User Manual

Tektronix

CMD 80
Digital Radiocommunication Tester

070-9230-08

This document applies to firmware version 3.3
and above.

www.tektronix.com

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Use Proper Voltage Setting. Before applying power, ensure that the line selector is in the proper position for the power source being used.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and marking on the product. Consult the product manual for further ratings information before making connections to the product.

The common terminal is at ground potential. Do not connect the common terminal to elevated voltages.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:

WARNING High Voltage	Protective Ground (Earth) Terminal	CAUTION Refer to Manual	Double Insulated

Preface

This manual is divided into six chapters.

- *Getting Started* – This chapter contains information you need to know before you use the CMD 80 Digital Radiocommunication Tester.
- *Operating Basics* – This chapter describes the front and rear panel controls and connectors. It also includes an overall view of the menu structure.
- *Reference* – This chapter provides detailed information about the menu selections and the tests that can be performed using the tester. The chapter is divided into five sections:
  - *Network, System, and Standard*
  - *CDMA*
  - *Analog*
  - *TDMA*
  - *Additional Measurements*
  - *Audio Measurements*
- *Appendice*s – Seven appendices are included:
  - *Appendix A: Specifications* describes the characteristics of the tester.
  - *Appendix B:FM/AF Measurement Filters* describes the filters the tester uses during measurements.
  - *Appendix D: Remote Control* describes the general use and gives programming information for the remote control interfaces.
  - *Appendix E: Remote Control Commands* lists the specific commands used to operate the tester remotely.
  - *Appendix F: Remote Control Command Tables* is a tabular listing of remote control commands and related information.
  - *Appendix G: Special Remote Commands* describes special-purpose remote commands that provide for nonstandard operation of the tester.
  - *Appendix H: GPIB Error Codes* lists the error codes and associated messages that may occur when using the remote control commands.
- *Glossary* – The glossary describes technical terms and acronyms that might not be familiar.
- *Index* – The index provides a quick way to find information relating to a particular subject.

Contacting Tektronix

Product Support	For questions about using Tektronix measurement products, call toll free in North America: 1-800-833-9200 6:00 a.m. – 5:00 p.m. Pacific time Or contact us by e-mail: tm_app_supp@tek.com For product support outside of North America, contact your local Tektronix distributor or sales office.
Service support	Tektronix offers a range of services, including Extended Warranty Repair and Calibration services. Contact your local Tektronix distributor or sales office for details. For a listing of worldwide service centers, visit our web site.
Toll-free Number	In North America: 1-800-833-9200 An operator can direct your call.
Postal Address	Tektronix, Inc. Department or name (if known) P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com

Getting Started

This chapter briefly describes the CMD 80 Digital Radiocommunication Tester and explains how to operate the tester for the first time.

Product Description

The standard tester tests mobile radiotelephones using CDMA (Code Division Multiple Access) technology. Two options (analog and TDMA) are available to support testing of additional wireless technologies.

- The Analog option (Option B82) allows you to test analog mobile radiotelephones or test the analog operation of a dual-mode radiotelephones.
- The TDMA option (Option B84) allows you to test mobile radiotelephones using IS-136-A TDMA (Time Domain Multiple Access) technology.

CDMA Description

In CDMA mode, the tester tests are based on the EIA IS-95, EIA IS-95A, TSB-74, and J-STD-008 CDMA standards. The tester emulates a Code Division Multiple Access (CDMA) base station, makes a call to the mobile, and tests for all essential characteristics of a CDMA mobile station. The tester can measure the following key parameters:

- FER service option 2 or 9
- Frame errors
- Waveform quality
- Error vector magnitude
- Phase error
- Magnitude error
- Carrier feedthrough
- Frequency accuracy
- Power measurements
- Base station signaling for mobile testing

Analog Description (Option B82)

With the Analog mode option installed, the tester supports testing of analog radiotelephones or test the analog operation of dual-mode radiotelephones (CDMA/Analog Mode handsets). The analog tests are AMPs based.

The tester can measure the following key analog parameters:

- SINAD
- Frequency and deviation (SAT) frequency error
- RF power
- Distortion
- Hum and noise
- Frequency response
- Modulation limits

TDMA Description (Option B84)

With the TDMA mode option installed, the tester supports testing of TDMA (Time Domain Multiple Access) radiotelephones. The tester TDMA tests are based on the IS-136-A and IS-137-A standards.

The tester can measure the following key TDMA parameters:

- BER for receiver testing
- Error vector magnitude
- Phase error
- Magnitude error
- Adjacent channel power
- Power versus time (RF power transition time)
- Time alignment
- Carrier frequency error
- Frequency accuracy
- Power measurements mobile and base station

First Time Operation

This section contains information for new users who are unfamiliar with the tester. After unpacking, use the following procedure to verify proper operation of the tester.

Power Connection

Use the power cord supplied with the tester to connect to the local supply as follows:

1. Connect the power cord from the rear panel to the AC supply.

The tester accepts supply voltages from 110 VAC to 240 VAC (50 Hz to 400 Hz) (refer to *Appendix A:Specifications*, Table A–11 on page A–11).

2. Switch the tester power on by first pressing the rear panel power switch and then pressing the front-panel power switch. If necessary, adjust the front-panel CONTRAST control to optimize the display legibility.

***NOTE**. When the main power switch (on the rear panel above the power connector) is in the OFF position, the tester is disconnected from the AC power supply.*

When the main power switch is in the ON position and the front-panel power switch is in the STANDBY position, voltage is supplied to only the reference frequency oscillator and the front-panel STANDBY indicator (yellow LED). When the front-panel power switch is in the ON position (green LED lighted), all of the tester modules are supplied with operating voltage.

Functional Checks

The procedures in this section provide you with some simple opterations to verify that your tester is operating correctly. You will need a mobile station (radio telephone) to perform the tests.

Connect the Mobile Station

Connect the mobile station to the tester as follows:

1. Connect the RF IN/RF OUT N-type connector of the tester to the antenna connector of the mobile station as illustrated in Figure 1–1.

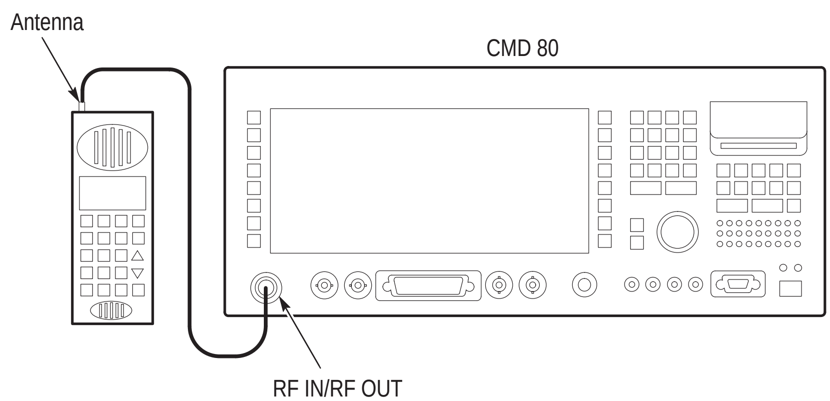

Figure 1–1: Mobile station input to the tester

***NOTE**. For accurate measurements, use a high quality RF cable with an attenuation of less than 0.5 dB.*

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2. Check that the mobile station is supplied with the correct operating voltage (battery or power supply).

There are three performace verification procedures; one for each system that the tester supports depending on the installed options.

CDMA Functional Check

Use the following procedure to establish communications between the tester and a mobile station operating in CDMA mode.

1. Perform the steps in *Power Connection* on page 1–3 and in *Connecting the Mobile Station* on page 1–4.
2. Press the **MENU HOME** front-panel key and check that the display is similar to that shown in Figure 1–2.
3. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. (The example displays show US CELLULAR as the network.)
4. Press the **SYSTEM** softkey to toggle between CDMA, ANALOG, or TDMA. Select CDMA as the system.

***NOTE**. The SYSTEM selection is available if you have Option B82 (Analog Mode) or Option B84 (TDMA Mode) installed in the tester. Otherwise, the softkey is not available and the system (CDMA) is indicated in a rounded box located below the NETWORK field.*

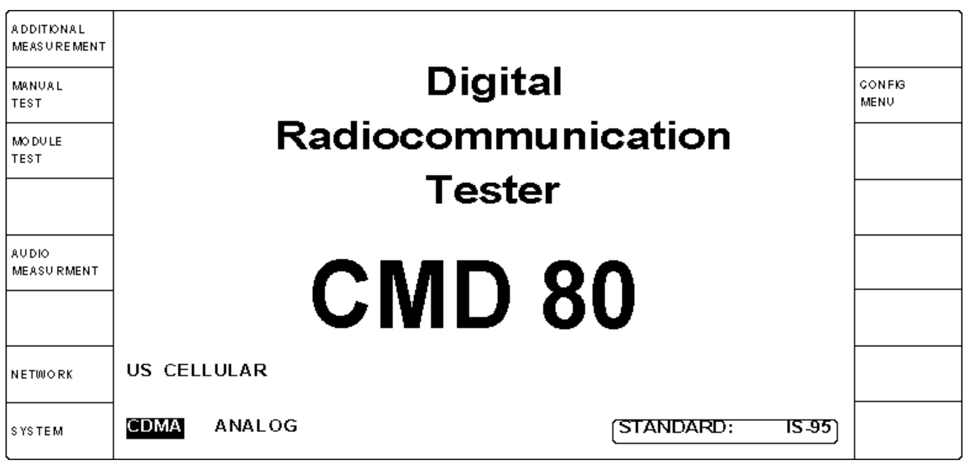


Figure 1–2: Home menu display

5. Press the **MANUAL TEST** softkey. The CDMA Manual Test (MS UNREGISTERED) screen is displayed until the mobile station has registered with the tester. See Figure 1–3.

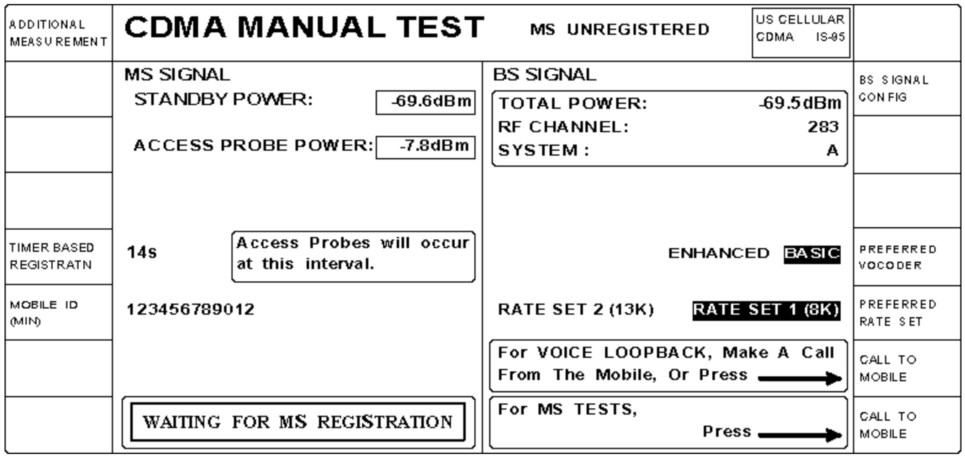


Figure 1–3: CDMA manual test — MS unregistered menu (initialization state)

***NOTE**. During initialization, the “Waiting for...” text block blinks on and off until the registration is complete (approximately 10 to 40 seconds).*

When initialization is complete, the tester displays a CDMA MS REGISTERED menu similar to Figure 1–4. If the mobile station does not connect, go to the BS SIGNAL CNFG menu via the CONFIG MENU softkey in the home menu and verify that the base station parameters are correctly configured.

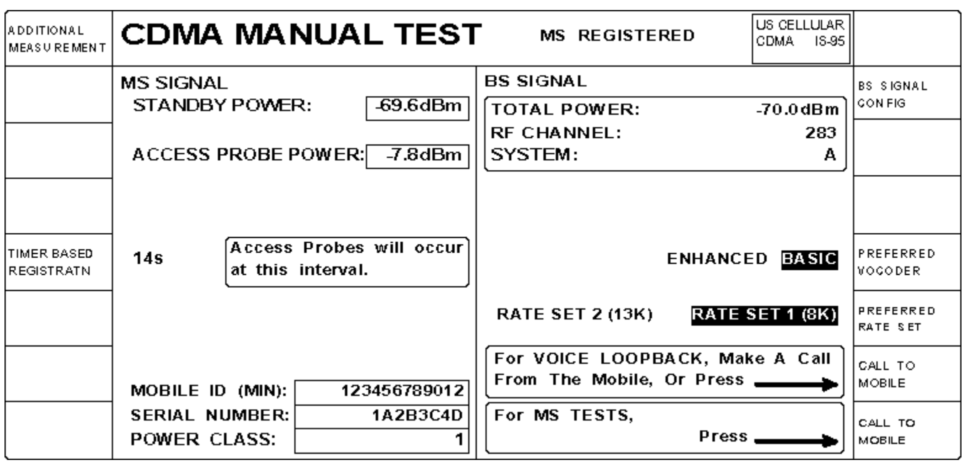


Figure 1–4: CDMA manual test — MS registered menu (idle/access state)

6. Using the mobile station keypad, enter any telephone number (the number is not important and can be up to 32 digits) and initiate the call.

7. Check that the tester indicates that the call has been established by displaying the CDMA MANUAL TEST CALL ESTABLISHED VOICE LOOPBACK menu shown in Figure 1–5. Establishing this connection verifies that the mobile station was able to communicate properly with the tester.

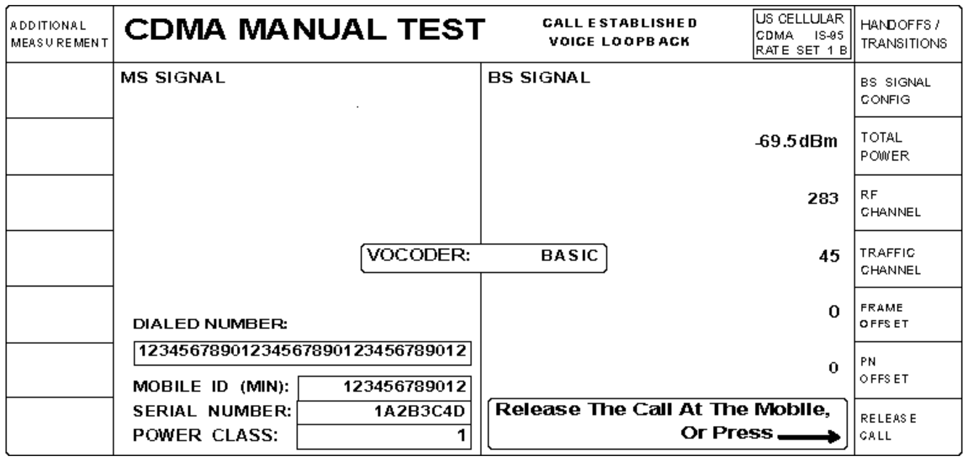


Figure 1–5: CDMA manual test — call established voice loopback menu

8. To disconnect the call to the mobile station, press the **RELEASE CALL** softkey at the bottom right of the display area, or end the call from the mobile station.

Analog Functional Check (Option B82 Only)

If you have Option B82 (Analog Mode) installed in the tester, use the following procedure to establish communications between the tester and a mobile station operating in Analog mode. (The mobile station must be able to operate in Analog AMPS mode.)

1. Perform the steps in *Power Connection* on page 1–3 and in *Connecting the Mobile Station* on page 1–4.
2. Press the **MENU HOME** front-panel key and check that the display is similar to that shown in Figure 1–6.

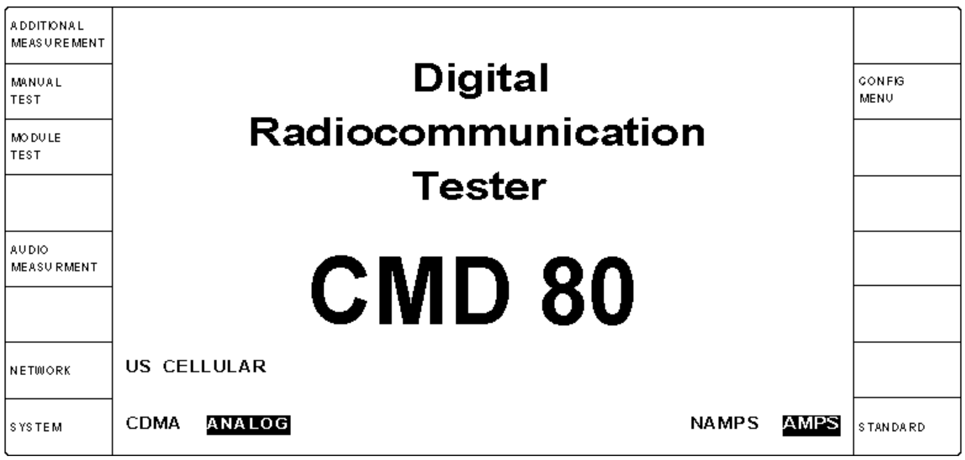


Figure 1–6: Home menu display

3. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. (The example displays show US CELLULAR as the network.)
4. Press the **SYSTEM** softkey to toggle between CDMA, ANALOG, or TDMA. Set the system to ANALOG.

***NOTE**. The SYSTEM selection is available if you have Option B82 (Analog Mode) or Option B84 (TDMA Mode) installed in the tester. Otherwise, the softkey is not available and the system (CDMA) is indicated in a rounded box located below the NETWORK field.*

5. Press the **STANDARD** softkey to select AMPS.
6. Press the **MANUAL TEST** softkey to display the ANALOG MANUAL TEST (MS UNREGISTERED) menu. See Figure 1–7.

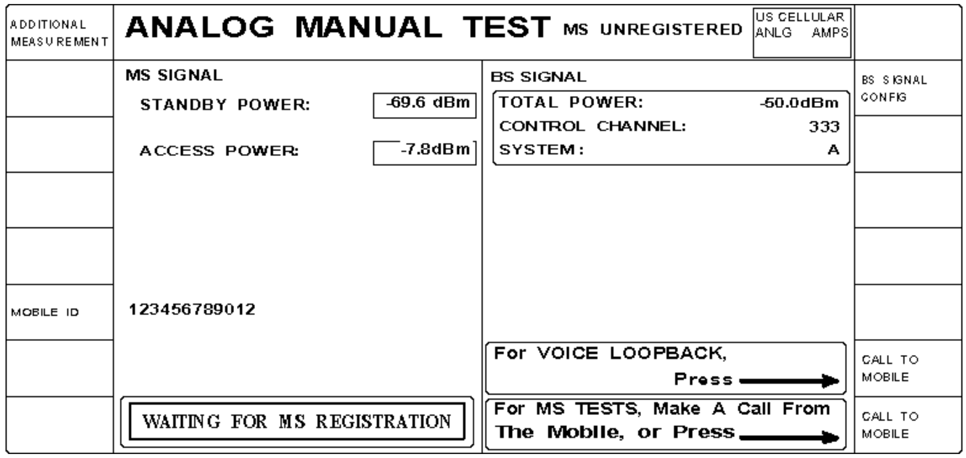


Figure 1–7: ANALOG manual test — MS unregistered menu (initialization state)

NOTE*. During initialization, the "Waiting for..." text block blinks on and off until the registration is complete (approximately 10 to 40 seconds).*

When initialization is complete, a menu similar to Figure 1–8 is displayed. If the mobile unit does not connect, go to the BS SIGNAL CNFG page via the CONFIG MENU softkey in the home menu and verify that the base station parameters are correctly configured.

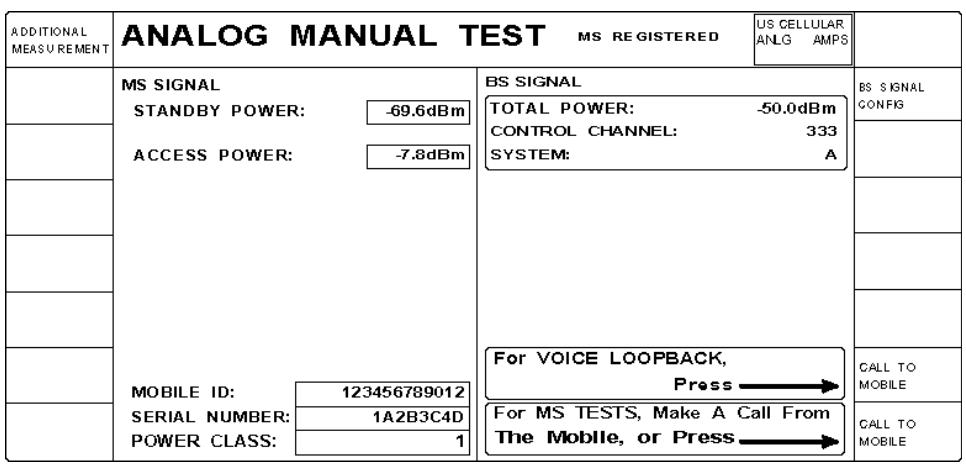


Figure 1–8: ANALOG manual test — MS registered menu (idle/access state)

7. Using the mobile station keypad, enter any telephone number (the number is not important and can be up to 32 digits) and initiate the call.

8. Check that the tester indicates that the call has been established by displaying the ANALOG MANUAL TEST (CALL ESTABLISHED MS TESTS) menu shown in Figure 1–9. Establishing this connection verifies that the mobile station was able to communicate properly with the tester.

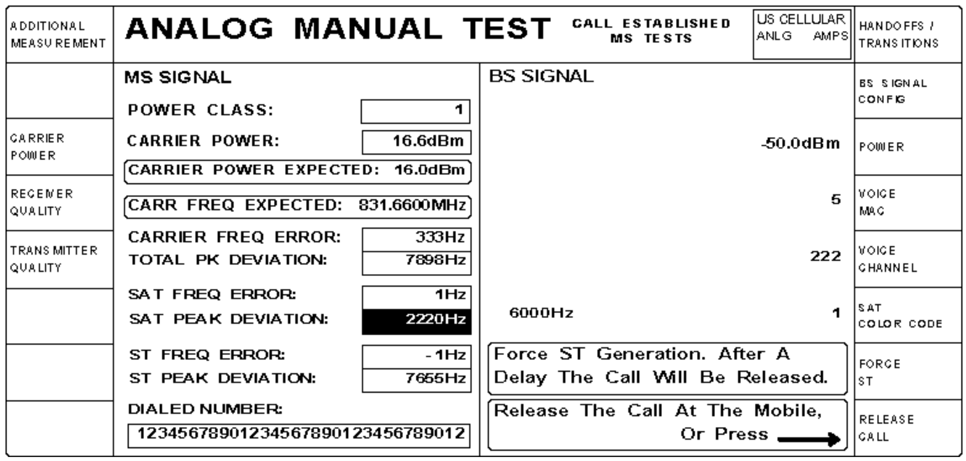


Figure 1–9: ANALOG manual test — call established menu

9. To disconnect the call to the mobile station, press the **RELEASE CALL** softkey at the bottom right of the display area, or end the call from the mobile station.

TDMA Functional Check (Option B84 Only)

If you have Option B84 (TDMA Mode) and Option B82 (Analog Mode) installed in the tester, use the following procedure to establish communications between the tester and a mobile station operating in TDMA mode. (The phone connected to the tester must be able to operate in TDMA mode.)

1. Perform the steps in *Power Connection* on page 1–3 and in *Connecting the Mobile Station* on page 1–4.

2. Press the **MENU HOME** front-panel key and check that the display is similar to that shown in Figure 1–10.

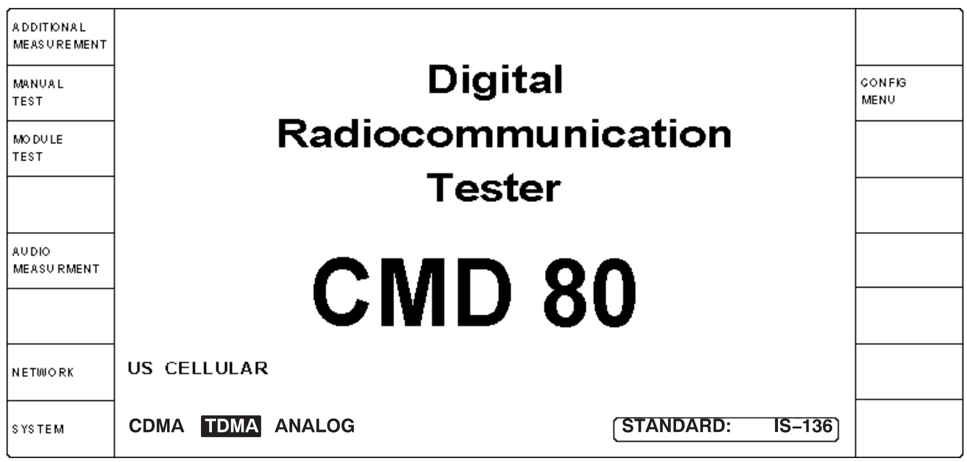


Figure 1–10: Home menu display

3. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. (The example displays show US CELLULAR as the network.)

4. Press the **SYSTEM** softkey to toggle between CDMA, ANALOG, or TDMA. Set the system to TDMA.

***NOTE**. The SYSTEM selection is available if you have Option B82 (Analog Mode) and Option B84 (TDMA Mode) installed in the tester. Otherwise, the softkey is not available and the system (CDMA) is indicated in a rounded box located below the NETWORK field.*

5. Press the **MANUAL TEST** softkey to display the TDMA MANUAL TEST (MS UNREGISTERED) menu. See Figure 1–11.

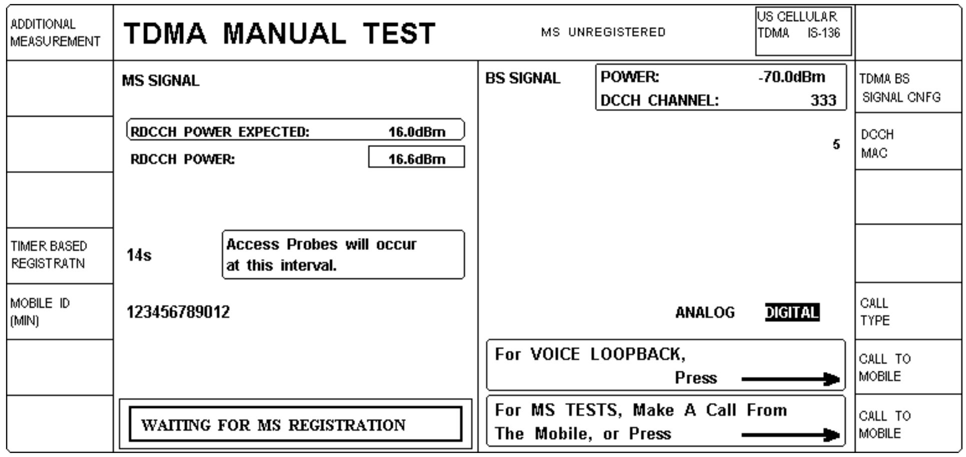


Figure 1–11: TDMA manual test — MS unregistered menu (initialization, control channel scanning and locking)

***NOTE**. During initialization, the “Waiting for...” text block blinks on and off until the registration is complete (approximately 10 to 40 seconds).*

When initialization is complete, a menu similar to Figure 1–12 is displayed. If the mobile station does not connect, go to the BS SIGNAL CNFG page via the CONFIG MENU softkey in the home menu and verify that the base station parameters are correctly configured.

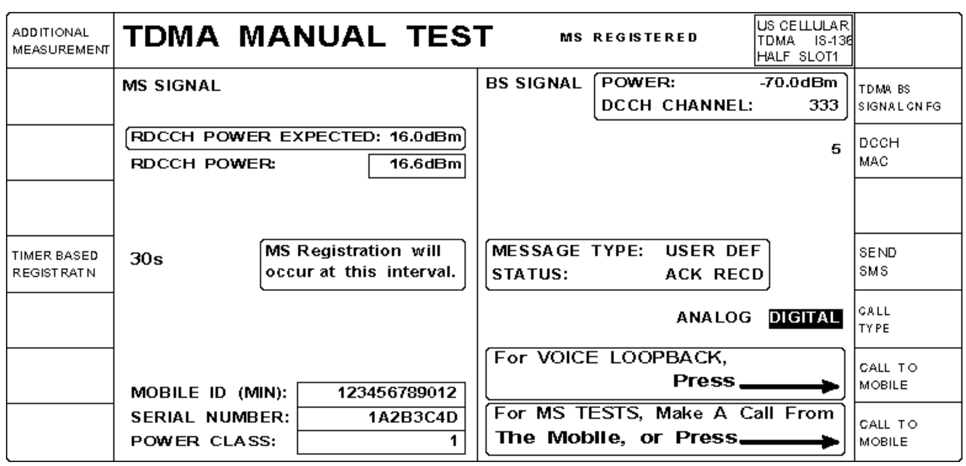


Figure 1–12: TDMA manual test — MS registered menu (DCCH camping)

6. Using the mobile station keypad, enter any telephone number (the number is not important and can be up to 32 digits) and initiate the call.

7. Check that the tester indicates that the call has been established by displaying the TDMA MANUAL TEST (CALL ESTABLISHED MS TESTS) menu shown in Figure 1–13. Establishing this connection verifies that the mobile station was able to communicate properly with the tester.

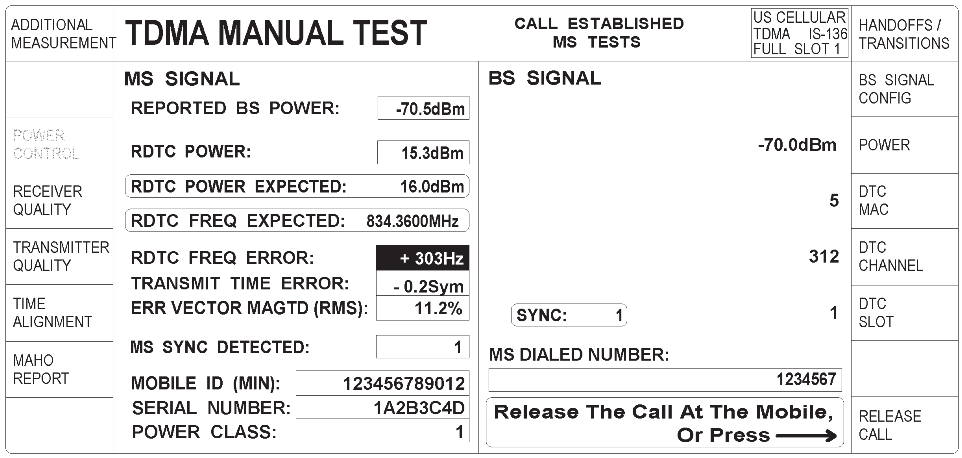
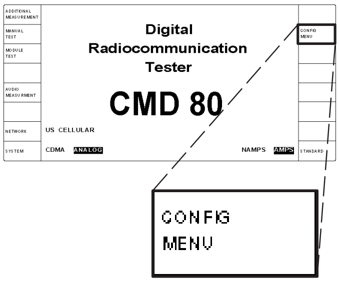


Figure 1–13: TDMA manual test — call established menu

8. To disconnect the call to the mobile station, press the **RELEASE CALL** softkey at the bottom right of the display area, or end the call from the mobile station.

General Configuration



This section describes the configuration menus that are not affected by the system or standard you select. These include:

- Reference and timing configuration
- RF connection and external attenuation configuration
- GPIB/IEC address
- Printer configuration
- Other
- Options installed in the tester

These items are accessed from the Home Menu. (The Home Menu is displayed each time the tester is switched on and is easily displayed by pressing the MENU HOME front-panel key.) Press the CONFIG softkey to display the configuration menu (see Figure 1–14).

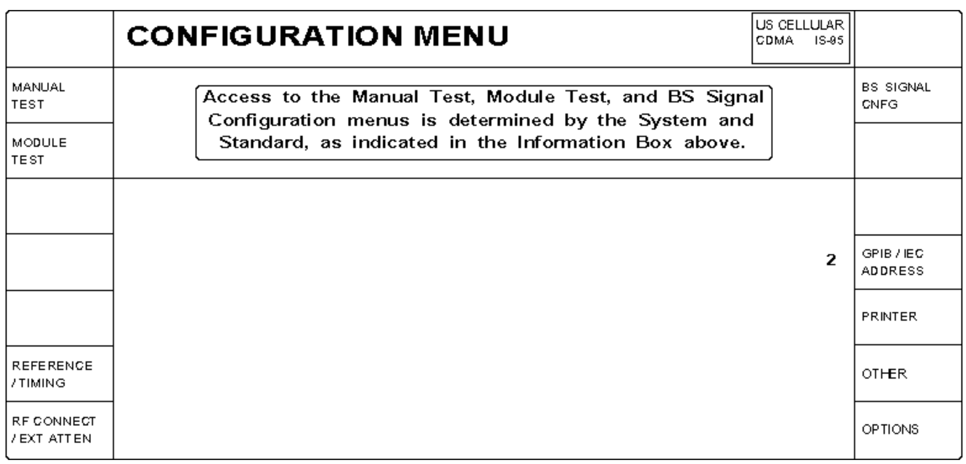


Figure 1–14: Configuration menu

NOTE*. The MANUAL TEST, MODULE TEST, and BS SIGNAL CNFG menu selections are dependent on the system and standard you chose from the Home Menu. Refer to the following pages for descriptions about these softkeys:*

CDMA Configuration *begins on page 3–48*
Analog Configuration *begins on page 3–117*
TDMA Configuration *begins on page 3–229*

REFERENCE/TIMING This softkey displays a menu to select the timing reference input and output sources (see Figure 1–15). The tester uses either its internal reference or an external reference that you connect to the REF IN connector on the rear panel. You can use 1 MHz, 2 MHz, 5 MHz, or 10 MHz inputs as external references.

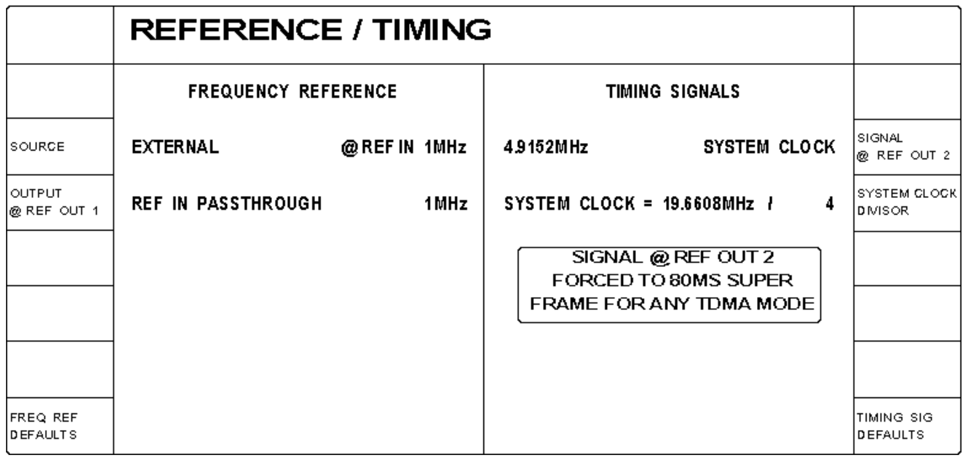


Figure 1–15: Reference/timing menu

While in this menu, you can vary the following parameters:

- SOURCE. Press this softkey to select the source for the reference frequency available at the optional REF OUT 1 connector on the rear-panel. The selections are as follows:
  - INTERNAL sets the source to the tester's 10 MHz internal reference.
  - EXTERNAL @REF IN 1MHz sets the source to a 1 MHz signal applied to the REF IN connector on the rear panel.
  - EXTERNAL @REF IN 2MHz sets the source to a 2 MHz signal applied to the REF IN connector on the rear panel.
  - EXTERNAL @REF IN 5MHz sets the source to a 5 MHz signal applied to the REF IN connector on the rear panel.
  - EXTERNAL @REF IN 10MHz sets the source to a 10 MHz signal applied to the REF IN connector on the rear panel.
- OUTPUT @ REF OUT 1. This displays the external source signal setting.
- FREQ REF DEFAULTS. Press this softkey to set the frequency reference to the default settings.

- SIGNAL @ REF OUT 2. Press this softkey to set the signal available at the REF OUT 2 connector. The selections are as follows:
  - SYSTEM CLOCK (19.6608 MHz)
  - INACTIVE
  - PP2S (pulse per 2 seconds)
  - SUPER FRAME (80 ms)
  - PAGING FRAME (20 ms)
  - SYNC FRAME (26.67 ms)
  - PWR CONTROL FRAME (1.25 ms)

NOTE*. The REF OUT 2 connector provides a TDMA superframe signal when the tester is in TDMA mode. The superframe signal is a positive logic signal with an 80 ms period.*

- SYSTEM CLOCK DIVISOR. This softkey is displayed if the SIGNAL @ REF OUT 2 is set to SYSTEM CLOCK. Press this softkey to select the divisor used to divide the system clock frequency.
- TIMING SIG DEFAULTS. Press this softkey to set the timing signals to the default settings.

RF CONNECT/EXT ATTEN

This softkey displays a menu to select the front-panel RF IN/OUT connectors and external attenuation for your test setup (see Figure 1–16).

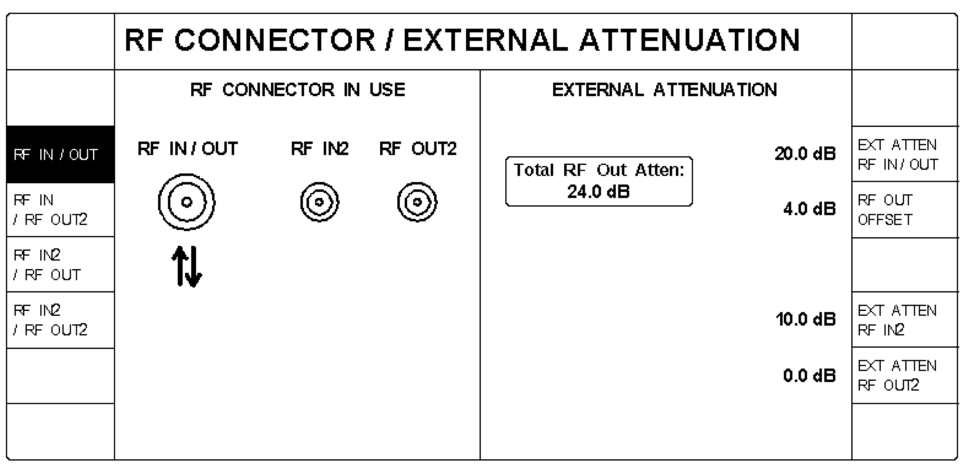


Figure 1–16: RF connector and external attenuation menu

The softkeys on the left select the front-panel input and output RF connectors you intend to use.

- RF IN/OUT. Press this softkey to select the bidirectional RF IN/RF OUT front-panel RF connector for both input and output signals to and from the tester.
- RF IN / RF OUT2. Press this softkey to select front-panel RF IN/RF OUT connector as the input signal path to the tester and the front-panel RF OUT 2 connector as the output signal path from the tester.
- RF IN2 / RF OUT. Press this softkey to select the front-panel RF IN 2 connector as the input signal path to the tester and the front-panel RF IN/RF OUT connector as the output signal path from the tester.
- RF IN2 / RF OUT2. Press this softkey to select the front-panel RF IN 2 connector as the input signal path to the tester and the RF OUT 2 connector as the output signal path from the tester.

The softkeys on the right side to correct for any external attenuation in the connection path.

- EXT ATTEN RF IN/OUT. Press this softkey to set the amount of external gain or attenuation present in the connection to the mobile station when using the RF IN/OUT connector. A positive value indicates attenuation (loss) and a negative value indicates gain in the signal path.

  The tester uses this value as a correction factor for RF power measurements and also to correct the RF output power so that the power presented to the mobile station is equal to the instrument front-panel setting.

- RF OUT OFFSET. Press this softkey to set the additional correction factor (attenuation or gain) present in the forward RF path (base station to mobile station). This factor is applied in addition to the EXT ATTEN RF IN/OUT correction factor.
- EXT ATTEN RF IN2. Press this softkey to set the amount of external gain or attenuation present in the connection to the mobile station when using the RF IN2 connector. A positive value indicates attenuation (loss) and a negative value indicates gain in the signal path.

  The tester uses this value as a correction factor for RF power measurements.

- EXT ATTEN RF OUT2. Press this softkey to set the amount of external gain or attenuation present in the connection to the mobile station when using the RF OUT2 connector. A positive value indicates attenuation (loss) and a negative value indicates gain in the signal path.

  The tester uses this value to correct the RF output power so that the power presented to the mobile station is equal to the instrument front-panel setting.

GPIB/IEC ADDRESS Press this softkey to set the tester’s GPIB address. Use the numeric key pad to enter a value between 1 and 30.

PRINTER Press this softkey to display the PRINTER CONFIGURATION menu (see Figure 1–17). Use this menu to specify the type of printer connected to the rear panel printer connector. Table 1–1 provides a list of the currently supported printer types. Figure 2–5 on page 2–8 shows the location of the printer connector.

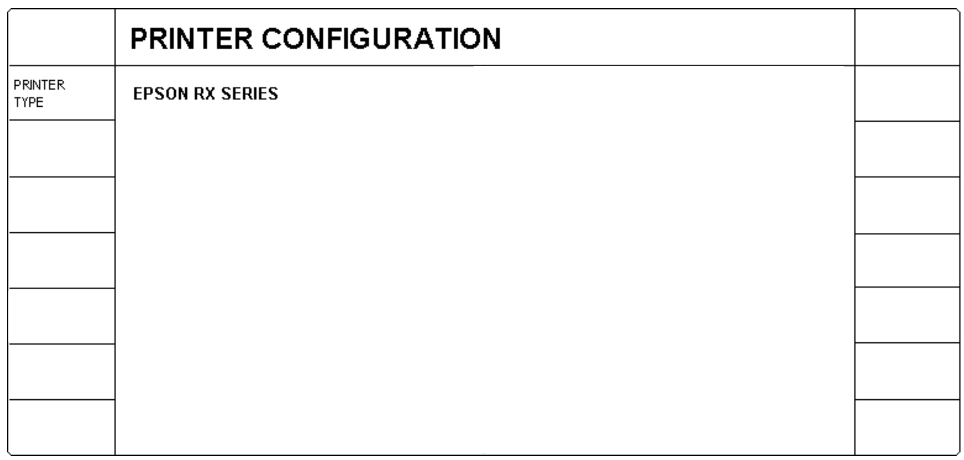


Figure 1–17: Printer configuration menu

Table 1–1: Supported printers

Printer type	Printer type	Printer type
Epson EPL Series	HP DeskJet Series (B/W)	NEC Colormate PS
Epson EX Series (B/W)	HP DeskJet 500c (Color)	NEC LC-890 Laser
Epson EX Series (Color)	HP DeskJet 550c (Color)	NEC Pinwriter P2/P3
Epson FX Series	HP DeskJet 1200C (Color)	NEC Pinwriter Series (24–B/W)
Epson FX Series (B/W)	HP LaserJet Series I	NEC Pinwriter Series (24-Clr)
Epson FX Series (Color)	HP LaserJet Series II	NEC Silent Writer2 990
Epson LQ Series (24-pin, B/W)	HP LaserJet Series III	NEC Silentwriter LC-860+
Epson LQ Series (24-pin, Color)	HP LaserJet Series IV	R&S Ink-Jet CM-222
Epson LQ Series (8-pin, B/W)	HP PaintJet Series (B/W)	
Epson LQ Series (8-pin, Color)	HP PaintJet Series (Color)	
Epson MX Series	HP PaintJet XL300 (8.5″ x 11″)	
Epson RX Series	HP PaintJet XL300 (11″ x 17″)	

OTHER Press this softkey to display the OTHER CONFIGURATIONS menu (see Figure 1–18). You can use this menu to do the following:

- KEY CLICK. Press this softkey to turn on the key click function, which produces an audible click each time you press a front-panel key.
- ACOUSTIC WARNINGS. Press this softkey to turn on the acoustic warnings function, which produces a beep if you attempt to perform an illegal action.
- DATE. Press this softkey to set the system date (month, day, year). Use periods to separate the entries.
- TIME. Press this softkey to set the system time (hours, minutes, seconds). Use periods to separate the entries.

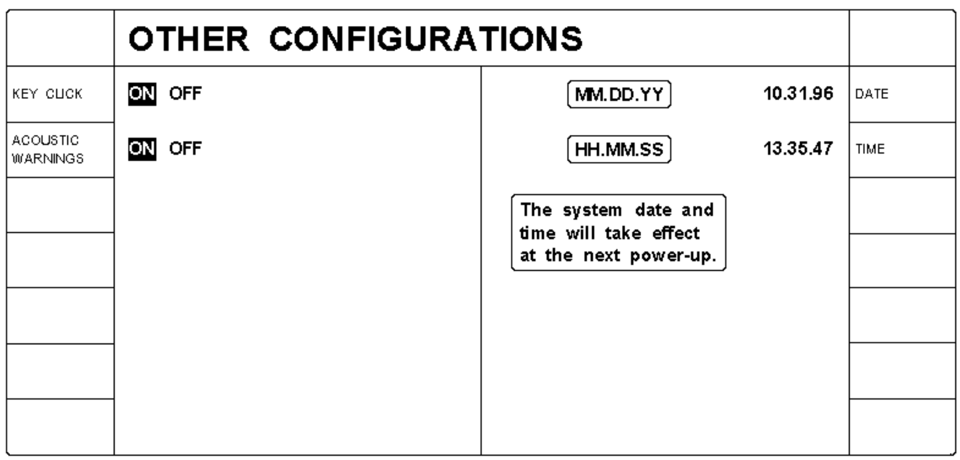


Figure 1–18: Other configurations menu

OPTIONS Press this softkey to display a list of the options installed in your tester. Options that are installed are indicated by a check mark (✓) in their fields. See Figure 1–19.

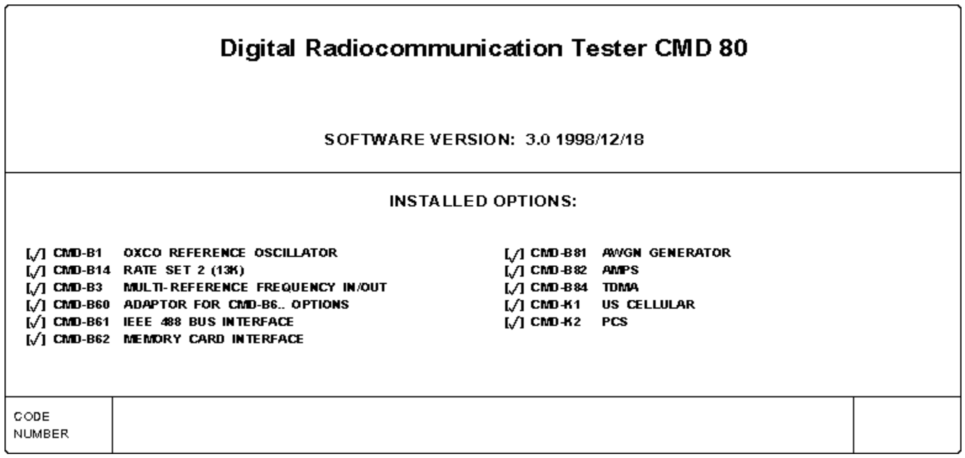


Figure 1–19: Options display

Use the CODE softkey to enable firmware options. Contact your sales representative for details.

Table 1–2 lists the available options for the CMD 80 Digital Radiocommunication Tester.

Table 1–2: List of options

Tektronix option	Rohde & Schwarz option	Function
396-4905-00	ZZA-94	19 inch rack mount kit
B1	CMD-B1	High-stability reference oscillator
B81	CMD-B81	Additive White Gaussian Noise (AWGN) generator
B3	CMD-B3	Multireference frequency inputs and outputs
B61	CMD-B60	Adapter for B61 and B62
B61	CMD-B61	IEEE 488 (GPIB) bus interface
B61	CMD-B62	Memory card interface
B14	CMD-B14	13k vocoder rate (14.4k data rate)
B82	CMD-B82	Adds Analog mode operation
(Standard)	CMD-K1	Adds cellular operation
K2	CMD-K2	Adds PCS operation
B84	CMD-B84	Adds TDMA mode operation

Operating Basics

This chapter describes the front and rear panel controls and connectors. It also provides a brief description of the menu selections and how they are used.

Front-Panel Display, Controls, and Connectors

Figure 2–1 illustrates the front panel. Refer to this illustration when reading the description for a particular area.

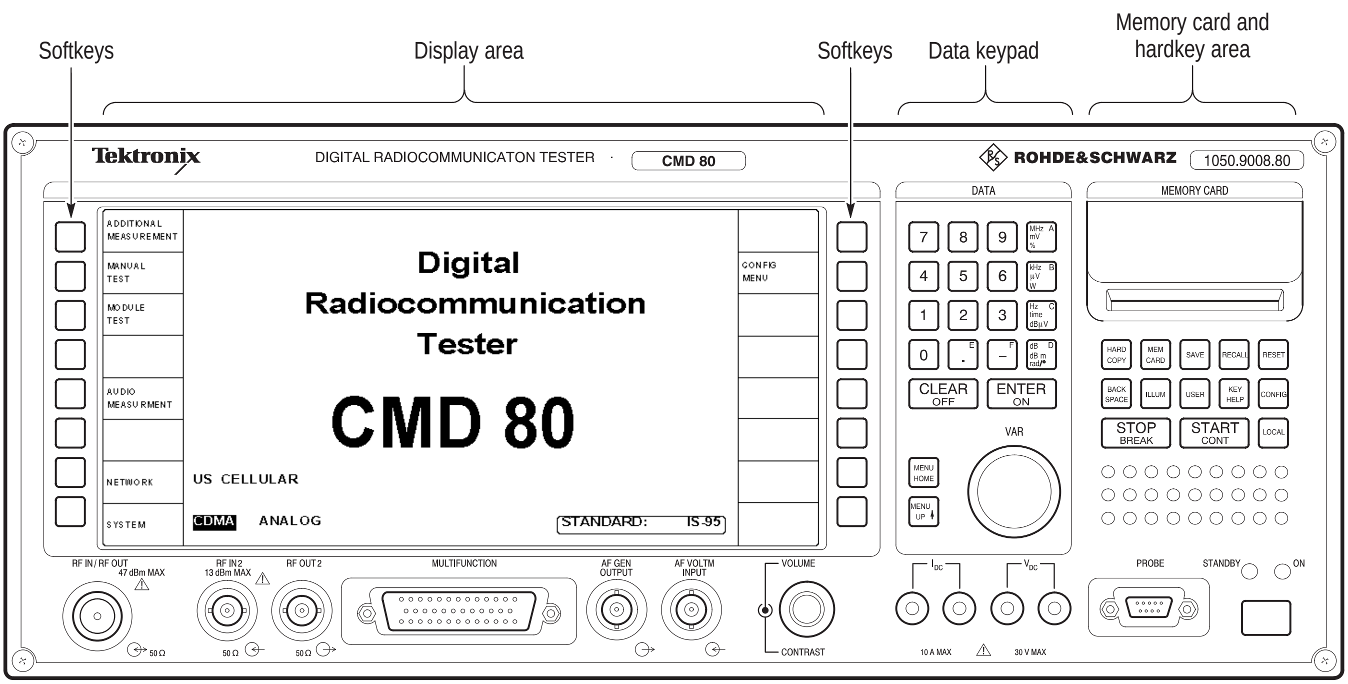


Figure 2–1: CMD 80 Digital Radiocommunicaton Tester front-panel controls and connectors

Softkeys

The softkeys are the eight keys to the left and eight keys to the right of the display area. Each softkey has mutiple functions depending on the operating mode. The current function is displayed directly next to the softkey in the display area. If the display area next to a softkey is blank, the softkey has no function.

Numerical Entry. With the softkey on a bright background, data cannot be entered. Pressing a softkey changes the softkey display to a dark background and allows data to be entered. For some entries, a small VAR symbol appears, indicating that the VAR control can be used. Entry is as follows:

Rotating the VAR control increases or decreases the setting value.

Pressing the first key in the data area causes an input window to open displaying the first digit. At this point, the VAR control cannot be used. Enter additional digits using the keypad. The BACKSPACE key deletes the last digit, the CLEAR key clears the complete entry, and the STOP BREAK key closes the input window without recording the value. Press the ENTER key or a unit key to set the value and close the input window. Once this is done, the VAR control is reactivated.

Selection With Softkeys. In addition to numeric entry, softkeys are used to select various displays. For example, the POWER CONTROL GATED OUTPUT display is available in one of three formats:

- Full display (see Figure 3–13 on page 3–19)
- Rising edge (see Figure 3–14 on page 3–20)
- Falling edge (see Figure 3–14 on page 3–20)

The active softkey selection is indicated by a dark background.

Loop Toggle. Two (or more) operating states can be displayed next to a softkey. The active state is indicated by an inverse video display. You can switch operating states by pressing the softkey.

Display Area

The display area shows the menu headings, descriptions of the softkey functions, settings, measured values, and status messages. The contents of the display change depending on the menu selected. The display also may be affected by the options that are installed in your tester.

Measurement conventions. Failed measurements are returned in reverse video (white text on black background). Measurements with “– – –” indicate that the tester was not able to make a valid measurement. NAN is displayed if the value is not a number.

Data Keypad

This area is used to enter data for a particular function. The controls in this area are illustrated in Figure 2–2.

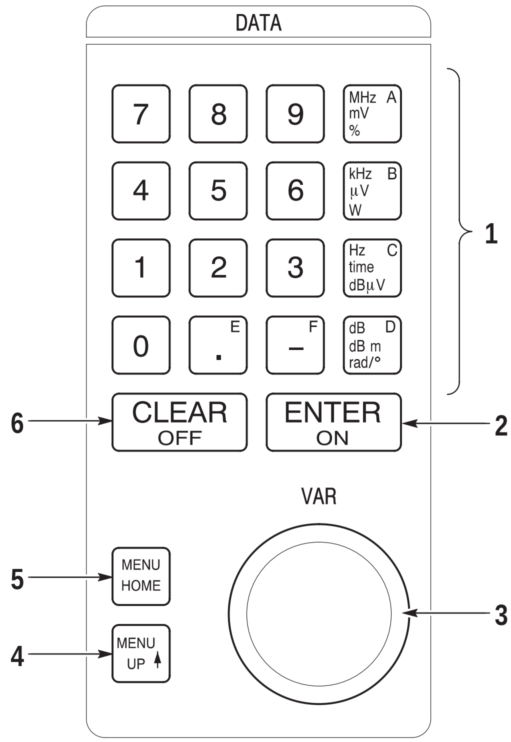


Figure 2–2: Detail of data keypad area

1. Numeric Keypad. Use the numeric keypad to enter digits 0 through 9.

The unit keys to the right of the numeric keys provide the appropriate units for an entry and are context sensitive.

For example, if you press the top key it is interpreted as MHz, mV, %, or the hexadecimal digit A, depending on the parameter you are specifying.

The key units and corresponding functions are as follows:

Key Marked:	Function:
MHz	Frequency
mV	Voltage
%	Distortion, for example
A	Hexadecimal digit
kHz	Frequency
µV	Voltage
W	Power
B	Hexadecimal digit
Hz	Frequency
time	Time
dBµV	Level
C	Hexadecimal digit
dB	Relative power setting
dBm	Power level
rad/°	Phase deviation
D	Hexadecimal digit
–	Minus sign (negative value)
F	Hexadecimal digit
.	Decimal point
E	Hexadecimal digit

2. ENTER ON. This key performs the following functions:
   - Terminates all numeric entries not having or not requiring a unit key termination
   - Activates the functions that were deactivated by OFF (usually measurements or levels)
3. VAR. This spinwheel is used to vary a number of functions, usually relating to the softkey parameters. The spinwheel is also used to position the MARKER on a display.
4. MENU UP. This key displays the next higher level menu.
5. MENU HOME. This key displays the highest level menu.

6. CLEAR OFF. This key performs the following functions:

- Aborts entries not yet concluded
- Switches off or selects the minimum value when entering values
- Switches off various functions (for example, AWGN or BS frequency offset)

Memory Card, Hardkey, and Loudspeaker Area

The slot in the memory card area is used to insert the optional PCMCIA memory card. Keys in the hardkey area perform dedicated functions. The keys are located below the MEMORY CARD slot (see Figure 2–3).

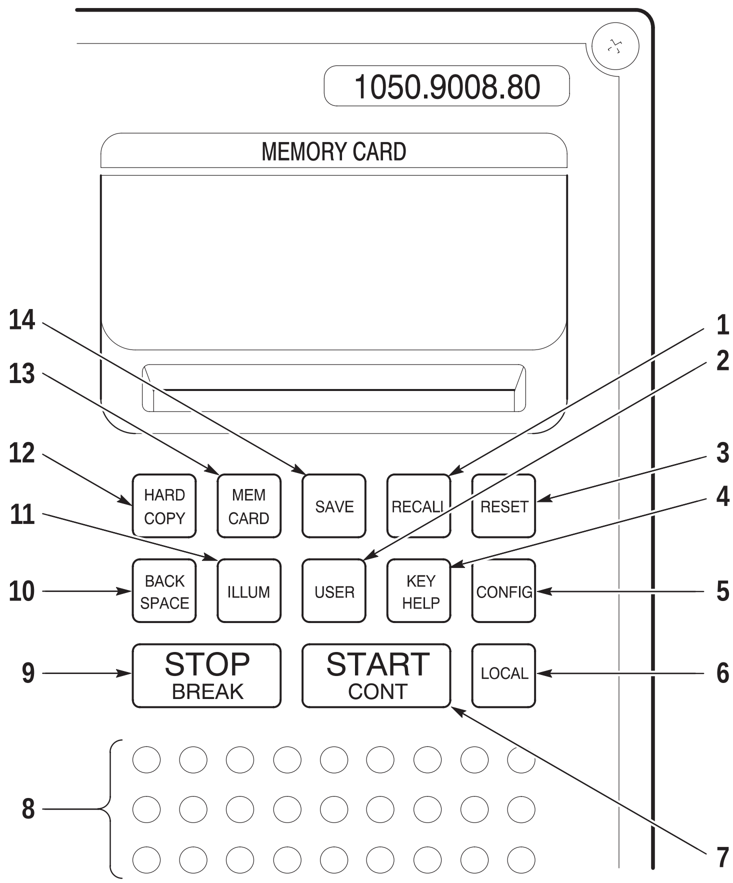


Figure 2–3: Detail of memory card, hardkey, and loudspeaker areas

***NOTE**. Not all hardkeys have functions assigned to them. Keys that do not have functions assigned are for future enhancements.*

1. RECALL. This hardkey accesses the menu to recall saved tester states.

   You can recall setups from the internal hard drive or a PCMCIA memory card (option installation required).

2. USER. This hardkey displays a menu from which you select the user number. Each user number has its own set of states that can be recalled when you press the RECALL key. You can store the tester states using the SAVE key.

3. RESET. This hardkey sets the tester to a default state.

4. KEY HELP. This hardkey is not used.

5. CONFIG. This hardkey displays the configuration menu for particular functions of the original menu. Not all menus use this function.

6. LOCAL. This hardkey switches from Remote (GPIB or RS-232 control) to Local (manual control).

7. START CONT. This hardkey is not used.

8. Loudspeaker. The loudspeaker is used when you have the key click function or audible warnings turned on.

9. STOP BREAK. Press this hardkey to abort editor entries.

10. BACK SPACE. This hardkey deletes the figure last entered from the keypad.

11. ILLUM. This hardkey is not used.

12. HARD COPY. This hardkey sends a copy of the display area to the printer.

13. MEM CARD. This hardkey is not used.

14. SAVE. This hardkey accesses the menu to save tester states.

    You can store setups to the internal hard drive or a PCMCIA memory card (option installation required). It is recommended that you use a PC card with 128 kB or greater memory capacity.

***NOTE**. You must format the memory card on an MS-DOS personal computer prior to use with the tester.*

Front-Panel Controls and Connectors

The remaining front-panel controls and connectors are located at the bottom of the front panel as illustrated in Figure 2–4.

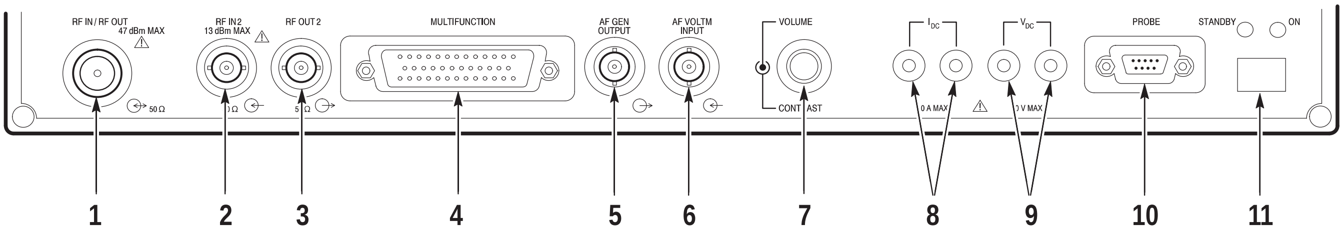


Figure 2–4: Front-panel controls and connectors

1. RF IN/RF OUT. This is a bidirectional RF connector. It provides both an input and output for RF signals from instruments. The antenna connection of a mobile phone is usually connected here.
2. RF IN 2. This connector is a sensitive RF input which can be used as an alternative to the RF IN/RF OUT signal.
3. RF OUT 2. This connector provides a high-level RF output signal as an alternative to the RF IN/RF OUT signal.
4. MULTIFUNCTION. This 50-contact connector is reserved for future options.
5. AF GEN OUTPUT. This connector provides audio-frequency tones. This output is active only if the tester has Option B82 (AMPS) installed in it.
6. AF VOLTM INPUT. This connector is used to measure audio-frequency tones. This connector is active only if the tester has Option B82 (AMPS) installed in it.
7. VOLUME/CONTRAST. The center knob has no function. The outer knob adjusts the contrast of the display area.
8. I_{DC}. These connectors are used to measure the DC current. The left connector is positive.
9. V_{DC}. These connectors are used to measure the DC voltage. The left connector is positive.
10. PROBE. This connector is reserved for future options.
11. STANDBY/ON. This is the front-panel power switch. When engaged, all test modules are powered. When disengaged, only the Standby LED is powered.

Rear-Panel Controls and Connectors

The rear-panel controls and connectors are shown in Figure 2–5. Refer to the figure when reading the description for each area.

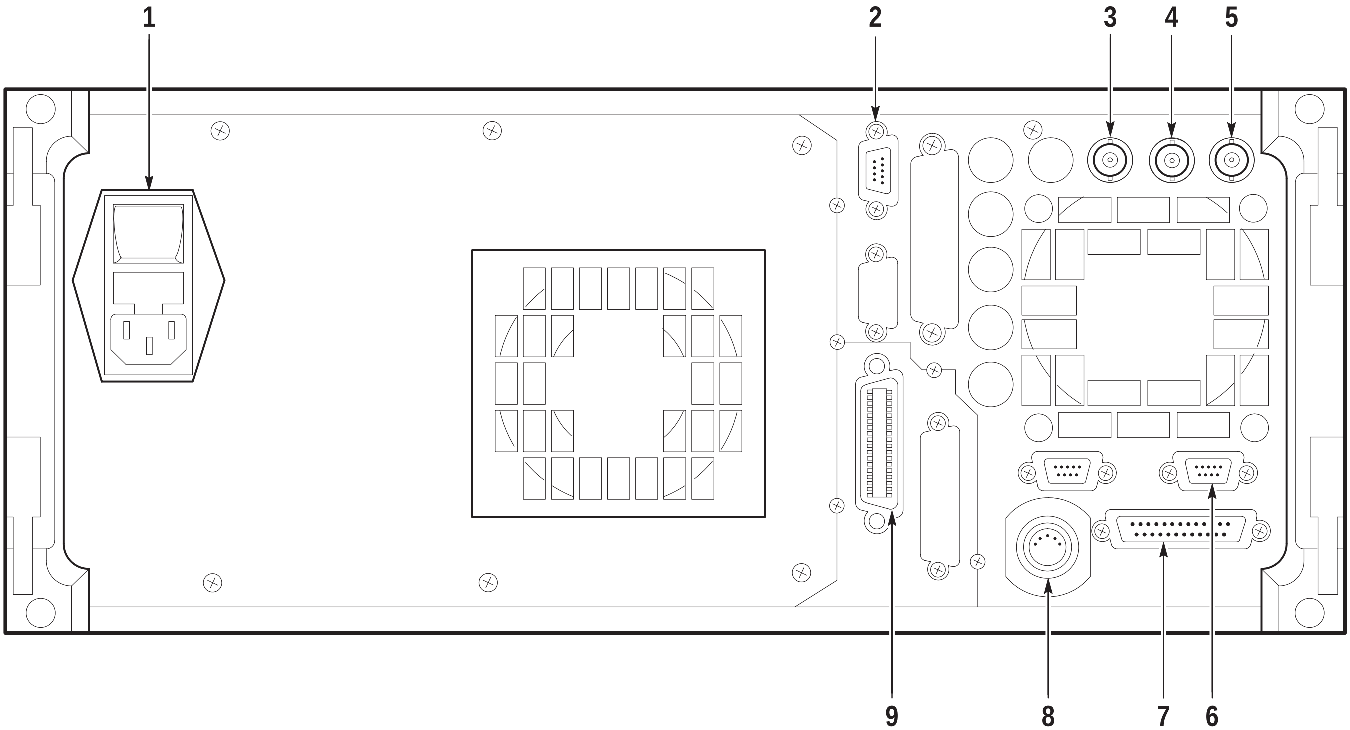


Figure 2–5: Rear-panel controls and connectors

1. Power Connector Area. This area has the following items:

- Power connector. Use this to connect external power to the tester.
- Fuse holder. This holder contains the power line fuse.
- Power switch. This is the master power switch that isolates all poles of the power supply.

2. SERVICE. This connector is for use by factory personnel only.

CAUTION. *To prevent equipment damage, do not make any connection to the SERVICE connector on the rear panel.*

3. RF OUT 10 MHz/REF IN. This is an optional output connector for the reference frequency of the measuring instrument: 10 MHz or signal of REF IN connector (without resynchronization). Refer to the *Reference Timing* section on page 1–15 for details.
4. REF OUT 2. This is an optional output connector for CDMA timing signals. Refer to *Reference Timing* on page 1–16 for details.
5. REF IN. This is an optional reference frequency input connector.
6. RS-232. This connector is a remote control interface and is also used to update the tester operating system.
7. PRINTER. This is a 25-contact Centronics connector, which is used to connect a printer.
8. KEYBOARD. This connector is not used.
9. IEEE BUS. This connector is an optional IEEE 488/IEC 625 (GPIB) interface.

Other rear panel connectors are provided for future expansion.

CAUTION. *To prevent equipment damage, open ports should not be used even when a connector is present.*

Menu Structures

You control the tester with the menu selections displayed on the screen. The menus allow you to configure the tester and and perform the measurements. Some menus simply toggle or select a setting while others display subsequent menu screens.

The menu structure divides logically into two main sections: test menus and configuration menus. For the standard tester, these menus are used to set up and perform tests on CDMA (digital) mobile stations. If you have Option B82 or Option B84 installed, your tester also has menus that allow you to set up and perform tests on Analog or TDMA mode mobile stations.

The following illustration shows the partial menu structure of the CDMA CONFIGURATION MENU.

```
CONFIG MENU — MANUAL TEST — STANDBY POWER
                            POWER CONTROL — OPEN LOOP TIME RESPNS
                                            MINIMUM OUTPUT
                                            MAXIMUM OUTPUT
                                            GATED OUTPUT
```

To access the Power Control configuration menu for the Gated Output function, perform the following steps:

1. Press the **MENU HOME** front-panel key to display the home menu. Returning to the home menu returns the tester to an idle state thus dropping an established call to a mobile station.
2. Press the **SYSTEM** softkey to select CDMA. This softkey is available if other system selections other than CDMA are installed.
3. Press the **CONFIG MENU** softkey to display the CONFIGURATION MENU.
4. Press the **MANUAL TEST** softkey to display the CDMA MANUAL TEST CONFIGURATION menu.
5. Press the **POWER CONTROL** softkey to display the POWER CONTROL CONFIGURATION menu.
6. Press the softkey for the function whose parameters you want to set.

Figure 3–3 on page 3–6 shows the CDMA menu tree; Figure 3–29 on page 3–48 shows the CDMA configuration menu tree.

Figure 3–32 on page 3–53 shows the analog test menu tree; Figure 3–89 on page 3–118 shows the Analog configuration menu tree.

Figure 3–133 on page 3–169 shows the TDMA test menu tree; Figure 3–181 on page 3–229 shows the TDMA configuration menu tree.

***NOTE**. For the analog or TDMA test and configuration menus to appear on the display, your tester must have Option B82 or Option B84) installed in it.*

Reference

This chapter contains more detailed information about using the CMD 80 Digital Radiocommunication Tester. To simplify usage, this chapter is divided into six sections.

- *Network, System, and Standard* contains information about the interactions between the network, system, and standard settings.
- *CDMA Measurements* contains information about using the tester to emulate a Code Division Multiple Access (CDMA) base station and the tests that you can perform on CDMA mobile stations. This information is applicable to all testers.
- *Analog Measurements* (Option B82) contains information about using the tester to emulate an analog base station and the tests that you can perform on analog mobile stations. Option B82 must be installed to access the analog menus and measurements.
- *TDMA Measurements* (Option B84) contains information about using the tester to emulate a Time Division Multiple Access (TDMA) base station and the tests that you can perform on analog mobile stations. Option B84 and Option B82 must be installed to access the TDMA menus and measurements.
- *Additional Measurements* contains information about using the tester to make common voltage and current measurement. This information is applicable to all testers.
- *Audio Measurements* contains information about using the tester to make common audio measurements. This information is applicable to all testers.

Network, System, and Standard

Network, System, and Standard

The NETWORK, SYSTEM, and STANDARD softkey functions interact with each other (see Figure 3–1) Depending on which network you select, you also may be required to select a system and a standard. Because of this interaction, the three softkeys are discussed within this topic.

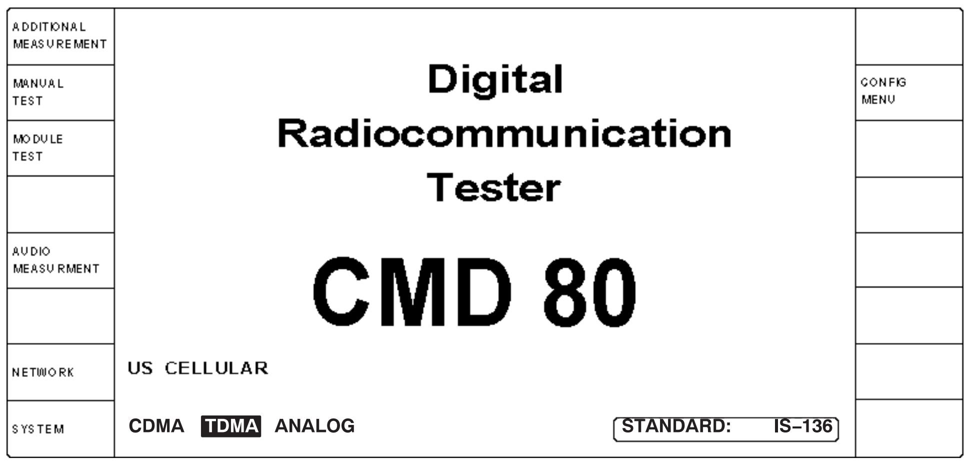


Figure 3–1: Home menu display

Typically, you first select the network. Then if the SYSTEM softkey is displayed, you select the system. Finally, if after selecting the system, the STANDARD softkey is displayed, you select the standard to which you want to test. Each of the softkey functions is described in the following subtopics.

Network

Press the NETWORK softkey to activate the VAR control so that you can select the network for the mobile station you are testing. Note that when you select NETWORK, a box labeled “VAR” is displayed next to the highlighted NETWORK softkey. This indicates that the VAR control is active. Rotate the control to select from the following networks:

- US CELLULAR
- JAPAN CELLULAR
- CHINA CELLULAR
- US PCS
- KOREA PCS
- KOREA 2 PCS

Available only with Option K2

System

Press the SYSTEM softkey to select the system that you want to test. The system selections interact with the selection made for the Network.

If you select US CELLULAR, JAPAN CELLULAR, or CHINA CELLULAR as the network and the tester has more than one system capability installed, you must select the system for which you want to test your mobile station. Press the SYSTEM softkey to toggle between the selections available (CDMA, ANALOG, or TDMA). All other network choices test the CDMA system only. (CDMA is displayed in a rounded box.)

Standard

Press this softkey to select the standard that you want to test. This softkey interacts with both the NETWORK and SYSTEM settings.

The tester displays the STANDARD softkey whenever there is more than one available standard for the selected network. Press the STANDARD softkey to toggle between the choices. Table 3–1 shows the standards for each network and system.

NOTE. *If there is only one standard available for the selected network and system, the tester displays the default standard in the lower right corner in a rounded box.*

Table 3–1: Available standard choices

NETWORK	SYSTEM	STANDARD
US CELLULAR	CDMA TDMA [1] ANALOG [2]	IS-95 IS-136-A AMPS or NAMPS
US PCS	CDMA TDMA [1]	UB IS-95 or J-STD008 IS-136-A
JAPAN CELLULAR	CDMA ANALOG [2]	IS-95 or T53 NTACS or JTACS
CHINA CELLULAR	CDMA ANALOG [2]	IS-95 ETACS or TACS
KOREA PCS	CDMA	UB IS-95 or J-STD008
KOREA 2 PCS	CDMA	UB IS-95 or J-STD008

[1] **Available with Option B84.**

[2] **Available with Option B82.**

CDMA Measurements

CDMA

This section describes the operation and configuration of the CDMA tests that the CMD 80 Digital Radiocommunication Tester can perform. Some menu items and softkeys are associated with a specific option. If you do not have that option installed, the supporting menus and softkeys do not appear in the display.

This section discusses the tests and station configurations that are exclusive to the CDMA system.

Using the Home Menu

After power on, the tester displays the home menu (see Figure 3–2). You can press the MENU HOME front-panel key to return to this menu at any time. The softkeys displayed by this menu allow you to select from a number of main topics.

From this menu you can select the Network, System, (and Standard if appropriate). Once these are set, you can use the other softkeys to proceed to the measurement tests or to the configuration menus.

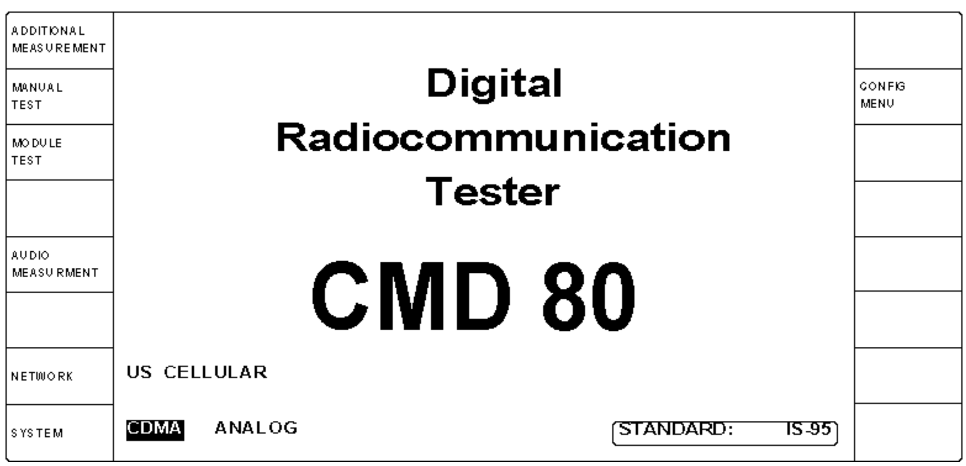


Figure 3–2: Home menu display

The softkey menus discussed in this section are the MANUAL TEST, MODULE TEST, and CONFIG MENU as they are defined by setting the system to CDMA mode.

For detailed descriptions about the ADDITIONAL MEASUREMENT softkey, refer to page 3–255. For detailed descriptions about the AUDIO MEASUREMENT softkey, refer to page 3–257. For detailed descriptions about the NETWORK, SYSTEM, and STANDARD softkeys, refer to page 3–3.

To see displays on your tester similar to the ones shown in this section, you need to set the network to US CELLULAR and the system to CDMA. Use the following steps:

1. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. Rotate the VAR control to select US CELLULAR as the network.

2. Press the **SYSTEM** softkey to select CDMA as the system. This softkey is only available if you have Analog mode (Option B82) and/or TDMA mode (Option B84) installed). If neither of these options are installed, CDMA appears in a rounded box.

Some of the softkey selections in the home menu have several levels of submenus associated with them. Figure 3–3 shows the CDMA menu structure for the tester. This subsection contains a description of each of these menus and their softkeys.

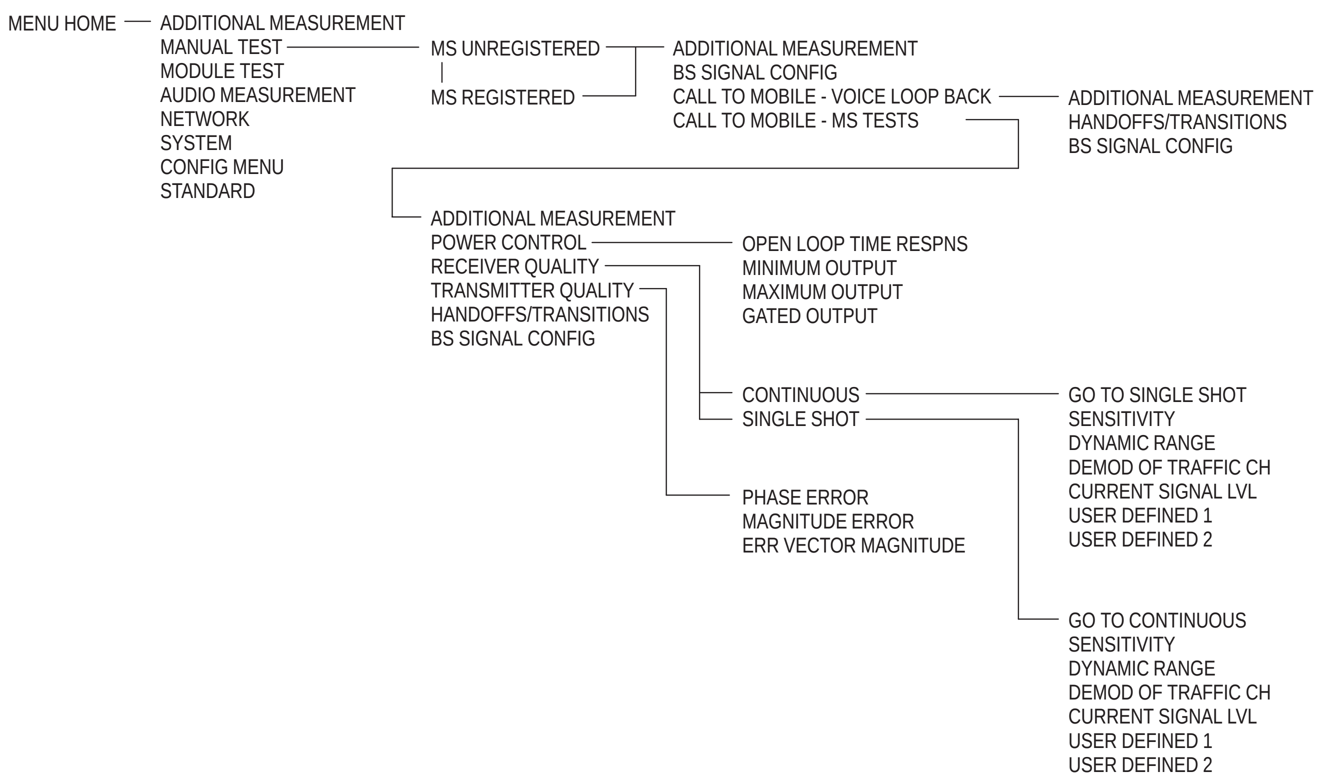
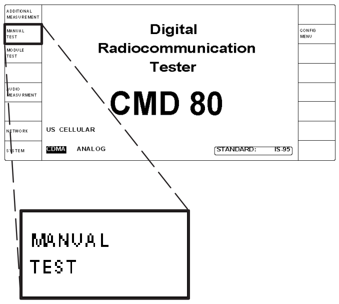


Figure 3–3: CDMA manual test menu tree

Manual Test (Signaling)



The MANUAL TEST softkey (from the home menu) selects the manual test measurements for the system selected with the SYSTEM softkey. This section discusses the tests available when you have selected CDMA as the system.

Press the MANUAL TEST softkey to display the menu used to perform call processing and measurements on CDMA mobile stations (see Figure 3–4). Selecting this test initiates a sequence composed of three states:

1. MS Unregistered (initialization)
2. MS Registered (idle/access)
3. Call Established

MS Unregistered

The first stage of the manual test is the MS Unregistered (initialization) state, which is started by pressing the MANUAL TEST softkey. During this initialization state, the tester establishes contact with the mobile station and enables the output power from the tester. Figure 3–4 shows the display during this state.

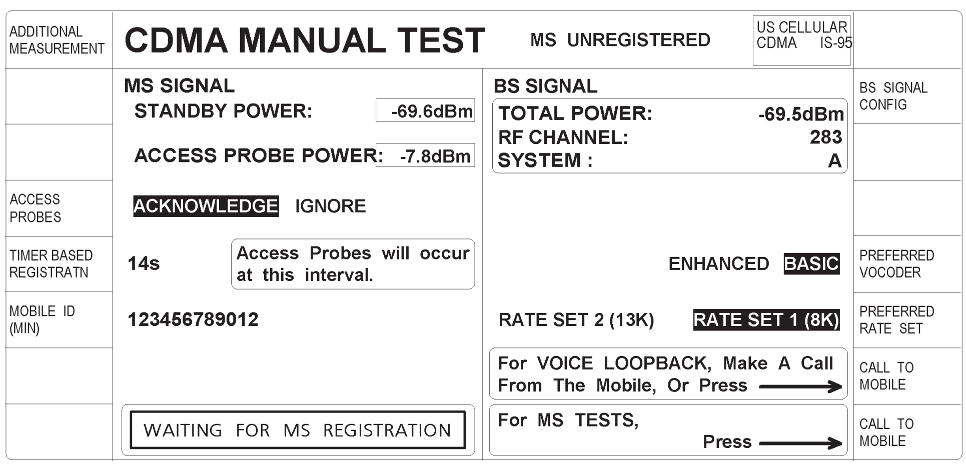


Figure 3–4: MS unregistered menu (initialization state)

You can use either of the two CALL TO MOBILE softkeys to initiate a call to the mobile station, or you can place a voice loopback call from the mobile station by entering any telephone number on the mobile station and pressing SEND.

The following softkeys are available in the MS Unregistered state:

- ADDITIONAL MEASUREMENT. Refer to *Additional Measurements* on page 3–255.
- ACCESS PROBES. Press this softkey to toggle the ACCESS PROBES state between ACKNOWLEDGE and IGNORE.

  IGNORE prevents the registration process from proceeding, and allows the user to more easily observe the Access Probe Power measurement.
- TIMER BASED REGISTRATN. Press this softkey to set the interval that the mobile station will use to register with the tester. You can use the VAR control to set a range of values from 12 seconds to approximately 2 minutes. If you select OFF, the mobile station discontinues periodic registration with the tester.
- MOBILE ID. Press this softkey to enter the MIN or IMSI (mobile ID) of the mobile station. You are not required to provide this information. However, entering the mobile ID provides the tester with the necessary information so that you can use the CALL TO MOBILE softkeys without waiting for registration. This number is retained from the last entered value or the last mobile station to register with the tester.

***NOTE**. The tester requires either a MIN or an IMSI mobile identification type. (You select the ID type in the CDMA BS PARAMETERS CONFIGURATION menu (refer to* CDMA BS PARAMETERS *on page 3–49.) For some protocol revisions, you can choose either a MIN or an IMSI mobile ID. For other protocol revisions, a choice of mobile ID is not available. In the latter case, the CDMA BS PARAMETERS CONFIGURATION menu does not display the MOBILE ID TYPE softkey; instead, it displays the mobile ID type in a rounded box below the protocol revision field.*

- CDMA BS SIGNAL CONFIG. This softkey displays the configuration menu where you can define the components of the base station signal. These include the levels of the pilot, sync, and paging channels and other parameters, such as traffic channel and frame offset that are used when a call is set up.
- PREFERRED VOCODER. This softkey is displayed only if you have selected RATE SET 1 (8K) as the preferred rate set. Press this softkey to select the preferred vocoder, either BASIC or ENHANCED. If the rate selected is not supported by the mobile station, the tester reverts to the supported rate.
- PREFERRED RATE SET. This softkey enables you to select either the 8K or 13K vocoder rates (option B14 installation is required). If the rate selected is not supported by the mobile station, the tester reverts to the supported rate.

- CALL TO MOBILE. Activation of the upper softkey causes the tester to initiate a voice loopback call to the mobile station. Pressing the lower softkey initiates the mobile station loopback tests (Service Option 2 as specified in IS-126).

CDMA MANUAL TEST MS Unregistered Configuration Menu. While in the MS Unregistered (initialization) state, you can press the front-panel CONFIG key to access the configuration menu (see figure 3–5).

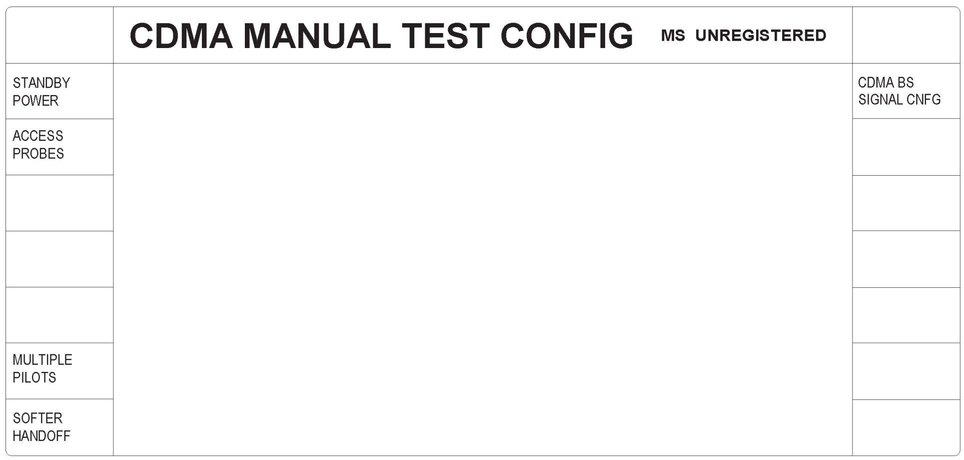


Figure 3–5: CDMA manual test configuration menu (unregistered state)

This configuration menu gives you access to the configuration menus for the following modes:

- STANDBY POWER. This softkey displays the standby power configuration menu, where you can set the maximum limit of standby power and toggle the auto stop function on or off, or set the parameters to their default values.
- ACCESS PROBES. This softkey displays the access probes configuration menu, where you can define the nominal offset, initial offset, probe increment, number of probes per sequence, and the number of sequences per attempt. See figure 3–6.
- MULTIPLE PILOTS. This softkey displays the multiple pilots configuration menus, where you can define the PN offsets, pilot levels, T_ADD, and T_DROP for multiple pilot tests. See figures 3–23 and 3–24, on page 3–39.
- SOFTER HANDOFF. This softkey displays the softer handoff configuration menu, where you can define the parameters for softer handoff. These include: fer interval, maximum FER %, T_ADD and T_DROP levels, total power, and the secondary sector PN offset and traffic channel. See figure 3–25 on page 3–40.

- BS SIGNAL CONFIG. This softkey displays the configuration menu where you can define the components of the base station signal. These include the levels of the pilot, sync, and paging channels and other parameters, such as traffic channel and frame offset that are used when a call is set up.

ACCESS PROBES configuration menu. Enter the Access Probes configuration menu, see figure 3–6, by pressing the ACCESS PROBES softkey while in any of the CDMA Manual Test configuration menus.

