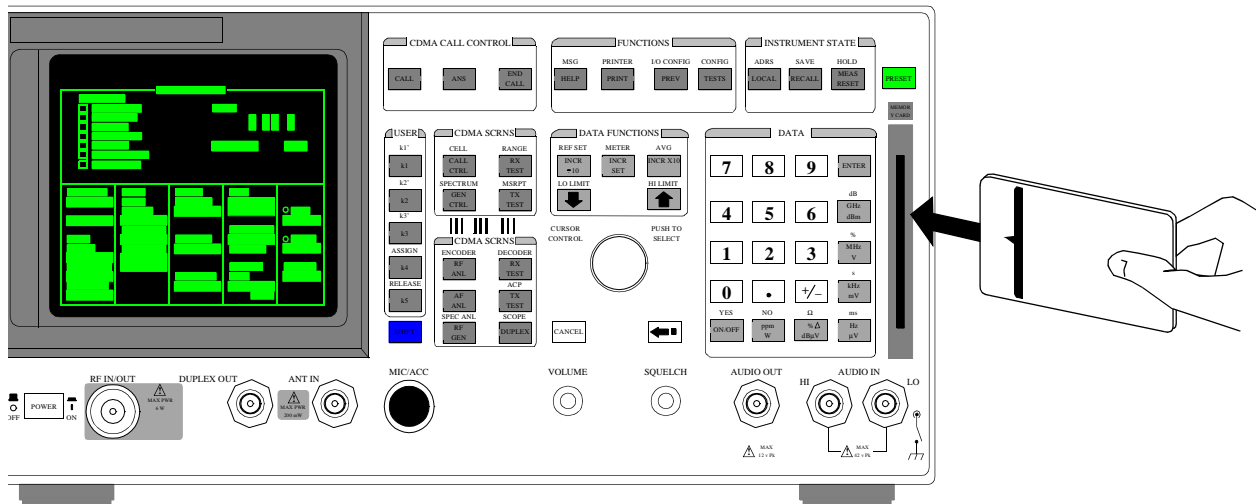


# HP 83217A Option 003 JCDMA/JTACS/NTACS TESTS

## *Reference Guide*

Software Revision A.02.03 and above



HP Part No. 83217-90010

Printed in U. S. A.

April 1999

Rev. B

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**Product Description**

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## Description

The HP 83217A Option 003 Software when used with the HP 8924C CDMA Mobile Test Set provides parametric test capability for 800 MHz CDMA/JTACS/NTACS Mobile Stations.

The HP 83217A Option 003 Software can be used for the installation, maintenance, and/or repair of CDMA or CDMA/JTACS/NTACS Mobile Stations.

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## Software Functions

- Parametric verification of CDMA mobile station transmitter and receiver performance.
- Parametric verification of JTACS/NTACS 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.
- Tests 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.

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## Items Included in the HP 83217A, Option 003 Software

- Memory cards:
  - (1) 2 Mbyte Flash (containing the HP 83217A option 003 software), part number 83217-90010.
  - (1) Uninitialized 64 Kbyte SRAM (for storage), part number HP 83230A.
- *HP 83217A Test Software Introduction to Operation.*
- *HP 83217A Test Software User's Guide.*
- *HP 83217A Opt. 001 CDMA/JTACS/NTACS Test Reference Guide.*
- HP software product license agreement.

Chapter 1, Product Description  
Items Included in the HP 83217A, Option 003 Software



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## Test Descriptions

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## 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:

- ARIB STD-T53 Part I and Part III

With the exception of tests:

[TEST\\_13 - TXA Current Drain](#)

[TEST\\_19 - RXA FVC Order Message Error Rate](#)

Which are not derived from any particular standard, but instead are derived from customer needs relating to standard mobile phone operation.

## 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

## Other Nomenclature

- MSUR - Mobile Station Under Test

---

## 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 **SCRATCH C** command in IBASIC.

## Test Descriptions

### Test Descriptions

**Pass/Fail Limits Used**

- None

**Parameters Used**

- **2. CPA Control Channel**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. 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

<b>Description</b>	<p>Initiates a call to the mobile station from the base station. Specifically, this test does the following:</p> <ol style="list-style-type: none"><li>1. Performs a page to the MSUT</li><li>2. Performs 3 of 5 majority voting on the Reverse Control Message</li><li>3. Performs BCH (Bose-Chaudhuri-Hocquenghem) error detection and correction of the Reverse Control Message</li><li>4. Tests each section of the page response, bit by bit</li><li>5. Sends an Initial-Voice-Channel-Designation order to the MSUT, directing it to tune to a voice channel obtained from the <b>Channel Information</b> table. If the channel number from the table has an N 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.</li><li>6. Sends an ALERT order to the MSUT by way of the Forward Voice Channel (FVC)</li><li>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.</li></ol>
<b>Pass/Fail Limits Used</b>	<ul style="list-style-type: none"><li>• None</li></ul>
<b>Parameters Used</b>	<ul style="list-style-type: none"><li>• <b>2. CPA Control Channel</b></li><li>• <b>3. CPA DSAT Vector [0 thru 6]</b></li><li>• <b>4. CPA Enter Ph# [0=If Needed,1=Always,Here]</b></li><li>• <b>5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]</b></li><li>• <b>6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]</b></li><li>• <b>7. CPA SAT Tone (Hz)</b></li><li>• <b>22. RX RF Level for Signaling (dBm)</b></li><li>• <b>49. TXA TS Atten for Signaling [0, 20, 40] (dB)</b></li></ul>

---

## 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 20. 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**

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

**Parameters Used**

- [2. CPA Control Channel](#)
- [3. CPA DSAT Vector \[0 thru 6\]](#)
- [4. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [5. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [6. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\] 0](#)
- [7. CPA SAT Tone \(Hz\)](#)
- [15. RT High Supply Voltage \(Vdc\)](#)
- [16. RT Low Supply Voltage \(Vdc\)](#)
- [17. RT Nominal Supply Voltage \(Vdc\)](#)
- [20. 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 Carrier Power

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### NOTE:

This test will not run if all three of the following conditions are true:

1. The test set is an HP 8924E.
2. The test set does not include a spectrum analyzer (hardware Option 012).
3. Parameter 21 is set to YES.

If any of these conditions is not true, the test will run.

---

### 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 20. 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 36. TX Units for Pwr Meas \[0=dBm 1=Watts\]](#).

