displayed to help the operator set the volume control during all of the receiver tests.

To use this parameter, the test operator must have control or have access to the audio power (volume control) from the MSUT's transceiver unit.

Example

If your radio is to be tested at 50% of rated audio power, enter the audio level in volts, for example 0.2 for 200 mV. The test operator is prompted to adjust to the correct volume level during testing. (The test system displays an analog meter. Correct adjustment is made when the meter needle is set between the two longer lines on the meter.)

The value must be either a 0 for no, or a value for audio level in volts.

32. RXA Tolerance for Setting Audio Level (% error)

This parameter is used as the value of the maximum percentage of error that you are allowed for setting the MSUT volume.

The value sets the tolerance window in the analog meter screen that is used to manually set the MSUT's volume during testing; the meter needle must be within the tolerance window (shown by two longer lines on the meter) before the program will accept the manually set MSUT's volume. The tolerance should be as accurate as the volume control will allow.

NOTE: This parameter is only active when parameter (RX Set Audio Lvl) is set to accept audio level in volts.

Example

Enter the value as a percentage of the desired audio level. For example, if the MSUT's maximum audio power is 10 watts, and the tolerance for setting volume is set to 5%, the window will be 1 watt (which is $\pm 5\%$ of 10 watts, the tolerance allows settings above and below the point determined by the audio level value converted from volts to watts).

33. RXD Maximum Frames for FER

This parameter sets the maximum frame count for each FER test.

The software tests apply confidence limits to FER testing as described in TIA/EIA IS-98A or J-STD-018. The frame count entered in this parameter, along with the actual number of frame errors counted and FER Spec, will determine whether the maximum number of frames is reached before Pass or Fail criteria is met.

The probability that an FER test will end with a Pass or Fail indication increases when the maximum frames parameter is increased. Decreasing the value in this parameter could cause testing to end before either Pass or Fail criteria is met.

Example

If the RXD Maximum Frames for FER is 5000, and you want to increase the likelihood that the FER test will end with either a Pass or Fail indication, enter 6000 for this parameter.

34. RXD RF Level for Sensitivity (dBm)

This parameter sets the RF signal level that is used in the digital sensitivity tests.

Example

If you desire to apply a -104 dBm signal, enter **-104** as the value.

35. RXD Sensitivity FER Search Specification (%)

This parameter sets the FER specification that will be used to determine when to stop [TEST_47 - RXD Sensitivity Level Search](#). Entering larger numbers in this parameter lowers the number of frames that must be measured in order to achieve the 95-percent confidence level and stop the test. Larger numbers therefore shorten test time. As an illustration of this process, an FER of 0.5 percent requires that at least 600 frames be measured at each power level, an FER of 1.0 percent requires that at least 300 frames be measured, an FER of 2.0 percent requires that at least 150 frames be measured, and so forth. This parameter is used only in [TEST_47 - RXD Sensitivity Level Search](#) and not in [TEST_39 - RXD Sensitivity & Dynamic Range](#).

Example

If you wish to perform an FER sensitivity search to an FER sensitivity specification of 2.0 percent, enter **2.0** as the value.

36. RXD Sensitivity FER Search Step Level (dB)

This parameter sets the step size used to vary the mobile station received power level from the value specified in [parameter 34. RXD RF Level for Sensitivity \(dBm\)](#) to a level that produces an FER greater than that specified in [parameter 35. RXD Sensitivity FER Search Specification \(%\)](#). This parameter is used only in [TEST_47 - RXD Sensitivity Level Search](#) and not in [TEST_39 - RXD Sensitivity & Dynamic Range](#).

Example

If you wish to set the sensitivity step size to 0.5 dB, enter **0.5** as the value.

37. TX Units for Pwr Meas [0=dBm 1=Watts]

This parameter sets the measurement units (dBm or watts) that will be used in transmitter tests. Select the type of unit required for your application. This parameter affects whether pass/fail limits TXA Output Power @ Level 0 through 7, which must be entered in dBm, are converted to Watts (or mW). See [pass/fail limit 26. TXA Output Power at Level 0 \(dBm\) on page 114](#) through [pass/fail limit 33. TXA Output Power at Level 7 \(dBm\) on page 122](#) for descriptions of these pass/fail limits.

38. TXA Audio Response Step Frequency (kHz)

This parameter is the step size used to vary the input signal frequency in **TEST_06 - TXA Audio Frequency Response**. The values must be entered in kHz.

Example

If you desire the modulation frequency to be varied from 300 Hz to 3000 Hz in 500 Hz steps, enter **0.5** as the value.

39. TXA Compressor Start Level (dB)

This parameter sets the start level used to vary the input level to the compressor in [TEST_12 - TXA Compressor Response](#). The values must be entered as dB.