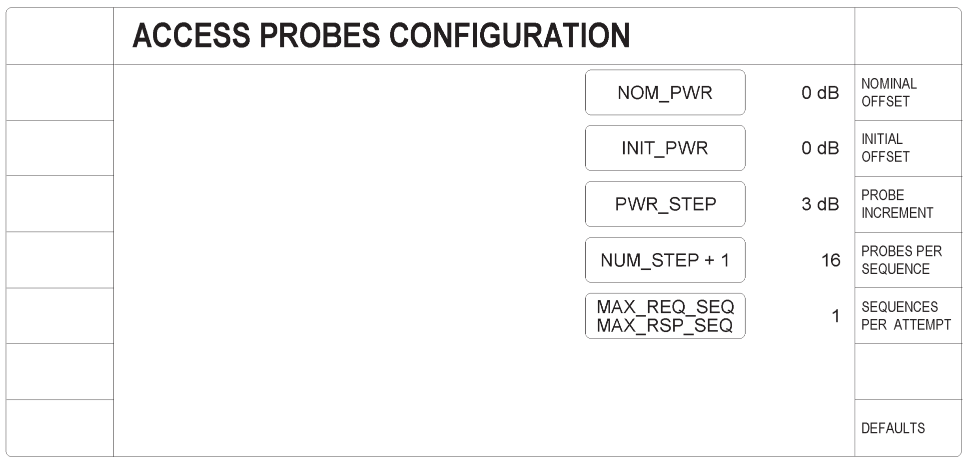


Figure 3–6: Access probes configuration menu

- NOMINAL OFFSET. Press this softkey to use the VAR control to set the nominal transmit power offset (“NOM_PWR” of the Access Parameters Message). Used in the computation of the mean output power of the access probes.
  Range: –8 dB to 7 dB.
- INITIAL OFFSET. Press this softkey to set the initial power offset for access (“INIT_PWR” of the Access Parameters Message) with the VAR control. Used in the computation of the mean output power of the access probes.
  Range: –16 dB to 15 dB.
- PROBE INCREMENT. Press this softkey to use the VAR control to set the power increment (“PWR_STEP” of the Access Parameters Message). Establishes the increase in transmit power between successive access probes.
  Range: 0 to 7 dB
- PROBES PER SEQUENCE. Press this softkey to set the number of access probes per sequence (“NUM_STEP” of the Access Parameters Message + 1)

with the VAR control. Establishes the maximum number of access probes transmitted in a single sequence.
Range: 1 to 16

- SEQUENCES PER ATTEMPT. Press this softkey to use the VAR control to set the number of access probe sequences per access attempt (“MAX_REQ_SEQ” or “MAX_RSP_SEQ” of the Access Parameters Message). Establishes the maximum number of access probe sequences transmitted for either an access channel request or access channel response.
Range: 1 to 15

- DEFAULTS. Press this softkey to return all access probe parameters to their factory default values.

MS Registered

After the mobile station is powered on and registered, the tester enters the MS Registered (idle/access) state. Figure 3–7 shows the display during this state.

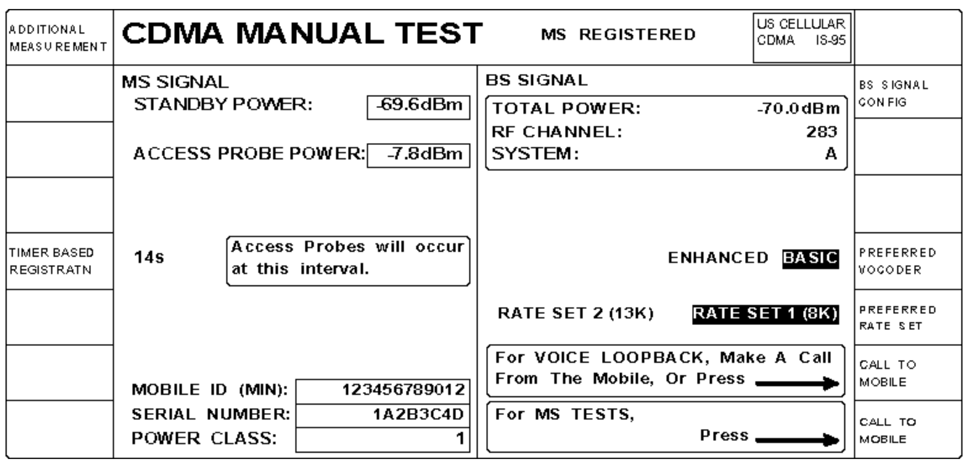


Figure 3–7: MS registered menu (idle/access state)

The tester displays the mobile station information on the left side of the screen and the base station information on the right side. You can use either of the two CALL TO MOBILE softkeys to initiate a call to the mobile station, or you can place a voice loopback call from the mobile station by entering any telephone number on the mobile station and pressing SEND.

***NOTE**. If the mobile station is not compliant with J-STD-008 and the power class information is not reported, the Power Class field displays "——" instead of a value; also, the tester will assume that the mobile station is a Power Class 5 mobile station and limit its output power to +8 dBm (except in the Maximum Output Power test).*

The following softkeys are available in the MS Registered menu:

- ADDITIONAL MEASUREMENT. Refer to *Additional Measurements* on page 3–255.
- TIMER BASED REGISTRATN. Refer to *TIMER BASED REGISTRATN* on page 3–8.
- BS SIGNAL CONFIG. Refer to *CDMA BS SIGNAL CONFIG* on page 3–8.
- PREFERRED VOCODER. This softkey is displayed only if you have selected RATE SET 1 (8K) as the preferred rate set. Press this softkey to select the preferred vocoder, either BASIC or ENHANCED. If the rate selected is not supported by the mobile station, the tester reverts to the supported rate.
- PREFERRED RATE SET. This softkey enables you to select either the 8K or 13K vocoder rates (option B14 installation is required). If the rate selected is not supported by the mobile station, the tester reverts to the supported rate.
- CALL TO MOBILE. Activation of the upper softkey causes the tester to initiate a voice loopback call to the mobile station. Pressing the lower softkey initiates the mobile station loopback tests (Service Option 2 as specified in IS-126).

CDMA MANUAL TEST MS Registered configuration menu. While in the MS Registered state, you can press the front-panel CONFIG key to access the configuration menu (see figure 3–8).

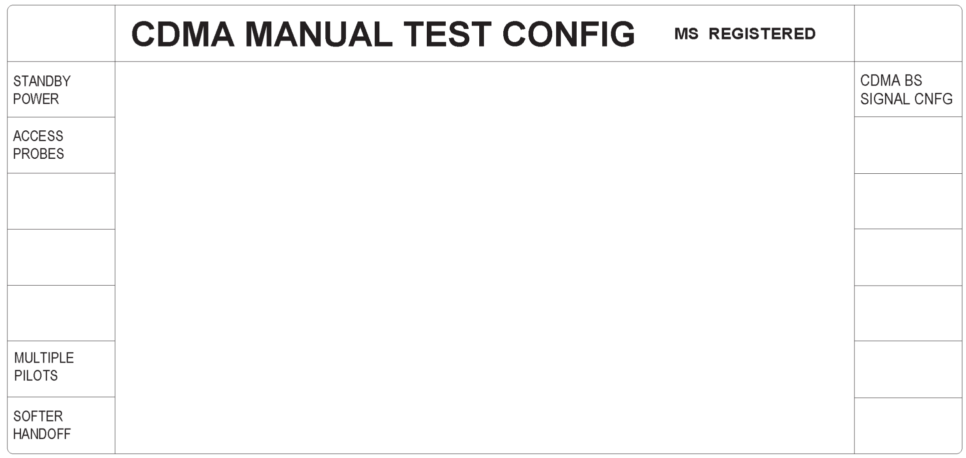


Figure 3–8: CDMA manual test configuration menu (registered state)

Use this configuration menu to access the configuration menus for the following modes:

- STANDBY POWER. This softkey displays the standby power configuration menu, where you can set the maximum limit of standby power and toggle the auto stop function on or off, or set the parameters to their default values.
- ACCESS PROBES. This softkey displays the access probes configuration menu where you can define the nominal offset, initial offset, probe increment, number of probes per sequence, and the number of sequences per attempt. See figure 3–6.
- MULTIPLE PILOTS. This softkey displays the multiple pilots configuration menu, where you can define the PN offsets, pilot levels, T_ADD, and T_DROP for multiple pilot tests. See figures 3–23 and 3–24.
- SOFTER HANDOFF. This softkey displays the softer handoff configuration menu where you can define the parameters for softer handoff. These include: FER interval, maximum FER %, T_ADD and T_DROP levels, total power, and the secondary sector PN offset and traffic channel. See figure 3–25.
- BS SIGNAL CONFIG. This softkey displays the configuration menu where you can define the components of the base station signal. These include the levels of the pilot, sync, and paging channels and other parameters, such as traffic channel and frame offset that are used when a call is set up.

Call to Mobile (Voice Loopback)

When you press the CALL TO MOBILE softkey for voice loopback and establish a call, the tester displays the menu shown in Figure 3–9. In this mode, a message spoken into the mobile station is returned in approximately two seconds. This allows you to test the quality of the call.

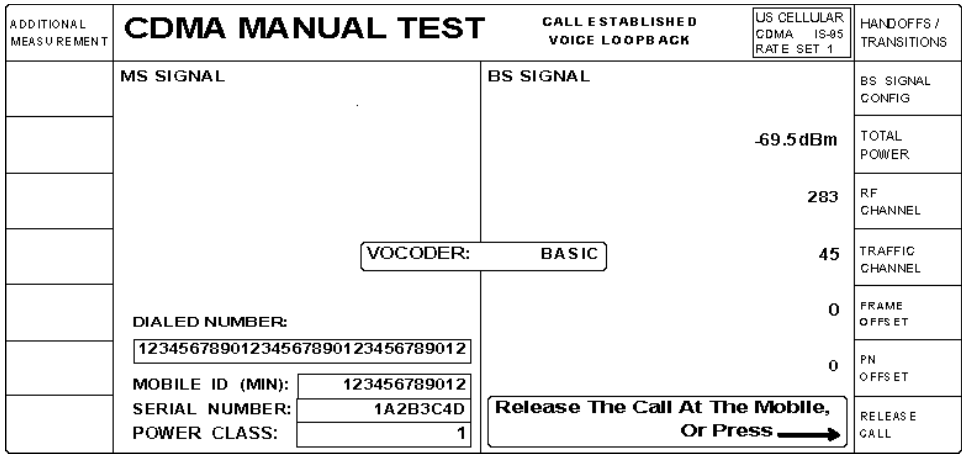


Figure 3–9: Call established menu for voice loopback

Once the voice loopback call is established, the following softkeys are available:

- ADDITIONAL MEASUREMENT (refer to page 3–255)
- HANDOFFS/TRANSITIONS (refer to page 3–33)
- BS SIGNAL CONFIG (refer to page 3–35)
- TOTAL POWER (refer to page 3–36)
- RF CHANNEL (refer to page 3–36)
- TRAFFIC CHANNEL (refer to page 3–36)
- FRAME OFFSET (refer to page 3–37)
- PN OFFSET (refer to page 3–37)
- RELEASE CALL. Press this softkey to simulate termination of the call by the base station. You can also release the call at the mobile station by hanging up the mobile station (press END on the mobile station).

Call to Mobile (MS Tests)

When you press the CALL TO MOBILE softkey for MS TESTS (Service Option 2 as specified in IS-126), the tester displays the menu shown in Figure 3–10.

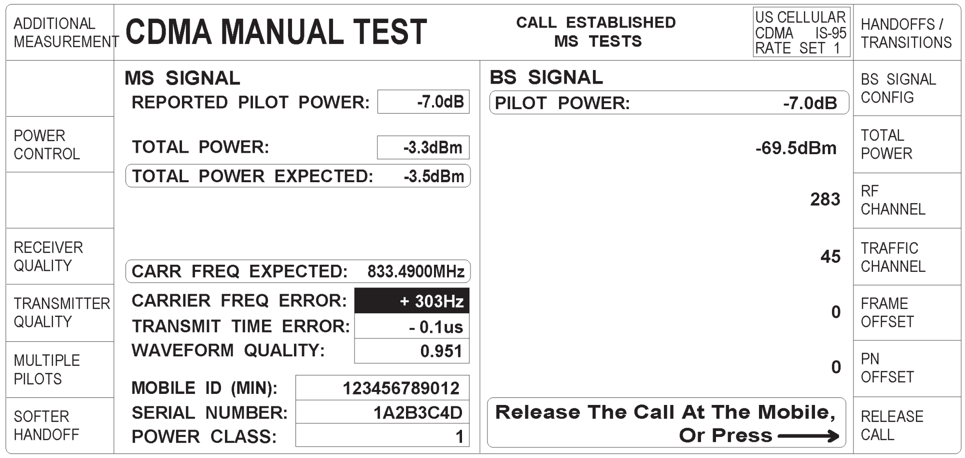


Figure 3–10: Call established menu for ms tests

This menu displays measurements for the mobile station on the left side of the display and displays base-station parameters on the right. The displayed results are updated about once a second. The tester displays any value that exceeds the limits established during configuration as inverse video (white on black). Refer to *Configuration* starting on page 3–48 for setting limits.

At this menu level, data transfers to the mobile unit at the full rate. The network status box in the upper right corner of the display shows the rate set that is in use for the call.

The value in the TOTAL POWER EXPECTED field is an internal tester calculation based on the presumed application of the open loop power control algorithm. The maximum value is limited by the reported power class of the mobile station. This method of determining expected power is used for all tests except the Maximum/Minimum Output Power test.

NOTE*. For accurate expected power readings, ensure that you have properly set the external gain or attenuations settings (refer to* RF CONNECT/EXT ATTEN *on page 1–16).*

Once the MS TESTS call is established, the following softkeys are available:

- ADDITIONAL MEASUREMENT (refer to page 3–255)
- POWER CONTROL (refer to page 3–16)

- RECEIVER QUALITY (refer to page 3–21)
- TRANSMITTER QUALITY (refer to page 3–26)
- MULTIPLE PILOTS (refer to page 3–28)
- SOFTER HANDOFF (refer to page 3–30)
- HANDOFFS/TRANSITIONS (refer to page 3–33)
- BS SIGNAL CONFIG (refer to page 3–35)
- TOTAL POWER (refer to page 3–36)
- RF CHANNEL (refer to page 3–36)
- TRAFFIC CHANNEL (refer to page 3–36)
- FRAME OFFSET (refer to page 3–37)
- PN OFFSET (refer to page 3–37)
- RELEASE CALL. Press this softkey to simulate termination of the call by the base station. You can also release the call at the mobile station by hanging up the mobile station (press END on the mobile station).

Additional Measurement

Refer to *Additional Measurements* on page 3–255.

Power Control

Press this softkey to configure and perform tests of the power control system. The tests available are: Open Loop Time Response, Minimum Output, Maximum Output, and Gated Output. Selection of a test item activates the test and begins the display of results.

If the test displays a waveform, an area at the bottom of the display shows the time in segments. If the test results are outside the template limit for a particular time segment, that segment is darkened.

Open Loop Time Response. Press this softkey to test the open-loop power control of the mobile station in response to an increase or decrease in base station total power. The default increase or decrease for this test is 20 dB. Figure 3–11 shows the response to this test.

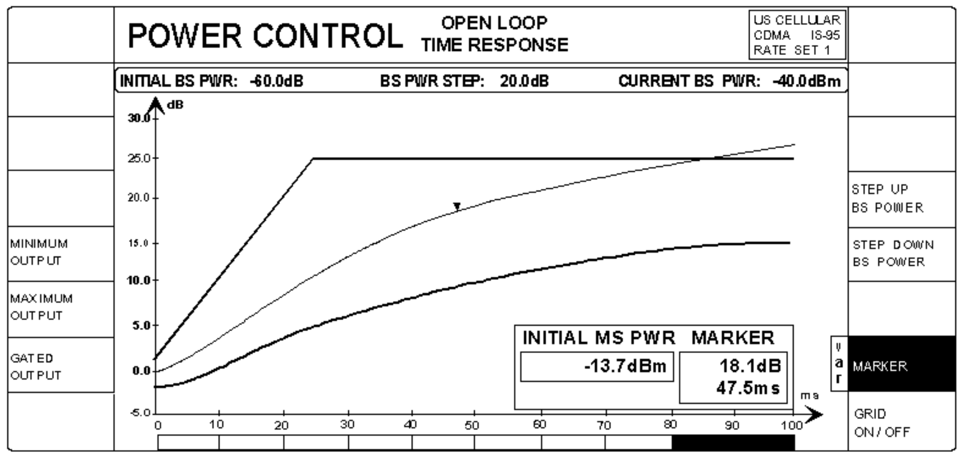


Figure 3–11: Open loop time response display

The tester performs an initial test when it opens this menu; you can perform additional measurements by pressing the STEP UP and STEP DOWN softkeys. You can change the step size and direction by pressing the CONFIG front-panel key. The minimum increase or decrease is 1 dB.

***NOTE**. The measurement display indicates all step changes with a positive slope.*

During the open-loop test, the closed-loop power is controlled to prevent unwanted interaction; this is achieved by alternately sending up and down power control bits to the mobile station.

Defective mobiles can produce power spikes at certain power steps during the OLTR test, which can result in a digitizer overflow in the tester. Digitizer overflow is reported as “OVL” instead of “– – –” in the INITIAL MS POWER display. Displaying “– – –” indicates that no measurement has been made.

When this overflow condition occurs neither the front panel display nor the GPIB results data buffer are updated. They retain and display (or return) the values of the most recent successful measurement. If the INITIAL MS POWER display shows “OVL”, ignore the displayed results.

Minimum Output/Maximum Output. Selecting either of these softkeys starts the tests using the values selected for total power, traffic level, and pilot level. You can set the initial values for the base station power by pressing the CONFIG front-panel key. The results (MS Signal values) are on the left of the display as shown in Figure 3–12.

***NOTE**. The connection to the mobile station can be lost when running the maximum output test if the total power is set too low.*

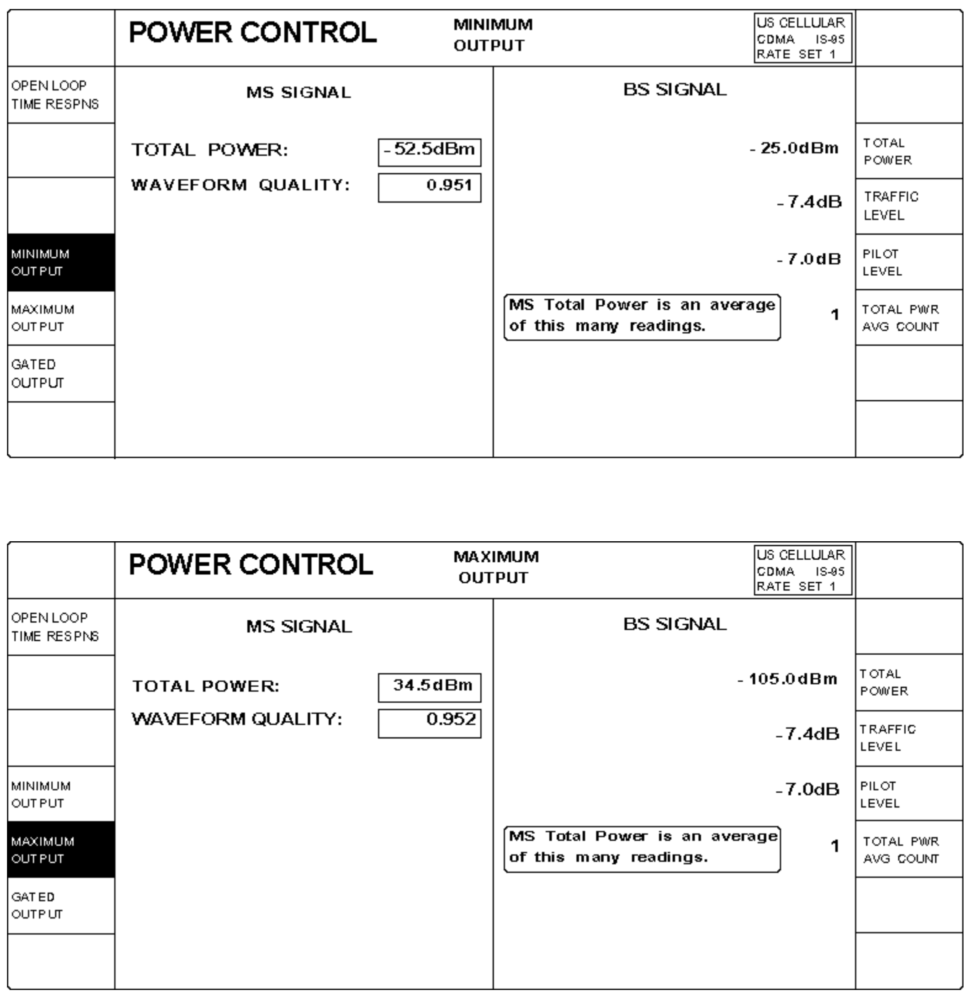


Figure 3–12: Minimum output and maximum output menus

You can change the specific power levels for total power, traffic level, and pilot level by selecting their softkeys. Use the VAR control or the DATA keypad to change the power level values. You can also use the TOTAL PWR AVG COUNT softkey to set how many readings are averaged to determine the total power of the mobile station. The number of counts can be from 1 to 100.

Results are displayed as a running average, even before the Total Power Average Count is reached, to eliminate the perceived long measurement time that results when the Total Power Average Count is set to a high number.

Gated Output. Selecting this test allows you to display the gated output of the RF carrier in several formats.

***NOTE**. This test reduces the data transmission rate to one-eighth rate.*

Select FULL DISPLAY to display the total period of the IS-98 specified gated output template. The period of the full display is approximately 1500 μs.

Select RISING EDGE or FALLING EDGE to zoom in to display the 17 μs period of the rising or falling edge of the waveform. During each of these displays, a MARKER is activated to display both power amplitude and relative time. See Figure 3–13.

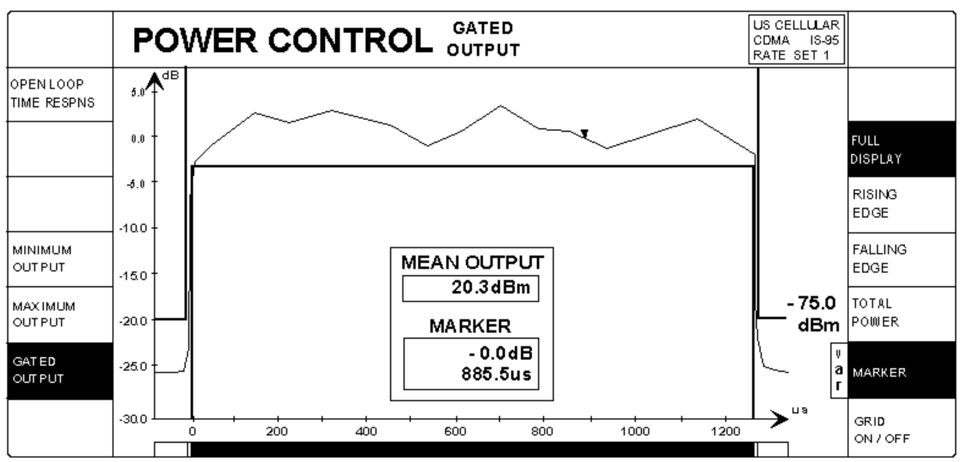


Figure 3–13: Gated output (full display)

For a more detailed view of the segment illustrated in Figure 3–13, press the RISING EDGE or FALLING EDGE softkey. The details of the rising and falling edges are displayed as shown in Figure 3–14.

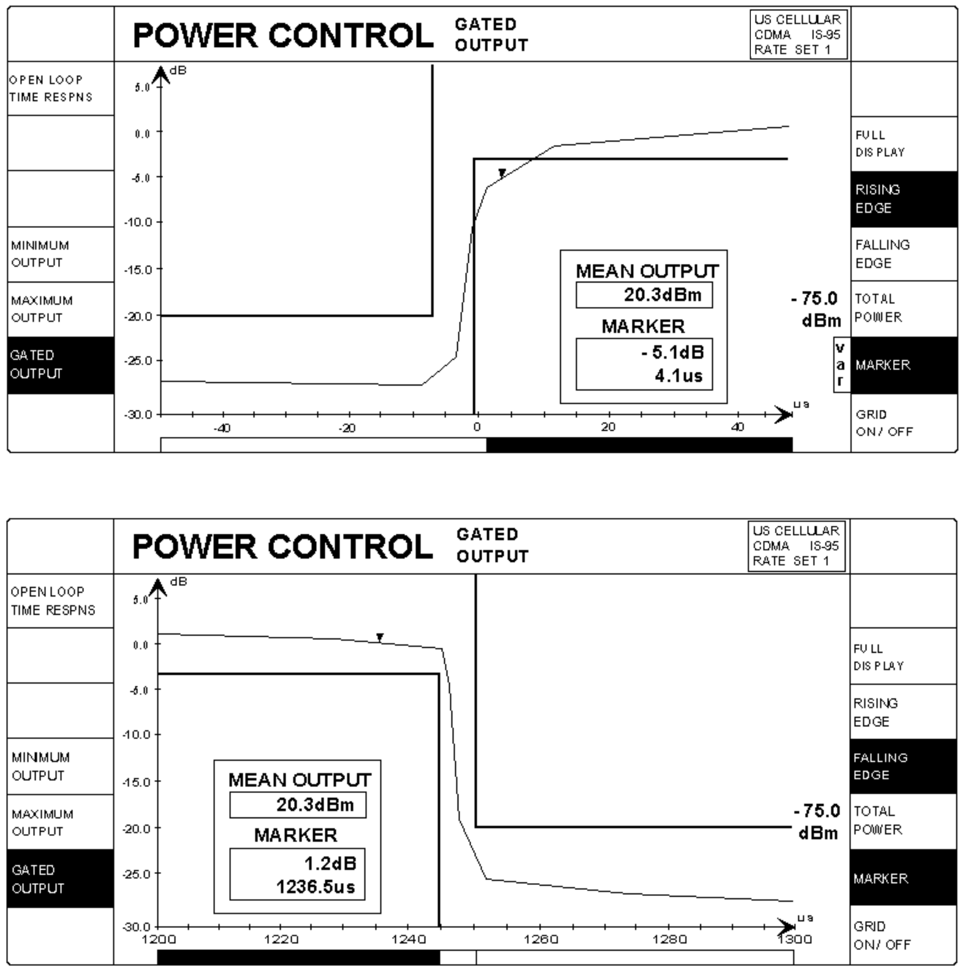


Figure 3–14: Gated output (rising edge and falling edge)

Receiver Quality

Use this softkey to set up tests of the performance of the mobile receiver. Two modes of operation are available: continuous mode or single shot mode. You can toggle between the modes by pressing the upper left softkey. When you select the continuous mode, you can press the softkey for the BS Signal or Environment parameters you want to change and vary the value by using the VAR control (see Figure 3–15).

In continuous mode, the tester continuously performs the receiver quality test and displays the frame error rate over the interval of the most recent number of frames. You can set this frame error rate interval (CONTINUOUS INTERVAL) in the configuration menu (refer to *Receiver Quality Configuration Menu* on page 3–23).

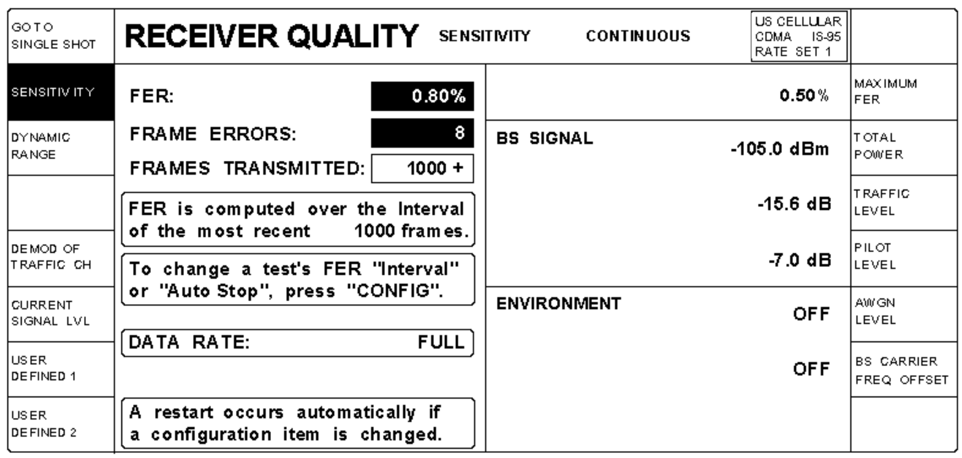


Figure 3–15: Receiver quality sensitivity (continuous)

If the FER exceeds the maximum FER limit, the FER is displayed in inverse video (white on black). The frame errors are also displayed in reverse video if they exceed the number determined by the selected maximum FER and continuous interval. AUTO STOP is not applied in CONTINUOUS mode.

When you select the single shot mode (see Figure 3–16), the tester will stop the receiver quality test under the following conditions:

- If you have the auto stop function turned off, the test stops when the number of frames that you set (single shot duration) is reached.
- If you have the auto stop function turned on, the test stops when one of the following conditions occurs:
  - The confidence level that you set is reached.
  - The frame errors reach the maximum limit, based on the single-shot duration and maximum FER that you set. Simply exceeding the maximum FER limit will not stop the test, since a falsely high FER can be generated in the initial portion of a test.
  - The number of frames that you set (single shot duration) is reached.

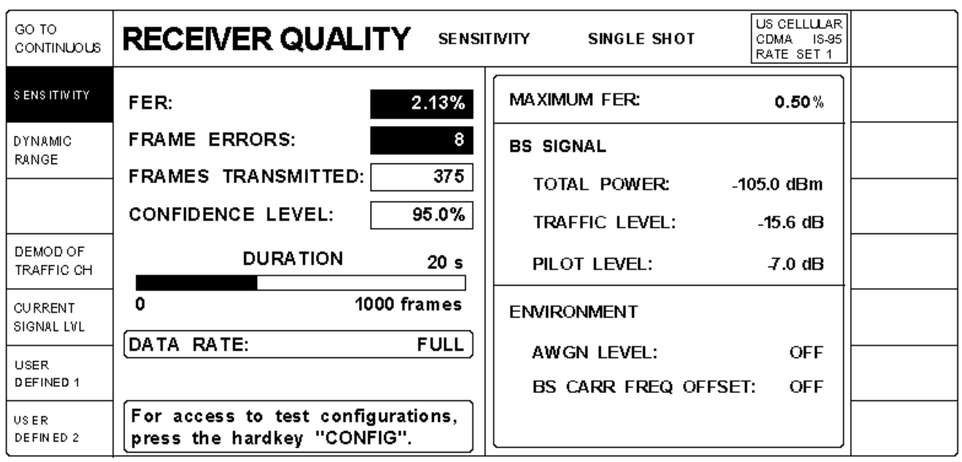


Figure 3–16: Receiver quality sensitivity (single shot)

Receiver Quality Configuration Menu. While in a receiver quality test menu, you can press the CONFIG front-panel key to display the configuration menu for that particular test (see Figure 3–17).

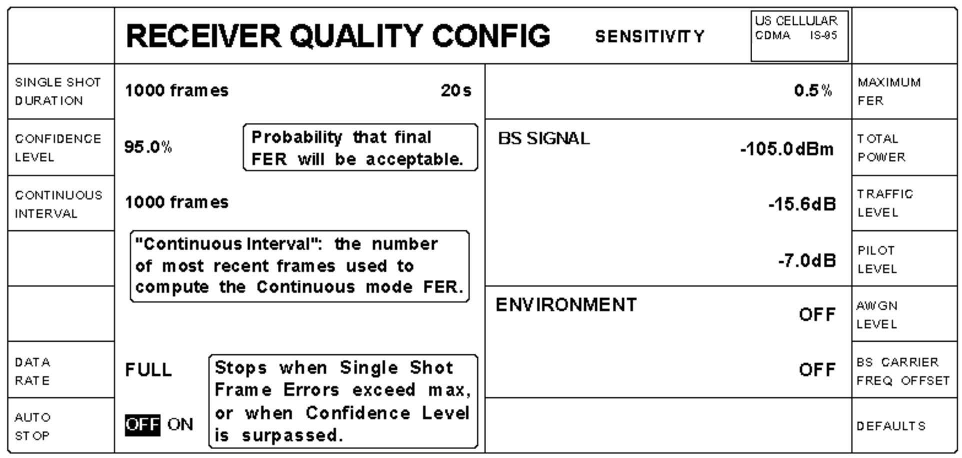


Figure 3–17: Sensitivity configuration menu

You can use the configuration menu to set the following parameters for the receiver quality tests:

- Single shot duration. Press the SINGLE SHOT DURATION softkey to set the number of frames that are tested. This parameter is used when you perform a receiver quality test in the single shot mode. The test stops when the number of frames that you set is reached.
- Confidence level. Press the CONFIDENCE LEVEL softkey to set the level of confidence to which you want to test. The tester uses this parameter when you have selected the single shot mode of operation, and you have turned on the auto stop function. If the frame errors do not exceed the maximum, the tester will execute the test until the probability of an acceptable frame error rate reaches the confidence level that you set. At this time, the tester will stop the test. (If the confidence level is not reached, the test stops when the single shot duration is reached.)

  Use of the confidence level allows a manufacturer to improve the throughput of a test station by running the receiver quality test only long enough to obtain the desired confidence level.
- Continuous Interval. Press the CONTINUOUS INTERVAL softkey to set the number of frames that you want the tester to use to compute the frame error rate for the continuous mode.

- Data rate. Press the DATA RATE softkey to set the traffic channel data rate. The selections for the data rate are: FULL, HALF, QUARTER, or EIGHTH.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on or off. When auto stop is on, the tester performs a single shot receiver quality test until the number of frames that you set (single shot duration) is reached or until one of two conditions occurs:
  - The confidence level that you set is reached.
  - The frame errors reach the maximum limit, based on the single-shot duration and maximum FER that you set. Simply exceeding the maximum FER limit will not stop the test, since a falsely high FER can be generated in the initial portion of a test.
- Maximum frame error rate. Press the MAXIMUM FER softkey to set the maximum frame error rate. The frame error rate is the percentage of bad frames with respect to the total number of frames tested. The maximum frame error rate is the frame error rate limit used to control the inverse video display of the FER and the FRAME ERRORS fields. For example, in Figure 3–17 the maximum frame error rate is set to 0.5%. The single shot duration is 1000 frames. Therefore, the maximum number of frame errors is 5.
- Total power. Press the TOTAL POWER softkey to set the transmitted power.
- Traffic level. Press the TRAFFIC LEVEL softkey to adjust the level of the forward traffic channel in the forward CDMA channel.

  The TRAFFIC LEVEL softkey specifies the FULL rate traffic channel level. If a data rate other than FULL is used, the actual test traffic level must be determined using the following table:

Rate	Correction
FULL	0 dB
HALF	–3 dB
QUARTER	–6 dB
EIGHTH	–9 dB

Real level = displayed + correction.

- Pilot level. Press the PILOT LEVEL softkey to adjust the level of the pilot channel in the forward CDMA channel.

- AWGN LEVEL (Additive White Gaussian Noise Level). This option provides additional noise to more closely simulate actual operating conditions. The tester displays the AWGN LEVEL softkey when the optional AWGN system is installed. Press the AWGN LEVEL softkey to adjust the level of the AWGN generator. Press the ON or OFF front-panel keys to turn the AWGN generator on or off.

  The tester's additive white gaussian noise (AWGN) signal is a calibrated, wideband (1.8 MHz) signal simulating white noise. The AWGN power is measured across the entire 1.8 MHz bandwidth. In some tests, such as those specified in IS-98, the described noise power is measured across the 1.23 MHz bandwidth of the CDMA signal. To use the tester's AWGN signal for these types of tests, you must set the AWGN level 1.1 dB higher than specified in IS-98 to compensate for differences in bandwidth.

  For example, in IS-98, section 9.3.3, *Demodulation of Forward Traffic Channel in Additive White Gaussian Noise*, the specification indicates that the total AWGN power should be 1.0 dB greater than the total forward traffic channel power. This specification assumes that the AWGN power is measured in a 1.23 MHz bandwidth. Since the tester uses a 1.8 MHz bandwidth to measure its AWGN power, you must compensate for the difference in noise measurement bandwidth by setting the AWGN level in the tester 1.1 dB higher than the value specified in the IS-98 test specification.

  In this example, where the IS-98 specification calls for a 1.0 dB greater AWGN level than the forward traffic channel level, you must set the tester's AWGN setting to 2.1 dB (the 1.0 dB from the IS-98 specification plus 1.1 dB for bandwidth compensation).

NOTE*. The total output power of the tester is the sum of the Forward CDMA signal plus the AWGN signal. When the Forward CDMA signal is within 10 dB of its maximum power output, the AWGN signal is turned off. Once the Forward CDMA signal is no longer within 10 dB of its maximum power, the AWGN signal level may be set to a new value.*

- Base station carrier frequency offset. Press the BS CARRIER FREQ OFFSET softkey to enter the frequency offset by which you want to shift the base station carrier. This allows you to test if the mobile station tracks the base station frequency.
- Defaults. Press the DEFAULTS softkey to set all the parameters to their preset conditions (typically, the default values are based on IS-98 specifications).

NOTE*. The ENVIRONMENT region is present only if the Additive White Gaussian Noise option is installed. This option provides additional noise to more closely simulate actual operating conditions.*

Transmitter Quality

Use this softkey to test the mobile station transmitter quality. Three sets of tests are performed by default:

- Carrier feedthrough and I/Q imbalance
- Carrier frequency error and transmit time error
- Waveform quality

One additional test can be selected by pressing one of the following softkeys:

- Phase Error
- Magnitude Error
- Error Vector Magnitude

When you press the softkey associated with a particular test, the graphical output and the first two lines of the numeric results output change to reflect the results of that test. Figure 3–18 shows a typical display for the PHASE ERROR test. This measurement is performed at the FULL data rate.

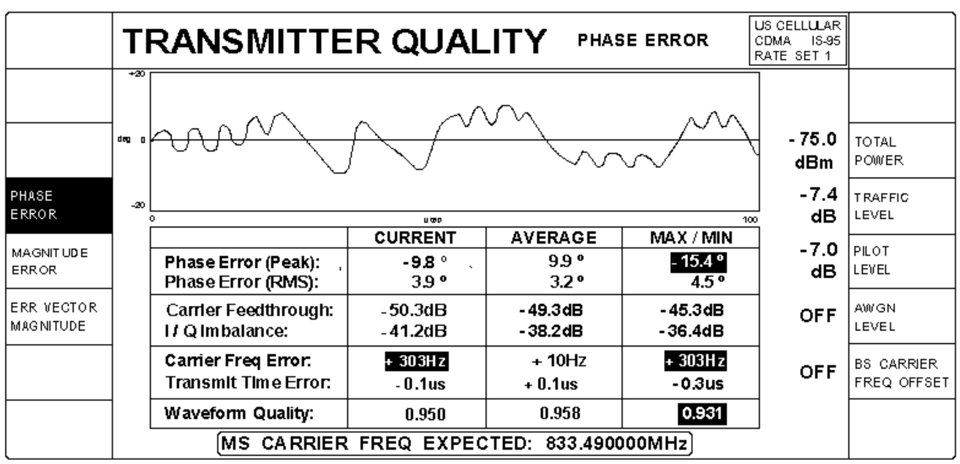


Figure 3–18: Transmitter quality menu

The tester displays "——" when it is not able to make a valid measurement of the input signal.

You can use this menu to set the following parameters:

- Total Power. Press the TOTAL POWER softkey to enable the VAR control to set the total power output level.
- Traffic level. Press the TRAFFIC LEVEL softkey to adjust the level of the forward traffic channel in the forward CDMA channel.
- Pilot Level. Press the PILOT LEVEL softkey to adjust the level of the pilot channel in the forward CDMA channel.
- AWGN Level. This option provides additional noise to more closely simulate actual operating conditions. The tester displays the AWGN LEVEL softkey when the optional AWGN system is installed. Press the AWGN LEVEL softkey to adjust the level of the AWGN generator. Press the ON or OFF front-panel keys to turn the AWGN generator on or off.

  The tester's additive white gaussian noise (AWGN) signal is a calibrated, wideband (1.8 MHz) signal simulating white noise. The AWGN power is measured across the entire 1.8 MHz bandwidth. In some tests, such as those specified in IS-98, the described noise power is measured across the 1.23 MHz bandwidth of the CDMA signal. To use the tester's AWGN signal for these types of tests, you must set the AWGN level 1.1 dB higher than specified in IS-98 to compensate for differences in bandwidth.

  For example, in IS-98, section 9.3.3, *Demodulation of Forward Traffic Channel in Additive White Gaussian Noise*, the specification indicates that the total AWGN power should be 1.0 dB greater than the total forward traffic channel power. This specification assumes that the AWGN power is measured in a 1.23 MHz bandwidth. Since the tester uses a 1.8 MHz bandwidth to measure its AWGN power, you must compensate for the difference in noise measurement bandwidth by setting the AWGN level in the tester 1.1 dB higher than the value specified in the IS-98 test specification.

  In this example, where the IS-98 specification calls for a 1.0 dB greater AWGN level than the forward traffic channel level, you must set the tester's AWGN setting to 2.1 dB (the 1.0 dB from the IS-98 specification plus 1.1 dB for bandwidth compensation).

NOTE. *The total output power of the tester is the sum of the Forward CDMA signal plus the AWGN signal. When the Forward CDMA signal is within 10 dB of its maximum power output, the AWGN signal is turned off. Once the Forward CDMA signal is no longer within 10 dB of its maximum power, the AWGN signal level may be set to a new value.*

- Base station carrier frequency offset. Press the BS CARRIER FREQ OFFSET softkey to enter the frequency offset by which you want to shift the base station carrier. This allows you to test if the mobile station tracks the base station frequency. You can also use this softkey to turn off the BS carrier frequency offset.

Multiple Pilots

Press the MULTIPLE PILOTS softkey to display the MULTIPLE PILOTS menu. See Figure 3–19. Multiple Pilots give the user control of up to five pilots, four of which may be turned off. A new state is defined when in multiple pilots mode: CMP.

The measurements reported on this menu will return the power level, keep bit state, and chip offset of each pilot the mobile recognizes. The power level of each pilot compared to the T_ADD and T_DROP levels determine which pilots are measured.

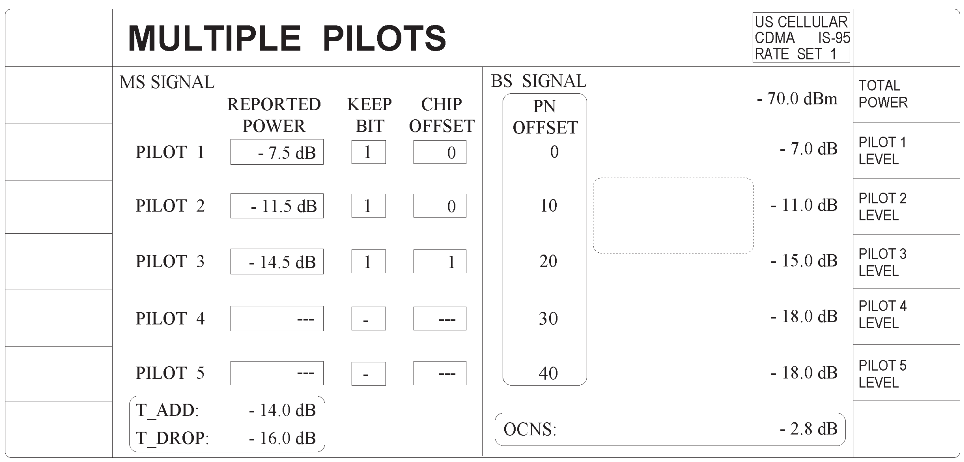


Figure 3–19: Multiple pilots menu

The measurements shown on this menu include:

- Reported Power. This column shows the power reported by the mobile for each pilot.
- Keep Bit. The keep bit is set by the mobile, and indicates that T_ADD has been surpassed (i.e. “keep the pilot”).
- Chip Offset. The chip offset is the PN phase, or “delay” reported by the mobile.

This menu also displays:

- PN Offset. The PN offset of each pilot is displayed.
- T_ADD. This display shows the currently set pilot detection threshold.

- T_DROP. This display shows the pilot drop threshold. (T_TDROP has been internally set at 4 seconds.)
- OCNS. The Orthogonal Channel Noise Simulator display supplies the difference in power between pilots and total power.

This menu also allows you to set the power levels for multiple pilots:

- Total Power. Press the TOTAL POWER softkey to enable the VAR control to set the total power output level.
- Pilot 1 Level. Press the PILOT 1 LEVEL softkey to enable the VAR control to set the Pilot 1 power output level.
- Pilot 2 Level. Press the PILOT 2 LEVEL softkey to enable the VAR control to set the Pilot 2 power output level, or turn the pilot OFF.
- Pilot 3 Level. Press the PILOT 3 LEVEL softkey to enable the VAR control to set the Pilot 3 power output level, or turn the pilot OFF.
- Pilot 4 Level. Press the PILOT 4 LEVEL softkey to enable the VAR control to set the Pilot 4 power output level, or turn the pilot OFF.
- Pilot 5 Level. Press the PILOT 5 LEVEL softkey to enable the VAR control to set the Pilot 5 power output level, or turn the pilot OFF.

Multiple pilot underdriven and overdriven conditions. The OCNS (Orthogonal Channel Noise Simulator) value represents the power needed, and automatically added, to bring the CDMA output power up to the level specified by the “Total Power” setting. The Total Power setting is therefore comprised of all the CDMA Base Station signal components, plus the appropriately calculated and “compli-mentary” OCNS value.

Total Power = Syn + Pg + P1 + P2 + P3 + P4 + P5 + OCNS

Sync, Paging, and Traffic channels are included in this equation, but may be ignored for the purpose of this discussion. Only the Pilots (P1 through P5) and OCNS will be discussed;

- Underdriven

  When the combined output of the Pilots is “low”, the output of the OCNS must be correspondingly “high” in order to make up the difference and insure that the specified Total Power is produced. In like manner, when the Pilots are “high”, the OCNS must be “low”. The OCNS must adjust automatically with changes in the Pilot Levels in order to maintain the specified Total Power.

  A CDMA chipset controls the distribution of power among the CDMA signal constituents. There are high and low gain components within this chipset. These gain components have been allocated to the CDMA signal constituents in a "uniform" manner. Pilots 4 and 5, though, must share these resources with the OCNS.

If Pilots 4 and 5 are configured by the user with high gain components, the OCNS will be left with only low gain components. This may leave the OCNS with insufficient capability to make up the difference in the Total Power when the combined Pilot Output is "low".

In this circumstance, the "Underdriven: Increase The Pilot Level(s)" message will be displayed:

UNDERDRIVEN:
INCREASE THE
PILOT LEVEL(S)

The OCNS level will be replace with a "——", indicating its exhausted ("topped-out") capability. The GPIB command set has related queries and return values.

An alternative to increasing the Pilot Levels would be to re-configure one or both of Pilots 4 and 5 from high gain to low gain, allocating greater capacity to the OCNS.

- Overdriven

  Each Pilot level is expressed in dB, based upon a ratio relative to the specified "Total Power". If the sum of the fractional components exceeds the value "1" (unity), the "Overdriven" warning will be displayed:

  OVERDRIVEN:
REDUCE THE
PILOT LEVEL(S)

  The OCNS level will be replaced with a "——", indicating that it can no longer reduce its level in a manner that will compensate for the elevated Pilot levels. The GPIB command set has related queries and return values.

Softer Handoff

Press the SOFTER HANDOFF softkey to display the SOFTER HANDOFF menu. See Figure 3–20. Softer handoff measurements allow the user to add a second sector. The user can then evaluate the phone's ability to incorporate a second sector, correlate transmitted data from both primary and secondary sectors, and complete a handoff to a second sector. A new state is defined when in softer handoff mode: CSH.

Softer handoff occurs over eleven pre–determined steps. At each step, the gain levels for the primary and secondary sectors will be adjusted. Also, at each step two measurements will be made:

1. An FER will be run in continuous mode, and

2. The mobile will be queried for the pilot power for both primary and secondary pilots. This measurement is actually run upon entering the softer handoff page, and will continue until the page is exited.

Here is an example of the handoff process:

On entering the softer handoff page, only the Keep bit for the primary sector should be set.

- A neighbor list message is sent upon entering the softer handoff page to make the mobile aware of the second pilot channel.

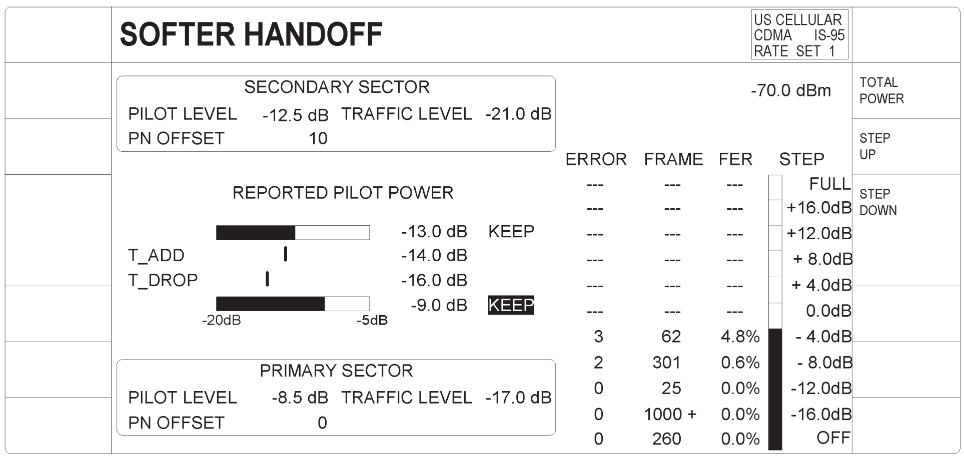


Figure 3–20: Softer handoff menu

- As the user presses the step up/step down buttons, the power ratio between the primary and secondary sectors will be changed.
- As the pilot power of the secondary pilot exceeds T_ADD, the mobile issues a pilot strength measurement message (mobile has moved this pilot from neighbor set to candidate set). This message will cause the CMD80 to issue a handoff direction message, which includes the PN offsets of *both* pilots. This message will cause the mobile to move the secondary pilot into the active set. After the mobile successfully acquires the new traffic channel, it will then respond with a handoff completion message.

  At this point, the mobile is combining the power of both traffic channels. The keep bit for both pilots should now be set. The keep bit for the *primary* sector will be displayed in reverse video.
- As the user continues to press “Step Up” and power of the primary level will drop below T_DROP. At this point, the mobile starts the T_TDROP timer. When this timer has expired, the mobile will then issue a pilot strength measurement message.

- The CMD80 will then issue a handoff direction message, which will *only* contain the PN offset for the secondary pilot. The mobile will then move the Primary pilot from the active set to the neighbor set and return a handoff completion message.

  After a softer handoff is completed from the primary sector to the secondary sector, the secondary sector becomes the new primary sector. To indicate this, the keep bit for the new primary sector is displayed in reverse video (regardless of the primary/secondary titling of the display boxes).

  If the total power is changed during the FER, the FER will restart.

For each of the eleven handoff steps, summarized in table 3–2, the power of each sector's channels (relative to other channels in that sector) will remain constant at -7 dB for the pilot, –15.6 dB for the traffic, –12.0 dB for the primary paging and -16.0 dB for the primary sync. Each of the eleven steps are represented as the power of the secondary sector relative to the primary sector. When the STEP UP button is pressed, the gain levels for the secondary sector will be increased, while the gain levels for the primary sector will be decreased. When the STEP DOWN button is pressed, the opposite will be true.

Table 3–2: Softer handoff step summary

Step	Secondary sector relative to primary sector, in dB	Primary (expected mobile readings in dB)		Secondary (expected mobile readings in dB)	
		Pilot	Traffic	Pilot	Traffic
1	Off	–7.0	–15.6	– – –	– – –
2	–16.0	–7.1	–15.6	–23.0	–32.0
3	–12.0	–7.3	–15.8	–19.4	–28.0
4	–8.0	–7.6	–16.3	–15.7	–24.5
5	–4.0	–8.5	–17.0	–12.4	–21.0
6	0.0	–10.0	–18.7	–10.0	–18.7
7	+4.0	–12.4	–21.0	–8.5	–17.0
8	+8.0	–15.7	–24.5	–7.6	–16.3
9	+12	–19.4	–28.0	–7.3	–15.8
10	+16	–23.0	–32.0	–7.1	–15.6
11	Full	– – –	– – –	–7.0	–15.6

If a softer handoff has been completed from the primary to the secondary sector, the completed handoff will now be reflected in the new PN offset value seen when returning to the Call Established menu. The new *secondary* sector PN offset will be automatically set at 10 above the old value.

If the handoff is not completed, the original PN offset values will be retained.

The sector that last had the solitary keep bit is the Primary Sector.

Handoffs/Transitions

Press the HANDOFFS/TRANSITIONS softkey to display the HANDOFFS/TRANSITIONS menu for the CALL ESTABLISHED mode. See Figure 3–21. You use this menu to either handoff an established call to another network, system, and/or standard, or to make a local transition, such as from RATE SET 1 to RATE SET 2.

***NOTE**. The menu displays the previous NETWORK HANDOFFS selections. The selections are retained until you change them.*

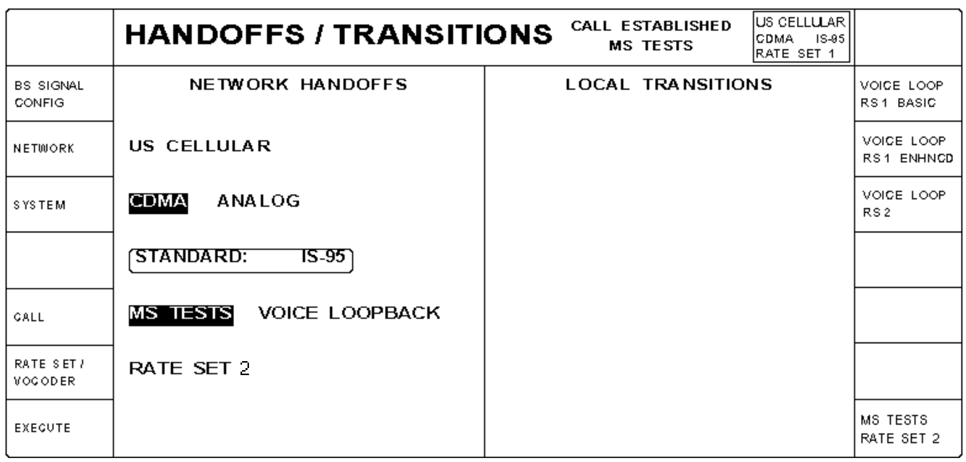


Figure 3–21: Handoffs/transitions menu for call established (MS tests)

To handoff a CDMA call, perform the following procedure:

***NOTE**. The tester does not support handoffs between TDMA and CDMA.*

1. In the NETWORK HANDOFFS side of the menu, select the network, system, and standard to which you want to handoff the call. Table 3–3 lists the supported handoffs with all options installed.

2. To configure the base station signal for the system to which you are handing off, press the BS SIGNAL CONFIG softkey.

   For information about configuring the operating parameters of an analog base station, refer to *ANALOG BS SIGNAL CNFG* on page 3–160. For information about configuring the operating parameters of a CDMA base station, refer to *CDMA BS SIGNAL CNFG* on page 3–49.

3. Press the CALL softkey to select either MS TESTS or VOICE LOOPBACK.

4. Select the RATE SET/VOCODER (CDMA system only).

If you selected CDMA as the system, a RATE SET/VOCODER softkey is displayed that allows you to select the rate set. The selections available for the rate set and vocoder type depend on whether you selected MS TESTS or VOICE LOOPBACK for CALL. For MS TESTS, the RATE SET/VOCODER softkey toggles between RATE SET 1 and RATE SET 2. For VOICE LOOPBACK, the RATE SET/VOCODER softkey cycles through RATE SET 1 BASIC (which specifies the Basic vocoder), RATE SET 1 ENHANCED (which specifies the Enhanced vocoder), and RATE SET 2.

***NOTE**. If the network handoff you selected is not implemented in the tester, the tester displays the message "The configured handoff is NOT currently available." In this case, the tester does not display the EXECUTE softkey.*

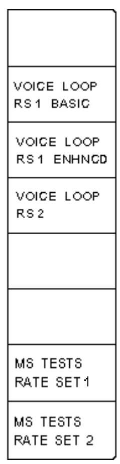
5. Press the EXECUTE softkey to make the handoff.

Table 3–3: Valid network handoffs

Network	Handoff from standard	Valid handoff to standards
US Cellular	CDMA (IS–95)	AMPS or NAMPS
	AMPS	NAMPS
	NAMPS	AMPS
	AMPS	TDMA (IS–136–A)
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US PCS TDMA (IS–136–A)
Japanese Cellular	CDMA (IS–95)	JTACS or NTACS
	J–CDMA (T53)	JTACS or NTACS
	JTACS	NTACS
	NTACS	JTACS
Chinese Cellular	CDMA (IS–95)	ETACS or TACS
US PCS	CDMA (UB IS–95)	AMPS or NAMPS
	CDMA (J–STD–008)	AMPS or NAMPS
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US Cellular TDMA (IS–136–A)

In the LOCAL TRANSITIONS side of the HANDOFFS/TRANSITIONS menu, you can use the softkeys to make a local transition, such as from RATE SET 1 to RATE SET 2.

Which softkeys appear in the LOCAL TRANSITIONS side of the menu depends on the currently active system, the type of established call (MS TESTS or VOICE LOOPBACK), the rate set, and the vocoder. For illustration purposes, the following figure shows all the possible choices. In the actual menu, the type of call that is currently active will not appear as a choice.



If you select a local transition that is not available, such as selecting Rate Set 2 when your tester does not support Rate Set 2, the transition will not occur and the message, “The selected transition is NOT currently available.” will appear in the menu.

BS Signal Cnfg

Press the BS SIGNAL CNFG softkey to display the main configuration menu for the call established state. You can use this menu to set the following parameters:

- Total Power. Press the TOTAL POWER softkey to enable the VAR control for the tester total power output level. This is the total power used in all three states of the manual test: Unregistered, Registered, and Call Established. You can set the total power using the CDMA BS SIGNAL CNFG softkey in any of the state menus.
- Traffic level. Press the TRAFFIC LEVEL softkey to adjust the level of the forward traffic channel in the forward CDMA channel.
- Paging level. Press the PAGING LEVEL softkey to adjust the level of the paging channel in the forward CDMA channel.
- Sync level. Press the SYNC LEVEL softkey to adjust the level of the sync channel in the forward CDMA channel.

- Pilot Level. Press the PILOT LEVEL softkey to adjust the level of the pilot channel in the forward CDMA channel.

Total Power

This softkey enables the VAR control to set the tester total power output level. You can also set the total power using the BS SIGNAL CNFG softkey in any other menu page.

NOTE*. The total power setting is the system default level unless overridden by a test. For example: the receiver sensitivity test overrides the total power value with the parameters established for the receiver sensitivity test. This is also true for the traffic level, page level, sync level, and pilot level.*

RF Channel

This softkey lets you change the RF channel. The RF channel can be set to one of the following:

- US Cellular: 1 to 799, 990 to 1023
- Japan Cellular: 0 to 1199
- China Cellular: 0 to 2047
- US PCS: 0 to 1199
- Korean PCS: 0 to 1300

NOTE*. Changing the RF channel initiate a hard handoff. You can change the RF channel only during the call established state or when using the CDMA BS SIGNAL CNFG menu described on page 3–49.*

You can make any number of changes; however, when the call is released, the tester resumes operation on the RF channel specified in the main base station configuration. Refer to Table 3–4 on page 3–50 for the allocated CDMA channels.

Traffic Channel

This softkey lets you change the traffic channel. You can set the traffic channel to values 2 through 31 and 33 through 63, inclusive.

NOTE*. Changing the traffic channel initiate a hard handoff. You can change the traffic channel only during the call established state or when using the CDMA BS SIGNAL CNFG menu described on page 3–49.*

Frame Offset

This softkey lets you change the frame offset. You can set the frame offset to any value between 0 and 15, inclusive.

NOTE. *Changing the frame offset initiates a hard handoff. You can change the frame offset only during the call established state or when using the CDMA BS SIGNAL CNFG menu described on page 3–49.*

PN Offset

This softkey lets you change the PN offset. You can set the PN offset to any value between 0 and 511, inclusive. This new PN offset becomes the PN offset of the tester for the current and subsequent calls.

NOTE. *Changing the PN offset initiates a hard handoff. You can change the frame offset only during the call established state or when using the CDMA BS SIGNAL CNFG menu described on page 3–49.*

Call Established configuration menu

While in the Call Established – MS Tests state, you can press the front-panel CONFIG key to access the configuration menu (see figure 3–22).

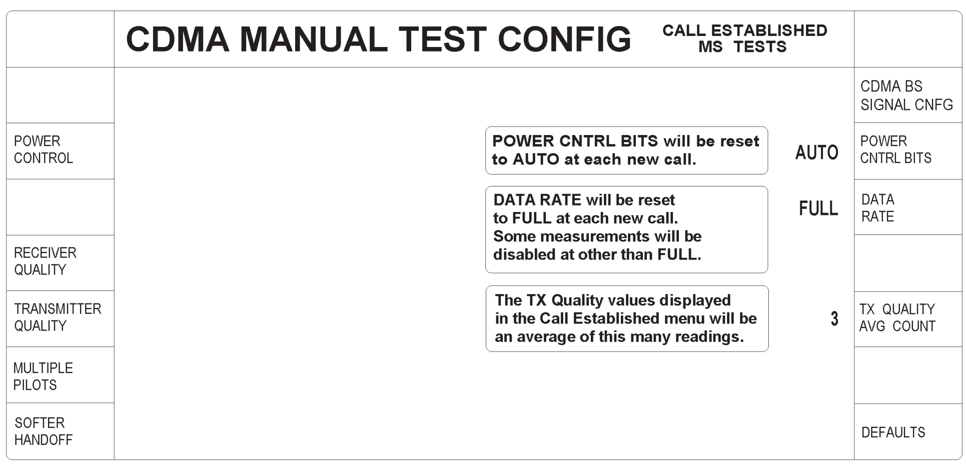


Figure 3–22: CDMA manual test configuration menu (call established – ms tests)

- POWER CONTROL. Press this softkey to access the power control configuration menu.

- RECEIVER QUALITY. Press this softkey to access the Receiver Quality configuration menu (see figure 3–17).
- TRANSMITTER QUALITY. Press this softkey to access the Transmitter Quality configuration menu.
- MULTIPLE PILOTS. Press this softkey to access the multiple pilots configuration menu (see figures 3–23 and 3–24).
- SOFTER HANDOFF. Press this softkey to access the softer handoff configuration menu (see figure 3–25)
- BS SIGNAL CONFIG. Press this softkey to access the base station signal configuration menu (see the menu description on page 3–49).
- POWER CNTRL BITS. Press this softkey to toggle the power control bits between AUTO and HOLD. The power control bits will be reset to AUTO at each call.
- DATA RATE. Press this softkey to enable the front-panel VAR knob. Use the VAR knob to select between data rates of FULL, HALF, QUARTER, and EIGHTH. The data rate will be reset to FULL at each call.
- TX QUALITY AVG COUNT. Press this softkey to use the front-panel VAR knob to set the number of readings to be averaged together for TX Quality values. This average is used to obtain the displayed Carrier Frequency Error, Transmit Time Error, and Waveform Quality values in the Call Established – MS Tests menu.
- DEFAULTS. Press this softkey to return all selections to factory default values.

Multiple Pilots Configuration Menu. From the Call Established configuration menu, press the multiple pilots softkey to display the multiple pilots configuration menus (see Figures 3–23 and 3–24).

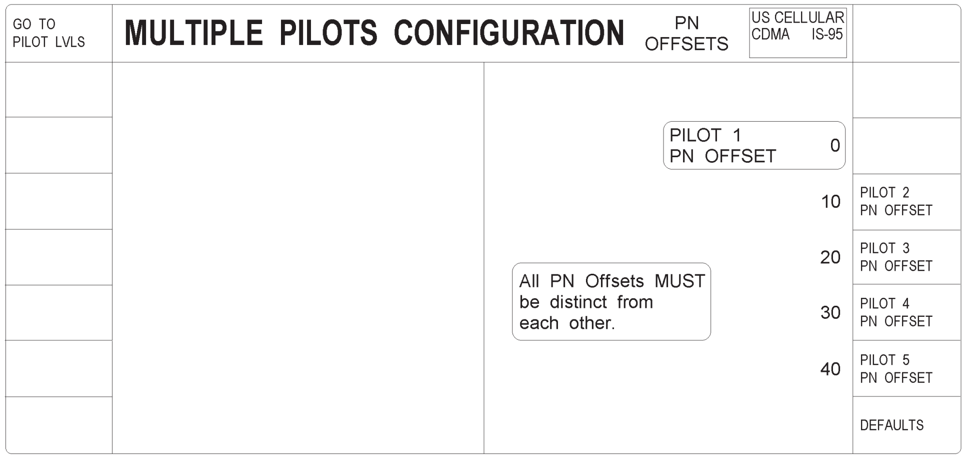


Figure 3–23: Multiple pilots PN offsets configuration menu

The multiple pilots PN offsets configuration menu allows you to set the PN offset for pilots 2 through 5. The GO TO PILOT LVLS softkey accesses the multiple pilots configuration menu for pilot levels, see figure 3–24. Press the DEFAULTS softkey to return the PN offsets to the factory defaults.

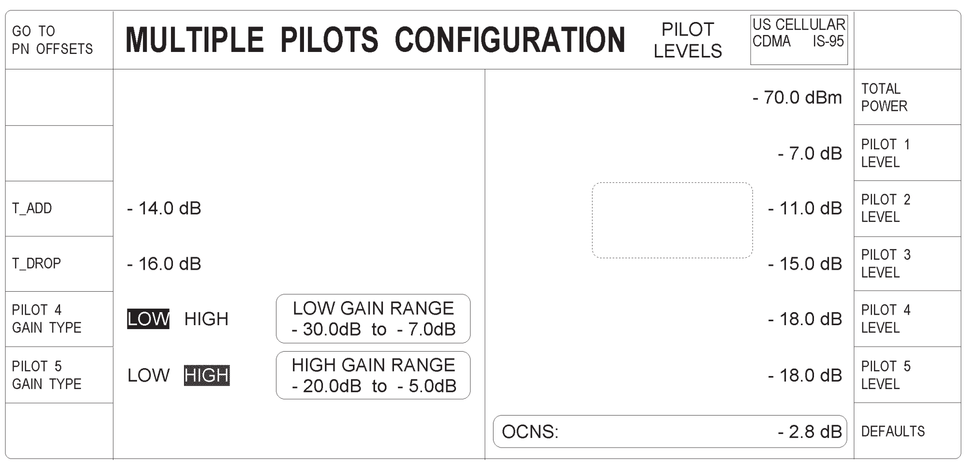


Figure 3–24: Multiple pilots Pilot Levels configuration menu

The multiple pilots Pilot Levels configuration menu offers the following softkeys:

- GO TO PN OFFSETS. This softkey accesses the PN offsets configuration menu. See figure 3–23.

- T_ADD. Press this softkey to use the front-panel VAR control to set the T_ADD level.
- T_DROP. Press this softkey to use the front-panel VAR control to set the T_DROP level.
- PILOT 4 GAIN TYPE. Press this softkey to toggle pilot 4 between low and high gain. (See Multiple Pilot Underdriven and Overdriven Conditions on page 3–29.)
- PILOT 5 GAIN TYPE. Press this softkey to toggle pilot 5 between low and high gain. (See Multiple Pilot Underdriven and Overdriven Conditions on page 3–29.)
- TOTAL POWER. Press this softkey to use the front-panel VAR control to set the total power level.
- PILOT 1 LEVEL. Press this softkey to use the front-panel VAR control to set the pilot 1 level.
- PILOT 2 through PILOT 5 LEVEL. Press these softkeys to use the front-panel VAR control to set the selected pilot level, or turn it OFF.
- DEFAULTS. Press this softkey to set all the selections back to the factory defaults.

Softer Handoff Configuration Menu. From the Call Established configuration menu, press the softer handoff softkey to access the softer handoff configuration menu (see Figure 3–25).

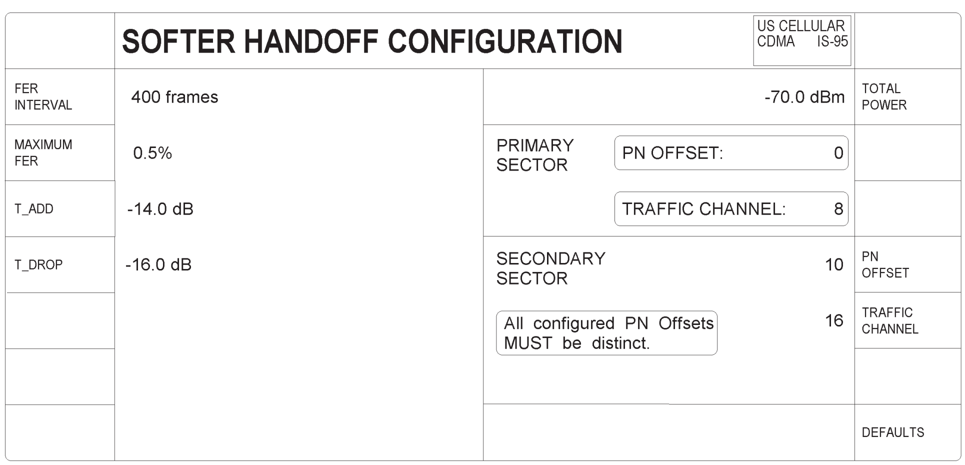
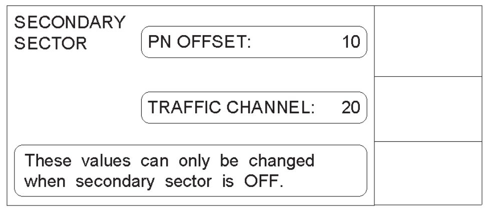


Figure 3–25: Softer handoff configuration menu

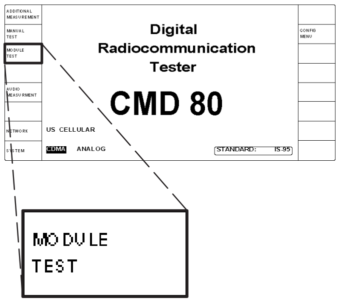
The secondary sector PN offset and traffic channel may only be edited when the secondary sector is completely off. If the secondary sector is emitting any energy, the softkeys will be removed and the secondary sector parameters will be fixed. The secondary sector portion of the display will change to show this:



NOTE. *This form of the menu will only be seen when entering the softer handoff configuration menu from the softer handoff measurement menu, not from the call established configuration menu.*

- FER INTERVAL. Press this softkey to use the front-panel VAR control to set the FER interval that you want the tester to use to compute the frame error rate.
- MAXIMUM FER. Press this softkey to use the front-panel VAR control to set the maximum FER allowed. FER values in excess of this limit will be shown in reverse video.
- T_ADD. Press this softkey to use the front-panel VAR control to set the pilot detection threshold.
- T_DROP. Press this softkey to use the front-panel VAR control to set the pilot drop threshold.
- TOTAL POWER. This softkey enables the VAR control to set the tester total power output level.
- PN OFFSET. Press this softkey to use the VAR control to set the secondary sector PN offset.
- TRAFFIC CHANNEL. This softkey enables the VAR control to set the secondary sector traffic channel.

Module Test



The MODULE TEST softkey (from the home menu) selects the module test measurements for the system selected with the SYSTEM softkey. This section discusses the tests available when you have selected CDMA as the system.

The module test feature supports testing the components of a mobile station before it is capable of completing a call. The module test feature provides CDMA signals and measures the output power and waveform quality; the tester can perform these tests without the mobile station having call-processing capability installed.

Press the MODULE TEST softkey to display the CDMA MODULE TEST menu.

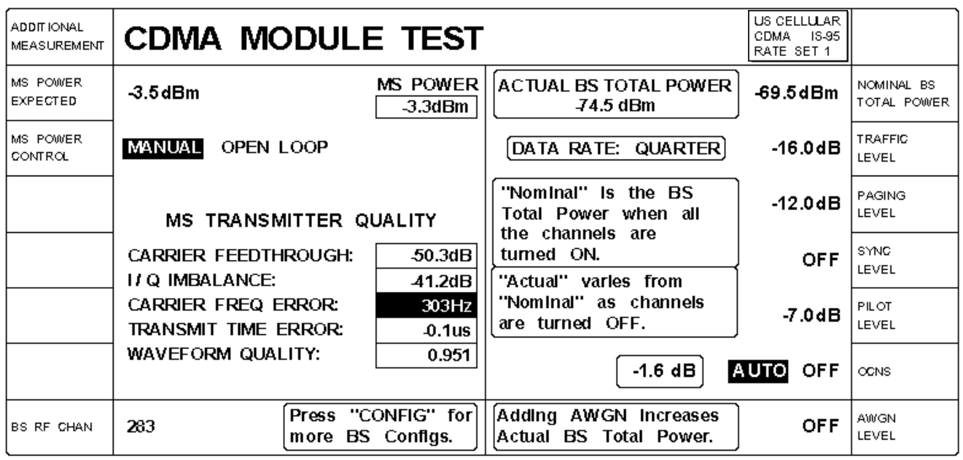


Figure 3–26: CDMA module test menu

The tester ignores the information content of the reverse link while in the Module Test mode. The tester forward link can contain a pilot, sync, paging, forward traffic, and five OCNS channels; you can individually set or disable the relative power of these signals. The Module Test mode also supports the optional AWGN signal injection.

In the Module Test mode, you can set the baseline output power using the NOMINAL BS OUTPUT POWER softkey. The ACTUAL BS TOTAL POWER display indicates the same value set by the NOMINAL BS OUTPUT POWER when all of the CDMA channels are enabled.

If a CDMA channel is disabled, the ACTUAL BS TOTAL POWER display is reduced by the amount contributed by the CDMA channel. The individual CDMA and AWGN channel levels remain constant when other channels are enabled or disabled.

The AWGN system adds energy to the ACTUAL BS TOTAL POWER display; however, the tester disables the AWGN when the NOMINAL BS TOTAL POWER is within 10 dB of the maximum output level of the tester.

The maximum output level depends on which RF connections are in use and the attenuation/gain settings for the connector in use. Refer to *RF CONNECT/EXT ATTEN* on page 1–16.

Additional Measurement

Use this softkey to perform voltage and current measurements using the front panel connections on the tester. Refer to *Additional Measurements* on page 3–255.

MS Power Expected

Use this softkey to set a value for the expected MS power when the MS POWER CONTROL is set to MANUAL. This softkey disappears when MS POWER CONTROL is set to “Open Loop.” Under this state, the expected MS power, calculated according to the open loop power control algorithm, is displayed in a rounded information box. The MS POWER display reads LOW or OVL (overload) when the power level of the mobile station is below or above the measurement window.

MS Power Control

Use this softkey to select how the expected power of the mobile station is calculated. The MANUAL mode uses the power level set when you press the MS POWER EXPECTED softkey. The OPEN LOOP mode uses the open loop power estimate based on the current network selection and the NOMINAL BS TOTAL POWER setting.

Transmitter Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile transmitter. The tester cannot perform carrier frequency error, transmit time error, and waveform quality measurements unless the input CDMA signal is synchronized to the tester.

BS RF Channel

Use this softkey to set the operating channel. The Module Test mode shifts immediately to the new channel without performing any handoff operation.

Nominal BS Total Power

Use this softkey to set the nominal output power of the tester. The choice of RF connector and the external attenuation or gain settings limit the output power. Press the ON or OFF front-panel keys to turn the output signal on and off.

Traffic Level

Use this softkey to adjust the level of the forward traffic channel in the forward CDMA channel. Press the ON or OFF front-panel keys to turn the forward traffic signal on and off. This sets the power for a FULL rate traffic channel.

If a data rate other than FULL is used, the actual test traffic level must be determined using the following table:

Rate	Correction
FULL	0 dB
HALF	–3 dB
QUARTER	–6 dB
EIGHTH	–9 dB

Real level = displayed + correction.

Paging Level

Use this softkey to adjust the level of the paging channel in the forward CDMA channel. Press the ON or OFF front-panel keys to turn the paging signal on and off.

Sync Level

Use this softkey to adjust the level of the sync channel in the forward CDMA channel. Press the ON or OFF front-panel keys to turn the sync signal on and off.

Pilot Level

Use this softkey to adjust the level of the pilot channel in the forward CDMA channel. Press the ON or OFF front-panel keys to turn the pilot signal on and off.

OCNS

Press this softkey to enable or disable the Orthogonal Channel Noise Simulator (OCNS). The OCNS adds power along with the sum of the data, traffic, paging, sync, and pilot levels so that their sum equals the NOMINAL BS TOTAL POWER. The tester displays the OCNS power level when you enable OCNS by selecting AUTO with the softkey.

AWGN Level

The tester displays this softkey when the optional AWGN system is installed. Press this softkey to adjust the amount of power that the AWGN system contributes to the ACTUAL BS TOTAL POWER. The tester displays the power level as a ratio of the AWGN power to the NOMINAL BS TOTAL POWER. The power range is –20 dB to +6 dB; however, the system is disabled when NOMINAL BS TOTAL POWER is within 10 dB of the tester's maximum power output. The maximum output level depends on which RF connections are in use and the attenuation/gain settings for the connector in use.

The tester's additive white gaussian noise (AWGN) signal is a calibrated, wideband (1.8 MHz) signal simulating white noise. The AWGN power is measured across the entire 1.8 MHz bandwidth. In some tests, such as those specified in IS-98, the described noise power is measured across the 1.23 MHz bandwidth of the CDMA signal. To use the tester's AWGN signal for these types of tests, you must set the AWGN level 1.1 dB higher than specified in IS-98 to compensate for differences in bandwidth.

For example, in IS-98, section 9.3.3, *Demodulation of Forward Traffic Channel in Additive White Gaussian Noise*, the specification indicates that the total AWGN power should be 1.0 dB greater than the total forward traffic channel power. This specification assumes that the AWGN power is measured in a 1.23 MHz bandwidth. Since the tester uses a 1.8 MHz bandwidth to measure its AWGN power, you must compensate for the difference in noise measurement bandwidth by setting the AWGN level in the tester 1.1 dB higher than the value specified in the IS-98 test specification.

In this example, where the IS-98 specification calls for a 1.0 dB greater AWGN level than the forward traffic channel level, you must set the tester's AWGN setting to 2.1 dB (the 1.0 dB from the IS-98 specification plus 1.1 dB for bandwidth compensation).

Module Test Configuration Menu

Access the menu shown in Figure 3–27 by pressing the CONFIG front-panel key while in the Module Test mode. You can also access the menu by pressing the Module Test softkey in the main Configuration menu.

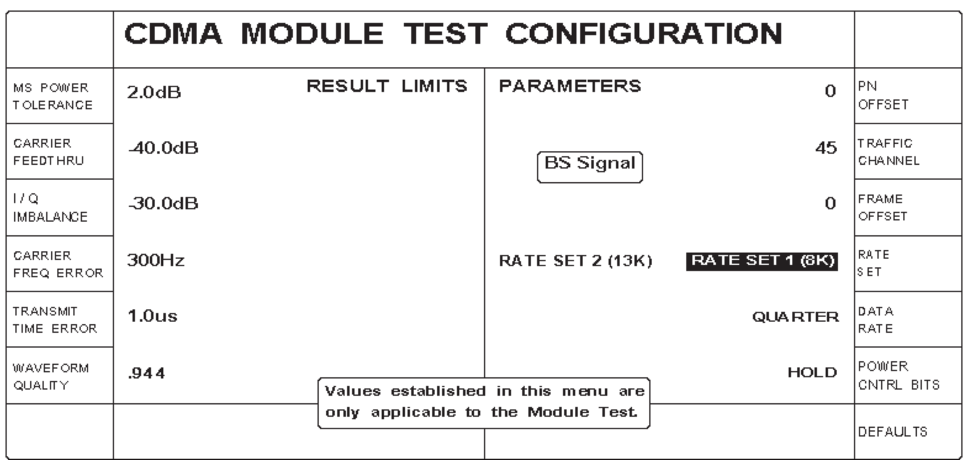


Figure 3–27: CDMA module test configuration menu

MS Power Tolerance. Press this softkey to set the tolerance for the MS Power Expected. The tester displays the MS Power value in reverse video when it differs from the MS Power Expected by a value greater than this amount.

Carrier Feedthru. Press this softkey to set the carrier feedthrough limit. The tester displays the carrier feedthrough value in reverse video when the value exceeds this limit.

I/Q Imbalance. Press this softkey to set the I/Q imbalance limit. The tester displays the I/Q imbalance value in reverse video when the value exceeds this limit.

Carrier Freq Error. Press this softkey to set the carrier frequency error limit. The tester displays the error value in reverse video when the value exceeds this limit.

Transmit Time Error. Press this softkey to set the transmit time error limit. The tester displays the error value in reverse video when the value exceeds this limit.

Waveform Quality. Press this softkey to set the waveform quality limit. The tester displays the waveform quality value in reverse video when the value is less than this limit.

PN Offset. Press this softkey to set the PN offset to a value between 0 and 511. Changing the PN offset changes the timing of the pilot channel, the timing and contents of the sync channel message, and the long code mask of the paging channel.

Traffic Channel. Press this softkey to set the traffic channel to a value between 2 and 31 or 33 and 63. The tester automatically shifts an OCNS channel if channel conflicts occur. Changing this value immediately changes the traffic channel, and no handoff is performed. Refer to page 3–44 for more information on OCNS channels.

Frame Offset. Press this softkey to set the frame offset to a value between 0 and 15 (inclusive). Changing this value immediately changes the traffic channel timing, and no handoff is performed.

Rate Set. Press this softkey to set the rate that data is generated for the traffic channel. This softkey requires that option B14 (Rate Set 2) be installed.

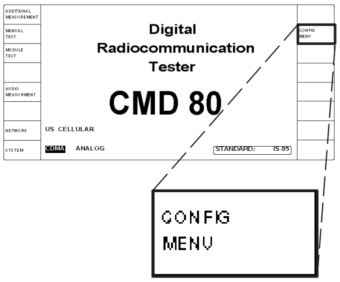
Data Rate. Press this softkey to set the traffic channel data rate. Select one of the following rates: FULL, HALF, QUARTER, or EIGHTH. Selecting a rate other than FULL reduces the power contributed to the actual BS total power. Refer to *Traffic Level* on page 3–43.

Power Cntrl Bits. Press this softkey to select the power control bit mode. The HOLD mode sends alternating up/down power control bits. The ALL DOWN mode forces the power control bits to the down state. The ALL UP mode forces the power control bits to the up state. The RANGE TEST mode sends eight frames of UP power bits followed by eight frames of DOWN power bits.

For example, the RANGE TEST mode sends 128 bits in each direction at the FULL rate, and 16 bits in each direction at the EIGHTH rate. OFF disables the power control bits, and the bits are not sent to the mobile station.

Defaults. Press this softkey to set the module test parameters to their default settings. This softkey does not affect any other parameters or modes.

Configuration



From the Home Menu, press the CONFIG MENU softkey to display the CONFIGURATION MENU shown in Figure 3–28.

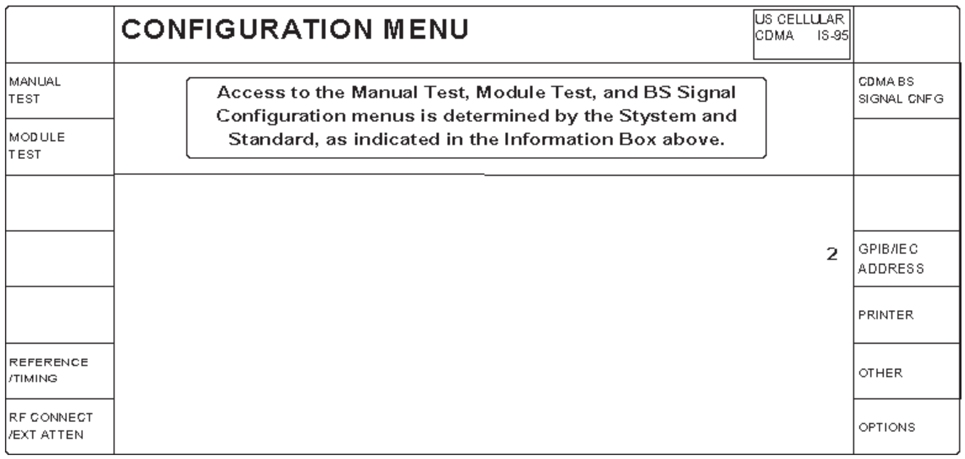


Figure 3–28: Configuration menu

Press the appropriate key for the specific item you want to configure. Some items contain submenus (see Figure 3–29). Each of the menus and their softkeys is described in the following section.

- MENU HOME
  - ADDITIONAL MEASUREMENT
  - MANUAL TEST
  - MODULE TEST
  - NETWORK
  - SYSTEM
  - CONFIG MENU
    - MANUAL TEST
      - STANDBY POWER
      - ACCESS PROBES
      - POWER CONTROL
        - OPEN LOOP TIME RESPNS
        - MINIMUM OUTPUT
        - MAXIMUM OUTPUT
        - GATED OUTPUT
      - RECEIVER QUALITY
        - SENSITIVITY
        - DYNAMIC RANGE
        - DEMOD OF TRAFFIC CH
        - CURRENT SIGNAL LVL
        - USER DEFINED 1
        - USER DEFINED 2
      - TRANSMITTER QUALITY
      - MULTIPLE PILOTS
      - SOFTER HANDOFF
    - MODULE TEST
    - REFERENCE/TIMING
    - RF CONNECT/EXT ATTEN
    - BS SIGNAL CNFG
      - CDMA BS PARAMETERS CONFIGURATION
    - PRINTER
    - OTHER
    - OPTIONS
  - STANDARD

Figure 3–29: Structure of CDMA configuration menu tree

Manual Test Press this softkey to select the configuration menus for the CDMA manual tests. You can use these menus to establish the parameters for those tests done while in the CDMA Manual Test mode.

Module Test Press this softkey to select the configuration menus for the CDMA module tests. Use this menu to set the parameters for the CDMA Module Test mode.

CDMA BS Signal Cnfg Press this softkey to select the CDMA BS SIGNAL CONFIGURATION menu for the CDMA tests. Use this menu to define the components of the base-station signal. These include the levels of the pilot, sync and paging channels, and other components, such as traffic channel and frame offset. You can use this menu to specify the default RF channel. Table 3–4 on page 3–50 lists the valid CDMA channels.

***NOTE**. The level settings set in the BS SIGNAL CONFIGURATION menu are the system default levels unless overridden by a test. For example, the receiver sensitivity test overrides the traffic and pilot level values with the parameters established for the receiver sensitivity test.*

CDMA BS Parameters. This softkey displays a submenu of the CDMA BS SIGNAL CONFIGURATION MENU. You can use this menu to specify parameters for the simulated base station (default values are available).

Press the CDMA BS PARAMETERS softkey to display the CDMA BS PARAMETERS CONFIGURATION menu.

Protocol Revision If you have selected US Cellular or PCS (upbanded IS-95) as the network, you can select one of the following protocols from the CDMA BS PARAMETERS CONFIGURATION menu:

- PROTOCOL REVISION 1 (IS-95)
- PROTOCOL REVISION 2 (IS-95A)
- PROTOCOL REVISION 3 (TSB-74)

Mobile ID Type You can also select the mobile identification type. Press the MOBILE ID TYPE softkey to select either the MIN or IMSI. The mobile ID provides the tester with the necessary information so that you can use the CALL TO MOBILE softkey in the MS UNREGISTERED menu. (Refer to Figure 3–4 on page 3–7 and *CALL TO MOBILE* on page 3–9). The MOBILE ID TYPE specifies the format of the mobile ID as either Mobile Identification Number (MIN) or International Mobile Station Identification (IMSI).