### Pass/Fail Limits Used

- [11. TXA Carrier Power at Level 0 \(dBm\)](#)
- [12. TXA Carrier Power at Level 1 \(dBm\)](#)
- [13. TXA Carrier Power at Level 2 \(dBm\)](#)
- [14. TXA Carrier Power at Level 3 \(dBm\)](#)
- [15. TXA Carrier Power at Level 4 \(dBm\)](#)
- [16. TXA Carrier Power at Level 5 \(dBm\)](#)
- [17. TXA Carrier Power at Level 6 \(dBm\)](#)
- [18. TXA Carrier Power at Level 7 \(dBm\)](#)

---

### NOTE:

Normally, all power levels are tested; however, [parameter 37. TXA Carrier Power Levels Tested \[BWD #\]](#) allows you to select only the levels you want tested.

**Parameters Used**

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



---

## TEST\_05 - TXA Peak Frequency Deviation

### 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 5.7 kHz deviation by the MSUT (3 kHz deviation for narrow analog operation).
3. The audio generator's level is increased by 20 dB.
4. 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 43. TXA Peak Frequency Deviation Step Freq \(kHz\)](#). 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

- [29. TXA Peak Frequency Deviation \(kHz\)](#)
- [28. TXA NTACS Peak Frequency Deviation \(kHz\)](#)

## 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 20. 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 AID Number](#)
- [3. CPA DSAT Vector \[0 thru 6\]](#)
- [4. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [5. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [6. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\]](#)
- [7. CPA SAT Tone \(Hz\)](#)
- [14. RC Compandor is Always On \[0=no 1=yes\]](#)
- [15. RT High Supply Voltage \(Vdc\)](#)
- [16. RT Low Supply Voltage \(Vdc\)](#)
- [17. RT Nominal Supply Voltage \(Vdc\)](#)
- [20. RT Test at Extreme Settings \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [43. TXA Peak Frequency Deviation Step Freq \(kHz\)](#)
- [44. TXA Pk Freq Dev 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 .

**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 2.3 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**

- **10. TXA Audio Response Dev from 6 dB/oct (dB)**

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **36. 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 9. TXA Audio Distortion (dB)**, as required.

Transmitter audio distortion is expressed in percent.

**Pass/Fail Limits Used**

- **9. TXA Audio Distortion (dB)**

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **42. TXA De-emphasis [0=off 1=on]**
- **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

- **26. TXA NTACS DSAT Deviation (Hz)**
- **32. TXA Signaling Tone Deviation (kHz)**
- **33. TXA Signaling Tone Frequency (kHz)**

### Parameters Used

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. 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 23. 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**

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

**Parameters Used**

- [2. CPA Control Channel](#)
- [3. CPA DSAT Vector \[0 thru 6\]](#)
- [4. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [5. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [6. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\]](#)
- [7. CPA SAT Tone \(Hz\)](#)
- [14. RC Compandor is Always On \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [42. TXA De-emphasis \[0=off 1=on\]](#)
- [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.

## Test Descriptions

### Test Descriptions

#### Pass/Fail Limits Used

- 25. TXA NTACS DSAT Closure (%)
- 26. TXA NTACS DSAT Deviation (Hz)
- 27. TXA NTACS DSAT Phase Jitter (%)
- 30. TXA SAT Deviation (kHz)
- 31. TXA SAT Frequency Error (Hz)

#### Parameters Used

- 2. CPA Control Channel
- 3. CPA DSAT Vector [0 thru 6]
- 4. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 7. CPA SAT Tone (Hz)
- 14. 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 Transient/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 Transient/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 34. 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 35. TXA Wideband Data Deviation Transient (kHz)**.

The third method, selected by setting **parameter 48. TXA Transient/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  $\pm 6.4 \text{ kHz} \pm 10\%$  (or a total of  $\pm 7.04 \text{ kHz}$ ). This test 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 6.4 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**

- **26. TXA NTACS DSAT Deviation (Hz)**
- **34. TXA Wideband Data Deviation Steady State (kHz)**
- **35. TXA Wideband Data Deviation Transient (kHz)**

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **48. TXA Transient/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 2.3 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 **parameter 40. TXA Compressor Stop Level (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.

**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.

Test Descriptions  
Test Descriptions

**Pass/Fail Limits  
Used**

- **19. TXA Compressor Tracking Error dB (dB)**

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor 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.

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

- **20. TXA Current Drain @Levels 0-3 (Amps)**
- **21. TXA Current Drain @Levels 4-7 (Amps)**

### Parameters Used

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. 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 2.3 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 Start Level (dB)**. The rms deviation is measured and the expander response relative to the reference is calculated.
- Deviation is varied over the desired range and the expander response relative to the "zero crossing" point is calculated.
- The sweep will go from **parameter 24. RXA Expander Start Level (dB)** to **parameter 26. RXA Expander Stop Level (dB)**. **Parameter 25. RXA Expander Step Level (dB)** will be made negative if **parameter 24.** is greater than **parameter 26.** and positive if **parameter 24.** is less than **parameter 26.**. Therefore, the sign used with **parameter 25. RXA Expander Step Level (dB)** is a don't care.

### 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.

## Test Descriptions

### Test Descriptions

#### Pass/Fail Limits Used

- 3. RXA Expander Track Error (dB)
- 4. RXA Expander Zero Reference Level (dBV)
- 6. RXA NTACS Expander Zero Reference Level (dBV)

#### Parameters Used

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



---

## TEST\_15 - RXA Audio Frequency Response

### Description

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

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 \(kHz\)](#).

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 2.3 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 \(dB\)](#)

### Parameters Used

- [2. CPA Control Channel](#)
- [3. CPA DSAT Vector \[0 thru 6\]](#)
- [4. CPA Enter Ph# \[0=If Needed,1=Always,Here\]](#)
- [5. CPA MIN From? \[0=RECC,1=All 0's,2=Phone #\]](#)
- [6. CPA Prt RECC RVC Data \[0=no 1=yes 2=fail\]](#)
- [7. CPA SAT Tone \(Hz\)](#)
- [14. RC Compandor is Always On \[0=no 1=yes\]](#)
- [22. RX RF Level for Signaling \(dBm\)](#)
- [23. RXA Audio Response Step Frequency \(kHz\)](#)
- [30. RXA Set Audio Lvl \[0=no XX=level volts\]](#)
- [31. 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 CCITT audio filter or the C-Message audio filter if it is installed in the test system. Otherwise, it uses the 300 Hz HPF and 3kHz LPF filters.

- A -50 dBm RF signal is applied to the receiver's antenna.
- The -50 dBm RF signal is modulated to deviate to 2.3 kHz at a 1 kHz rate with a 6000 Hz SAT tone present.
- Narrow analog operation uses 1.5 kHz deviation and DSAT.