Example

If you desire to start the relative input level at 20 dB, enter 20.

40. TXA Compressor Step Level (dB)

This parameter sets the step size used to vary the input level to the compressor in **TEST_12 - TXA Compressor Response**. The values must be entered as dB.

Example

If you desire to step the relative input level in 5 dB steps, enter 5.

41. TXA Current Drain Levels Tested [BWD #]

This parameter allows you to measure current drain at any or all of the power levels listed in the table below.

This parameter's range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, you choose the Power Levels that will be measured for current drain and add their weighted values.

The value must be entered as a BWD with a range from 1 to 255.

Power Level	0	1	2	3	4	5	6	7
Weighted Value	1	2	4	8	16	32	64	128

NOTE:

Power levels are defined by the IS-98A or J-STD-018 standard.

Example

If you desire to measure the analog transmitter power on the MSUT when it is at Power Levels 1 and 4, enter **18** (2 + 16) as the value.

42. TXA Frequency Deviation Step Frequency (kHz)

This parameter is the step size used to vary the input signal frequency in **TEST_05 - TXA Modulation Deviation Limiting**. This value must be entered in kHz.

Example

If you desire the modulation frequency to be varied from 300 Hz to 3000 Hz in 500 Hz steps, enter **0.5** as the value.

43. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]

This parameter activates a 50 Hz HPF in [TEST_05 - TXA Modulation Deviation Limiting](#). The HPF is set to <20 Hz in TEST_05 if this parameter is set to 0 (off). The HPF is set to 50 Hz in TEST_05 if this parameter is set to 1 (on).

Example

If you want to turn the 50 HPF on in lieu of the <20 Hz HPF, enter 1.

44. TXA Output Power Levels Tested [BWD #]

This parameter selects which output power levels will be tested in **TEST_04 - TXA RF Power Output**. This parameter's range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, choose the Power Levels that will be measured and add their weighted values. The value must be entered as a BWD with a range from 1 to 255.

Power Level	0	1	2	3	4	5	6	7
Weighted Value	1	2	4	8	16	32	64	128

NOTE:

Power levels are defined by the IS-98A or J-STD-018 standard.

Example

If you desire to measure the analog transmitter power on the MSUT when it is at Power Levels 1 and 4, enter **18** (2 + 16) as the value.

45. TXA Switch Channels Start Channel (Chan No.)

This parameter sets the start channel used in [TEST_26 - TXA Switch Channels](#).
The start channel may be any channel in the range from 1 to 1023.

Example

If you want to set the start channel to channel 300, enter 300.

46. TXA Switch Channels Step Channel (Chan No.)

This parameter sets the number of channels (step size) to increment between the start and stop channels. This parameter is used in [TEST_26 - TXA Switch Channels](#). This step size may be any integer bounded by [parameter 45. TXA Switch Channels Start Channel \(Chan No.\)](#) and [parameter 47. TXA Switch Channels Stop Channel \(Chan No.\)](#).

Example

If you want to set the step channel size to 10 channels, enter **10**.

47. TXA Switch Channels Stop Channel (Chan No.)

This parameter sets the stop channel used in [TEST_26 - TXA Switch Channels](#). The stop channel may be any channel in the range from 1 to 1023.

Example

If you want to set the stop channel to channel 600, enter **600**.

48. TXA Trnsient/ss data [0=tran 1=bth 2=ss]

This parameter allows the user to select between three modes of operation for the execution of TEST_11 TXA RVC Data Deviation.

- Select 0=tran (transient) to perform the test on the entire RVC data signal returned from the MSUT.
- Select 1=bth (both) to perform the test on just the steady state portion of the RVC data signal followed by a test of the entire signal.
- Select 2=ss (steady state) to test only the steady state portion of the signal.

49. TXA TS Atten for Signaling [0, 20, 40] (dB)

This parameter sets the input attenuation in the test system's RF Analyzer to attenuate the signal which is input to the test system. Values are entered as 0, 20, or 40 dB.

Example

If you need 20 dB input attenuation to the test system, enter **20** as the value.

NOTE:

All analog tests require 20 dB input attenuation.

50. TXD Antenna Gain (dB)

This parameter specifies the mobile station's antenna gain for CDMA tests. This parameter is required to relate power measurements made by the Test Set with the MSUT's ERP (effective radiated power). (Minimum test standards are given in ERP in the EIA/TIA IS-98A or J-STD-018 standards.)

No Antenna Gain parameter is used during analog tests.

Example

If the manufacturer specifies 1 dB of gain in the MSUT's antenna, enter 1 in the TXD Antenna Gain field.