***NOTE**. The tester requires either a MIN or an IMSI mobile identification type. For some protocol revisions, you can choose either a MIN or an IMSI mobile ID. For other protocol revisions, a choice of mobile ID is not available. In these cases, the tester does not display the MOBILE ID TYPE softkey. Instead, the tester displays the mobile ID type in a rounded box below the protocol revision field.*

Table 3–4: CDMA allocated channel table

System	CDMA frequency assignments	Analog channel count	CDMA channel number	Transmitter frequency assignment	
				Mobile station	Base station
A (1 MHz)	——	22	991	824.040 (MHz)	869.040 (MHz)
			1012	824.670 (MHz)	869.670 (MHz)
	CDMA	11	1013	824.700 (MHz)	869.700 (MHz)
			1023	825.000 (MHz)	870.000 (MHz)
A (10 MHz)	CDMA	311	1	825.030 (MHz)	870.030 (MHz)
			311	834.330 (MHz)	879.330 (MHz)
	——	22	312	834.360 (MHz)	879.360 (MHz)
			333	834.990 (MHz)	879.990 (MHz)
B (10 MHz)	——	22	334	835.020 (MHz)	880.020 (MHz)
			355	835.650 (MHz)	880.650 (MHz)
	CDMA	289	356	835.680 (MHz)	880.680 (MHz)
			644	844.320 (MHz)	889.320 (MHz)
	——	22	645	844.350 (MHz)	889.350 (MHz)
			666	844.980 (MHz)	889.980 (MHz)
A (1.5 MHz)	——	22	667	845.010 (MHz)	890.010 (MHz)
			688	845.640 (MHz)	890.640 (MHz)
	CDMA	6	689	845.670 (MHz)	890.670 (MHz)
			694	845.820 (MHz)	890.820 (MHz)
	——	22	695	845.850 (MHz)	890.850 (MHz)
			716	846.480 (MHz)	891.480 (MHz)
B (2.5 MHz)	——	22	717	846.510 (MHz)	891.510 (MHz)
			738	847.140 (MHz)	892.140 (MHz)
	CDMA	39	739	847.170 (MHz)	892.170 (MHz)
			777	848.310 (MHz)	893.310 (MHz)
	——	22	778	848.340 (MHz)	893.340 (MHz)
			799	848.970 (MHz)	893.970 (MHz)

Analog Measurements (Option B82 Only)

Analog

This section describes the operation and configuration of the Analog tests that the CMD 80 Digital Radiocommunication Tester can perform when Option B82 (Analog Mode) is installed in the tester. Some menu items and softkeys are associated with a specific option. If you do not have that option installed, the supporting menus and softkeys do not appear in the display.

This section discusses the tests and station configurations that are exclusive to the Analog system.

Using the Home Menu

After power on, the tester displays the home menu (see Figure 3–30). You can press the MENU HOME front-panel key to return to this menu at any time. The softkeys displayed by this menu allow you to select from a number of main topics.

From this menu you can select the Network, System, (and Standard if appropriate). Once these are set, you can use the other softkeys to proceed to the measurement tests or to the configuration menus.

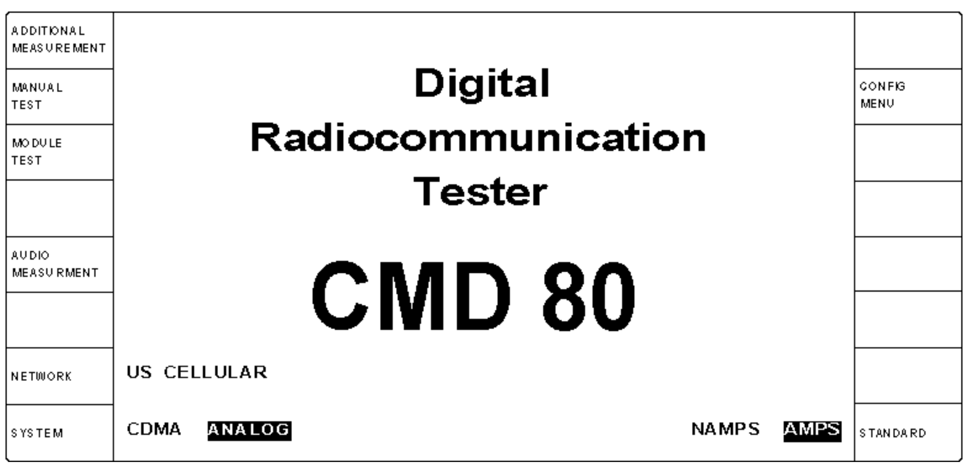


Figure 3–30: Home menu display

The softkey menus discussed in this section are the MANUAL TEST, MODULE TEST, and CONFIG MENU as they are defined by setting the system to Analog mode.

For detailed descriptions about the ADDITIONAL MEASUREMENT softkey, refer to page 3–255. For detailed descriptions about the AUDIO MEASUREMENT softkey, refer to page 3–257. For detailed descriptions about the NETWORK, SYSTEM, and STANDARD softkeys, refer to page 3–3.

To see displays on your tester similar to the ones shown in this section, you need to set the network to US CELLULAR, the system to ANALOG, and the standard to AMPS. Use the following steps:

1. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. Rotate the VAR control to select US CELLULAR as the network.
2. Press the **SYSTEM** softkey to select ANALOG as the system. This softkey is only available if you have Analog mode (Option B82) installed.
3. Press the **STANDARD** soft key to toggle between AMPS and NAMPS. Select AMPS as the standard.

About the menu displays

The tester supports the following analog standards: AMPS, NAMPS, NTACS, JTACS, ETACS, and TACS. The information box located in the upper right corner of most menus will display the selected network, system, and standard, such as shown in Figure 3–31.

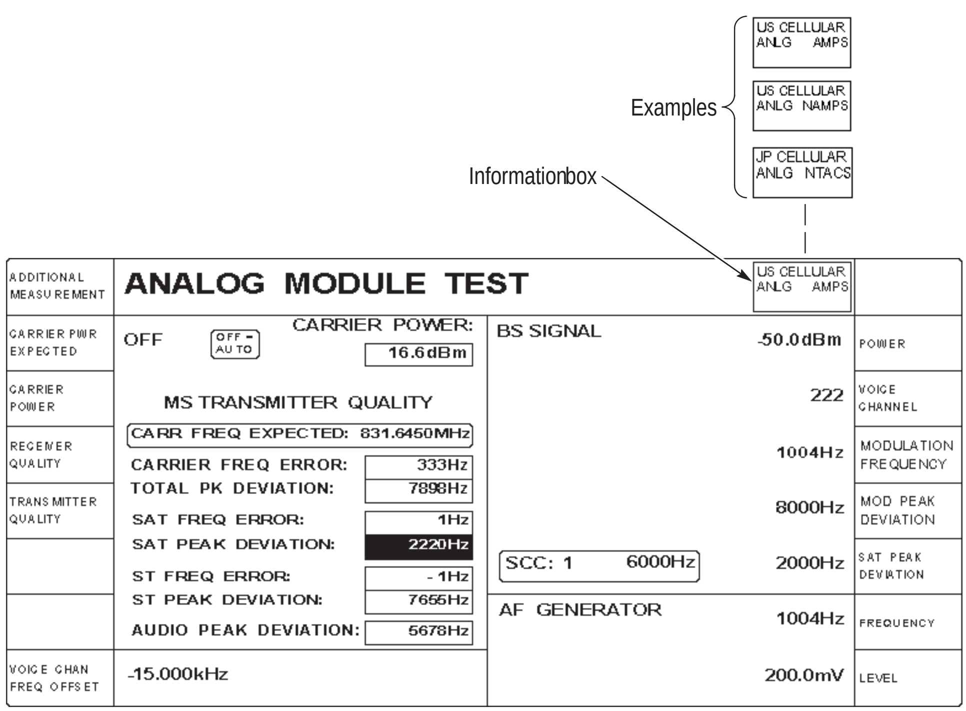


Figure 3–31: Examples of Information box displays (AMPS, NAMPS, and JTACS)

Since many menus are common for all networks and standards, this manual typically shows menu displays that occur when the selected network is US CELLULAR and the selected standard is AMPS. In cases where one or two fields or softkeys differ depending on the standard selected, the differences are noted in the descriptions of the menu. If greater changes occur to the menu, then complete menu displays are shown for the varying standards.

Some of the menu selections have several levels of submenus associated with them. Figure 3–32 shows the analog menus and their structure for the tester. This subsection contains a description of each of these softkeys.

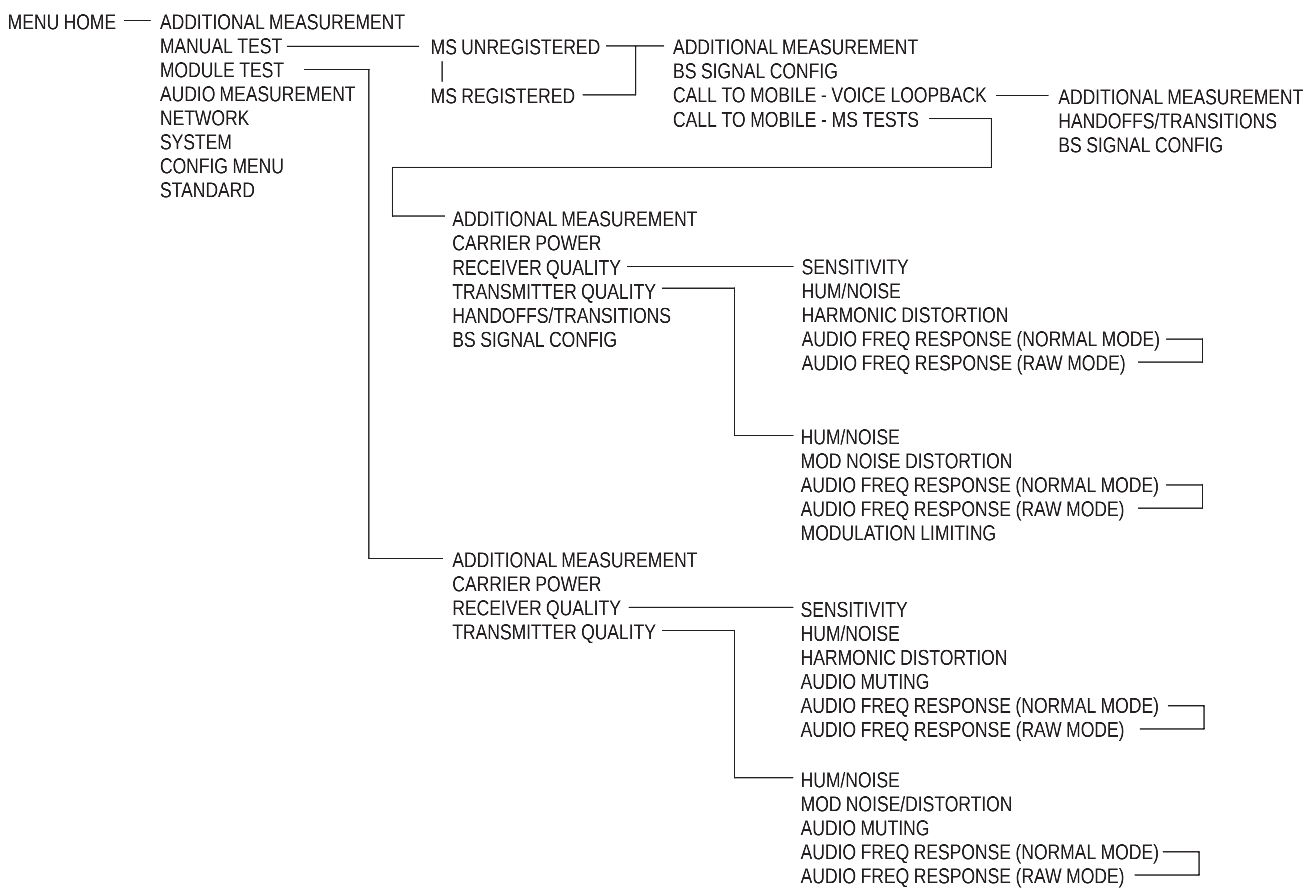
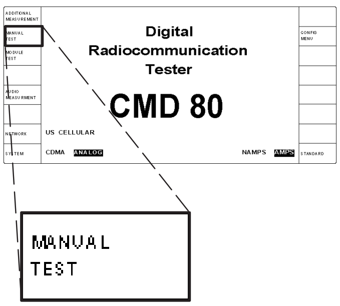


Figure 3–32: Analog test menu tree

Manual Test (Signaling)



***NOTE**. The tester displays analog test menus only if you have Option B82 installed and have selected the US CELLULAR network and ANALOG system (refer to* NETWORK *on page 3–3).*

This softkey selects the manual test (signaling mode) measurements for the system selected with the SYSTEM softkey. This section discusses the tests available when you have selected ANALOG as the system.

This softkey displays the menu used to perform measurements on the analog mobile station. Selecting this test initiates a sequence composed of three states:

1. MS Unregistered (Initialization)
2. MS Registered (Idle/Access)
3. Call Established

During each of these states various tests can be made. The states and related tests are described in the following topics.

MS Unregistered

The first stage of the manual test is the MS Unregistered (initialization) state, which you start by pressing the MANUAL TEST softkey. During the initialization state, the tester establishes contact with the mobile station and enables the output power from the tester. Figure 3–33 shows the display during this state.

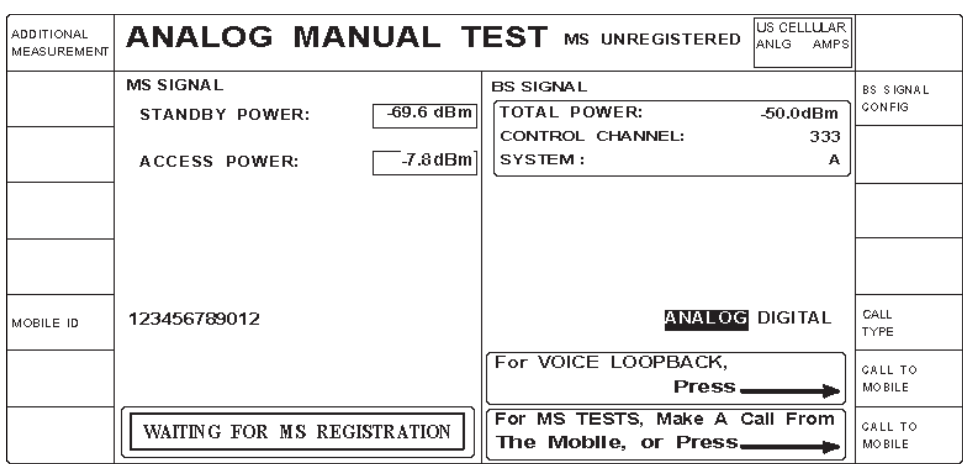


Figure 3–33: Analog manual test — MS unregistered menu

The following softkeys are available during the MS Unregistered (initialization) state:

- ADDITIONAL MEASUREMENT. (Refer to *Additional Measurements* on page 3–255).
- MOBILE ID. Press this softkey to enter the MIN or IMSI (mobile ID) of the mobile station. You are not required to provide this information. However, entering the mobile ID provides the tester with the necessary information so that you can use the CALL TO MOBILE softkeys without waiting for registration. This number is retained from the last entered value or the last mobile station to register with the tester.
- CALL TYPE. Press this softkey to set the type of call to analog or digital. This also determines the subsequent menu paths (between Analog mode and TDMA mode). When set to analog mode, the voice traffic channel uses an analog voice channel (AMPS call). When set to digital mode, the voice traffic channel uses a TDMA (IS-136-A) digital traffic call. Set this to ANALOG to make an AMPS mode call.

  If you select DIGITAL as the call type, refer to *CALL ESTABLISHED* on page 3–179 for TDMA mode information.

***NOTE**. The CALL TYPE softkey is displayed only if Option B84 (TDMA mode) is installed.*

- BS SIGNAL CONFIG. Press the BS SIGNAL CNFG softkey (in either the Unregistered or Registered state) to display a menu that allows you to configure the analog base station. For AMPS, JTACS, TACS, and ETACS standards, the menu is similar Figure 3–34. For the menu display for the NAMPS standard, see Figure 3–35 on page 3–58. For the menu display for the NTACS standard, see Figure 3–36 on page 3–59.

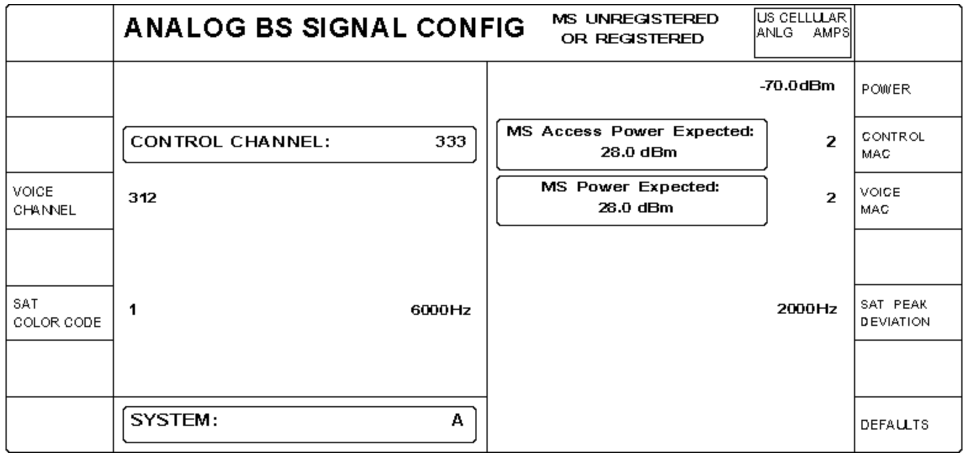


Figure 3–34: Analog BS signal configuration — MS unregistered or registered menu

You can set the following parameters in the ANALOG BS SIGNAL CONFIG menu:

- Voice channel. The voice channel is the channel over which voice communications occur. Press the VOICE CHANNEL softkey to select a voice channel.

***NOTE**. Only even numbered channels are allowed for the JTACS standard.*

- Supervisory audio tone color code. The SAT color code is used to identify the base station with which the mobile station is communicating. The SAT color codes and their corresponding frequencies are listed in the following table:

SAT color code	Frequency
0	5970 Hz
1	6000 Hz
2	6030 Hz

  Press the SAT COLOR CODE softkey to select the SAT color code you want.

- Power. Press the POWER softkey to set the level of the base station transmitter power.

- Control mobile attenuation code. The control mobile attenuation code is a code sent by the base station to control the output power of the mobile station when the mobile station is operating on the control channel. Press the CONTROL MAC softkey to select the control MAC you want.

- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.
- Defaults. Press the DEFAULTS softkey to set all the parameters to their preset conditions. Typically, the default values are based on the appropriate specification as shown in Table 3–5.

Table 3–5: Standard reference specifications

Standard	Reference specification
AMPS	IS-95A: Mobile Station – Base Station Compatibility for Dual-Mode Wideband Spectrum Cellular System, February, 1996 IS-136-A: TDMA Cellular/PCS Mobile Station – Base Station Compatibility for Traffic Channels and FSK Control Channel
NAMPS	IS-91: Mobile Station – Base Station Compatibility Standard for 800 MHz Analog Cellular, October, 1994
TACS/ETACS	TACS Mobile Station – Land Station Compatibility Standard, Issue 4, Amendment 2, February, 1995
JTACS/NTACS	TACS for Japan – Mobile Station Compatibility Specification, Version 6.6-CDMA-2, November, 1996

NOTE. *If you selected NAMPS as the standard, you will see an MS UNREGISTERED OR REGISTERED configuration menu similar to that shown in Figure 3–35.*

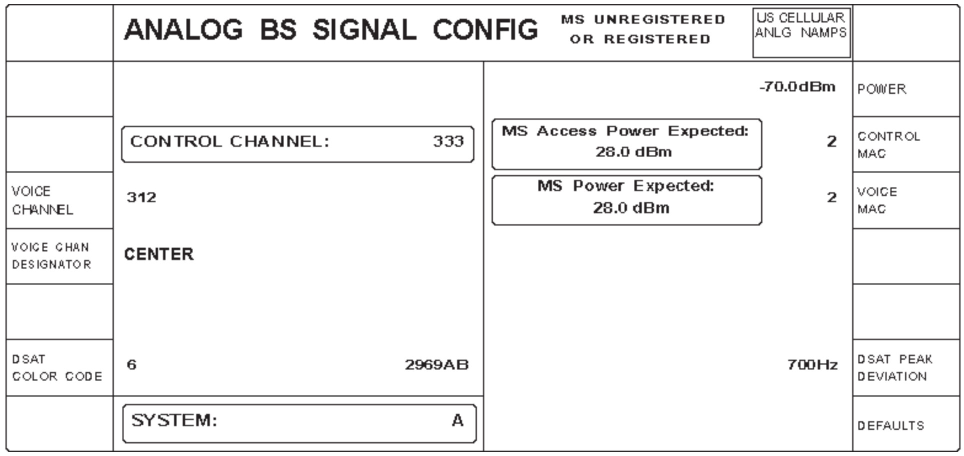


Figure 3–35: MS unregistered or registered menu for NAMPS standard

The following softkeys are different from the AMPS/TACS menu:

- Press the VOICE CHAN DESIGNATOR softkey to select the designator you want; 10kHZ ABOVE, CENTER, or 10kHz BELOW. CENTER is the default.
- Press the DSAT COLOR CODE softkey to select the desired Digital Supervisory Audio Tone Color Code (DSCC) and its associated 24-bit sequence. See table below.

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

- Press the DSAT PEAK DEVIATION softkey to set the amount of deviation used. The digital supervisory audio tone peak deviation is the amount of deviation that the base station uses to transmit the DSAT to the mobile station.

***NOTE**. If you selected NTACS as the standard, you will see an MS UNREGISTERED OR REGISTERED configuration menu similar to that shown in Figure 3–36.*

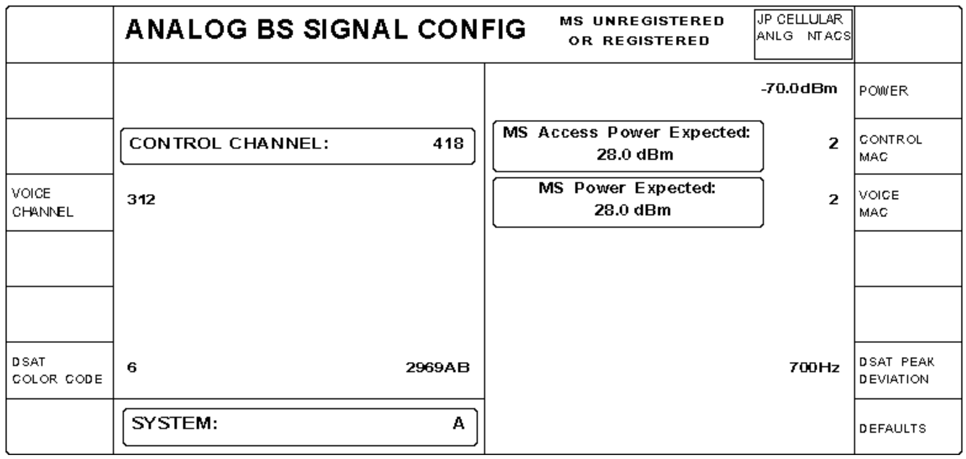


Figure 3–36: MS unregistered or registered menu for NTACS standard

The following softkeys are different from the AMPS/TACS menu:

- Press the DSAT COLOR CODE softkey to select the desired Digital Supervisory Audio Tone Color Code (0 through 6) and its associated sequence.
- Press the DSAT PEAK DEVIATION softkey to set the peak deviation that the base station uses to transmit the DSAT to the mobile station.

***NOTE**. If you do not press one of the CALL TO MOBILE softkeys listed below, the tester will register the mobile station and proceed to the MS Registered (idle/access) state. Refer to* MS Registered *on page 3–61.*

From the MS UNREGISTERED menu, the CALL TO MOBILE softkeys listed below will only work if the MOBILE ID field is properly set.

- CALL TO MOBILE (VOICE LOOPBACK). Press this softkey (see Figure 3–33 on page 3–54) to establish a voice loopback call. When the call is established, the tester displays the CALL ESTABLISHED (VOICE LOOPBACK) menu. In this mode, a message spoken into the mobile station is returned in approximately 0.5 second. This allows you to test the quality of the call. For detailed information about voice loopback, refer to *CALL ESTABLISHED (VOICE LOOPBACK)* on page 3–64.

- CALL TO MOBILE (MS TESTS). Press this softkey (see Figure 3–33 on page 3–54) to initiate an MS tests call. When the call is established, the tester displays the CALL ESTABLISHED (MS TESTS) menu. For detailed information about MS tests, refer to *CALL ESTABLISHED (MS TESTS)* on page 3–65.

From the MS UNREGISTERED menu (see Figure 3–33 on page 3–54), you can also press the CONFIG front-panel button to display a configuration menu that is dependent on the state of the call sequence. See Figure 3–37.

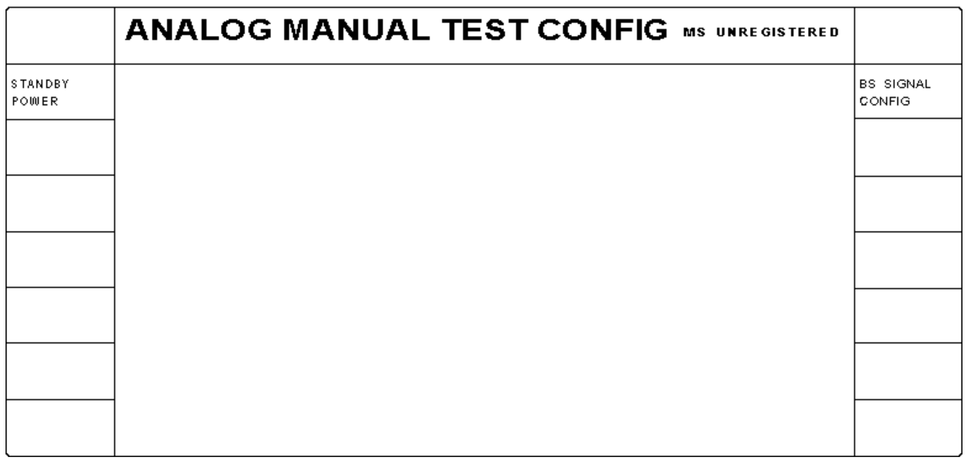


Figure 3–37: Analog manual test configuration — MS unregistered menu displayed by CONFIG front-panel key

Press the STANDBY POWER softkey to display the STANDBY POWER CONFIGURATION menu. See Figure 3–38.

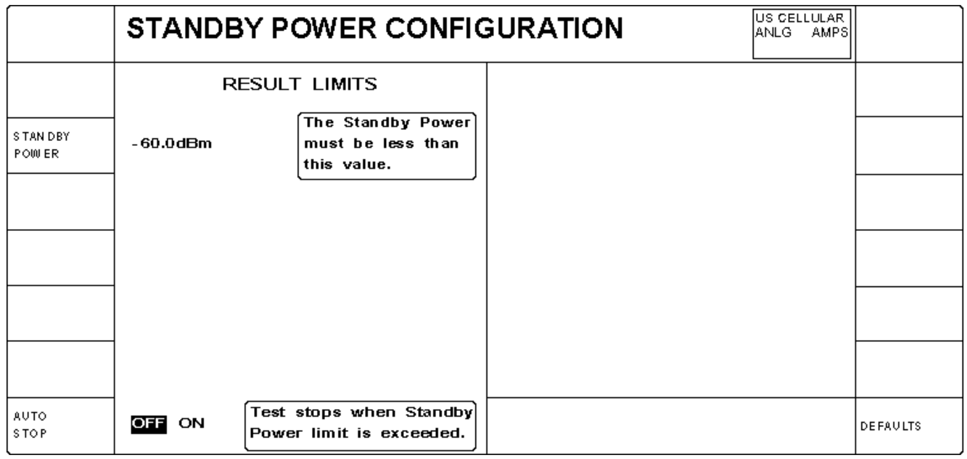


Figure 3–38: Analog standby power configuration menu

You use the STANDBY POWER CONFIGURATION menu to set the maximum limit of the standby power as measured in the MS UNREGISTERED and MS REGISTERED menus shown in Figure 3–33 on page 3–54 and Figure 3–39 on page 3–61, respectively. You can also toggle the auto stop function on or off and set the parameters to their default values. Refer to *STANDBY POWER* on page 3–120 for a detailed description of this menu.

Press the BS SIGNAL CONFIG softkey to display the MS UNREGISTERED OR REGISTERED menu for the base station signal configuration. See Figure 3–34 on page 3–56.

MS Registered

Once the mobile station is powered on and registered, the tester enters the MS Registered (idle/access) state and displays the menu shown in Figure 3–39.

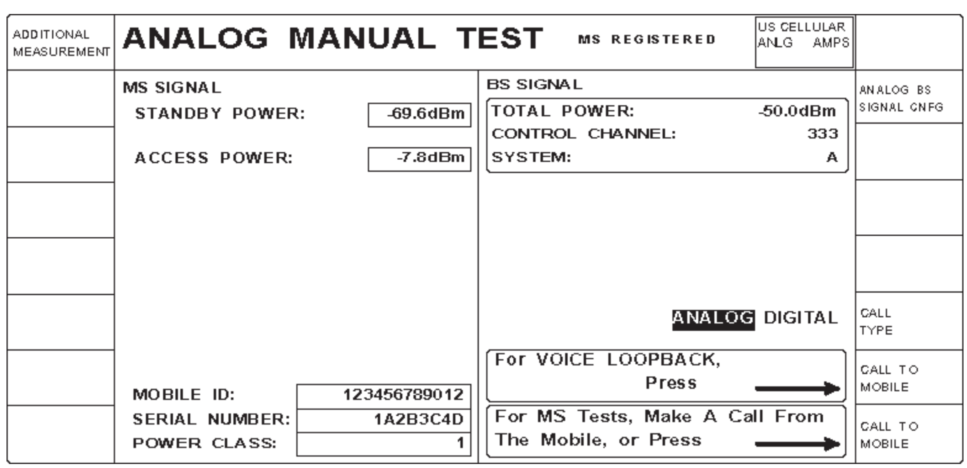


Figure 3–39: Analog manual test — MS registered menu

The mobile station information is displayed on the left side of the screen and base station information on the right. You can press a CALL TO MOBILE softkey to initiate a call to the mobile station, or you can place a call from the mobile station by entering any telephone number on the mobile station and pressing SEND.

During the idle/access state, the following softkeys are available:

- ADDITIONAL MEASUREMENT. Refer to *Additional Measurements* on page 3–255.
- BS SIGNAL CNFG. Refer to Figure 3–34 on page 3–56.
- CALL TYPE. Press this softkey to set the type of call to analog or digital. This also sets the subsequent menu paths (between Analog mode and TDMA mode). When set to analog mode, the voice traffic channel uses an analog voice channel (AMPS call). When set to digital mode, the voice traffic channel uses TDMA (IS-136-A) digital traffic call. Set CALL TYPE to ANALOG to make an AMPS mode call.

  If you select DIGITAL as the call type, the tester establishes a TDMA mode call. Refer to *CALL ESTABLISHED* on page 3–179 if establishing a call using TDMA mode.

***NOTE**. The CALL TYPE softkey is displayed only if Option B84 (TDMA mode) is installed.*

- CALL TO MOBILE (VOICE LOOPBACK). Press this softkey to establish a voice loopback call. When the call is established, the tester displays the CALL ESTABLISHED (VOICE LOOPBACK) menu. In this mode, a message spoken into the mobile station is returned in approximately 0.5 seconds. This allows you to test the quality of the call. For detailed information about voice loopback, refer to *CALL ESTABLISHED (VOICE LOOPBACK)* on page 3–64.
- CALL TO MOBILE (MS TESTS). Press this softkey to initiate an MS tests call. When the call is established, the tester displays the CALL ESTABLISHED (MS TESTS) menu. For detailed information about MS tests, refer to *CALL ESTABLISHED (MS TESTS)* on page 3–65.

You can also press the CONFIG front-panel button to display a configuration menu that is dependent on the state of the call sequence. See Figure 3–40.

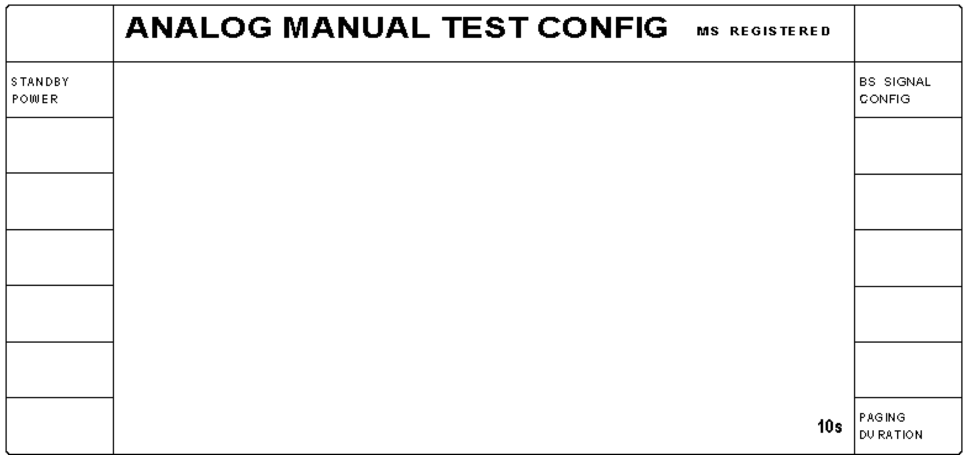


Figure 3–40: Analog manual test configuration — MS registered menu displayed by CONFIG front-panel key

Press the STANDBY POWER softkey to display the STANDBY POWER CONFIGURATION menu. Refer to Figure 3–38 on page 3–61.

You use the STANDBY POWER CONFIGURATION menu to set the maximum limit of the standby power as measured in the MS UNREGISTERED and MS REGISTERED menus shown in Figure 3–33 on page 3–54 and Figure 3–39 on page 3–61, respectively. You can also toggle the auto stop function on or off and set the parameters to their default values. Refer to *STANDBY POWER* on page 3–120 for a detailed description of this menu.

Press the BS SIGNAL CONFIG softkey to display the MS UNREGISTERED OR REGISTERED menu for the base station signal configuration. See Figure 3–34 on page 3–56.

Press the PAGING DURATION softkey to set the paging duration. The paging duration is how long the base station sends a paging message over the control channel to the mobile station when a call is being established. If you set this time too short, the signal search algorithm of the mobile station may take longer than the paging duration, and the call setup will fail.

Call Established

When you press a CALL TO MOBILE softkey and establish a call, the tester displays either a CALL ESTABLISHED (VOICE LOOPBACK) menu or a CALL ESTABLISHED (MS TESTS) menu, depending on which CALL TO MOBILE softkey you pressed. Each of these menus is discussed in the following text.

CALL ESTABLISHED (VOICE LOOPBACK). When you press the CALL TO MOBILE softkey for VOICE LOOPBACK (or initiate a call from the mobile station) and establish a call, the tester displays a menu similar to Figure 3–41. Differences from this menu for the NAMPS and NTACS standards are discussed beginning on page 3–65.

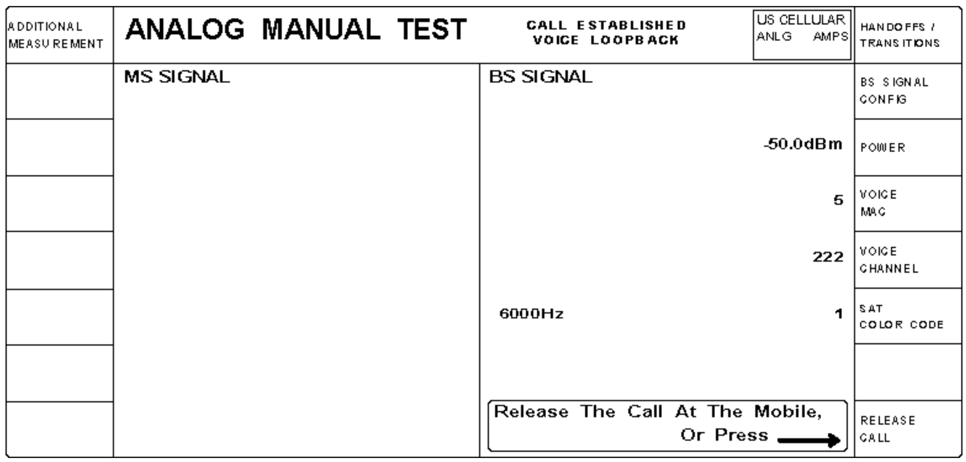


Figure 3–41: Call established (voice loopback) menu

The following softkeys are available in the CALL ESTABLISHED (VOICE LOOPBACK menu:

- ADDITIONAL MEASUREMENT. Press the ADDITIONAL MEASUREMENT softkey to take conventional measurements, such as measuring the voltage across the battery terminals of the mobile station. For more information, refer to *Additional Measurements* on page 3–255.
- HANDOFFS/TRANSITIONS. Press the HANDOFFS/TRANSITIONS softkey to handoff the established call to another network, system, and/or standard, or to make a transition to the Voice Loopback or MS Tests mode. For more information, refer to *Handoffs/Transitions* on page 3–91.
- BS SIGNAL CONFIG. Press the BS SIGNAL CONFIG softkey to configure the operating parameters of an analog base station. For more information, refer to *BS SignaL Configuration* on page 3–93.
- POWER. Press the POWER softkey to set the level of the base station transmitter power.
- VOICE MAC. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

- VOICE CHANNEL. The voice channel is the channel over which voice communications occur. Press the VOICE CHANNEL softkey to select a voice channel.

NOTE. *Only even numbered channels are allowed for the JTACS standard.*

- SAT COLOR CODE. The supervisory audio tones (SAT) are out-of-voice band audio tones used for signaling. There are three assigned frequencies of 5970 Hz, 6000 Hz, and 6030 Hz with corresponding supervisory color codes (SCC) of SCC 0, SCC 1, and SCC 2, respectively. Press the SAT COLOR CODE softkey to select the SAT color code that you want.
- RELEASE CALL. Press the RELEASE CALL softkey to simulate termination of the call by the base station. You can also release the call at the mobile station by hanging up the mobile station (press END on the mobile station).

NOTE. *If you selected NAMPS as the standard, the VOICE CHAN DESIGNATOR softkey is added to the menu and the DSAT COLOR CODE softkey replaces the SAT COLOR CODE softkey.*

The following menu softkeys are unique to this menu if NAMPS is the selected standard. See the figure below.

- VOICE CHAN DESIGNATOR. Press the VOICE CHAN DESIGNATOR softkey to select the designator you want; 10kHz ABOVE, CENTER, or 10kHz BELOW. CENTER is the default.
- DSAT COLOR CODE softkey. Press the DSAT COLOR CODE softkey to select the desired DSCC (0 through 6) and its associated sequence.

NOTE. *If you selected NTACS as the standard, the tester displays the DSAT COLOR CODE softkey as discussed previously. However, the* VOICE CHAN DESIGNATOR *softkey is not displayed.*

CALL ESTABLISHED (MS TESTS). When you press the CALL TO MOBILE softkey for MS tests and establish a call, a menu similar to Figure 3–42 is displayed. Variations in this menu for the NAMPS standard are shown in Figure 3–43 on page 3–67; variations in this menu for the NTACS standard are shown in Figure 3–44 on page 3–69. For information about the ADDITIONAL MEASUREMENT, CARRIER POWER, RECEIVER QUALITY, TRANSMITTER QUALITY, HANDOFFS/TRANSITIONS, and BS SIGNAL CONFIG menu selections, refer to *CALL ESTABLISHED (MS TESTS) Menu Selections* on page 3–73.

***NOTE**. The tester uses internal filters in determining the results in the CALL ESTABLISHED menu. Refer to* Appendix B *for filter descriptions and their use.*

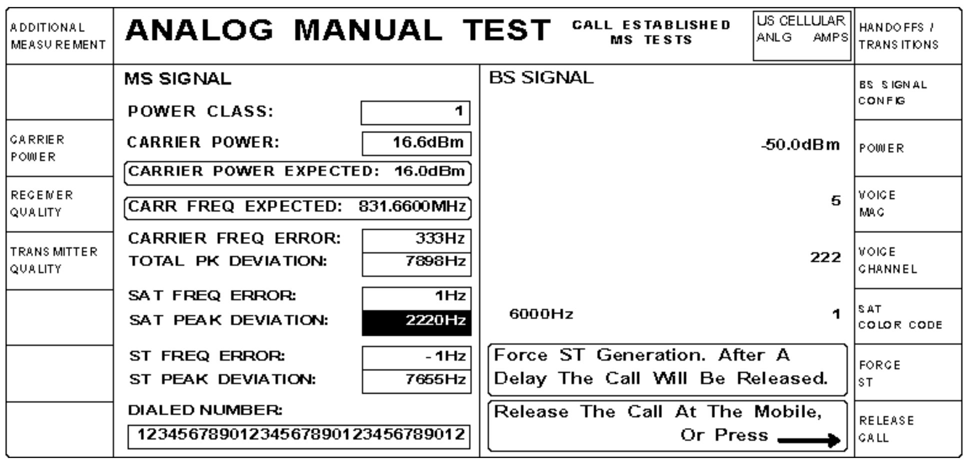


Figure 3–42: Analog manual test — call established (MS tests) menu

***NOTE**. The tester will not display a value in the SAT FREQ ERROR and ST FREQ ERROR fields if the deviation reading is less than 100 Hz.*

In the BS SIGNAL side of the display, you can adjust the following parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.
- Voice channel. The voice channel is the channel over which voice communications occur. Press the VOICE CHANNEL softkey to select a voice channel. Changing this value initiates a handoff to the new RF channel.

- SAT color code. The supervisory audio tones (SAT) are out-of-voice band audio tones used for signaling. There are three assigned frequencies of 5970 Hz, 6000 Hz, and 6030 Hz with corresponding supervisory color codes (SCC) of SCC 0, SCC 1, and SCC 2, respectively. Press the SAT COLOR CODE softkey to select the SAT color code that you want.

You can press the FORCE ST softkey to test the 10 kHz signaling tone. When you press the FORCE ST softkey, a maintenance order is sent to the mobile station. This should cause the mobile station to send a signaling tone for approximately 60 seconds and then release the call. For efficiency, it is suggested that you perform the signaling tone test as the last procedure in your test sequence.

You can terminate a call by using one of two methods:

- Terminate the call from the mobile station.
- Press the RELEASE CALL softkey to terminate the call from the base station.

NOTE. *If you selected NAMPS as the standard, you will see a CALL ESTABLISHED (MS TESTS) menu similar to that shown in Figure 3–43.*

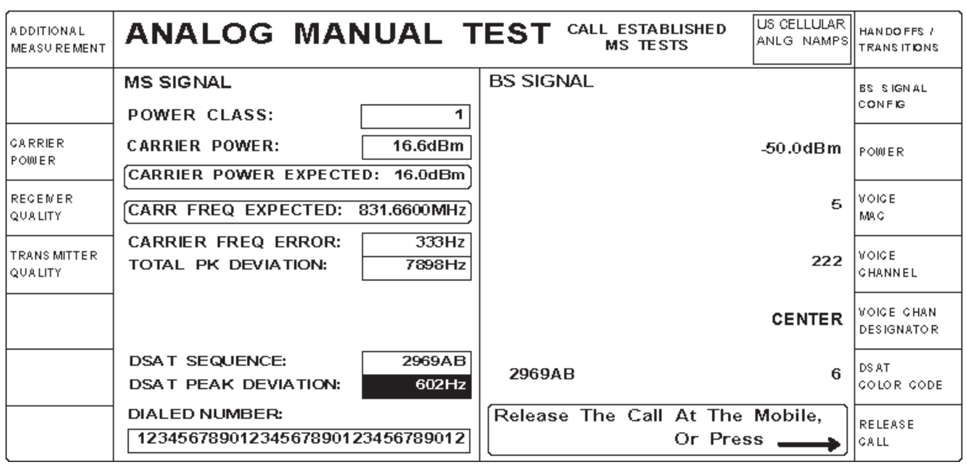


Figure 3–43: Call established (MS tests) menu for NAMPS standard

The differences in the CALL ESTABLISHED (MS TESTS) menu for NAMPS from the AMPS menu are listed below.

On the MS SIGNAL side of the menu:

- The SAT FREQ ERROR, SAT PEAK DEVIATION, ST FREQ ERROR, and ST PEAK DEVIATION fields are not displayed.
- The DSAT SEQUENCE field is added. This field contains one of the seven defined DSAT sequences, one of the seven defined DST sequences, or dashes if the received signal is not recognized as a valid DSAT or DST. If the received DSAT does not match the DSAT which is transmitted on the forward channel, this field appears in inverse video. (Whenever DST is received, it is regarded as matching the forward channel DSAT if the DST is the bit-wise complement of the DSAT.)

NOTE. *The tester will decode and recognize DSAT or DST sequences that contain either 0 or 1 bit errors per 24-bit pattern.*

- The DSAT PEAK DEVIATION field is added.

On the BS SIGNAL side of the menu:

- The VOICE CHAN DESIGNATOR softkey replaces the SAT COLOR CODE softkey. Press the VOICE CHAN DESIGNATOR softkey to select the designator you want; 10 kHz BELOW, CENTER, or 10 kHz ABOVE. CENTER is the default.
- The DSAT COLOR CODE softkey replaces the FORCE ST softkey. Press the DSAT COLOR CODE softkey to select the value of the digital supervisory audio tone color code (0 through 6) and its associated sequence.

***NOTE**. If you selected NTACS as the standard, you will see a CALL ESTABLISHED (MS TESTS) menu similar to that shown in Figure 3–44.*

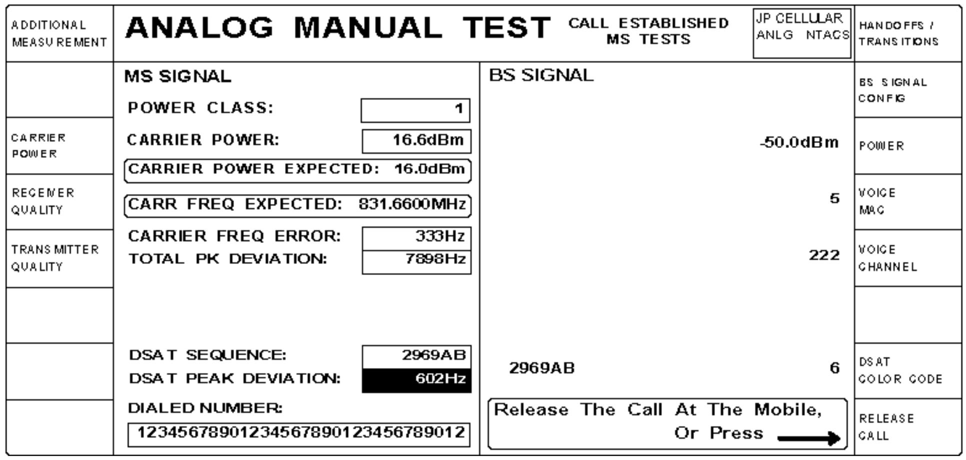


Figure 3–44: Call established (MS tests) menu for NTACS standard

The differences in the CALL ESTABLISHED (MS TESTS) menu for NTACS from the AMPS menu are listed below.

On the MS SIGNAL side of the menu:

- The SAT FREQ ERROR, SAT PEAK DEVIATION, ST FREQ ERROR, and ST PEAK DEVIATION fields are not displayed.
- The DSAT SEQUENCE field is added. This field contains one of the seven defined DSAT sequences, one of the seven defined DST sequences, or dashes if the received signal is not recognized as a valid DSAT or DST. If the received DSAT does not match the DSAT which is transmitted on the forward channel, this field appears in inverse video. (Whenever DST is received, it is regarded as matching the forward channel DSAT if the DST is the bit-wise complement of the DSAT.)

***NOTE**. The tester will decode and recognize DSAT or DST sequences that contain either 0 or 1 bit errors per 24-bit pattern.*

- The DSAT PEAK DEVIATION field is added.

On the BS SIGNAL side of the menu:

- The SAT COLOR CODE softkey is not displayed.

- The DSAT COLOR CODE softkey replaces the FORCE ST softkey. Press the DSAT COLOR CODE softkey to select the value of the digital supervisory audio tone color code (0 through 6) and its associated sequence.

While in the CALL ESTABLISHED MS TESTS menu, you can press the CONFIG front-panel key to display a configuration menu that is dependent on the state of the call sequence. See Figure 3–45.

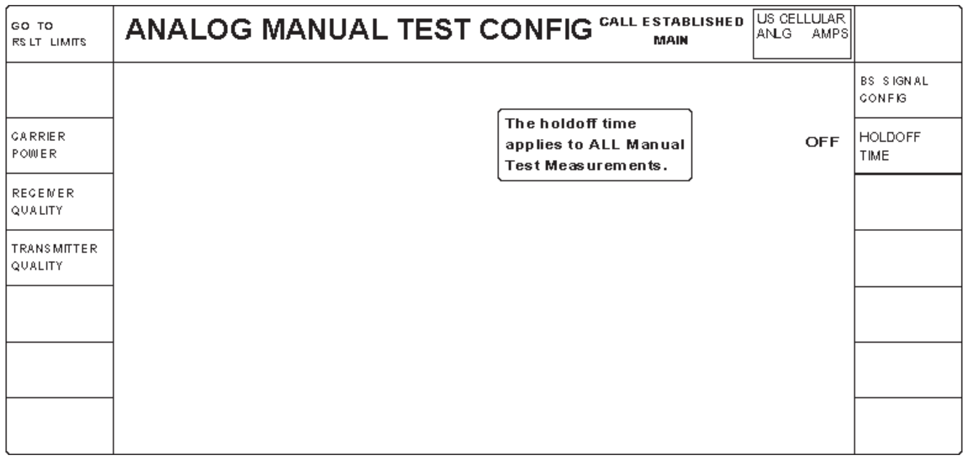


Figure 3–45: Analog manual test configuration — call established (main) menu

You can use the selections in the MAIN menu to set the holdoff time or access several configuration menus.

- CARRIER POWER (refer to *Carrier Power* on page 3–73)
- RECEIVER QUALITY (refer to *RECEIVER QUALITY* on page 3–122)
- TRANSMITTER QUALITY (refer to *TRANSMITTER QUALITY* on page 3–130)
- BS SIGNAL CONFIG (refer to *BS Signal Configuration* on page 3–93)
- Press the HOLDOFF TIME softkey to set a time delay between the start (or change) of an audio source and the acquisition of measurement data. This allows the transients induced in the mobile station by changes in the audio source to settle before data is accumulated.

Press the GO TO RSLT LIMITS softkey to display the RESULT LIMITS menu shown in Figure 3–46. You can use the selections in this menu to set the limit values for the listed parameters.

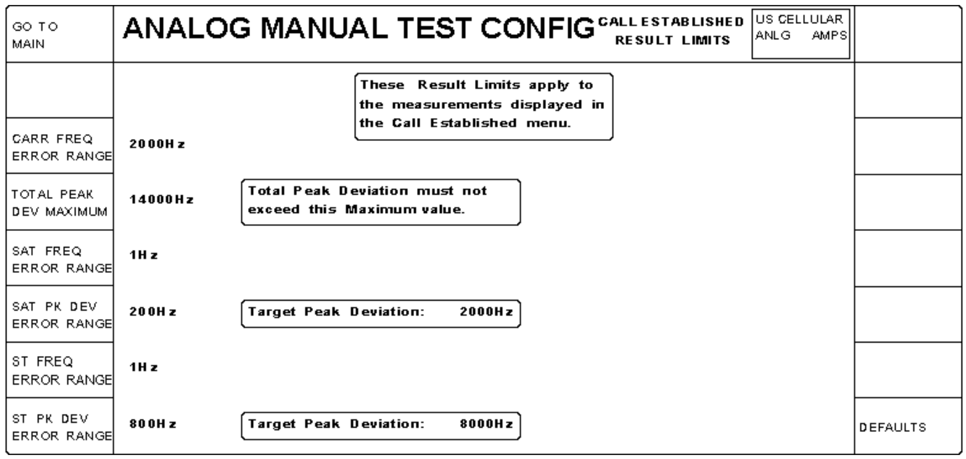


Figure 3–46: Analog manual test configuration — call established (result limits) menu

Press the DEFAULTS softkey to set all the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the Table 3–5 on page 3–57.)

Press the GO TO MAIN softkey to return to the MAIN menu (see Figure 3–45 on page 3–70).

You can press the MENU UP front-panel button to return directly to the CALL ESTABLISHED menu (see Figure 3–42 on page 3–66).

***NOTE**. If you selected NAMPS or NTACS as the standard, you will see a RESULT LIMITS menu similar to that shown in Figure 3–47.*

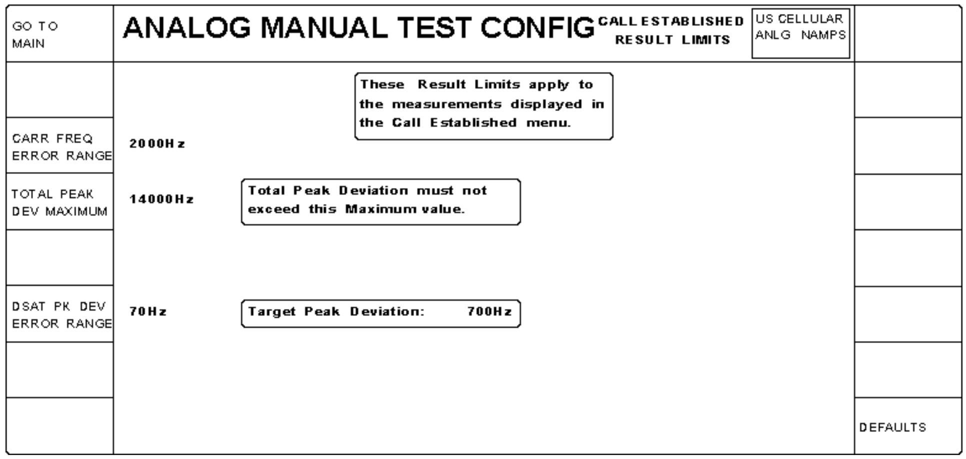


Figure 3–47: Call established (result limits) menu for NAMPS and NTACS standards

The differences in the CALL ESTABLISHED (RESULT LIMITS) menu for NAMPS and NTACS standards from the AMPS menu are as follows:

- The DSAT PK DEV ERROR RANGE softkey replaces the SAT PK DEV ERROR RANGE softkey.
- The tester does not display the SAT FREQ ERROR RANGE, the ST FREQ ERROR RANGE, and the ST PK DEV ERROR RANGE softkeys.

Call Established (MS Tests) Menu Selections

The following text describes each of the menu selections that are available in the Analog CALL ESTABLISHED menu (see Figure 3–48).

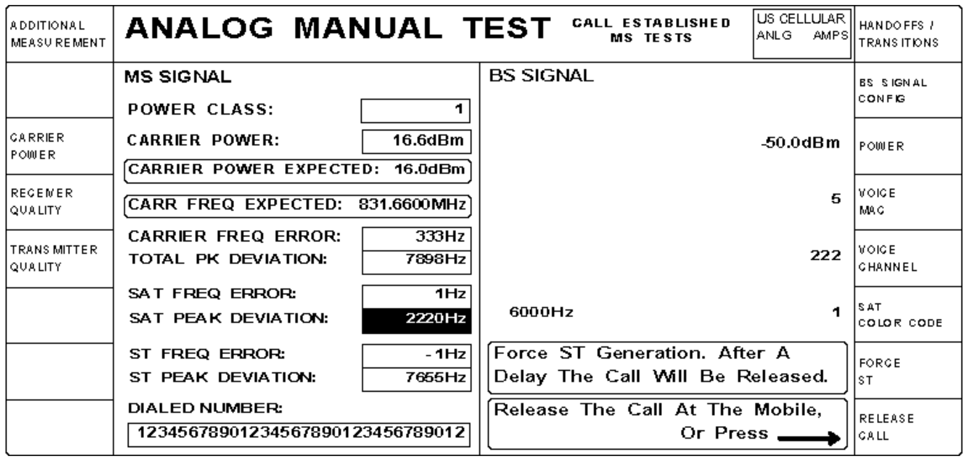


Figure 3–48: Call established (MS tests) menu

Additional Measurement

Press this softkey to make voltage and current measurements without quitting the CALL ESTABLISHED state. Refer to *Additional Measurements* on page 3–255 for more information.

Carrier Power

The CARRIER POWER measurement displayed in the CALL ESTABLISHED menu is measured and updated periodically. Press the CARRIER POWER softkey to display the CARRIER POWER menu (see Figure 3–49).

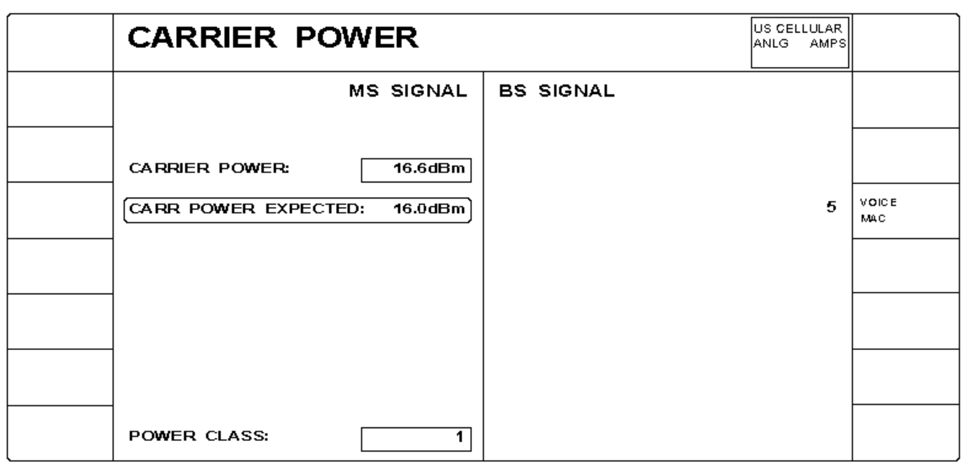


Figure 3–49: Analog carrier power menu

In this menu, the tester continually measures and displays the carrier power value. This is different from the carrier power measurement in Figure 3–42 on page 3–66 in which the measurement is only taken periodically.

This menu also has a CARR POWER EXPECTED field which displays the carrier power that the base station expects from the mobile station. This value is determined by the value in the POWER CLASS field and the value of the VOICE MAC.

The initial value for the VOICE MAC field is inherited from the CALL ESTABLISHED menu (see Figure 3–42 on page 3–66). However, you can press the VOICE MAC softkey in this menu to change the value. This will not change the value in the CALL ESTABLISHED menu.

You can configure the parameters for CARRIER POWER test in the CARRIER POWER CONFIG menu (refer to *CARRIER POWER* on page 3–121).

Press the MENU UP front-panel button to return to the CALL ESTABLISHED menu.

Receiver Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile receiver. Select the test that you want to perform from the menu selections on the left side of the menu. See Figure 3–50.

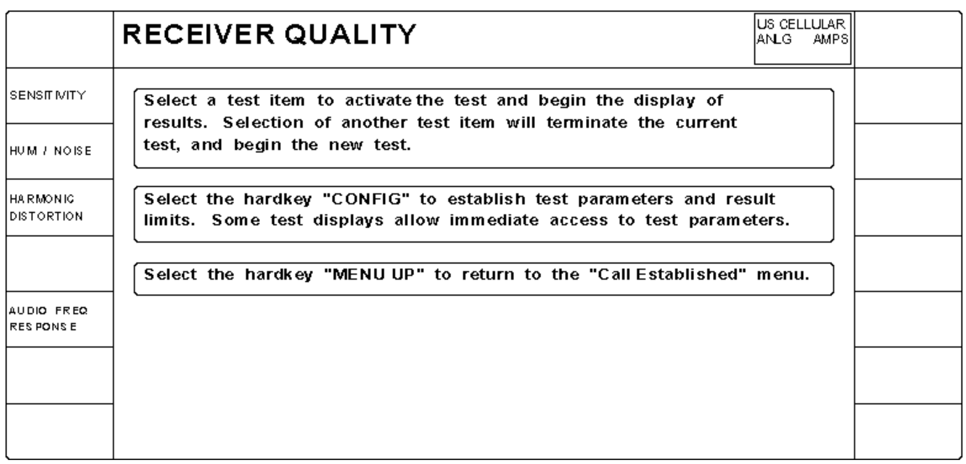


Figure 3–50: Analog receiver quality menu

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, returning to the home menu after establishing a call will drop the connection between the mobile station and the tester. If you want to set up or change the test parameters after a call is established, press the CONFIG front-panel button. This displays the RECEIVER QUALITY CONFIGURATION menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel button to return to the RECEIVER QUALITY test menu after making the configuration changes.

In some of the test menus, you can vary the base station and AF Generator parameters from within the test menu. The changes you make within the test menu change the settings you made in the associated configuration menu.

To perform mobile receiver tests, your mobile station must be connected to the tester. Figure 3–51 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

The following text discusses each of the RECEIVER QUALITY menu selections.

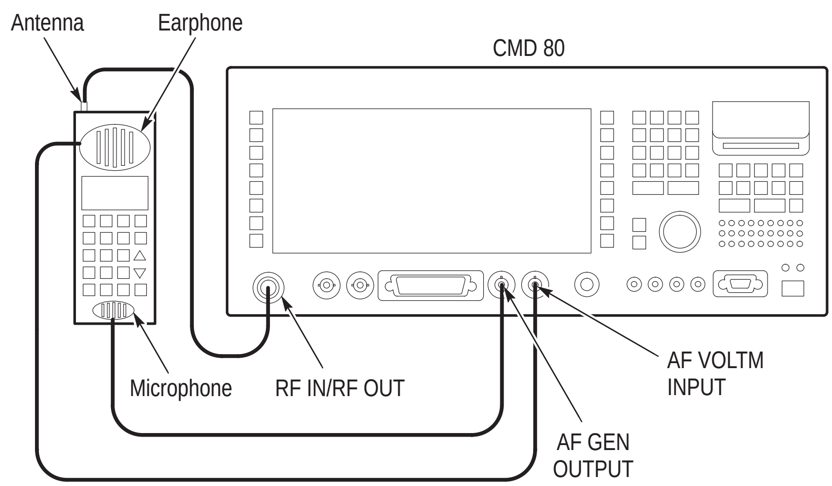


Figure 3–51: Setup for testing receiver quality

SENSITIVITY. Press the SENSITIVITY softkey to measure the sensitivity of the mobile receiver (see Figure 3–52). The tester displays the SINAD measurement. The purpose of the SINAD measurement is to ensure that the mobile station maintains acceptable audio signal quality when the RF input power is set to a minimum level that is dictated by the test specification.

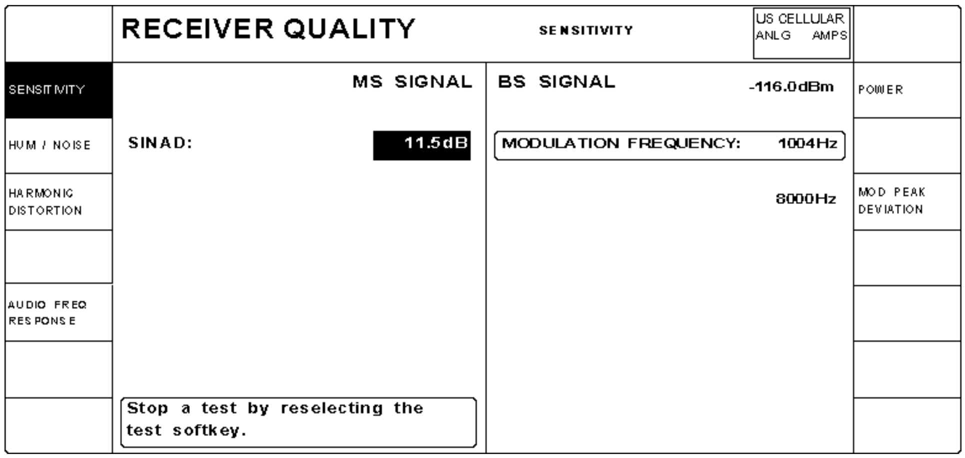


Figure 3–52: Analog receiver quality — sensitivity menu

The tester measures the SINAD value as a ratio of the sum of the received audio signal, noise, and distortion to the sum of the noise and distortion. The value is expressed in decibels.

NOTE*. The tester uses internal filters in determining the results in the SENSITIVITY menu. Refer to* Appendix B *for filter descriptions and their use.*

The SINAD value is highlighted if the result is less than the SINAD limit that you specified in the SENSITIVITY configuration menu (refer to *SENSITIVITY* on page 3–123).

NOTE*. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the SENSITIVITY configuration menu.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

HUM/NOISE. Press the HUM/NOISE softkey to measure the hum/noise of the mobile receiver. The test measures how much unwanted signal the receiver circuitry generates under normal RF power conditions. The tester measures the hum/noise as a ratio of the unmodulated audio output to the modulated audio output. The tester displays the hum/noise test result in decibels. The tester also displays the audio peak deviation in hertz. See Figure 3–53.

The HUM/NOISE measurement has the SAT/DSAT signal set to ON as a default. This is required in Manual Test, to maintain the call. The presence of SAT/DSAT may increase the HUM/NOISE value by ≈6 dB.

***NOTE**. The tester uses internal filters in determining the results in the HUM/NOISE menu. Refer to* Appendix B *for filter descriptions and their use.*

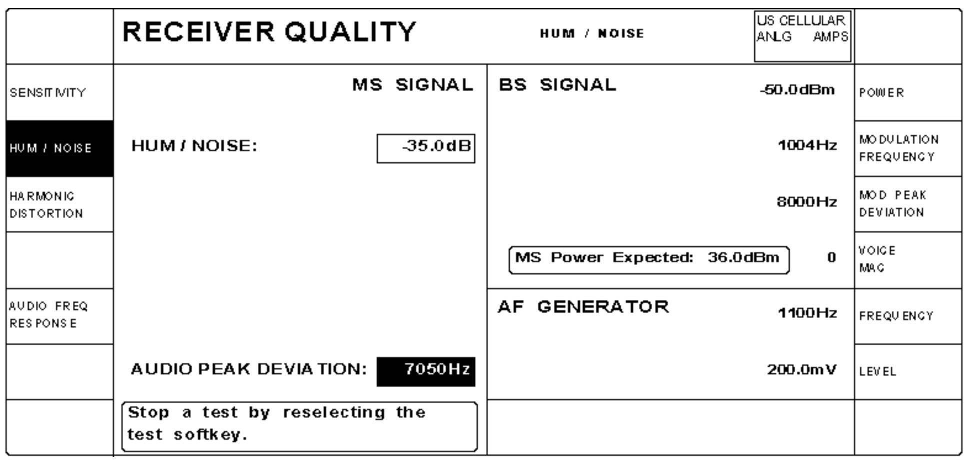


Figure 3–53: Analog receiver quality — hum/noise menu

A test result is highlighted if the value exceeds the hum/noise limit specified in the HUM/NOISE configuration menu (refer to *HUM/NOISE* on page 3–124).

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HUM/NOISE configuration menu.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.

- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the internal AF Generator frequency.
- Press the LEVEL softkey to adjust the internal AF Generator level or turn it off. Set the level so that the audio peak deviation is within the audio peak deviation error range.

NOTE. *The tester performs the hum/noise measurement only when the audio peak deviation is within the limits set in the HUM/NOISE configuration menu (refer to* HUM/NOISE on page 3–124*).*

HARMONIC DISTORTION. Press the HARMONIC DISTORTION softkey to measure the harmonic distortion of the mobile receiver. The test measures how cleanly the amplifier in the mobile station reproduces a tone. The receiver generates harmonics (unwanted frequencies) at integer multiples of the tone frequency received by the mobile receiver.

NOTE. *You must turn off the mobile station's expandor when performing this test.*

The tester measures the harmonic distortion as the percentage of the RMS value of the sum of the second and higher harmonic components to the RMS value of the total signal at the output of the mobile receiver for a specified signal applied to the receiver input. The test displays the harmonic distortion as a percentage. See Figure 3–54.

NOTE. *The tester uses internal filters in determining the results in the HARMONIC DISTORTION menu. Refer to* Appendix B *for filter descriptions and their use.*

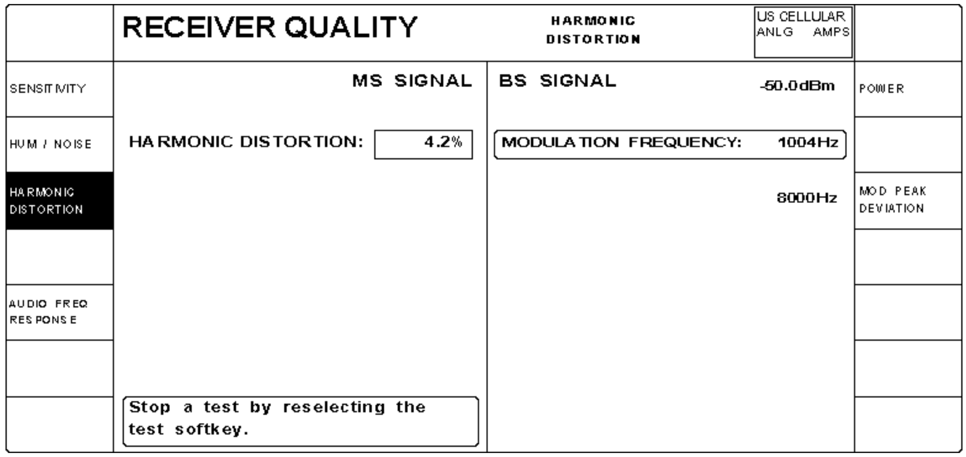


Figure 3–54: Analog receiver quality — harmonic distortion menu

A test result is highlighted if the harmonic distortion percentage exceeds the limit that you specified in the HARMONIC DISTORTION configuration menu (refer to *HARMONIC DISTORTION* on page 3–126).

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HARMONIC DISTORTION configuration menu.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

***NOTE**. The tester performs the harmonic distortion measurement only when the audio peak deviation is within the limits set in the HARMONIC DISTORTION configuration menu (refer to* HARMONIC DISTORTION *on page 3–126).*

Changing the preceding values in this menu changes the initial values that you set in the HARMONIC DISTORTION configuration menu.

AUDIO FREQ RESPONSE. Press the AUDIO FREQ RESPONSE softkey to measure the audio frequency response of the mobile receiver in the normal mode.

This test ensures that the volume level of any frequency transmitted by the base station and received by the mobile station falls within a predefined window.

***NOTE**. You must turn off the mobile station's expandor when performing this test.*

The tester measures the audio frequency response as the ratio of the electrical audio output of the mobile receiver to the modulated signal output of the base station (tester) as a function of frequency. See Figure 3–55.

***NOTE**. The tester uses internal filters in determining the results in the AUDIO FREQUENCY RESPONSE menu. Refer to* Appendix B *for filter descriptions and their use.*

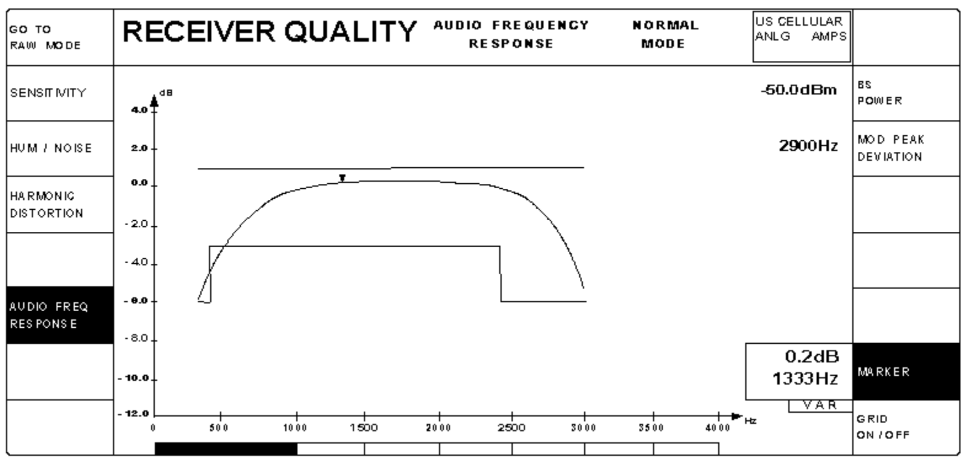


Figure 3–55: Analog receiver quality — audio freq response (normal mode) menu

***NOTE**. When performing the receiver audio frequency response test, the tester compensates for the mobile station's de-emphasis filter.*

When you press the AUDIO FREQ RESPONSE softkey, the tester displays the audio frequency response curve plotted between the upper and lower limit lines. Frequencies of the response curve that are not within the limit lines are indicated in inverse video at the bottom of the display.

The 0 dBm reference point amplitude is determined by the value you set with the MOD PEAK DEVIATION softkey. You can use the AUDIO FREQUENCY RESPONSE configuration menu to set the 0 dBm reference frequency with the MODULATION FREQUENCY softkey. You can also use the configuration menu to set the upper limit line, lower limit line, and the number of points sampled. Refer to AUDIO FREQ RESPONSE on page 3–127.

Press the MARKER softkey to position the marker along the frequency response curve. The values at the marker are displayed in the MARKER box.

Press the GRID ON/OFF softkey to toggle a grid display on or off.

You can vary the following base station parameters while in the AUDIO FREQUENCY RESPONSE test menu:

- BS Power. Press the BS POWER softkey to set the level of the base station transmitter power.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

Press the GO TO RAW MODE softkey to measure the audio frequency response in the raw mode. When the tester measures the audio frequency response in the normal mode, a pre-emphasis filter is active and you can use the configuration menu to establish limit lines for the measurement. However, in the raw mode, the tester takes the measurements without the pre-emphasis filter, and you cannot set limit lines for the measurement. See Figure 3–56.

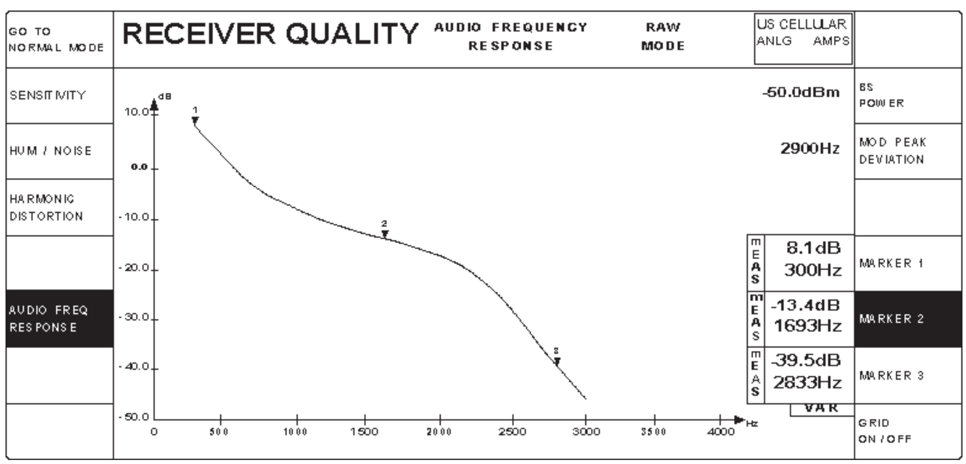


Figure 3–56: Analog audio frequency response (raw mode) menu

You use the AUDIO FREQUENCY RESPONSE (RAW MODE) configuration menu to set the beginning frequency, the ending frequency, and the number of points that are sampled (refer to *AUDIO FREQ RESPONSE* on page 3–127).

There are three markers available for taking measurements. Press the MARKER softkey to position the marker along the frequency response curve. The values at the marker are displayed in the MARKER box.

Press the GRID ON/OFF softkey to toggle a grid display on or off.

You can vary the following base station parameters while in the AUDIO FREQUENCY RESPONSE (RAW MODE) test menu:

- BS Power. Press the BS POWER softkey to set the level of the base station transmitter power.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

Press the GO TO NORMAL softkey to return to the AUDIO FREQUENCY RESPONSE (NORMAL MODE) menu.

Transmitter Quality

Press this softkey to display the TRANSMITTER QUALITY menu. From the menu selections on the left side of the menu, you can select the transmitter tests that you want to perform. See Figure 3–57.

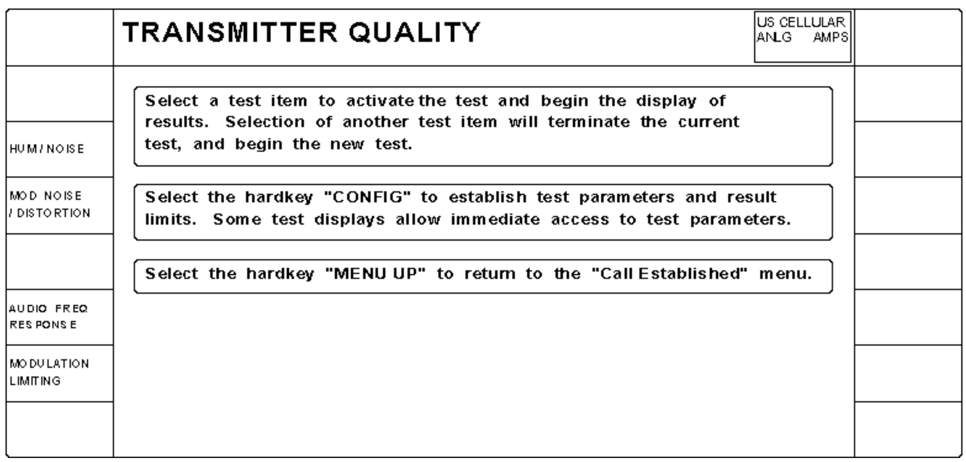


Figure 3–57: Analog transmitter quality menu

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, returning to the home menu after establishing a call will drop the connection between the mobile station and the tester. If you want to set up or change the test parameters after a call is established, press the CONFIG front-panel key. This displays the TRANSMITTER QUALITY CONFIGURATION menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel button to return to the TRANSMITTER QUALITY test menu after making the configuration changes.

In some of the test menus, you can vary the base station and AF Generator parameters from within the test menu. The changes you make within the test menu change the initial settings you made in the associated configuration menu.

To perform mobile transmitter tests, your mobile station must be connected to the tester. Figure 3–58 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

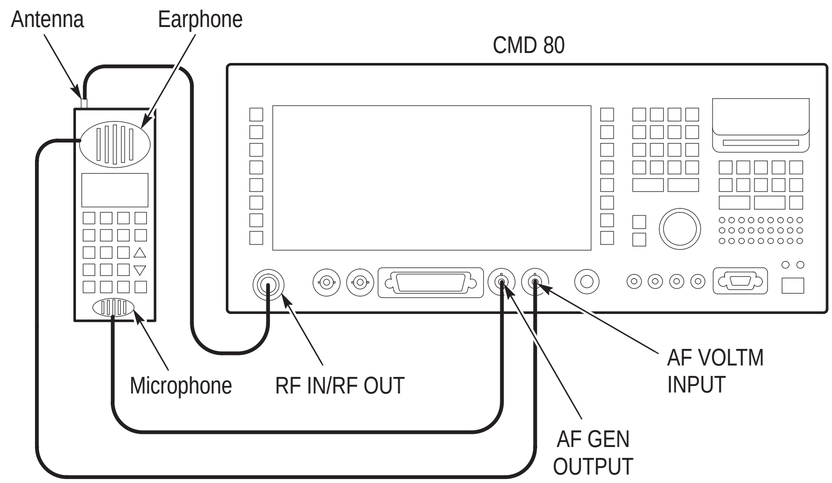


Figure 3–58: Setup for testing transmitter quality

The following text discusses each of the TRANSMITTER QUALITY menu selections.

HUM/NOISE. Press the HUM/NOISE softkey to measure the hum/noise of the mobile transmitter and the audio peak deviation. The transmitter hum/noise is the ratio of the residual frequency modulation to test modulation measured on the test mobile receiver. The test displays the hum/noise in decibels and the audio peak deviation in hertz. See Figure 3–59.

NOTE*. The tester uses internal filters in determining the results in the HUM/NOISE menu. Refer to* Appendix B *for filter descriptions and their use.*

A test result is highlighted if the level of the hum/noise exceeds the limit that you specified in the configuration menu (refer to *HUM/NOISE* on page 3–131).

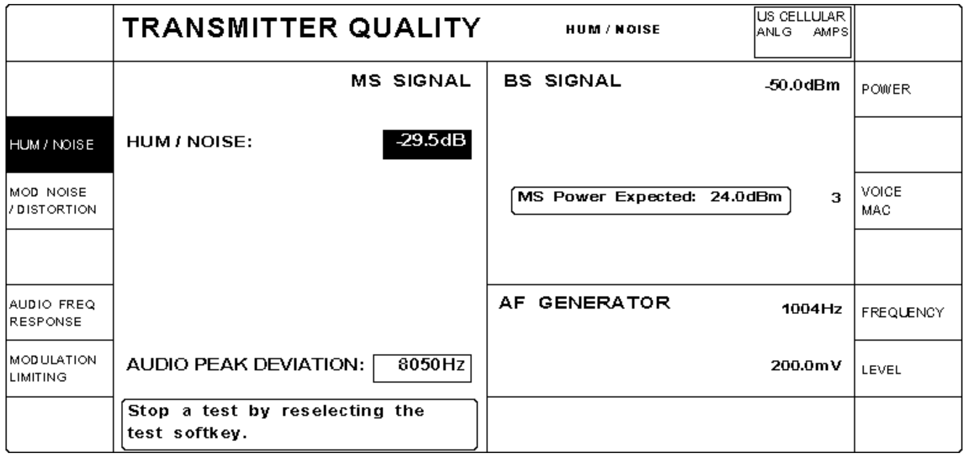


Figure 3–59: Analog transmitter quality — hum/noise menu

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HUM/NOISE configuration menu.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Frequency. Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Level. Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. Set the level so that the audio peak deviation is within the audio peak deviation error range that you specified in the HUM/NOISE configuration menu (refer to *HUM/NOISE* on page 3–131).

***NOTE**. The tester performs the hum/noise measurement only when the audio peak deviation is within the limits set in the HUM/NOISE configuration menu (refer to* HUM/NOISE on page 3–131).

MOD NOISE/DISTORTION. Press the MOD NOISE/DISTORTION softkey to measure the modulation noise and distortion of the mobile transmitter and the audio peak deviation. This test measures how much noise (unwanted signal) is transmitted with the intended signal.

The tester measures the modulation noise and distortion as the level of demodulated carrier audio RMS noise produced by audio distortion in the transmitter. The tester displays this value as a percentage and the audio peak deviation in hertz. See Figure 3–60.

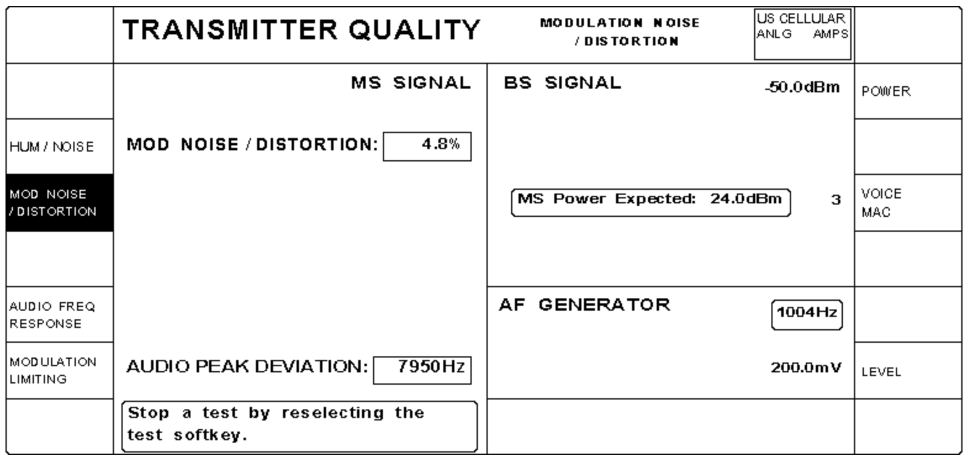


Figure 3–60: Analog transmitter quality — mod noise/distortion menu

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***NOTE**. The tester uses internal filters in determining the results in the MOD NOISE/DISTORTION menu. Refer to* Appendix B *for filter descriptions and their use.*

The modulation noise and distortion result is highlighted if the percentage of modulation noise and distortion exceeds the limit that you specified in the configuration menu (refer to *MOD NOISE/DISTORTION* on page 3–132).

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the MOD NOISE/DISTORTION configuration menu.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Frequency. Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Level. Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. Set the level so that the audio peak deviation is within the audio peak deviation error range that you specify in the MOD NOISE/DISTORTION configuration menu (refer to *MOD NOISE/DISTORTION* on page 3–132).

NOTE. *The tester performs the modulation/distortion measurement only when the audio peak deviation is within the limits set in the MOD NOISE/DISTORTION configuration menu (refer to* MOD NOISE/DISTORTION *on page 3–132).*

AUDIO FREQ RESPONSE. Press the AUDIO FREQ RESPONSE softkey to measure the audio frequency response of the mobile transmitter in the normal mode. Refer to Figure 3–61. This test ensures that the volume level of any frequency transmitted by the mobile station falls within a predefined window. The purpose of the test is to ensure that high frequencies and low frequencies are reproduced at the same volume levels.

NOTE. *You must turn off the mobile station's compressor when performing this test.*

The tester measures the audio frequency response as the ratio of the demodulated signal output of the mobile station to the electrically coupled (acoustic) signal input of the mobile station (driven by the tester) as a function of frequency. See Figure 3–61.

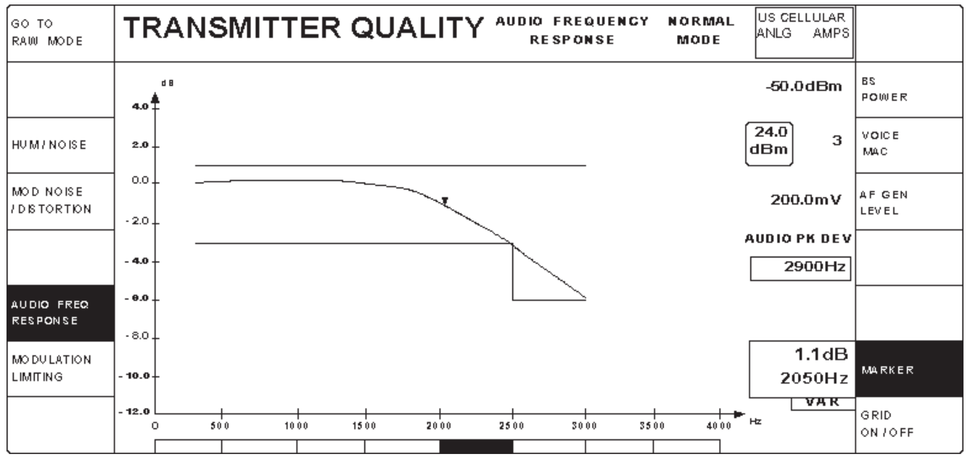

Figure 3–61: Analog transmitter quality — audio frequency response (normal mode) menu

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***NOTE**. The tester uses internal filters in determining the results in the MOD NOISE/DISTORTION menu. Refer to* Appendix B *for filter descriptions and their use.*

When performing the transmitter audio frequency response test, the tester compensates for the user's pre-emphasis filter.

When you press the AUDIO FREQ RESPONSE softkey, the tester displays the audio frequency response curve plotted between the upper and lower limit lines. Frequencies of the response curve that are not within the limit lines are indicated in inverse video at the bottom of the display.

You can set the 0 dB reference point amplitude with the AF GEN LEVEL softkey. Adjust this level until the audio peak deviation is within the target range (nominally, 2900 kHz). The value of the audio peak deviation is the 0 dBm amplitude reference. You can use the AUDIO FREQUENCY RESPONSE configuration menu to set the 0 dBm reference frequency with the AF Generator FREQUENCY softkey. You can also use the configuration menu to set the upper limit line, lower limit line, and the number of points sampled. Refer to *AUDIO FREQ RESPONSE* on page 3–133.

Press the MARKER softkey to position the marker along the frequency response curve. The values at the marker are displayed in the MARKER box.

Press the GRID ON/OFF softkey to toggle a grid display on or off.

You can vary the following base station parameters while in the AUDIO FREQUENCY RESPONSE test menu:

- BS Power. Press the BS POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.
- Audio frequency generator level. Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. Set the level so that the audio peak deviation is within the audio peak deviation error range that you specify in the AUDIO FREQUENCY RESPONSE configuration menu (refer to *AUDIO FREQ RESPONSE* on page 3–133).

***NOTE**. The tester performs the audio frequency response measurement only when the audio peak deviation is within the limits set in the AUDIO FREQUENCY RESPONSE configuration menu (refer to* AUDIO FREQ RESPONSE *on page 3–133).*

Press the GO TO RAW MODE softkey to measure the audio frequency response of the mobile transmitter in the raw mode (see Figure 3–62). When the tester measures the audio frequency response in the normal mode, a de-emphasis filter is active and you can use the configuration menu to establish limit lines for the measurement. However, in the raw mode, the tester takes the measurements without the de-emphasis filter, and you cannot set limit lines for the measurement. See Figure 3–56 on page 3–81.