**Pass/Fail Limits Used**

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

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **30. RXA Set Audio Lvl [0=no XX=level volts]**
- **31. 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 6.4 kHz at a 1 kHz rate with a SAT tone present.
- The SAT tone is always on during this test.
- Narrow analog operation uses 1.5 kHz deviation and DSAT.

### Pass/Fail Limits Used

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

### Parameters Used

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **30. RXA Set Audio Lvl [0=no XX=level volts]**
- **31. 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 28. 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 at Extremes \(dBm\)](#)) is modulated to deviate to 2.3 kHz at a 1 kHz rate with a SAT tone present.
- The measurement is repeated at high and low supply voltages if [parameter 20. RT Test at Extreme Settings \[0=no 1=yes\]](#) is set to 1.
- Narrow analog operation uses 1.5 kHz deviation and DSAT.

### Pass/Fail Limits Used

- [8. 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 20. 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.

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. RC Compandor is Always On [0=no 1=yes]**
- **15. RT High Supply Voltage (Vdc)**
- **16. RT Low Supply Voltage (Vdc)**
- **17. RT Nominal Supply Voltage (Vdc)**
- **20. RT Test at Extreme Settings [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **28. RXA RF Level for SINAD (dBm)**
- **30. RXA Set Audio Lvl [0=no XX=level volts]**
- **28. RXA RF Level for SINAD (dBm)**
- **29. RXA RF Level for SINAD at Extremes (dBm)**
- **30. RXA Set Audio Lvl [0=no XX=level volts]**
- **31. 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 27. 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 %.

This test is not specified by TIA/EIA standards.

**Pass/Fail Limits Used**

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

**Parameters Used**

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

---

## TEST\_20 - CPA Release

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### NOTE:

As part of the release test, the test software ordinarily measures power and time. However, if the test set is an HP 8924E, and the test set does not include a spectrum analyzer (hardware Option 012), and **parameter 21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]** is set to YES, the test will perform only the call processing release function. In such case, no measurements are made.

---

### Description

This test provides the necessary commands to release the mobile unit.

The test works as follows:

- 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

- None

### Parameters Used

- **2. CPA Control Channel**
- **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)**
- **21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **36. 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 N 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

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



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## **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 Carrier Power**
- 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 28. 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**

- 24. TXA Frequency Error (ppm)
- 25. TXA NTACS DSAT Closure (%)
- 26. TXA NTACS DSAT Deviation (Hz)
- 27. TXA NTACS DSAT Phase Jitter (%)
- 12. TXA Carrier Power at Level 1 (dBm)
- 12. TXA Carrier Power at Level 1 (dBm)
- 13. TXA Carrier Power at Level 2 (dBm)
- 14. TXA Carrier Power at Level 3 (dBm)
- 15. TXA Carrier Power at Level 4 (dBm)
- 16. TXA Carrier Power at Level 5 (dBm)
- 17. TXA Carrier Power at Level 6 (dBm)
- 18. TXA Carrier Power at Level 7 (dBm)
- 30. TXA SAT Deviation (kHz)
- 31. TXA SAT Frequency Error (Hz)
- 32. TXA Signaling Tone Deviation (kHz)
- 32. TXA Signaling Tone Deviation (kHz)
- 34. TXA Wideband Data Deviation Steady State (kHz)
- 35. TXA Wideband Data Deviation Transient (kHz)

**Parameters Used**

- 2. CPA Control Channel
- 3. CPA DSAT Vector [0 thru 6]
- 4. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 7. CPA SAT Tone (Hz)
- 14. RC Compandor is Always On [0=no 1=yes]
- 15. RT High Supply Voltage (Vdc)
- 16. RT Low Supply Voltage (Vdc)
- 17. RT Nominal Supply Voltage (Vdc)
- 20. RT Test at Extreme Settings [0=no 1=yes]
- 21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 28. RXA RF Level for SINAD (dBm)
- 28. RXA RF Level for SINAD (dBm)
- 31. RXA Tolerance for Setting Audio Level (% error)
- 35. TX Units for Power Meas [0=dBm 1=Watts]
- 37. TXA Carrier Power Levels Tested [BWD #]
- 48. TXA Transient/ss data [0=tran 1=bth 2=ss]
- 49. TXA TS Atten for Signaling [0, 20, 40] (dB)

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## **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 Carrier Power**
- TEST\_05 - TXA Peak Frequency Deviation**
- 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**

## Test Descriptions

### Test Descriptions

#### Pass/Fail Limits Used

- 9. TXA Audio Distortion (dB)
- 10. TXA Audio Response Dev from 6 dB/oct (dB)
- 11. TXA Carrier Power at Level 0 (dBm)
- 12. TXA Carrier Power at Level 1 (dBm)
- 13. TXA Carrier Power at Level 2 (dBm)
- 14. TXA Carrier Power at Level 3 (dBm)
- 15. TXA Carrier Power at Level 4 (dBm)
- 16. TXA Carrier Power at Level 5 (dBm)
- 17. TXA Carrier Power at Level 6 (dBm)
- 18. TXA Carrier Power at Level 7 (dBm)
- 23. TXA FM Hum and Noise (dB)
- 24. TXA Frequency Error (ppm)
- 29. TXA Peak Frequency Deviation (kHz)
- 25. TXA NTACS DSAT Closure (%)
- 26. TXA NTACS DSAT Deviation (Hz)
- 27. TXA NTACS DSAT Phase Jitter (%)
- 25. TXA NAMPS Modulation Limiting (kHz)
- 30. TXA SAT Deviation (kHz)
- 31. TXA SAT Frequency Error (Hz)
- 32. TXA Signaling Tone Deviation (kHz)
- 33. TXA Signaling Tone Frequency (kHz)
- 34. TXA Wideband Data Deviation Steady State (kHz)
- 35. TXA Wideband Data Deviation Transient (kHz)