Numerics

50 Hz HPF

for modulation deviation limiting,
parameter, 185**A**

accuracy

frequency, signaling tone, pass/fail
limits, 126

Amplitude Error test (TEST_33), 61

analog call processing. *See* CPA
parameters, CPA tests.Analog Channel for D/A Handoff
parameter, 150

analog voice channel

digital to analog handoff, parameter,
150

SAT tone, parameter, 148

ANSI J-STD-008, 12

antenna gain

mobile station, parameter, 192

Antenna Gain parameter, 192

ARIB T-53 protocol, 161

attenuation

input, RF analyzer, parameter, 191

audio connections

testing without, 42

audio distortion

receiver, pass/fail limits, 89

transmitter, pass/fail limits, 99

Audio Distortion pass/fail limits, 89, 99

Audio Distortion test, receiver

(TEST_16), 35

Audio Distortion test, transmitter

(TEST_07), 21

audio frequency response

receiver, pass/fail limits, 90, 91

receiver, step frequency, parameter,
165

roll-off, pass/fail limits, 101

transmitter, pass/fail limits, 100

transmitter, step frequency, parameter,
180

Audio Frequency Response test, receiver

(TEST_15), 34

Audio Frequency Response test,

transmitter (TEST_06), 20

audio level

setting, parameter, 173

tolerance for setting, parameter, 174

Audio Response Dev from 6dB/oct pass/
fail limits, 100Audio Response Dev From -6db/oct R1
pass/fail limits, 90Audio Response Dev From -6db/oct R2
pass/fail limits, 91Audio Response Roll >2.5 kHz pass/fail
limits, 101Audio Response Step Frequency
parameter, 165, 180

averaging

spectrum analyzer measurements,
parameter, 156

video, parameter, 156

B

base station identification. *See* BID.
 BID Number parameter, 151

C

call processing, analog. *See* CPA parameters, CPA tests.
 call processing, digital. *See* CPD parameters, CPD tests.
 Carrier Feedthrough test (TEST_33), 61
 CDMA Release test (TEST_44), 81
 CDMA Voice Quality test (TEST_42), 78
 channel number
 start channel for switch channels test, 187
 step size for switch channels test, 188
 stop channel for switch channels test, 189
 Closed Loop Power Control Range pass/fail limits, 129
 Closed Loop Power Control test (TEST_35), 64
 closure
 DSAT, pass/fail limits (NAMPS), 110
 compandor
 on or off, parameter, 157
 Compandor is Always On parameter, 157
 Compressor Response test (TEST_12), 28
 Compressor Start Level parameter, 181
 Compressor Tracking Error <0dB pass/fail limits, 102
 Compressor Tracking Error >0dB pass/fail limits, 103
 control channel number
 System A, parameter, 143
 System B, 143
 Control Channel parameter, 143
 controlled output power
 TEST_37, 68
 CPA definition, 12, 142
 CPA parameters
 Control Channel, 143
 DSAT Vector, 144
 Enter Ph#, 145
 MIN From?, 146
 Prt RECC RVC, 147
 SAT Tone, 148
 SID Number, 149
 CPA tests
 Flow Chart, 49
 Hook Flash, 53
 Origination, 41
 Page, 15
 Registration, 13
 Release, 40
 CPD definition, 12, 142
 CPD parameters
 Analog Channel for D/A Handoff, 150
 BID Number, 151
 Echo Delay, 152
 NID Number, 153
 SID Number, 155
 Spectrum Averages, 156
 CPD tests
 CDMA Release, 81
 CDMA Voice Quality, 78
 Digital to Analog Handoff, 82
 Origination, 58
 Page, 60
 Registration, 56
 Softer Handoff, 74
 Talk Time, 84
 Current Drain @Levels 0-3 pass/fail limits, 104
 Current Drain @Levels 4-7 pass/fail limits, 105
 Current Drain Levels Tested parameter, 183
 Current Drain test (TEST_13), 30

D

data deviation
 RVC, TEST_11, 26
 steady state, parameter, 190
 transient, parameter, 190
 wideband, steady state, pass/fail limits, 127
 wideband, transient, pass/fail limits, 128

delay
 echo, parameter, 152

deviation
 data, steady state, parameter, 190
 data, transient, parameter, 190
 limiting, 50 Hz HPF, parameter, 185
 limiting, pass/fail limits, 109
 limiting, pass/fail limits (NAMPS), 113
 limiting, TEST_05, 18
 NAMPS DSAT, pass/fail limits, 111
 RVC data, TEST_11, 26
 SAT, pass/fail limits, 123
 signaling tone, pass/fail limits, 125
 wideband data, steady state, pass/fail limits, 127
 wideband data, transient, pass/fail limits, 128

digital call processing. *See* CPD
 parameters, CPD tests.