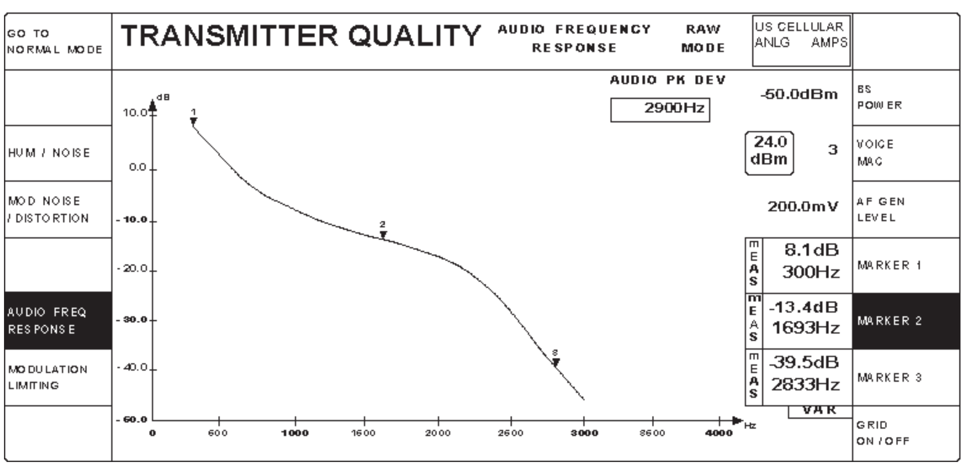


Figure 3–62: Analog transmitter quality — audio frequency response (raw mode) menu

You use the AUDIO FREQUENCY RESPONSE (RAW MODE) configuration menu to set the beginning frequency, the ending frequency, the number of points that are sampled, and other parameters (refer to *AUDIO FREQ RESPONSE* on page 3–133).

There are three markers available for taking measurements. Press the MARKER softkey to position the marker along the frequency response curve. The values at the marker are displayed in the MARKER box.

Press the GRID ON/OFF softkey to toggle a grid display on or off.

You can vary the following base station parameters while in the AUDIO FREQUENCY RESPONSE (RAW MODE) test menu:

- BS Power. Press the BS POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.
- Press the AF GEN LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. You can adjust the level to achieve the audio peak deviation value that you want.

Press the GO TO NORMAL softkey to return to the AUDIO FREQUENCY RESPONSE (NORMAL MODE) menu.

MODULATION LIMITING. Press the MODULATION LIMITING softkey to measure the maximum frequency deviation that the mobile transmitter allows. See Figure 3–63.

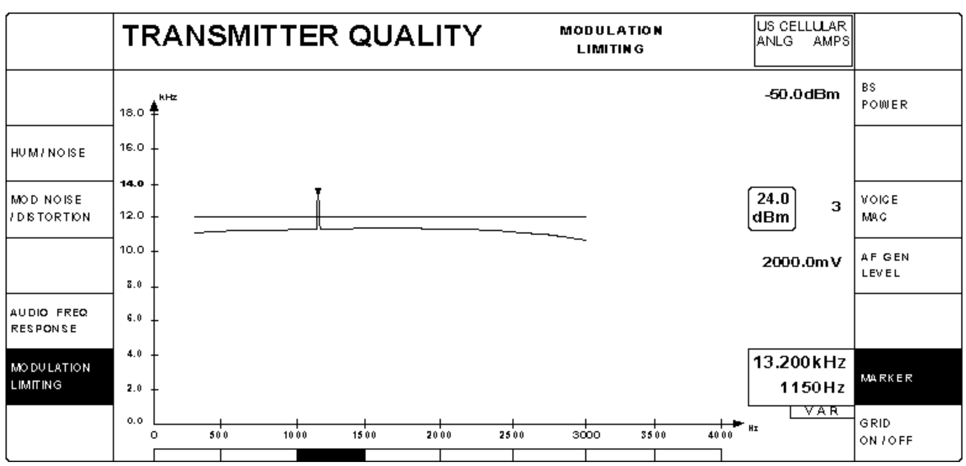


Figure 3–63: Analog transmitter quality — modulation limiting menu

The Modulation Limiting test checks that the mobile transmitter does not produce a deviation greater than the rated system deviation.

NOTE. *The tester uses internal filters in determining the results in the MODULATION LIMITING menu. Refer to* Appendix B *for filter descriptions and their use.*

The upper line in the display is the result limit for the test. You can set this limit line in the configuration menu for the MODULATION LIMITING test (refer to *MODULATION LIMITING* on page 3–139).

The lower line in the display represents the audio peak deviation over the specified frequency range. You can set the frequency range in the configuration menu for the MODULATION LIMITING test (refer to *MODULATION LIMITING* on page 3–139).

If the audio peak deviation exceeds the limit line, a range of frequencies within which the test failed is shown in inverse video at the bottom of the display. In Figure 3–63, the range of frequencies between 1000 Hz and 1500 Hz is in inverse video.

Press the MARKER softkey to position the marker along the curve to measure the audio peak deviation and the corresponding frequency. In Figure 3–63, the marker indicates a peak audio deviation of 13,200 kHz at a frequency of 1150 Hz.

Press the GRID ON/OFF softkey to superimpose a grid over the display.

While in this menu, you can vary the following parameters of the base station:

- Base station power. Press the BS POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

Press the AF GEN LEVEL softkey to adjust the level of the internal AF Generator. You can also use this softkey to turn off the AF Generator.

Handoffs/Transitions

Press the HANDOFFS/TRANSITIONS softkey to display the HANDOFFS/ TRANSITIONS menu for the CALL ESTABLISHED mode. See Figure 3–64. You use this menu to either handoff an established call to another network, system, and/or standard or to make a local transition, such as from ANALOG MS TESTS to ANALOG VOICE LOOPBACK.

***NOTE**. The menu displays the previous NETWORK HANDOFFS selections. The selections are retained until you change them.*

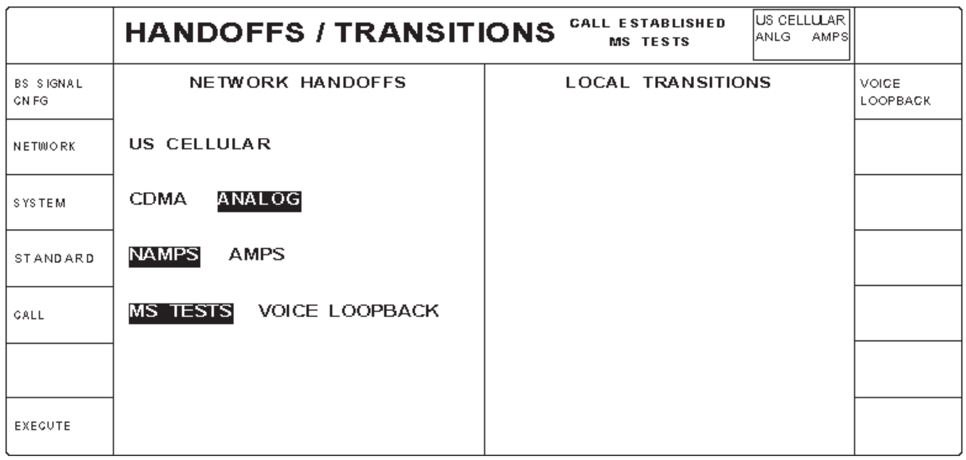


Figure 3–64: Handoffs/transitions menu for call established (MS tests)

To hand off an analog call, perform the following procedure:

1. In the NETWORK HANDOFFS side of the menu, select the network, system, and standard to which you want to handoff the call. Table 3–6 on page 3–92 lists the supported handoffs with all options installed.

2. To configure the the base station signal for the system to which you are handing off, press the BS SIGNAL CONFIG softkey.

   For information about configuring the operating parameters of an analog base station, refer to *ANALOG BS SIGNAL CNFG* on page 3–160. For information about configuring the operating parameters of a TDMA base station, refer to *TDMA BS SIGNAL CNFG* on page 3–251.

3. Press the CALL softkey to select either MS TESTS or VOICE LOOPBACK. This determines the state that the tester is in after you execute the handoff.

***NOTE**. If the network handoff you selected is not implemented in the tester, the tester displays the message "The configured handoff is NOT currently available." In this case, the tester does not display the EXECUTE softkey.*

4. Press the EXECUTE softkey to make the handoff.

Table 3–6: Valid network handoffs

Network	Handoff from standard	Valid handoff to standards
US Cellular	CDMA (IS–95)	AMPS or NAMPS
	AMPS	NAMPS
	NAMPS	AMPS
	AMPS	TDMA (IS–136–A)
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US PCS TDMA (IS–136–A)
Japanese Cellular	CDMA (IS–95)	JTACS or NTACS
	J–CDMA (T53)	JTACS or NTACS
	JTACS	NTACS
	NTACS	JTACS
Chinese Cellular	CDMA (IS–95)	ETACS or TACS
US PCS	CDMA (UB IS–95)	AMPS or NAMPS
	CDMA (J–STD–008)	AMPS or NAMPS
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US Cellular TDMA (IS–136–A)

In the LOCAL TRANSITIONS side of the HANDOFFS/TRANSITIONS menu, you can use the softkeys to make a local transition. When ANALOG is the system for the currently established call, the only transition softkeys that are available are VOICE LOOPBACK (if the selected CALL is MS TESTS) or MS TESTS (if the selected CALL is VOICE LOOPBACK).

BS Signal Configuration

Press the BS SIGNAL CNFG softkey to display the ANALOG BS SIGNAL CONFIG menu associated with the CALL ESTABLISHED state. See Figure 3–65. Use this menu to set the operating parameters of the base station signal.

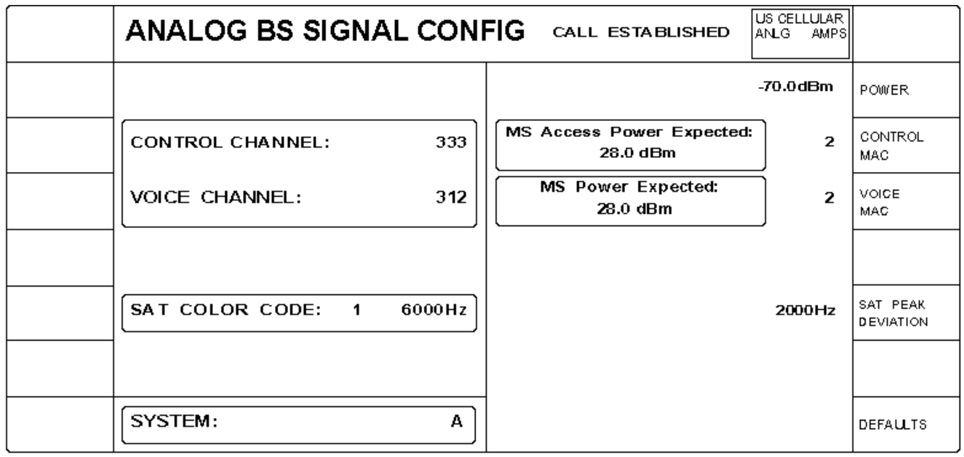


Figure 3–65: Analog BS signal configuration — call established menu

While in this menu, you can vary the following parameters of the base station:

- Power. Press this softkey to set the base station transmitter power level.
- Control mobile attenuation code. Press this softkey to select the control MAC you want. The control mobile attenuation code is a code sent by the base station to control the output power of the mobile station.
- Voice mobile attenuation code. Press this softkey to set the parameter for the voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions.
- Supervisory audio tone peak deviation. Press this softkey to set the deviation used. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station.
- Defaults. Press this softkey to set all the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

***NOTE**. If you selected NAMPS as the standard, you will see a CALL ESTABLISHED configuration menu similar to that shown in Figure 3–66.*

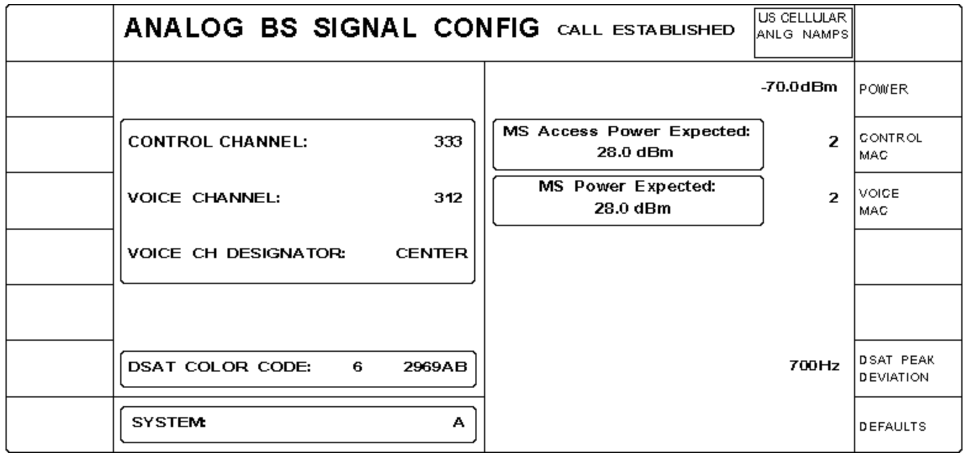


Figure 3–66: Call established menu when NAMPS is the selected standard

The differences in the CALL ESTABLISHED menu for NAMPS from the AMPS menu are as follows:

- The menu shows VOICE CH DESIGNATOR information.
- The DSAT COLOR CODE value and its associated sequence replace the SAT COLOR CODE and its associated frequency.
- The DSAT PEAK DEVIATION softkey replaces the SAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

__NOTE__. If you selected NTACS as the standard, you will see a CALL ESTABLISHED configuration menu similar to that shown in Figure 3–67.

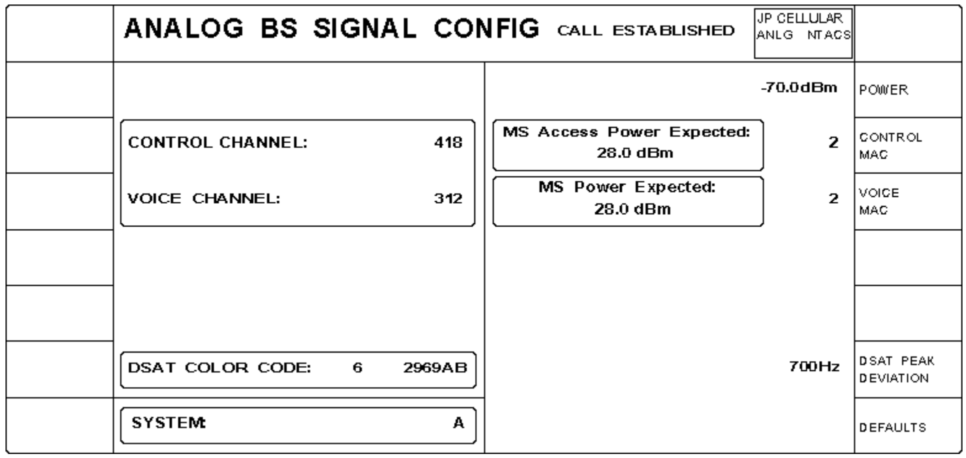
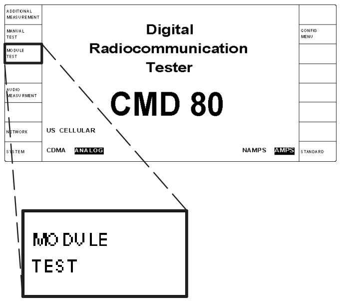


Figure 3–67: Call established menu when NTACS is the selected standard

The differences in the CALL ESTABLISHED menu for NTACS from the AMPS menu are as follows:

- The DSAT COLOR CODE value and its associated sequence replace the SAT COLOR CODE and its associated frequency.
- The DSAT PEAK DEVIATION softkey replaces the SAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Module Test



***NOTE**. The tester displays analog module test menus only if you have Option B82 installed and have selected the US CELLULAR, JAPAN CELLULAR, or CHINA CELLULAR network and ANALOG system (refer to* NETWORK *on page 3–3).*

The MODULE TEST softkey selects the module test measurements for the system selected with the SYSTEM softkey. This section discusses the tests available when you have selected ANALOG as the system.

The module test feature supports testing the components of a mobile station before they are assembled into a unit that is capable of completing a call. The tester transmits a configurable forward voice channel while ignoring the information content in the reverse channel. This allows the tester to measure the power level and waveform quality on the reverse channel while not requiring that the module-under-test be capable of establishing or maintaining a call.

It is up to you to force the module-under-test into an appropriate state before performing the module tests. In some cases, you may want to manually force other conditions that are not under the control of the tester in this mode of operation. Examples of this are the enabling or disabling of the audio compandor or the pre-emphasis/de-emphasis functions.

Press the MODULE TEST softkey to display the ANALOG MODULE TEST menu for the AMPS, JTACS, TACS, and ETACS standards (see Figure 3–68).

***NOTE**. Since there are several differences in the menus for NAMPS (see Figure 3–69 on page 3–98) and NTACS (see Figure 3–70 on page 3–100), their unique fields and softkeys are discussed following the menu description for the AMPS standard.*

The menu shows the test results for the transmitter quality of the mobile station. A measurement that exceeds its result limit displays in inverse video.

***NOTE**. The tester uses internal filters in determining the results in the ANALOG MODULE TEST menu. Refer to* Appendix B *for filter descriptions and their use.*

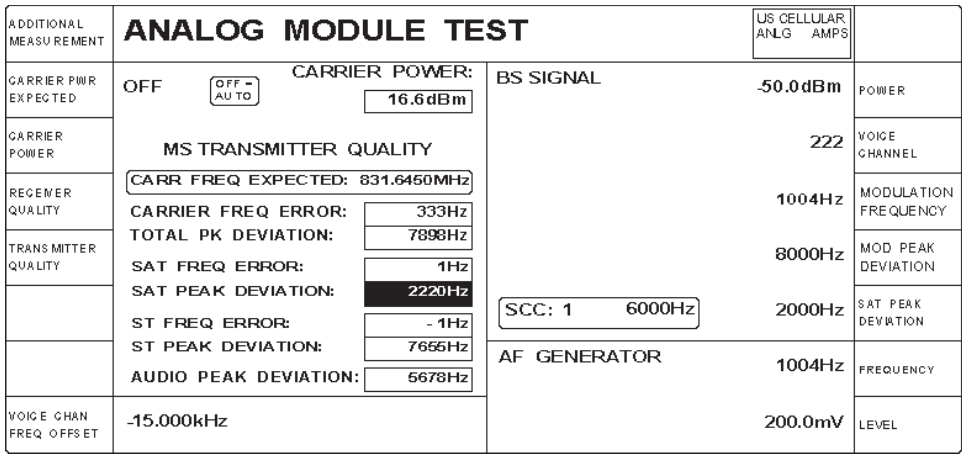


Figure 3–68: Analog module test menu for AMPS (and JTACS, TACS, ETACS) standard

The CARRIER POWER EXPECTED softkey allows you to specify the power expected from the mobile station or let the tester find the power level with autorange mode. Autorange mode is activated by setting CARRIER POWER EXPECTED to OFF with the front-panel CLEAR OFF front-panel key. Specifying the expected power allow measurements to proceed faster.

The tester measures the carrier power periodically and displays the value in the CARRIER POWER field. “OVL” or “LOW” is displayed in the field if the measured carrier power range is exceeded. If you want a continuous display of the carrier power measurement, press the CARRIER POWER softkey. (For additional information, refer to *CARRIER POWER* on page 3–104.)

Press the VOICE CHAN FREQ OFFSET softkey to offset the voice channel frequency from –50 kHz to +50 kHz. This control allows you to check the AFC (automatic frequency control) of the mobile station.

***NOTE**. The tester will not display a value in the SAT FREQ ERROR and ST FREQ ERROR fields if the deviation reading is less than 100 Hz.*

While in this menu, you can vary the following parameters of the base station:

- Power. Press the POWER softkey to set the level of the base station transmitter power. You can also use this softkey to turn off the power.
- Voice channel. The voice channel is the channel over which voice communications occur. Press the VOICE CHANNEL softkey to select a voice channel.

***NOTE**. Only even numbered channels are allowed for the JTACS standard.*

- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.You can also use this softkey to turn off the SAT peak deviation.

NOTE. *You can set the SCC (SAT color code) in the ANALOG MODULE TEST CONFIG MAIN menu (refer to page 3–101).*

You can also change the following AF Generator settings:

- Frequency. Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Level. Press the LEVEL softkey to adjust the level of the internal AF Generator. You can adjust the level to achieve the audio peak deviation target value that is displayed in the menu. You can also use this softkey to turn off the AF Generator.

Figure 3–69 shows the menu with NAMPS selected as the standard.

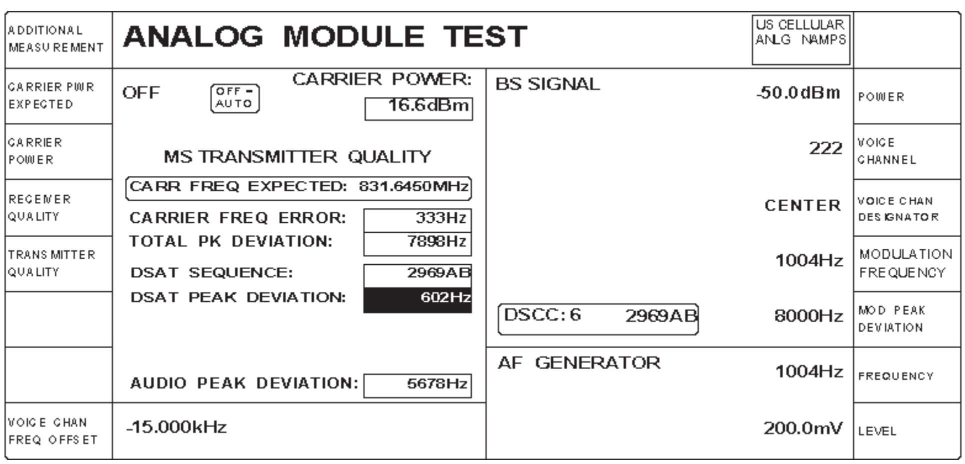


Figure 3–69: Analog module test menu for NAMPS standard

The differences in the ANALOG MODULE TEST menu for NAMPS from the AMPS menu are listed below.

On the MS SIGNAL side of the menu:

- The SAT FREQ ERROR, SAT PEAK DEVIATION, ST FREQ ERROR, and ST PEAK DEVIATION fields are not displayed.
- The DSAT SEQUENCE field is added. This field contains one of the seven defined DSAT sequences, one of the seven defined DST sequences, or dashes if the received signal is not recognized as a valid DSAT or DST. If the received DSAT does not match the DSAT which is transmitted on the forward channel, this field appears in inverse video. (Whenever DST is received, it is regarded as matching the forward channel DSAT if the DST is the bit-wise complement of the DSAT.)

***NOTE**. The tester will decode and recognize DSAT or DST sequences that contain either 0 or 1 bit errors per 24-bit pattern.*

- The DSAT PEAK DEVIATION field is added.

On the BS SIGNAL side of the menu:

- The VOICE CHAN DESIGNATOR softkey is inserted, shifting the MODULATION FREQUENCY softkey down. Press the VOICE CHAN DESIGNATOR softkey to select the designator you want; CENTER is the default.

***NOTE**.* You can set the value of the DSAT PEAK DEVIATION in the ANALOG MODULE TEST CONFIG MAIN menu. Refer to *DSAT PEAK DEVIATION softkey* on page 3–102.

- DSCC field replaces the SCC field. You can set the value of the digital supervisory audio tone color code (DSCC) and its associated sequence in the ANALOG MODULE TEST CONFIG MAIN menu. Refer to *DSAT COLOR CODE softkey* on page 3–102.

Figure 3–70 shows the menu with NTACS selected as the standard.

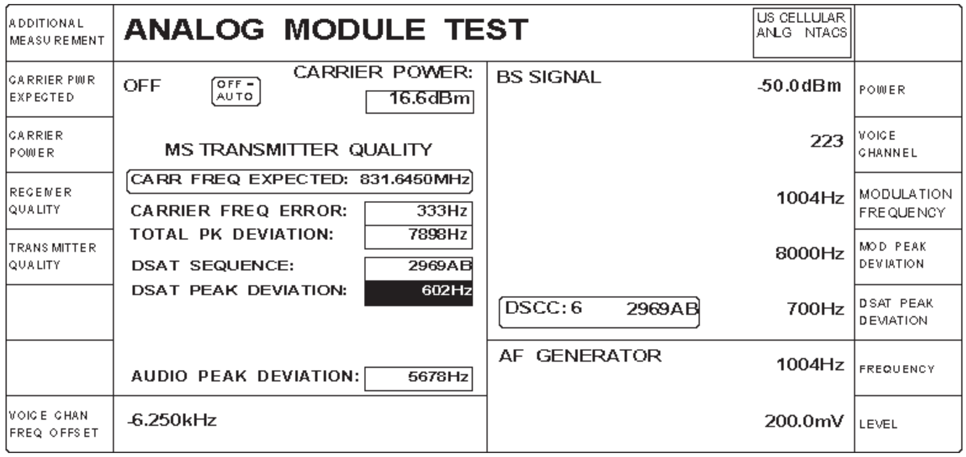


Figure 3–70: Analog module test menu for NTACS standard

The differences in the ANALOG MODULE TEST menu for NTACS from the AMPS menu are listed below.

On the MS SIGNAL side of the menu:

- The SAT FREQ ERROR, SAT PEAK DEVIATION, ST FREQ ERROR, and ST PEAK DEVIATION fields are not displayed.
- The DSAT SEQUENCE field is added. This field contains one of the seven defined DSAT sequences, one of the seven defined DST sequences, or dashes if the received signal is not recognized as a valid DSAT or DST. If the received DSAT does not match the DSAT which is transmitted on the forward channel, this field appears in inverse video. (Whenever DST is received, it is regarded as matching the forward channel DSAT if the DST is the bit-wise complement of the DSAT.)

***NOTE**. The tester will decode and recognize DSAT or DST sequences that contain either 0 or 1 bit errors per 24-bit pattern.*

- The DSAT PEAK DEVIATION field is added.

On the BS SIGNAL side of the menu:

- The DSAT PEAK DEVIATION softkey replaces the SAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel. The default is OFF.

***NOTE**. You can set the value of the DSAT color code (DSCC) in the ANALOG MODULE TEST CONFIG MAIN menu. Refer to *DSAT COLOR CODE softkey* on page 3–102.*

To set the result limits for the ANALOG MODULE TEST, first press the CONFIG front-panel button to display the MAIN ANALOG MODULE TEST CONFIG menu (see Figure 3–71).

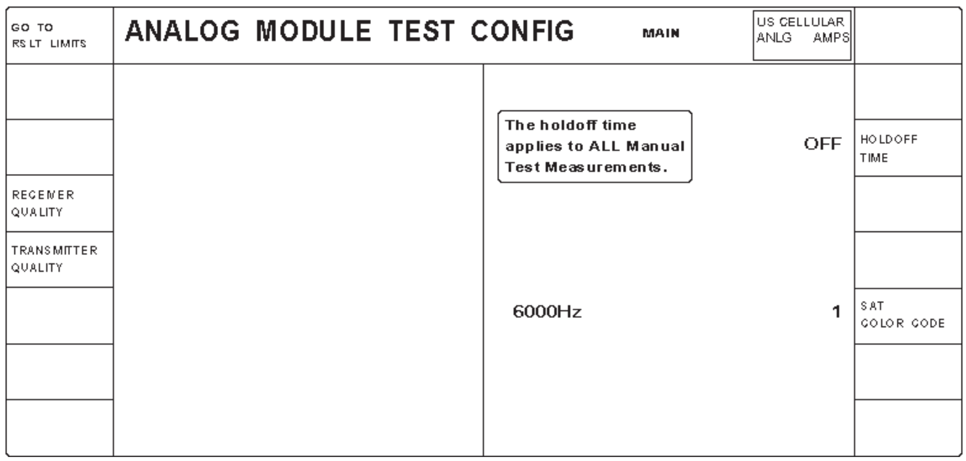


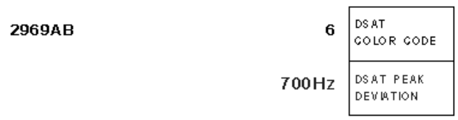
Figure 3–71: Analog module test configuration — main menu

- Press the HOLDOFF TIME softkey to set a time delay between the start (or change) of an audio source and the acquisition of measurement data. This allows the transients induced in the mobile station by changes in the audio source to settle before data is accumulated.

You can use this menu to change the SAT color code (SCC) that is in the ANALOG MODULE TEST menu shown in Figure 3–68. The supervisory audio tones (SAT) are out-of-voice-band audio tones used for signaling. There are three assigned frequencies of 5970 Hz, 6000 Hz, and 6030 Hz with corresponding SAT color codes of SCC 0, SCC 1, and SCC 2, respectively. Press the SAT COLOR CODE softkey to select the SAT color code that you want.

***NOTE**. With NAMPS selected as the standard, the DSAT COLOR CODE softkey (with the selected digital supervisory audio tone color code (DSCC) and its associated sequence) replaces the SAT COLOR CODE softkey. Also, the DSAT PEAK DEVIATION softkey is added to the menu, since it does not appear on the ANALOG MODULE TEST menu for NAMPS.*

With NAMPS selected as the standard, the following two menu items are displayed.



- DSAT COLOR CODE softkey. Press the DSAT COLOR CODE softkey to select the desired DSCC (0 through 6). A six-character hexadecimal string representing the associated 24-bit DSAT sequence is displayed to the left of the DSCC. See page 3–58 for a list of the sequences.
- DSAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

***NOTE**. With NTACS selected as the standard, the tester displays the DSAT COLOR CODE softkey as discussed previously. However, the DSAT PEAK DEVIATION softkey is not displayed in this menu; it is displayed in the ANALOG MODULE TEST menu for NTACS (refer to page 3–100).*

Press the GO TO RSLT LIMITS softkey to display the RESULTS LIMITS configuration menu (see Figure 3–72). This menu configures the test limits for the ANALOG MODULE TEST Main menu.

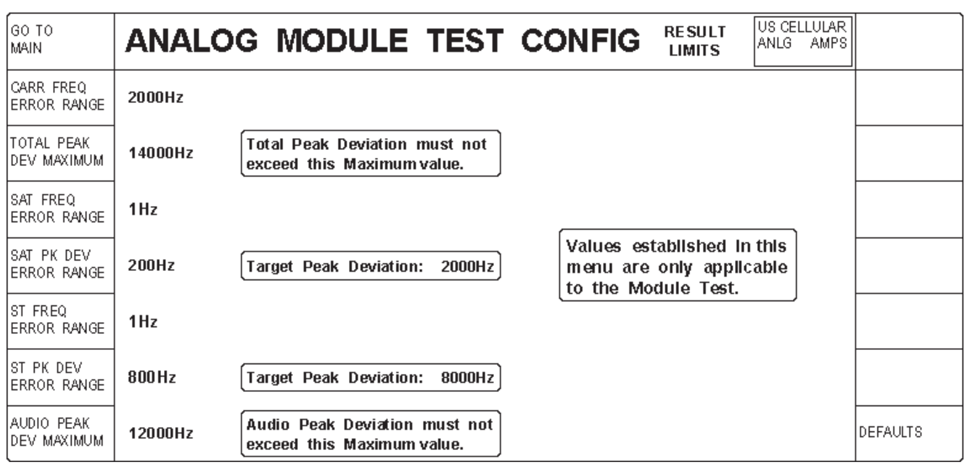


Figure 3–72: Analog module test configuration — result limits menu

To change a limit, press the corresponding softkey on the left side of the menu and set the value you want.

Press the DEFAULTS softkey to set all the limits to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

Press the GO TO MAIN softkey to return to the Main configuration menu for the ANALOG MODULE TEST; press the MENU UP front-panel button to return to the ANALOG MODULE TEST menu.

***NOTE**. If you selected NAMPS or NTACS as the standard, you will see a RESULT LIMITS menu similar to that shown in Figure 3–73.*

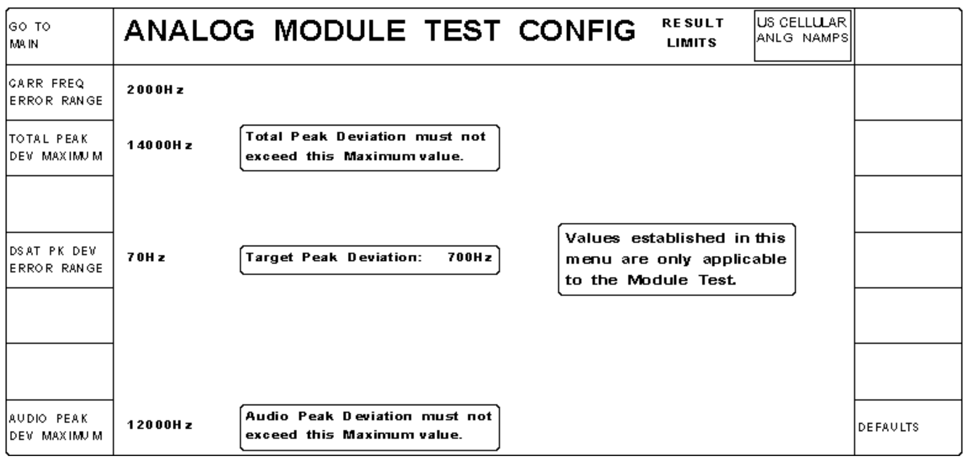


Figure 3–73: Result limits menu for NAMPS or NTACS standards

In the RESULT LIMITS menu for NAMPS and NTACS standards, the DSAT PK DEV ERROR RANGE softkey replaces the SAT PK DEV ERROR RANGE softkey. Also, the tester does not display the SAT FREQ ERROR RANGE, ST FREQ ERROR RANGE, and ST PK DEV ERROR RANGE softkeys.

Additional Measurement

Press the ADDITIONAL MEASUREMENT softkey to display the ADDITIONAL MEASUREMENTS menu, which you can use to take conventional measurements. Refer to *ADDITIONAL MEASUREMENT* on page 3–255.

Carrier Power

Press the CARRIER POWER softkey to display the CARRIER POWER menu (see Figure 3–74). The tester continually measures and displays the carrier power value. This is different from the carrier power measurement in Figure 3–68 on page 3–97 in which the measurement is only taken periodically.

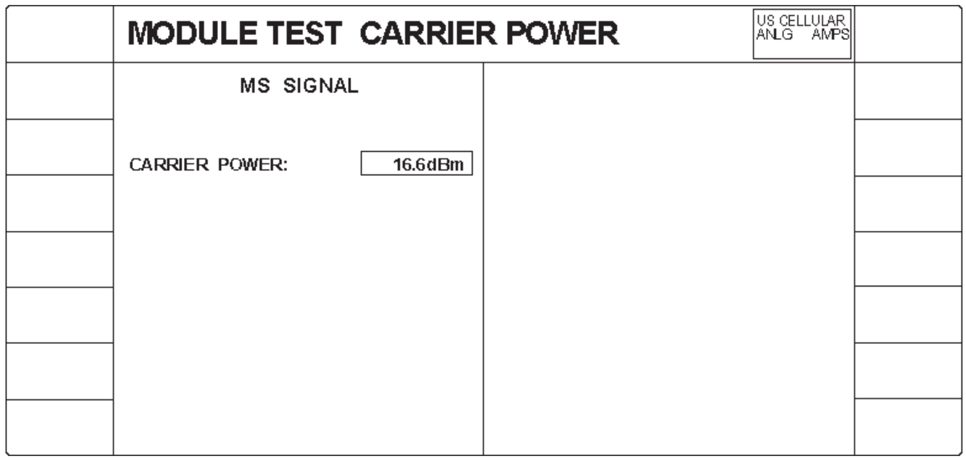


Figure 3–74: Analog module test carrier power menu

Receiver Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile receiver. Select the test that you want to perform from the menu selections on the left side of the menu. See Figure 3–75.

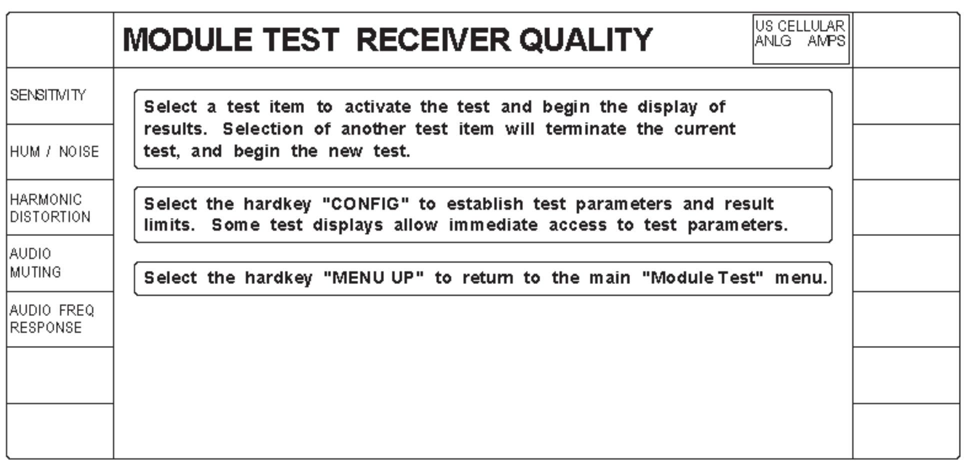


Figure 3–75: Analog module test receiver quality menu

To perform mobile receiver tests, your mobile station must be connected to the tester. Figure 3–51 on page 3–75 shows the recommended connections for testing receiver quality. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, you can also press the CONFIG front-panel button to display the MODULE TEST RX QUAL CNFG menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel button to return to the MODULE TEST RECEIVER QUAL test menu after making the configuration changes.

In some of the test menus, you can vary the base station and AF Generator parameters from within the test menu. The changes you make within the test menu change the settings you made in the associated configuration menu.

Since the analog manual tests for receiver quality discussed earlier are similar to the analog module tests, you will be referred to the analog module tests for menu descriptions. Only menu items unique to the analog module test are discussed in the following subsections.

SENSITIVITY. Press the SENSITIVITY softkey to measure the sensitivity of the mobile receiver (see Figure 3–76). The SINAD value is highlighted if the result is less than the SINAD limit that you specified in the SENSITIVITY configuration menu (refer to *SENSITIVITY* on page 3–141).

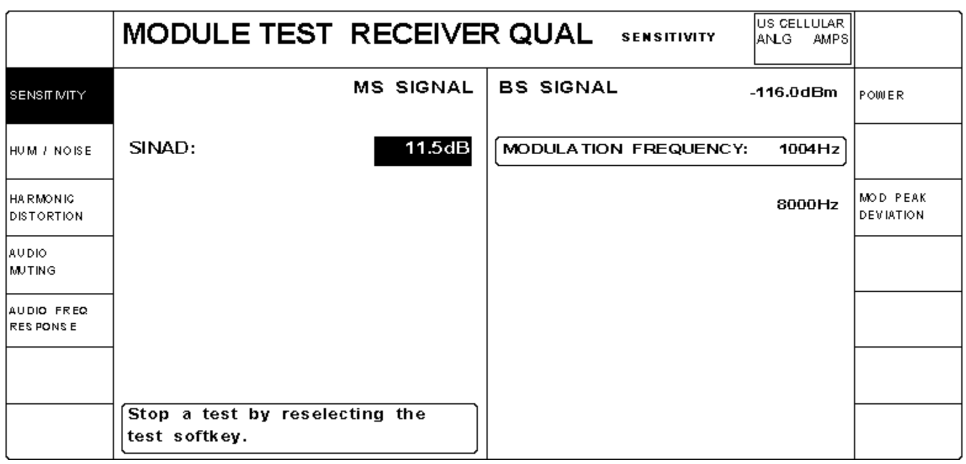


Figure 3–76: Analog module test receiver qual — sensitivity menu

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the SENSITIVITY configuration menu.*

Refer to *SENSITIVITY* on page 3–76 for a detailed description of the menu items.

HUM/NOISE. Press the HUM/NOISE softkey to measure the hum/noise of the mobile receiver (see Figure 3–77).

The HUM/NOISE measurement has the SAT/DSAT signal set to ON as a default. This is not required in Module Test, as no call is active, so it may be turned off by the user. this must be done from the front panel, or the GPIB remote command. The presence of SAT/DSAT may increase the HUM/NOISE value by $\approx$6 dB.

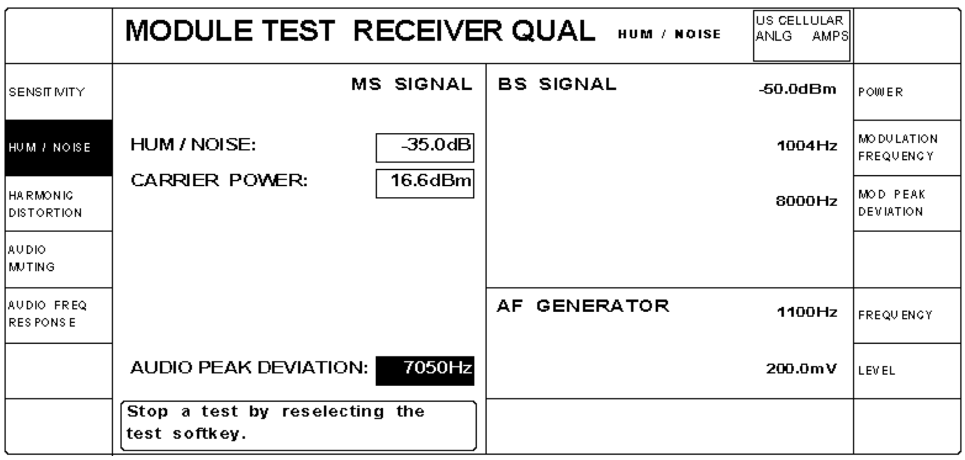


Figure 3–77: Analog module test receiver qual — hum/noise menu

A test result is highlighted if the value exceeds the hum/noise limit that you specified in the HUM/NOISE configuration menu (refer to *HUM/NOISE* on page 3–143). Also, the tester performs the hum/noise measurement only when the audio peak deviation is within the limits set in the HUM/NOISE configuration menu.

In addition to the hum/noise measurement result, the tester also displays the carrier power.

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HUM/NOISE configuration menu.*

Refer to *HUM/NOISE* on page 3–77 for a detailed description of the menu items.

HARMONIC DISTORTION. Press the HARMONIC DISTORTION softkey to measure the harmonic distortion of the mobile receiver (see Figure 3–78).

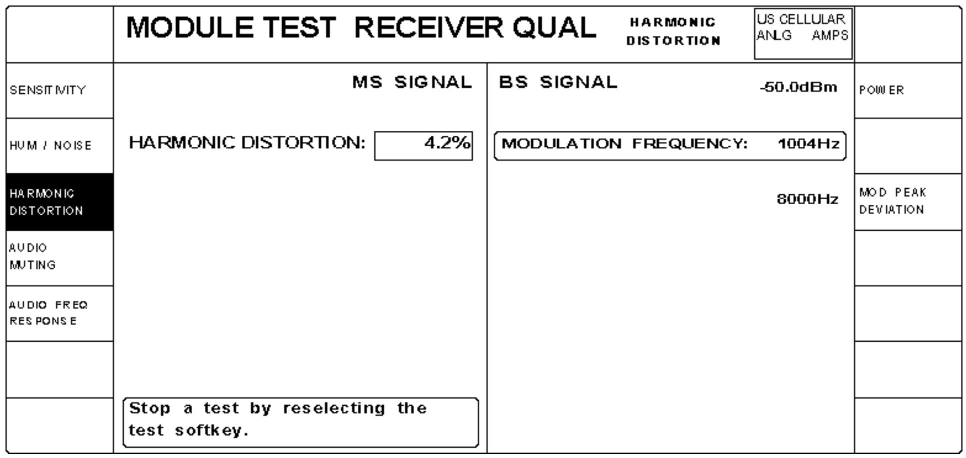


Figure 3–78: Analog module test receiver qual — harmonic distortion menu

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***NOTE**. You must turn off the mobile station's expandor when performing this test.*

A test result is highlighted if the harmonic distortion percentage exceeds the limit that you specified in the HARMONIC DISTORTION configuration menu (refer to *HARMONIC DISTORTION* on page 3–144).

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HARMONIC DISTORTION configuration menu.*

Refer to *HARMONIC DISTORTION* on page 3–78 for a detailed description of the menu items.

AUDIO MUTING. Press the AUDIO MUTING softkey to measure the audio muting parameters of the mobile receiver. The audio muting test measures how well the mobile receiver can mute the audio output (when required by the mobile station) so that the user does not hear unwanted noise. Measurements are displayed for the audio level reference, current audio level, and audio muting. See Figure 3–79.

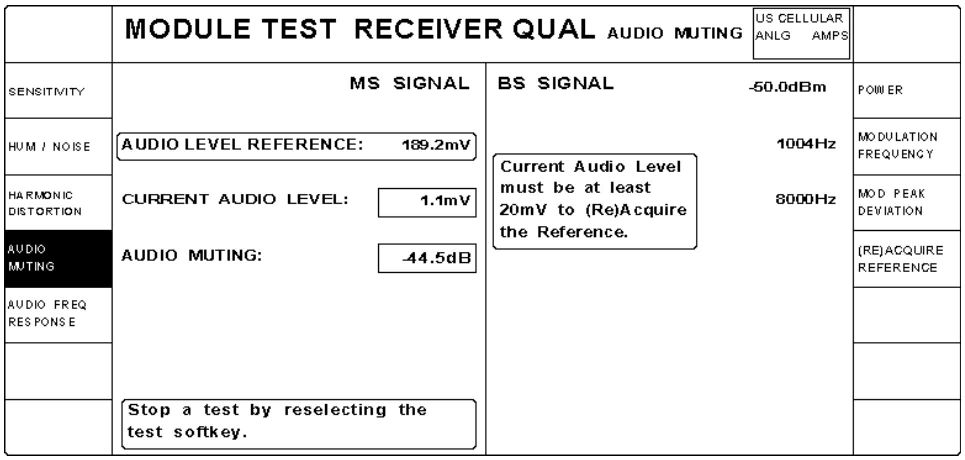


Figure 3–79: Analog module test receiver qual — audio muting menu

A test result is highlighted if the value of the measured parameter exceeds the limit that you specified for that parameter in the configuration menu (refer to *AUDIO MUTING* on page 3–145).

***NOTE**. Displays of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the AUDIO MUTING configuration menu.*

You can vary the following base station parameters while in the AUDIO MUTING test menu:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the power level of the audio frequency modulating tone (power level of the modulating frequency).

Press the (RE)ACQUIRE REFERENCE softkey to run the audio muting test again.

AUDIO FREQUENCY RESPONSE. Press the AUDIO FREQ RESPONSE softkey to measure the audio frequency response of the mobile receiver (see Figure 3–80).

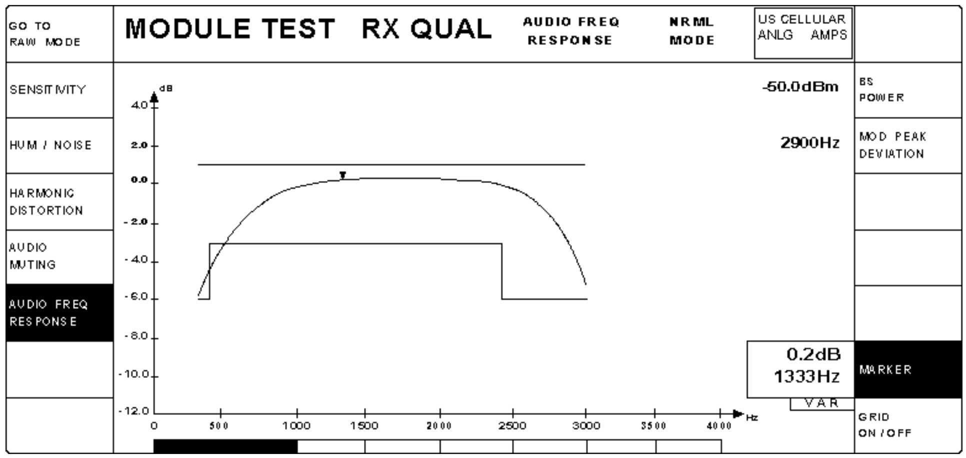


Figure 3–80: Analog module test rx qual — audio freq response (normal mode)

NOTE*. You must turn off the mobile station's expandor when performing this test.*

When you press the AUDIO FREQ RESPONSE softkey, the audio frequency response curve for the normal mode is plotted between the upper and lower limit lines. Frequencies of the response curve that are not within the limit lines are indicated in inverse video at the bottom of the display.

You set the upper limit line, lower limit line, and the number of points sampled in the configuration menu. Refer to *AUDIO FREQ RESPONSE* on page 3–147 for detailed information about the configuration menu.

Refer to *AUDIO FREQ RESPONSE* on page 3–79 for a detailed description of the menu items.

Press the GO TO RAW MODE softkey to measure the audio frequency response of the mobile receiver in the raw mode. When the tester measures the audio frequency response in the normal mode, a pre-emphasis filter is active and you can use the configuration menu to establish limit lines for the measurement. However, in the raw mode the tester takes the measurements without the pre-emphasis filter, and you cannot set limit lines for the measurement. See Figure 3–81.

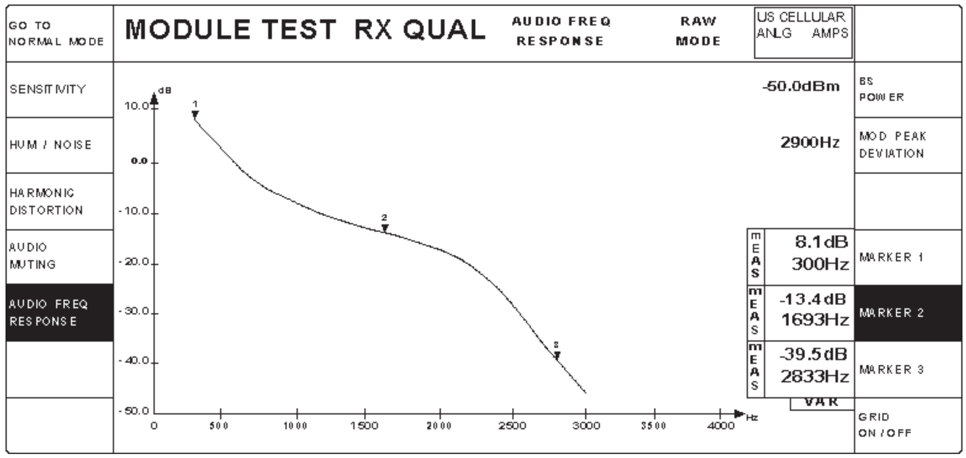


Figure 3–81: Analog module test rx qual — audio freq response (raw mode)

You use the AUDIO FREQUENCY RESPONSE (RAW MODE) configuration menu to set the beginning frequency, the ending frequency, and the number of points that are sampled (refer to *AUDIO FREQUENCY RESPONSE* on page 3–147).

Refer to page 3–81 for a detailed description of the menu items.

Press the GO TO NORMAL MODE softkey to return to the MODULE TEST RX QUAL — AUDIO FREQ RESPONSE (NRML MODE) menu.

Transmitter Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile transmitter. Select the transmitter test that you want to perform from the menu selections on the left side of the menu. See Figure 3–82.

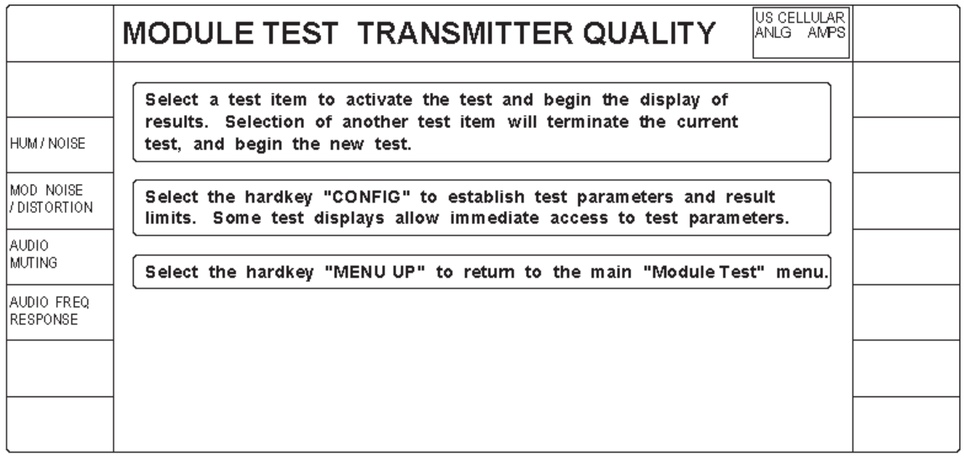


Figure 3–82: Analog module test transmitter quality menu

To perform mobile transmitter tests, your mobile station must be connected to the tester. Figure 3–58 on page 3–83 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, you can also press the CONFIG front-panel button to display the MODULE TEST TX QUAL CNFG menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel button to return to the MODULE TEST TRANSMIT QUAL test menu after making the configuration changes.

In some of the test menus, you can vary the base station and AF Generator parameters from within the test menu. The changes you make within the test menu change the initial settings you made in the associated configuration menu.

Since the analog manual tests for transmitter quality discussed earlier are similar to the analog module tests, you will be referred to those tests for menu descriptions. Only items unique to the analog module test are discussed in the following subsections.

The following text discusses each of the MODULE TEST TRANSMITTER QUALITY menu selections.

HUM/NOISE. Press the HUM/NOISE softkey to measure the hum/noise of the mobile transmitter and the audio peak deviation (see Figure 3–83).

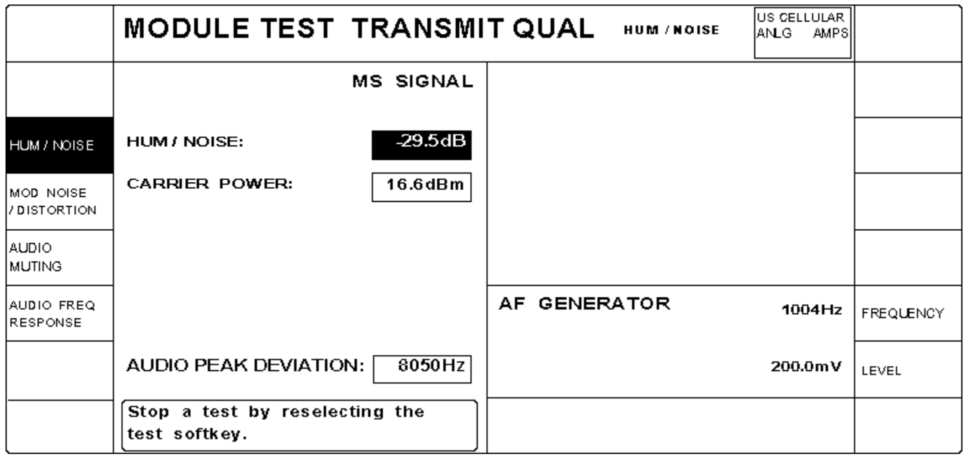


Figure 3–83: Analog module test transmit qual — hum/noise menu

A test result is highlighted if the value exceeds the hum/noise limit that you specified in the HUM/NOISE configuration menu (refer to *HUM/NOISE* on page 3–152). Also, the tester performs the hum/noise measurement only when the audio peak deviation is within the limits set in the HUM/NOISE configuration menu.

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the HUM/NOISE configuration menu.*

Refer to *HUM/NOISE* on page 3–83 for a detailed description of the menu items.

MOD NOISE/DISTORTION. Press the MOD NOISE/DISTORTION softkey to measure the modulation noise and distortion of the mobile transmitter and the audio peak deviation (see Figure 3–84).

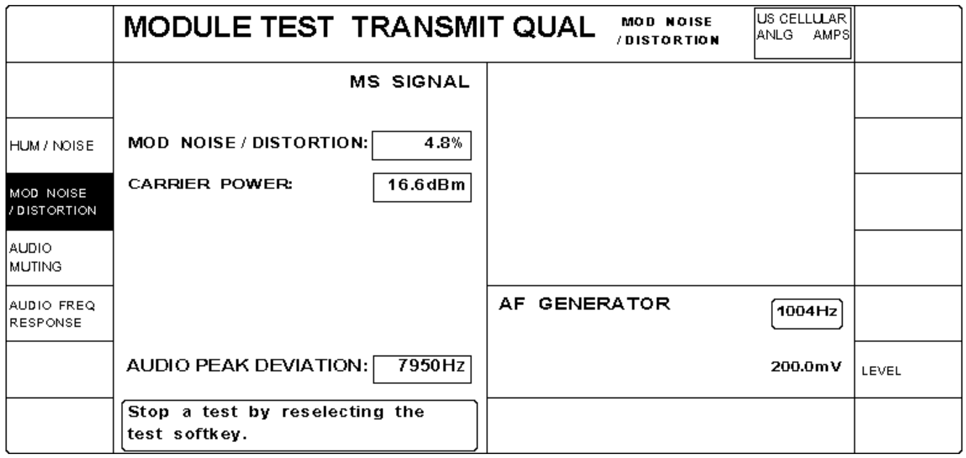


Figure 3–84: Analog module test transmit qual — mod noise/distortion

The modulation noise and distortion result is highlighted if the percentage of modulation noise and distortion exceeds the limit that you specified in the configuration menu (refer to *MOD NOISE/DISTORTION* on page 3–153). Also, the tester performs the modulation/distortion measurement only when the audio peak deviation is within the limits set in the MOD NOISE/DISTORTION configuration menu.

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the MOD NOISE/DISTORTION configuration menu.*

Refer to *MOD NOISE/DISTORTION* on page 3–85 for a detailed description of the menu items.

AUDIO MUTING. Press the AUDIO MUTING softkey to measure the audio muting of the mobile transmitter. The test measures how much the demodulated level is reduced when audio muting is activated during wideband data transmission periods. See Figure 3–85.

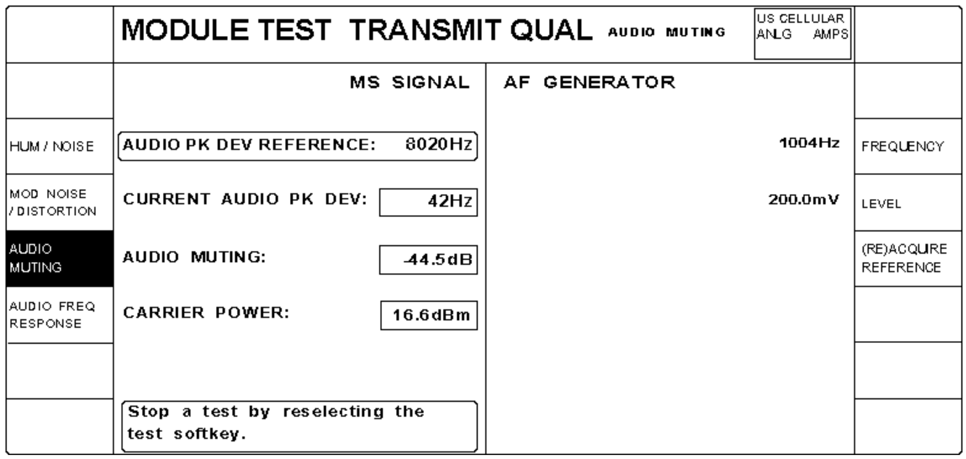


Figure 3–85: Analog module test transmit qual — audio muting

The audio muting result is highlighted if the level of audio muting exceeds the limit that you specified in the configuration menu (refer to *AUDIO MUTING* on page 3–154).

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the AUDIO MUTING configuration menu.*

While in this menu, you can change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off.

Press the (RE)ACQUIRE REFERENCE softkey to run the audio muting test again.

AUDIO FREQ RESPONSE. Press the AUDIO FREQ RESPONSE softkey to measure the audio frequency response of the mobile transmitter using the normal mode (see Figure 3–86).

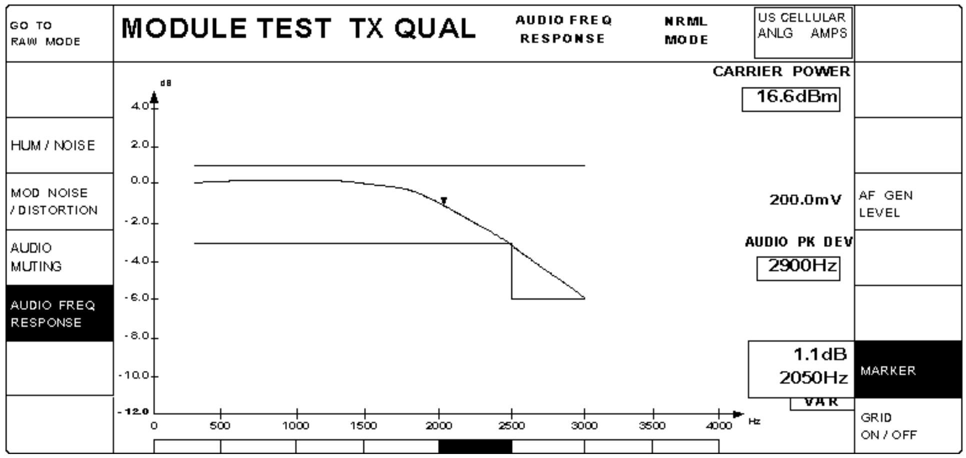


Figure 3–86: Analog module test tx qual — audio freq response (normal mode)

NOTE*. You must turn off the mobile station's compressor when performing this test.*

When you press the AUDIO FREQ RESPONSE softkey, the tester displays the audio frequency response curve plotted between the upper and lower limit lines. Frequencies of the response curve that are not within the limit lines are indicated in inverse video at the bottom of the display.

You use the configuration menu to set the upper limit line, lower limit line, and the number of points sampled. Refer to *AUDIO FREQUENCY RESPONSE* on page 3–156.

Refer to *AUDIO FREQ RESPONSE* on page 3–86 for a detailed description of the menu items.

Press the GO TO RAW MODE softkey to measure the audio frequency response of the mobile transmitter in the raw mode. When the tester measures the audio frequency response in the normal mode, a de-emphasis filter is active and you can use the configuration menu to establish limit lines for the measurement. However, in the raw mode, the tester takes the measurements without the de-emphasis filter, and you cannot set limit lines for the measurement. See Figure 3–87.

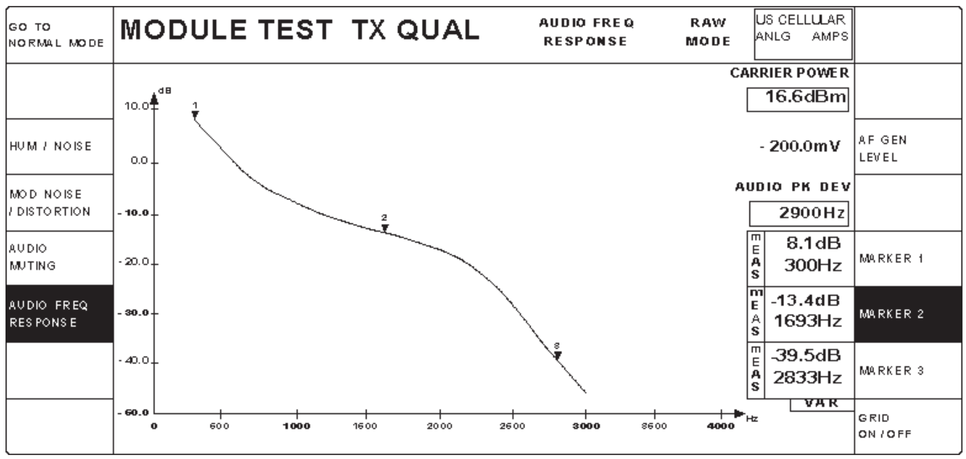


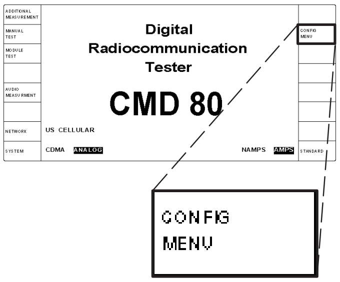
Figure 3–87: Analog module test tx qual — audio freq response (raw mode)

You use the AUDIO FREQUENCY RESPONSE (RAW MODE) configuration menu to set the beginning frequency, the ending frequency, the number of points that are sampled, and other parameters (refer to *AUDIO FREQ RESPONSE* on page 3–147).

Refer to *AUDIO FREQ RESPONSE* on page 3–86 for a detailed description of the menu items.

Press the GO TO NORMAL MODE softkey to return to the MODULE TEST TX QUAL — AUDIO FREQ RESPONSE (NRML MODE) menu.

Configuration



Press the CONFIG MENU softkey to display the CONFIGURATION MENU. See Figure 3–88.

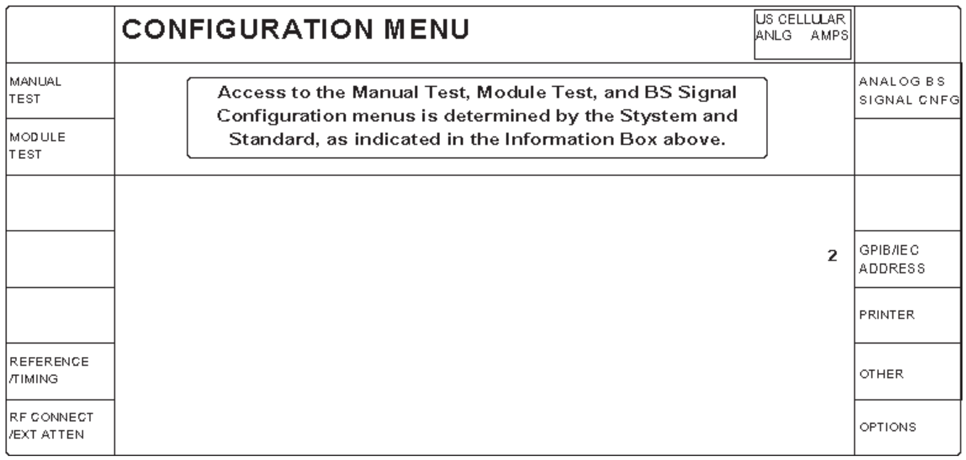


Figure 3–88: Analog configuration menu

Press the appropriate key for the specific item you want to configure. Some selections contain submenus (see the menu tree in Figure 3–89). Each softkey is described in the following subsection.

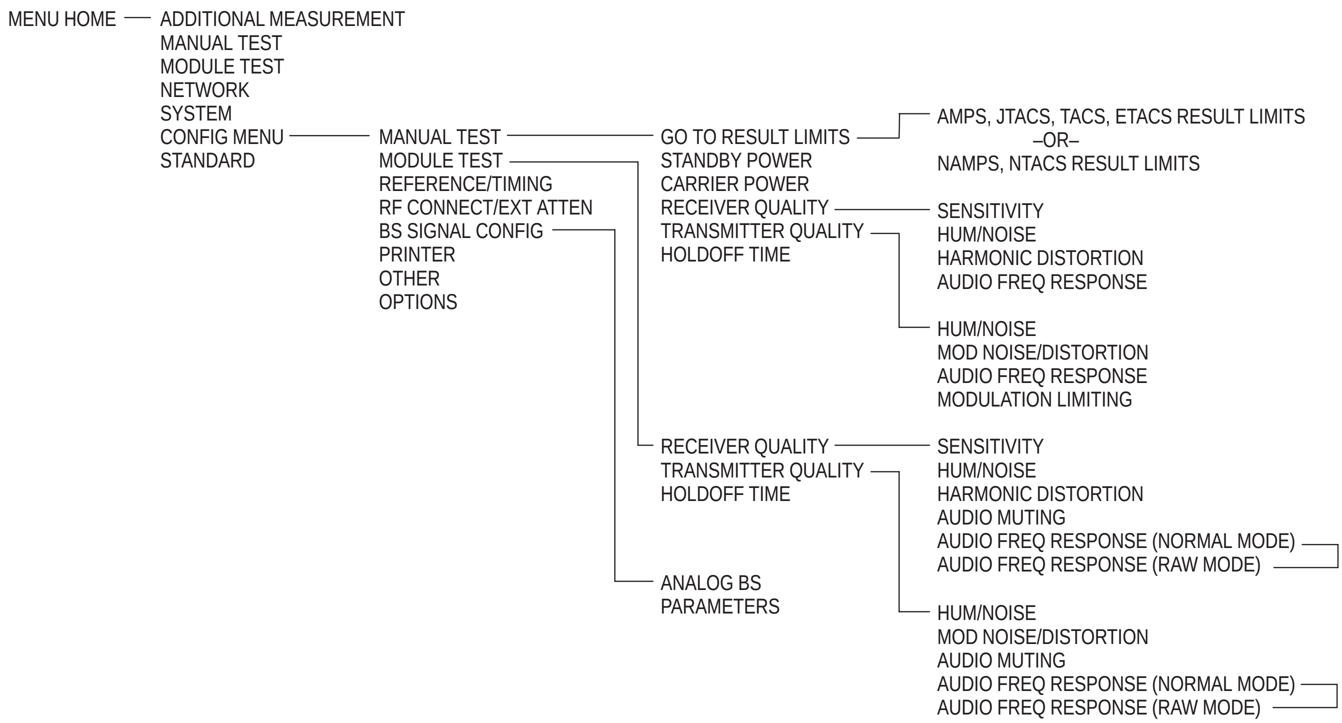


Figure 3–89: Analog configuration menu tree

Manual Test

Press this softkey to select the configuration menus for the manual tests. This subsection discusses the configuration options available when you have selected ANALOG as the system. See Figure 3–90.

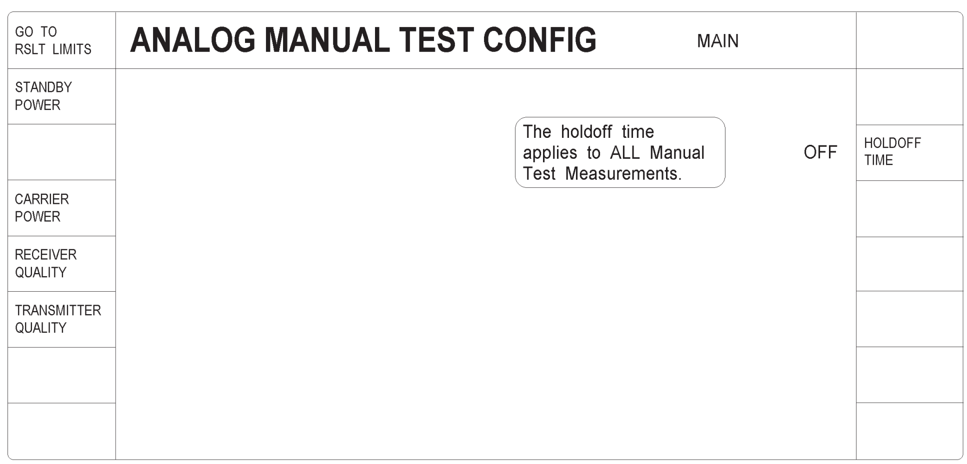


Figure 3–90: Analog manual test configuration menu

The following text discusses each of the ANALOG MANUAL TEST CON-FIGURATION menu selections.

GO TO RSLT LIMITS. Press this softkey to display the result limits menu. This menu will be slightly different depending on what system you are testing. AMPS, JTACS, TACS, and ETACS systems will display the menu shown in Figure 3–91, while NAMPS and NTACS systems will display the menu shown in Figure 3–92.

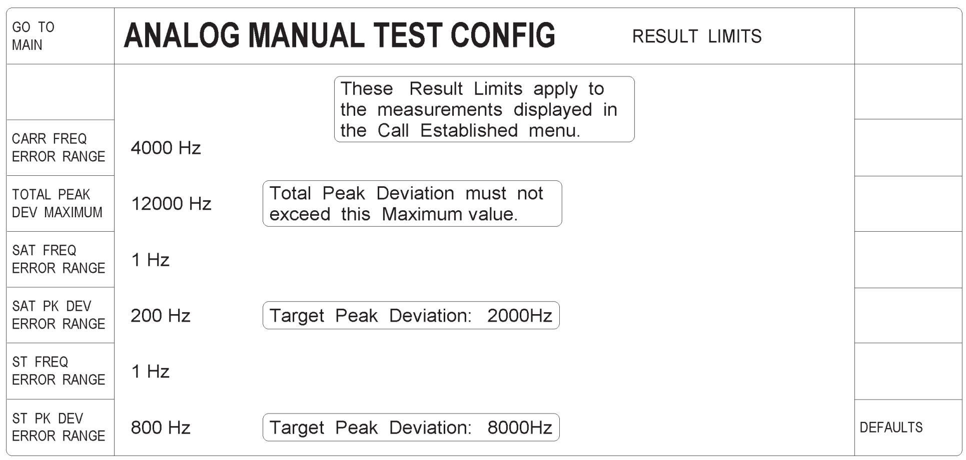


Figure 3–91: Analog result limits menu for AMPS, JTACS, TACS, and ETACS systems.

- Press the CARR FREQ ERROR RANGE softkey to set the error range for the carrier.
- Press the TOTAL PEAK DEV MAXIMUM softkey to set the maximum level for peak deviation. Total peak deviation must not exceed the level set here.
- Press the SAT FREQ ERROR RANGE softkey to set the error range for the Supervisory Audit Tone frequency.
- Press the SAT PK DEV ERROR RANGE softkey to set the error range for the Supervisory Audit Tone peak deviation.
- Press the ST FREQ ERROR RANGE softkey to set the error range for the Signaling Tone frequency.
- Press the ST PK DEV ERROR RANGE softkey to set the error range for the Signaling Tone peak deviation.

- Press the DEFAULTS softkey to set all the parameters to their preset conditions.

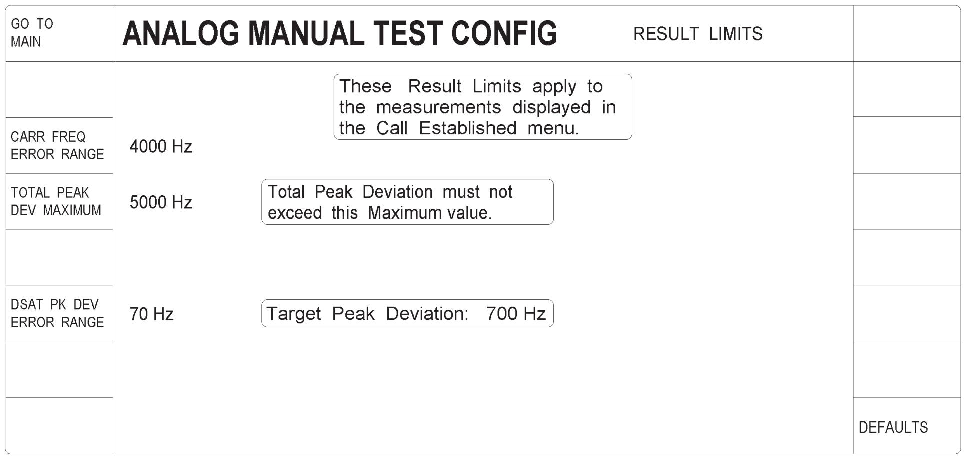


Figure 3–92: Analog result limits menu for NAMPS and NTACS systems.

- Press the CARR FREQ ERROR RANGE softkey to set the error range for the carrier.
- Press the TOTAL PEAK DEV MAXIMUM softkey to set the maximum level for peak deviation. Total peak deviation must not exceed the level set here.
- Press the DSAT PK DEV ERROR RANGE softkey to set the error range for the Digital Supervisory Audit Tone peak deviation.

STANDBY POWER. Press this softkey to display the standby power configuration menu. Use this menu to set the parameters that the tester uses when taking standby power measurements. See Figure 3–93.

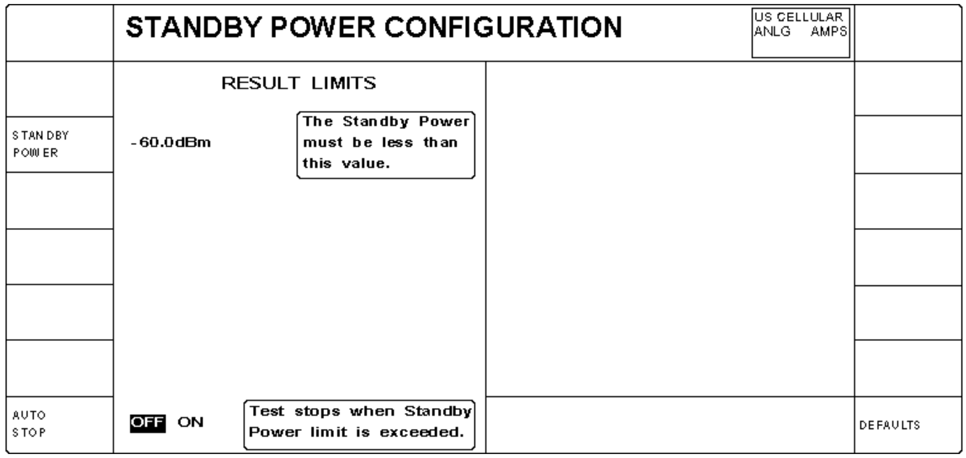


Figure 3–93: Analog standby power configuration menu

- Press the STANDBY POWER softkey to set the maximum limit of the standby power. The standby power is the power level of the mobile station when the transmitter is disabled while the mobile station is in the IDLE state.
- Press the AUTO STOP softkey to toggle the auto stop function on or off. If AUTO STOP is on, the test stops if the standby power exceeds the limit you set. Otherwise, the test runs continuously.
- Press the DEFAULTS softkey to set all the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

CARRIER POWER. Press the CARRIER POWER softkey to set the result limits for the carrier power (see Figure 3–94).

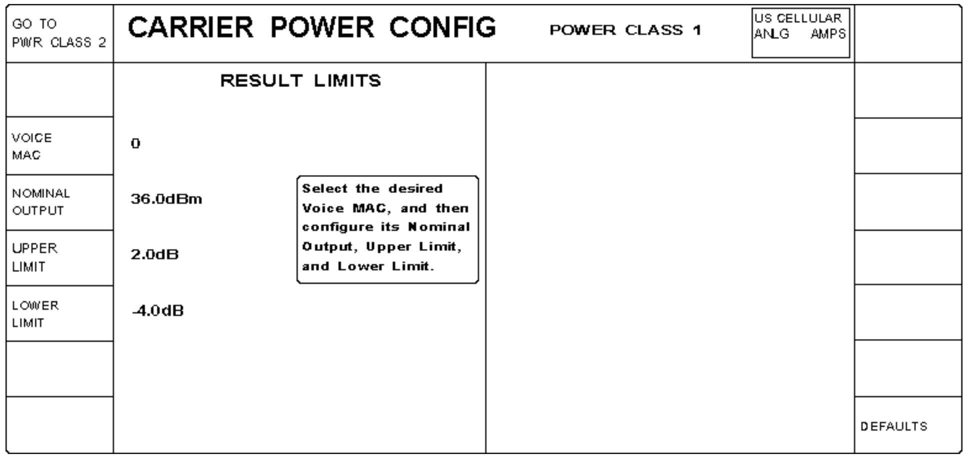


Figure 3–94: Analog carrier power configuration menu

You use this menu to set the following parameters for the carrier power:

- Press the VOICE MAC softkey to set the parameter for the voice mobile attenuation code. The voice MAC is a code sent by the base station to control the output power for voice transmissions. Each voice MAC has its own nominal output, upper limit, and lower limit to configure.
- Press the NOMINAL OUTPUT softkey to set the nominal carrier power value around which you will set upper and lower limits.
- Press the UPPER LIMIT softkey to set the upper limit for the carrier power.
- Press the LOWER LIMIT softkey to set the lower limit for the carrier power.
- Press the DEFAULTS softkey to set all the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

Press the GO TO POWER CLASS … to cycle through menus for each of the power classes.

RECEIVER QUALITY. Press the RECEIVER QUALITY softkey to display the RECEIVER QUALITY CONFIGURATION menu, which has selections that you use to set parameters for the various receiver quality tests. See Figure 3–95.

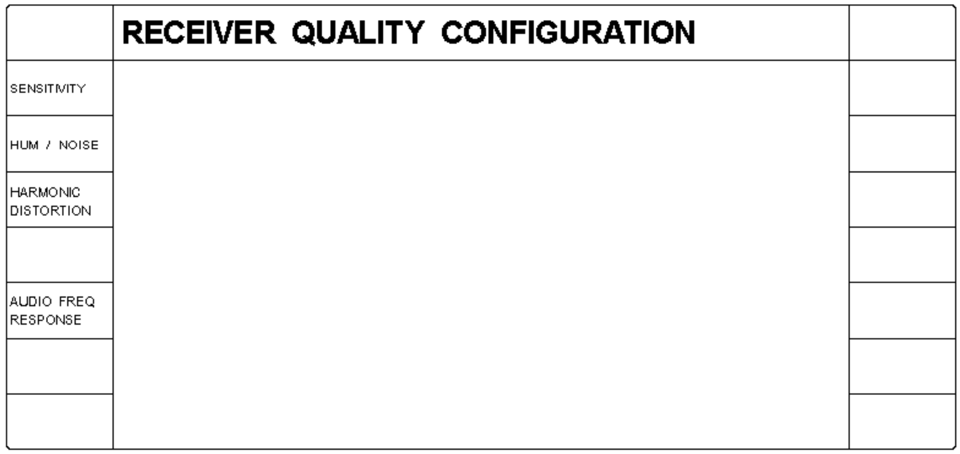


Figure 3–95: Analog receiver quality configuration menu

Each of the RECEIVER QUALITY CONFIGURATION menu choices is discussed in the following text.

- **SENSITIVITY.** Press the SENSITIVITY softkey to display the SENSITIVITY menu. See Figure 3–96. Use this menu to set the parameters for the RECEIVER QUALITY SENSITIVITY test.

  You can set the following test parameters:

  - SINAD. Press the SINAD softkey to set the lower limit for the SINAD.
  - SINAD average count. Press the SINAD AVG COUNT softkey to set how many readings the tester will average to determine the SINAD value. The count value can be from 1 to 100.
  - Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the SINAD value is less than the value you set. Otherwise, the test runs continuously.

  You can also set the following base station signal parameters from within this menu:

  - Power. Press the POWER softkey to set the level of the base station transmitter power.
  - Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

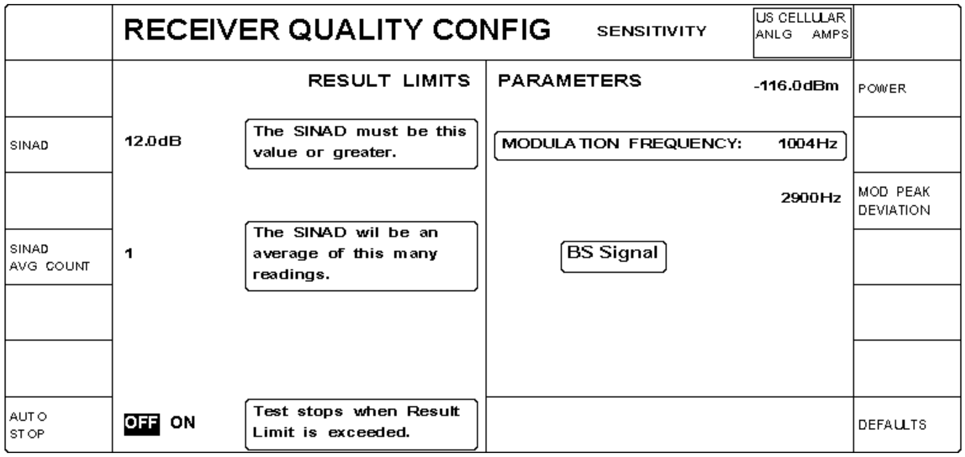


Figure 3–96: Analog receiver quality configuration — sensitivity menu

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **HUM/NOISE.** Press the HUM/NOISE softkey to display the HUM/NOISE menu. See Figure 3–97. Use this menu to set the parameters for the RECEIVER QUALITY HUM/NOISE test.

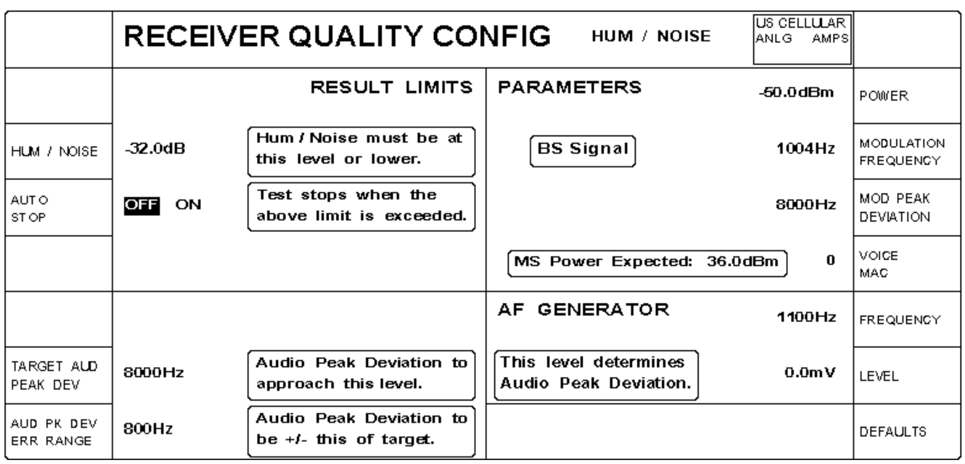


Figure 3–97: Analog receiver quality configuration — hum/noise menu

You can set the following test parameters:

- Hum/Noise. Press the HUM/NOISE softkey to set the maximum test limit for the hum/noise level.

- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the hum/noise level is greater than the value you set. Otherwise, the test runs continuously.

***NOTE**. Use the TARGET AUD PEAK DEV and AUDIO PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the hum/noise measurement.*

- Target audio peak deviation. Press the TARGET AUD PEAK DEVIATION softkey to set the desired audio peak deviation.
- Audio peak deviation error range. Press the AUDIO PK DEV ERR RANGE softkey to set the allowable deviation (±) from the target audio peak deviation value.

Within this menu you can also set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **HARMONIC DISTORTION.** Press the HARMONIC DISTORTION softkey to display the HARMONIC DISTORTION menu. See Figure 3–98. You use the selections in this menu to set the parameters for the RECEIVER QUALITY HARMONIC DISTORTION test.

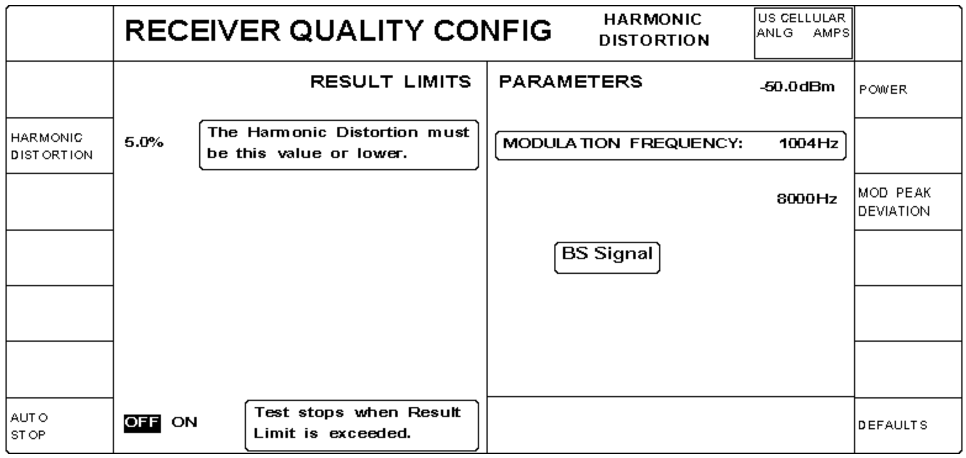


Figure 3–98: Analog receiver quality configuration — harmonic distortion menu

You can set the following test parameters:

- Harmonic Distortion. Press the HARMONIC DISTORTION softkey to set the maximum test limit for the harmonic distortion level.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the harmonic distortion level is greater than the value you set. Otherwise, the test runs continuously.

Within this menu you can also set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **AUDIO FREQ RESPONSE.** Press the AUDIO FREQ RESPONSE softkey to set the parameters for measuring the audio frequency response of the mobile receiver in either the NORMAL MODE or the RAW MODE. See Figure 3–99.