**Parameters Used**

- 2. CPA Control Channel
- 3. CPA DSAT Vector [0 thru 6]
- 4. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 7. CPA SAT Tone (Hz)
- 14. RC Compandor is Always On [0=no 1=yes]
- 15. RT High Supply Voltage (Vdc)
- 16. RT Low Supply Voltage (Vdc)
- 17. RT Nominal Supply Voltage (Vdc)
- 20. RT Test at Extreme Settings [0=no 1=yes]
- 21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 31. RXA Tolerance for Setting Audio Level (% error)
- 35. TX Units for Power Meas [0=dBm 1=Watts]
- 36. TXA Audio Response Step Frequency (kHz)
- 39. TXA Compressor Step Level (dB)
- 43. TXA Peak Frequency Deviation Step Freq (kHz)
- 44. TXA Pk Freq Dev 50 Hz HPF [0=off 1=on]
- 37. TXA Carrier Power Levels Tested [BWD #]
- 48. TXA Transient/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 (dB)**
- **2. RXA Audio Response Dev from -6 dB/oct (dB)**
- **3. RXA Expander Track Error (dB)**
- **4. RXA Expander Zero Reference Level (dBV)**
- **5. RXA Hum and Noise (dB)**
- **6. RXA NTACS Expander Zero Reference Level (dBV)**
- **8. RXA SINAD (dB)**

**Parameters Used**

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

---

## TEST\_25 - CPA Flow Chart

---

### NOTE:

As part of the CPA flow chart test, the test software ordinarily measures power. However, if the test set is an HP 8924E, and the test set does not include a spectrum analyzer (hardware Option 012), and **parameter 21. RT Use DUPLEX OUT & ANT IN [0=no I=yes]** is set to YES, the test will perform the rest of the tests, but not the power measurements.

---

### Description

This test displays a flow-chart representing a cellular phone as it gains access to a system. It operates with JTACS and NTACS phones. Once you have established a voice channel using the flow chart for JTACS and NTACS 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 JTACS or NTACS 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 JTACS or NTACS phone, select the **Anl Page** field.
  - To originate an JTACS or NTACS 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

- **chn<sub>g</sub> chan** allows you to change cellular phone channels.
- **chn<sub>g</sub> 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.
- **chn<sub>g</sub> sat** allows you to change the Supervisory Audio Tone (SAT).
- **chn<sub>g</sub> dsat** allows you to change the digital supervisory audio tone (DSAT) for NTACS phones.
- **DTMF** allows you to measure the frequency error of the high and low tones from the DTMF generator in the phone.
- **maintenance** 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

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]**
- **22. RX RF Level for Signaling (dBm)**
- **35. TX Units for Power Meas [0=dBm 1=Watts]**
- **49. TXA TS Atten for Signaling [0, 20, 40] (dB)**

---

## TEST\_26 - TXA Switch Channels

---

### NOTE:

As part of the TXA switch channels test, the test software ordinarily measures power, RF frequency error, and SAT frequency error. However, if the test set is an HP 8924E, and the test set does not include a spectrum analyzer (hardware Option 012), and [parameter 21. RT Use DUPLEX OUT & ANT IN \[0=no 1=yes\]](#) parameter 22 is set to YES, the test will perform only the RF frequency error and SAT frequency error measurements.

---

### 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.

### Pass/Fail Limits Used

- [24. TXA Frequency Error \(ppm\)](#)
- [11. TXA Carrier Power at Level 0 \(dBm\)](#)
- [12. TXA Carrier Power at Level 1 \(dBm\)](#)
- [13. TXA Carrier Power at Level 2 \(dBm\)](#)
- [14. TXA Carrier Power at Level 3 \(dBm\)](#)
- [15. TXA Carrier Power at Level 4 \(dBm\)](#)
- [16. TXA Carrier Power at Level 5 \(dBm\)](#)
- [17. TXA Carrier Power at Level 6 \(dBm\)](#)
- [18. TXA Carrier Power at Level 7 \(dBm\)](#)
- [31. TXA SAT Frequency Error \(Hz\)](#)

**Parameters Used**

- 2. CPA Control Channel
- 3. CPA DSAT Vector [0 thru 6]
- 4. CPA Enter Ph# [0=If Needed,1=Always,Here]
- 5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]
- 6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]
- 7. CPA SAT Tone (Hz)
- 14. RC Compandor is Always On [0=no 1=yes]
- 21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]
- 22. RX RF Level for Signaling (dBm)
- 35. TX Units for Power 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**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. 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**

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

**Parameters Used**

- **2. CPA Control Channel**
- **3. CPA DSAT Vector [0 thru 6]**
- **4. CPA Enter Ph# [0=If Needed,1=Always,Here]**
- **5. CPA MIN From? [0=RECC,1=All 0's,2=Phone #]**
- **6. CPA Prt RECC RVC Data [0=no 1=yes 2=fail]**
- **7. CPA SAT Tone (Hz)**
- **14. 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 - 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. 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. 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 (>30 seconds) 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 *HP 8924C Reference Guide* for information about the Sector A Power, RF Channel, Register, MS ID, and MS Database fields.

---

**NOTE:**

A **TEST\_29 - CPD Registration** or a **TEST\_30 - 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\_29 - CPD Registration** or the **TEST\_30 - 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_30 - 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* 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_31 - 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 and 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* 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_32- TXD Waveform Quality & Freq Acc

### Description

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

1. A Service Option 2 (or 9 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 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 ARIB STD-T53 Part III 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

- **37. TXD Frequency Error (Hz)**
- **43. TXD Rho**
- **44. TXD Timing Offset (us)**

### Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_33 - TXD Traffic Channel Open Loop Power

### Description

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

This test is performed as follows:

1. A Service Option 2 (or 9 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 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 ARIB STD-T53 Part III 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 measurement and the Average Power measurement is used for the following two measurements. 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 dBm <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.

**TEST\_33 - TXD Traffic Channel Open Loop Power****Pass/Fail Limits  
Used**

- **40. TXD Open Loop Output Power @ Ior=-104 dBm (dBm)**
- **41. TXD Open Loop Output Power @ Ior=-25dBm (dBm)**
- **42. TXD Open Loop Output Power @ Ior=-65dBm (dBm)**

**Parameters Used**

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **35. TX Units for Power Meas [0=dBm 1=Watts]**
- **50. TXD Antenna Gain (dB)**

---

## TEST\_34 - 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 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 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**

- **36. TXD Closed Loop Power Control Range (dB)**

**Parameters Used**

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_35- 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 ARIB STD-T53 Part III for this test.
2. A Service Option 2 (or 9 if [parameter 19. RT Rate Set Selection \[0=9600 1=14400\]](#) is set to 1) call is attempted, unless a Service Option 2 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 35. TX Units for Power 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 ARIB STD-T53 minimum standard for the Maximum RF Output Power test.

**Parameters Used**

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **35. TX Units for Power Meas [0=dBm 1=Watts]**
- **50. TXD Antenna Gain (dB)**

---

## TEST\_36 - 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 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1) call is attempted, unless a Service Option 2 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.