digital signaling tone *See* DST

digital supervisory audio tone *See* DSAT

digital to analog handoff
 analog voice channel, parameter, 150

Digital to Analog Handoff test
 (TEST_45), 82

distortion
 receiver, audio pass/fail limits, 89
 receiver, audio TEST_16, 35
 transmitter, audio pass/fail limits, 99
 transmitter, audio TEST_07, 21

drain
 current, parameter, 183
 current, pass/fail limits, 104, 105

DSAT
 closure, pass/fail limits (NAMPS), 110
 tone sequence, parameter, 144

DSAT test (TEST_10), 24

DSAT Vector parameter, 144

DST test (TEST_08), 22

DTMF Frequency Error pass/fail limits, 106

DTMF Frequency Error test (TEST_28), 54

dual tone multi-frequency *See* DTMF

dynamic range, receiver
 TEST_39, 72

E

echo delay
 call processing, digital, parameter, 152

Echo Delay parameter, 152

EIA/TIA IS-90, 12

EIA/TIA IS-95, 12

EIA/TIA IS-98, 12

emissions, spectrum
 TEST_43, 79

Enter Phone# parameter, 145

error rate
 frame, frames counted, parameter, 175
 FVC order message, pass/fail limits, 97
 FVC order message, TEST_19, 39

Expander Step Level parameter, 166, 182

Expander test (TEST_14), 32

Expander Tracking Error <0dB pass/fail limits, 92

Expander Tracking Error >0dB pass/fail limits, 93

Expander Zero Reference Level pass/fail limits, 94

Expander Zero Reference Level, NAMPS pass/fail limits, 96

eye pattern
 closure, DSAT, pass/fail limits (NAMPS), 110
 jitter pass/fail limits, 112

F

FER, traffic channel
TEST_38, 70

flash, hook
TEST_27, 53

Flow Chart test (TEST_25), 49

FM Hum and Noise test (TEST_09), 23

forward voice channel. *See* FVC.

frame count
maximum, parameter, 175

frame error rate
maximum frames, parameter, 175

Frequency Error test (TEST_03), 16

frequency accuracy
signaling tone, pass/fail limits, 126

Frequency Accuracy test (TEST_33), 61

frequency deviation
data, steady state, parameter, 190
data, transient, parameter, 190
limiting pass/fail limits, 109
limiting pass/fail limits (NAMPS), 113
limiting, 50 Hz HPF, parameter, 185
NAMPS DSAT pass/fail limits, 111
SAT, pass/fail limits, 123
signaling tone, pass/fail limits, 125
transmitter, step frequency, parameter, 184

wideband data, steady state, pass/fail limits, 127

wideband data, transient, pass/fail limits, 128

Frequency Deviation Step Frequency
parameter, 184

frequency error
DTMF, pass/fail limits, 106
DTMF, TEST_28, 54
SAT, pass/fail limits, 124

Frequency Error pass/fail limits, 108, 130

frequency response
receiver, pass/fail limits, 90, 91
receiver, TEST_15, 34
roll-off, pass/fail limits, 101
transmitter, pass/fail limits, 100
transmitter, TEST_06, 20

FVC Message Error Rate RF Level
parameter, 167

FVC order message error rate
pass/fail limits, 97

FVC Order Message Error Rate test
(TEST_19), 39

G

gain
antenna, mobile station, parameter, 192

general tests
CDMA receiver/transmitter, TEST_41, 76
receiver, TEST_24, 47
transmitter, TEST_23, 44

H

handoff

digital to analog, parameter, [150](#)

digital to analog, TEST_45, [82](#)

softer, TEST_40, [74](#)

High Supply Voltage parameter, [158](#), [163](#)

Hook Flash test (TEST_27), [53](#)

Hum and Noise pass/fail limits, [95](#), [107](#)

Hum and Noise test (TEST_17), [36](#)

I

input attenuation

for signaling, parameter, [191](#)

IS-95 protocol, [161](#)

IS-95A protocol, [161](#)

J

jitter

NAMPS DSAT, pass/fail limits, [112](#)

J-STD-008 protocol, [161](#)

K

Korean PCS protocol, [161](#)

L

level
 audio, setting, parameter, [173](#)
 audio, tolerance for setting, parameter, [174](#)
 expandor zero reference, pass/fail limits, [94](#)
 expandor zero reference, pass/fail limits (NAMPS), [96](#)
 MRI RF carrier, parameter, [168](#)
 RF signaling, parameter, [164](#)
 RF SINAD, parameter, [171](#)
 RF SINAD, parameter (NAMPS), [169](#)
 RF SINAD, parameter at extremes, [163](#), [172](#)
 RF SINAD, parameter at extremes (NAMPS), [163](#), [170](#)
 RF, for sensitivity tests, parameter, [176](#)
 Level for Signaling parameter, [164](#)
 Level for SINAD at Extremes parameter, [163](#), [172](#)
 Level for SINAD parameter, [171](#)
 Low Supply Voltage parameter, [159](#), [163](#)