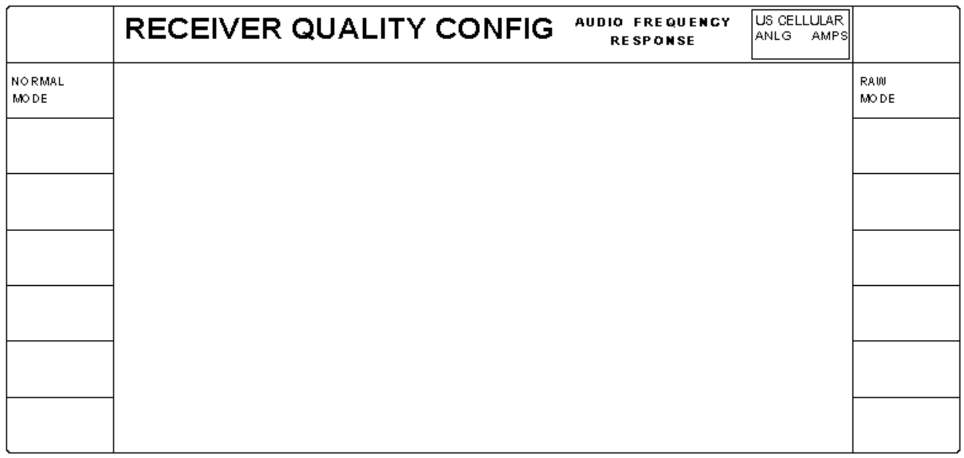


Figure 3–99: Analog receiver quality configuration — audio frequency response menu

When the tester measures the audio frequency response in the normal mode, a pre-emphasis filter is active and you can establish limit lines for the measurement. In the raw mode, the tester takes the measurements without the pre-emphasis filter, and you cannot set limit lines for the measurement.

Press the NORMAL MODE softkey to set the parameters for the NORMAL MODE (see Figure 3–100).

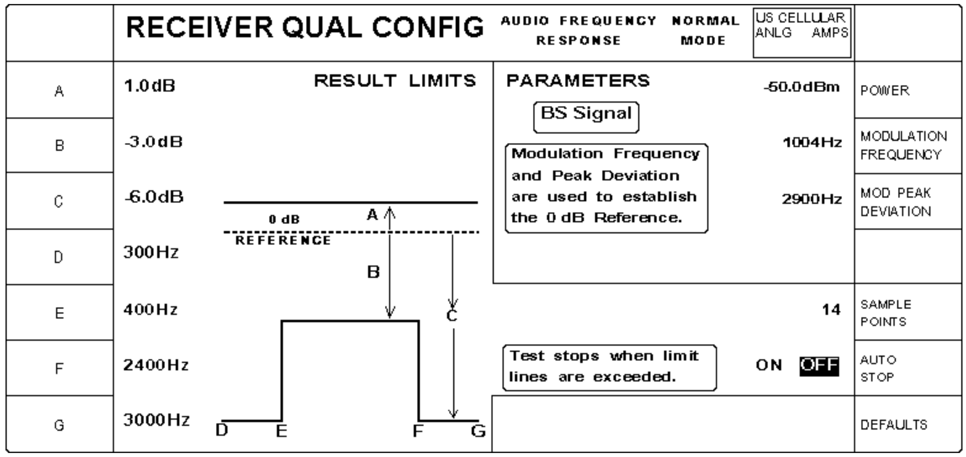


Figure 3–100: Analog receiver qual configuration — audio frequency response (normal mode) menu

You use the softkeys on the left side of the menu to set the result limits. The lower limit line is defined by three sections (see Figure 3–100):

- Press the D softkey to set the start frequency.
- Press the E softkey to set the end of the first section (D to E).
- Press the F softkey to set the end of the second section (E to F).
- Press the G softkey to set the end of the third section (F to G).

The levels for each section are set as follows (see Figure 3–100):

- Press A to set the level for the upper limit line (D to G).
- Press the B softkey to set the level for the lower limit line, section E to F.
- Press the C softkey to set the level for the lower limit line, sections D to E and F to G.

Within the AUDIO FREQUENCY RESPONSE (NORMAL MODE) menu, you can set the following base station parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.

- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

Press the SAMPLE POINTS softkey to select the number of points that are sampled when the tester takes the audio frequency response measurements.

Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the audio frequency response exceeds the limits that you set. Otherwise, the test runs continuously.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

Press the MENU UP front-panel button to return to the RECEIVER QUALITY CONFIG — AUDIO FREQUENCY RESPONSE menu (see Figure 3–99 on page 3–127).

Press the RAW MODE softkey (see Figure 3–99 on page 3–127) to set the parameters for the RAW MODE. See Figure 3–101.

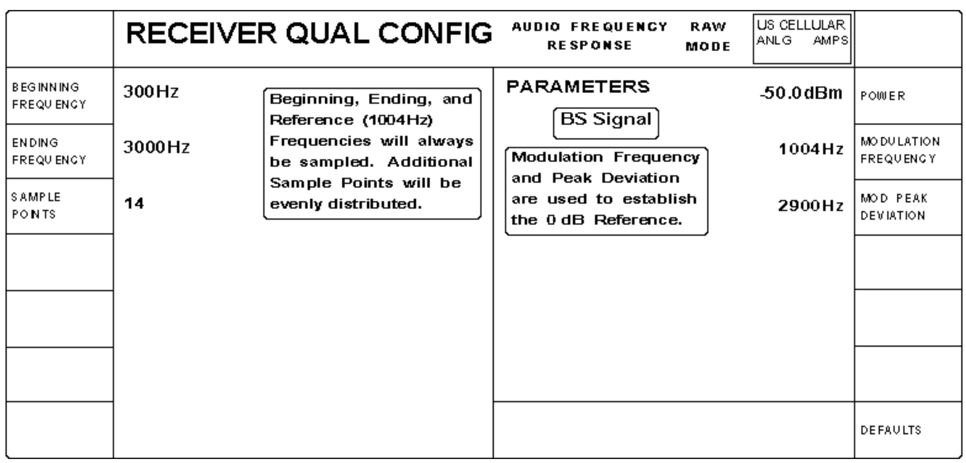


Figure 3–101: Analog receiver qual configuration — audio frequency response (raw mode) menu

Use the softkeys on the left side to set the following:

- Press the BEGINNING FREQUENCY softkey to set the start frequency.
- Press the ENDING FREQUENCY softkey to set the end frequency.

- Press the SAMPLE POINTS softkey to select the number of points that are sampled when the tester takes the audio frequency response measurements.

Within the AUDIO FREQUENCY RESPONSE (RAW MODE) menu, you can set the following base station parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

Press the MENU UP front-panel button to return to the RECEIVER QUALITY CONFIG — AUDIO FREQUENCY RESPONSE menu (see Figure 3–99 on page 3–127).

TRANSMITTER QUALITY. Press the TRANSMITTER QUALITY softkey (see Figure 3–90 on page 3–118) to display the TRANSMITTER QUALITY CONFIGURATION menu, which has selections that you use to set parameters for the various transmitter quality tests. See Figure 3–102.

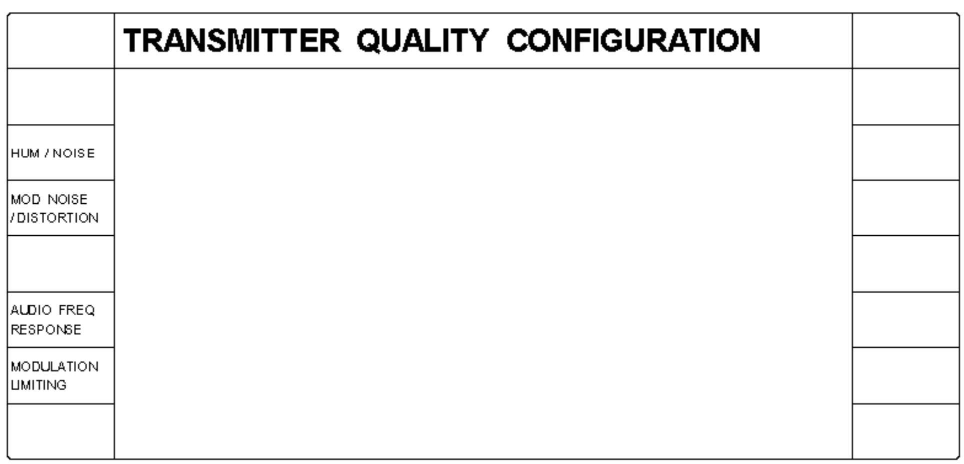


Figure 3–102: Analog transmitter quality configuration menu

Each of the TRANSMITTER QUALITY CONFIGURATION menu choices is discussed in the following text.

- **HUM/NOISE.** Press the HUM/NOISE softkey to display the HUM/NOISE menu. See Figure 3–103. Use this menu to set the parameters for the TRANSMITTER QUALITY HUM/NOISE test.

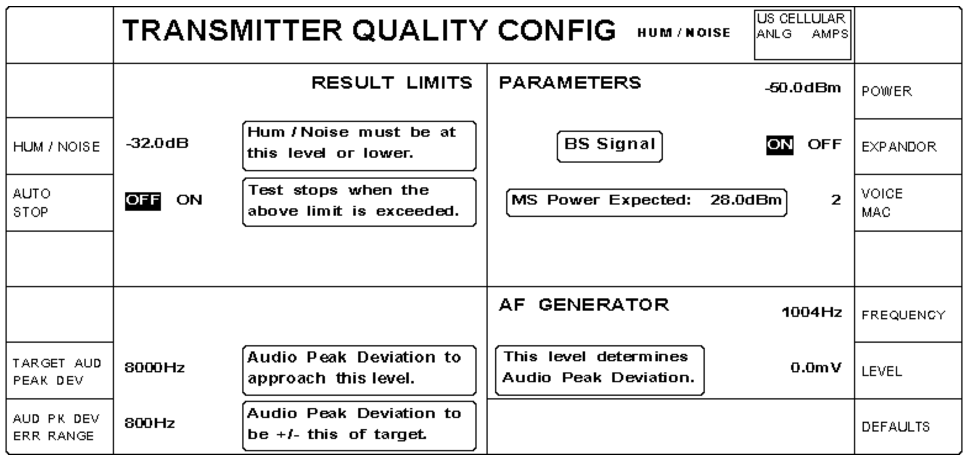


Figure 3–103: Analog transmitter quality configuration — hum noise menu

You can set the following test parameters:

- Hum/Noise level. Press the HUM/NOISE softkey to set the maximum test limit for the hum/noise level.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the hum/noise level exceeds the value that you set. Otherwise, the test runs continuously.

NOTE*. Use the TARGET AUD PEAK DEV and AUDIO PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the hum/noise measurement.*

- Target audio peak deviation. Press the TARGET AUD PEAK DEV softkey to set the desired audio peak deviation.
- Audio peak deviation error range. Press the AUDIO PK DEV ERR RANGE softkey to set the allowable deviation (±) from the target audio peak deviation value.

Within this menu you can set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Expandor. This is an audio signal-processing function that increases the dynamic range of the audio signal. For every 1 dB change in input level to the expandor, the change in output level is a nominal 2 dB. Press the EXPANDOR softkey to toggle the expandor function on or off.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator.
- Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. You can adjust the level to achieve the audio peak deviation target value that is displayed in the menu.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **MOD NOISE/DISTORTION.** Press the MOD NOISE/DISTORTION softkey to display the MODULATION NOISE/DISTORTION menu. See Figure 3–104. Use this menu to set the parameters for the TRANSMITTER QUALITY MOD NOISE/DISTORTION test.

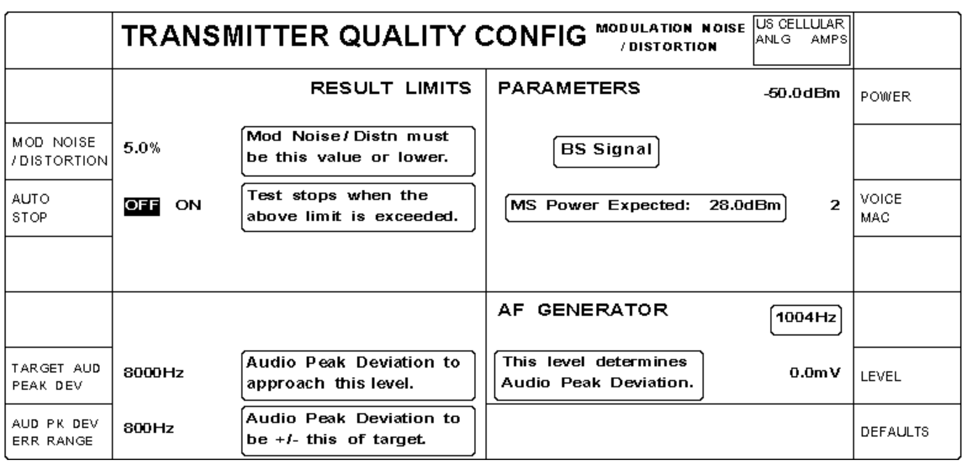


Figure 3–104: Analog transmitter quality configuration — modulation noise/distortion menu

You can set the result limits for the following test parameters:

- Modulation noise/distortion level. Press the MOD NOISE/DISTORTION softkey to set the maximum test limit for the modulation noise/distortion level.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the modulation noise/distortion level exceeds the value that you set. Otherwise, the test runs continuously.

***NOTE**. Use the TARGET AUD PEAK DEV and AUDIO PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the mod noise distortion measurement.*

- Target audio peak deviation. Press the TARGET AUD PEAK DEV softkey to set the desired audio peak deviation.
- Audio peak deviation error range. Press the AUDIO PK DEV ERR RANGE softkey to set the allowable deviation (±) from the target audio peak deviation value.

Within this menu you can set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

Press the LEVEL softkey to adjust the level of the internal AF Generator. You can adjust the level to achieve the audio peak deviation target value that is displayed in the menu. You can also use this softkey to turn off the AF Generator.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **AUDIO FREQ RESPONSE.** Press the AUDIO FREQ RESPONSE softkey to set the parameters for measuring the audio frequency response of the mobile transmitter in either the NORMAL MODE or the RAW MODE. See Figure 3–105.

  When the tester measures the audio frequency response in the normal mode, a de-emphasis filter is active and you can establish limit lines for the measurement. In the raw mode, the tester takes the measurements without the de-emphasis filter, and you cannot set limit lines for the measurement.

Figure 3–105: Analog transmitter quality configuration — audio frequency response menu

Press the NORMAL MODE softkey to set the result limits for the NORMAL MODE (see Figure 3–106).

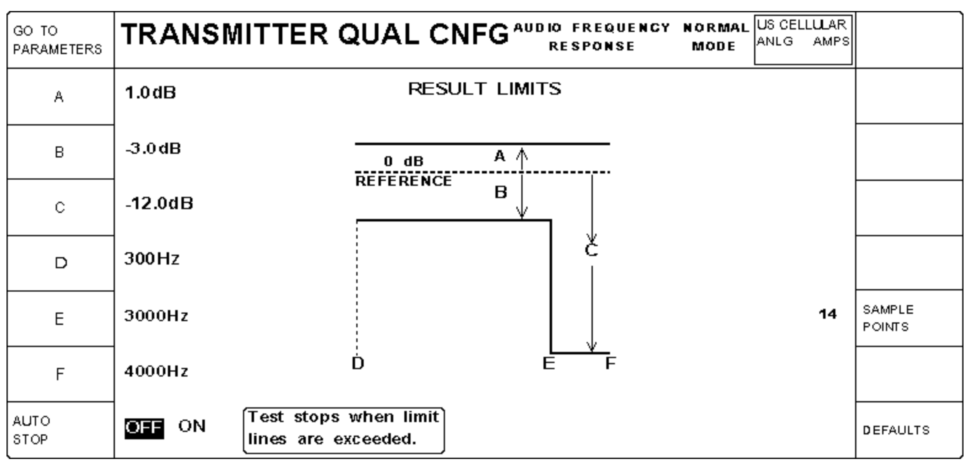


Figure 3–106: Transmitter qual configuration — audio frequency response (normal mode) result limits menu

Press the D softkey to set the start frequency of the limit lines, and press the F softkey to set the end frequency of the limit lines.

Press the A softkey to set the level for the upper limit line.

The lower limit line contains two sections. Press E to set the transition frequency (frequencies D to E, and E to F). Press the B softkey to set the level for the first section of the lower limit line. Press C to set the level for the second section of the lower limit line.

Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the audio frequency response exceeds the limit lines. Otherwise, the test runs continuously.

Press the SAMPLE POINTS softkey to select the number of points that are sampled when the tester takes the test measurements.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

Press the GO TO PARAMETERS softkey to set the parameters for the AUDIO FREQUENCY RESPONSE (NORMAL MODE). See Figure 3–107.

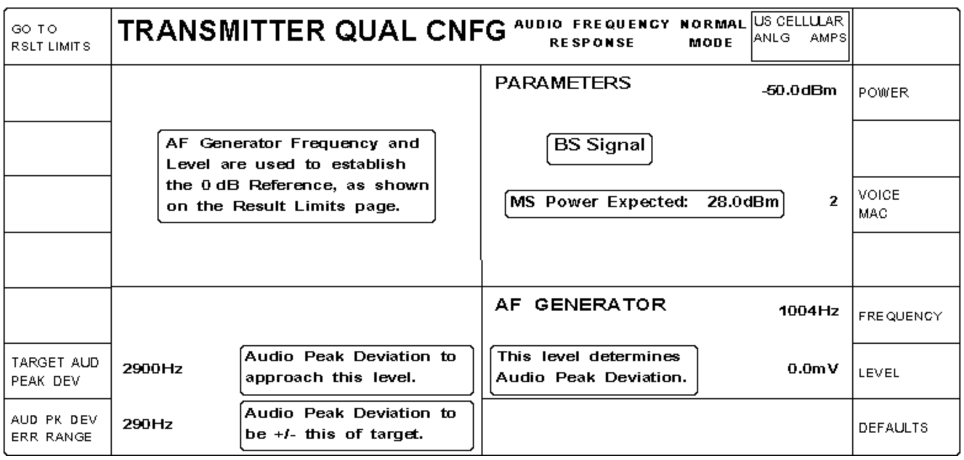


Figure 3–107: Analog transmitter qual configuration — audio frequency response (normal mode) parameters menu

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***NOTE**. Use the TARGET AUD PEAK DEV and AUD PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the audio frequency response measurement.*

Press the TARGET AUD PEAK DEV softkey to set the target value for the audio peak deviation. This is the target peak deviation at the frequency you specify with the AF Generator FREQUENCY softkey.

Press the AUD PK DEV ERR RANGE softkey to set the amount of audio peak deviation error that is acceptable for your test.

Within this menu you can set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator. This sets the frequency of the reference point for this measurement.
- Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. You can adjust the level to achieve the audio peak deviation target value that is displayed in the menu.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

Press the GO TO RSLT LIMITS softkey to return to the RESULT LIMITS menu (see Figure 3–106 on page 3–134); press the MENU UP front-panel button to display the TRANSMITTER QUALITY CONFIG — AUDIO FREQUENCY RESPONSE menu (see Figure 3–105 on page 3–134).

From the TRANSMITTER QUALITY CONFIG — AUDIO FREQUENCY RESPONSE menu (see Figure 3–105 on page 3–134), press the RAW MODE softkey to set the parameters for measuring the audio frequency response of the mobile transmitter in the raw mode. See Figure 3–108.

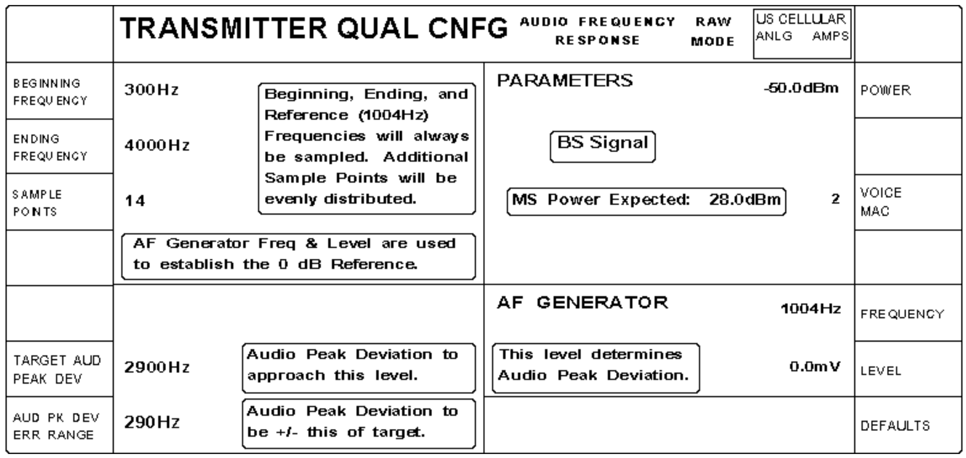


Figure 3–108: Analog transmitter qual configuration — audio frequency response (raw mode) menu

Use the softkeys on the left side to set the following:

- Press the BEGINNING FREQUENCY softkey to set the start frequency.
- Press the ENDING FREQUENCY softkey to set the end frequency.
- Press the SAMPLE POINTS softkey to select the number of points that are sampled when the tester takes the audio frequency response measurements.

***NOTE**. Use the TARGET AUD PEAK DEV and AUD PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the audio frequency response measurement.*

- Press the TARGET AUD PEAK DEV softkey to set the target value for the audio peak deviation. This is the target peak deviation at the frequency you specify with the AF Generator FREQUENCY softkey.
- Press the AUD PK DEV ERR RANGE softkey to set the amount of audio peak deviation error that is acceptable for your test.

Within the AUDIO FREQUENCY RESPONSE (RAW MODE) menu, you can set the following base station parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the internal AF Generator. This sets the frequency of the reference point for this measurement.
- Press the LEVEL softkey to adjust the level of the internal AF Generator or to turn it off. You can adjust the level to achieve the audio peak deviation value that you want.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

Press the MENU UP front-panel button to return to the RECEIVER QUALITY CONFIG — AUDIO FREQUENCY RESPONSE menu (see Figure 3–105 on page 3–134).

- **MODULATION LIMITING.** Press the MODULATION LIMITING softkey to display the TRANSMITTER QUALITY CONFIG MODULATION LIMITING menu. See Figure 3–109. Use this menu to set the result limits and parameters for the MODULATION LIMITING test.

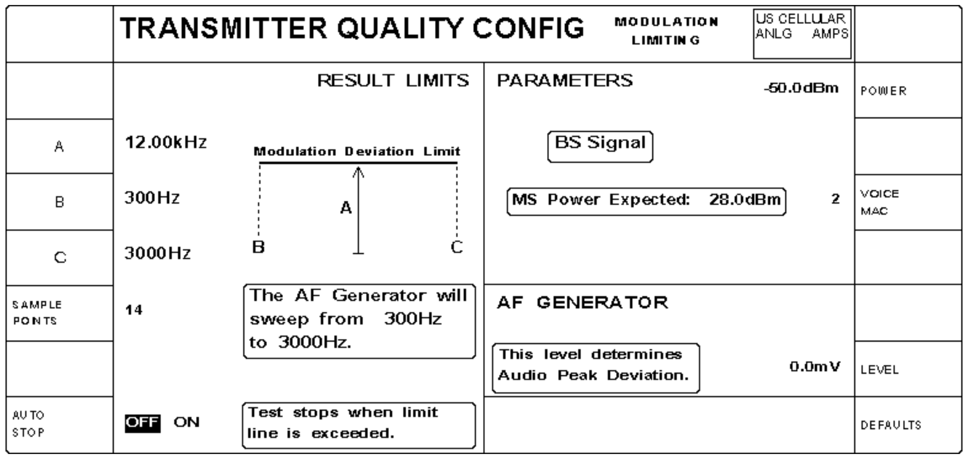


Figure 3–109: Analog transmitter quality configuration — modulation limiting menu

You can set the following result limits:

- A. Press the A softkey to set the audio peak deviation (modulation) limit for the test.
- B. Press the B softkey to set the starting frequency.
- C. Press the C softkey to set the ending frequency.
- Sample points. Press the SAMPLE POINTS softkey to select the number of points that are sampled when the tester takes the test measurements.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the audio peak deviation exceeds the modulation limit value that you set. Otherwise, the test runs continuously.

Within this menu you can set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.

Press the LEVEL softkey to adjust the level of the internal AF Generator. You can adjust the level to achieve the audio peak deviation value that you want. You can also use this softkey to turn off the AF Generator.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

HOLDOFF TIME. Press the HOLDOFF TIME softkey (see Figure 3–90 on page 3–118) to set a time delay between the start (or change) of an audio source and the acquisition of measurement data. This allows the transients induced in the mobile station by changes in the audio source to settle before data is accumulated.

Module Test

Press this softkey to display a menu with selections that you use to set parameters for tests done while in the ANALOG MODULE TEST mode. See Figure 3–110. The following text discusses the ANALOG MODULE TEST CONFIGURATION menu selections.

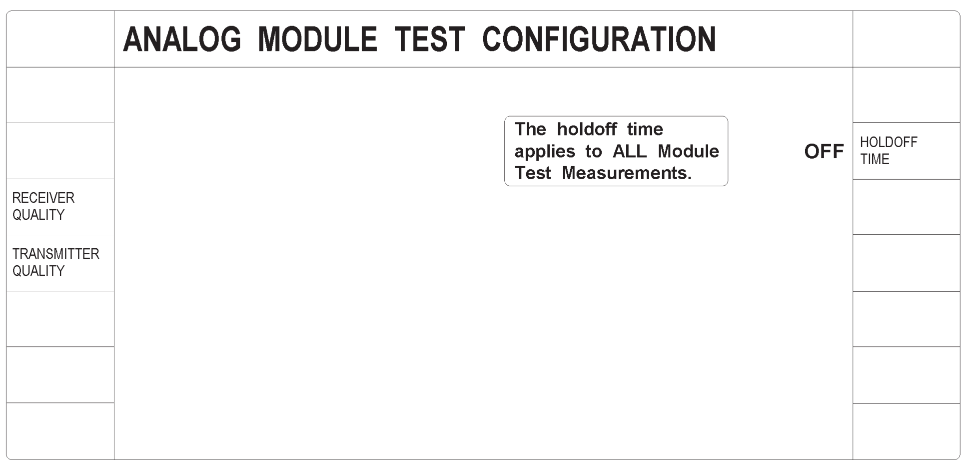


Figure 3–110: Analog module test configuration menu

RECEIVER QUALITY. Press the RECEIVER QUALITY softkey to display the RECEIVER QUALITY CONFIGURATION menu (see Figure 3–111). Select the test whose parameters you want to configure from the menu selections on the left side of the menu. Since the configuration menus for analog manual tests are similar to the configuration menus for the analog module tests, you will be referenced to the analog manual test configuration menus for menu descriptions. Only items unique to the configuration menus for analog module tests are discussed in the following subsections.

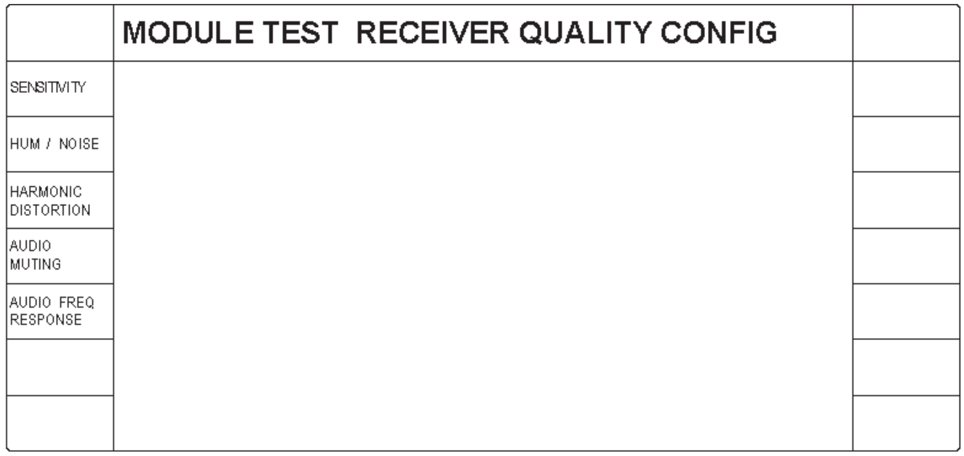


Figure 3–111: Analog module test receiver quality configuration menu

The following text discusses each of the MODULE TEST RECEIVER QUALITY CONFIG menu choices.

- **SENSITIVITY.** Press the SENSITIVITY softkey to display the SENSITIVITY menu (see Figure 3–112). Use this menu to set the parameters for the MODULE TEST RECEIVER QUAL SENSITIVITY test.

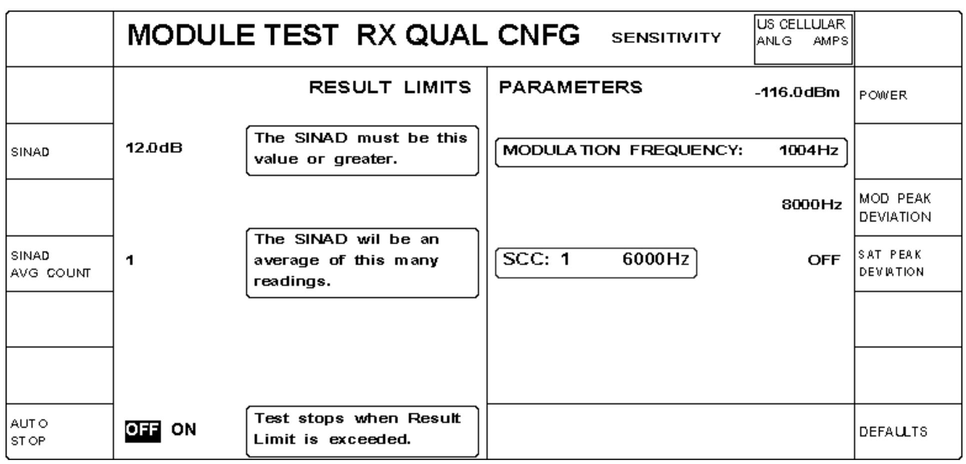


Figure 3–112: Analog module test rx qual configuration — sensitivity menu

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *SENSITIVITY* on page 3–123 for a description of the other items in this menu.

- **HUM/NOISE.** Press the HUM/NOISE softkey to display the HUM/NOISE menu. See Figure 3–113. Use this menu to set the parameters for the MODULE TEST RECEIVER QUAL HUM/NOISE test.

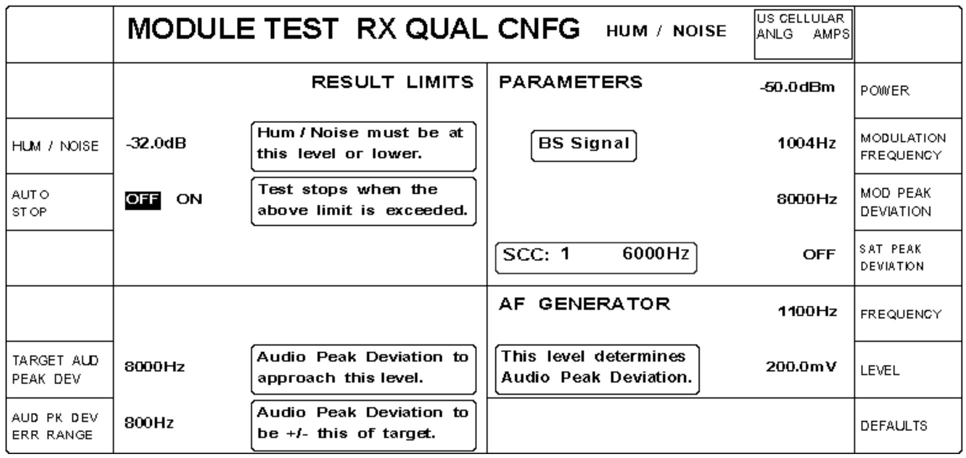


Figure 3–113: Analog module test rx qual configuration — hum/noise menu

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.

- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *HUM/NOISE* on page 3–124 for a description of the other items in this menu.

- **HARMONIC DISTORTION.** Press the HARMONIC DISTORTION softkey to display the HARMONIC DISTORTION menu (see Figure 3–114). You use the selections in this menu to set the parameters for the MODULE TEST RECEIVER QUAL HARMONIC DISTORTION test.

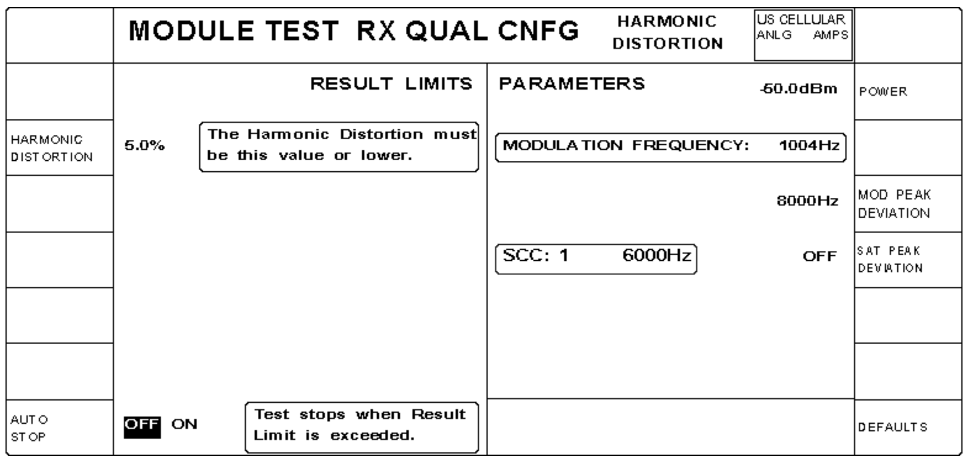


Figure 3–114: Analog module test rx qual configuration — harmonic distortion menu

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *HARMONIC DISTORTION* on page 3–126 for a description of the other items in this menu.

- **AUDIO MUTING.** Press the AUDIO MUTING softkey to display the AUDIO MUTING menu. See Figure 3–115. You use the selections in this menu to set the parameters for the audio muting test.

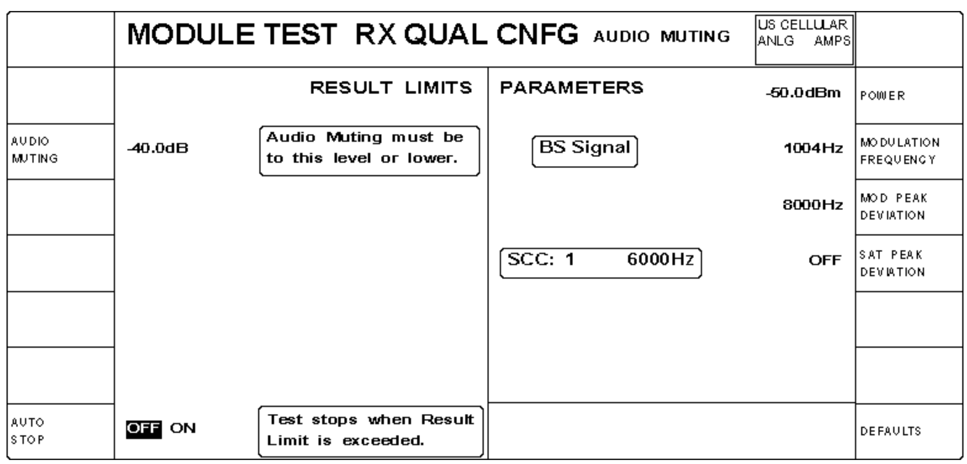


Figure 3–115: Analog module test rx qual configuration — audio muting menu

You can set the following test limits:

- Audio muting. Press the AUDIO MUTING softkey to set the maximum test limit for the audio muting level.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the audio muting level is greater than the value you set. Otherwise, the test runs continuously.

Within this menu you can also set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Modulation frequency. Press the MODULATION FREQUENCY softkey to set the audio frequency of the signal that modulates the base station carrier.
- Modulation peak deviation. Press the MOD PEAK DEVIATION softkey to set the deviation used to modulate the test tone in the RF output of the tester. You can also use this softkey to turn off the modulation peak deviation.
- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

- **AUDIO FREQ RESPONSE.** Press the AUDIO FREQ RESPONSE softkey to set the parameters for measuring the audio frequency response of the mobile receiver in either the NORMAL MODE or the RAW MODE (see Figure 3–116).

  When the tester measures the audio frequency response in the normal mode, a pre-emphasis filter is active and you can establish limit lines for the measurement. In the raw mode, the tester takes the measurements without the pre-emphasis filter, and you cannot set limit lines for the measurement.

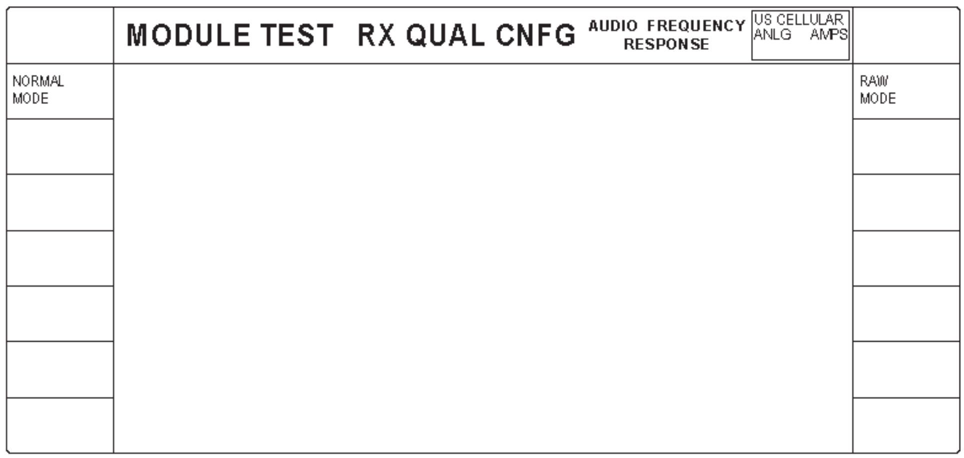


Figure 3–116: Analog module test rx qual configuration — audio frequency response menu

Press the NORMAL softkey to set the parameters for measuring the audio frequency response of the mobile receiver in the normal mode (see Figure 3–117).

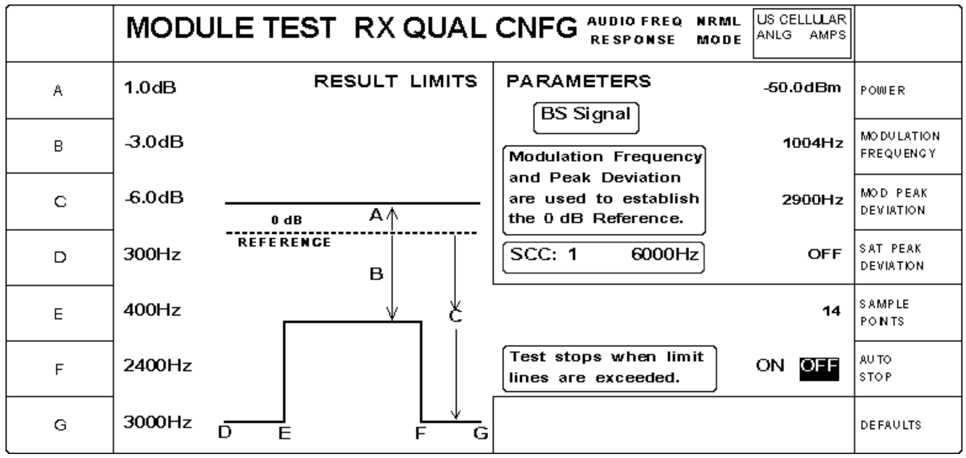


Figure 3–117: Analog module test rx qual configuration — audio freq response (normal mode)

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *AUDIO FREQ RESPONSE* on page 3–127 for a description of the other items in this menu.

Press the RAW MODE softkey (see Figure 3–116 on page 3–147) to set the parameters for measuring the audio frequency response of the mobile receiver in the raw mode (see Figure 3–118).

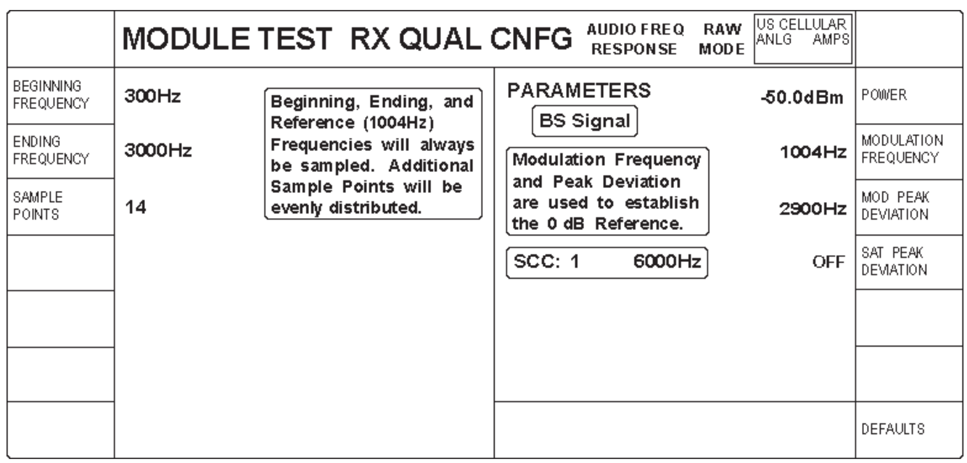


Figure 3–118: Analog module test rx qual configuration — audio freq response (raw mode)

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.

- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.

- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *AUDIO FREQ RESPONSE* on page 3–127 for a description of the other items in this menu.

TRANSMITTER QUALITY. Press the TRANSMITTER QUALITY softkey to display the TRANSMITTER QUALITY CONFIGURATION menu (see Figure 3–119). Select the test whose parameters you want to configure from the menu selections on the left side of the menu. Since the configuration menus for analog manual tests are similar to the configuration menus for the analog module tests, you will be referred to the analog manual test configuration menus for menu descriptions. Only items unique to the configuration menus for analog module tests are discussed in the following subsections.

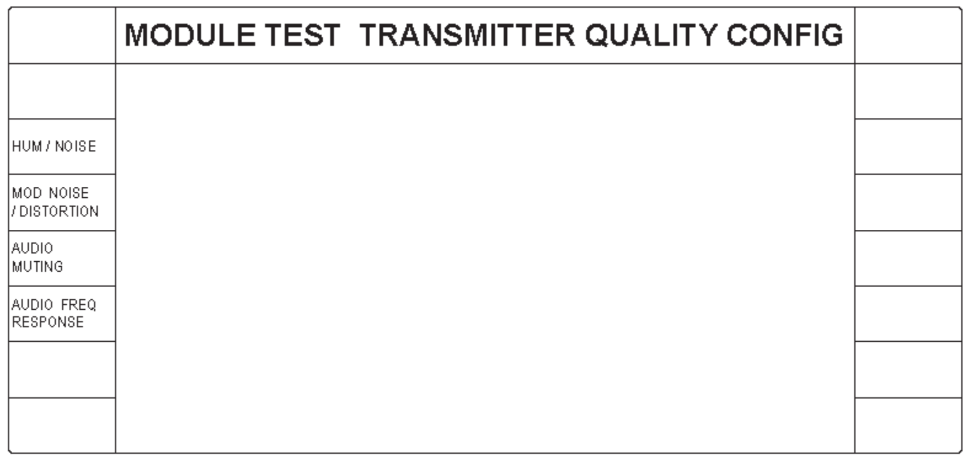


Figure 3–119: Analog module test transmitter quality configuration menu

Each of the MODULE TEST TRANSMITTER QUALITY CONFIG menu choices is discussed in the following text.

- **HUM/NOISE.** Press the HUM/NOISE softkey to display the HUM/NOISE menu (see Figure 3–120). Use this menu to set the parameters for the MODULE TEST TRANSMITTER QUAL HUM/NOISE test.

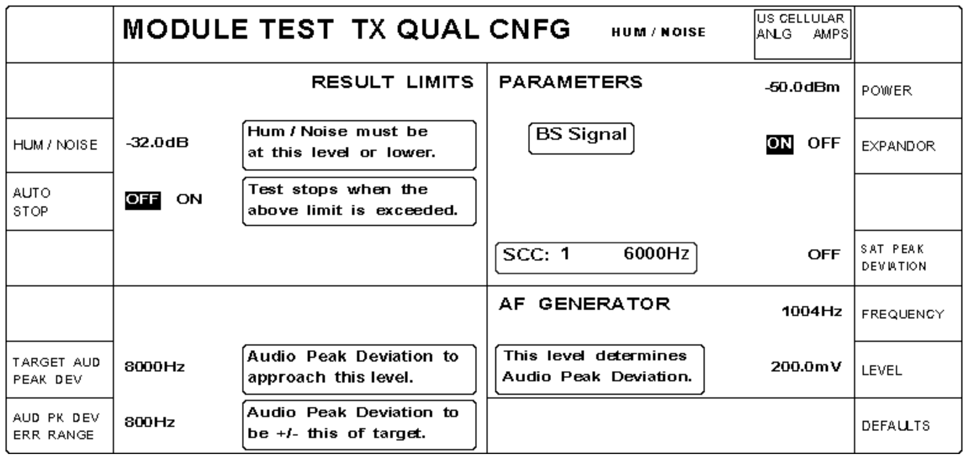


Figure 3–120: Analog module test tx qual configuration — hum/noise menu

The following menu items are unique to this menu:

- Expandor. The expandor is an audio signal-processing function that increases the dynamic range of the audio signal. For every 1 dB change in input level to the expandor, the change in output level is a nominal 2 dB. Press the EXPANDOR softkey to toggle the expandor function on or off.

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.

- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the following figure.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *HUM/NOISE* on page 3–131 for a description of the other items in this menu.

- **MOD NOISE/DISTORTION.** Press the MOD NOISE/DISTORTION softkey to display the Analog MODULE TEST MOD NOISE/DISTORTION menu. See Figure 3–121. Use this menu to set the parameters for the MODULE TEST TRANSMITTER QUAL MOD NOISE/DISTORTION test.

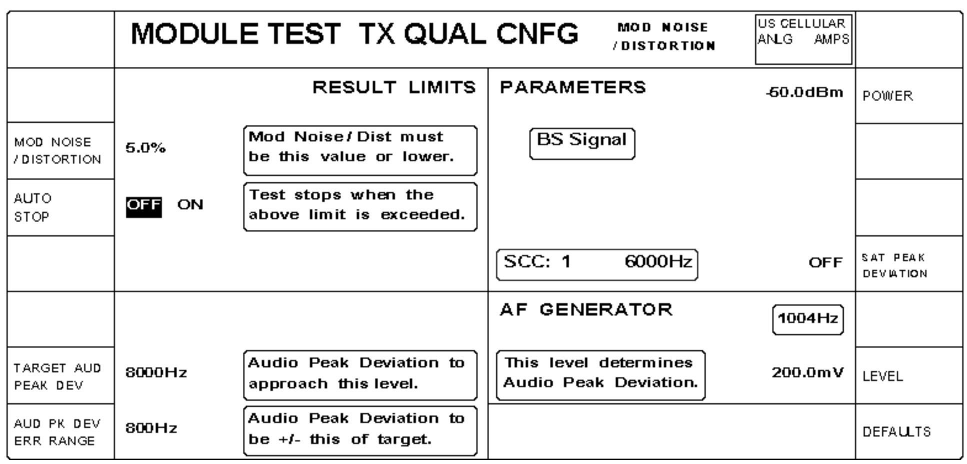


Figure 3–121: Analog module test tx qual configuration — mod noise/distortion menu

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.

- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.

- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to *MOD NOISE/DISTORTION* on page 3–132 for a description of the other items in this menu.

- **AUDIO MUTING.** Press the AUDIO MUTING softkey to display the AUDIO MUTING menu. See Figure 3–122. Use this menu to set the parameters for the TRANSMITTER QUALITY AUDIO MUTING test.

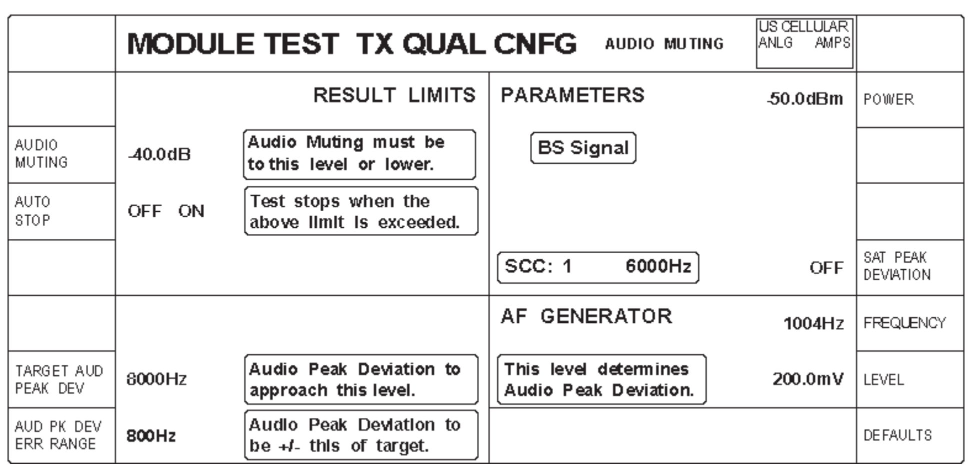


Figure 3–122: Analog module test tx qual configuration — audio muting menu

You can set the following test parameters:

- Audio muting level. Press the AUDIO MUTING softkey to set the maximum test limit for the audio muting level.
- Auto stop. Press the AUTO STOP softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops if the audio muting level exceeds the value that you set. Otherwise, the test runs continuously.

***NOTE**. Use the TARGET AUD PEAK DEV and AUD PK DEV ERR RANGE softkeys to set the range of audio peak deviation that must be achieved before the tester will make the audio frequency response measurement.*

- Target audio peak deviation. Press the TARGET AUD PEAK DEV softkey to set the desired audio peak deviation.
- Audio peak deviation error range. Press the AUDIO PK DEV ERR RANGE softkey to set the allowable deviation (±) from the target audio peak deviation value.

Within this menu you can set the following base station signal parameters:

- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

You can also change the following AF Generator settings:

- Press the FREQUENCY softkey to adjust the frequency of the sinusoidal test tone generated by the AF Generator.
- Press the LEVEL softkey to adjust the RMS output voltage of the AF Generator or to turn it off.
- Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on IS-98 specifications.)

- **AUDIO FREQ RESPONSE.** Press the AUDIO FREQ RESPONSE softkey to display a configuration menu that allows you to choose to configure the parameters for the normal mode or the raw mode of the audio frequency response test (see Figure 3–123).

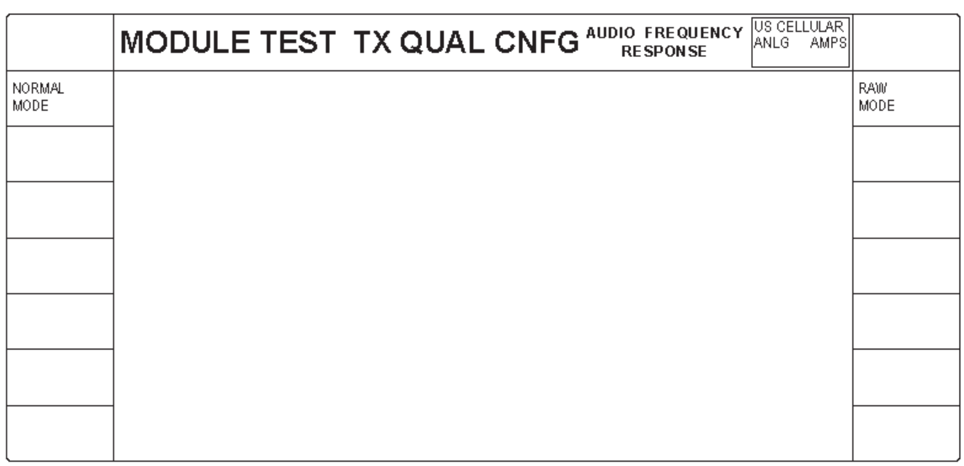


Figure 3–123: Analog module test tx qual configuration — audio frequency response menu

When the tester measures the audio frequency response in the normal mode, a de-emphasis filter is active and you can establish limit lines for the measurement. In the raw mode, the tester takes the measurements without the de-emphasis filter, and you cannot set limit lines for the measurement.

Press the NORMAL MODE softkey to set the result limits for measuring the audio frequency response of the mobile transmitter in the normal mode (see Figure 3–124). Refer to page 3–134 for a description of this menu.

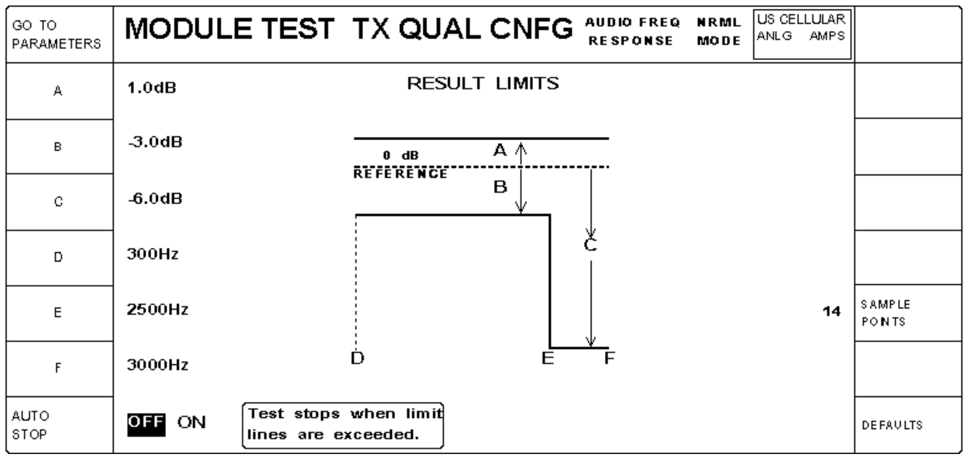


Figure 3–124: Analog module test tx qual configuration — audio freq response (normal mode) results menu

Press the GO TO PARAMETERS softkey to set the parameters for measuring the audio frequency response of the mobile transmitter in the normal mode (see Figure 3–125).

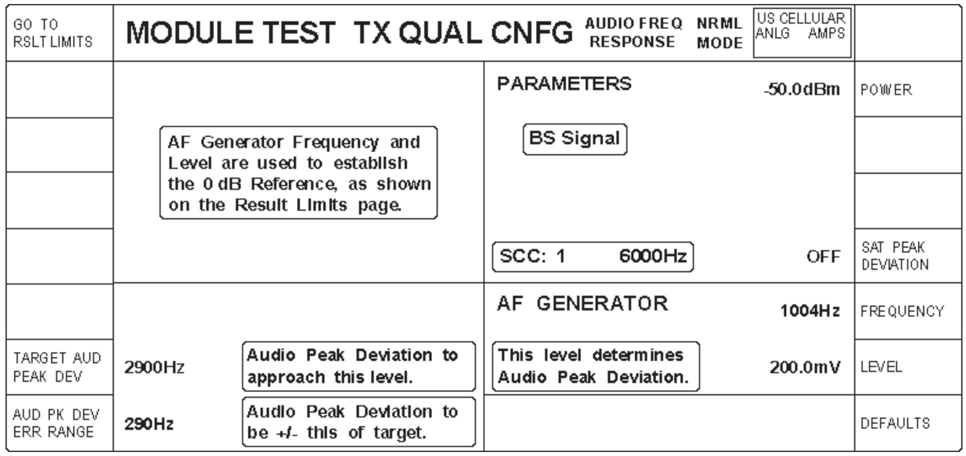


Figure 3–125: Analog module test tx qual configuration — audio freq response (normal mode) parameters menu

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to page 3–135 for a detailed description of the other menu items.

Press the RAW MODE softkey (see Figure 3–123 on page 3–156). This displays the configuration menu for measuring audio frequency response in the raw mode (see Figure 3–126).

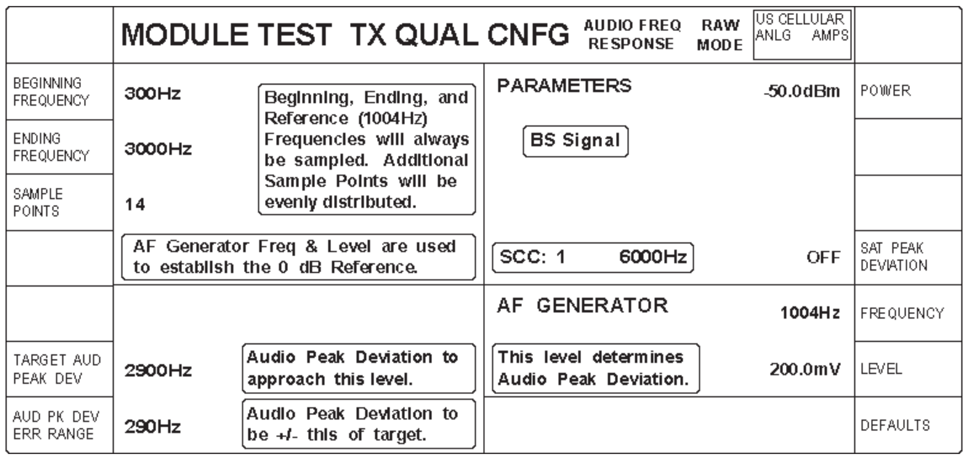


Figure 3–126: Analog module test tx qual configuration — audio freq response (raw mode)

The following menu items are unique to this menu:

- Supervisory audio tone color code (SCC) field. This field displays the selected SCC and its associated frequency, which is inherited from the MAIN ANALOG MODULE TEST CONFIG menu. See Figure 3–71 on page 3–101.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

***NOTE**. If you selected NAMPS or NTACS as the standard, the DSAT PEAK DEVIATION softkey and associated DSCC field replace the SAT PEAK DEVIATION softkey and the SCC field.*

The following menu items are unique to this menu if NAMPS or NTACS is the selected standard. See the figure below.

- Digital supervisory audio tone color code (DSCC) field. This field displays the selected DSCC and its associated sequence, which are inherited from the MAIN ANALOG MODULE TEST CONFIG menu. Refer to note on page 3–101.
- Digital supervisory audio tone (DSAT) peak deviation. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

Refer to page 3–133 for a detailed description of the other menu items.

HOLDOFF TIME. Press the HOLDOFF TIME softkey (see Figure 3–110 on page 3–140) to set a time delay between the start (or change) of an audio source and the acquisition of measurement data. This allows the transients induced in the mobile station by changes in the audio source to settle before data is accumulated.

ANALOG BS Signal CNFG

This softkey displays the configuration menu to define the operating parameters of an analog base station signal. You can arrive at this menu in two ways, and there is a fundamental difference in the type of configuration you make, depending on which menu you used to get here.

- Normal operation. If you arrived at the ANALOG BS SIGNAL CONFIGURATION menu from the main CONFIGURATION MENU (see *CONFIG MENU* on page 3–117), you are configuring the analog base station corresponding to the network, system, and standard that you selected in the home menu. This is the standard that is used for call setup and all normal tests accessible from the MANUAL TEST softkey.
- Handoff operation. If you arrived at the ANALOG BS SIGNAL CONFIGURATION menu from the HANDOFFS/TRANSITIONS menu (see *HANDOFFS/TRANSITIONS* on page 3–91), you are configuring the analog base station corresponding to the network, system, and standard that you selected in the HANDOFFS/TRANSITIONS menu. This is the base station that is effective only after you execute the handoff. In this case, the options selected have no effect on the base station configuration for the current standard. The tester displays an information box stating “These settings will become active AFTER a handoff is executed.”

__NOTE__. The information box displayed in the upper right corner of the menus normally reflects the current network, system, and standard. However, when configuring a base station for a handoff, the information box reflects the settings selected in the NETWORK HANDOFFS section of the HANDOFFS/TRANSITIONS menu on page 3–91.

The ANALOG BS SIGNAL CONFIGURATION menu has minor variations depending on the standard for which you are configuring. The menu used for AMPS, TACS, JTACS, and ETACS (see Figure 3–127) is described first, followed by descriptions of the menus for NAMPS and NTACS.

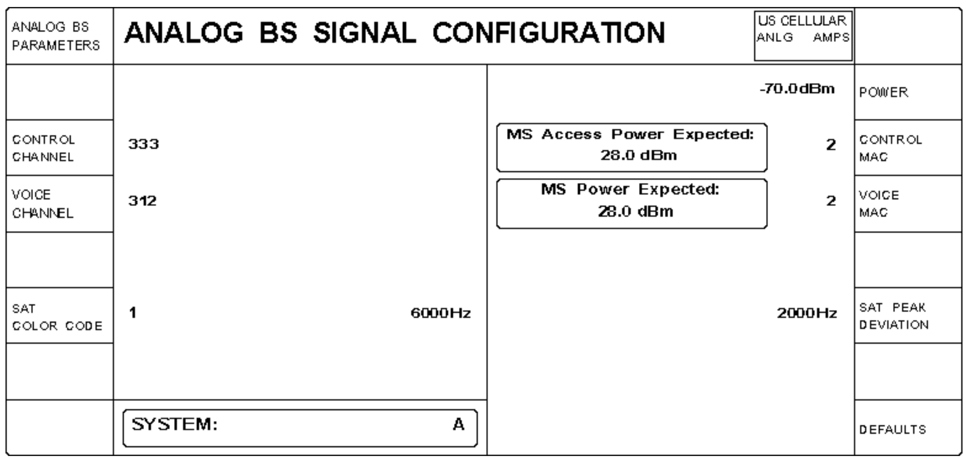


Figure 3–127: Analog BS signal configuration menu

__NOTE__. The level settings set in the ANALOG BS SIGNAL CONFIGURATION MENU are the system default levels unless overridden by a test. For example, the modulation limiting test overrides the voice MAC value with the parameter established for modulation limiting test.

You can set the following analog base station parameters:

- Control channel. The base station uses the control channel to page and call the mobile station (initiate communication). Press the CONTROL CHANNEL softkey to select a control channel.
- Voice channel. The voice channel is the channel over which voice communications occur. Press the VOICE CHANNEL softkey to select a voice channel.

***NOTE**. Only even numbered channels are allowed for the JTACS standard.*

- SAT color code. The supervisory audio tones (SAT) are out-of-voice band audio tones used for signaling. There are three assigned frequencies of 5970 Hz, 6000 Hz, and 6030 Hz with corresponding SAT color codes (SCC) of SCC 0, SCC 1, and SCC 2, respectively. Press the SAT COLOR CODE softkey to select the SAT color code that you want.
- Power. Press the POWER softkey to set the level of the base station transmitter power.
- Control mobile attenuation code. The control mobile attenuation code is a code sent by the base station to control the output power of the mobile station on the control channel. Press the CONTROL MAC softkey to select the control MAC you want.
- Voice mobile attenuation code. The voice mobile attenuation code is a code sent by the base station to control the output power for voice transmissions. Press the VOICE MAC softkey to set the voice MAC parameter.
- Supervisory audio tone peak deviation. The supervisory audio tone deviation is the amount of deviation that the base station uses to transmit the SAT to the mobile station. Press the SAT PEAK DEVIATION softkey to set the amount of deviation used.

Press the DEFAULTS softkey to set the parameters to their preset conditions. (Typically, the default values are based on the specifications shown in the table on page 3–57.)

***NOTE**. If you selected NAMPS as the standard, you will see an ANALOG BS SIGNAL CONFIGURATION menu similar to that shown in Figure 3–128.*

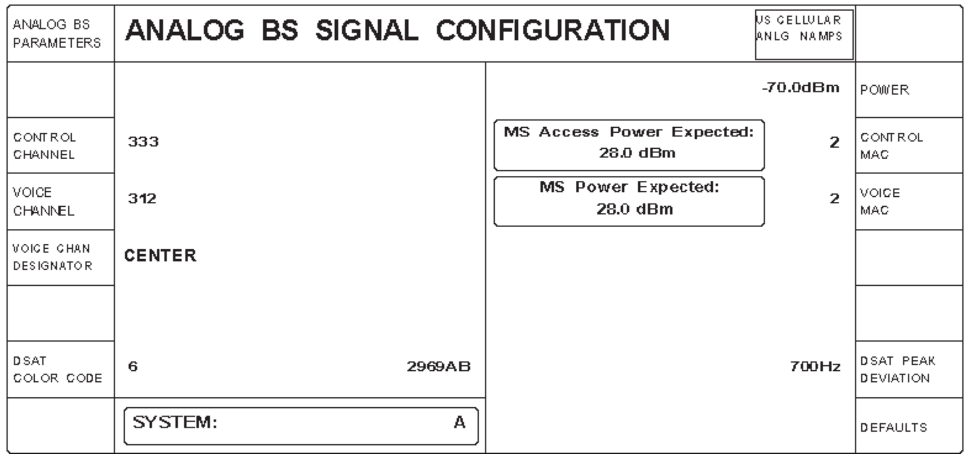


Figure 3–128: Analog BS signal configuration menu for NAMPS

The differences in the ANALOG BS SIGNAL CONFIGURATION menu for NAMPS from the AMPS menu are as follows:

- The menu displays a VOICE CHAN DESIGNATOR softkey. Press the VOICE CHAN DESIGNATOR softkey to select the designator you want; 10kHz ABOVE, CENTER, or 10kHz BELOW. CENTER is the default.
- The DSAT COLOR CODE softkey replaces the SAT COLOR CODE softkey. Press the DSAT COLOR CODE softkey to select the desired Digital Supervisory Audio Tone Color Code (0 through 6) and its associated sequence. See the table on page 3–58 for a list of the sequences.
- The DSAT PEAK DEVIATION softkey replaces the SAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

__NOTE__. If you selected NTACS as the standard, you will see an ANALOG BS SIGNAL CONFIGURATION menu similar to that shown in Figure 3–129.

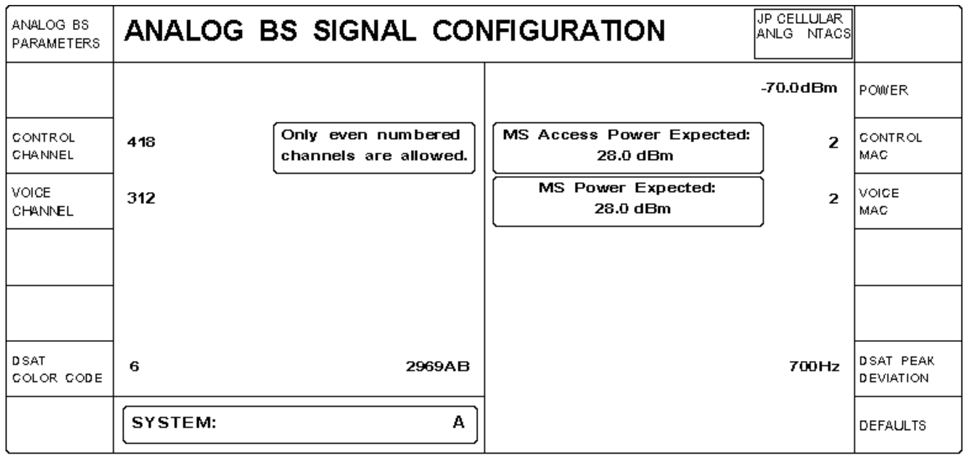


Figure 3–129: Analog BS signal configuration menu for NTACS

The differences in the ANALOG BS SIGNAL CONFIGURATION menu for NTACS from the AMPS menu are as follows:

- The DSAT COLOR CODE softkey replaces the SAT COLOR CODE softkey. Press the DSAT COLOR CODE softkey to select the desired Digital Supervisory Audio Tone Color Code (0 through 6) and its associated sequence. See the table on page 3–58 for a list of the sequences.
- The DSAT PEAK DEVIATION softkey replaces the SAT PEAK DEVIATION softkey. Press the DSAT PEAK DEVIATION softkey to set the peak deviation of the DSAT transmitted by the tester on the forward voice channel.

ANALOG BS PARAMETERS. This softkey displays a menu to specify parameters for the simulated base station (see Figure 3–130).

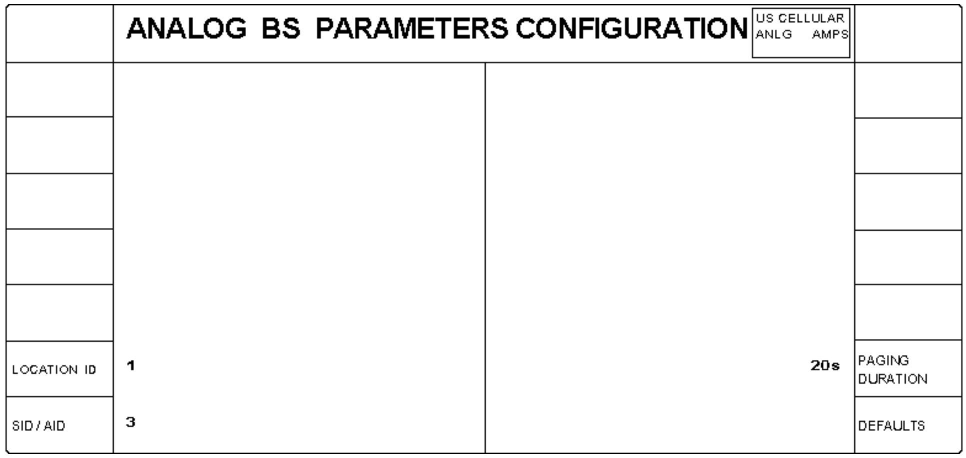


Figure 3–130: Analog BS parameters configuration menu

You can set the following parameters for the base station:

- Location identification. Press the LOCATION ID softkey to set a location identification number. This is a number that identifies a location area within a particular system.
- System identification/Area identification. Press the SID/AID softkey to set a system identification number (in some systems, this is referred to as an area identification number). This number uniquely identifies a cellular system.

***NOTE**. For some standards, the SID/AID is defined to be an odd number if the control channel is in the A system or an even number if the control channel is in the B system. For these standards, the number entered as the SID/AID will be automatically adjusted to be consistent with the control channel selection.*

- Paging duration. Press the PAGING DURATION softkey to set the paging duration. The paging duration is how long the base station sends a paging message over the control channel to the mobile station when a call is being established. If you set this time too short, the signal search algorithm of the mobile station may take longer than the paging duration, and the call setup will fail.

TDMA Measurements (Option B84 Only)

TDMA

This section describes the operation and configuration of the IS-136-A TDMA tests that the CMD 80 Digital Radiocommunication Tester can perform if Option B84 (TDMA mode) and Option B82 (Analog mode) is installed in the tester. Some menu items and softkeys are associated with a specific option. If you do not have that option installed, the supporting menus and softkeys do not appear in the display.

This section discusses the tests and station configurations that are exclusive to the TDMA system.

Using the Home Menu

After power on, the tester displays the home menu (see Figure 3–131). You can press the MENU HOME front-panel key to return to this menu at any time. The softkeys displayed by this menu allow you to select from a number of main topics.

From this menu you can select the Network, System, (and Standard if appropriate). Once these are set, you can use the other softkeys to proceed to the measurement tests or to the configuration menus.

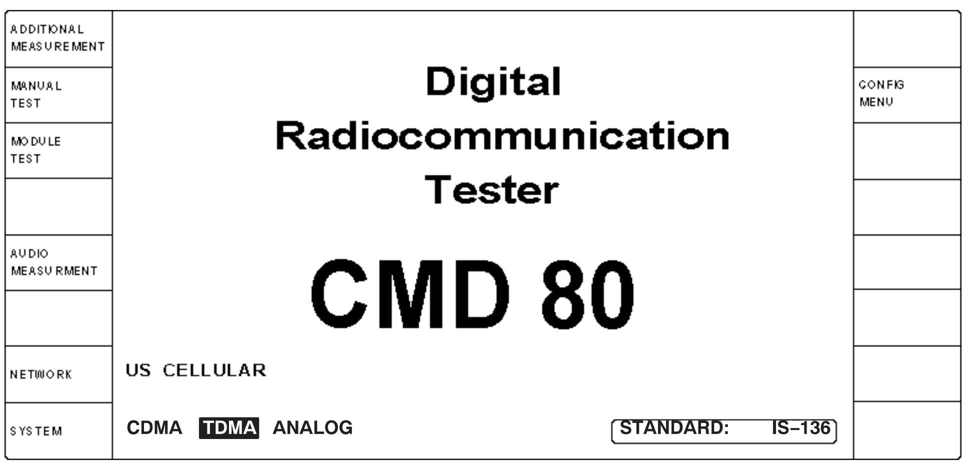


Figure 3–131: Home menu display

The softkey menus discussed in this section are the MANUAL TEST, MODULE TEST, and CONFIG MENU as they are defined by setting the system to TDMA mode.

For detailed descriptions about the ADDITIONAL MEASUREMENT softkey, refer to page 3–255. For detailed descriptions about the AUDIO MEASUREMENT softkey, refer to page 3–257. For detailed descriptions about the NETWORK, SYSTEM, and STANDARD softkeys, refer to page 3–3.

To see displays on your tester similar to the ones shown in this section, you need to set the network to US CELLULAR or US PCS and the system to TDMA. Use the following steps.

1. Press the **NETWORK** softkey to activate the VAR control so that you can select the network for the mobile station you are testing. Rotate the **VAR** control to select US CELLULAR or US PCS as the network.

2. Press the **SYSTEM** softkey to select TDMA as the system.

   The only available standard for TDMA is IS-136-A so there is no STANDARD softkey selection for TDMA. The standard is displayed in the lower right hand corner in a rounded box.

About the menu displays

The tester supports the TDMA IS-136-A standards. The information box located in the upper right corner of most menus displays the selected network, system, and standard. When a call is established, it also displays the data rate and slot. Figure 3–132 shows a sample display.

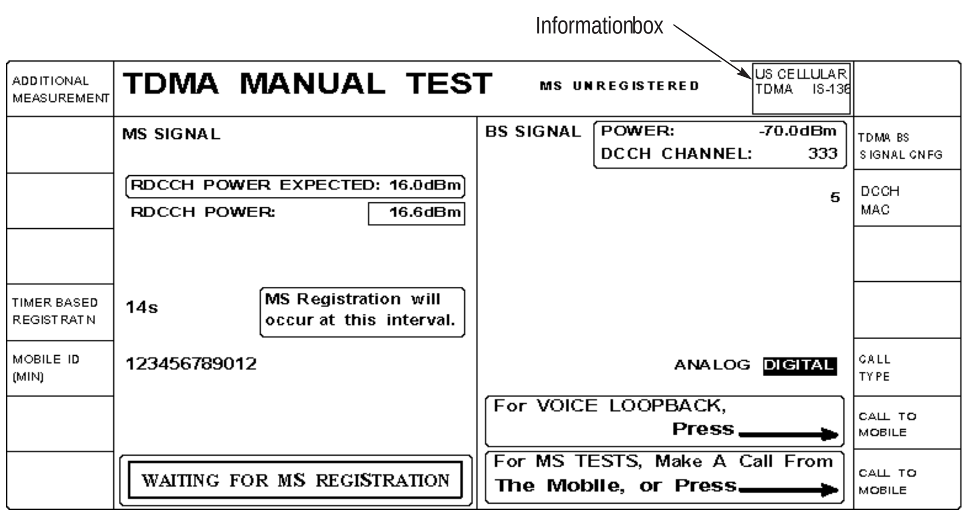


Figure 3–132: Information box display

Some of the menu selections have several levels of submenus associated with them. Figure 3–133 shows the TDMA menus and their structure for the tester. This subsection contains a description of each of these softkeys.

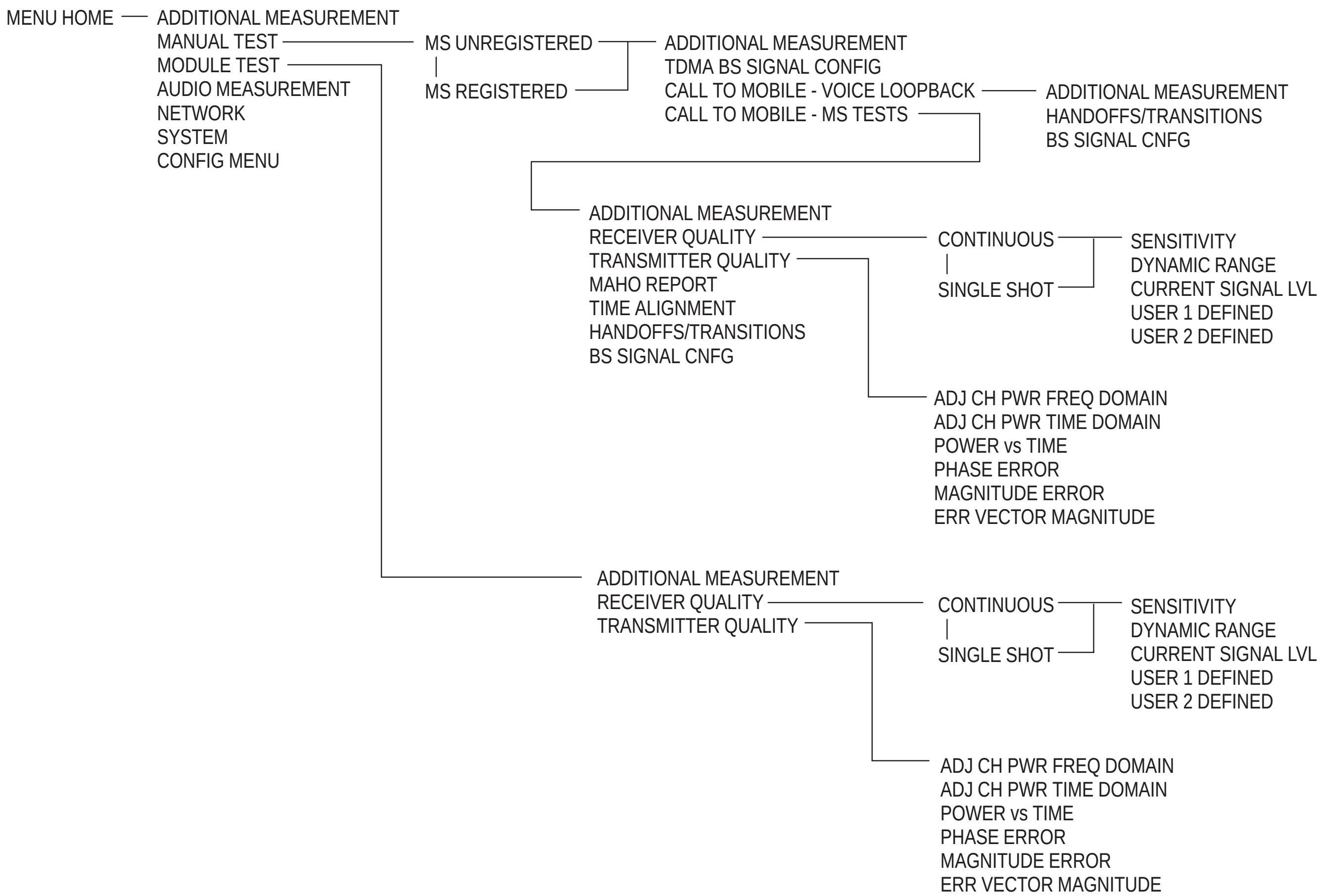
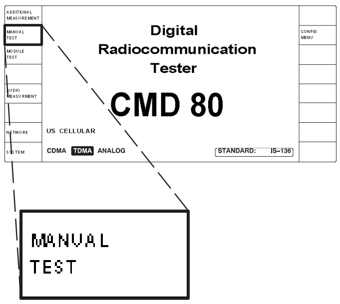


Figure 3–133: TDMA test menu tree

Manual Test



The MANUAL TEST softkey selects the manual test measurements for the system selected with the SYSTEM softkey in the home menu. This section discusses the tests available with TDMA selected as the system.

NOTE*. The tester displays TDMA test menus only if you have Option B84 and Option B82 installed and have selected the US CELLULAR or US PCS network and TDMA system (refer to* NETWORK *on page 3–3).*

Press MANUAL TEST to initiate a sequence composed of three states:

- MS Unregistered State (initialization, control channel scanning and locking)
- MS Registered State (DCCH camping)
- Call Established (voice loopback or mobile station tests)

During each of these states various tests may be made. The states and related tests are described in the following topics.

To perform mobile station tests, your mobile station must be connected to the tester. Figure 3–134 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

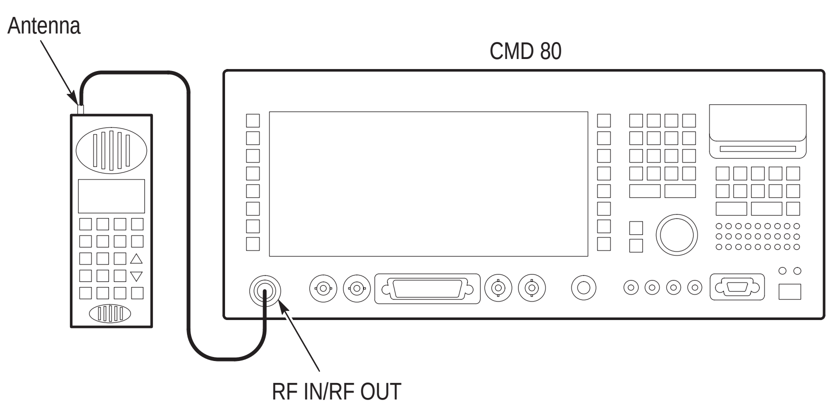


Figure 3–134: Mobile station to tester connection for testing

MS Unregistered State

The first stage of the manual test is the MS Unregistered (initialization) state, which starts when the MANUAL TEST softkey is pressed. During the initialization state, the tester establishes contact with the mobile station and enables the RF output power from the tester. Figure 3–135 shows the display during this state.

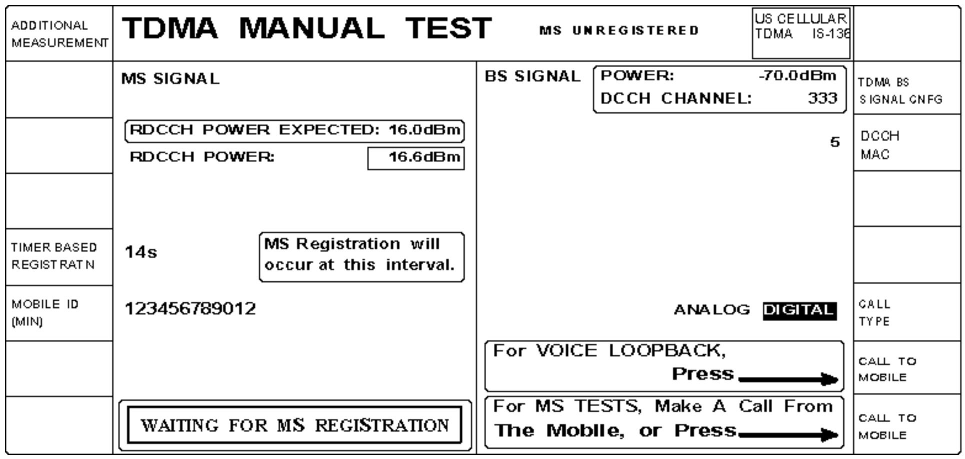


Figure 3–135: TDMA manual test — ms unregistered menu

The following softkeys are available during the MS Unregistered (initialization) state:

- ADDITIONAL MEASUREMENT. (Refer to *Additional Measurements* on page 3–255).
- TIMER BASED REGISTRATN. Press this softkey to adjust the time interval (5 to 300 seconds) between registrations. When the timer expires, the tester changes the state of the FOREG bit in the registration parameters message in the DCCH from disabled to enabled, causing the mobile station to register.

***NOTE**. If the timer based registration is set to off, the REGPER parameter and the mobile station's timer will cause the mobile station to attempt registration every five minutes.*

- MOBILE ID. Press this softkey to enter the MIN or IMSI (mobile ID) of the mobile station. You are not required to provide this information. However, entering the mobile ID provides the tester with the necessary information so that you can use the CALL TO MOBILE softkeys without waiting for registration. This number is retained from the last entered value or the last mobile station to register with the tester.

- TDMA BS SIGNAL CNFG. Press this softkey (in either the Unregistered or Registered state) to display a menu that allows you to configure the TDMA base station. See Figure 3–136.

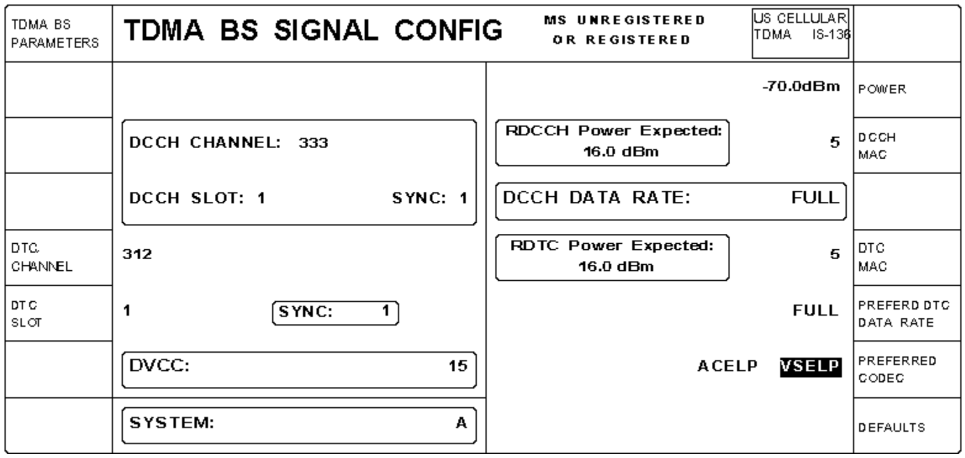


Figure 3–136: TDMA bs signal config — ms unregistered or registered menu

Set any of the following parameters in the TDMA BS SIGNAL CONFIG menu:

- DTC CHANNEL. Press this softkey to set the Digital Traffic Channel (1 to 799 or 991 to 1023 for cellular; 1 to 1999 for PCS).
- DTC SLOT. Press this softkey to set the Digital Traffic Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic).
- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DCCH MAC. Press this softkey to set the Digital Control Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to the mobile station to control the output power when the mobile station is operating on the control channel. This also sets the expected power level and attenuation/gain through the receive path.
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.

- PREFERRED DTC DATA RATE. Press this softkey to toggle the DTC data rate between full and one half. At registration, the mobile station is requested to provide a capability report. If the mobile station supports the PREFERRED DATA RATE setting, that setting will be used; otherwise, the data rate supported by the mobile station will be used. If a call is attempted before a capability report is received from the mobile station, the PREFERRED DTC DATA RATE setting will be used.
- PREFERRED DTC CODEC. Press this softkey to toggle the DTC voice coder/decoder between ACELP and VSELP. At registration, the mobile station is requested to provide a capability report. If the mobile station supports the PREFERRED CODEC setting, that CODEC type will be used; otherwise, the CODEC supported by the mobile station will be used. If a call is attempted before a capability report is received from the mobile station, the PREFERRED DTC CODEC setting will be used.

NOTE. *If a capability report from the mobile station is not received or invalid, the preferred DTC data rate and DTC CODEC values are used to attempt the call. If the preferred values don’t match the mobile station’s capabilities. the call may fail.*

- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136-A specifications.

- DCCH MAC. Press this softkey to set the Digital Control Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to the mobile station to control the output power when the mobile station is operating on the control channel. This also sets the expected power level and attenuation/gain through the receive path. This selection is the same as the one in the TDMA BS SIGNAL CONFIG menu.
- CALL TYPE. Press this softkey to set the type of call to analog or digital. This also determines the subsequent menu paths (between Analog mode and TDMA mode). When set to analog mode, the voice traffic channel uses an analog voice channel (AMPS call). When set to digital mode, the voice traffic channel uses a TDMA (IS-136-A) digital traffic call. Set this to ANALOG to make an AMPS mode call. Set this to DIGITAL to make a TDMA IS-136-A call.

  If you select ANALOG as the call type, refer to *CALL ESTABLISHED* on page 3–63 for Analog mode information.

***NOTE**. If you do not press one of the CALL TO MOBILE softkeys listed below, the tester will register the mobile station and proceed to the MS Registered (DCCH camping) state. Refer to* MS Registered State *on page 3–175.*

From the MS UNREGISTERED menu, the CALL TO MOBILE softkeys listed below will only work if the MOBILE ID field is properly set.

To establish a TDMA mode call, the CALL TYPE must be set to Digital.