**TEST\_36 - TXD Minimum Controlled Output Power****Pass/Fail Limits  
Used**

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

**Parameters Used**

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **35. TX Units for Power Meas [0=dBm 1=Watts]**
- **50. TXD Antenna Gain (dB)**

---

## TEST\_37 - 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 19. 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.
3. AWGN is set to -54 dBm.
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 ARIB STD-T53 Part III.
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  $E_c/I_{or}=-16.3$  &  $E_b/N_t=3.8^1$
  - Traf Chan FER w/AWGN  $E_c/I_{or}=-15.8$  &  $E_b/N_t=4.3$
  - Traf Chan FER w/AWGN  $E_c/I_{or}=-15.6$  &  $E_b/N_t=4.5$
  - Traf Chan FER w/AWGN @ 4800bps &  $E_b/N_t=4.0$
  - Traf Chan FER w/AWGN @ 2400bps &  $E_b/N_t=4.5$
  - Traf Chan FER w/AWGN @ 1200bps &  $E_b/N_t=4.6$

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 ARIB STD-T53 Part III 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **32. RXD Maximum Frames for FER**
- **35. TX Units for Power Meas [0=dBm 1=Watts]**

---

## TEST\_38 - 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 19. 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. (For each test, FER%, number of frames counted and number of errors counted is displayed):
  - 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 ARIB STD-T53 Part III minimum standard for the Receiver Sensitivity and Dynamic Range test.

**Parameters Used**

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**
- **32. RXD Maximum Frames for FER**
- **34. RXD Sensitivity FER Search Specification (%)**

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## TEST\_39- CPD Softer Handoff

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### 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.

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### 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 19. 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

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## TEST\_40 - RTD RX/TX CDMA Quick General

### Description

This is a CDMA quick test to verify the functionality of the mobile stations's 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 19. 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**

- 37. TXD Frequency Error (Hz)
- 43. TXD Rho
- 44. TXD Timing Offset (us)

**Parameters Used**

- 9. CPD BID Number
- 11. CPD NID Number
- 12. CPD SID Number
- 18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]
- 19. RT Rate Set Selection [0=9600 1=14400]
- 22. RX RF Level for Signaling (dBm)
- 32. RXD Maximum Frames for FER
- 33. RXD RF Level for Sensitivity (dBm)
- 50. TXD Antenna Gain (dB)

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## TEST\_41 - CPD CDMA Voice Quality

<b>Description</b>	<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"><li>1. A Service Option 1 (or 9 if <b>parameter 19. RT Rate Set Selection [0=9600 1=14400]</b> 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 &lt;&gt;" will be displayed. To correct this problem, perform the CPD Registration test.</li><li>2. The Data Type field is set to "Echo" mode.</li><li>3. The operator is prompted to speak into the MSUT and then enter either "Pass" or "Fail" for the test.</li></ol>
<b>Pass/Fail Limits Used</b>	<ul style="list-style-type: none"><li>• None</li></ul>
<b>Parameters Used</b>	<ul style="list-style-type: none"><li>• <b>9. CPD BID Number</b></li><li>• <b>10. CPD Echo Delay [0, 2 or 5] (Seconds)</b><sup>1,2</sup></li><li>• <b>11. CPD NID Number</b></li><li>• <b>12. CPD SID Number</b></li><li>• <b>18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]</b></li><li>• <b>19. RT Rate Set Selection [0=9600 1=14400]</b></li><li>• <b>22. RX RF Level for Signaling (dBm)</b></li></ul>

1. Parameter 10 is used if you have a HP 8924C or HP 8924E with firmware A.02.03 or later.
2. The Echo Delay in a HP 8924E with firmware earlier than A.02.03 is fixed at 0 seconds.

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## TEST\_42 - TXD Spectrum Emissions

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### **NOTE:**

To run this test on an HP 8924E, Option 012 must be installed.

### **Description**

This test measures the level of emissions at 900 kHz and 1.98 MHz offset from the mobile station's carrier frequency.

1. A Service Option 2 (or 9 if **parameter 19. 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>
  - TXD Spectrum Lvl @ 1.98 MHz <dBc/30 kHz>

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

## Test Descriptions

### Test Descriptions

#### Pass/Fail Limits Used

The Pass/Fail limits for this test are hard-coded into the software. The values used were obtained from ARIB STD-T53 Part III minimum standard for the Conducted Spurious Emissions test.

#### Parameters Used

- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **13. CPD Spectrum Averages [10,20,50,100]**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_43 - CPD CDMA Release

### Description

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

1. A Service Option 2 (or 9) 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**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_44 - CPD Digital to Analog Handoff

### Description

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

1. A Service Option 1 (or 9 if **parameter 19. 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, 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 JTACS/NTACS 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. The reason is because this software does not use the analog call control subsystem to do call processing.

---



**Pass/Fail Limits  
Used**

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

**Parameters Used**

- **7. CPA SAT Tone (Hz)**
- **8. CPD Analog Channel for D/A Handoff**
- **9. CPD BID Number**
- **11. CPD NID Number**
- **12. CPD SID Number**
- **18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]**
- **19. RT Rate Set Selection [0=9600 1=14400]**
- **22. RX RF Level for Signaling (dBm)**

---

## TEST\_45 - CPD Talk Time

### Description

This test measures the mobile station battery life/talk time by simulating the battery load conditions experienced in a typical system.

1. Before a call is started, two questions are asked:  
    “Test urban topography or suburban topography?”  
    & “Loopback data mode or echo data mode?”

Where both questions are answered by pressing the appropriated USER key K1 or K2. The first question determines which mobile station transmit power statistics will be used during the test as defined by CDG Stage 4 Optional System performance Tests Revision 2.0. The second question determines which service option and data type or data rate in the CDMA CALL CONTROL screen will be used. Selecting loopback data mode sets Service Option 2 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 0 (rate set = 9600) or Service Option 9 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1 (rate set =14400). It also sets the data rate to ‘random’ which statistically spends an equal amount of time at each of the four data rates (about 47% on 53% off). Selecting echo data mode sets Service Option 1 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 0 (rate set = 9600) or Service Option 32768 if **parameter 19. RT Rate Set Selection [0=9600 1=14400]** is set to 1 (rate set = 14400)). It also sets the data type to ‘echo’ where **parameter 10. CPD Echo Delay [0, 2 or 5] (Seconds)** sets the echo delay. This allows the user to couple custom voice data into the mobile for voice echo.

---

### NOTE:

**Parameter 10. CPD Echo Delay [0, 2 or 5] (Seconds)** is used if you have a HP 8924C or HP 8924E with firmware A.02.03 or later.