M

Maximum Frames for FER parameter, [175](#)
Maximum RF Output Power test (TEST_36), [66](#)
measurement units (dBm or Watts), [179](#)
message error rate
 FVC RF level, parameter, [167](#)
MIN From? parameter, [146](#)
Minimum Controlled Output Power pass/fail limits, [131](#)
Minimum Controlled Output Power test (TEST_37), [68](#)
mobile identification number. *See* MIN.
mobile reported interference. *See* MRI
Mod Dev Limit 50 Hz HPF parameter, [185](#)
Modulation Deviation Limiting test (TEST_05), [18](#)
Modulation Limiting pass/fail limits, [109](#)
Modulation Limiting, NAMPS pass/fail limits, [113](#)
MRI Step Level parameter, [168](#)
MRI test (TEST_29), [55](#)

N

NAMPS DSAT Closure parameter, 110
 NAMPS DSAT Deviation parameter, 111
 NAMPS DSAT Phase Jitter parameter, 112
 NAMPS Expander Zero Reference Level pass/fail limits, 96
 NAMPS Level for SINAD at Extremes parameter, 163, 170
 NAMPS Level for SINAD parameter, 169
 NAMPS Modulation Limiting pass/fail limits, 113
 network identification number. *See* NID.
 NID Number parameter, 153
 No Audio Functional test (TEST_22), 42
 noise
 FM transmitter, TEST_09, 23
 receiver, pass/fail limits, 95
 receiver, TEST_17, 36
 transmitter, pass/fail limits, 107
 Nominal Supply Voltage parameter, 160

O

OMER, 39
 pass/fail limits, 97
 Open Loop Output Power @ Ior=-104 dBm pass/fail limits, 132
 Open Loop Output Power @ Ior=-25 dBm pass/fail limits, 133
 Open Loop Output Power @ Ior=-65 dBm pass/fail limits, 134
 Open Loop Power Range test (TEST_34), 62
 Order Message Error Rate (OMER) pass/fail limits, 97
 Order Message Error Rate, FVC test (TEST_19), 39
 Origination test, analog (TEST_21), 41
 Origination test, digital (TEST_31), 58
 OTA definition, 12
 OTA tests
 No Audio Functional, 42
 output power
 controlled, transmitter, digital, pass/fail limits, 131
 maximum RF, TEST_36, 66
 minimum controlled, TEST_37, 68
 mobile station transmitter, 17
 open loop, pass/fail limits, 132, 133, 134
 transmitter, parameter, 186
 Output Power at Level 0 pass/fail limits, 114
 Output Power at Level 1 pass/fail limits, 116
 Output Power at Level 2 pass/fail limits, 117
 Output Power at Level 3 pass/fail limits, 118
 Output Power at Level 4 pass/fail limits, 119
 Output Power at Level 5 pass/fail limits, 120
 Output Power at Level 6 pass/fail limits, 121
 Output Power at Level 7 pass/fail limits, 122
 Output Power Levels Tested parameter, 186

P

Page test, analog (TEST_02), 15
 Page test, digital (TEST_32), 60
 paging
 analog call processing, TEST_02, 15
 parameters
 analog call processing. *See* CPA parameters.
 definition, 142
 digital call processing. *See* CPD parameters.
 pass/fail limits
 analog receiver. *See* RXA pass/fail limits.
 analog transmitter. *See* TXA pass/fail limits.
 definition, 88
 digital transmitter. *See* TXD pass/fail limits.
 peak frequency deviation
 NAMPS DSAT, pass/fail limits, 111
 SAT, pass/fail limits, 123
 signaling tone, pass/fail limits, 125
 transmitter, pass/fail limits, 109
 transmitter, pass/fail limits (NAMPS), 113
 Phase Error test (TEST_33), 61
 phase jitter
 NAMPS DSAT, pass/fail limits, 112
 phone number
 call processing, analog, parameter, 145
 PN-3385, 12
 power control, closed loop
 TEST_35, 64
 transmitter, digital, pass/fail limits, 129
 power level
 current drain tested at, parameter, 183
 power output
 transmitter test, 17
 power range, open loop
 TEST_34, 62
 power, audio
 setting, parameter, 173
 tolerance for setting, parameter, 174
 power, output
 controlled, pass/fail limits, 131
 transmitter, parameter, 186
 transmitter, pass/fail limits, 114

print
 RECC message, 147
 RVC message, 147
Protocol Std parameter, 161
Prt RECC RVC Data parameter, 147

Q

Quick General test, analog receiver
 (TEST_24), 47
Quick General test, analog transmitter
 (TEST_23), 44
Quick General, CDMA RX/TX test
 (TEST_41), 76