- CALL TO MOBILE (VOICE LOOPBACK). Press this softkey to establish a voice loopback call. When the call is established, the tester displays the CALL ESTABLISHED (VOICE LOOPBACK) menu. In this mode, a message spoken into the mobile station is returned in approximately 2 seconds. This allows you to test the voice quality of the call. For detailed information about voice loopback, refer to *CALL ESTABLISHED (VOICE LOOPBACK)* on page 3–179.
- CALL TO MOBILE (MS TESTS). Press this softkey to initiate an MS tests call. When the call is established, the tester displays the CALL ESTABLISHED (MS TESTS) menu. For detailed information about MS tests, refer to *CALL ESTABLISHED (MS TESTS)* on page 3–180.

MS Registered State

Once the mobile station is powered on and registered, the tester enters the MS Registered (DCCH camping) state and displays the menu shown in Figure 3–137.

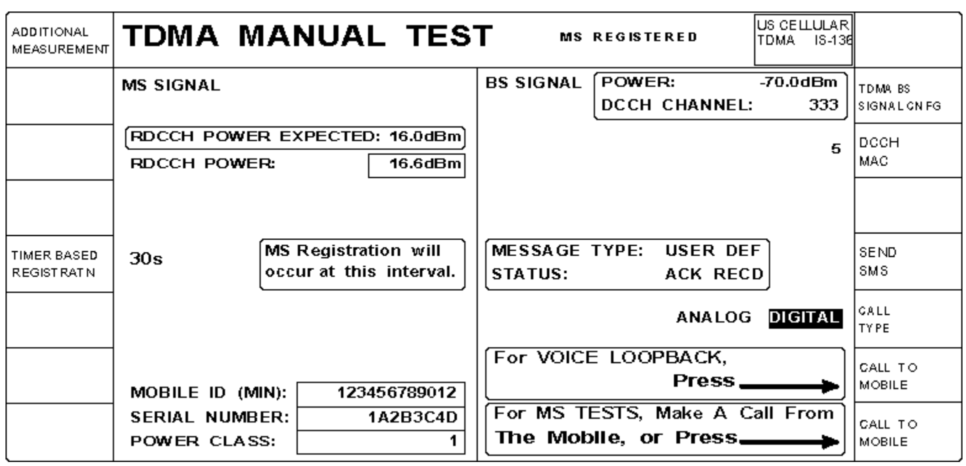


Figure 3–137: TDMA manual test — MS registered menu

The mobile station information is displayed on the left side of the screen and the base station information on the right. Press a CALL TO MOBILE softkey to initiate a call to the mobile station, or place a call from the mobile station by entering any telephone number on the mobile station and pressing SEND.

During the MS registered state, the following softkeys are available:

- ADDITIONAL MEASUREMENT. Refer to *Additional Measurements* on page 3–255.
- TIMER BASED REGISTRATN. Press this softkey to adjust the the time interval (5 to 300 seconds) between registrations. When the timer expires, the tester changes the state of the FOREG bit in the registration parameters message in the DCCH from disabled to enabled, causing the mobile station to register.

NOTE*. If the timer based registration is set to off, the REGPER parameter and the mobile station's timer will cause the mobile station to attempt registration every five minutes.*

- TDMA BS SIGNAL CNFG. Press this softkey to display a menu that allows you to configure the TDMA base station. See Figure 3–136 on page 3–173.
- DCCH MAC. Press this softkey to set the Digital Control Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to the mobile station to control the output power when the mobile station is operating on the control channel. This also sets the expected power level and attenuation/gain through the receive path. This selection is the same as the one in the TDMA BS SIGNAL CONFIG menu.
- SEND SMS. Press this softkey to send a Short Message Service message over the DCCH SPACH channel to the mobile station. For detailed information about configuring an SMS message, refer to page 3–178.

  The rounded information box next to the SEND SMS softkey provides message configuration information (USER DEFINED or DEFAULT message) along with the message transmission status. The Status proceeds through the following states:

    Blank. No SMS message has been sent.

    SENDING. An SMS message is being (or has been) transmitted over the DCCH.

    ACK RECVD. The tester has received an R-DATA ACK message from the mobile station.

REJECTED. The tester has received an R-DATA REJECT message from the mobile station indicating the mobile station rejected the SMS message.

NO RESP. The tester has sent the SMS message but has received no response message from the mobile station (within a five second time-out).

- CALL TYPE. Press this softkey to set the type of call to analog or digital. This also determines the subsequent menu paths (between Analog mode and TDMA mode). When set to analog mode, the voice traffic channel uses an analog voice channel (AMPS call). When set to digital mode, the voice traffic channel uses a TDMA (IS-136-A) digital traffic call. Set CALL TYPE to ANALOG to make an AMPS mode call. Set to DIGITAL to make a TDMA IS-136-A call.

NOTE. *To establish a TDMA mode call, the CALL TYPE must be set to Digital.*

If you select ANALOG as the call type, refer to *CALL ESTABLISHED* on page 3–63 for establishing a call in Analog mode.

- CALL TO MOBILE (VOICE LOOPBACK). Press this softkey to establish a voice loopback call. When the call is established, the tester displays the CALL ESTABLISHED (VOICE LOOPBACK) menu. In this mode, a message spoken into the mobile station is returned in approximately 2 seconds. This allows you to test the voice quality of the call. For detailed information about voice loopback, refer to *CALL ESTABLISHED (VOICE LOOPBACK)* on page 3–179.

- CALL TO MOBILE (MS TESTS). Press this softkey to initiate an MS tests call. When the call is established, the tester displays the CALL ESTABLISHED (MS TESTS) menu. For detailed information about MS tests, refer to *CALL ESTABLISHED (MS TESTS)* on page 3–180.

You may also press the CONFIG front-panel key to display a configuration menu that is dependent on the state of the call sequence. See Figure 3–138.

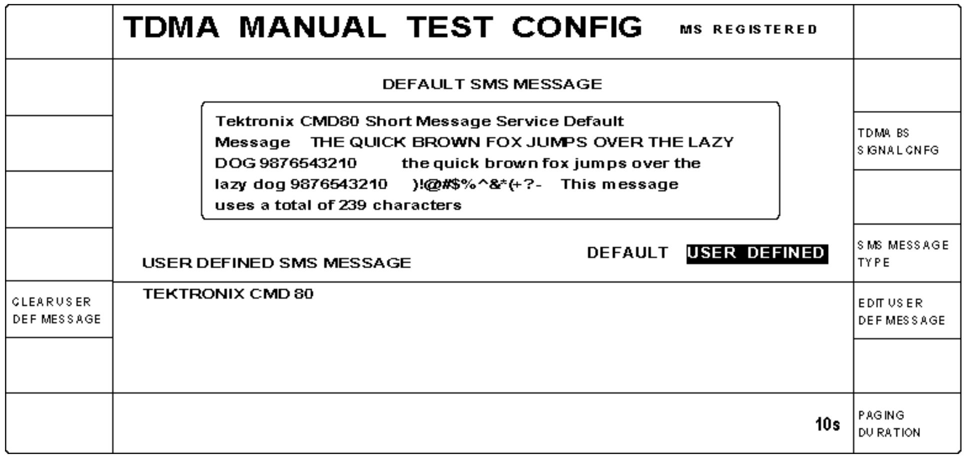


Figure 3–138: TDMA manual test config — MS registered menu displayed by CONFIG front-panel key

- CLEAR USER DEF MESSAGE. Press this softkey to clear the user defined SMS message.
- BS SIGNAL CONFIG. Press this softkey to display the MS UNREGISTERED OR REGISTERED menu for the base station signal configuration. See Figure 3–136 on page 3–173.
- SMS MESSAGE TYPE. Press this softkey to select either the system DEFAULT message or the USER DEFINED message. The default message transmits 239 characters, using “the quick brown fox...” message.
- EDIT USER DEF MESSAGE. Press this softkey to display an editing window to enter your own message of up to 239 characters.
- PAGING DURATION. Press this softkey to set the paging duration. The paging duration is how long the base station sends a paging message over the control channel to the mobile station when a call is being established. If you set this time too short, the signal search algorithm of the mobile station may take longer than the paging duration, causing the call setup to fail.

***NOTE**. The tester is internally configured to use Paging Frame Class 1.*

Call Established

When you press a CALL TO MOBILE softkey and establish a call, the tester displays either a CALL ESTABLISHED (VOICE LOOPBACK) menu or a CALL ESTABLISHED (MS TESTS) menu, depending on which CALL TO MOBILE softkey you pressed. Each of these menus is discussed in the following text.

CALL ESTABLISHED (VOICE LOOPBACK). When you press the CALL TO MOBILE softkey for VOICE LOOPBACK (or initiate a call from the mobile station) and establish a call, the tester displays the menu shown in Figure 3–139.

The information box located in the upper right corner of most menus displays the selected network, system, and standard. When a call is established, it also displays the data rate and slot. Figure 3–132 on page 3–168 shows a sample display.

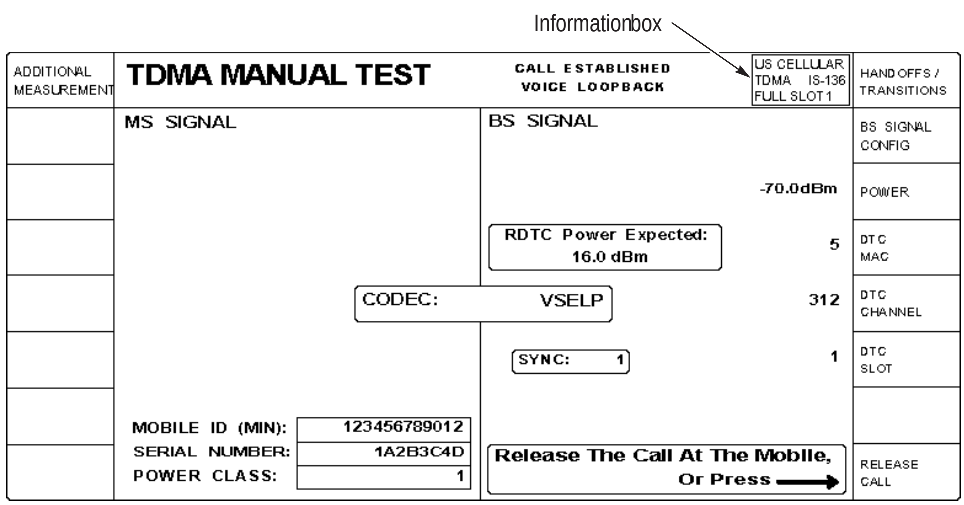


Figure 3–139: TDMA call established (voice loopback) menu

The following softkeys are available in the CALL ESTABLISHED (VOICE LOOPBACK menu:

- ADDITIONAL MEASUREMENT. Press this softkey to take conventional measurements, such as measuring the voltage across the battery terminals of the mobile station. For more information, refer to *Additional Measurements* on page 3–255.
- HANDOFFS/TRANSITIONS. Press this softkey to handoff the established call to another network, system, and/or standard, or to make a transition to the Voice Loopback or MS Tests mode. For more information, refer to *HANDOFF/TRANSITIONS* on page 3–211.

- BS SIGNAL CONFIG. Press this softkey to configure the operating parameters of a TDMA base station. For more information, refer to *BS Signal Configuration (Call Established)* on page 3–213.
- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DTC CHANNEL. Press this softkey to set the Digital Traffic Channel (1 to 799 or 991 to 1023 for cellular; 1 to 1999 for PCS).
- DTC SLOT. Press this softkey to set the Digital Traffic Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic). The SYNC information box displays the expected sync word number corresponding to the slot selection.
- RELEASE CALL. Press this softkey to simulate termination of the call by the base station. You can also release the call at the mobile station by hanging up the mobile station (press END on the mobile station).

CALL ESTABLISHED (MS TESTS).
When you press the CALL TO MOBILE softkey for MS TESTS and establish a call, the menu shown in Figure 3–140 is displayed.

For information about the ADDITIONAL MEASUREMENT, RECEIVER QUALITY, TRANSMITTER QUALITY, HANDOFFS/TRANSITIONS, and BS SIGNAL CONFIG menu selections, refer to *CALL ESTABLISHED MS TESTS Selections* on page 3–185.

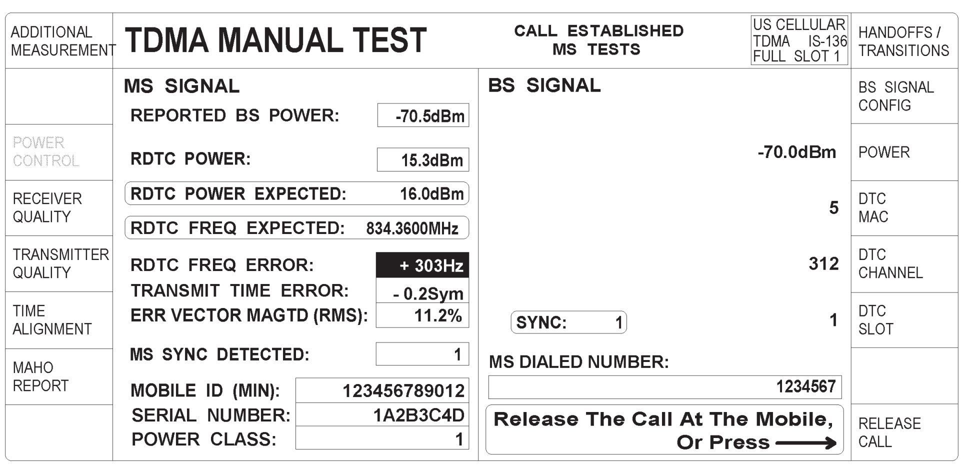


Figure 3–140: TDMA manual test — call established (MS tests) menu

On the MS SIGNAL side of the display the following information is displayed:

- REPORTED BS POWER. This represents the RSSI measurement returned from the mobile station (in response to a Measurement Order).
- RDTC POWER. This is the measured RMS burst power of the mobile station measured by the tester. The measurement displays the RMS power according to the status of the burst. See Table 3–7.

Table 3–7: RMS measurements based on burst status

Burst status	RMS measurement	Additional display information
Valid burst	RMS measured over valid burst	
Burst power too low	RMS measured over one acquisition frame (6+ slots)	LOW POWER
No power ramp detected	RMS measured over one acquisition frame (6+ slots)	NO POWER RAMP
Invalid burst length, but power ramp detected	RMS measured from ramp edge to end of valid slot duration time	INVALID BURST

- RDTC POWER EXPECTED. This value is the expected mobile station power based on the setting of the DTC MAC.
- RDTC FREQ EXPECTED. This is the expected mobile station RF frequency based on the setting of the DTC CHANNEL.
- RDTC FREQ ERROR. This is the measured mobile station's transmit carrier frequency expressed in terms of difference from nominal expected frequency for that channel.
- TRANSMIT TIME ERROR. This is the measured mobile station time alignment error expressed in terms of the difference from the nominal time alignment of 0 symbol periods. The measurement is given in terms of symbol periods.
- ERR VECTOR MAGTD (RMS). This is the RMS of the Error Vector Magnitude. The EVM is a calculated percentage of vector error between the ideal signal waveform and the received signal from the mobile station.
- MS SYNC DETECTED. This is the designated number of the detected sync sequence transmitted by the mobile station corresponding to the selected DTC Slot.
- MOBILE ID. This is the identification number of the mobile station and its type. The tester supports both MIN and IMSI identification numbers.

- SERIAL NUMBER. This is the electronic serial number of the mobile station.
- POWER CLASS. This is the mobile station's maximum output power class.

On the BS SIGNAL side of the display, you can adjust the following parameters:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DTC CHANNEL. Press this softkey to set the Digital Traffic Channel (1 to 799 or 991 to 1023 for cellular; 1 to 1999 for PCS).
- DTC SLOT. Press this softkey to set the Digital Traffic Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic). The SYNC information box displays the expected sync word number corresponding to the slot selection.

You can terminate a call by using one of two methods:

- Terminate the call from the mobile station.
- Press the RELEASE CALL softkey to terminate the call from the base station.

While in the CALL ESTABLISHED MS TESTS menu, you may press the CONFIG front-panel key to display the main configuration menu. See Figure 3–141.

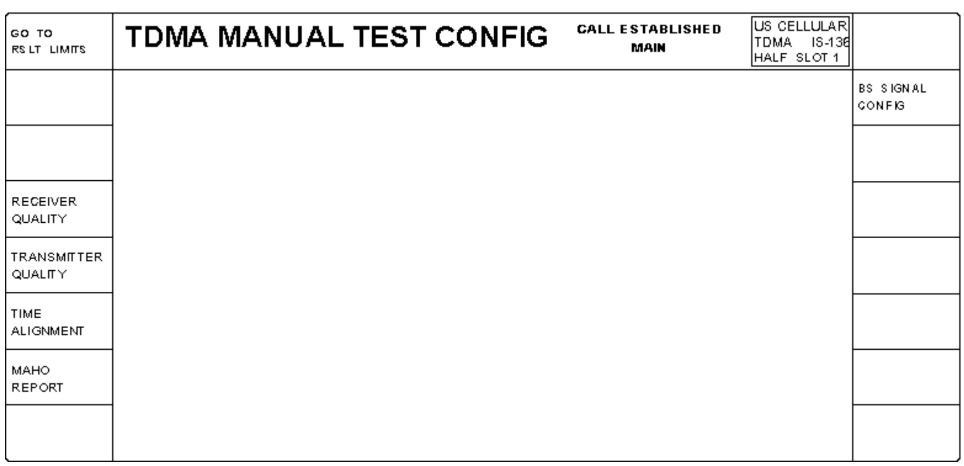


Figure 3–141: TDMA manual test config — call established (main) menu

You can use the selections in the CALL ESTABLISHED MAIN configuration menu to access the following configuration menus:

- RECEIVER QUALITY (refer to *RECEIVER QUALITY* on page 3–232)
- TRANSMITTER QUALITY (refer to *TRANSMITTER QUALITY* on page 3–237)
- TIME ALIGNMENT (refer to *TIME ALIGNMENT* on page 3–241)
- MAHO REPORT (refer to *MAHO REPORT* on page 3–242)
- BS SIGNAL CONFIG (refer to *BS Signal Configuration (Call Established)* on page 3–213)

Press the GO TO RSLT LIMITS softkey to display the RESULT LIMITS menu (see Figure 3–142). You can use the selections in this menu to set the limit values for the listed parameters that appear in the TDMA CALL ESTABLISHED MS TESTS menu.

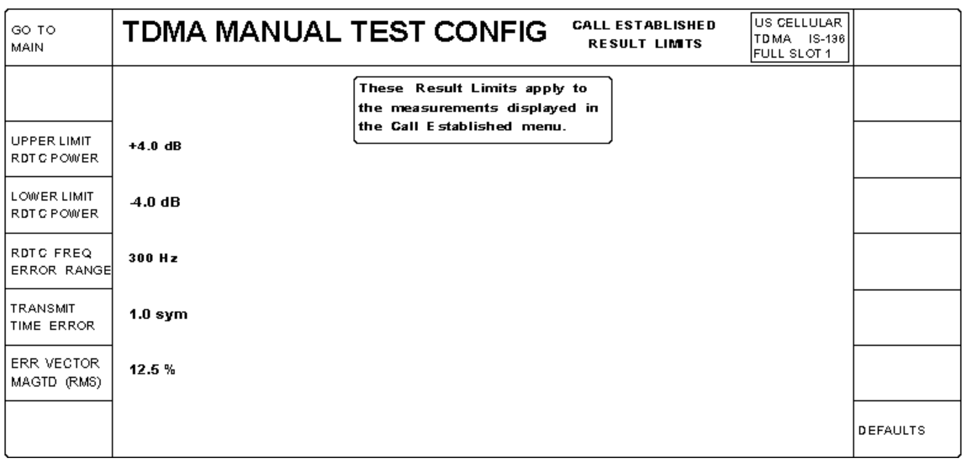


Figure 3–142: TDMA manual test configuration — call established (result limits) menu

- UPPER LIMIT RDTC POWER. Press this softkey to set the RDTC MS POWER upper limit (0 to +10 dB). This limit is applied relative to the MS EXPECTED power.
- LOWER LIMIT RDTC POWER. Press this softkey to set the RDTC MS POWER lower limit (–10 dB to 0). This limit is applied relative to the MS EXPECTED power.
- RDTC FREQ ERROR RANGE. Press this softkey to set the MS transmitter Reverse Digital Traffic Channel carrier frequency error limit (0 to 4000 Hz).

  - TRANSMIT TIME ERROR. Press this softkey to set the MS transmitter burst time alignment error limit (0 to 15 symbol periods in 0.01 symbol increments). This is an absolute value limit.
  - ERR VECTOR MAGTD (RMS). Press this softkey to to set the MS transmitter Error Vector Magnitude limit (0 to 100%) for RMS measurements.
  - DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-137-A specifications.
- GO TO MAIN. Press this softkey to return to the MAIN menu (see Figure 3–141 on page 3–182).

You can press the MENU UP front-panel key to return directly to the CALL ESTABLISHED menu (see Figure 3–140 on page 3–180).

Call Established (MS Tests) Selections

The following text describes each of the menu selections that are available from the CALL ESTABLISHED menu.

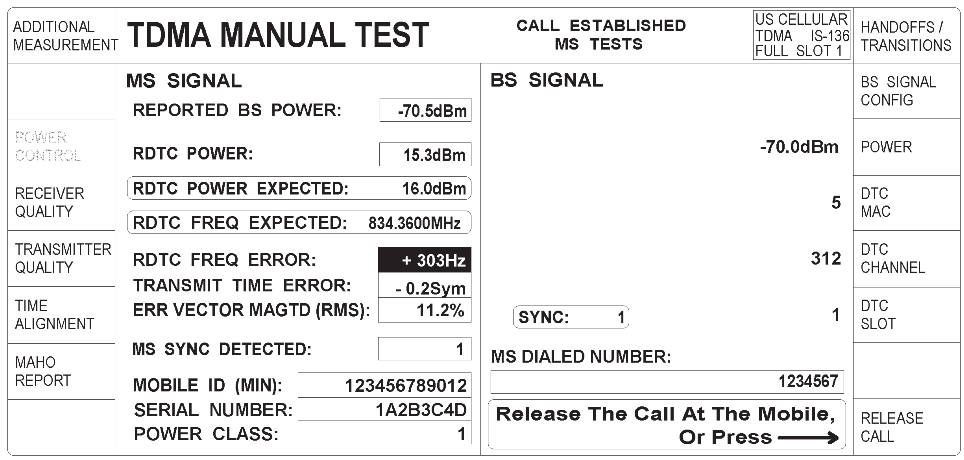


Figure 3–143: TDMA manual test — call established (MS tests) menu

Additional Measurement

Press this softkey to make voltage and current measurements without quitting the CALL ESTABLISHED state. Refer to *Additional Measurements* on page 3–255 for more information.

Receiver Quality

To perform mobile receiver tests, your mobile station must be connected to the tester. Figure 3–144 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

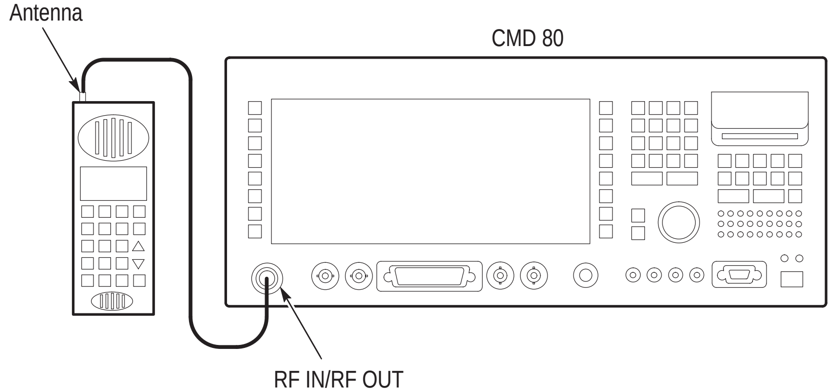


Figure 3–144: Mobile station to tester connection for testing

***NOTE**. The mobile station must be manually placed in a loopback mode to send data from the receiver to the transmitter for the receiver quality BER test. If this takes longer than five seconds, the call will be dropped.*

Press the RECEIVER QUALITY softkey to display the test selection menu (see Figure 3–145). From this menu, select the measurement you want to use to measure the performance of the mobile receiver.

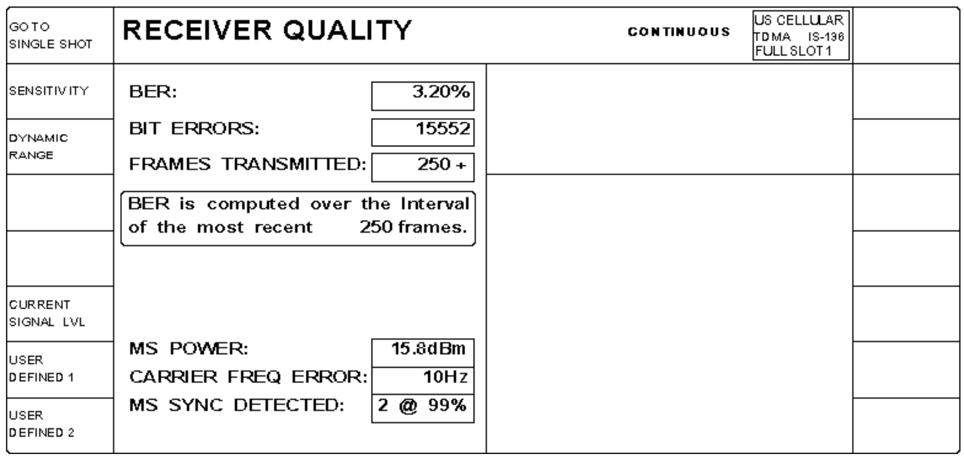
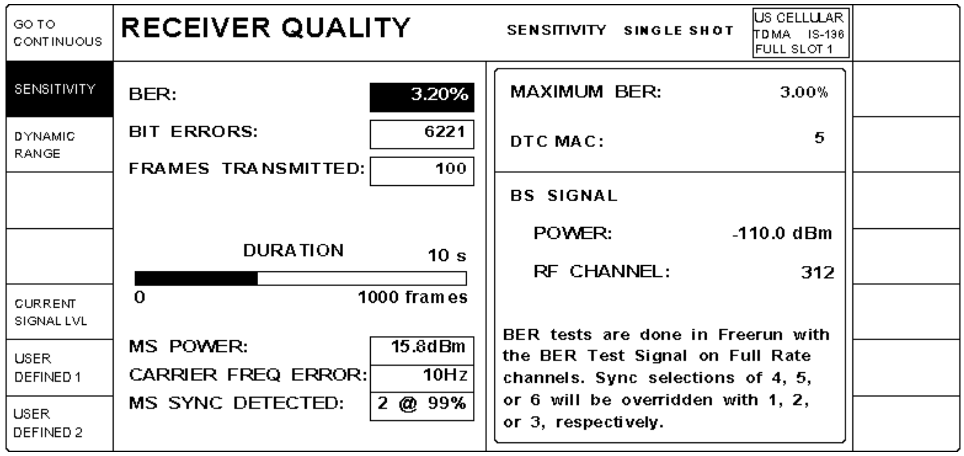


Figure 3–145: TDMA receiver quality menu

You can run each receiver quality test in either continuous mode or single shot mode. Pressing the GO TO SINGLE SHOT/GO TO CONTINUOUS softkey toggles between the two modes.

In continuous mode, the tester continuously performs the receiver quality test and displays the bit error rate over the interval of the most recent number of frames. In single shot mode, the tester performs the quality test once for a defined number of frames. Figure 3–146 shows examples of the Sensitivity measurement display in both single shot mode and continuous mode.



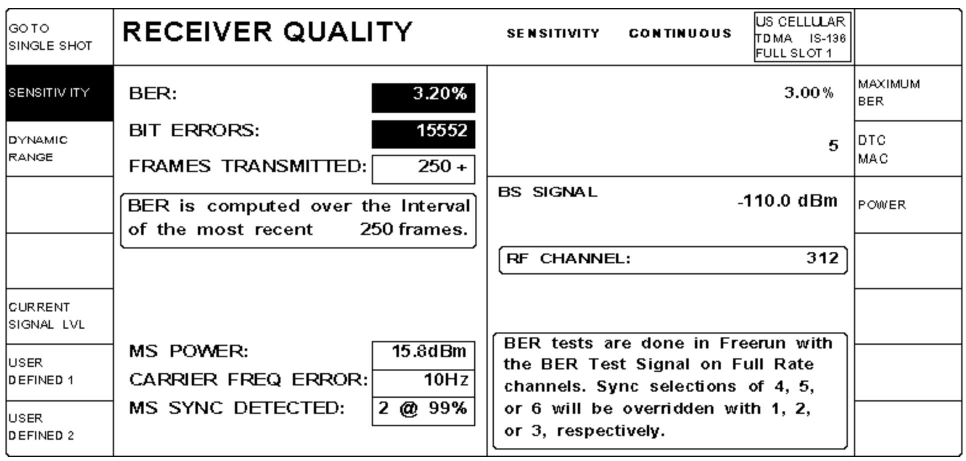


Figure 3–146: TDMA Receiver Quality single shot and continuous modes

You can set the bit error rate interval (CONTINUOUS INTERVAL) and the number of frames (SINGLE SHOT DURATION) in the configuration menu (refer to *Receiver Quality* configuration on page 3–232).

Receiver Quality Measurement Displays. Each of the five receiver quality tests displays the following measurements and/or settings:

- BER displays the percent of Bit Error Rate. The percent is calculated by:
  Bit Errors $\div$ (number of frames $\times$ bits per frame)
- BIT ERRORS displays the total number of bit errors.
- FRAMES TRANSMITTED displays the total number of frames transmitted. In single shot mode, the test stops when this number is equal to or greater than the number you set with the SINGLE SHOT DURATION softkey in the configuration menu (refer to *RECEIVER QUALITY* on page 3–232). In continuous mode, this number increments until it is equal to or greater than the number you set with the CONTINUOUS INTERVAL softkey. After this point a + sign is displayed at the end of the FRAMES TRANSMITTED value and flashes.
- MS POWER displays the mobile station RF power level measured by the tester.
- CARRIER FREQ ERROR displays the carrier frequency error based on the difference between the measured frequency and the ideal frequency for the current channel.
- MS SYNC DETECTED displays the mobile station sync. The percent indicates the confidence level that the mobile station sync is being detected. The maximum confidence level is 98%.
- MAXIMUM BER displays the set maximum bit error rate in percent when the sensitivity measurement is set to Single Shot mode. In Continuous mode, press this softkey to set the maximum bit error rate percentage.
- DTC MAC displays the Digital Traffic Channel Mobile Attenuation Code when the sensitivity measurement is set to Single Shot mode. In Continuous mode, press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- POWER displays the base station transmitter power when the sensitivity measurement is set to Single Shot mode. In Continuous mode, press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- RF CHANNEL displays the set RF channel.

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, returning to the home menu after establishing a call drops the connection between the mobile station and the tester. If you want to set up or change the test parameters after a call is established, press the CONFIG front-panel key. This displays the

RECEIVER QUALITY CONFIGURATION menu (see Figure 3–147). You may use this menu to select the configuration screens to set or change the test parameters for receiver quality tests. Use the MENU UP front-panel key to return to the RECEIVER QUALITY test menu after making the configuration changes.

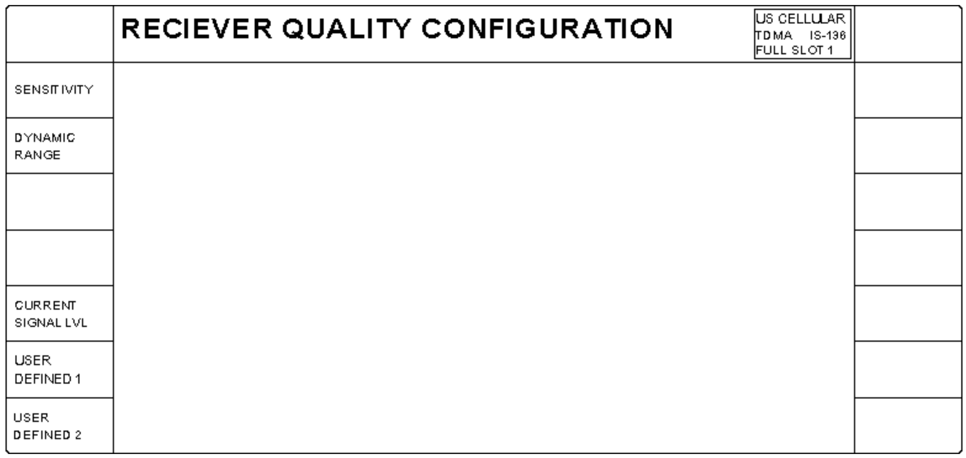


Figure 3–147: TDMA receiver quality configuration (call established) menu

***NOTE**. Refer to* RECEIVER QUALITY *on page 3–232 for the discussions on the receiver quality configuration menu selections.*

Pages 3–190 through 3–193 discusses each of the RECEIVER QUALITY menu selections.

SENSITIVITY. Press the sensitivity softkey to measure the sensitivity of the mobile receiver using a Bit Error Rate measurement (see Figure 3–148). The sensitivity measurement is intended to test the receiver error rate while the mobile station is receiving a minimum level of RF power.

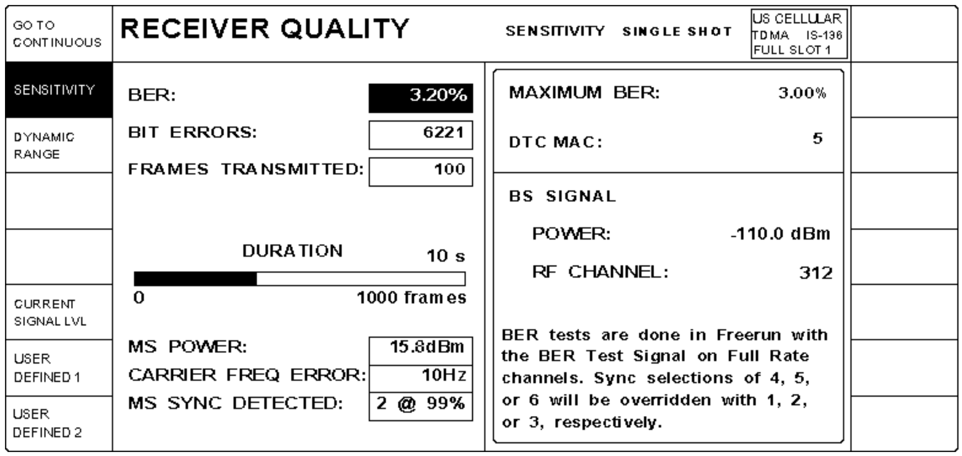


Figure 3–148: TDMA manual receiver quality test — sensitivity

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the SENSITIVITY configuration menu. This indicates that the measurement is out of the test limits.*

For a discussion of each measurement display, refer to the general discussion under *Receiver Quality Measurement Displays* on page 3–188.

If you want to set up or change the test parameters, press the CONFIG front-panel key. This displays the RECEIVER QUALITY CONFIGURATION menu (see Figure 3–147 on page 3–189).

DYNAMIC RANGE. Press the dynamic range softkey to measure the dynamic range of the mobile receiver using a BER measurement (see Figure 3–149). The Dynamic Range measurement is intended to test the receiver error rate while receiving a maximum level of RF power.

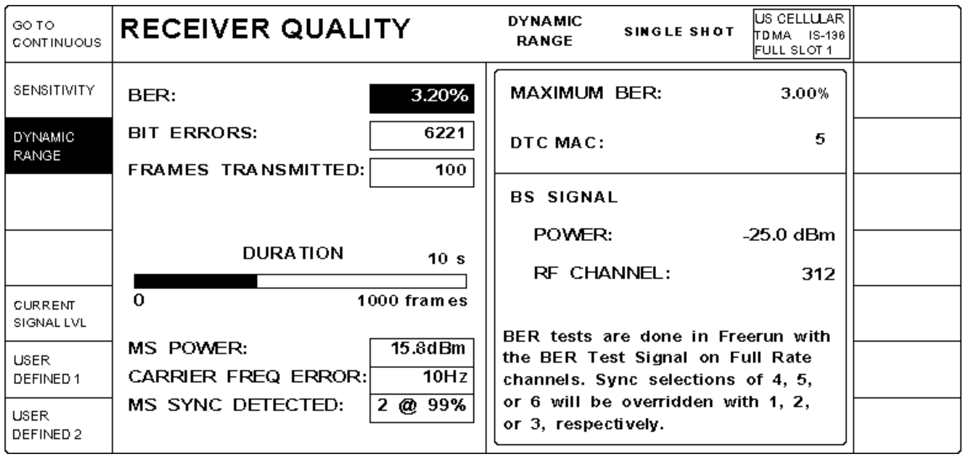


Figure 3–149: TDMA manual receiver quality test — dynamic range

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***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the DYNAMIC RANGE configuration menu. This indicates that the measurement is out of the test limits.*

For a discussion of each measurement display, refer to the general discussion under *Receiver Quality Measurement Displays* on page 3–188.

If you want to set up or change the test parameters, press the CONFIG front-panel key. This displays the RECEIVER QUALITY CONFIGURATION menu (see Figure 3–147 on page 3–189).

CURRENT SIGNAL LVL. Press the current signal level softkey to measure the receiver performance of the mobile station using a BER measurement (see Figure 3–150). This measurement tests the receiver using the current power level setting of the tester.

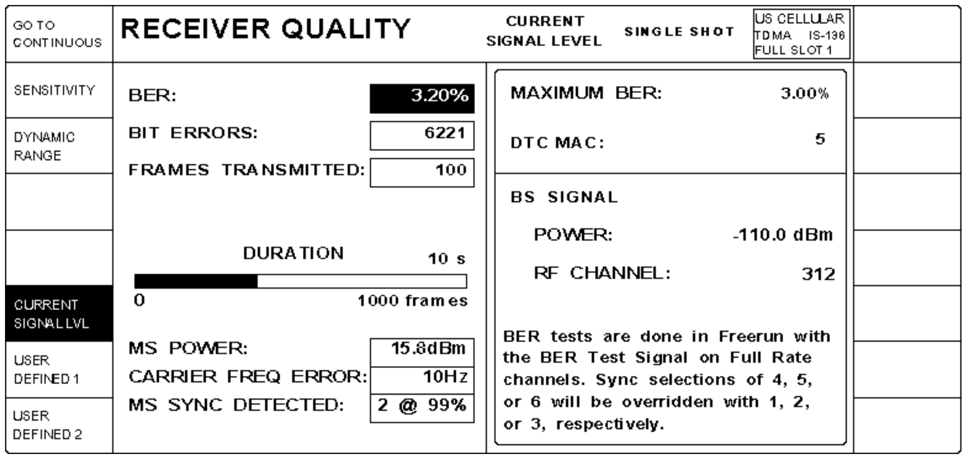


Figure 3–150: TDMA manual receiver quality test — current signal level

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the CURRENT SIGNAL LEVEL configuration menu. This indicates that the measurement is out of the test limits.*

For a discussion of each measurement display, refer to the general discussion under *Receiver Quality Measurement Displays* on page 3–188.

If you want to set up or change the test parameters, press the CONFIG front-panel key. This displays the RECEIVER QUALITY CONFIGURATION menu (see Figure 3–147 on page 3–189).

USER DEFINED 1 (2). Press either of these softkeys to measure the receiver performance of the mobile station using a user defined power level setting for the BER measurement. (see Figure 3–151).

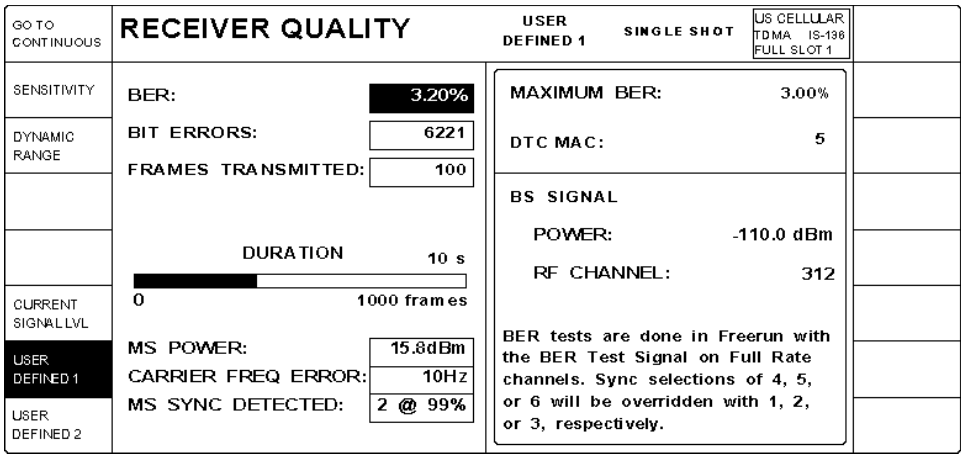


Figure 3–151: TDMA manual receiver quality test — user defined 1 (2)

***NOTE**. The display of the test results may toggle between normal and highlighted if you have set AUTO STOP to OFF in the USER DEFINED 1(2) configuration menu. This indicates that the measurement is out of the test limits.*

For a discussion of each measurement display, refer to the general discussion under *Receiver Quality Measurement Displays* on page 3–188.

If you want to set up or change the test parameters, press the CONFIG front-panel key. This displays the RECEIVER QUALITY CONFIGURATION menu (see Figure 3–147 on page 3–189).

Transmitter Quality

To perform the mobile station transmitter tests, your mobile station must be connected to the tester. Figure 3–152 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

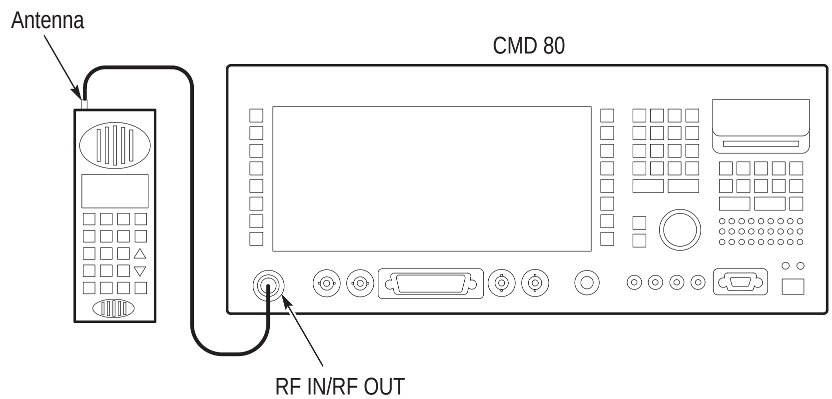


Figure 3–152: Setup for testing transmitter quality

Press the TRANSMITTER QUALITY softkey to display the tests used to measure the performance of the mobile station transmitter. Select the transmitter test that you want to perform from the menu selections on the left side of the menu. Figure 3–153 shows the menu with the adjacent channel power frequency domain measurement selected.

***NOTE**. The initial menu display after pressing the TRANSMITTER QUALITY softkey defaults to the last menu accessed within the transmitter quality menu group.*

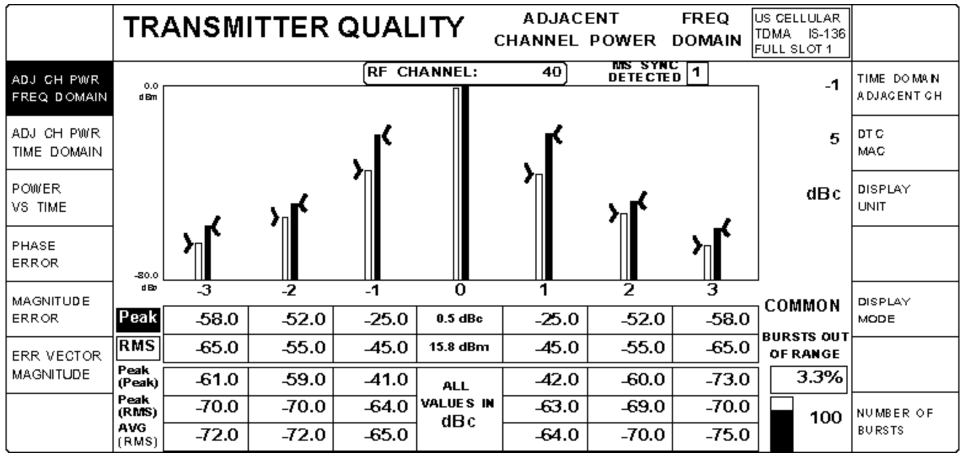


Figure 3–153: TDMA manual transmitter quality test — adjacent channel power

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, returning to the home menu after establishing a call will drop the connection between the radiotelephone and the tester. If you want to set up or change the test parameters after a call is established, press the CONFIG front-panel key. This displays the TRANSMITTER QUALITY CONFIGURATION menu that is associated with the selected test (see Figure 3–154). You may use this menu to set or change the test parameters. Use the MENU UP front-panel key to return to the TRANSMITTER QUALITY test menu after making the configuration changes.

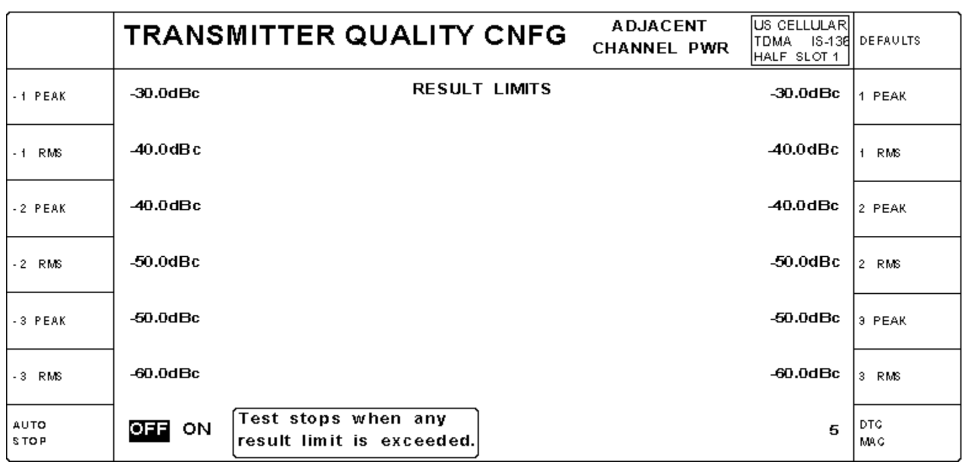


Figure 3–154: Transmitter quality configuration (adjacent channel power) menu

Pages 3–196 through 3–206 discusses each of the TRANSMITTER QUALITY menu selections.

ADJ CH PWR FREQ DOMAIN. The adjacent channel power measurement allows the user to measure the adjacent, first, and second alternate channel power and display the results in a frequency domain view. See Figure 3–155.

These are the three neighboring channels above and below the current active channel. This measurement is made at frequency offsets of ±30 kHz (adjacent channels), ±60 kHz (alternate channels), and ±90 kHz (second alternate channels). The tester uses a passband filter (described in IS-136-A section 2.1.3.3) to eliminate interference from unwanted sources.

There are two different effects to be covered by this measurement. First, the power that is part of the mean power output of the transmitter resulting from the modulation and noise. This refers to the calculated RMS values. Second, the out-of-band power arising from the switching transients (caused by the ramping-on and ramping-off of the transmitter) is covered by the calculated Peak values.

The RMS measurement is made using 50% of the symbol periods in one time slot of the active channel. Only 50% of the the symbols are evaluated to increase measurement speed. The measurement results are statistically evaluated; for each channel the absolute peak, the maximum, and the average RMS value is calculated over a user defined number of bursts. The measurement results are presented either in absolute values (dBm) or in relative values (dBc). In the latter case the RMS values are relative to the RMS power of the active channel (due to modulation). The PEAK values are relative to the PEAK power of the active channel (due to switching). The RMS and PEAK power of the active channel are averaged over a user defined number of bursts.

The results are presented graphically as bars, using either RMS, peak, or common (both RMS and peak) DISPLAY MODE, over a variable number of bursts (1 to 1000). The MS sync number detected, RF channel, and the bursts out of range are also displayed.

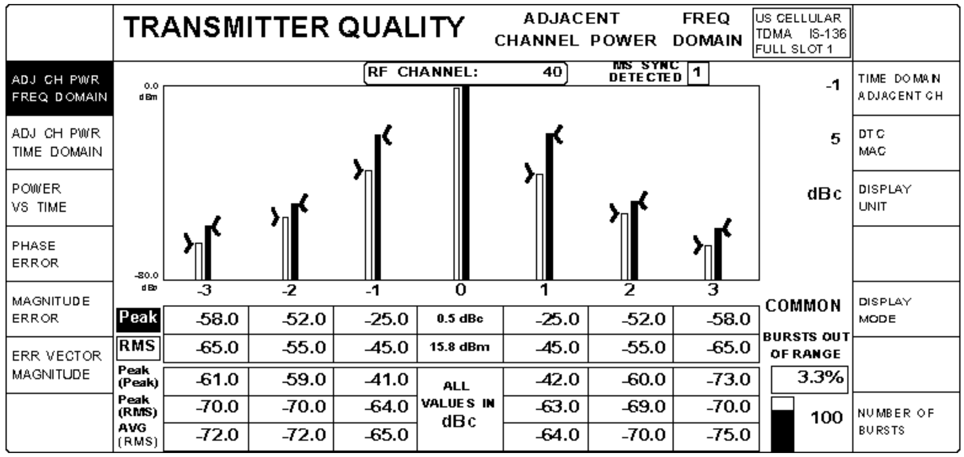


Figure 3–155: TDMA manual transmitter quality test — adjacent channel power measurement (frequency domain)

From this measurement display, you may adjust the following parameters.

- TIME DOMAIN ADJACENT CH. Press this softkey to set the respective channel to be evaluated in the time domain view. The range is –3 to +3 (including 0 for the useful channel). This setting has no effect on the FREQ DOMAIN view.
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DISPLAY UNIT. Press this softkey to set the display units for the results. The bar graph is always presented as absolute values (dBm).
- DISPLAY MODE. Press this softkey to toggle the bar graph display from displaying only the peak bars, the RMS bars, or both peak and RMS (common).
- NUMBER OF BURSTS. Press this softkey to set the total number of bursts to be taken into account for the statistical evaluation. The range is between 1 and 1000.

  The Bursts Out of Range field displays the percentage of total number of bursts failing one of the RMS/Peak limits defined in the configuration menu. A burst is only regarded as failed if the current Peak/RMS value exceeds a limit.

Limits for the RMS and PEAK limits are defined in the configuration menu by pressing the CONFIG front-panel key (refer to page 3–248). Any result exceeding these limits is displayed as inverse video (white on black).

ADJ CH PWR TIME DOMAIN. The adjacent channel power measurement performs similarly to the ADJ CH PWR FREQ DOMAIN measurement but displays the results in a time domain view. See Figure 3–156. The time domain view provides a graphical representation of the time-domain burst in the selected adjacent/alternate channel with accompanying results. Note that the percentage in the Bursts Out of Range field covers all 6 neighboring channels.

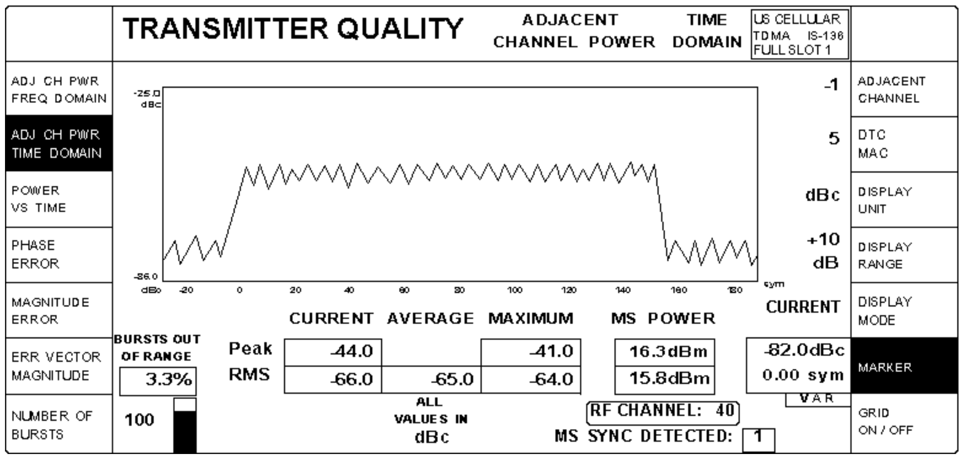


Figure 3–156: TDMA manual transmitter quality test — adjacent channel power measurement (time domain)

From this measurement display, you may adjust the following parameters.

- NUMBER OF BURSTS. Press this softkey to set the total number of bursts to be taken into account for the statistical evaluation. The range is between 1 and 1000.

  The Bursts Out of Range field displays the percentage of the total number of bursts failing one of the RMS/Peak limits defined in the configuration menu. A burst is only regarded as failed if the current Peak/RMS value exceeds a limit.

- ADJACENT CHANNEL. Press this softkey to set the selected channel to be evaluated in the time domain view. The range is –3 to +3 (including 0 for the active channel).

- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.

- DISPLAY UNIT. Press this softkey to set the display units for the results. The graph is always presented as absolute values (dBm).

- DISPLAY RANGE. Press this softkey to set the graphical display reference level. The range is –60 dB to +10 dB relative to the active channel.

- DISPLAY MODE. Press this softkey to toggle the graphical display between CURRENT, AVERAGE, or MAXIMUM power levels.
- MARKER. Press this softkey to set the marker position. The marker range is between symbol –28 to symbol 190 (0.25 symbol resolution).
- GRID ON/OFF. Press this softkey to turn the display grid pattern on or off.

RMS and PEAK limits are defined in the configuration menu by pressing the CONFIG front-panel key (refer to page 3–248). Any result exceeding these limits is displayed as inverse video (white on black).

POWER vs TIME. The power versus time measurement allows the user to verify the correct transmit carrier switching time required to produce power output at the required power level from the carrier-off state as well as the release time required to reduce carrier power to the carrier-off state. See Figure 3–157.

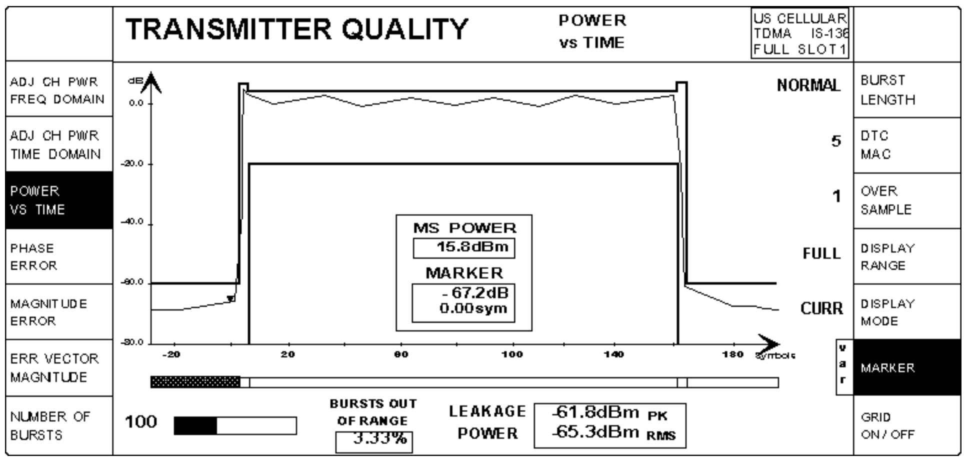


Figure 3–157: TDMA manual transmitter quality test — power vs time

A spectrum analyzer filter of 100 kHz bandpass is used for this measurement.

The leakage power measurement verifies that the mobile station transmitter power is below a user defined limit (default is –60 dBm) during the carrier-off state. Refer to page 3–237 for setting the transmitter quality limits.

Since the dynamic range of the tester at any one attenuator setting is about 65 dBm, the leakage power level may not be reached by the actual power versus time curve for all mobile station power levels. Thus the displayed curve may not reflect the correct leakage power measurement. If the leakage limit setting in the configuration menu is less than 60 dB below the MS Expected Power setting, the leakage power measurement will execute concurrently with the burst measurements. Otherwise the leakage measurement is made once the acquisition of the specified number of bursts is complete, so it will update at the completion of the burst measurement sequence.

The horizontal segmented bar at the bottom of the display shows the different parts during the time period of a burst in segments. If the test results are outside the defined template limit (defined in the configuration menu) for a particular time segment, that segment is darkened to indicate a failure.

The number of bursts out of range is also displayed.

From this measurement display, you may adjust the following parameters.

- BURST LENGTH. Press this softkey to set the type of burst to be measured. NORMAL burst measures the normal 162 symbol-length burst. SHORTENED burst measures the 140 symbol-length shortened burst. Because mobile stations only transmit in shortened burst mode immediately after a handoff, handoffs (to the same RF channel and slot) will be done approximately every five seconds to keep the mobile station in shortened burst mode for this measurement.
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- OVER SAMPLE. Press this softkey to set the oversampling factor of the displayed signal curve to 1 or 8.
- DISPLAY RANGE. Press this softkey to select different parts of the burst to zoom in on for closer analysis. You have six choices: FULL, RISING EDGE, CENTER, FALLING EDGE, LEFT CORNER, and RIGHT CORNER.
- DISPLAY MODE. Press this softkey to toggle the display between CURRENT, AVERAGE, or MAXIMUM power levels.
- MARKER. Press this softkey to set the marker position. The marker range is between symbol –28 to symbol 190 (0.25 symbol resolution).
- GRID ON/OFF. Press this softkey to turn the display grid pattern on or off.
- NUMBER OF BURSTS. Press this softkey to set the number of bursts to be taken into account for averaging. The range is between 1 and 1000.

Limits for the nominal transmit power (NTP), Leakage power, and the template are defined in the configuration menu accessed by pressing the CONFIG front-panel key (refer to page 3–249). Any result exceeding these limits is displayed as inverse video (white on black).

PHASE ERROR. The phase error measurement allows you to measure the difference in phase between the actual measured signal from the mobile station transmitter and an ideal signal waveform at the detection points. See Figure 3–158.

The peak and the RMS phase error in the current burst are displayed. In addition, the average and the maximum deviation (positive or negative) over a user defined number of bursts is calculated. All valid 157 symbols of an uplink burst (symbol 6 to symbol 162) are evaluated for the measurement.

The carrier feedthrough refers to the origin offset which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.

The amplitude difference between the in-phase and quadrature components of the signal is represented by the I/Q imbalance measurement.

This measurement also allows you to measure the Mobile Station transmit carrier frequency, expressed in terms of difference from the nominal frequency for that channel. The average carrier frequency error is the difference between the average carrier frequency of the actual transmitted waveform and the ideal computed signal waveform carrier frequency.

The Amplitude droop measurement allows you to determine the difference of the signal power between the detection point of the first valid symbol (symbol 6) in the active slot and the last valid symbol (symbol 162).

The measurement filter used is:

Square Root Nyquist r = 0.35 (ref. to IS-136-A section 2.1.3.3)

The detected MS sync number is also displayed.

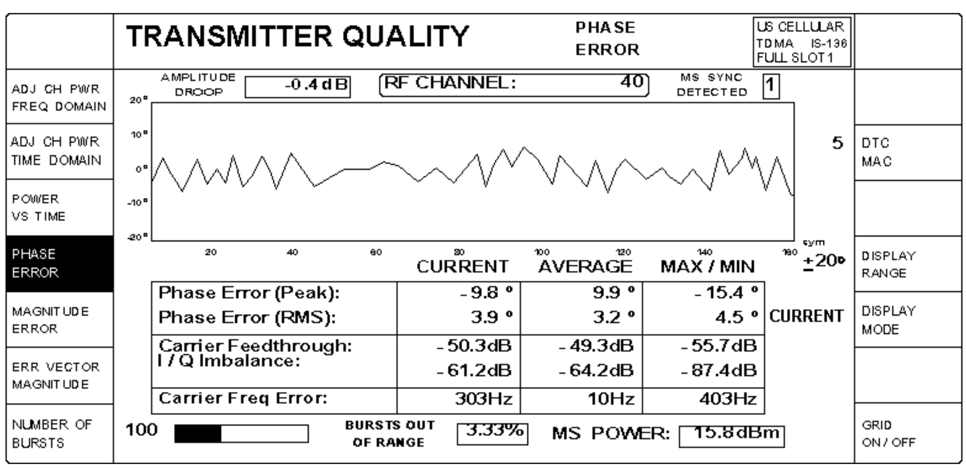


Figure 3–158: TDMA manual transmitter quality test — phase error

From this measurement display, you may adjust the following parameters.

- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DISPLAY RANGE. Press this softkey to set the graphic display range (± 5 to 30 degrees).
- DISPLAY MODE. Press this softkey to select which curve to display (CURRENT, AVERAGE or MAX/MIN).
- NUMBER OF BURSTS. Press this softkey to set the number of bursts to be taken into account for averaging. The range is between 1 and 1000.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and Error Vector Magnitude (Pk, RMS) are defined in the configuration menu accessed by pressing the CONFIG front-panel key (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

MAGNITUDE ERROR. The magnitude error measurement allows you to measure the difference in magnitude between the received signal waveform and an ideal $\pi/4$ DQPSK signal waveform. See Figure 3–159.

The magnitude error is the difference in amplitude between the actual measured signal from the mobile station transmitter and an ideal signal waveform at the detection points. The peak and the RMS magnitude error of the current burst is displayed. In addition, the average and the maximum deviation (positive or negative) over a user definable number of bursts is calculated. All valid 157 symbols of an uplink burst (symbol 6 to symbol 162) are evaluated.

The carrier feedthrough refers to the origin offset which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.

The amplitude difference between the in-phase and quadrature components of the signal is represented by the I/Q imbalance measurement.

This measurement also allows you to measure the mobile station transmit carrier frequency, expressed in terms of difference from the nominal frequency for that channel. The average carrier frequency error is the difference between the average carrier frequency of the actual transmitted waveform and the ideal computed signal waveform carrier frequency.

The Amplitude droop measurement allows you to determine the difference of the signal power at the detection point of the first valid symbol (symbol 6) in the active slot and the last symbol (symbol 162).

The measurement filter used is:

Square Root Nyquist r = 0.35 (ref. to IS-136-A section 2.1.3.3)

The detected MS sync number is also displayed.

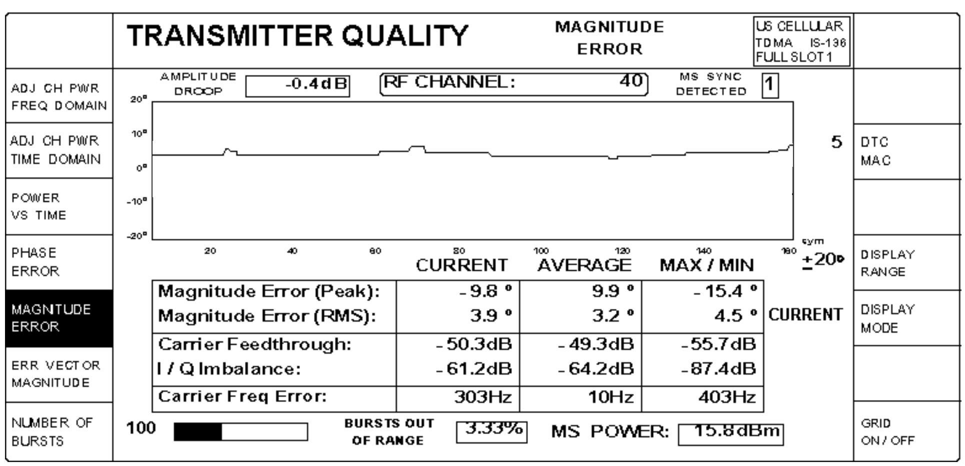


Figure 3–159: TDMA manual transmitter quality test — magnitude error

From this measurement display, you may adjust the following parameters.

- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DISPLAY RANGE. Press this softkey to set the graphic display range (5 to 30 percent).
- DISPLAY MODE. Press this softkey to select which curve to display (CURRENT, AVERAGE or MAX/MIN).
- NUMBER OF BURSTS. Press this softkey to set the number of bursts to be taken into account for averaging and min/max. The range is between 1 and 1000.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and EVM (Pk, RMS) are defined in the Configuration Menu accessed by pressing the CONFIG front-panel key (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

ERR VECTOR MAGNITUDE. The error vector magnitude measurement allows you to measure the modulation accuracy. The EVM is a calculated percentage of vector error between an ideal $\pi/4$ DQPSK signal waveform and the received signal from the mobile station. See Figure 3–160.

The error vector magnitude measures the amplitude of the vector connecting the actual measured signal from the mobile station transmitter and the ideal signal vector at the detection points. The peak and the RMS vector error in the current burst is displayed. In addition, the average and the maximum deviation over a user definable number of bursts is calculated. For example, all valid 157 symbols of an uplink burst (symbol 6 to symbol 162) are evaluated.

The carrier feedthrough refers to the origin offset which is the magnitude of the RF carrier relative to the magnitude of the modulated carrier.

The amplitude difference between the in-phase and quadrature components of the signal is represented by the I/Q imbalance measurement.

This measurements also allows the user to measure the mobile station transmit carrier frequency, expressed in terms of difference from the nominal frequency for that channel. The average carrier frequency error is the difference between the average carrier frequency of the actual transmitted waveform and the ideal computed signal waveform carrier frequency.

The Amplitude droop measurement allows you to determine the difference between the signal power at the detection point of the first valid symbol (symbol 6) in the active slot and the last symbol (symbol 162).

The measurement filter used is:

Square Root Nyquist r = 0.35 (ref. to IS-136-A section 2.1.3.3)

The detected MS sync number is also displayed.

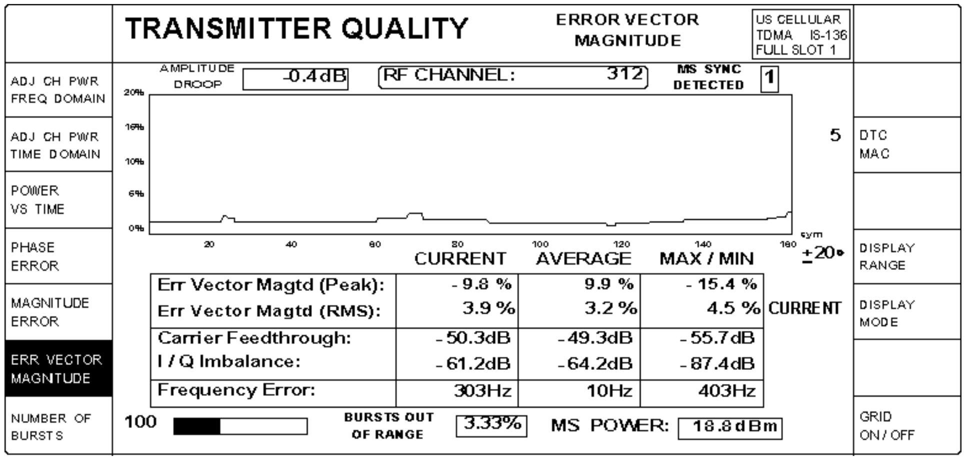


Figure 3–160: TDMA manual transmitter quality test — error vector magnitude

From this measurement display, you may adjust the following parameters.

- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.
- DISPLAY RANGE. Press this softkey to set the graphic display range (5 to 30 percent).
- DISPLAY MODE. Press this softkey to select which curve to display (CURRENT, AVERAGE, or MAX/MIN).
- NUMBER OF BURSTS. Press this softkey to set the number of bursts to be taken into account for averaging. The range is between 1 and 1000.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and EVM (Pk, RMS) are defined in the configuration menu by pressing the CONFIG front-panel key (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

Time Alignment

Press this softkey to display the timing measurement screen that you can use to measure the timing alignment (in symbols) between the user specified delay and the actual measured delay of the burst signal from the mobile station transmitter. Figure 3–161 shows the TIME ALIGNMENT menu.

The MS POWER measurement displayed is the power level of the mobile station.

The ACTUAL TIMING ADVANCE measurement is the number of symbols delay from symbol 0 of the active slot.

The TIMING ADVANCE ERROR measurement is the difference between the actual timing advance and the expected advance.

The bar graph displays the measured symbol delay (actual) to the user specified (expected) symbol delay.

The detected MS sync number is also displayed.

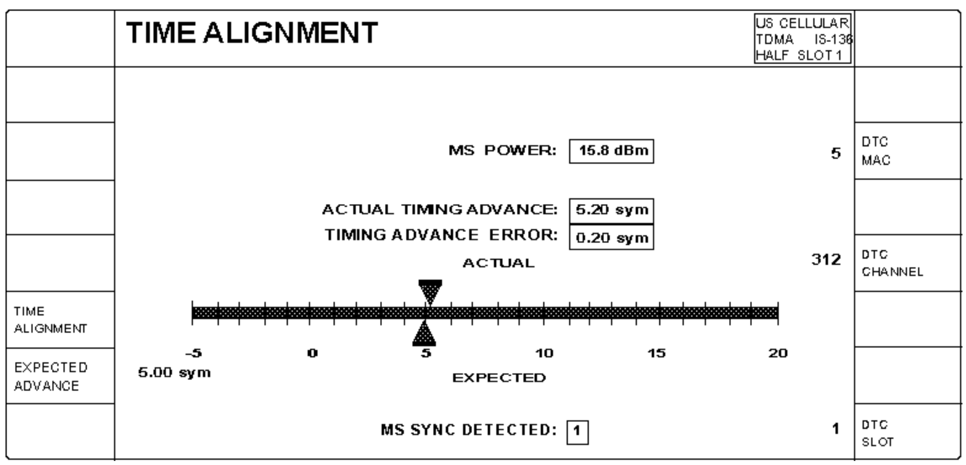


Figure 3–161: TDMA time alignment menu

From this measurement display, you may adjust the following parameters:

- TIME ALIGNMENT. Press this softkey to start the measurement.
- EXPECTED ADVANCE. Press this softkey to enter the number of symbols by which you want the mobile station to delay the burst signal. This configures the Time Alignment parameter of a PLC message. The advance can be set from 0 to 15 symbols in ½ symbol increments.
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This is a code sent by the base station to control

the output power for the digital voice traffic channel. This also sets the expected power level and attenuation/gain through the receive path.

- DTC CHANNEL. Press this softkey to set the Digital Traffic Channel (1 to 799 or 991 to 1023 for cellular; 1 to 1999 for PCS).
- DTC SLOT. Press this softkey to set the Digital Traffic Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic).

Limits for Time Alignment are defined in the configuration menu by pressing the CONFIG front-panel key (refer to page 3–241). Any result exceeding these limits is displayed as inverse video (white on black).

MAHO Report

Press this softkey to display the Mobile Assisted Handoff report menu (see Figure 3–162). This screen displays the results of the mobile station measurement report, showing the current base station channel in use, its RSSI (received signal strength indication), and the BER RANGE (bit error information estimated by the mobile station).

The mobile station also sends back the RSSI measurements for the defined neighbor channels.

This information is transmitted from the mobile station to the tester over the SACCH (slow associated control channel).

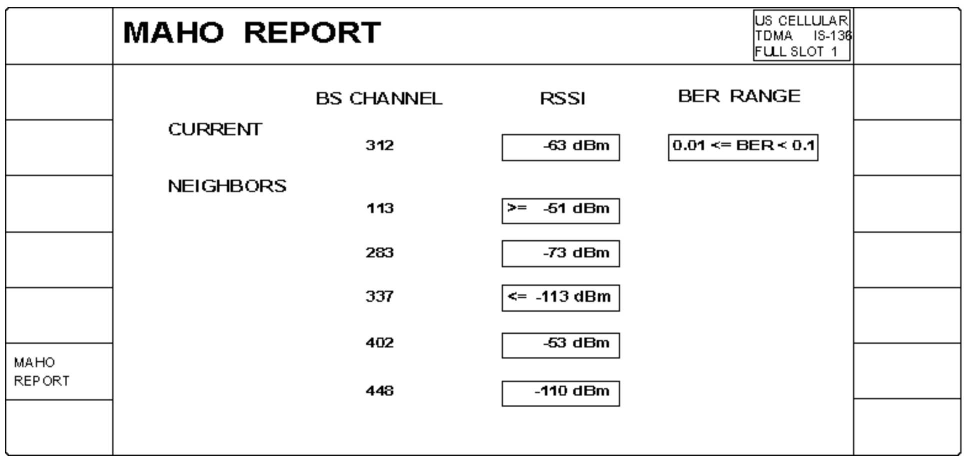


Figure 3–162: TDMA MAHO report menu

The list of neighbor channels is defined in the configuration menu by pressing the CONFIG front-panel key (refer to page 3–242). There are no error limits associated with this measurement.

Handoffs/Transitions

Press the HANDOFFS/TRANSITIONS softkey to display the HANDOFFS/ TRANSITIONS menu for the CALL ESTABLISHED mode. See Figure 3–163.

You use this menu to either handoff an established call to another network or system, or you can make a local transition such as from TDMA MS TESTS to TDMA VOICE LOOPBACK.

***NOTE**. The menu displays the previous NETWORK HANDOFFS selections. The selections are retained until you change them.*

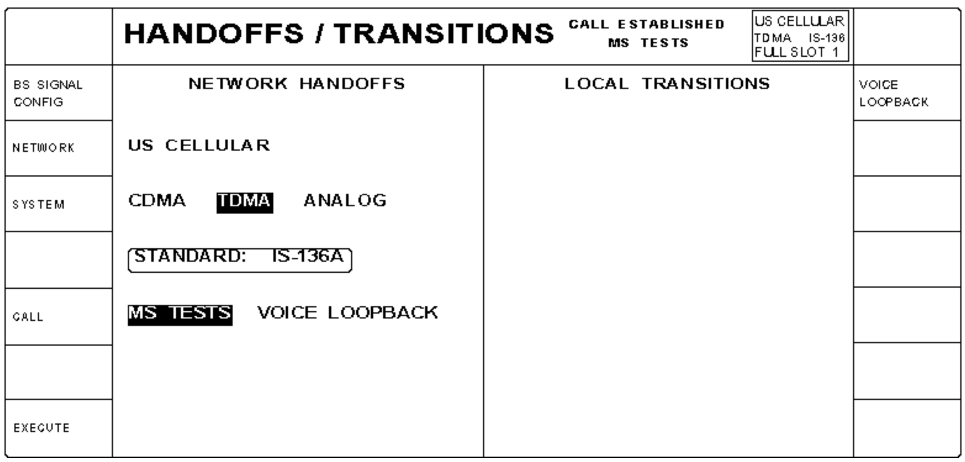


Figure 3–163: Handoffs/transitions menu for call established (MS tests)

To handoff a TDMA call, perform the following procedure:

1. In the NETWORK HANDOFFS side of the menu, select the network, system, and standard to which you want to handoff the call. Table 3–8 lists the supported handoffs with all options installed.

***NOTE**. The tester does not support handoffs between TDMA and CDMA.*

2. To configure the the base station signal for the system to which you are handing off, press the BS SIGNAL CNFG softkey.

   For information about configuring the operating parameters of a TDMA base station, refer to *TDMA BS SIGNAL CNFG* on page 3–251. For information about configuring the operating parameters of an analog base station, refer to *ANALOG BS SIGNAL CNFG* on page 3–160.

3. Press the CALL softkey to select either MS TESTS or VOICE LOOPBACK. This determines the state that the tester is in after you execute the handoff.

NOTE*. If the network handoff you selected is not implemented in the tester, the tester displays the message "The configured handoff is NOT currently available." In this case, the tester does not display the EXECUTE softkey.*

4. Press the EXECUTE softkey to make the handoff.

Table 3–8: Valid network handoffs

Network	Handoff from standard	Valid handoff to standards
US Cellular	CDMA (IS–95)	AMPS or NAMPS
	AMPS	NAMPS
	NAMPS	AMPS
	AMPS	TDMA (IS–136–A)
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US PCS TDMA (IS–136–A)
Japanese Cellular	CDMA (IS–95)	JTACS or NTACS
	J–CDMA (T53)	JTACS or NTACS
	JTACS	NTACS
	NTACS	JTACS
Chinese Cellular	CDMA (IS–95)	ETACS or TACS
US PCS	CDMA (UB IS–95)	AMPS or NAMPS
	CDMA (J–STD–008)	AMPS or NAMPS
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US Cellular TDMA (IS–136–A)

In the LOCAL TRANSITIONS side of the HANDOFFS/TRANSITIONS menu, you can use the softkeys to make a local transition. When TDMA is the system for the currently established call, the only transition softkeys that are available are VOICE LOOPBACK (if the selected CALL is MS TESTS) or MS TESTS (if the selected CALL is VOICE LOOPBACK).

BS Signal Configuration (Call Established)

Press the BS SIGNAL CNFG softkey to display the base station configuration menu associated with the CALL ESTABLISHED state for the selected network. This section describes the menus when TDMA is the selected system. See Figure 3–164. Use this menu to set the operating parameters of the base station signal.

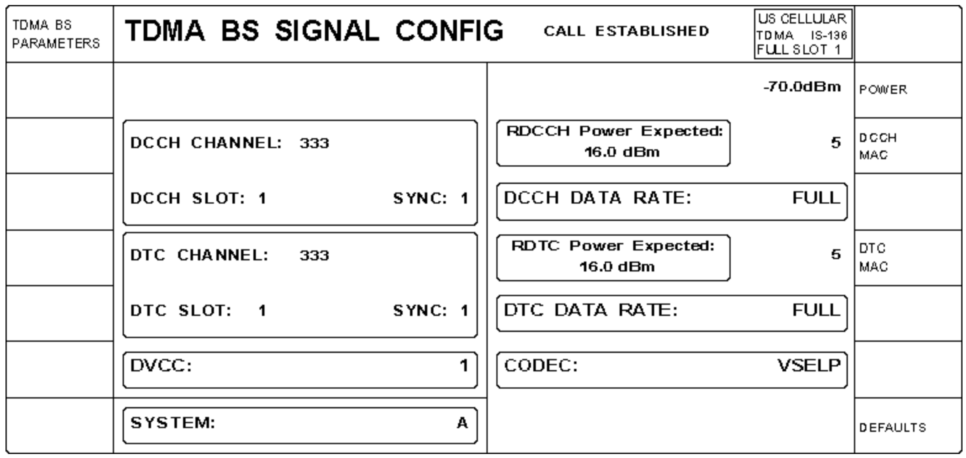


Figure 3–164: TDMA BS signal configuration (call established) menu

While in this menu, you can vary the following parameters of the base station:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DCCH MAC. Press this softkey to set the Digital Control Channel Mobile Attenuation Code (0 to 10).
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This sets the expected power level and attenuation/gain through the receive path.
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136-A specifications.

NOTE*. The parameters in the rounded boxes cannot be changed while a call is established. To change these parameters, press the MENU HOME front-panel key (dropping the call). Select the CONFIG MENU softkey, then select the TDMA BS SIGNAL CNFG softkey.*

- TDMA BS PARAMETERS. Press this softkey to display the TDMA BS PARAMETERS CONFIGURATION menu. See Figure 3–165.

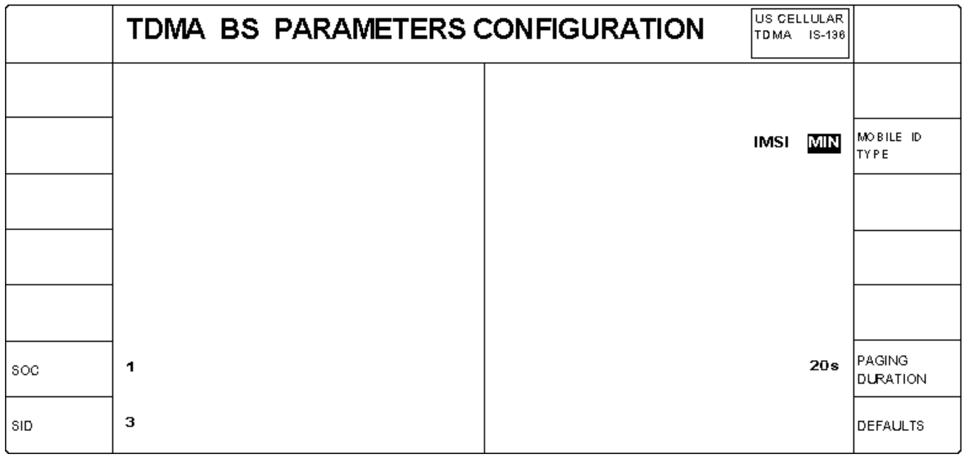
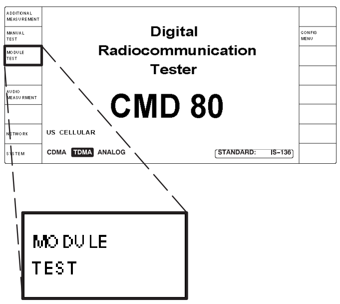


Figure 3–165: TDMA BS parameters configuration menu (call established) menu

You can set the following parameters for the base station:

- SOC. Press this softkey to set the System Operator Code number (0 to 4095). This is a number that uniquely identifies a cellular service provider.
- SID. Press this softkey to set a system identification number (1 to 32767). This is a number that uniquely identifies a cellular system.
- MOBILE ID TYPE. Press this softkey to toggle the mobile station ID type between MIN (Mobile Identification Number) and IMSI (International Mobile Station Identity) as defined in IS-136-A section 8.1.3 and 8.1.1 respectively. MIN is a 34 bit mobile station ID number. IMSI is an ID number with a maximum of 15 decimal digits.
- PAGING DURATION. Press this softkey to set the paging duration. The paging duration is how long the base station sends a paging message over the control channel to the mobile station when a call is being established. If you set this time too short, the signal search algorithm of the mobile station may take longer than the paging duration, and the call setup may fail.
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136-A specifications.

Module Test



The MODULE TEST softkey selects the module test measurements for the system selected with the SYSTEM softkey in the home menu. This section discusses the tests available for the TDMA system.

***NOTE**. The tester displays TDMA module test menus only if you have Option B84 and Option B82 installed and have selected TDMA as the SYSTEM.*

The module test feature supports testing the components of a mobile station before they are assembled into a unit that is capable of completing a call. In general, the tester transmits a configurable forward voice channel while ignoring the information content in the reverse channel. This allows the tester to measure the power level and waveform quality on the reverse channel while not requiring that the module-under-test be capable of establishing or maintaining a call.

It is up to the user to force the module-under-test into an appropriate state (such as the time-slot and DVCC) before performing the module tests. In some cases, you may want to manually force other conditions that are not under the control of the tester in this mode of operation. Examples of this are the enabling or disabling loopback mode using the TDMA ON command.

Press the MODULE TEST softkey to display the TDMA MODULE TEST menu (see Figure 3–166).

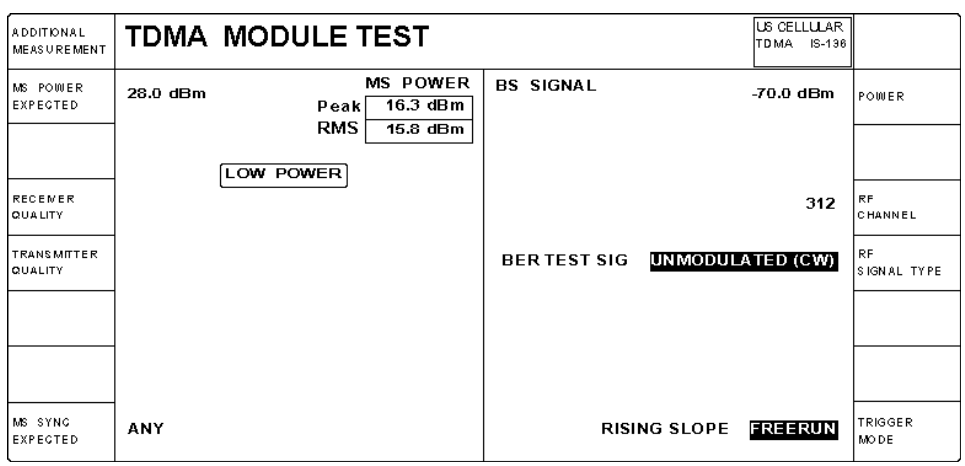


Figure 3–166: TDMA module test menu

The tester measures the mobile station’s power and displays the Peak and RMS values in the MS POWER field.

The MS power measurement allows the user to measure the mobile station transmit peak power and RMS power over any of the 11 digital mobile station nominal power levels. The digital RF power of the output transmitter is the mean power during the burst available at the output terminals of the transmitter. For this digital measurement, the tester is synchronized to a burst and only active slots are taken into account. The peak/RMS power is calculated over 140 consecutive symbol periods between symbol 6 and symbol 162. Refer to Table 3–9 for the possible display values. The additional display information will appear in a rounded box below the power measurements.

Table 3–9: TDMA module test return values and error codes

	Return parameter		
Burst status	**Peak measurement**	**RMS measurement**	**Additional display information**
Valid burst	PEAK	RMS	
Burst power too low	Measured over one acquisition frame (6+ slots)	Measured over one acquisition frame (6+ slots)	Low Power
No power ramp detected	Measured over one acquisition frame (6+ slots)	Measured over one acquisition frame (6+ slots)	No Power Ramp
Invalid burst length, power ramp detected	Measured from ramp edge to end of valid slot duration time	Measured from ramp edge to end of valid slot duration time	Invalid Burst

The following narrow band RF filter is used for the measurement:

Square Root Nyquist Filter r = 0.35

While in this menu, you can vary the following parameters of the base station:

- MS POWER EXPECTED. Press this softkey to set the permitted dynamic range for the expected mobile station power. The MS POWER display reads LOW or OVL (overload) when the power level of the mobile station is above or below the measurement window. The range can be set as follows:

  RF IN/OUT –80 dBm to +39 dBm
  RF IN2 –121 dBm to –2 dBm

- MS SYNC EXPECTED. Press this softkey to set the sync selection. The choices include: Any, None, and Sync 1 through Sync 6 (corresponding to slots 1 through 6 respectively).

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).

  You can also use this softkey to turn off the tester's transmit power.

- RF CHANNEL. Press this softkey to set the RF channel. All possible channels (1 to 799 and 991 to 1023 for cellular; 1 to 1999 for PCS) are available depending on the installed options.

- RF SIGNAL TYPE. Press this softkey to set the base station signal type to either a BER test signal or an unmodulated (CW) test signal.

NOTE. *The BER test signal simulates three full rate users with the following time-slot and DVCC configurations. The mobile station may need to be reconfigured accordingly, in order to attain the synchronization necessary to run the BER tests.*

User	1	2	3
Time-slot	1, 4	2, 5	3, 6
DVCC	1	2	3

- TRIGGER MODE. Press this softkey to toggle the trigger mode operation. With Rising Slope selected, the tester uses the rising portion of the test signal to detect the burst. With Free Run selected, the tester uses the detection of the sync sequence to detect the burst.

  The Bit Error Rate and the MS power measurements are always done in the Free Run trigger mode.

Normally, you set up the parameters for the receiver and transmitter quality tests you want to make using the configuration menus that you access from the home menu. However, you can also press the CONFIG front-panel key to display the TDMA MODULE TEST CONFIGURATION menu to set or change the receiver and transmitter test parameters. See Figure 3–167. Use the MENU UP front-panel key to return to the TDMA MODULE TEST menu after making the configuration changes.

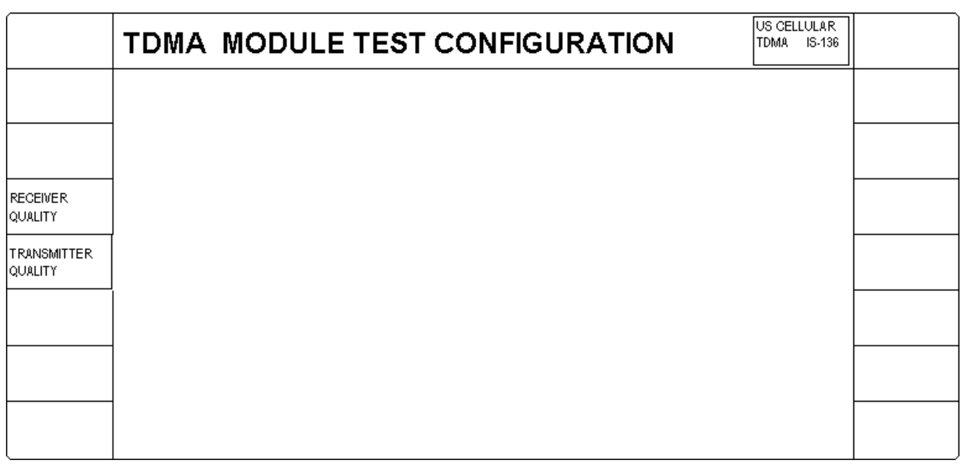


Figure 3–167: TDMA module test configuration menu

Refer to pages 3–243 and 3–247 for information about setting up the test configurations for receiver quality and transmitter quality.