2. The correct type of service option call as defined in step 1 above is attempted, unless that type of 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 link power is then cycled through a statistical profile to simulate actual system use. The Sector A power level is displayed at each new power level.
4. 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.
5. The timer is stopped and the talk time is displayed.
  - Mobile Talk Time is <talk time in minutes>

**Pass/Fail Limits  
Used**

- None

**Parameters Used**

- **19. RT Rate Set Selection [0=9600 1=14400]**
- **10. CPD Echo Delay [0, 2 or 5] (Seconds)**

---

## TEST\_46 - 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 [parameter 33. RXD RF Level for Sensitivity \(dBm\)](#) to a level that generates an FER greater than that specified by [parameter 34. RXD Sensitivity FER Search Specification \(%\)](#). The actual search 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 19. 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 34. 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 32. RXD Maximum Frames for FER](#). If a timeout occurs, a timeout message displays and the test continues.
7. Sector A Power is reduced in 0.5-dB steps until the measured FER is greater than that specified in [parameter 34. 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 Sensitivity FER@ <current mobile received power in dBm> <FER in %>

### Pass/Fail Limits Used

- None

### Parameters Used

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

---

## TEST\_47 - CPD SMS & Authentication

### Description

This test brings the SMS (Short Message Service) and Authentication test functionality provided by the HP 8924C/E firmware in the SMS and Authentication screens to this software. The test is provided in this software for test and result reporting convenience. The test is entirely menu driven with no associated parameters in the TESTS (Test Parameters) screen.

1. When the test is run, the user's first menu will have the following choices:
  - SMS test
  - Authentication Test
  - Quit
2. By selecting the SMS test menu, the following menu becomes available:

- Execute SMS
  - Data Mode :ASCII
  - Encoder Mode :7-bit ASCII
  - User Data :ABCDE
  - Duplicate User Data :1
  - Alert :Off
  - Priority :None
  - Privacy :None
  - Originator :89204001
  - Channel Type :Page
  - SMS Service Option :None
  - Return

Each SMS menu item is discussed below:

**Execute SMS** - when this item is selected, the SMS message in the User Data field is sent to the phone. The MS Acknowledge message must be sent to the test set confirming the receipt of the message for this activity to have a passing result.

**Data Mode** - this parameter can be set to ASCII or HEX. It indicates the type of data in the User Data field.

**Encoder Mode** - available choices are Octet or 7-bit ASCII. Sets the Encoder Mode for the data in the SMS message.

**User Data** - If the Data Mode is ASCII this field will accept up to 45 ASCII characters. If the Data Mode is HEX this field will accept up to 45 hexadecimal characters.

**Duplicate User Data** - determines the maximum number of copies of the entered ASCII or HEX data that will be sent in the SMS Data Burst Message. If a large number of copies are desired, and the length of the message times the number of copies exceeds the maximum length of an SMS message, the number of copies will be reduced until the entire message can be sent in each copy.

**Alert**- available choices are On or Off. Sets the Alert parameter in the SMS message.

**Priority** - available choices are None/Normal/Interactive/Urgent/Emergency. Sets the Priority parameter in the SMS message.

**Privacy** - available choices are None/No Restrict/Restricted/Confident/Secret. Sets the Privacy parameter in the SMS message.

**Originator Address** - This field will accept entries up to eleven digits long. This sets the originating address for the SMS message and is required for authentication testing of data burst messages.

**Channel Type** - available choices are Page or Traffic. This determines what channel the SMS message will be transmitted on.

**SMS Service Option** - available choices are None/Option 6/Option 14. This determines what service option is used when sending the SMS message. If None is selected, the current service option is used.

**Return** - returns to the main menu.

3. By selecting the Authentications test menu, the following menu becomes available

Register

MS Page

MS Origination

SSD Update

Unique Challenge

A-key: 00000000000000000000 Check Bits:

Return

Each Authentication menu item is discussed below:

Register - available choices are Zone/Timer/Return. Selecting either Zone or Time will cause a registration. This activity generates the Check bits. The AUTH\_MODE, AUTHR, RANDC, COUNT, and REG\_TYPE parameters are also obtained from this activity. The test will report if each of the received parameters from the phone match the expected values.

MS Page - Once the phone responds to the page, the AUTH\_MODE, AUTHR, RANDC and COUNT parameters are obtained. The test will report if each of the received parameters from the phone match the expected values.

MS Origination - Once the phone sends the origination message, the AUTH\_MODE, AUTHR, RANDC, and COUNT parameters are obtained. The test will report if each of the received parameters from the phone match the expected values.

SSD Update - A registration is required prior to this operation. If a registration is not performed, this operation will fail. This activity can be performed on the paging or traffic channel. There are no parameters that are received from the phone's response to the SSD Update. If the phone responds to the SSD Update correctly, the operation passes.

Unique Challenge - A registration is required prior to this operation. If a registration is not performed, this operation will fail. This activity can be performed on the paging or traffic channel. The AUTHU parameter is obtained from the mobile's response to the Unique Challenge request. The test will report if the received parameter from the phone match the expected value.

A-key - this is a user entry field, allowing up to 20 decimal digital. If the user does not enter anything into this field, the default data (all zero's) will be used.

Check Bits - The 6 decimal check digits are generated based on the A-key information, the ESN of the phone and appropriate encryption algorithm.

Return - returns to the main menu.

Test Descriptions  
Test Descriptions

**Pass/Fail Limits  
Used** • None

**Parameters Used** • User entered at run time. See menu descriptions above.



---

## Test 48\_TXD Access Probe Open Loop Power

This test measures the range of the mobile's access probe output power (reverse link) in response to changes in the Test Set's output power (forward link) while the mobile is being paged.

The test limits the page to the access channel where there is no closed loop power control, sets the access probe power step to 0 dB and measures the mobile's reverse link access probe power at the three specified forward link power levels.

### Pass/Fail Limits Used

- 40. TXD Open Loop Output Power @ Ior=-104 dBm (dBm)
- 41. TXD Open Loop Output Power @ Ior=-25dBm (dBm)
- 42. TXD Open Loop Output Power @ Ior=-65dBm (dBm)

### Parameters Used

- 18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]
- 35. TX Units for Power Meas [0=dBm 1=Watts]
- 50. TXD Antenna Gain (dB)

Test Descriptions  
**Test Descriptions**

---

## 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 (dB)

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 dB.

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  $-24$  dB at a normal audio output, enter  $-24$  as the Upper Limit.