R

radio standards
 ANSI J-STD-008, 12
 EIA/TIA IS-90, 12
 EIA/TIA IS-95, 12
 EIA/TIA IS-98, 12
 PN-3385, 12
Rate Set Selection parameter, 162
RC definition, 142
RC parameters
 Comandor is Always On, 157
RECC registration, 13
receiver parameters, analog. *See* RXA
 parameters.
receiver tests, analog. *See* RXA tests
receiver tests, digital. *See* RXD tests.
reference level
 zero, expandor (NAMPS), pass/fail
 limits, 96
 zero, expandor, pass/fail limits, 94
Registration test, analog (TEST_01), 13
Registration test, digital (TEST_30), 56
Release test (TEST_20), 40
Release, CDMA test (TEST_44), 81
response
 compressor, TEST_12, 28
 expandor, TEST_14, 32
reverse voice channel. *See* RVC
RF Frequency Error
 TEST_33, 61
RF level
 for signaling, parameter, 164
 for SINAD at extremes, parameter,
 163, 172
 for SINAD at extremes, parameter
 (NAMPS), 163, 170
 for SINAD, parameter, 171
 for SINAD, parameter (NAMPS), 169
 FVC message error rate, parameter,
 167
 sensitivity, parameter, 176
RF Level for Sensitivity parameter, 176
RF output power
 digital, TEST_36, 66
RF Power Output test (TEST_04), 17
Rho pass/fail limits, 135
Rho test (TEST_33), 61
RT definition, 142

-
- RT parameters
- High Supply Voltage, 158, 163
 - Low Supply Voltage, 159, 163
 - Nominal Supply Voltage, 160
 - Protocol Std, 161
 - Rate Set Selection, 162
 - Test at Extreme Settings, 163
- RTD definition, 12, 142
- RTD tests
- RX/TX CDMA Quick General, 76
- running conditions. *See* RC parameters.
- RVC Data Deviation test (TEST_11), 26
- RX definition, 142
- RX parameter
- RF Level for Signaling, 164
- RX/TX CDMA Quick General test (TEST_41), 76
- RXA definition, 12, 142
- RXA parameters
- Audio Response Step Frequency, 165
 - Expander Step Level, 166
 - FVC Message Error Rate RF Level, 167
 - MRI Step Level, 168
 - NAMPS RF Level for SINAD, 169
 - NAMPS RF Level for SINAD at Extremes, 163, 170
 - RF Level for SINAD, 171
 - RF Level for SINAD at Extremes, 163, 172
 - Set Audio Lvl, 173
 - Tolerance for Setting Audio Level, 174
- RXA pass/fail limits
- Audio Distortion, 89
 - Audio Response Dev From -6 dB/oct R1, 90
 - Audio Response Dev From -6 dB/oct R2, 91
 - Expander Tracking Error <0, 92
 - Expander Tracking Error >0, 93
 - Expander Zero Reference Level, 94
 - FVC Order Message Error Rate, 97
 - Hum and Noise, 95
 - NAMPS Expander Zero Reference Level, 96
 - SINAD, 98
- RXA tests
- Audio Distortion test, 35
 - Audio Frequency Response, 34
 - Expander, 32
 - FVC Order Message Error Rate, 39
 - Hum and Noise, 36
 - MRI, 55
 - Quick General, 47
 - SINAD test, 37
- RXD definition, 12, 142
- RXD parameters
- Maximum Frames for FER, 175
 - RF Level for Sensitivity, 176
 - Sensitivity FER Search Specification (%), 177
 - Sensitivity Fer Search Step Level (dB), 178
- RXD tests
- dynamic range, 72
 - FER, traffic channel, 70
 - Sensitivity & Dynamic Range, 72
 - Sensitivity Level Search, 85
 - Traffic Channel FER, 70
- S**
- SAT Deviation pass/fail limits, 123
- SAT frequency
- AVC, parameter, 148
- SAT Frequency Error pass fail limits, 124
- SAT Tone parameter, 148
- SAT/DSAT test (TEST_10), 24
- sensitivity
- RF level, parameter, 176
- Sensitivity & Dynamic Range test (TEST_39), 72
- sensitivity FER search specification, parameter, 177
- sensitivity FER search step level (dB) parameter, 178
- Sensitivity Level Searchf test, TEST_47, 85
- Set Audio Lvl parameter, 173
- SID Number parameter, 149, 155
- Signaling Tone Deviation pass/fail limits, 125
- Signaling Tone Frequency pass/fail limits, 126
- Signaling Tone/DST test (TEST_08), 22
- SINAD pass/fail limits, 98
- SINAD test (TEST_18), 37
- Softer Handoff test (TEST_40), 74
- software
- accessories included, 140
 - features of HP 83217A, 139
 - functions of HP 83217A, 138
- specifications. *See* pass/fail limits.
- Spectrum Averages parameter, 156
- Spectrum Emissions test (TEST_43), 79
- start level
- compressor, parameter, 181
- StaticTiming Offset test (TEST_33), 61
- step frequency
- audio frequency response, receiver, parameter, 165
 - audio frequency response, transmitter, parameter, 180
 - deviation, input signal, parameter, 184
- step level
- compressor, parameter, 182
 - expander, parameter, 166
- supervisory audio tone. *See* SAT supply voltage
-