Additional Measurement

Press the ADDITIONAL MEASUREMENT softkey to display the ADDITIONAL MEASUREMENTS menu, which you can use to take conventional measurements. Refer to *Additional Measurements* on page 3–255.

Receiver Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile station receiver. See Figure 3–168.

***NOTE**. The BER tests may not function if the mobile station is configured improperly. Refer to page 3–217 for more information.*

Two modes of operation are available when testing receiver quality, continuous or single shot. You can toggle between the two modes by pressing the GO TO SINGLE SHOT/GO TO CONTINUOUS softkey.

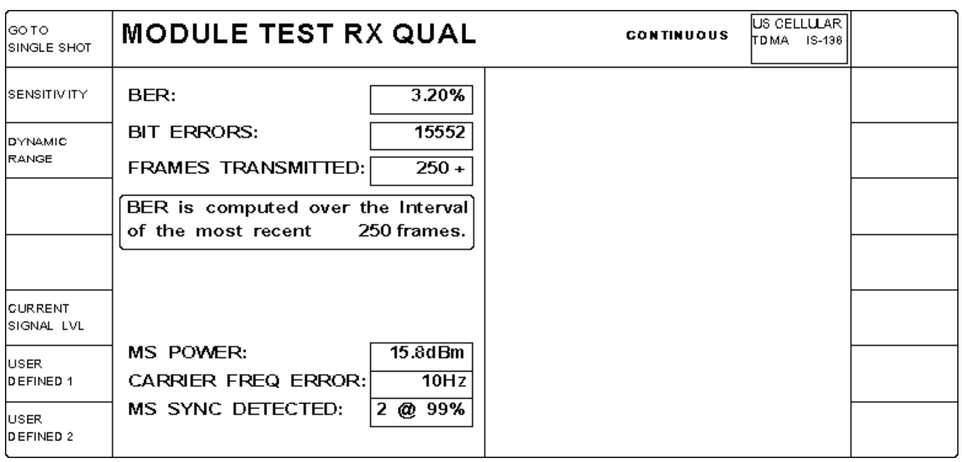


Figure 3–168: TDMA module test receiver quality menu

In continuous mode, the tester continuously performs the receiver quality test and displays the bit error rate over the interval of the most recent number of frames. You can set the bit error rate interval (CONTINUOUS INTERVAL) in the configuration menu (refer to *Receiver Quality* on page 3–232).

To perform mobile station receiver tests, your mobile station must be connected to the tester. Figure 3–144 on page 3–185 shows the recommended connections for testing receiver quality. Other methods of connecting are possible (refer to *RF CONNECT/EXT ATTEN* on page 1–16).

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, you can also press the CONFIG front-panel key to display the MODULE TEST RECEIVER QUALITY CNFG menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel key to return to the MODULE TEST RECEIVER QUAL test menu after making the configuration changes.

Since the TDMA manual tests for receiver quality discussed earlier are similar to the TDMA module tests, you will be referred to the TDMA manual tests for menu descriptions. Only menu items unique to the TDMA module tests are discussed in the following subsections.

SENSITIVITY. Press the sensitivity softkey to measure the sensitivity of the mobile station receiver using a Bit Error Rate measurement (see Figure 3–169). The sensitivity measurement is intended to test the receiver error rate while the mobile station is receiving a minimum level of RF power.

NOTE. *You must place the mobile station in data loopback mode to run the receiver sensitivity tests. If this is not done, the tests will measure large error rates.*

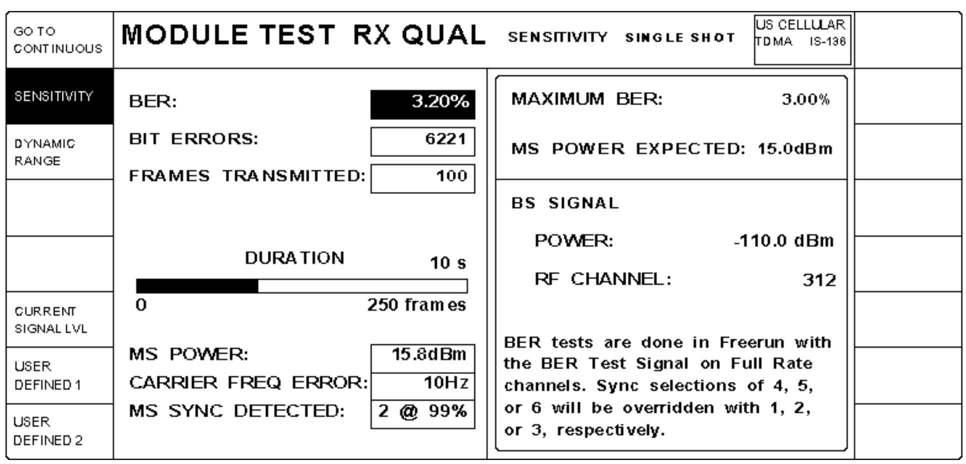


Figure 3–169: TDMA module receiver quality test — sensitivity

Refer to *SENSITIVITY* on page 3–190 for a detailed description of the menu items.

DYNAMIC RANGE. Press the dynamic range softkey to measure the dynamic range of the mobile station receiver using a BER measurement (see Figure 3–170). The Dynamic Range measurement is intended to test the receiver error rate while receiving a maximum level of RF power.

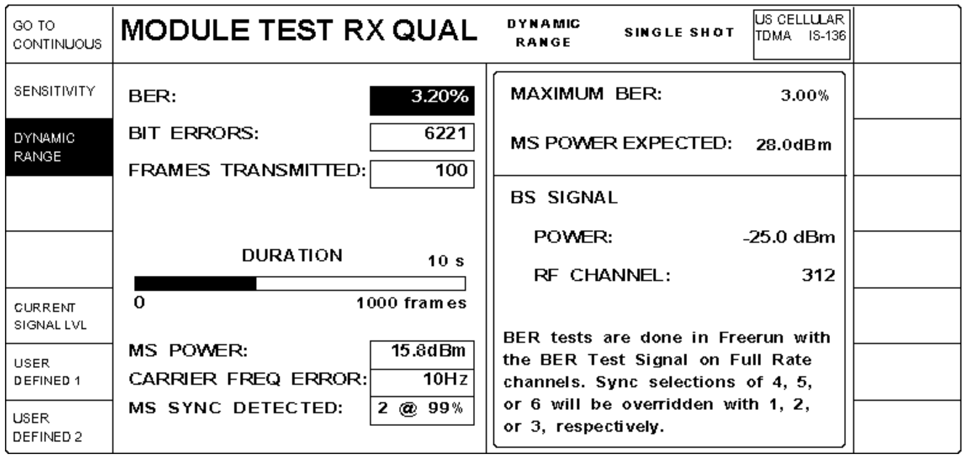


Figure 3–170: TDMA module receiver quality test — dynamic range

Refer to *DYNAMIC RANGE* on page 3–191 for a detailed description of the menu items.

CURRENT SIGNAL LVL. Press the current signal level softkey to measure the receiver performance of the mobile station using a BER measurement (see Figure 3–171). This measurement tests the receiver using the current power level setting of the tester.

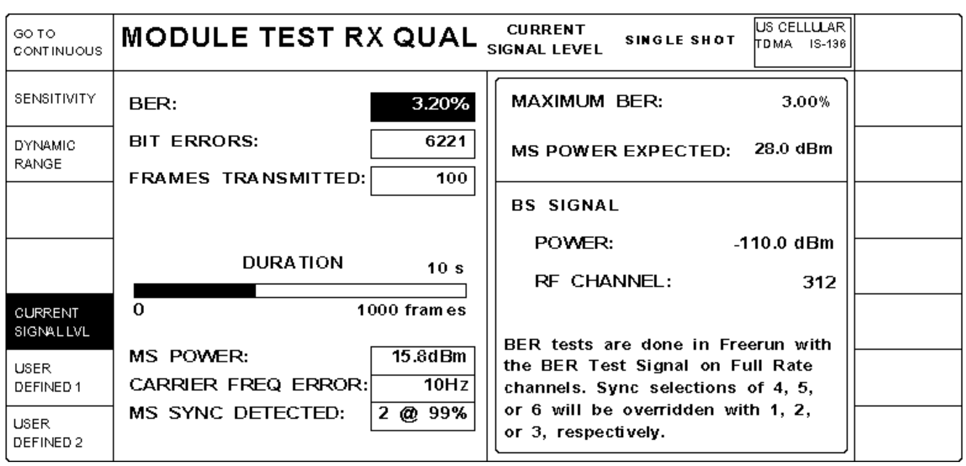


Figure 3–171: TDMA module receiver quality test — current signal level

Refer to *CURRENT SIGNAL LVL* on page 3–192 for a detailed description of the menu items.

USER DEFINED 1 (2). Press either of these softkeys to measure the receiver performance of the mobile station using a user defined power level setting for the BER measurement (see Figure 3–172).

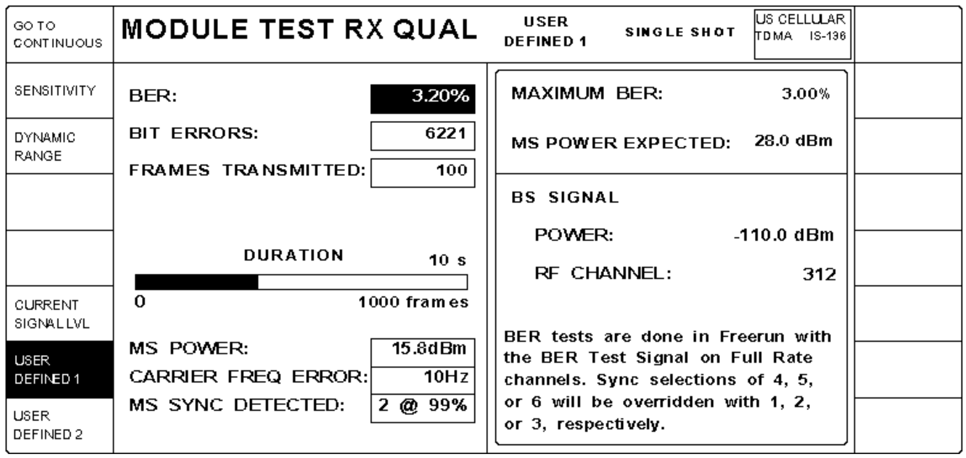


Figure 3–172: TDMA module receiver quality test — user defined 1 (2)

Refer to *USER DEFINED 1 (2)* on page 3–193 for a detailed description of the menu items.

Transmitter Quality

Press this softkey to display the tests that you can use to measure the performance of the mobile station transmitter. Select the transmitter test that you want to perform from the menu selections on the left side of the menu. Figure 3–173 shows the menu with the adjacent channel power frequency domain measurement selected.

***NOTE**. The initial menu display after pressing the TRANSMITTER QUALITY softkey defaults to the last menu accessed within the transmitter quality menu group.*

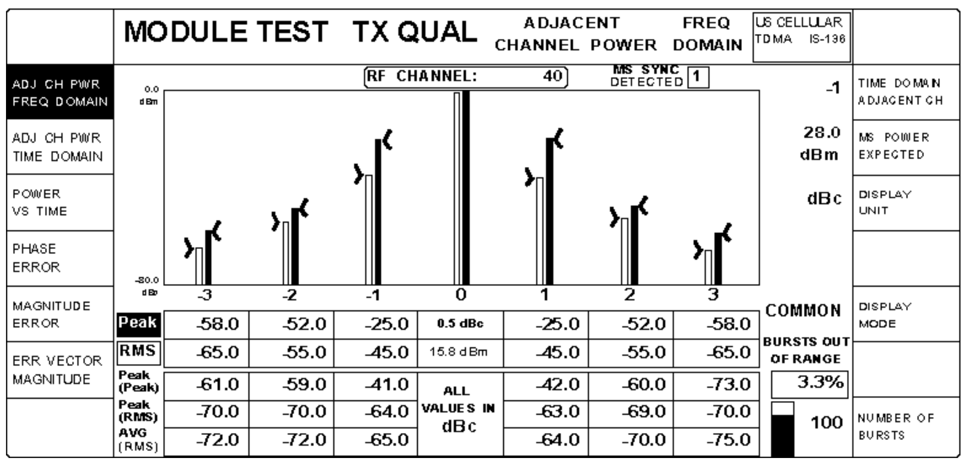


Figure 3–173: TDMA module test transmitter quality menu

Normally, you set up the parameters for the tests you want to make using the configuration menus that you access from the home menu. However, you can also press the CONFIG front-panel key to display the MODULE TEST TX QUAL CNFG menu that is associated with the selected test. You can use this menu to set or change the test parameters. Use the MENU UP front-panel key to return to the MODULE TEST TRANSMIT QUAL test menu after making the configuration changes. Refer to the module test *TRANSMITTER QUALITY* configuration discussions beginning on page 3–247 for configuration.

To perform mobile station transmitter tests, your mobile station must be connected to the tester. Figure 3–152 on page 3–194 shows the recommended connections. Other methods of connecting are possible (refer to *RF CONNECT/ EXT ATTEN* on page 1–16).

Since the TDMA manual tests for transmitter quality discussed earlier are similar to the TDMA module tests, you will be referred to those tests for menu descriptions. Only items unique to the TDMA module test are discussed in the following subsections.

The following text discusses each of the MODULE TEST TRANSMITTER QUALITY menu selections.

ADJ CH PWR FREQ DOMAIN. The adjacent channel power measurement allows the user to measure the adjacent, first and second alternate channel power and display the results in a frequency domain view. See Figure 3–174.

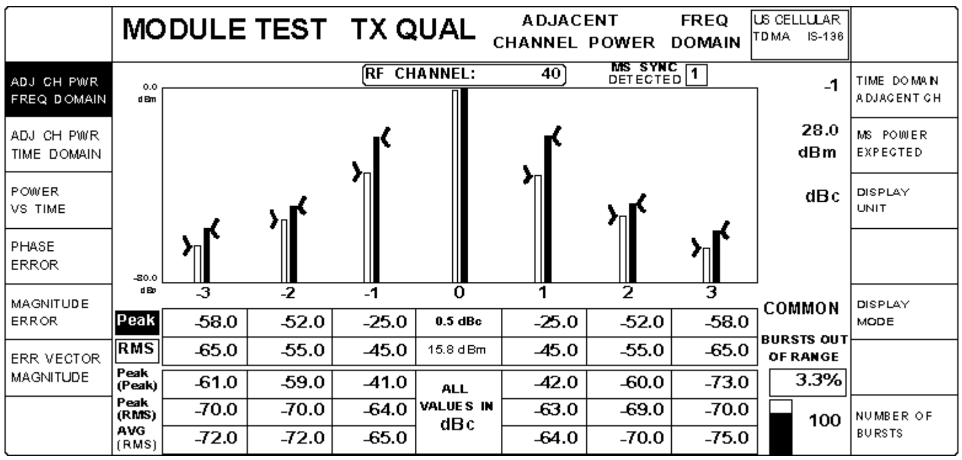


Figure 3–174: TDMA module transmitter quality test — adjacent channel power (frequency domain)

This test performs the same as the manual test. Refer to *ADJ CH PWR FREQ DOMAIN* on page 3–196 for a description of this test.

Limits for the RMS and PEAK limits are defined in the configuration menu (refer to page 3–248).

ADJ CH PWR TIME DOMAIN. The adjacent channel power measurement performs much the same as the ADJ CH PWR FREQ DOMAIN measurement but displays the results in a time domain view. See Figure 3–175. The time domain view provides a graphical representation of the time-domain burst in the selected adjacent/alternate channel with the accompanying statistic results. Note that the percentage in the Bursts Out of Range field covers all 6 neighboring channels.

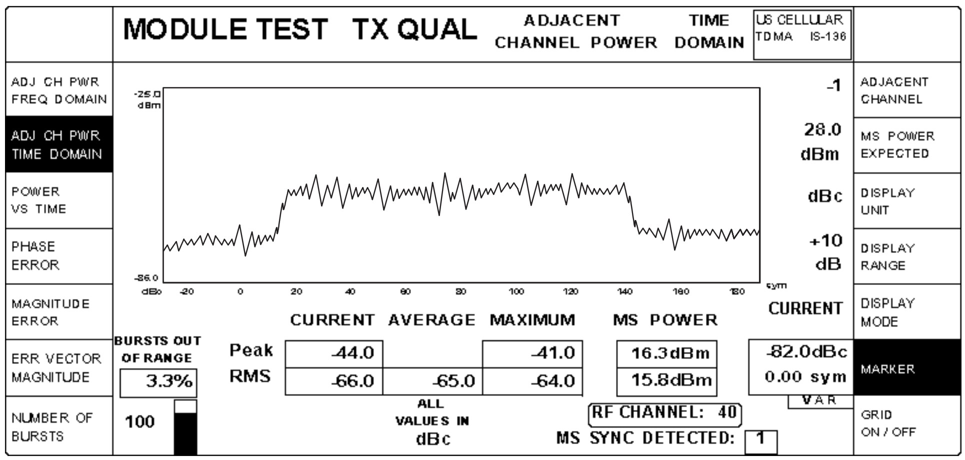


Figure 3–175: TDMA module transmitter quality test — adjacent channel power (time domain)

This test performs the same as the manual test. Refer to *ADJ CH PWR TIME DOMAIN* on page 3–198 for a description of this test.

Limits for the RMS and PEAK limits are defined in the configuration menu (refer to page 3–248).

POWER VS TIME. The power versus time measurement allows the user to verify the correct transmit carrier switching time required to produce power output at the required power level from the carrier-off state as well as the release time required to reduce carrier power to the carrier-off state. See Figure 3–176.

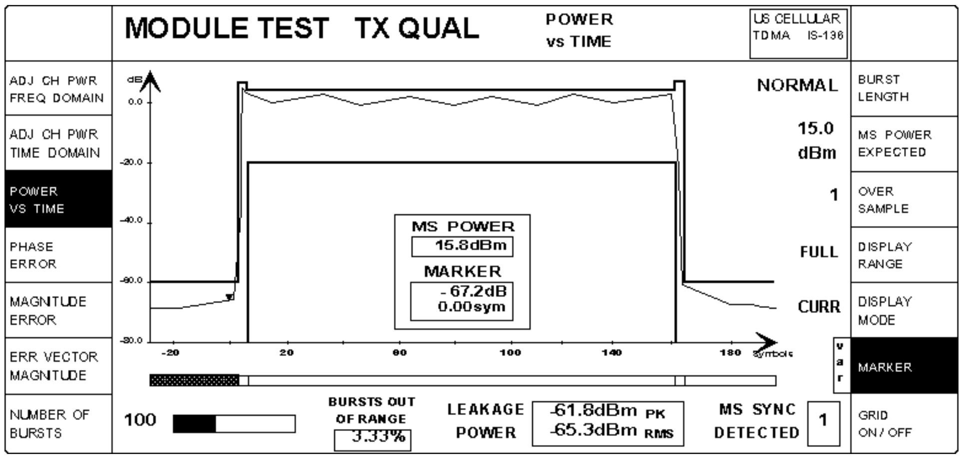


Figure 3–176: TDMA module transmitter quality test — power vs time

This test performs the same as the manual test (except for the BURST LENGTH softkey selection noted below). Refer to *POWER VS TIME* on page 3–200 for a description of this test.

***NOTE**. The type of burst length to be measured is set with the BURST LENGTH softkey as described in the manual test mode. The difference is that no handoffs are performed for the shortened burst module test.*

Limits for the nominal transmit power (NTP), Leakage power, and the template are defined in the configuration menu (refer to page 3–249).

PHASE ERROR. The phase error measurement allows you to measure the difference in phase between the actual measured signal from the mobile station transmitter and an ideal signal waveform at the detection points. See Figure 3–177.

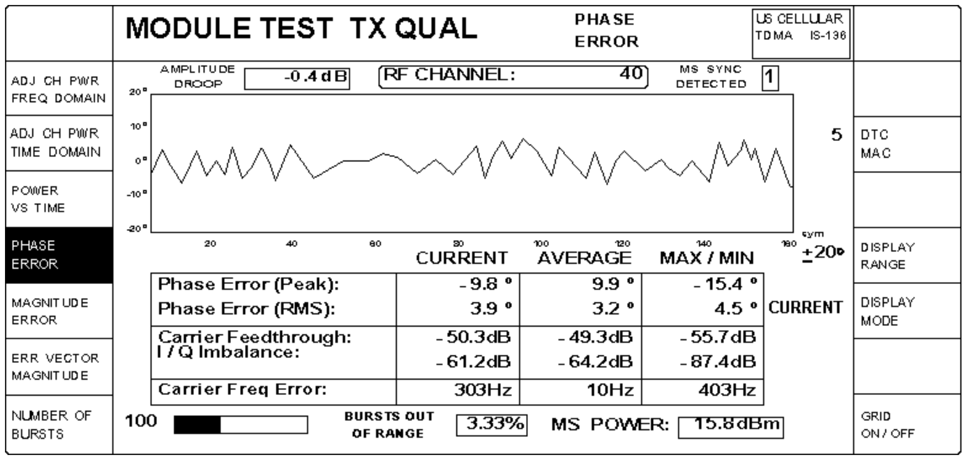


Figure 3–177: TDMA module transmitter quality test — phase error

This test performs the same as the manual test. Refer to *PHASE ERROR* on page 3–202 for a description of this test.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and Error Vector Magnitude (Pk, RMS) are defined in the configuration menu (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

MAGNITUDE ERROR. The magnitude error measurement allows you to measure the difference in magnitude between the received signal waveform magnitude to an ideal $\pi/4$ DQPSK signal waveform. See Figure 3–178.

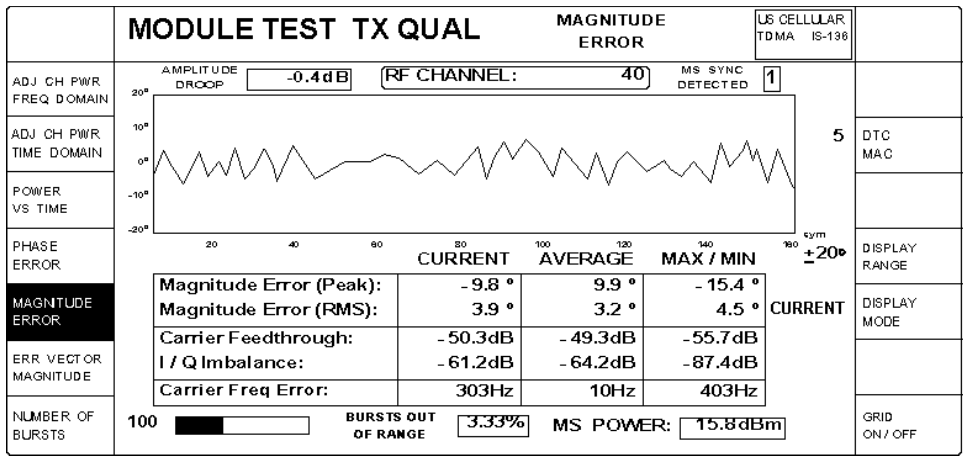


Figure 3–178: TDMA module transmitter quality test — magnitude error

This test performs the same as the manual test. Refer to *MAGNITUDE ERROR* on page 3–204 for a description of this test.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and EVM (Pk, RMS) are defined in the configuration menu (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

ERR VECTOR MAGNITUDE. The error vector magnitude measurement allows you to measure the modulation accuracy by comparing the received signal waveform with an ideal $\pi/4$ DQPSK signal waveform. See Figure 3–179.

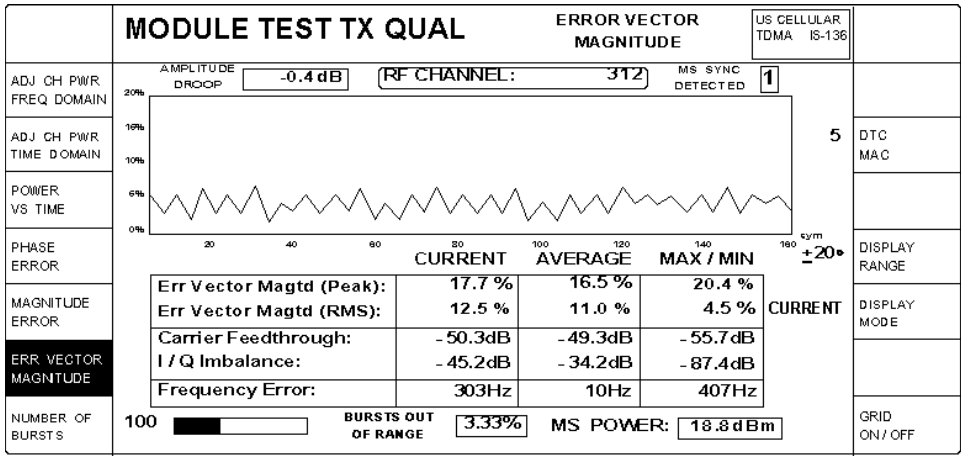
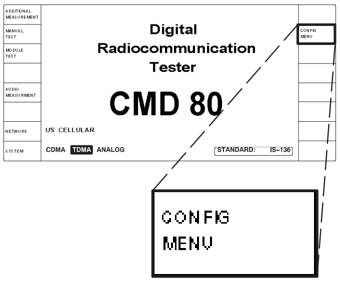


Figure 3–179: TDMA module transmitter quality test — error vector magnitude

This test performs the same as the manual test. Refer to *ERR VECTOR MAGNITUDE* on page 3–206 for a description of this test.

Limits for Phase Error (Pk, RMS), Magnitude Error (Pk, RMS), and EVM (Pk, RMS) are defined in the configuration menu (refer to page 3–250). Any result exceeding these limits is displayed as inverse video (white on black).

Configuration



Press the CONFIG MENU softkey to display the CONFIGURATION MENU. See Figure 3–180.

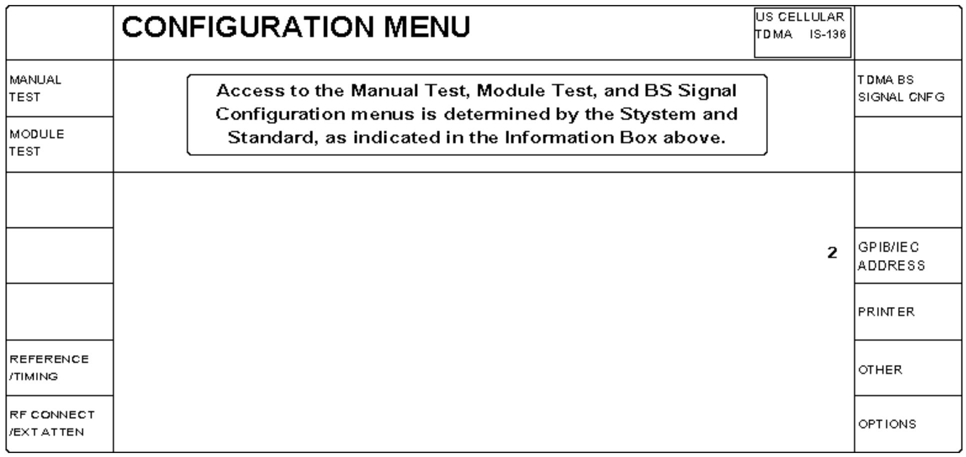


Figure 3–180: TDMA configuration menu

Press the appropriate key for the specific item you want to configure. Some selections contain submenus (see the menu tree in Figure 3–181). Each of the softkeys is described in the following subsection.

- HOME MENU
  - ADDITIONAL MEASUREMENT
  - MANUAL TEST
  - MODULE TEST
  - AUDIO MEASUREMENT
  - NETWORK
  - SYSTEM
  - CONFIG MENU
    - MANUAL TEST
      - RESULT LIMITS
      - RECEIVER QUALITY
        - SENSITIVITY
        - DYNAMIC RANGE
        - CURRENT SIGNAL LVL
        - USER DEFINED 1
        - USER DEFINED 2
      - TRANSMITTER QUALITY
        - ADJACENT CHANNEL PWR
        - POWER VS TIME
        - PE ME EVM
      - TIME ALIGNMENT
      - MAHO REPORT
    - MODULE TEST
      - RECEIVER QUALITY
        - SENSITIVITY
        - DYNAMIC RANGE
        - CURRENT SIGNAL LVL
        - USER DEFINED 1
        - USER DEFINED 2
      - TRANSMITTER QUALITY
        - ADJACENT CHANNEL PWR
        - POWER VS TIME
        - PE ME EVM
    - REFERENCE/TIMING
    - RF CONNECT/EXT ATTEN
    - TDMA BS SIGNAL CONFIG
      - TDMA BS PARAMETERS
    - PRINTER
    - OTHER
    - OPTIONS

Figure 3–181: Structure of the TDMA configuration menu tree

Manual Test

Press this softkey to select the configuration menus for the CDMA, TDMA, or Analog manual tests, depending on the selected system. This subsection discusses the configuration options that are available when you have selected TDMA as the system. See Figure 3–182.

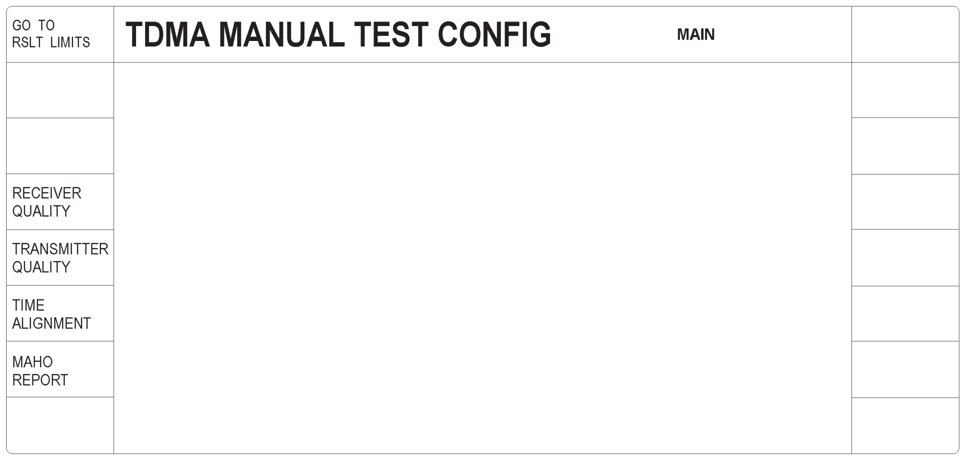


Figure 3–182: TDMA manual test configuration menu

You can use the selections in the TDMA MANUAL TEST CONFIGURATION menu to access the following configuration menus:

- RESULT LIMITS
- RECEIVER QUALITY (refer to *RECEIVER QUALITY* on page 3–232)
- TRANSMITTER QUALITY (refer to *TRANSMITTER QUALITY* on page 3–237)
- TIME ALIGNMENT (refer to *TIME ALIGNMENT* on page 3–241)
- MAHO REPORT (refer to *MAHO REPORT* on page 3–242)

GO TO RSLT LIMITS. Press this softkey to display the TDMA RESULT LIMITS menu (see figure 3–183).

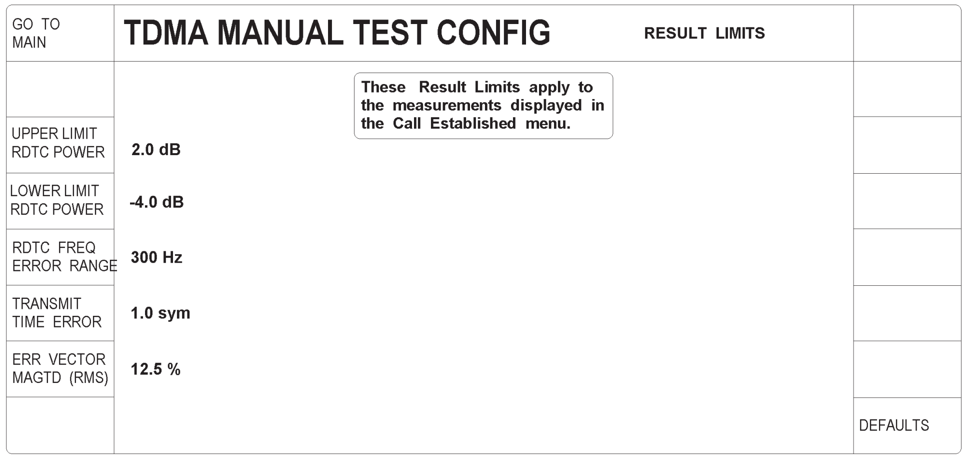


Figure 3–183: TDMA manual test configuration menu — result limits

You can use the selections in this menu to set the limit values for the listed parameters that appear in the TDMA CALL ESTABLISHED MS TESTS menu.

- UPPER LIMIT RDTC POWER. Press this softkey to set the RDTC MS POWER upper limit (0 to +10 dB). This limit is applied relative to the MS EXPECTED power.
- LOWER LIMIT RDTC POWER. Press this softkey to set the RDTC MS POWER lower limit (–10 dB to 0). This limit is applied relative to the MS EXPECTED power.
- RDTC FREQ ERROR RANGE. Press this softkey to set the MS transmitter Reverse Digital Traffic Channel carrier frequency error limit (0 to 4000 Hz).
- TRANSMIT TIME ERROR. Press this softkey to set the MS transmitter burst time alignment error limit (0 to 15 symbol periods in 0.01 symbol increments). This is an absolute value limit.
- ERR VECTOR MAGTD (RMS). Press this softkey to to set the MS transmitter Error Vector Magnitude limit (0 to 100%) for RMS measurements.
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-137-A specifications.

- GO TO MAIN. Press this softkey to return to the MAIN menu (see Figure 3–182 on page 3–230).

RECEIVER QUALITY. Press this softkey to display the TDMA RECEIVER QUALITY CONFIGURATION menu, which has selections that you use to set parameters for the various receiver quality tests. See Figure 3–184.

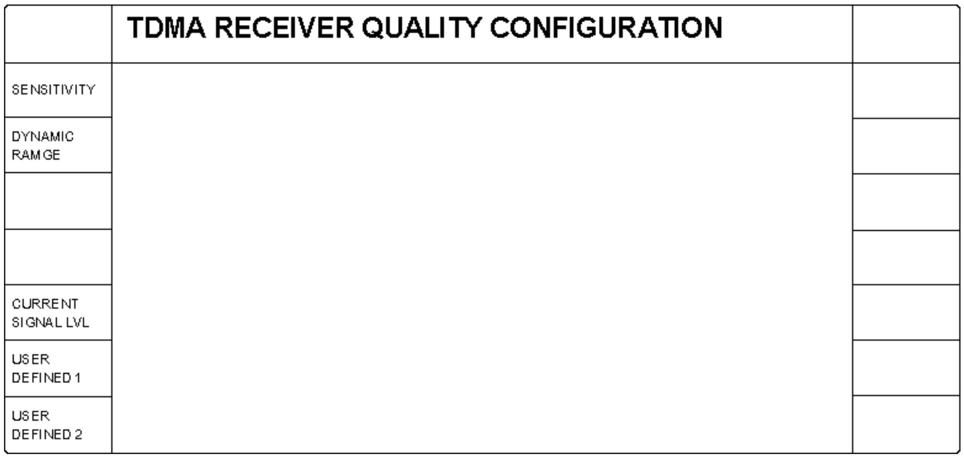


Figure 3–184: TDMA receiver quality configuration menu

Each RECEIVER QUALITY CONFIGURATION menu choice is discussed in the following text.

- **SENSITIVITY.** Press this softkey to display the SENSITIVITY menu (see Figure 3–185). Use this menu to set the parameters for the RECEIVER QUALITY SENSITIVITY test. (Refer to page 3–190 and page 3–219 respectively for Manual and Module Receiver Quality Sensitivity test descriptions.)

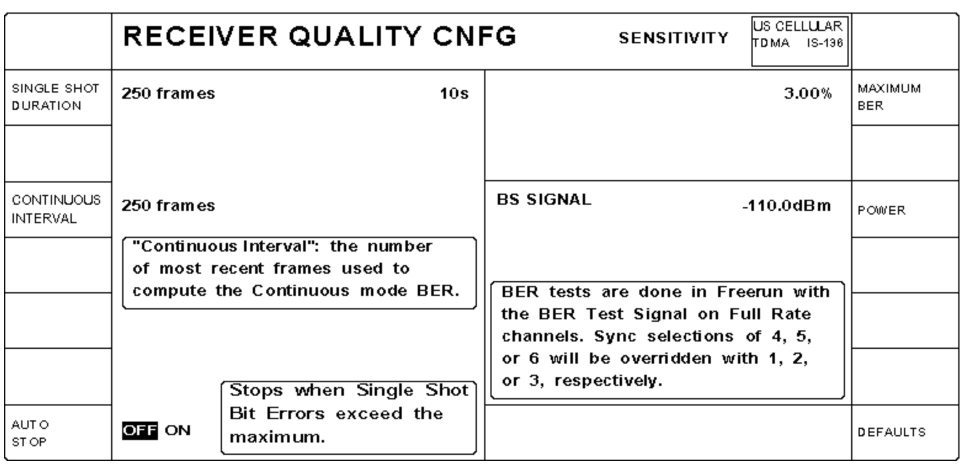


Figure 3–185: TDMA receiver quality configuration menu — sensitivity

You can set the following test parameters:

- SINGLE SHOT DURATION. Press this softkey to set the number of TDMA frames (1 to 500) for the BER measurement when in single shot mode. A TDMA frame length is 40 ms. The actual time duration of the measurement is displayed to the right of the selected number of frames.
- CONTINUOUS INTERVAL. Press this softkey to set the number of TDMA frames (1 to 249) for the BER measurement when in continuous mode.
- AUTO STOP. Press this softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops when the Single Shot Bit Errors exceed the maximum BER percentage you set.
- MAXIMUM BER. Press this softkey to set the pass/fail test limit for the BER measurement. Any result exceeding this limit will be displayed in reverse video (white on black) in the sensitivity measurement screen.

You can also set the following base station signal parameters from within this menu:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

- **DYNAMIC RANGE.** Press this softkey to display the DYNAMIC RANGE configuration menu (see Figure 3–185). Use this menu to set the parameters for the RECEIVER QUALITY DYNAMIC RANGE test. (Refer to page 3–191 and page 3–220 respectively for Manual and Module Receiver Quality Dynamic Range test descriptions.)

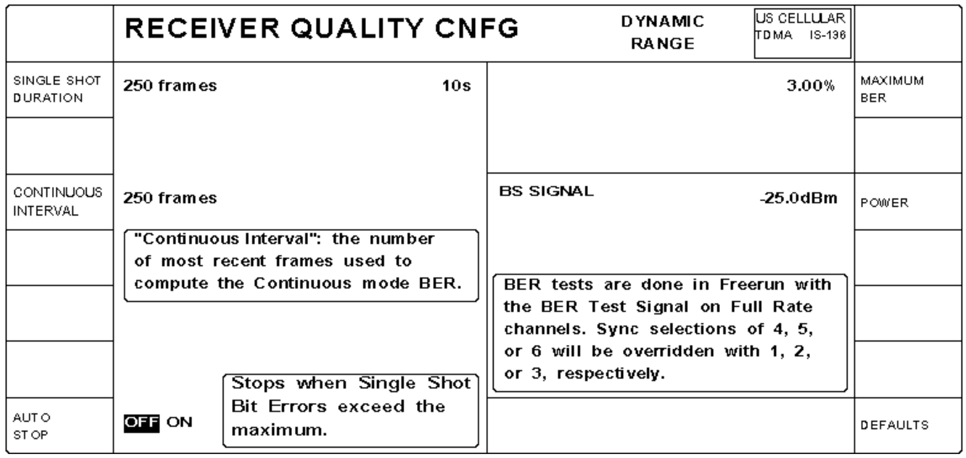


Figure 3–186: TDMA receiver quality configuration menu — dynamic range

You can set the following test parameters:

- SINGLE SHOT DURATION. Press this softkey to set the number of TDMA frames (1 to 500) for the BER measurement when in single shot mode. A TDMA frame length is 40 ms. The actual time duration of the measurement is displayed to the right of the selected number of frames.
- CONTINUOUS INTERVAL. Press this softkey to set the number of TDMA frames (1 to 249) for the BER measurement when in continuous mode.
- AUTO STOP. Press this softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops when the Single Shot Bit Errors exceed the maximum BER percentage you set.
- MAXIMUM BER. Press this softkey to set the pass/fail test limit for the BER measurement. Any result exceeding this limit will be displayed in reverse video (white on black) in the sensitivity measurement screen.

You can also set the following base station signal parameters from within this menu:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

- **CURRENT SIGNAL LVL.** Press this softkey to display the CURRENT SIGNAL LEVEL configuration menu (see Figure 3–185). Use this menu to set the parameters for the RECEIVER QUALITY CURRENT SIGNAL LVL test.

(Refer to page 3–192 and page 3–220 respectively for Manual and Module Receiver Quality Current Signal LVL test descriptions.)

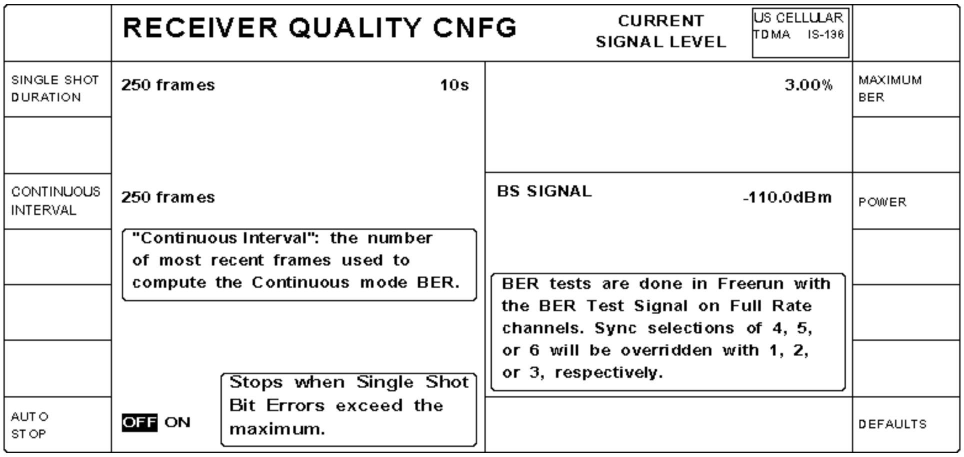


Figure 3–187: TDMA receiver quality configuration menu — current signal level

You can set the following test parameters:

- SINGLE SHOT DURATION. Press this softkey to set the number of TDMA frames (1 to 500) for the BER measurement when in single shot mode. A TDMA frame length is 40 ms. The actual time duration of the measurement is displayed to the right of the selected number of frames.
- CONTINUOUS INTERVAL. Press this softkey to set the number of TDMA frames (1 to 249) for the BER measurement when in continuous mode.
- AUTO STOP. Press this softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops when the Single Shot Bit Errors exceed the maximum BER percentage you set.
- MAXIMUM BER. Press this softkey to set the pass/fail test limit for the BER measurement. Any result exceeding this limit will be displayed in reverse video (white on black) in the sensitivity measurement screen.

You can also set the following base station signal parameters from within this menu:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

- **USER DEFINED 1 (2).** Press this softkey to display the USER DEFINED 1(2) configuration menu (see Figure 3–188). Use this menu to set the parameters for the RECEIVER QUALITY USER DEFINED 1(2) test. (Refer to page 3–193 and page 3–221 respectivley for Manual and Module Receiver Quality User Defined test descriptions.)

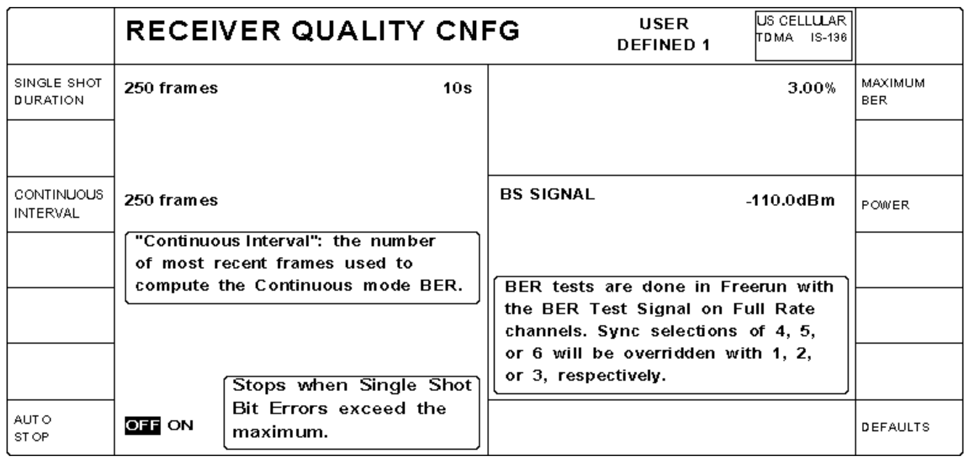


Figure 3–188: TDMA receiver quality configuration menu — user defined 1 (2)

You can set the following test parameters:

- SINGLE SHOT DURATION. Press this softkey to set the number of TDMA frames (1 to 500) used when making BER measurements in single shot mode. A TDMA frame length is 40 ms. The actual time duration of the measurement is displayed to the right of the selected number of frames.
- CONTINUOUS INTERVAL. Press this softkey to set the number of TDMA frames (1 to 249) used BER measurements in continuos mode.
- AUTO STOP. Press this softkey to toggle the auto stop function on and off. If the auto stop function is on, the test stops when the Single Shot Bit Errors exceed the maximum BER percentage you set.
- MAXIMUM BER. Press this softkey to set the pass/fail test limit for the BER measurement. Any result exceeding this limit will be displayed in reverse video (white on black) in the sensitivity measurement screen.

You can also set the following base station signal parameters from within this menu:

- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to –17 dBm).

- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

TRANSMITTER QUALITY. Press this softkey (see Figure 3–182 on page 3–230) to display the TDMA MANUAL TEST TX QUAL CNFG menu, which has selections that you use to set parameters for the various transmitter quality tests. See Figure 3–189.

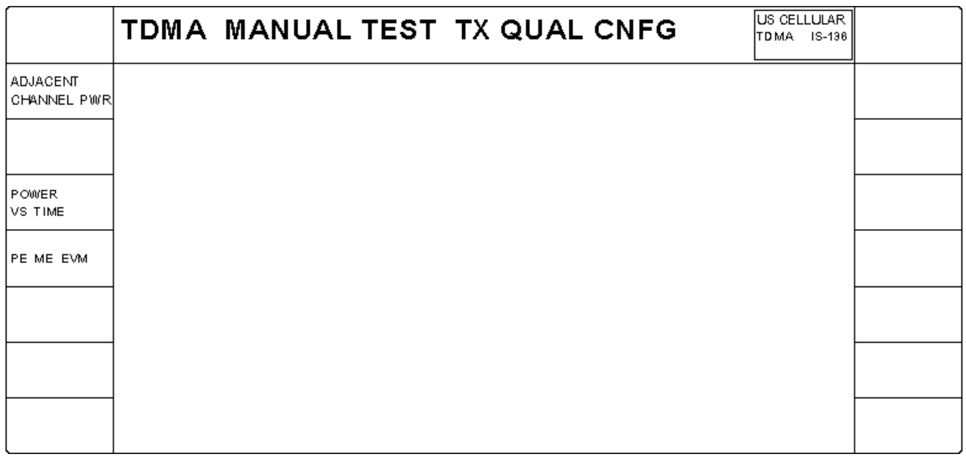


Figure 3–189: TDMA manual test transmitter quality configuration menu

Each of the transmitter quality configuration menu choices is discussed in the following text.

- **ADJACENT CHANNEL PWR.** Press this softkey to display the ADJACENT CHANNEL PWR configuration menu (see Figure 3–190). This is the configuration menu for the manual adjacent channel power module transmission tests (frequency domain and time domain).

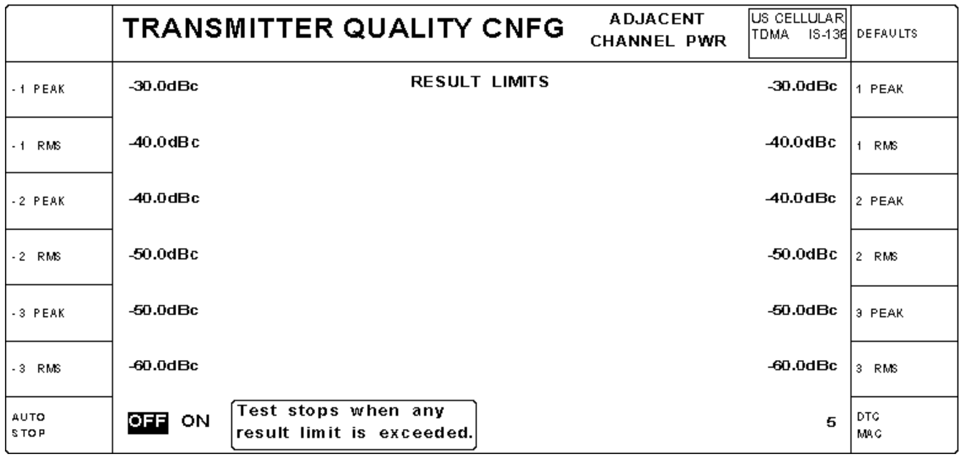


Figure 3–190: TDMA transmitter quality configuration menu — adjacent channel pwr

Press the respective softkeys to modify the RMS or PEAK value limits for the different channels. The RMS limits are relative levels to the RMS power in the active channel and the Peak limits are relative to the Peak power in the active channel.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136 specifications.

- **POWER vs TIME.** Press this softkey to display the POWER VS TIME configuration menu (see Figure 3–191). This is the configuration menu for the power vs time manual test transmission test.

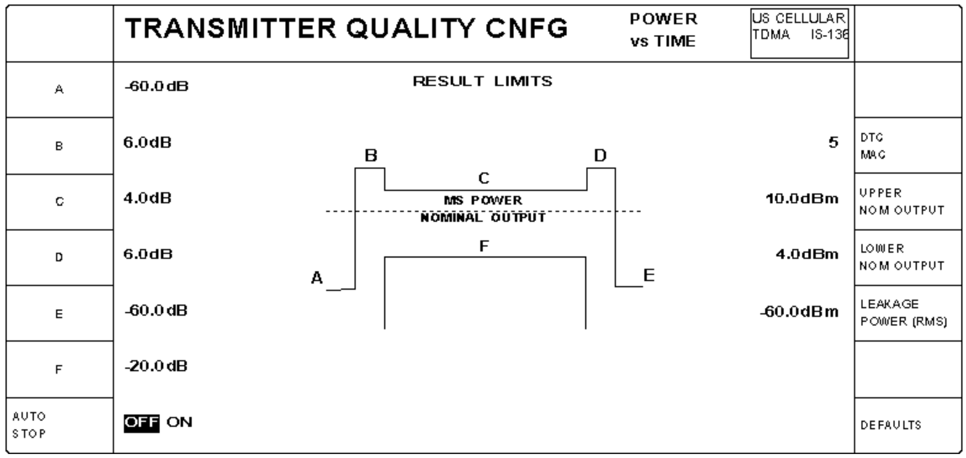


Figure 3–191: TDMA transmitter quality configuration menu — power vs time

Press the respective softkeys to modify the different parts of the template, the upper and lower limits of the nominal transmit power, and the upper limit of the leakage power. Define the template relative to the average carrier power (in dBc). The nominal output limits and the leakage limit are absolute values (dBm).

To apply the template correctly, the upper Nominal Output and lower Nominal Output power limits should bracket the expected power. For example, if you set the DTC MAC to 5 (nominal transmit power 16 dBm), the upper nominal output limit could be set to 20 dBm, and the lower nominal output could be set to 12.0 dBm.

Since the dynamic range of the tester at any one attenuator setting is about 65 dBm, the leakage power level may not be reached by the actual power versus time curve for all Mobile Station Power Levels. Thus the displayed curve may not reflect the correct leakage power measurement. If the leakage limit setting is less than 60 dB below the MS Expected Power setting, the leakage power measurement will execute concurrently with the burst measurements. Otherwise the leakage measurement is made once the acquisition of the specified number of bursts is complete, so it will update at the completion of the burst measurement sequence.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136-A specifications.

- **PE ME EVM.** Press this softkey to display the PE ME EVM configuration menu (see Figure 3–192). This is the configuration menu for the phase error, magnitude error, and error vector magnitude manual transmission tests.

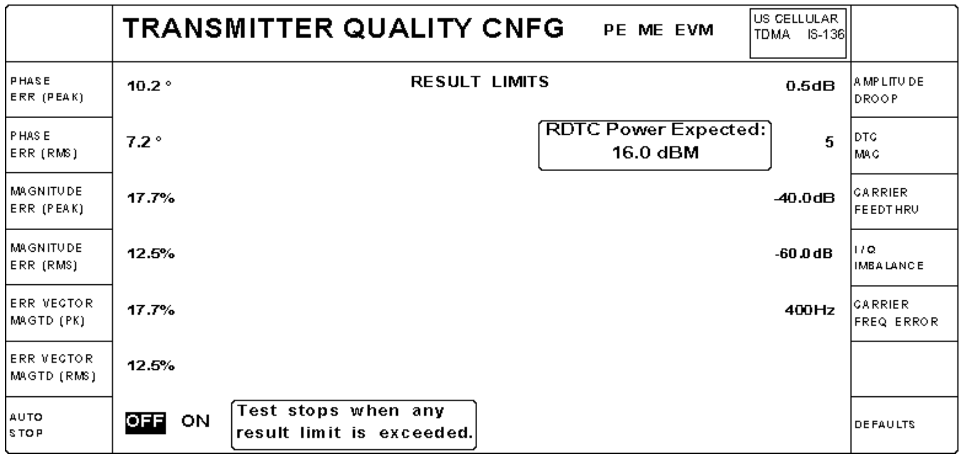


Figure 3–192: TDMA transmitter quality configuration menu — PE ME EVM

Press the respective softkeys to modify the different RMS and PEAK limit values for the modulation measurements, the carrier feedthrough, I/Q imbalance, or carrier frequency error. These limits are applied to the CURRENT, AVERAGE, and MAX/MIN measurements equally. These measurements are displayed in the Phase Error, Magnitude Error, and Error Vector Magnitude measurement screens; refer to pages 3–202, 3–204, and 3–206 respectively for detailed explanations of these measurement values.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136 specifications.

TIME ALIGNMENT. Press this softkey (from the main configuration menu, see Figure 3–182 on page 3–230) to display the TIME ALIGNMENT configuration menu, which has selections that you use to set parameters for the various timing tests. See Figure 3–193.

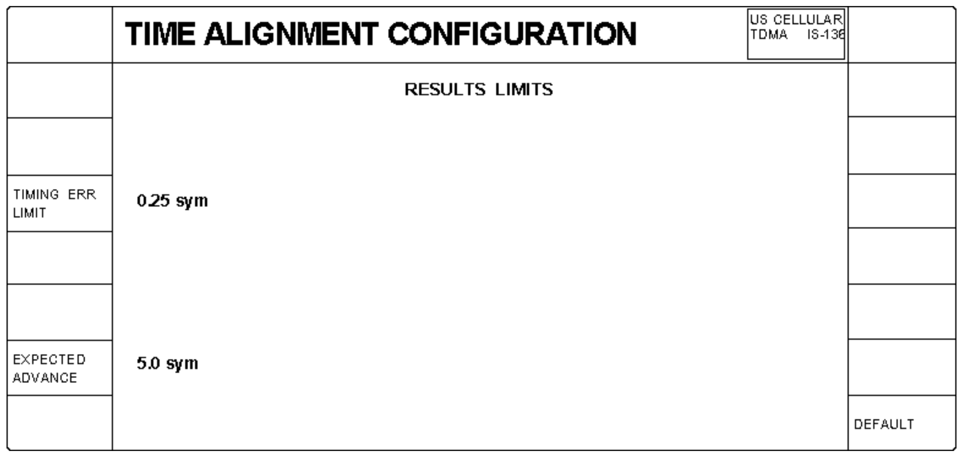


Figure 3–193: TDMA time alignment configuration menu

- TIMING ERR LIMIT. Press this softkey to set the MS transmitter burst time alignment error limit (0 to 15 symbols, 0.01 symbol increments). This is an absolute value limit (positive or negative).
- EXPECTED ADVANCE. Press this sofkey to set the time alignment expected advance value (0 to 15 symbols, 0.5 symbol increments) for use by the measurement. This value is then sent to the mobile station as the Time Alignment parameter in a PLC message.

MAHO REPORT. Press this softkey (from the main configuration menu, see Figure 3–182 on page 3–230) to display the MAHO CONFIGURATION menu, which has selections that you use to set parameters for the various MAHO quality tests. See Figure 3–194.

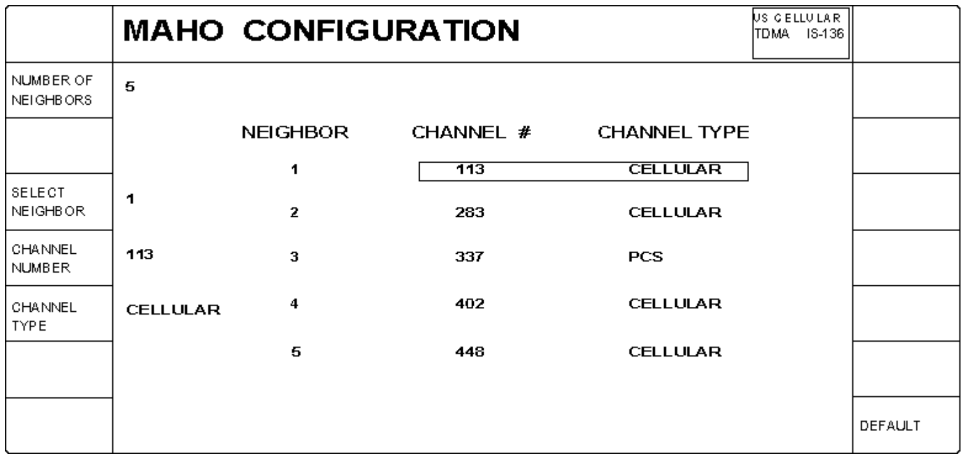


Figure 3–194: TDMA MAHO configuration menu

- NUMBER OF NEIGHBORS. Press this softkey to select the number of neighbor channels for the MAHO report. Changing this selection changes the number of RF channels sent in the MEASUREMENT ORDER message to the mobile station and alters the selection screen to conform to the setting.
- SELECT NEIGHBOR. Press this softkey to select the neighbor channel you want to configure using the CHANNEL NUMBER and CHANNEL TYPE softkeys. The selected neighbor will be highlighted with a box surrounding the channel configuration information.
- CHANNEL NUMBER. Press this softkey to select the RF channel for the MAHO measurement. The range is dependent on the channel type setting:

CELLULAR	1 to 799, 991 to 1023
PCS	1 to 1999

- CHANNEL TYPE. Press this softkey to select the network (CELLULAR or PCS) for the selected neighbor channel.

Module Test

Press this softkey to display a menu with selections that you use to set parameters for tests done while in the TDMA MODULE TEST mode. See Figure 3–195. The following text discusses the TDMA MODULE TEST CONFIGURATION menu selections.

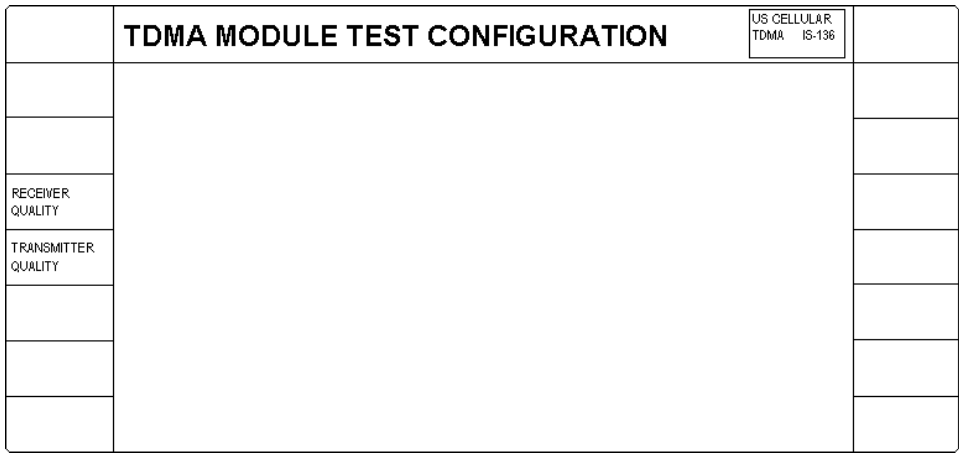


Figure 3–195: TDMA module test configuration menu

RECEIVER QUALITY. Press this softkey to display the TDMA RECEIVER QUALITY CONFIGURATION menu (see Figure 3–196). Select the test whose parameters you want to configure from the menu selections on the left side of the menu. Since the configuration menus for TDMA manual tests are similar to the configuration menus for the TDMA module tests, you will be refered to the TDMA manual test configuration menus for menu descriptions. Only items unique to the configuration menus for TDMA module tests are discussed in the following subsections.

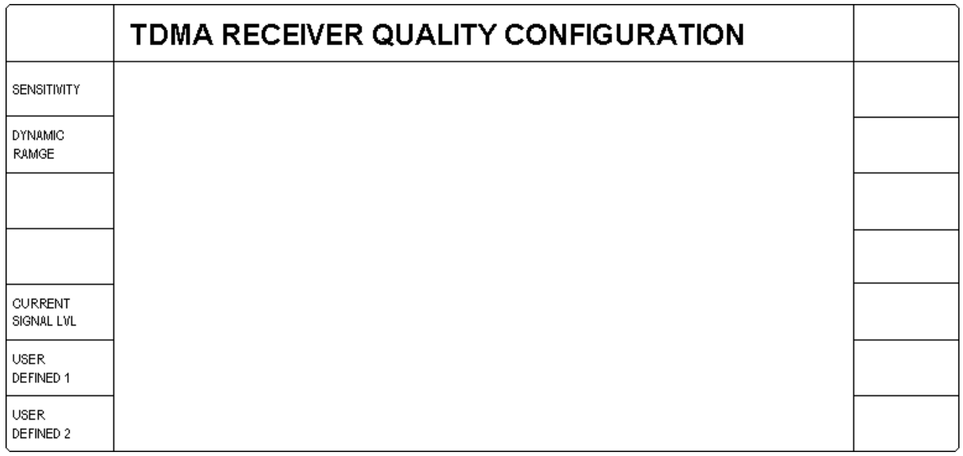


Figure 3–196: TDMA receiver quality configuration (module test) menu

The following text discusses each of the MODULE TEST RECEIVER QUALITY CONFIG menu choices.

- **SENSITIVITY.** Press this softkey to display the SENSITIVITY configuration menu (see Figure 3–197). Use this menu to set the parameters for the module test receiver quality sensitivity test. Refer to *SENSITIVITY* on page 3–232 for a description of the menu items.

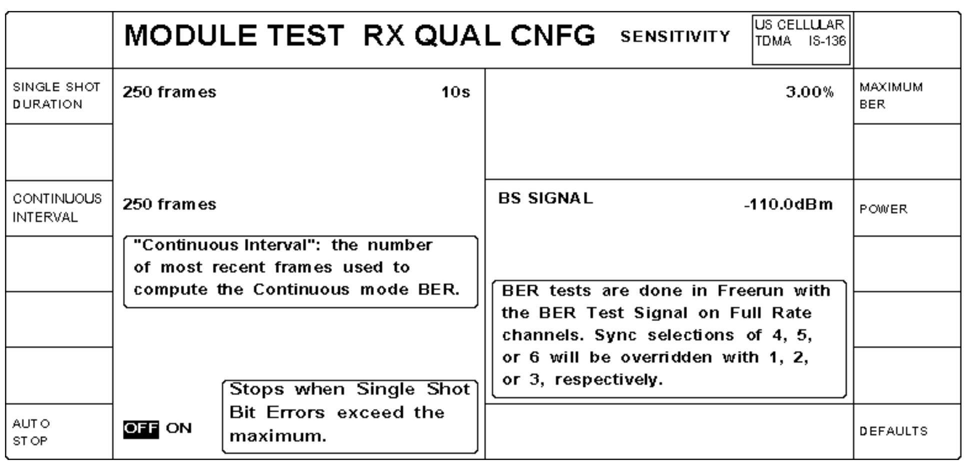


Figure 3–197: TDMA module test receiver quality configuration — sensitivity

- **DYNAMIC RANGE.** Press this softkey to display the DYNAMIC RANGE configuration menu (see Figure 3–198). Use this menu to set the parameters for the module test receiver quality dynamic range test. Refer to *DYNAMIC RANGE* on page 3–233 for a description of the menu items.

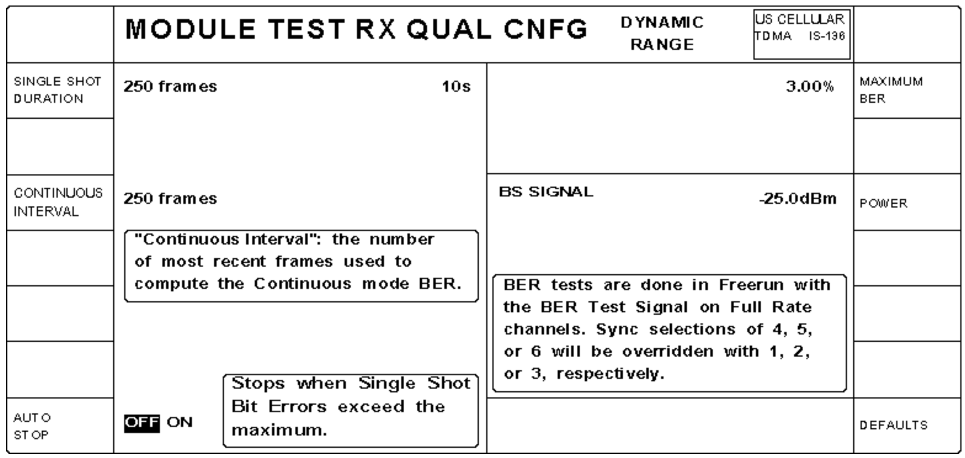


Figure 3–198: TDMA module test receiver quality configuration — dynamic range

- **CURRENT SIGNAL LVL.** Press this softkey to display the current signal level test configuration menu (see Figure 3–199). Use this menu to set the parameters for the module test receiver quality current signal level test. Refer to *CURRENT SIGNAL LVL* on page 3–234 for a description of the menu items.

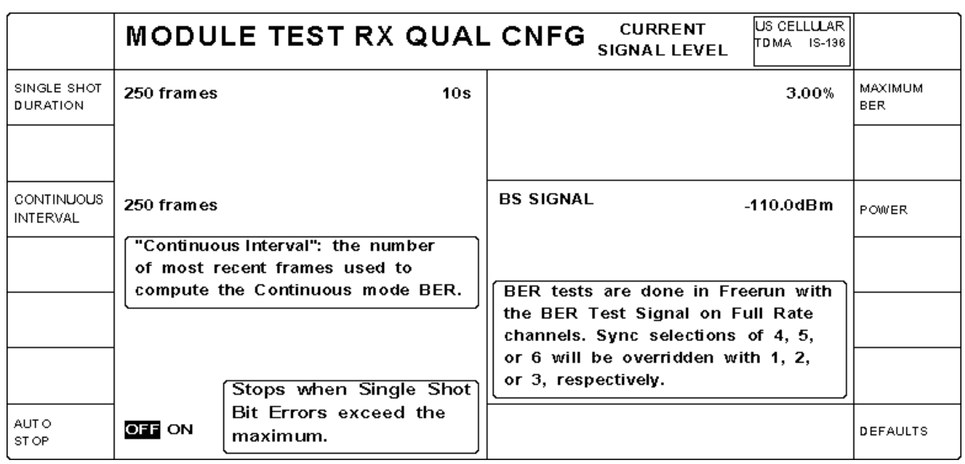


Figure 3–199: TDMA module test receiver quality configuration — current signal level

- **USER DEFINED 1 (2).** Press this softkey to display the USER DEFINED 1 (or 2) configuration menus (see Figure 3–200). Use this menu to set the parameters for the module test receiver quality user defined 1 (or 2) test. Refer to *USER DEFINED 1 (2)* on page 3–236 for a description of the menu items.

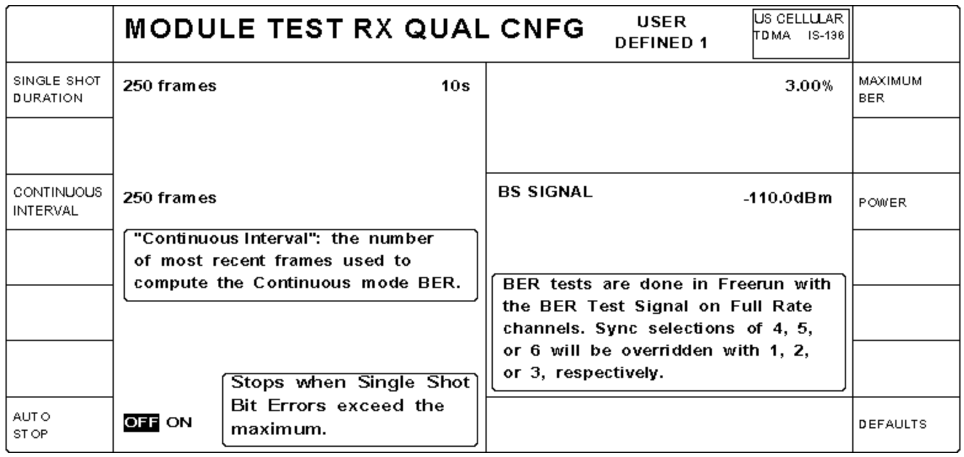


Figure 3–200: TDMA module test receiver quality configuration — user defined 1

TRANSMITTER QUALITY. Press the TRANSMITTER QUALITY softkey to display the TRANSMITTER QUALITY CONFIGURATION menu (see Figure 3–201). From the menu selections, select the test whose parameters you want to configure. Since the configuration menus for TDMA manual tests are similar to the configuration menus for the TDMA module tests, you will be referred to the TDMA manual test configuration menus for menu descriptions. Only items unique to the configuration menus for TDMA module tests are discussed in the following subsections.

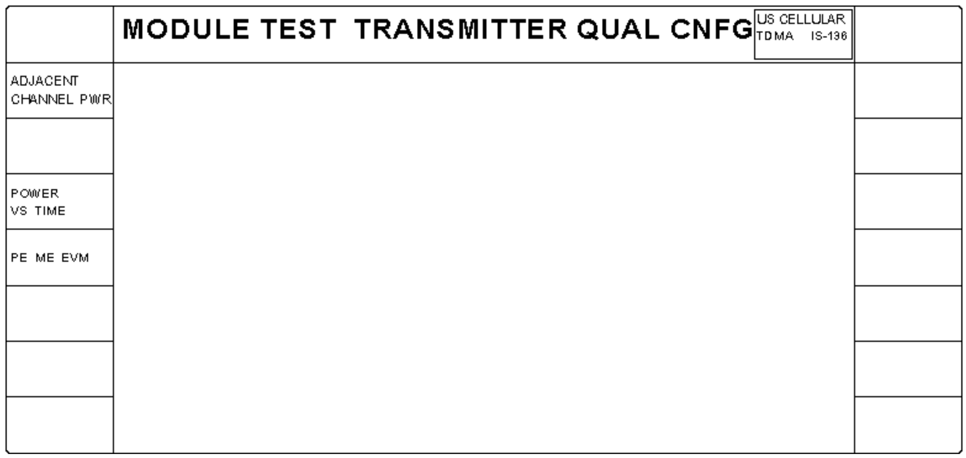


Figure 3–201: TDMA module test transmitter quality configuration menu

Each of the MODULE TEST TRANSMITTER QUALITY CONFIG menu choices is discussed in the following text.

- **ADJACENT CHANNEL PWR.** Press this softkey to display the ADJACENT CHANNEL PWR configuration menu (see Figure 3–202). This is the configuration menu for the adjacent channel power module transmission tests (frequency domain and time domain).

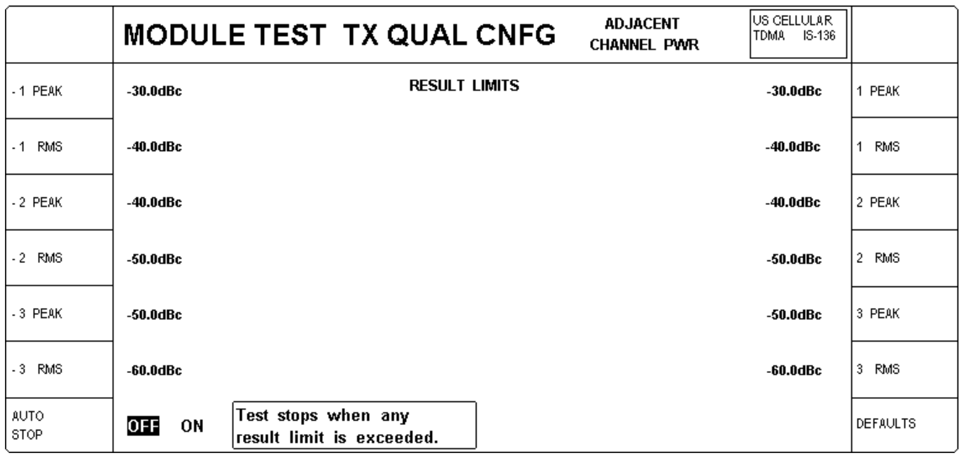


Figure 3–202: TDMA module test transmitter quality configuration — adjacent channel pwr

Press the respective softkeys to modify the RMS or PEAK value limits for the different channels. The RMS limits are relative levels to the RMS power in the useful channel and the Peak limits are relative to the Peak power in the useful channel.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136-A specifications.

- **POWER VS TIME.** Press this softkey to display the POWER VS TIME configuration menu (see Figure 3–203). This is the configuration menu for the power vs time module test transmission test.

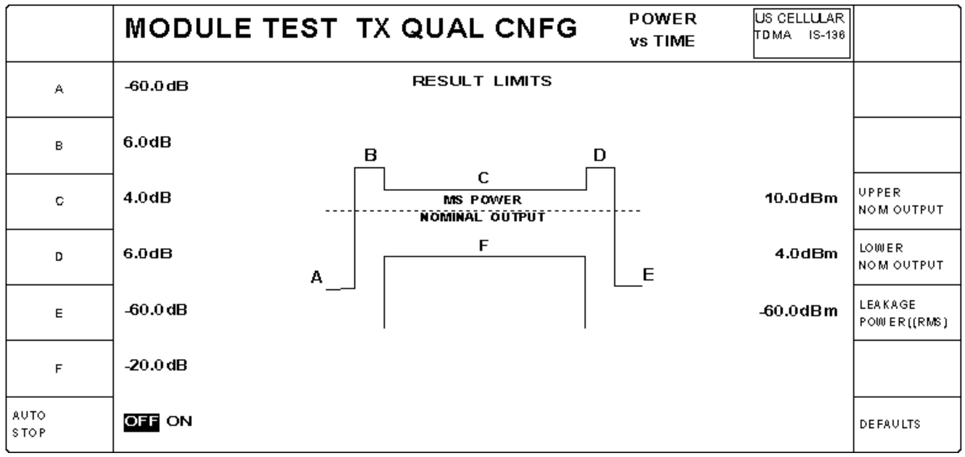


Figure 3–203: TDMA module test transmitter quality configuration — power vs time

Press the respective softkeys to modify the different parts of the template, the upper and lower limit of the nominal transmit power, and the upper limit of the leakage power. Define the template relative to the average carrier power (in dBc). The nominal output limits and the leakage limit are absolute values (dBm).

To apply the template correctly, the upper nominal output and lower nominal Output power limits should bracket the expected power. For example, if you set the expected power to 16 dBm, the upper nominal output limit could be set to 20 dBm, and the lower nominal output could be set to 12.0 dBm.

Since the dynamic range of the tester at any one attenuator setting is about 65 dBm, the leakage power level may not be reached by the actual power versus time curve for all Mobile Station Power Levels. Thus the displayed curve may not reflect the correct leakage power measurement. If the leakage limit setting is less than 60 dB below the MS Expected Power setting, the leakage power measurement will execute concurrently with the burst measurements. Otherwise the leakage measurement is made once the acquisition of the specified number of bursts is complete, so it will update at the completion of the burst measurement sequence.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136-A specifications.

- **PE ME EVM.** Press this softkey to display the PE ME EVM configuration menu (see Figure 3–204). This is the configuration menu for the phase error, magnitude error, and error vector magnitude module transmission tests.

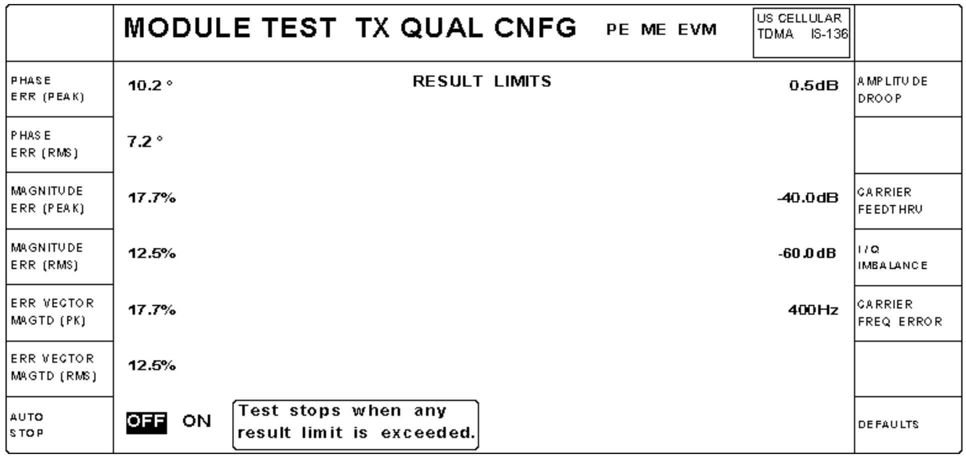


Figure 3–204: TDMA module test transmitter quality configuration — PE ME EVM

Press the respective softkey to modify either the RMS or Peak value of the different modulation error types, the carrier feedthrough, I/Q imbalance or the carrier frequency error. These measurements are displayed in the following measurement screens: Phase Error on page 3–202, Magnitude Error on page 3–204, and Error Vector Magnitude on page 3–206. Refer to these measurement topics for detailed explanations of the measurement values.

- AUTO STOP. Press this softkey to stop the test when any defined limit is exceeded by the measurement results.
- DEFAULTS. Press this softkey to set the limits to the default values based on the TDMA IS-136-A specifications.

TDMA BS SIGNAL CNFG

This softkey displays the configuration menu to define the operating parameters of a TDMA base station signal. You can arrive at this menu in two ways, and there is a fundamental difference in the type of configuration you make, depending on which menu you use to get here.

- Normal operation. If you arrived at the TDMA BS SIGNAL CONFIGURATION menu from the main CONFIGURATION MENU (see page 3–229), you are configuring the TDMA base station corresponding to the network, system, and standard you selected in the home menu. This standard is used for call setup and all normal tests accessible from the MANUAL TEST softkey.
- Handoff operation. If you arrived at the TDMA BS SIGNAL CONFIGURATION menu from the HANDOFFS/TRANSITIONS menu (see *HANDOFFS/TRANSITIONS* on page 3–211), you are configuring the TDMA base station corresponding to the network, system, and standard you selected in the HANDOFFS/TRANSITIONS menu. This is the base station that is effective only after you execute the handoff. In this case, the options selected have no effect on the base station configuration for the current standard. The tester displays an information box stating "These settings will become active AFTER a handoff is executed."

This subsection describes the TDMA BS SIGNAL CONFIGURATION menu arrived at from normal operation.

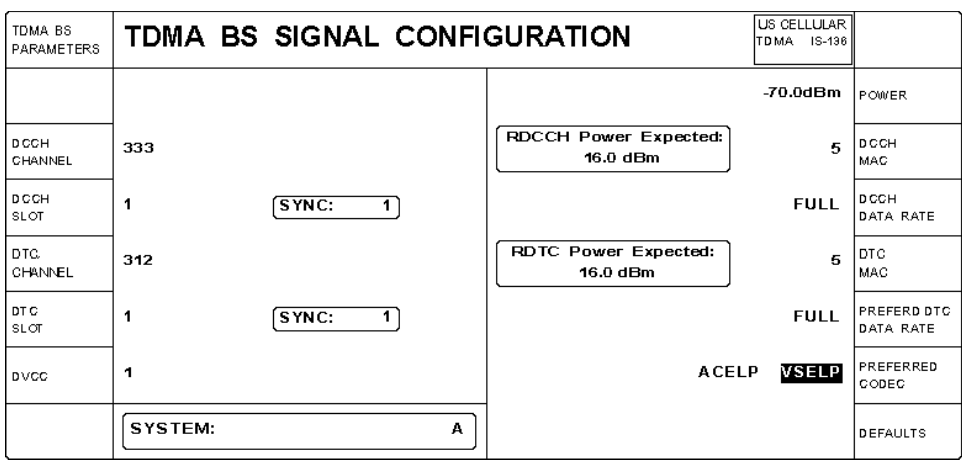


Figure 3–205: TDMA BS signal configuration menu

You can set the following TDMA base station parameters:

- DCCH CHANNEL. Press this softkey to set the Digital Control Channel (1 to 799 or 991 to 1023).

- DCCH SLOT. Press this softkey to set the Digital Control Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic).
- DTC CHANNEL. Press this softkey to set the Digital Traffic Channel (1 to 799 or 991 to 1023 for cellular; 1 to 1999 for PCS).
- DTC SLOT. Press this softkey to set the Digital Traffic Channel slot (1 to 6 for half-rate traffic or 1 to 3 for full rate traffic).
- DVCC. Press this softkey to set the Digital Verification Color Code. This is the base station code to the mobile to identify the base station (1 to 255).
- POWER. Press this softkey to set the level of the base station transmitter power (–131 dBm to 17 dBm).
- DCCH MAC. Press this softkey to set the Digital Control Channel Mobile Attenuation Code (0 to 10).
- DCCH DATA RATE. Press this softkey to set the Digital Control Channel data rate.
- DTC MAC. Press this softkey to set the Digital Traffic Channel Mobile Attenuation Code (0 to 10). This sets the expected power level and attenuation/gain through the receive path.
- PREFERRED DTC DATA RATE. Press this softkey to toggle the DTC data rate between full and half. At registration, the mobile station is requested to provide a capability report. If the mobile station supports the PREFERRED DATA RATE setting, that setting will be used; otherwise, the data rate supported by the mobile station will be used. The PREFERRED DTC DATA RATE setting will be used if a call is attempted before receiving a capability report from the mobile station.
- PREFERRED DTC CODEC. Press this softkey to toggle the DTC voice coder/decoder between ACELP and VSELP. At registration, the mobile is requested to provide a capability report. If the mobile station supports the PREFERRED CODEC setting, that CODEC type will be used; otherwise, the CODEC supported by the mobile will be used. If a call is attempted before a capability report is received from the mobile, the PREFERRED DTC CODEC setting will be used.

***NOTE**. If a capability report from the mobile station is not received or invalid, the preferred DTC data rate and DTC CODEC values are used to attempt the call. If the preferred values don’t match the mobile station’s capabilities. the call may fail.*

- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

TDMA BS PARAMETERS. This softkey displays a menu to specify parameters for the simulated base station (see Figure 3–206).

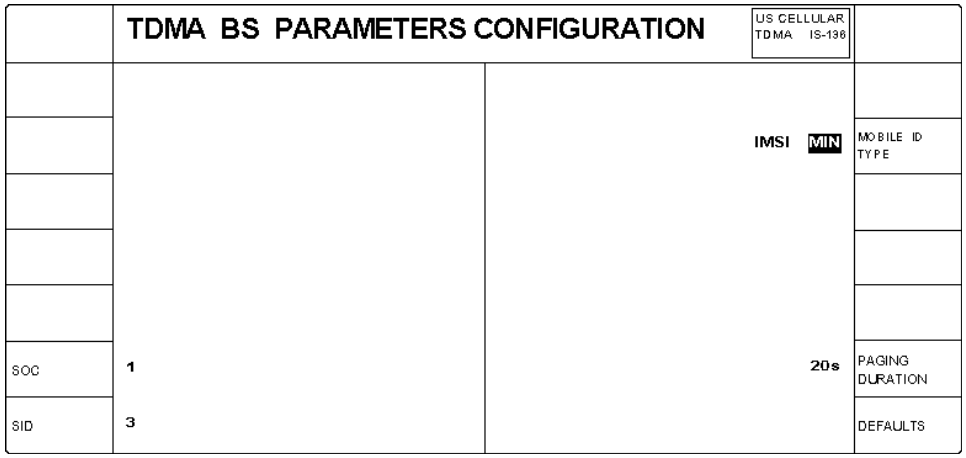


Figure 3–206: TDMA BS parameters configuration menu

You can set the following parameters for the base station:

- SOC. Press this softkey to set the System Operator Code number (0 to 4095). This is a number that uniquely identifies a cellular service provider.
- SID. Press this softkey to set a system identification number (1 to 32767). This is a number that uniquely identifies a cellular system.
- MOBILE ID TYPE. Press this softkey to toggle the mobile ID type between MIN (Mobile ID Number) and IMSI (International Mobile Station Identity) as defined in IS-136 section 8.1.3 and 8.1.1 respectively.
- PAGING DURATION. Press this softkey to set the paging duration. The paging duration is how long the base station sends a paging message over the control channel to the mobile station when a call is being established. If you set this time too short, the signal search algorithm of the mobile station may take longer than the paging duration, and the call setup will fail.
- DEFAULTS. Press this softkey to set all the parameters to their preset conditions. Typically, the default values are based on the TDMA IS-136 specifications.

Additional Measurements

Additional Measurements

This section describes the common voltage and current measurements that all CMD 80 Digital Radiocommunication Testers can perform. These tests are accessed from the home menu (see Figure 3–207) and are not dependent on the network, system, or standard settings.

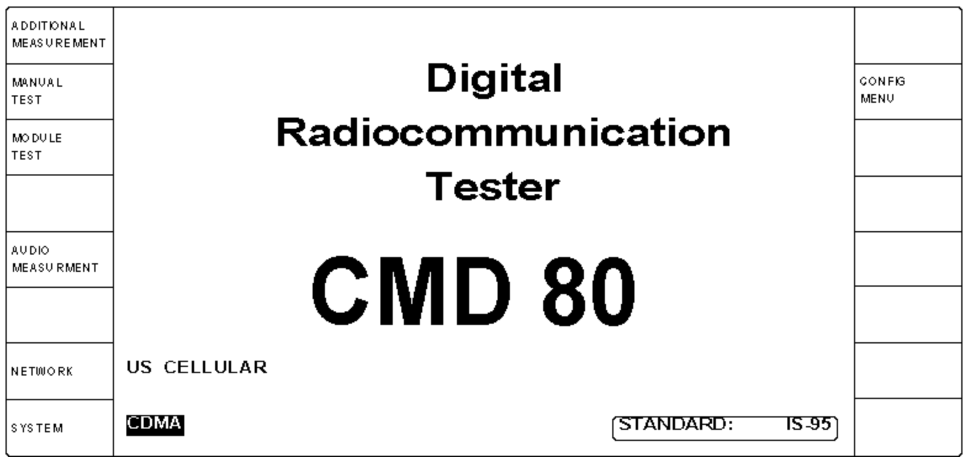


Figure 3–207: Home menu (accessing additional measurements)

Press the ADDITIONAL MEASUREMENT softkey to display the ADDITIONAL MEASUREMENTS menu (see Figure 3–208). Using the selections in this menu, you can take conventional measurements, such as measuring the voltage across the battery terminals of the mobile radiotelephone and the current level. The following measurements are available:

- DC voltage
- Average DC current
- Maximum current
- Minimum current

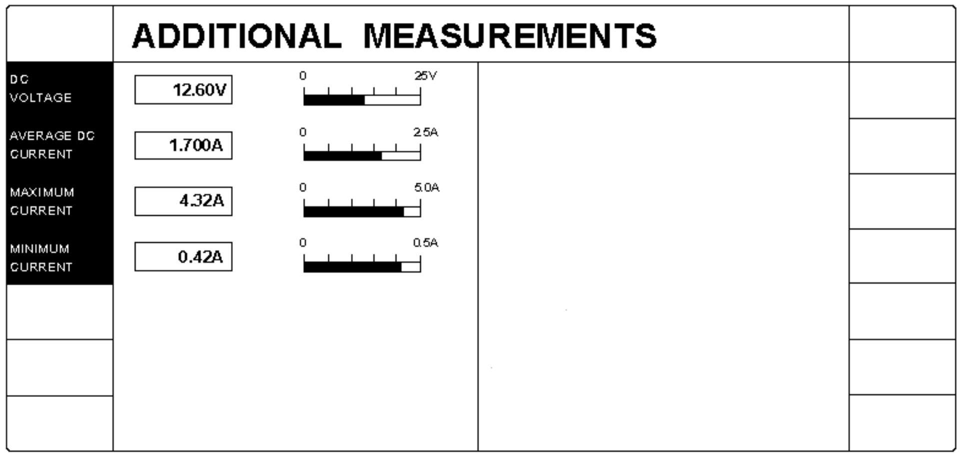


Figure 3–208: Additional measurements menu

Audio Measurements

Audio Measurements

The tester provides a measurement function capable of testing the audio circuit of a CDMA, TDMA, or Analog mobile station. This audio measurement feature supports testing the audio circuit before it is assembled into a unit that is capable of completing a call.