## 2. RXA Audio Response Dev from $-6$ dB/oct (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 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  $+2$  to  $-2$  dB over the frequency range of 300 to 3000 Hz, enter  $-2$  as the Lower Limit and  $+2$  as the Upper Limit.

---

### 3. RXA Expander Track Error (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  $\pm 1$  dB, enter **-1** as the Lower Limit and **1** as the Upper Limit.

## 4. 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 19. TXA Compressor Tracking Error dB \(dB\)](#) 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  $\pm 1$  dB, enter **-21** as the Lower Limit and **-19** as the Upper Limit.



---

## 5. RXA Hum and Noise (dB)

This sets the pass/fail limits used in [TEST\\_17 - RXA Hum and Noise](#) and for the [TEST\\_24 - RXA Quick General](#) 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  $\pm 6.4$  kHz peak frequency deviation, enter **-26** as the Upper Limit.

## 6. RXA NTACS 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 NTACS Expander Zero Reference Level is not specified in the EIA/TIA standard for NTACS phones. The test is performed and pass/fail limits are available so that the operator can measure the RXA NTACS 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 19. TXA Compressor Tracking Error dB (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  $\pm 1$  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.)

---

## 7. 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:

- MSUT Specification

### **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.)

---

## 8. 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.

---

## 9. TXA Audio Distortion (dB)

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 dB.

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 – 26 dB, enter –26 as the Upper Limit.

## 10. 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  $\pm 2$  dB from a true 6 dB/octave pre-emphasis curve, enter **-2** as the Lower Limit and **2** as the Upper Limit.

## 11. TXA Carrier Power at Level 0 (dBm)

Pass/fail limits 11 through 18 set the pass/fail limits for output power levels 0 through 7 measured at the transmitter's output terminal. Units for the pass/fail limits are set by **parameter 35. TX Units for Power Meas [0=dBm 1=Watts]**. If Watts (1) is selected the software will automatically convert these units to Watts when comparing and displaying results. 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.

**Table 1**

Power Level	Nominal Value (dBm)	Lower Limit (dBm)	Upper Limit (dBm)
Level 0	34.5	30.5	36.5
Level 1	30.5	26.5	32.5
Level 2	26.5	22.5	28.5
Level 3	22.5	18.5	24.5
Level 4	18.5	14.5	20.5
Level 5	14.5	10.5	16.5
Level 6	10.5	6.5	12.5
Level 7	6.5	2.5	8.5

---

## 12. TXA Carrier Power at Level 1 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.



---

## 13. TXA Carrier Power at Level 2 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 14. TXA Carrier Power at Level 3 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 15. TXA Carrier Power at Level 4 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 16. TXA Carrier Power at Level 5 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 17. TXA Carrier Power at Level 6 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 18. TXA Carrier Power at Level 7 (dBm)

See [pass/fail limit 11. TXA Carrier Power at Level 0 \(dBm\)](#) for more information about this pass/fail limit.

---

## 19. TXA Compressor Tracking Error dB (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  $\pm 0.5$  dB, enter  $-0.5$  as the Lower Limit and  $0.5$  as the Upper Limit.

---

## 20. 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.



---

## 21. 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.

## 22. 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.

---

## 23. 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 26 dB below the level of a 1 kHz tone at  $\pm 2.3$  kHz deviation, enter **-26** as the Upper Limit.

## 24. 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  $\pm 3.0$  parts per million (ppm) of any assigned channel frequency, enter **-3.0** as the Lower Limit and **3.0** as the Upper Limit.

---

## 25. TXA NTACS 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 70%, you would enter **.70** as the lower limit and no upper limit.

## 26. TXA NTACS 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  $\pm 700$  Hz with a  $\pm 10$  % tolerance, you would enter **630** as the lower limit and **770** as the upper limit.

---

## 27. TXA NTACS 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 10%, you would enter **10** as the upper limit and no lower limit.

---

## 28. TXA NTACS Peak Frequency Deviation (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  $\pm 5$  kHz, you would enter 5 as the Upper Limit.



---

## 29. TXA Peak Frequency Deviation (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  $\pm 9.5$  kHz, you would enter **9.5** as the Upper Limit.

### 30. 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 1.7 kHz  $\pm$ 10 kHz, you would enter **1.53** as the Lower Limit and **1.87** as the Upper Limit.

---

## 31. 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  $\pm 1$  Hz, you would enter **-1** as the lower limit and **1** as the upper limit.

---

## 32. 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  $\pm 6.4$  kHz with a  $\pm 10\%$  tolerance, enter **5.76** as the Lower Limit and **7.04** as the Upper Limit.

---

### 33. 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 8 kHz  $\pm$ 1 Hz, enter **7.999** as the Lower Limit and **8.001** as the Upper Limit.

---

## 34. 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  $\pm 6.4$  kHz with a  $\pm 10\%$  tolerance, you would enter **5.76** as the Lower Limit and **7.04** as the Upper Limit.

Lower and Upper Limits must be entered in kHz.

---

## 35. 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  $\pm 6.4$  kHz with a  $\pm 10\%$  tolerance, you would enter **5.76** as the Lower Limit and **7.04** as the Upper Limit.

Lower and Upper Limits must be entered in kHz.

---

## 36. 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  $\pm 24$  dB around the open loop estimate, enter **24** as the lower limit.



---

## 37. 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  $\pm 300$  Hz of any assigned channel frequency, enter **-300** as the Lower Limit and **300** as the Upper Limit.

---

## 38. TXD Maximum RF Output Power (dBm)

This sets the pass/fail limits for the maximum controlled RF output power. 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 range of maximum RF output power to be +23 dBm to +30 dBm for the lower limit and 30 for the upper limit.

---

### 39. TXD Minimum Controlled Output Power (dBm)

This sets the pass/fail limits for the 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.

---

## 40. TXD Open Loop Output Power @ $I_{or} = -104$ 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  $I_{or} = -104$  dBm to be 18 dBm to the maximum allowable ERP for the mobile station class, then enter 18 as the lower limit and specify “Lower” for the check field. Any number placed in the upper field will be ignored if check field is set to “Lower”. If the “Check” field is set to “Lower” then the upper limit will be set by the maximum RF output power for the class of mobile station being tested.

---

## 41. TXD Open Loop Output Power @ I<sub>or</sub>=-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<sub>or</sub> = -25 dBm to be -48 dBm ±9.5 dB, then enter -57.5 as the lower limit and -38.5 as the upper limit.