-
- high, parameter, [158, 163](#)
 - low, parameter, [159, 163](#)
 - nominal, parameter, [160](#)
 - Switch Channels Start Channel parameter, [187](#)
 - Switch Channels Step Channel parameter, [188](#)
 - Switch Channels Stop Channel parameter, [189](#)
 - Switch Channels test (TEST_26), [51](#)
 - synchronization
 - to pilot PN sequence, [136](#)
 - system identification number. *See* SID.
- T**
- Talk Time test, TEST_46, [84](#)
 - Test at Extreme Settings parameter, [163](#)
 - TEST_01 TXA CPA Registration, [13](#)
 - TEST_02 CPA Page, [15](#)
 - TEST_03 TXA Frequency Error, [16](#)
 - TEST_04 TXA RF Output Power, [17](#)
 - TEST_05 TXA FM Hum and Noise, [23](#)
 - TEST_05 TXA Modulation Deviation Limiting, [18](#)
 - TEST_06 TXA Audio Frequency Response, [20](#)
 - TEST_07 TXA Audio Distortion, [21](#)
 - TEST_08 TXA Signaling Tone/DST, [22](#)
 - TEST_10 TXA SAT/DSAT, [24](#)
 - TEST_11 TXA RVC Data Deviation, [26](#)
 - TEST_12 TXA Compressor Response, [28](#)
 - TEST_13 TXA Current Drain, [30](#)
 - TEST_14 RXA Expander, [32](#)
 - TEST_15 RXA Audio Frequency Response, [34](#)
 - TEST_16 RXA Audio Distortion, [35](#)
 - TEST_17 RXA Hum and Noise, [36](#)
 - TEST_18 RXA SINAD, [37](#)
 - TEST_19 RXA FVC Order Message Error Rate, [39](#)
 - TEST_20 CPA Release, [40](#)
 - TEST_21 CPA Origination, [41](#)
 - TEST_22 OTA No Audio Functional, [42](#)
 - TEST_23 TXA Quick General, [44](#)
 - TEST_24 RXA Quick General, [47](#)
 - TEST_25 CPA Flow Chart, [49](#)
 - TEST_26 TXA Switch Channels, [51](#)
 - TEST_27 CPA Hook Flash, [53](#)
 - TEST_28 TXA DTMF Frequency Error, [54](#)
 - TEST_29 RXA MRI, [55](#)
 - TEST_30 CPD Registration, [56](#)
 - TEST_30 TXD Waveform Quality & Freq Acc, [61](#)
 - TEST_31 CPD Origination, [58](#)
 - TEST_32 CPD Page, [60](#)
 - TEST_34 TXD Open Loop Power Range, [62](#)
 - TEST_35 TXD Closed Loop Power Control, [64](#)
 - TEST_36 TXD Maximum RF Output Power, [66](#)
 - TEST_37 TXD Minimum Controlled Output Power, [68](#)
 - TEST_38 RXD Traffic Channel FER, [70](#)
 - TEST_39 RXD Sensitivity & Dynamic Range, [72](#)
 - TEST_40 CPD Softer Handoff, [74](#)
 - TEST_41 RTD RX/TX CDMA Quick General, [76](#)
 - TEST_42 CPD CDMA Voice Quality, [78](#)
 - TEST_43 TXD Spectrum Emissions, [79](#)
 - TEST_44 CPD CDMA Release, [81](#)
 - TEST_45 CPD Digital to Analog Handoff, [82](#)
 - TEST_46 CPD Talk Time, [84](#)
 - TEST_47 RXD Sensitivity Level Search, [85](#)
 - Timing Offset pass/fail limits, [136](#)
 - Timing Offset test (TEST_33), [61](#)
 - Tolerance for Setting Audio Level parameter, [174](#)
 - tone sequence
 - DSAT, parameter, [144](#)
 - tracking error
 - <0, receiver, pass/fail limits, [92](#)
 - <0, transmitter, pass/fail limits, [102](#)
 - >0 dB, transmitter, pass/fail limits, [103](#)
 - >0, receiver, pass/fail limits, [93](#)
 - Traffic Channel FER test (TEST_38), [70](#)
 - transmitter tests, analog. *See* TXA tests.
 - transmitter tests, digital. *See* TXD tests.
 - Transient/ss data parameter, [190](#)
 - TS Atten for Signaling parameter, [191](#)
 - TSB-74 protocol, [161](#)
 - TX definition, [142](#)
 - TX parameters
 - Units for Pwr Meas, [179](#)
 - TXA definition, [12, 142](#)
 - TXA parameters
 - Audio Response Step Frequency (kHz), [180](#)
 - Compressor Start Level (dB), [181](#)
 - Compressor Step Level, [182](#)
 - Current Drain Levels Tested, [183](#)
 - Frequency Deviation Step Frequency, [184](#)
 - Mod Dev Limit 50 Hz HPF, [185](#)
-

-
- Output Power Levels Tested, 186
 - Switch Channels Start Channel, 187
 - Switch Channels Stop Channel, 188
 - Switch Channels Stop Channel, 189
 - Trnsient/ss data, 190
 - TS Atten for Signaling, 191
 - TXA pass/fail limits
 - Audio Distortion, 99
 - Audio Response Dev From 6 dB/oct, 100
 - Audio Response Roll >2.5 kHz, 101
 - Compressor Tracking Error <0 dB, 102
 - Compressor Tracking Error >0, 103
 - Current Drain @ Levels 0-3, 104
 - Current Drain @ Levels 4-7, 105
 - DTMF Frequency Error, 106
 - Frequency Error, 108
 - Hum and Noise, 107
 - Modulation Limiting, 109
 - NAMPS DSAT Closure, 110
 - NAMPS DSAT Deviation, 111
 - NAMPS DSAT Phase Jitter, 112
 - NAMPS Modulation Limiting, 113
 - Output Power at Level 0, 114
 - Output Power at Level 1, 116
 - Output Power at Level 2, 117
 - Output Power at Level 3, 118
 - Output Power at Level 4, 119
 - Output Power at Level 5, 120
 - Output Power at Level 6, 121
 - Output Power at Level 7, 122
 - SAT Deviation, 123
 - SAT Frequency Error, 124
 - Signaling Tone Deviation, 125, 126
 - Wideband Data Deviation Steady State, 127
 - Wideband Data Deviation Transient, 128
 - TXA tests
 - Audio Distortion, 21
 - Audio Frequency Response, 20
 - Compressor Response, 28
 - Current Drain, 30
 - DTMF Frequency Error, 54
 - FM Hum and Noise, 23
 - Frequency Error, 16
 - Modulation Deviation Limiting test, 18
 - output power, 51
 - Quick General, 44
 - RF frequency error, 51
 - RF Power Output, 17
 - RVC Data Deviation, 26
 - SAT frequency error, 51
 - SAT/DSAT, 24
 - Signaling Tone/DST, 22
 - Switch Channels, 51
 - TXD definition, 12, 142
 - TXD parameters
 - Antenna Gain, 192
 - TXD pass/fail limits
 - Closed Loop Power Control Range, 129
 - Frequency Error, 130
 - Minimum Controlled Output Power, 131
 - Open Loop Output Power @ Ior=-105dBm, 132
 - Open Loop Output Power @ Ior=-25dBm, 133
 - Open Loop Output Power @ Ior=-65dBm, 134
 - Rho, 135
 - Timing Offset, 136
 - TXD tests
 - amplitude error, 61
 - carrier feedthrough, 61
 - Closed Loop Power Control, 64
 - emissions, spectrum, 79
 - frequency accuracy, 61
 - Maximum RF Output Power, 66
 - Minimum Controlled Output Power, 68
 - Open Loop Power Range, 62
 - phase error, 61
 - power control, closed loop, 64
 - RF frequency error, 61
 - RF output power, maximum, 66
 - rho, 61
 - Spectrum Emissions, 79
 - static timing offset, 61
 - Waveform Quality & Freq Acc, 61
- U**
- Units for Pwr Meas parameter, 179
-

V

video averaging
 call processing, digital, parameter, [156](#)
voice quality, CDMA
 TEST_42, [78](#)
voltage
 supply, high, parameter, [158](#), [163](#)
 supply, low, parameter, [159](#), [163](#)
 supply, nominal, parameter, [160](#)
volume control
 setting, parameter, [173](#)
 tolerance for setting, parameter, [174](#)

W

waveform quality
 pass/fail limits, [135](#)
Waveform Quality & Freq Acc test
 (TEST_33), [61](#)
Wideband Data Deviation Steady State
 pass/fail limits, [127](#)
Wideband Data Deviation Transient
 pass/fail limits, [128](#)

Z

zero reference
 expandor (NAMPS), pass/fail limits,
 [96](#)
 expandor, pass/fail limits, [94](#)