---

## 42. TXD Open Loop Output Power @ $I_{or} = -65\text{dBm}$ (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  $I_{or} = -65\text{ dBm}$  to be  $-8\text{ dBm} \pm 9.5\text{ dB}$ , then enter  $-17.5$  as the lower limit and  $1.5$  as the upper limit.

---

## 43. 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.

#### 44. 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.



---

## 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 AID Number

This parameter is used to identify the Area Identification Number (AID) for the cellular phone's traffic area.

### **Example**

If the MSUT's AID number is 11100, you would enter 11100 as the value.

## 2. CPA Control Channel

This parameter is used to identify the control channel used by the MSUT. Primary control channels for System A are numbered from 418 to 440. Primary control channels for System B are numbered from 520 to 542. Both System A and System B allow even control channels only. 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 418 to set up a call with the MSUT, enter 418 as the value.

---

### 3. CPA DSAT Vector [0 thru 6]

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.

---

#### 4. 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**, 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 5. 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 4.** 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 5. 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 5. 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 4.** is set to **1231234567** and **parameter 5.** 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.

---

---

## 5. 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 5** 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 5** 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-95 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 5** to **0=RECC** and getting the MIN from the RECC Data from a MSUT that has an all zero MIN.

---

**NOTE:**

If **parameter 5** is set to **1=All 0's**, then **parameter 4. CPA Enter Ph# [0=If Needed,1=Always,Here]** is not used.

Setting **parameter 5** to **2=Phone #** causes the Test Set to derive the MIN from the phone number, depending on the entry in **parameter 4. CPA Enter Ph# [0=If Needed,1=Always,Here]** described below:

- If **parameter 4** contains a phone number, the phone number is used to derive a MIN.
- If **parameter 4** is set to **0=If Needed** or **1=Always** 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 5**.

---

## 6. 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



---

## 7. 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.

## 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.

### Example

If you want to handoff to a JTACS (even channels only) channel of 2, enter 2 as the value.

---

## 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 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.

---

### 13. 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.

## 14. 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.



---

## 15. 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 20. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 15. 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 20. RT Test at Extreme Settings [0=no 1=yes]** on page 166 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.

## 16. 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 20. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 13. 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 20. RT Test at Extreme Settings [0=no 1=yes]** on page 166 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.

---

## 17. 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 20. RT Test at Extreme Settings \[0=no 1=yes\] on page 166](#) 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.

---

## 18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]

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

### Example

If you want to use ARIB STD-T53 as the CDMA protocol standard, enter 3 as the value.

---

## 19. 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 18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]** must be set to 2 (TSB-74) or 3 (ARIB) if this parameter is set to 1 and the user expects the software to do rate set 2 (14400) testing. If **parameter 18. RT Prot Std [0=95 1=95A 2=TSB74 3=ARIB]** 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:

### Example

If you want to test at rate set 2, enter 1 as the value.

## 20. 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 15. RT High Supply Voltage (Vdc)**

**Parameter 16. RT Low Supply Voltage (Vdc)**

**Parameter 29. 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.

**TEST\_03 - TXA Frequency Error**

**TEST\_04 - TXA Carrier Power**

**TEST\_18 - RXA SINAD**

---

## 21. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]

This parameter allows you to select which RF ports on the test system will be used for cellular phone tests. A value of 0 causes the RF IN/OUT port to be used for both forward and reverse channels. A value of 1 causes the DUPLEX OUT port to be used for the forward channel and the ANT IN port to be used for the reverse channel.

Use of the DUPLEX OUT and ANT IN ports allows the RF link between the test system and the cellular phone to be established via antennas instead of coaxial cable.

---

**CAUTION:**

If the RF link is accomplished with antennas, it must be done inside a shielded environment to avoid interference with local cellular telephone service.

Do not overdrive the antenna port's 200 mW maximum input, particularly when measuring the maximum RF power of the MSUT.

---

---

## 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 Start Level (dB)

This parameter is the lowest 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 start the input level to the expander at 12.5 dB, enter **12.5**.

---

## 25. 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  $-5$ .

## 26. RXA Expander Stop Level (dB)

This parameter is the stop level it is the highest 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 stop the input level to the expander at -15 dB, enter -15.

---

## 27. 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.

## 28. RXA RF Level for SINAD (dBm)

This parameter sets the RF signal level for measuring SINAD 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.

---

## 29. 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 20. RT Test at Extreme Settings [0=no 1=yes]** must be set to “yes” for **parameter 29. RXA RF Level for SINAD at Extremes (dBm)** to be activated.

### Example

If you desire the RF signal level to be at –113 dBm, enter **–113** as the value.

### 30. 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.



---

## 31. RXA Tolerance for Setting Audio Level (% error)

### Example

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 30. RXA Set Audio Lvl \[0=no XX=level volts\]](#) 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).

## 32. 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 ARIB STD-T53 Part III. 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.

---

### 33. 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.

### 34. RXD Sensitivity FER Search Specification (%)

This parameter sets the FER specification that will be used to determine when to stop [TEST\\_46 - 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\\_46 - RXD Sensitivity Level Search](#) and not in [TEST\\_38 - 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.

---

### 35. TX Units for Power 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..

#### **Example**

If you want power displayed in watts, enter **1** as the value.

### 36. 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 **.5** as the value.

---

### 37. TXA Carrier Power Levels Tested [BWD #]

This parameter selects which output power levels will be tested in **TEST\_04 - TXA Carrier Power**. 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.

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

#### 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.

### 38. 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 15 dB, enter 15.



---

### 39. 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.

---

## 40. TXA Compressor Stop Level (dB)

This parameter SETS the stop level used to vary the input level to the expander in [TEST\\_12 - TXA Compressor Response](#). The values must be entered as dB.

### Example

If you desire to stop the relative input level at -30 dB, enter -30.

---

## 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.

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

### 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 De-emphasis [0=off 1=on]

This parameter allows you to turn on or off the de-emphasis filter on the test set in order to restore the received pre-emphasized signal.

### Example

If you want to turn off the de-emphasis filter in the test set, you would enter 0 as the value.

---

### 43. TXA Peak Frequency Deviation Step Freq (kHz)

This parameter is the step size used to vary the input signal frequency in **TEST\_05 - TXA Peak Frequency Deviation** . 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 **.5** as the value.

#### **44. TXA Pk Freq Dev 50 Hz HPF [0=off 1=on]**

This parameter activates a 50 Hz HPF in **TEST\_05 - TXA Peak Frequency Deviation**. 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**.

---

## 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 1039.

### 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 1039.

### Example

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

## 48. TXA Transient/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 ARIB STD-T53 Part III standard.)

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.

---

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