The audio tests are accessed from the home menu (see Figure 3–209) and are not dependent on the network, system, or standard settings.

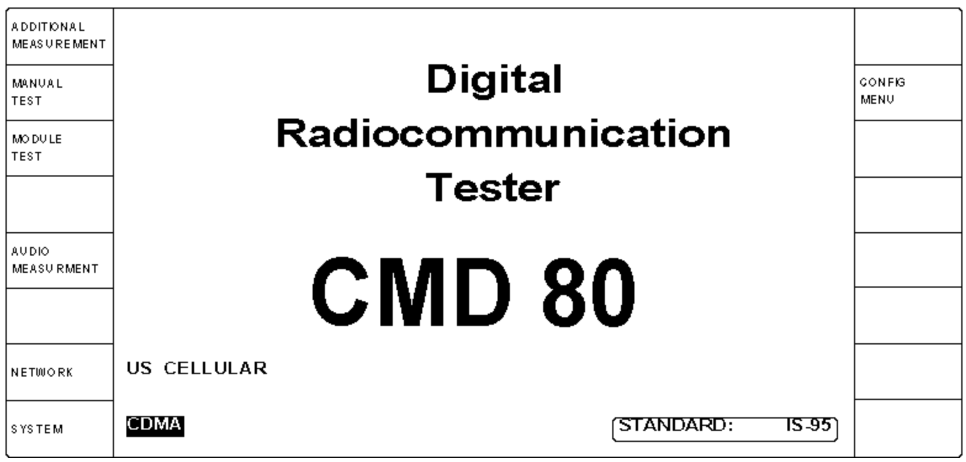


Figure 3–209: Home menu (accessing audio measurements)

The tester uses its internal AF generator to provide an audio signal to the mobile station. To perform an audio measurement test, you must connect a coaxial cable between the BNC front-panel connector for the AF GEN OUTPUT and the audio input circuit of the mobile station. You must also connect a coaxial cable from the audio output circuit of the mobile station to the BNC front-panel connector for the AF VOLTM INPUT. Since connection points may vary with different products and manufacturers, it is up to you to make the correct connections to the audio circuit under test.

Fundamental Frequency

After you make the necessary test connections, press the AUDIO MEASURE-MENT softkey to display the AUDIO MEASUREMENT menu shown in Figure 3–210.

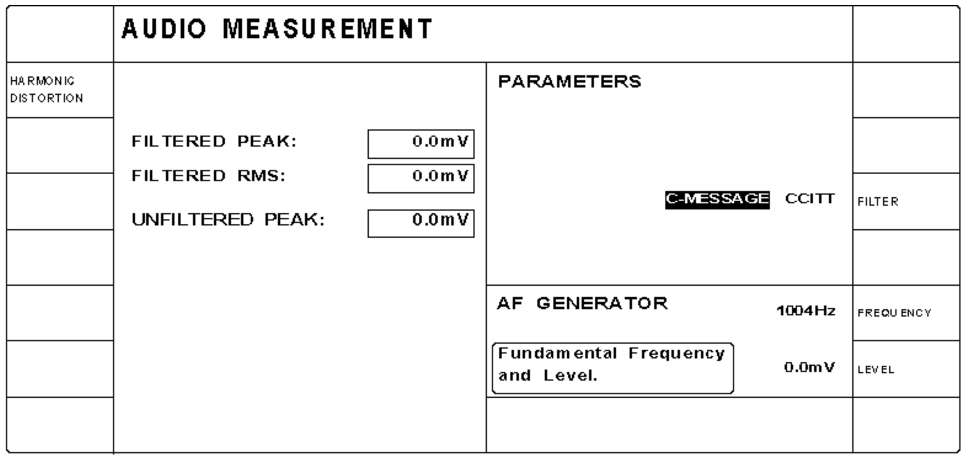


Figure 3–210: Audio measurement menu

The tester produces an audio signal whose frequency and level you set using the softkeys for the AF GENERATOR. You also select which filter to use (C-MES-SAGE or CCITT). You can then measure the unfiltered peak, the filtered peak, or the filtered RMS audio voltage of the mobile station.

- HARMONIC DISTORTION. Press this softkey to display the menu used to measure harmonic distortion. Refer to *Harmonic Distortion* on page 3–259.
- HOLDOFF TIME. Press this softkey to set a time delay between the start (or change) of an audio source and the acquisition of measurement data. This allows the transients induced by the mobile station to settle before data is accumulated.
- FILTER. Press this softkey to toggle between a C-MESSAGE or CCITT filter.

In the AF GENERATOR section of the menu, you can make the following settings:

- FREQUENCY. Press this softkey to set the frequency of the sinusoidal test tone generated by the AF Generator (300 Hz to 3300 Hz).
- LEVEL. Press this softkey to adjust the RMS output voltage of the AF Generator (0 to 5 V_{RMS}).

While in the AUDIO MEASUREMENT menu, you can press the CONFIG front-panel key to display the AUDIO MEASUREMENT CONFIG menu. See Figure 3–211.

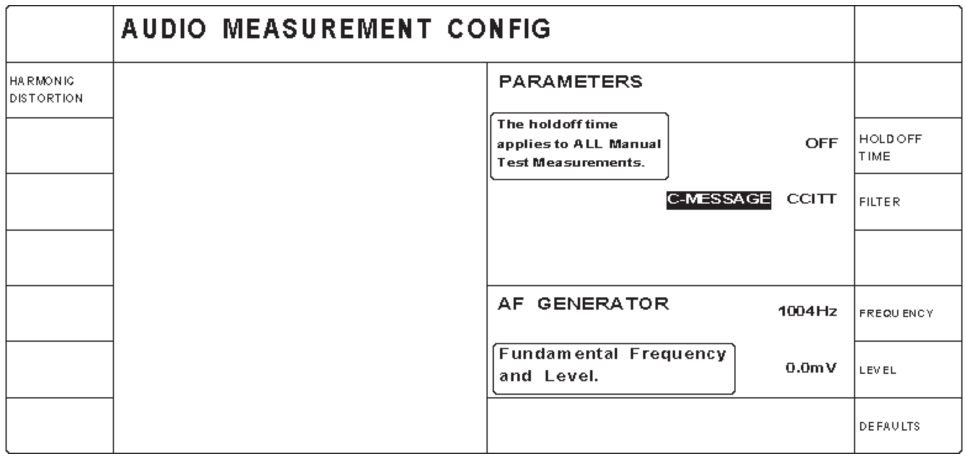


Figure 3–211: Audio measurement configuration menu

The softkeys and functions on the PARAMETERS side of this configuration menu are the same as discussed earlier for the Audio Measurement menu.

- DEFAULTS. Press this softkey to return the menu to its default settings:

FILTER	C-MESSAGE
AF GENERATOR	
FREQUENCY	1004 Hz
LEVEL	0.0 mV

Press the MENU UP front-panel key to return to the AUDIO MEASUREMENT menu or press the HARMONIC DISTORTION softkey to go to the menu for configuring the tester to make an audio harmonic distortion measurement.

Harmonic Distortion

If you pressed the HARMONIC DISTORTION softkey in the AUDIO MEASUREMENT menu (see Figure 3–210 on page 3–258), the tester displays the AUDIO MEASUREMENT (HARMONIC DISTORTION) menu shown in Figure 3–212.

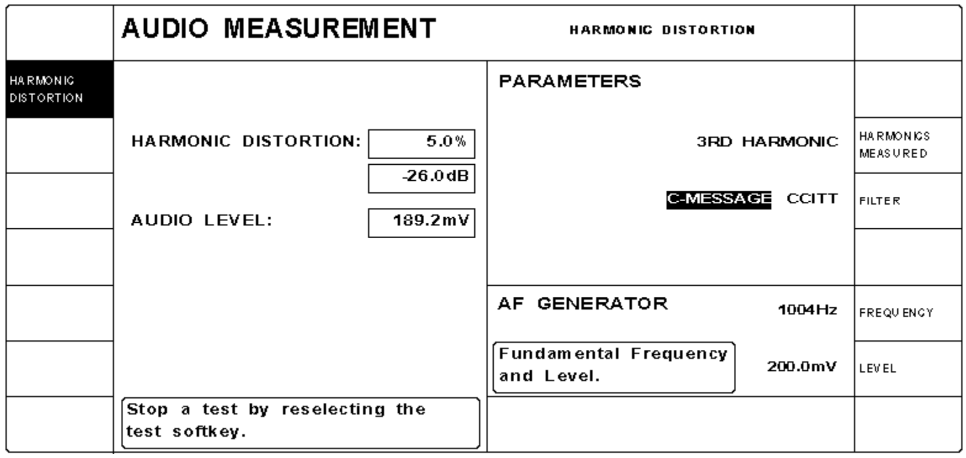


Figure 3–212: Audio measurement (harmonic distortion) menu

Press the HARMONIC DISTORTION softkey to start or stop measuring the harmonic distortion of the mobile receiver's audio amplifier.

The test measures how cleanly the amplifier in the mobile station reproduces a sinusoidal audio test tone. The amplifier generates harmonics (additional tones at integer multiples of the test tone's frequency). The level of these tones relative to the level of the input tone is a measure of the amplifier's harmonic distortion. You can select whether this test measures ALL HARMONICS or only the 3RD HARMONIC.

When you select ALL HARMONICS, the tester measures the harmonic distortion as the percentage of the RMS value of the sum of the second and higher harmonic components to the RMS value of the total signal at the audio output of the mobile station receiver for a specified signal applied to the audio input of the receiver. The test displays the harmonic distortion as a percentage and as an equivalent dB level.

When you select 3RD HARMONIC, the tester measures the harmonic distortion as the percentage of the RMS value of the third harmonic component to the RMS value of the total signal at the audio output of the mobile station receiver for a specified signal applied to the audio input of the receiver. The test displays the 3rd harmonic distortion as a percentage and as an equivalent dB level.

In the PARAMETERS section of the menu, you can make the following settings:

- HARMONICS MEASURED. Press this softkey to toggle between 3RD HARMONIC and ALL HARMONICS setting.
- FILTER. Press this softkey to toggle between a C-MESSAGE or CCITT filter.

In the AF GENERATOR section of the menu, you can make the following settings:

- FREQUENCY. Press this softkey to set the fundamental frequency generated by the AF Generator (300 Hz to 3300 Hz).
- LEVEL. Press this softkey to adjust the RMS output voltage of the AF Generator (0 to 5 V_{RMS}).

While in the HARMONIC DISTORTION menu, you can press the CONFIG front-panel key to display the AUDIO MEASUREMENT CONFIG (HARMON-IC DISTORTION) menu. See Figure 3–213.

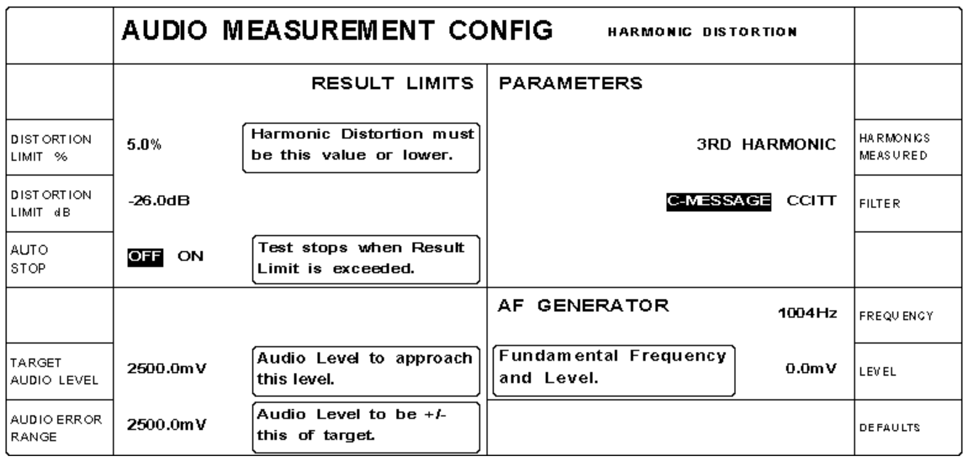


Figure 3–213: Audio measurement configuration (harmonic distortion) menu

You use this menu to configure the result limits and parameters for the harmonic distortion test. On RESULT LIMITS side of this menu, you can set the following:

- Distortion Limit %. Press this softkey to adjust the limit. Note that changing the percentage value also changes the dB level on the alternative softkey. The two readouts express the same level in different units.
- Distortion Limit dB. Press this softkey to adjust the limit. Note that changing the dB level also changes the percentage value on the alternative softkey. The two readouts express the same level in different units.
- AUTO STOP. Press this softkey to toggle the auto stop function on or off. If the auto stop function is on, the test stops if the distortion limit is exceeded.
- TARGET AUDIO LEVEL. Press this softkey to set the nominal audio level you expect at the output of the audio circuit (and therefore, at the AF VOLTM input to the tester).

- AUDIO ERROR RANGE. Press this softkey to set the variation that you want to allow from the target audio level. If the input voltage at the AF VOLTM connector deviates from the target audio level by more than the audio error range while the test is running, the test will be suspended until the input voltage returns to the acceptable range. While the test is suspended, the AUDIO LEVEL field appears in inverse video and the HARMONIC DISTORTION fields display dashes.

In the PARAMETERS section of the menu, you can make the following settings:

- HARMONICS MEASURED. Press this softkey to toggle between 3RD HARMONIC and ALL HARMONICS setting.
- FILTER. Press this softkey to toggle between a C-MESSAGE or CCITT filter.

In the AF GENERATOR section of the menu, you can make the following settings:

- FREQUENCY. Press this softkey to set the frequency of the sinusoidal test tone generated by the AF Generator (300 Hz to 3300 Hz).
- LEVEL. Press this softkey to adjust the RMS output voltage of the AF Generator (0 to 5 V_{RMS}).
- DEFAULTS. Press this softkey to return the menu settings to the following defaults:

DISTORTION LIMIT %	5.0%
DISTORTION LIMIT DB	–26.0 dB
AUTO STOP	OFF
TARGET AUDIO LEVEL	2500.0 mV_{RMS}
AUDIO ERROR RANGE	2500.0 mV_{RMS}
HARMONICS MEASURED	ALL HARMONICS
FILTER	C-MESSAGE
AF GENERATOR	
FREQUENCY	1004 Hz
LEVEL	0.0 mV_{RMS}

Press the MENU UP front-panel key to return to the AUDIO MEASUREMENT (HARMONIC DISTORTION) menu shown on page 3–260 or to the AUDIO MEASUREMENT CONFIG menu shown on page 3–259, depending on which menu you used to enter this menu.

Appendix A: Specifications

Tables A–1 through A–11 list the characteristics of the CMD 80 Digital Radiocommunication Tester including all options.

Table A–1: CDMA RF signal generator characteristics

Characteristic	Description
Frequency	
Range	US Cellular: 869 MHz to 894 MHz Japan Cellular: 832 MHz to 870 MHz China Cellular 934 MHz to 969 MHz US PCS: 1930 MHz to 1990 MHz Korean PCS: 1805 MHz to 1870 MHz
Resolution	1 Hz
Error	Same as timebase
Output level	
RF IN/OUT	–124 dBm to –20 dBm
RF OUT 2	–105 dBm to 0 dBm
Resolution	0.1 dB
Error	<1.5 dB
Error with Option CMD–Z8	Typical at (25 ± 5)°C
Absolute level error	
RF IN/OUT for levels –108 dBm to –20 dBm	<1.0 dB
RF OUT 2 for levels –103.5 dBm to 0 dBm	<1.0 dB
Relative level error [1]	
RF IN/OUT for levels –108 dBm to –38 dBm	±0.5 dB
RF OUT 2 for levels –104 dBm to –18 dBm	±0.5 dB
Modulation	QPSK
Carrier suppression	30 dB

1 **Linearity is measured at a constant frequency. A 1 dB range has to be determined for all measured values.**

Table A–2: CDMA RF analyzer characteristics

Characteristic	Description
Frequency	
Range	US Cellular: 824 MHz to 849 MHz Japan Cellular: 887 MHz to 925 MHz China Cellular 889 MHz to 924 MHz US PCS: 1850 MHz to 1910 MHz Korean PCS: 1715 MHz to 1780 MHz
Resolution	1 Hz
Error	Same as timebase
Power measurement	
Reference level range	
RF IN/OUT (full scale)	–28 dBm to +41 dBm
RF IN2 (full scale)	–69 dBm to 0 dBm
Measurement error	
Absolute	<1.5 dB
Relative	<0.3 dB (reference level –30 dBm)
Typical	<0.5 dB (typical at (25 ± 5)° C
Dynamic range	50 dB below reference level. Within the following ranges: RF IN/OUT (full scale) –65 dBm to +41 dBm RF IN2 (full scale) –75 dBm to 0 dBm
Demodulation	O-QPSK
Modulation analyzer	
ρ error (25 ±10)°C	<0.003 (for ρ 0.9 to 1)
Frequency measurement range	–3 kHz to + 3kHz
Frequency measurement error	< reference ±30 Hz
Timing measurement error	<60 ns
Rate set support	
Rate set 1 (8 k)	Standard
Rate set 2 (13 k)	Option CMD-B14
AWGN Generator (Option B81)	
Equivalent noise bandwidth	1.8 MHz (typical)[1]
Gain adjustment range	–20 dB to +6 dB of forward channel power
Signaling	

Table A–2: CDMA RF analyzer characteristics (cont.)

Characteristic	Description
Digital modes	IS95, UB IS95, J–STD008, T53

[1] **In some tests, such as those specified in IS-98, the described noise power is measured across the 1.23 MHz bandwidth of the CDMA signal. To use the tester's AWGN signal for these types of tests, you must set the AWGN level 1.1 dB higher than specified in IS-98 to compensate for differences in bandwidth. Refer to *AWGN LEVEL* on page 3–25 for an example.**

Table A–3: TDMA signal generator characteristics (Option B84)

Characteristic	Description
Frequency	
Range	US Cellular: 869 MHz to 894 MHz US PCS: 1930 MHz to 1990 MHz
Resolution	1 Hz
Error	Same as timebase
Output level	
RF IN/OUT	–120 dBm to –20 dBm
RF OUT 2	–100 dBm to 0 dBm
Resolution	0.1 dB
Error	<1.5 dB
Modulation	$\pi/4$ DQPSK or unmodulated
Error	<4.0% (EVM RMS)
3rd order modulation distortion	< –45 dBc
Carrier feedthrough	< –25 dB
Spectral purity	
SSB phase noise	–94 dBc (1 Hz at 50 kHz offset) –106 dBc (1 Hz at 100 kHz offset)

Table A–4: TDMA modulation analyzer characteristics (Option B84)

Characteristic	Description
Frequency	
Range	US Cellular: 824 MHz to 849 MHz US PCS: 1850 MHz to 1910 MHz
Resolution	1 Hz
Error	Same as timebase

Table A–4: TDMA modulation analyzer characteristics (Option B84) (cont.)

Characteristic	Description
Power measurements	
Reference level range	
RF IN/OUT (full scale)	0 dBm to +39 dBm
RF IN2 (full scale)	–40 dBm to 0 dBm
Residual level	< –65 dBm (RF IN/OUT)
Spectral purity	
Phase noise	–94 dBc at 50 kHz offset –106 dBc at 100 kHz offset
Modulation analyzer	
CR-band: 824 MHz to 849 MHz	
EVM RMS (residual)	1%
EVM Pk (residual)	3%
CR-band: 1850 MHz to 1950 MHz	
EVM RMS (residual)	1.5%
EVM Pk (residual)	5%
I/Q offset (residual)	50 dB (0.3%)
I/Q imbalance (residual)	50 dB (0.3%)
Frequency measurement range	–1 kHz to +1 kHz
Frequency measurement error	<5 Hz + reference
Power versus time measurement	
Power level error	<1.5 dB down to 20 dB below reference level, otherwise 3 dB Dynamic limit 66 dB (IS136 BW)
Leakage power	–65 dBm
Adjacent channel power measurement	
Dynamic range	
1st adjacent channel	36 dB
2nd and 3rd adjacent channel	55 dB
Signaling	
Digital modes	IS 136–A, IS 54

Table A–5: Analog signal generator characteristics (Option B82)

Characteristic	Description
RF Frequency	
Range	AMPS: 869 MHz to 894 MHz N–AMPS: 869 MHz to 894 MHz TACS: 935 MHz to 960 MHz J–TACS: 860 MHz to 870 MHz E–TACS: 917 MHz to 950 MHz N–TACS: 843 MHz to 846 MHz 863.5 MHz to 867 MHz
Resolution	1 Hz
Error	Same as timebase + resolution
Output level	
RF IN/OUT	–124 dBm to –20 dBm
RF OUT 2	–105 dBm to 0 dBm
Resolution	0.1 dB
Error	<1.5 dB
Modulation	
FM deviation	0 Hz to 12 kHz
FM resolution	1 Hz
FM rate	50 Hz to 15 kHz
FM distortion (THD + noise)	≤0.5% (8 kHz dev., 1 kHz rate, 0.3 kHz to 3 kHz BW, 25° ± 5° C)
Residual FM	<10 Hz (rms, 0.3 kHz to 3 kHz BW)
Deviation error	≤ 2% of setting + residual FM + FM resolution + timebase error (0.3 kHz ≤ FM rate ≤ 3 kHz; measurement bandwidth 30 Hz to 20 kHz)

Table A–6: Analog RF analyzer characteristics (Option B82)

Characteristic	Description
Frequency	
Range	AMPS: 824 MHz to 849 MHz N–AMPS: 824 MHz to 849 MHz TACS: 890 MHz to 915 MHz J–TACS: 915 MHz to 925 MHz E–TACS: 872 MHz to 905 MHz N–TACS: 898 MHz to 901 MHz 918.5 MHz to 922 MHz
Resolution	1 Hz
Reference level range	
RF IN/OUT (full scale)	–28 dBm to +41 dBm
RF IN2 (full scale)	–69 dBm to 0 dBm
RF frequency measurement	
Dynamic range (from reference level)	>40 dB
Resolution	1 Hz
Error	< resolution + timebase error
RF power measurement	
Narrowband (RF IN/OUT, DSP)	
Reference level range	0 dBm to 41 dBm
Range	0 dB to 50 dB below reference level
Error	<1.5 dB <0.5 dB (typical at (25 ±5)°C)
Wideband	
Range	
RF IN/OUT	0 dBm to 41 dBm
RF IN2	–16 dBm to 0 dBm
Error	<1.5 dB

Table A–6: Analog RF analyzer characteristics (Option B82) (cont.)

Characteristic	Description
FM measurements	
RF bandwidth ((2 × deviation) + (4 × rate))	≤60 kHz
Deviation range	0 Hz to 30 kHz
Resolution	1 Hz
FM rate range	0 Hz to 12 kHz
Sensitivity (0.3 kHz to 3 kHz BW, 12 dB SINAD, 2.9 kHz deviation, 1 kHz FM rate)	
RF IN/OUT connector (Ref. Lev. = –28 dBm)	13 µV (–85 dBm), typical
RF IN2 connector (Ref. Lev. = –69 dBm)	1.3 µV (–105 dBm), typical
Residual FM	
RF IN/OUT	≤7 Hz (0.3 kHz to 3 kHz BW, rms), typical
RF IN2	≤9 Hz (0.3 kHz to 3 kHz BW, rms), typical
Error	<4 % of reading + 30 Hz + residual FM (FM rate ≤12 kHz, deviation ≤30 kHz)
Signaling	
Analog mode	AMPS, N–AMPS, TACS, J/E/N–TACS

Table A–7: Audio source characteristics

Characteristic	Description
Frequency	
Range	50 Hz to 4 kHz (single tone)
Resolution	1 Hz
Error	Half resolution
Output Voltage	
Range	0.1 mV to 5 V_{RMS}
Resolution	0.1 mV
Maximum output current	20 mA_{peak}
Output impedance	<5 Ω
Level error	<5 % (output voltage > 1 mV)
Distortion (THD + noise)	≤0.1 % (100 kHz BW, output voltage ≥200 mV)

Table A–8: AF analyzer characteristics

Characteristic	Description
Frequency measurement	
Range	50 Hz to 15 kHz
Resolution	1 Hz
Error	<1 Hz + timebase
Input voltage range	10 mV to 30 V
AC voltage measurement	
Input range	0.1 mV to 30 V_{RMS}
Error	<5 % + resolution
Nominal input impedance	1 MΩ in parallel with 100 pF
Distortion measurement	
Bandwidth	Limited by C-message filter
Frequency	1004 Hz
Input voltage range	100 mV to 30 V_{RMS}
Inherent distortion	<0.2 %
Resolution	0.1 % distortion
Error	<5 % + inherent distortion
SINAD measurement	
Bandwidth	Limited by C-message filter
Frequency	1004 Hz
Input voltage range	100 mV to 30 V_{RMS}
Inherent distortion	0.2 %
Resolution	0.1 dB
Error	≤5 % + inherent distortion
Filters	Audio filters and notch filters are automatically selected based on the specific measurement. Refer to *Appendix B* for filter usage.
6 Hz high-pass	–3 dB min. @ 6 Hz
50 Hz high-pass	–3 dB min. @ 50 Hz
Pre-emphasis filter	High-pass, 212 Hz, 1 zero
3 kHz low-pass	–40 dB min. @ 6 kHz
4 kHz low-pass	–40 dB min. @ 6 kHz
De-emphasis filter	Low-pass, 212 Hz, 1 pole
300 Hz - 3 kHz bandpass	–35 dB min. @ 6 kHz
300 Hz - 4 kHz bandpass	–35 dB min. @ 6 kHz
SAT filter	$F_{BW} \cong$ 20 Hz, 5.97 kHz, 6 kHz, or 6.03 kHz selectable

Table A–8: AF analyzer characteristics (cont.)

Characteristic	Description
ST filter	$F_{BW} \cong$ 20 Hz, 8 kHz or 10 kHz depending on standard
C-message	Weighted audio bandpass filter
CCITT Psophometric	Weighted audio bandpass filter
1.004 kHz notch (band-reject)	$F_{BW} \cong$ 20 Hz, –35 dB min. rejection
Compressor	2 dB in to 1 dB out, 1.5 kHz or 2.9 kHz reference
Expandor	1 dB in to 2 dB out, 1.5 kHz or 2.9 kHz reference

Table A–9: Timebase characteristics

Characteristic	Description
Standard time base	
Nominal frequency	10 MHz
Frequency drift in temperature range 0°C to 35°C	$\leq 1.5 \times 10^{-6}$
Frequency aging	$\leq 0.5 \times 10^{-6}$/year (at 35° C)
OCXO reference oscillator (Option B1)	
Nominal frequency	10 MHz
Frequency drift in temperature range 0°C to 45°C	$\leq 1.0 \times 10^{-7}$
Frequency aging	$\leq 2 \times 10^{-7}$/year $\leq 0.5 \times 10^{-9}$/day after 30 days of operation
Warm-up time (at 25°C)	Approximately 5 minutes

Table A–9: Timebase characteristics (cont.)

Characteristic	Description
Reference frequency inputs/outputs (Option B3)	
Synchronization input	1, 2, 5, 10 MHz (selectable)
Impedance	Approximately 100 Ω
Input voltage range	632 mV_{p-p} to 5 V_{p-p}
Level	0 dBm to 5 V_{p-p}
Synchronization output	
Frequency	10 MHz or frequency at synchronization input
Voltage	5 V_{p-p}, R_{out} = 50 Ω
Synchronization output (Option B60)	
Selectable	2 s (even second pulse) 80 ms superframe 20 ms paging frame 26.67 ms sync frame 1.25 ms power control frame 19.6608 MHz system clock
TDMA	80 ms super frame only
VSWR	
RF IN/OUT (N connector)	VSWR = 1.3 typical
RF IN 2 (BNC connector)	VSWR = 1.8 typical
RF OUT 2 (N connector)	VSWR = 1.8 typical

Table A–10: DC measurement characteristics

Characteristic	Description
DC voltage measurements	
Range	0 to ±30 V
Resolution	10 mV
Error	<2% + resolution
DC current measurements	
Mode	Averaging, +peak, – peak
Range	0 to ±10 A
Common-mode rejection	±30 V
Shunt resistance	50 mΩ
Resolution for averaging	1 mA / 10 mA
Resolution for peak	10 mA
Residual indices	<10 mA at 25° C and common-mode rejection ± voltage 10 V
Error	<2% + resolution + residual indication

Table A–11: General characteristics

Characteristic	Description
Rated temperature range	5 to 45° C to DIN IEC 68-2 1/2
Storage temperature range	–40 to +60° C
Shock and vibration	
Sine vibration	5 Hz to 55 Hz, maximum 2g 55 Hz to 150 Hz, constant 0.5g
Random vibration	10 Hz to 300 Hz, 1.2g rms
Shock	40g shock spectrum
Power supply	100 to 120 V (AC) ±10% 220 to 240 V (AC) ±10% 50 to 400 Hz ±5%
Power consumption (without options)	Approximately 80 W
Dimensions (W x H x D)	435 mm × 192 mm × 363 mm
Weight (without options)	Approximately 15 kg

Table A–12 lists the Certifications and compliances for the CMD 80 Digital Radiocommunication Tester.

Table A–12: Certifications and compliances

EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities: EN 50081-1 Emissions: EN 55022 — Class B Radiated and Conducted Emissions EN 60555-2 — AC Power Line Harmonic Emissions EN 50082-1 Immunity: IEC 801-2 — Electrostatic Discharge Immunity IEC 801-3 — RF Electromagnetic Field Immunity IEC 801-4 — Electrical Fast Transient/Burst Immunity
EC Declaration of Conformity – Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 73/23/EEC EN 61010-1:1993 — Safety requirements for electrical equipment for measurement, control, and laboratory use
Installation Category Descriptions	Terminals on this product may have different installation category designations. The installation categories are: CAT III — Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location CAT II — Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected CAT I — Secondary (signal level) or battery operated circuits of electronic equipment

Appendix B: Channel to Frequency Conversion Formulas

The following formulas may be used to determine the frequency of the mobile and base station Tx and Rx channels.

CDMA USCellular

Mobile Station

Channel Number	Frequency
$1 \le N \le 777$	0.030 N + 825.000
$1013 \le N \le 1023$	0.030 (N - 1023) + 825.000

Base Station

Channel Number	Frequency
$1 \le N \le 777$	0.030 N + 870.000
$1013 \le N \le 1023$	0.030 (N - 1023) + 870.000

CDMA US PCS

Mobile Station

Channel Number	Frequency
$1 \le N \le 1199$	0.050 N + 1850.000

Base Station

Channel Number	Frequency
$1 \le N \le 1199$	0.050 N + 1930.000

CDMA China Cellular

Mobile Station

Channel Number	Frequency
$1 \le N \le 1000$	0.025 N + 889.9875
$1329 \le N \le 2047$	0.025 N + 872.0125

Base Station

Channel Number	Frequency
$1 \le N \le 1000$	0.025 N + 934.9875
$1329 \le N \le 2047$	0.025 N + 917.0125

CDMA Korean PCS II

Mobile Station

Channel Number	Frequency
$0 \le N \le 599$	0.050 N + 1750.000
$600 \le N \le 699$	0.050 (N - 1300) + 1750.000

Base Station

Channel Number	Frequency
$0 \le N \le 599$	0.050 N + 1840.000
$600 \le N \le 699$	0.050 (N - 1300) + 1840.000

CMDA Korean PCS I

Mobile Station

Channel Number	Frequency
$0 \leq N \leq 1300$	0.050 N + 1715.000

Base Station

Channel Number	Frequency
$0 \leq N \leq 1300$	0.050 N + 1805.000

CDMA Japan Cellular T53 (JTACS / NTACS)

Mobile Station

Channel Number	Frequency
$1 \leq N \leq 799$	0.0125 N + 915.000
$801 \leq N \leq 1039$	0. 0125 (N - 800) + 898.000
$1041 \leq N \leq 1199$	0. 0125 (N - 1040) + 887.000

JTACS utilizes only even numbered channels. NTACS utilizes even number channels for the control channel, and both even and odd for the voice channel.

Base Station

Channel Number	Frequency
$1 \leq N \leq 799$	0.0125 N + 860.000
$801 \leq N \leq 1039$	0. 0125 (N - 800) + 843.000
$1041 \leq N \leq 1199$	0. 0125 (N - 1040) + 832.000

TDMA/AMPS USCellular (NAMPS)

Mobile Station

Channel Number	Frequency
$1 \leq N \leq 799$	0.030 N + 825.000
$990 \leq N \leq 1023$	0.030 (N - 1023) + 825.000

Base Station

Channel Number	Frequency
$1 \leq N \leq 799$	0.030 N + 870.000
$990 \leq N \leq 1023$	0.030 (N - 1023) + 870.000

TDMA US PCS

Mobile Station

Channel Number	Frequency
$1 \leq N \leq 1999$	0.030 N + 1849.980

Base Station

Channel Number	Frequency
$1 \leq N \leq 1999$	0.030 N + 1930.020

TACS (E–TACS)

Mobile Station

Channel Number	Frequency
$1 \leq N \leq 1000$ (2047)	0.025 N + 890.0125

Base Station

Channel Number	Frequency
$1 \leq N \leq 1000$ (2047)	0.025 N + 935.0125

Appendix C: FM/AF Measurement Filters

The audio filters for the AF/FM measurements are implemented as DSP applications, allowing for better stability and sharper cutoffs than the hardware equivalents. Most filters are a bandpass type, or combinations of high-pass and low-pass filters are used to create a bandpass equivalent.

Table C–1 lists the specifications of each filter type. Table C–2 shows the dominant filters used for the measurements.

Normally there is a 6 Hz high-pass filter that is always present (but may be switched to 50 Hz high-pass). The normal system rolloff is approximately 15 kHz, but this is determined by other factors and is not implemented as an actual filter, and is uncontrolled. Unless noted, the 6 Hz high-pass and 15 kHz system bandwidth limit have virtually no effect on measurement results.

Table C–1: Filter specifications

Filter [1]	Characteristics
6 Hz high-pass	–3dB min. @ 6 Hz
50 Hz high-pass	–3dB min. @ 50 Hz
Pre-emphasis filter	High-pass, 212 Hz, 1 zero
3 kHz low-pass	–40 dB min. @ 6 kHz
4 kHz low-pass	–40 dB min. @ 6 kHz
De-emphasis filter	Low-pass, 212 Hz, 1 pole
300 Hz - 3 kHz bandpass	–35 dB min. @ 6 kHz
300 Hz - 4 kHz bandpass	–35 dB min. @ 6 kHz
SAT filter	$F_{BW} \cong$ 20 Hz, 5.97 kHz, 6 kHz, or 6.03 kHz selectable
ST filter	$F_{BW} \cong$ 20 Hz, 8 kHz or 10 kHz depending on standard
C-message	Weighted audio bandpass filter
CCITT Psophometric	Weighted audio bandpass filter
1.004 kHz notch (band-reject)	$F_{BW} \cong$ 20 Hz, –35 dB min. rejection
Compressor	2 dB in to 1 dB out, 1.5 kHz or 2.9 kHz reference
Expandor	1 dB in to 2 dB out, 1.5 kHz or 2.9 kHz reference

1 **In the pass-band, all filters exhibit 0.1 dB of ripple or less. Unless specified, filter width is considered the pass-band rather than the –3 dB down point.**

Table C–2: FM/AF measurement filter usage

Test name	Result field label	FM standard [2]	Filters
Audio measurement			
Audio Measurement	UNFILTERED PEAK	Not applicable	6 Hz high-pass, 15 kHz low-pass
	FILTERED RMS FILTERED PEAK	Not applicable	C-message, CCITT Psophometric (user selectable)
Harmonic Distortion	AUDIO LEVEL	Not applicable	6 Hz high-pass, 15 kHz low-pass
	HARMONIC DISTOR-TION	Not applicable	C-message, CCITT Psophometric (user selectable)
Analog manual			
Call Established MS Tests	TOTAL PK DEVI-ATION	AMPS, TACS	50 Hz high-pass, 15 kHz low-pass
		NAMPS, NTACS	6 Hz high-pass, 15 kHz low-pass
	SAT PK DEVIATION	AMPS, TACS	SAT bandpass
	DSAT PK DEVIATION	NAMPS, NTACS	6 Hz high-pass, 3 kHz low-pass
	ST PK DEVIATION	AMPS	ST bandpass (f_c = 10 kHz)
		TACS	ST bandpass (f_c = 8 kHz)
Rx Quality			
Sensitivity	SINAD	AMPS, NAMPS	1004 Hz notch, C-message
		TACS, NTACS	1004 Hz notch, CCITT Psophometric
Hum / Noise	AUDIO PEAK DEVI-ATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	HUM / NOISE	AMPS, NAMPS	C-message
		TACS, NTACS	CCITT Psophometric
Harmonic Distortion	HARMONIC DISTOR-TION	AMPS, NAMPS	C-message
		TACS, NTACS	CCITT Psophometric
Audio Frequency Response (Normal)	Graphic display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass, pre-emphasis
		NAMPS, NTACS	300 Hz - 4 kHz bandpass pre-emphasis
Audio Frequency Response (Raw)	Graphic display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass

Table C–2: FM/AF measurement filter usage (cont.)

Test name	Result field label	FM standard [2]	Filters
Tx Quality			
Hum / Noise	AUDIO PEAK DEVIATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	HUM / NOISE	AMPS	De-emphasis, C-message, expandor (2.9 kHz reference)
		TACS	De-emphasis, CCITT Psophometric, expandor (2.9 kHz reference)
		NAMPS	De-emphasis, C-message, expandor (1.5 kHz reference)
		NTACS	De-emphasis, CCITT Psophometric, expandor (1.5 kHz reference)
Modulation Noise / Distortion	AUDIO PEAK DEVIATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	MODULATION NOISE / DISTORTION	AMPS	De-emphasis, C-message, 1.004 kHz notch, expandor (2.9 kHz reference)
		TACS	De-emphasis, CCITT Psophometric, 1.004 kHz notch, expandor (2.9 kHz reference)
		NAMPS	De-emphasis, C-message, 1.004 kHz notch, expandor (1.5 kHz reference)
		NTACS	De-emphasis, CCITT Psophometric, 1.004 kHz notch, expandor (1.5 kHz reference)
Audio Frequency Response (Normal)	AUDIO PK DEV	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	Graphic Display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass, de-emphasis
		NAMPS, NTACS	300 Hz - 4 kHz bandpass, de-emphasis
Audio Frequency Response (Raw)	AUDIO PK DEV	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	Graphic Display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
Modulation Limiting	Graphic Display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass

Table C–2: FM/AF measurement filter usage (cont.)

Test name	Result field label	FM standard [2]	Filters
Analog module			
Analog Module Test	TOTAL PK DEVIATION	AMPS, TACS	50 Hz high-pass, 15 kHz low-pass
		NAMPS, NTACS	6 Hz high-pass, 15 kHz low-pass
	SAT PK DEVIATION	AMPS, TACS	SAT bandpass
	DSAT PK DEVIATION	NAMPS, NTACS	6 Hz high-pass, 3 kHz low-pass
	ST PK DEVIATION	AMPS	ST bandpass (f_c = 10 kHz)
		TACS	ST bandpass (f_c = 8 kHz)
	AUDIO PEAK DEVIATION	AMPS, TACS	50 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
Rx Quality Sensitivity	SINAD	AMPS, NAMPS	1.004 kHz notch, C-message
		TACS, NTACS	1.004 kHz notch, CCITT Psophometric
Hum / Noise	AUDIO PEAK DEVIATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	HUM / NOISE	AMPS, NAMPS	C-message
		TACS, NTACS	CCITT Psophometric
Harmonic Distortion	HARMONIC DISTORTION	AMPS, NAMPS	C-message
		TACS, NTACS	CCITT Psophometric
Audio Muting	CURRENT AUDIO LEVEL	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	AUDIO MUTING	AMPS, NAMPS	C-message
		TACS, NTACS	CCITT Psophometric
Audio Frequency Response — Normal	Graphic display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass, pre-emphasis
		NAMPS, NTACS	300 Hz - 4 kHz bandpass, pre-emphasis
Audio Frequency Response — Raw	Graphic display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass

Table C–2: FM/AF measurement filter usage (cont.)

Test name	Result field label	FM standard [2]	Filters
Tx Quality			
Hum / Noise	AUDIO PEAK DEVI-ATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	HUM / NOISE	AMPS	De-emphasis, C-message, expandor (2.9 kHz reference)
		TACS	De-emphasis, CCITT Psophometric, expandor (2.9 kHz reference)
		NAMPS	De-emphasis, C-message, expandor (1.5 kHz reference)
		NTACS	De-emphasis, CCITT Psophometric, expandor (1.5 kHz reference)
Modulation Noise / Distortion	AUDIO PEAK DEVI-ATION	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	MODULATION NOISE / DISTOR-TION	AMPS	De-emphasis, C-message, 1.004 kHz notch, expandor (2.9 kHz reference)
		TACS	De-emphasis, CCITT Psophometric, 1.004 kHz notch, expandor (2.9 kHz reference)
		NAMPS	De-emphasis, C-message, 1.004 kHz notch, expandor (1.5 kHz reference)
		NTACS	De-emphasis, CCITT Psophometric,1.004 kHz notch, expandor (1.5 kHz reference)
Audio Muting	CURRENT AUDIO PK DEV	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	AUDIO MUTING	AMPS, NAMPS	De-emphasis, C-message
		TACS, NTACS	De-emphasis, CCITT Psophometric
Audio Frequency Response (Normal)	AUDIO PK DEV	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	Graphic Display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass, de-emphasis
		NAMPS, NTACS	300 Hz - 4 kHz bandpass, 6 Hz high-pass, de-emphasis
Audio Frequency Response (Raw)	AUDIO PK DEV	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass
	Graphic Display	AMPS, TACS	6 Hz high-pass, 4 kHz low-pass
		NAMPS, NTACS	300 Hz - 4 kHz bandpass

[2] **The FM standard types have been reduced to AMPS, NAMPS, TACS, and NTACS. Standards that are a minor variant of the type listed use the same filter selection. For instance, if the standard selected is ETACS or JTACS, the filter selection will be the same as the TACS standard.**

Appendix D: Remote Control

This section contains information about remote operation of the CMD 80 Digital Radiocommunication Tester. Either the RS-232 or the IEC/IEEE bus (GPIB) can be used as an interface for remote operation. Figure 2–5 on page 2–8 illustrates the location of both connectors.

NOTE*. For remote control via the serial interface, some controllers send characters to the serial interface during booting. This causes the tester to switch to the REMOTE state as soon as it receives these characters, since no explicit addressing is possible with the serial remote control. If this occurs, you can press the LOCAL key to switch from the REMOTE state to the LOCAL state.*

The IEC/IEEE bus interface corresponds to the IEC 625-1, IEEE 488.1, and the IEEE 488.2 standards. This standard describes data transfer formats and common commands. Further, the command syntax closely conforms to standard SCPI 1995.0.

Figure D–1 illustrates the IEC/IEEE 488 connector on the rear panel. It also illustrates the connector pin number and corresponding line.

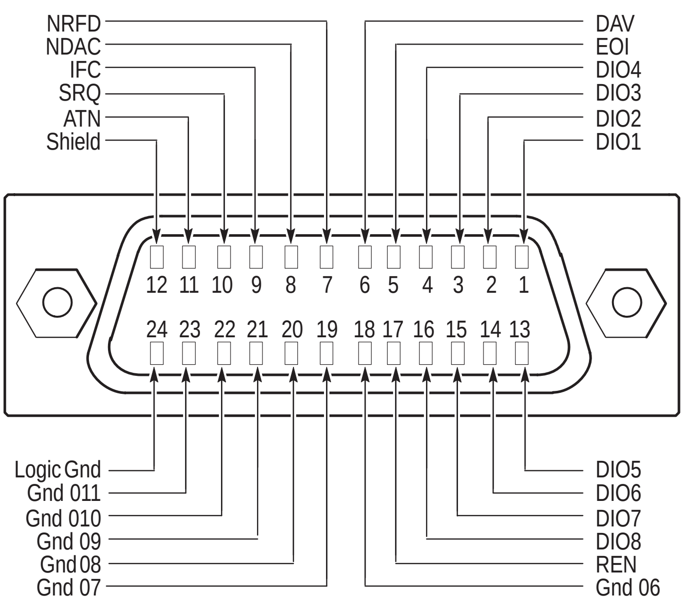


Figure D–1: IEC/IEEE 488 Connector

The bus connections are in accordance with the IEEE 488 standard. The interface contains three groups of bus lines as follows:

- Data bus with 8 lines DIO 1 to DIO 8

  Data transmission is bit-parallel and byte-serial with the characters in ISO 7-bit code (ASCII code).

  DIO 1 represents the least significant bit and DIO 8 the most significant bit.

- Control bus with 5 lines

  This is used to transmit control functions as follows:

  ATN (Attention) – becomes active low when addresses, universal commands, or addressed commands are transmitted to the connected device.

  REN (Remote Enable) – enables the device to be switched to the remote status.

  SRQ (Service Request) – enables a connected device to send a Service Request to the controller by activating this line.

  IFC (Interface Clear) – is activated by the controller to set the interface to a defined status.

  EOI (End or Identify) – is used to identify the end of data transfer and is used with a parallel poll.

- Handshake bus with 3 lines

  This is used to control the data transfer timing as follows:

  NRFD (Not Ready For Data) – an active low on this line signals to the talker/controller that one of the connected devices is not ready to accept data.

  DAV (Data Valid) – is activated by the talker/controller shortly after a new data byte has been applied to the data bus.

  NDAC (Not Data Accepted) – is held at active low by the connected device until it has accepted the data present on the data bus.

Detailed information on the data transfer timing is available in the IEC 625-1 standard.

According to the IEC 625-1 standard, devices controlled by means of the GPIB bus can be equipped with different interface functions. Table D–1 lists the interface functions applicable to the tester.

Table D–1: Interface functions

Control Characters	Interface Function
SH1	Source Handshake function, complete capability
AH1	Acceptor Handshake function, complete capability
L4	Listener function, complete capability, unaddress if MTA
T6	Talker function, complete capability, capability to relay to serial poll, unaddress if MTA
SR1	Service Request function, complete capability
PP1	Parallel Poll function, complete capability
RL1	Remote/Local switchover function, complete capability
DC1	Device Clear function, complete capability
DT0	Device Trigger function, no Device Trigger
C0	Controller function, no controller function

Setting the Device Address

The device address can be set in the CONFIG menu using the GPIB/IEC ADDRESS softkey. The address between 0 and 30 is entered using the numeric keys and remains stored when the device is switched off. The tester is factory set to address 1. The address is the decimal equivalent of bits DI01 to DI05 of the Talker or Listener address.

Serial Interface

The tester is equipped with a serial interface (RS-232C) as standard equipment. The 9-pin connector is located at the rear of the tester. A controller for remote control can be connected through the interface. The connection is effected using a null modem cable.

***NOTE**. For remote control via the serial interface, some controllers send characters to the serial interface during booting. This causes the tester to switch to the REMOTE state as soon as it receives these characters, since no explicit addressing is possible with the serial remote control. If this occurs, you can press the LOCAL key to switch from the REMOTE state to the LOCAL state.*

Interface Characteristics

The interface characteristics are as follows:

- Serial data transfer
- Bidirectional data transfer
- Software or hardware handshake
- Possible length of connecting cable > 20 m

Figure D–2 shows a 9-pin RS-232 connector with each pin labeled. Table identifies each connector for both a 9-pin and a 25-pin RS-232 connector.

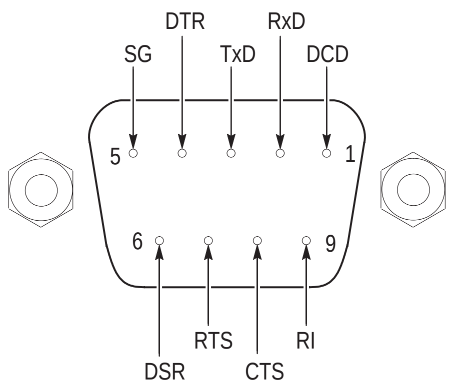


Figure D–2: RS-232 Interface connector (9-pin)

Table D–2: Interface connections

Designation		Pin Number (9-pin)	Pin Number (25-pin)
Data Carrier Detected	DCD	1	8
Receive Data	RxD	2	3
Transmit Data	TxD	3	2
Data Terminal Ready	DTR	4	20
Signal Ground	SG	5	7
Data Set Ready	DSR	6	6
Request To Send	RTS	7	4
Clear To Send	CTS	8	5
Ring Indicator	RI	9	21

Data Lines

RxD (receive data) and **TxD** (Transmit data)

The transmission is bit-serial in the ASCII code starting with the LSB. The two lines are necessary as the minimum requirement for a transmission; however, no hardware handshake is possible, but only the XON/XOFF protocol.

Control Lines

DCD (Data Carrier Detected), active LOW

Input; using this signal, the data terminal recognizes that the modem of the remote station receives valid signals with sufficient level. DCD is used to disable the receiver in the data terminal and prevent reading of false data if the modem cannot interpret the signals of the remote station.

DTR (Data Terminal Ready), active LOW

Output indicating that the data terminal is ready to receive data.

DSR (Data Set Ready), active LOW

Input indicating that the external device is ready to receive data.

RTS (Request To Send), active LOW

Output that can be used to indicate the readiness to receive data.

CTS (Clear To Send), active LOW

Input used to enable the transmission of data.

RI (Ring Indicator) active LOW

Input used by a modem to indicate that a remote station wants to set up a connection.

Default Settings

The serial interface is set to the values listed in Table D–3.

Table D–3: RS-232 default settings

Parameter	Setting Value
Baud rate	2400 baud
Data bits	8 bits
Stop bits	1 bits
Parity	none

Handshake

Software Handshake. In the case of the software handshake, the data transfer is controlled using the two control characters XON and XOFF.

The tester uses the control character XON to indicate that it is ready to receive data. If the receive buffer is full, it sends the XOFF character via the interface to the controller. The controller then interrupts the data output until it receives another XON from the CMD. The controller indicates to the tester that it is ready to receive data in the same way.

Cable for Local Controller Coupling in the Case of Software Handshake. The connection of the tester with the controller in the case of software handshake is effected by crossing the data lines. The wiring diagram shown in Figure D–3 applies to a controller with 9-pin or 25-pin configuration.

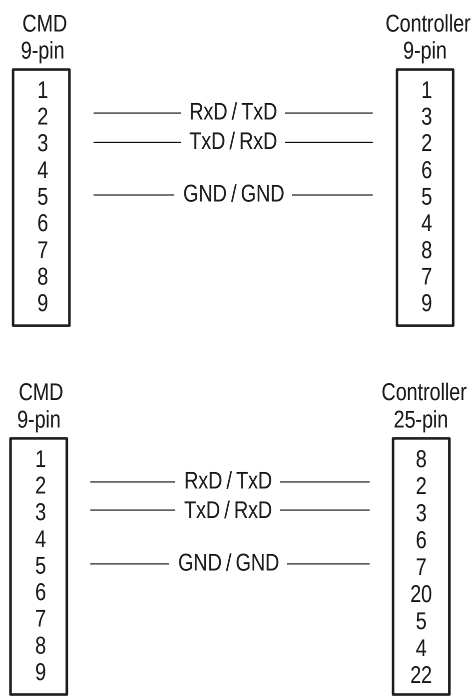


Figure D–3: Wiring of the data lines for software handshake

Hardware Handshake. In the case of the hardware handshake, the tester indicates that it is ready to receive data via the lines DTR and RTS. A logic 0 on both lines means “ready” and a logic 1 means “not ready”. The RTS line is always active (logic 0) as long as the serial interface is switched on. The DTR line thus controls the readiness of the tester to receive data.

The readiness of the remote station to receive data is reported to the tester via the CTS and DSR lines. A logic 0 on both lines activates the data output and a logic

1 on both lines stops the data output of the tester. The data output is via the TxD line.

Cable for Local Controller Coupling in the Case of Hardware Handshake. The connection of the tester to a controller is effected with a “null modem cable”. In the case of this cable, the data, control, and report lines must be crossed. The wiring diagram shown in Figure D–4 applies to a controller with 9-pin or 25-pin configuration.

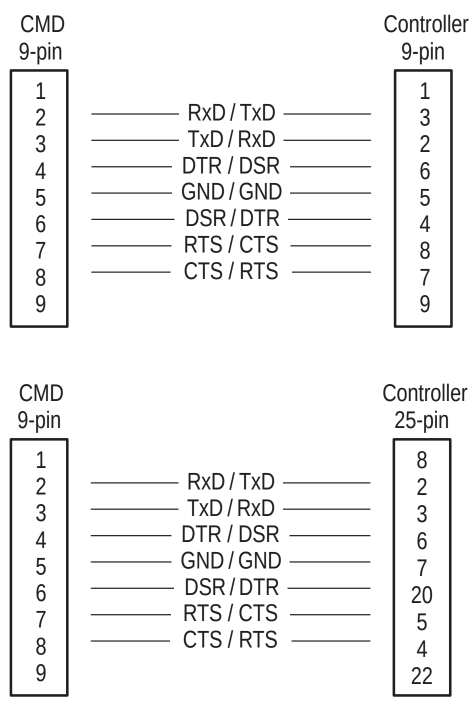


Figure D–4: Wiring of the data, control, and report lines for hardware handshake

Local/Remote Switchover

The device is in the Local state (manual mode) when powered on.

If the tester is addressed as a Listener by a GPIB controller or if it receives a character over the serial interface, it enters the Remote state and remains in this state after data transfer has been completed. All controls on the front panel except the LOCAL key are disabled.

The two methods to return to the Local status are as follows:

- The controller sends the addressed command GTL (Go to Local).
- The user presses the LOCAL key. Data output from the controller to the tester should be stopped before pressing the LOCAL key, or else the tester immediately enters the Remote state again. The LOCAL key can be disabled by the controller sending the universal command LLO (Local Lockout).

When the tester is switched to the Local state, it returns to the home menu.

Interface Messages

GPIB interface messages are transmitted to the device on the data lines when the Attention line ATN is active (low).

Universal Commands (GPIB only)

The universal commands have codes between 10 and 1F hexadecimal (see Table D–5 on page D–9). The commands act, without previous addressing, on all devices connected to the bus. The universal commands are described in Table D–4.

Table D–4: Universal commands

Command	Function
DCL (Device Clear)	Aborts processing of the currently received commands and sets the command processing software to a defined initial status. The device setting is not changed.
LLO (Local Lockout)	The LOCAL key is disabled.
SPE (Serial Poll Enable)	Ready for serial poll.
SPD (Serial Poll Disable)	End of serial poll.

Table D–5: ASCII and GPIB code chart

B7 B6 B5 BITS	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B4 B3 B2 B1	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
0 0 0 0	0 NUL 0 0	20 DLE 10 16	40 LA0 SP 20 32	60 LA16 0 30 48	100 TA0 @ 40 64	120 TA16 P 50 80	140 SA0 ` 60 96	160 SA16 p 70 112
0 0 0 1	1 GTL SOH 1 1	21 LL0 DC1 11 17	41 LA1 ! 21 33	61 LA17 1 31 49	101 TA1 A 41 65	121 TA17 Q 51 81	141 SA1 a 61 97	161 SA17 q 71 113
0 0 1 0	2 STX 2 2	22 DC2 12 18	42 LA2 " 22 34	62 LA18 2 32 50	102 TA2 B 42 66	122 TA18 R 52 82	142 SA2 b 62 98	162 SA18 r 72 114
0 0 1 1	3 ETX 3 3	23 DC3 13 19	43 LA3 # 23 35	63 LA19 3 33 51	103 TA3 C 43 67	123 TA19 S 53 83	143 SA3 c 63 99	163 SA19 s 73 115
0 1 0 0	4 SDC EOT 4 4	24 DCL DC4 14 20	44 LA4 $ 24 36	64 LA20 4 34 52	104 TA4 D 44 68	124 TA20 T 54 84	144 SA4 d 64 100	164 SA20 t 74 116
0 1 0 1	5 PPC ENQ 5 5	25 PPU NAK 15 21	45 LA5 % 25 37	65 LA21 5 35 53	105 TA5 E 45 69	125 TA21 U 55 85	145 SA5 e 65 101	165 SA21 u 75 117
0 1 1 0	6 ACK 6 6	26 SYN 16 22	46 LA6 & 26 38	66 LA22 6 36 54	106 TA6 F 46 70	126 TA22 V 56 86	146 SA6 f 66 102	166 SA22 v 76 118
0 1 1 1	7 BEL 7 7	27 ETB 17 23	47 LA7 ' 27 39	67 LA23 7 37 55	107 TA7 G 47 71	127 TA23 W 57 87	147 SA7 g 67 103	167 SA23 w 77 119
1 0 0 0	10 GET BS 8 8	30 SPE CAN 18 24	50 LA8 (28 40	70 LA24 8 38 56	110 TA8 H 48 72	130 TA24 X 58 88	150 SA8 h 68 104	170 SA24 x 78 120
1 0 0 1	11 TCT HT 9 9	31 SPD EM 19 25	51 LA9) 29 41	71 LA25 9 39 57	111 TA9 I 49 73	131 TA25 Y 59 89	151 SA9 i 69 105	171 SA25 y 79 121
1 0 1 0	12 LF A 10	32 SUB 1A 26	52 LA10 * 2A 42	72 LA26 : 3A 58	112 TA10 J 4A 74	132 TA26 Z 5A 90	152 SA10 j 6A 106	172 SA26 z 7A 122
1 0 1 1	13 VT B 11	33 ESC 1B 27	53 LA11 + 2B 43	73 LA27 ; 3B 59	113 TA11 K 4B 75	133 TA27 [5B 91	153 SA11 k 6B 107	173 SA27 { 7B 123
1 1 0 0	14 FF C 12	34 FS 1C 28	54 LA12 , 2C 44	74 LA28 < 3C 60	114 TA12 L 4C 76	134 TA28 \ 5C 92	154 SA12 l 6C 108	174 SA28 ¦ 7C 124
1 1 0 1	15 CR D 13	35 GS 1D 29	55 LA13 – 2D 45	75 LA29 = 3D 61	115 TA13 M 4D 77	135 TA29] 5D 93	155 SA13 m 6D 109	175 SA29 } 7D 125
1 1 1 0	16 SO E 14	36 RS 1E 30	56 LA14 . 2E 46	76 LA30 > 3E 62	116 TA14 N 4E 78	136 TA30 ^ 5E 94	156 SA14 n 6E 110	176 SA30 ~ 7E 126
1 1 1 1	17 SI F 15	37 US 1F 31	57 LA15 / 2F 47	77 UNL ? 3F 63	117 TA15 O 4F 79	137 UNT – 5F 95	157 SA15 o 6F 111	177 RUBOUT (DEL) 7F 127
	ADDRESSED COMMANDS	UNIVERSAL COMMANDS	LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS	

KEY

octal → 5 PPC ← **GPIB code (with ATN asserted)**
ENQ ← ASCII character
hex → 5 5 ← decimal

Tektronix
REF: ANSI STD X3.4-1977
IEEE STD 488.1-1987
ISO STD 646-2973

Addressed Commands (GPIB only)

The addressed commands have codes between 00 and 0F hexadecimal (see Table D–5). They act only on devices addressed as Listeners. The addressed commands are described in Table D–6.

Table D–6: Addressed commands

Command	Function
SDC (Selected Device Clear)	Aborts processing of the currently received commands and sets the command processing software to a defined initial status. The device setting is not changed.
GTL (Go To Local)	Changes to Local state (manual operation)

Commands Received by the tester in Listen Mode (Controller to Device Messages)

Input Buffer. All commands received are buffered in a memory with a maximum capacity of 256 bytes. To process command lines that are longer, the part of the command line that was first received is processed before accepting the next part.

Command Syntax. Figure D–5 shows the syntax of a command line (program message).

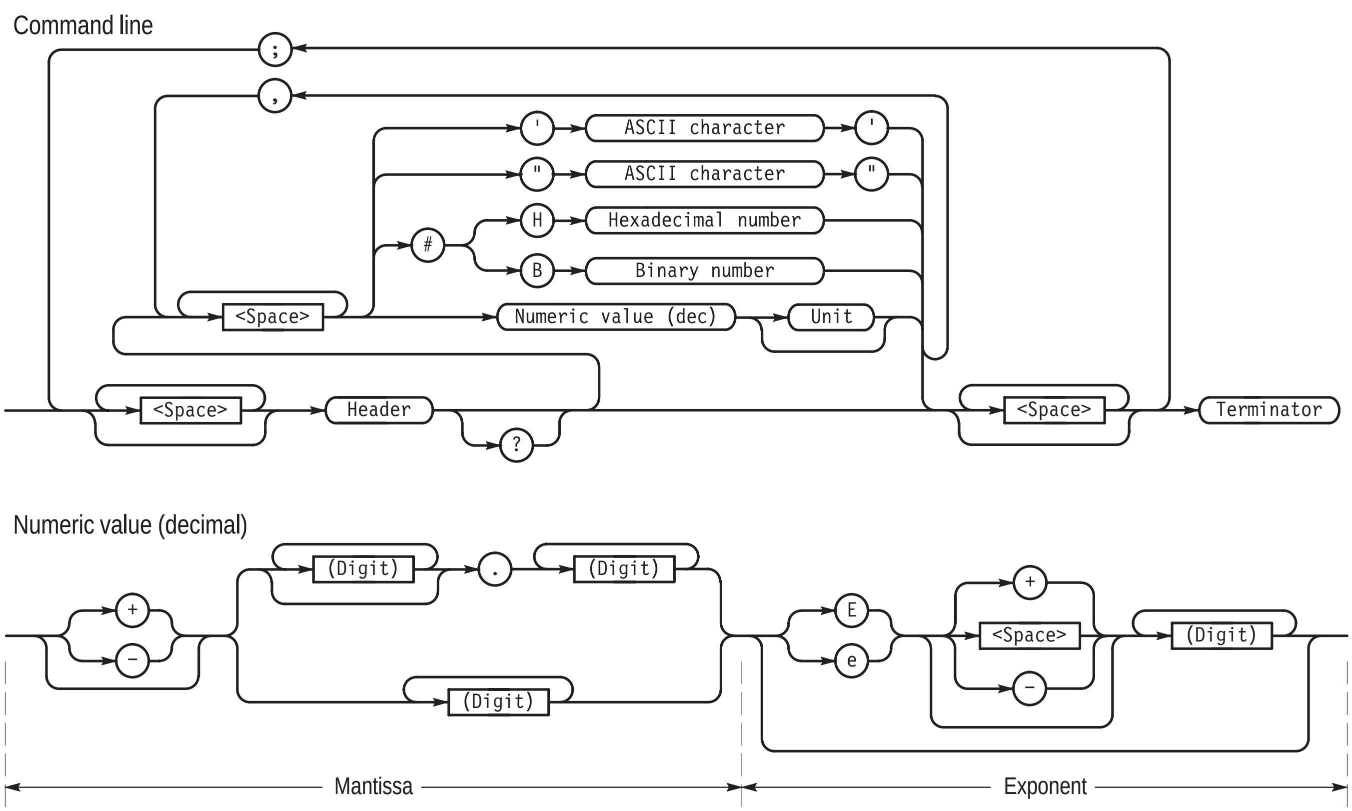


Figure D–5: Syntax diagram of a command line

Commands consist of a header and, in most cases, one or more following parameters. A query is formed by appending a '?' to the header. Queries may, but usually do not, have parameters.

Except for common or device independent commands (those beginning with '*'), a command header consists of several keywords with ':' separators.

Several conventions apply when listing keywords and commands. The first is the notation for the long form and the short form of keywords. The long form of a keyword is the full keyword. The short form is an abbreviation permitted if the keyword contains more than four characters. This abbreviation consists of the first four characters of the keyword unless the fourth character is a vowel, in which case the abbreviation is the first three characters. The short form is indicated by capitalizing the characters that make up this form, as in "CONFigure." The capitalization is for notation only; keywords are case insensitive and either upper, lower, or mixed case may be used when sending commands to the tester.

The conversion to the short form is done separately and independently for each keyword. Thus, the header "CONFigure:CLEVels:DURation" may also be given as (lowercase used just for the example), "conf:clev:dur," "conf:clev:duration," "conf:clevels:dur," "conf:clevels:duration," "configure:clev:dur," "configure:clev:duration," or "configure:clevels:dur." Keyword abbreviations other than the specified short or long forms (for example, "config") are not allowed.

A second convention concerns optional keywords. Optional keywords (also known as default nodes in the SCPI standard) are keywords that, although they are needed for a full description of the command, may be omitted because they are assumed by the command interpreter. An optional keyword is indicated by surrounding it and its associated ':' separator with brackets. For example, the header indicated as "CONFigure:BSTation:SOURce[:CDMA]:POWer" may be sent to the tester as "CONFigure:BSTation:SOURce:CDMA:POWer" or as "CONFigure:BSTation:SOURce:POWer" (or as one of the corresponding short forms).

The majority of commands have parameters that either choose a value for or directly set the value of the item selected by the command header. Parameters can be predefined (in association with the command) character parameters, numeric values, or, less commonly, strings. The parameter or parameters must be separated from the header by one or more whitespace characters (those with decimal ASCII codes between 0 and 9 or 11 and 32, inclusive).

Depending upon the command, a parameter may have optional units. For instance, when entering a frequency value, HZ, KHZ, MHZ, or GHZ may be used as units. If no explicit units are used, the basic unit for the parameter (HZ in the case of a frequency parameter) is assumed.

Commands that accept numeric parameters can also accept the special character parameters “MAXimum” and “MINimum.” These arguments set the value of the command item to the upper or the lower limits of the range accepted by the tester. Such a command also has associated queries for the maximum and minimum values: if the command header is “<xxxx>,” then the queries are “<xxxx>? MAXimum” and “<xxxx>? MINimum.” These queries give the respective ends of the range and not the current value.

***NOTE**. The STATus and common (*) commands do not accept the MAX or MIN arguments.*

The same conventions apply when listing parameters as when listing headers: short and long forms are distinguished by showing the acceptable short form in upper case (just as with headers, the case used when sending parameters to the tester is not important) and optional parameters are shown by surrounding them with square brackets.

There are also several conventions specific to parameters. The parameter description is surrounded by angle brackets (‘<’ and ‘>’) to distinguish it from the header. Alternate parameters, only one of which may be given, are separated by ‘|’. Thus, the parameters for a command that accepted a numeric power, “MAXimum,” or “MINimum” would be described by:<power [DBM] | MAXimum | MINimum>.

Multiple commands can be sent to the tester on one command line. The individual commands are separated by a ‘;’. The second command is interpreted in one of two ways:

- If the command header starts with a ‘:’, it is interpreted as a separate header with no connection to the previous command.
- If the header starts with a keyword, the header of the previous command (except for the last keyword) is prepended to the given command.

The following example illustrates the use of multiple commands sent on one command line:

- “CONFigure:BSTation:CHANnel:TRAFfic 8;:CONFigure:BSTation:FREQuency:CHANnel 283” is equivalent to “CONFigure:BSTation:CHANnel:TRAFfic 8” followed by“CONFigure:BSTation:FREQuency: CHANnel 283”

***NOTE**. If the commands are sent on different command lines, the full header for each command must be given. The initial ‘:’ should not be used.*

Every command line must end with a terminator. Terminators are:

- New line (ASCII code 10 decimal)
- End (EOI line active) together with the last useful character of the command line or the new line character (GPIB only)

  Since the carriage return character (ASCII code 13 decimal) is permissible as a filler without effect before the terminator, the combination of carriage return and new line is permissible. A command line may require more than one line of the controller screen since it is only limited by the terminator. The terminator is automatically added to the end of command text with most GPIB-bus controllers.

Spaces. Additional spaces may be inserted at the following points:

- Before a header
- Between header and number
- Before and after commas (,) and semicolons (;)
- Before the terminator

Decimal Numbers. The following notations are permissible for decimal numbers:

- With and without sign (for example: 5, +5, and –5)
- With and without decimal point; any position of the decimal point is permissible (for example: 1.234, –100.5, and .327)
- With or without exponent to base 10, “E” or “e” is used as the exponent character (for example: .451, 451E–3, and 4.51e–2)
- The exponent is permissible with or without a sign; also, a space is permissible instead of the sign (for example: 1.5E +3, 1.5E–3, and 1.5E 3)
- Leading zeros are permissible in the mantissa and exponent (for example: +001.5 and –01.5E–03)
- The length of the number, including the exponent, may be up to 30 characters. The number of digits for the mantissa and exponent is limited only by this condition. Digits that exceed the resolution of the device are rounded up or down; they are always considered for the order of magnitude (power of ten). Examples are 150000000 and 0.00000032.

NOTE*. Specification of the exponent alone (for example, E–3) is not permissible. 1E–3 is the correct notation.*

Hexadecimal and Binary Numbers. Hexadecimal numbers and binary numbers are permissible only without exponent and unit. The following notations are permissible:

- Hexadecimal number (for example: #H12ffab, #h12FFAB, and #HFf19a)
- Binary number (for example: #b101011 and #B11001)
- String entries as follows:

  ’01234567890abcdef’
  ’01234567890ABCDEF’
  ”01234567890abcdef”
  ”01234567890AbcdEF”

Messages Sent by the tester in Talker Mode (Device to Controller Messages)

The tester sends messages over the remote interface under the following conditions:

- The tester has been requested to provide data in its output buffer by one or more query messages with a question mark within one command line.
- The tester indicates by setting bit 4 (message available) in the status byte that the requested data is now present in the output buffer (see *Service Request and Status Registers* on page D–16) or indicates messages in the error queue by setting bit 2.
- If using GPIB, the tester has been addressed as a talker.

NOTE*. The command line with the data request must be transmitted immediately before the talker is addressed. If another command line is present in between, the output is cleared.*

If the tester is addressed as a Talker immediately after the query message, the bus handshake is disabled until the requested data is available.

The syntax of the messages sent by the tester is shown in Figure D–6.

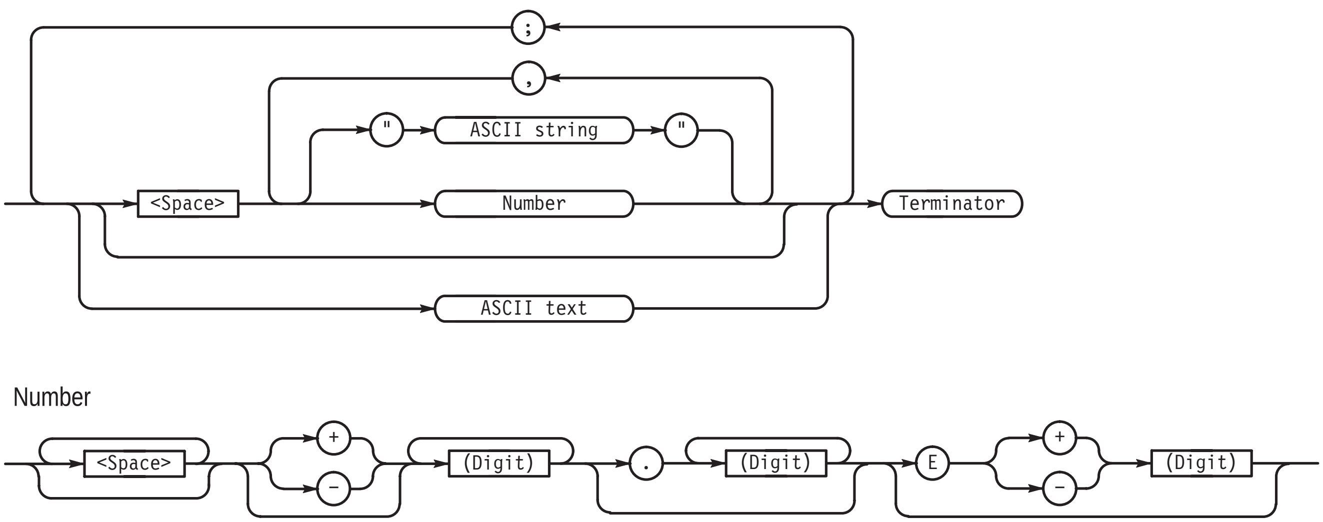


Figure D–6: Syntax diagram of messages sent by the tester

The syntax is similar to that of the commands received by the tester. Specific syntax rules are as follows:

- A carriage return/new line (ASCII code 13 and 10 decimal) together with an end message (line EOI active — applies to GPIB only) is used as a terminator.
- If the tester receives several query messages, it also returns several messages within one line separated by semicolons (;).
- Several numbers can be sent as a reply to certain query messages; they are separated by commas (,).
- The syntax of the numbers is described in Figure D–6.
- Messages sent by the tester do not contain units. In the case of physical variables, the numbers refer to the basic form of the unit (V, A, W, OHM, S, Hz, RAD, %, DB).

Device Independent (Common) Commands

The device independent commands are listed in Table F–1 on page F–8. The commands are of the following types:

- Commands that refer to the GPIB Service Request function, with the associated status and mask registers
- Commands for device identification
- Commands that refer to the GPIB Parallel Poll function
- Commands for device internal sequences (reset, calibration) and for synchronizing sequences

The commands are taken from the IEEE 488.2 standard which ensures that these commands have the same effect in different devices.

The headers of these commands consist of a star (*) followed by three letters.

Device-Specific Commands

All functions that can be set using the keyboard can also be controlled through the GPIB bus. The effect of the remote commands is the same as the corresponding entry from the keyboard. The GPIB bus can also be used to read the values set for all parameters.

The headers are designed in conformance with SCPI.

Service Request and Status Registers

Figure D–7 shows the status registers and the effective links between them. To comply with the IEEE 488.2/SCPI 1995.0 standard, the Status Byte (STB) and its associated mask register (SRE) (that are also present in older devices) have been supplemented by the Event Status Register (ESR) and its Event Status Enable Mask Register (ESE).

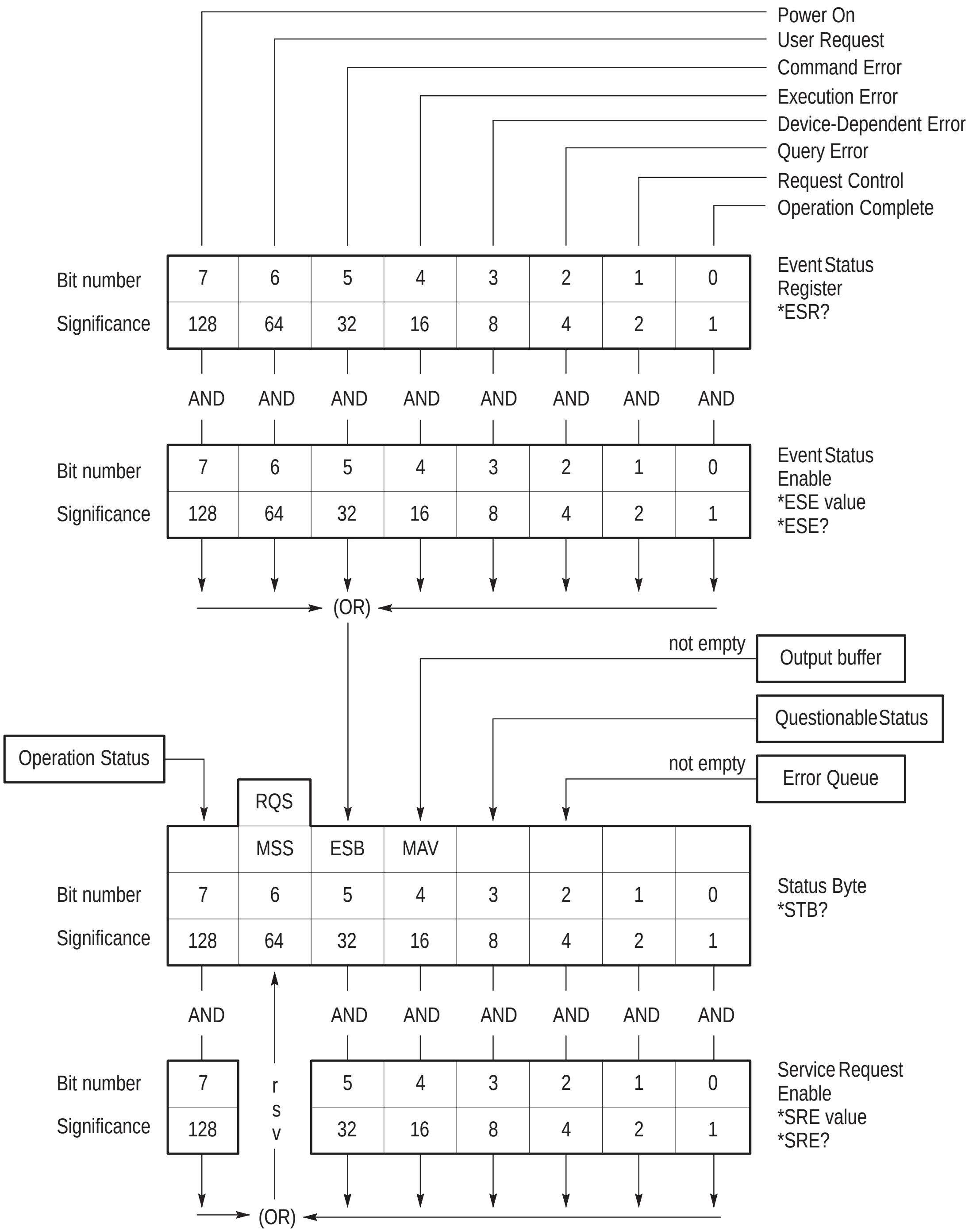


Figure D–7: Status registers

A bit is set to 1 in the ESR in the case of certain events (for example: fault, ready signal). Refer to Table D–8. These bits remain set until they are cleared by reading the ESR (by the command *ESR?) or by the following conditions:

- The commands *RST or *CLS
- Switching the AC supply (note that the power-on bit is set in this case)

Using the ESE mask register, the user can select the bits in the ESR that also set the sum bit ESB (bit 5 in the status byte) and trigger the service request. The sum bit is therefore only set if at least one bit in the ESR and the corresponding bit in the ESE are set to 1. The sum bit is automatically cleared again if the previous condition is no longer fulfilled (for example, if the bits in the ESR have been cleared by reading the ESR or if the ESE has been modified).

The ESE mask register is written by the command *ESE *<value>* (value is the register contents in decimal form) and can be read again by the command *ESE?. The value is set to 0 at AC power on if the power-on status clear flag is 1 (*PSC 1). The ESE mask register is not changed by other commands or interface messages (DCL, SDC).

The bits listed in Table D–7 are used in the status byte (STB).

Table D–7: Bit allocation of status byte

Bit Number*	Bus Line	Description	Meaning
2	DOI 3	—	There is an entry in the error queue
3	DOI 4	—	Sum bit of the Questionable status
4	DOI 5	MAV	Message Available Indicates that there is a message to be read in the output buffer. The bit is 0 if the output buffer is empty.
5	DOI 6	ESB	Sum bit of the Event Status Register
6	DOI 7	RSQ	Request Service
7	DOI 8	—	Sum bit of the Operation status

***Bits 0 and 1 are not used.**

***NOTE**. The status register bits are numbered from 0 to 7 in compliance with the standard, but the bus data lines are designated DIO 1 to DIO 8.*

Table D–8 shows the bit allocation for Event Status Register (ESR).

Table D–8: Bit allocation of ESR

Bit Number	Meaning
7	Power On This bit is set when the tester is switched on or if the power returns following a failure.
6	User Request This function is not implemented in the tester.
5	Command Error This bit is set if one of the following faults is detected in the received commands: Syntax error Illegal unit Illegal header A number has been combined with a header where no number is allowed.
4	Execution Error This bit is set if one of the following errors was detected during execution of the received commands: A number is outside the permissible range (for the respective parameter) A received command is not compatible with the current device setting
3	Device-Dependent Error This bit is set when a functional errors occur.
2	Query Error This bit is set if one of the following conditions occurs: The controller wants to read data from the tester but no query message has previously been output. (GPIB only) The data present in the output buffer of the tester has not been read and a new command was sent to the tester instead. The output buffer is cleared in this case.
1	Request Control This function is not implemented in the tester.
0	Operation Complete This bit is set by the commands *OPC and *OPC? when all previous commands have been executed.

Using the SRE mask register, the user can determine whether the RQS bit of the status byte is set and a Service Request sent to the controller by activating the

SRQ line with a set bit of the status byte. Since each bit in the SRE mask register is assigned to the corresponding bit in the status byte, the possibilities are indicated in Table D–9.

Table D–9: SRE bit status

Contents of SRE (decimal)	Set Bit Number in SRE	Effect
0	—	No Service Request
4	2	Service Request if there is a message in the error queue
8	3	Service Request if bit(s) is set in the Questionable status (and not masked)
16	4	Service Request if MAV bit is set (message in output buffer)
32	5	Service Request if ESB bit is set (at least 1 bit set and not masked in the ESR)
128	7	Service Request if bit(s) is set in the Operation status (and not masked)

The Service Request Enable mask register (SRE) is written by the command *SRE <*value*> (value is the contents in decimal form) and can be read again by the command *SRE?. The SRE is set to 0 when the AC power is switched on (if the power on clear flag is 1). The Service Request function is thus disabled. The SRE mask register is not changed by other commands or interface messages (DCL, SDC).

Several devices can trigger a Service Request simultaneously. The controller must read the status bytes of the devices to identify the device or devices that triggered the Service Request. A set RQS bit (bit 6/DIO7) indicates that the device is sending a Service Request.

The status byte of the tester can be read in the following manner:

- By the command *STB?

  The status byte is output in decimal form. The status byte is not changed by being read, and the Service Request is not cleared.

- By a Serial Poll

  The contents are transferred in binary form as one byte. The RQS bit is then set to 0 and the Service Request becomes inactive; the other bits of the status byte are not changed.

The status byte of the tester is cleared in the following manner:

- By the command *CLS

  This command clears the ESR and the output buffer; the ESB and MAV bits in the status byte are also set to 0. This in turn clears the RQS bit and the Service Request.

- By reading the ESR (*ESR? command) or setting the ESE mask register to 0 (*ESE command) and by reading the contents of the output buffer
- By reading out the error queue using SYSTEM:ERROR?
- By reading the Questionable/Operation status register or zeroing the respective enable register

Resetting the Device Functions

Table D–10 lists the various commands and events that cause individual device functions to be reset.

Table D–10: Device reset functions

Event	Power On Clear Flag		DCL, SDC (Device Clear, Selected Device Clear)	Commands	
	0	1		*RST	*CLS
Basic device setting	—	—	—	Yes	—
Set Event Status Register ESR to zero	Yes	Yes	—	Yes	Yes
Set mask register ESE and SRE to zero	—	Yes	—	—	—
Clear output buffer	Yes	Yes	Yes	—	Yes
Clear Service Request	Yes	[1]	[2]	[3]	Yes
Reset command processing input buffer	Yes	Yes	Yes	—	—

[1] **Yes, but “Service Request on power on” is possible.**

[2] **Yes, if only caused by message in the output buffer.**

[3] **Yes, if not caused by message in the output buffer.**

Command Processing Sequence and Synchronization

The commands received by the tester are first stored in an input buffer and are processed in the order in which they were sent. During this time, the GPIB bus can be used for communication with other devices. Command lines that exceed the capacity of the input buffer are processed in several sections. The bus is occupied during this time.

OPERATION COMPLETE Command

The commands *OPC and *OPC? (Operation complete) are used as feedback to indicate the following:

- The time when processing of the received commands was terminated
- Whether a measurement (if any) has been completely performed

The *OPC command sets bit 0 in the ESR, and a Service Request can then be triggered when all previous commands have been executed.

The *OPC? query additionally provides a message in the output buffer and sets bit 4 (MAV) in the status byte.

WAIT Command

Synchronization can be established within a command line by the command *WAI. All subsequent commands are executed only when the previous commands have been completely executed. This is sometimes useful in the case of very short measurement times.

Error Handling

All errors detected by the tester in connection with remote operation are indicated in the ESR by setting a bit (bit 2, 4, or 5, see Table D–8). Function faults are signalled by setting bit 3. At the same time, a message is entered into the error queue. These bits remain set until the ESR is read or is cleared by the command *RST or *CLS. This is complies with the standard IEEE 488.2/SCPI 1995.0 and enables triggering of a Service Request and program-controlled evaluation of the type error.

Appendix E: Remote Control Commands

This appendix describes the use of the remote command set for control of the tester. This command set is designed to be compliant with IEEE 488.2 and, as much as possible, with SCPI 1995.0

The command language is SCPI-like in cases where deviation from SCPI is needed. The main deviation from the SCPI standard is in configuring and running predefined tests and in returning the data from these tests to the host or controller. Configuration in the tester relates mainly to the parameters of the test being run, while configuration in the SCPI model relates mainly to the characteristics of the signal to be measured.

Because of the large number of test results, more than one data item may be returned (depending upon the test) in response to a query. This feature is not part of the SCPI standard.

The information in this appendix is based on *Standard Commands for Programmable Instruments (SCPI)*, Version 1996.0

Command Set Organization

Keywords in the command headers form a hierarchy. For example, all command headers starting with the keyword CONFigure are for instrument configuration. Further keywords limit the command. Command headers for configuring a CDMA mode base station simulator begin with CONFigure:BSTation ; those for configuring the RF source in the simulator begin with CONFigure:BSTation:SOURce. This hierarchy can be represented as as tree structure. Figure E–1 shows a partial structure for configuration headers.

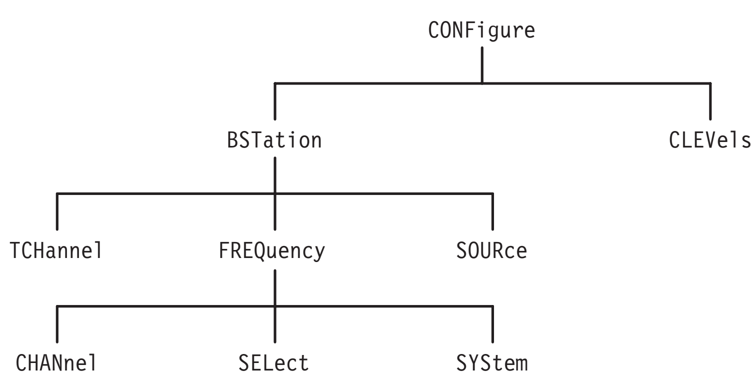


Figure E–1: Partial command tree for headers starting with CONFigure

The root or first keyword of a command indicates to which instrument system or command group the command belongs. The areas of the instrument controlled by commands beginning with different keywords are as follows:

- Commands beginning with '*' that do not follow the model of keywords with ':' separators are commands required by IEEE 488.2 and by SCPI.
- Commands beginning with CONFigure configure the instrument and tests that the tester can perform. Configuration includes both setting of test conditions, such as source levels, and setting of limits for acceptable test results.
- The command beginning with DISPlay affects what is shown on the front-panel display.
- Queries beginning with FETCh return data without performing a new measurement. A new measurement is not needed in two cases: when the data is always available without performing a measurement and when the data is from a previous measurement that started with a READ query. If the second keyword of the query is [:SCALar], the returned data consists of either one item or of several different items. If the second keyword is ARRay, the returned data consists of an array of items of the same type.
- Commands beginning with MMEMory are associated with storage and recall of instrument settings.
- Commands beginning with PROCedure cause the tester and/or the mobile station under test to change states. No tests are performed and no data is returned.
- Queries beginning with READ perform predefined tests on the tester and return results after the test is complete. Queries ending with the keyword [:ALL] return more than one data item; other queries return only one data item. For some tests, additional data can be returned with a FETCh query.
- Commands beginning with ROUTe control which of the signal inputs and outputs on the tester front panel are used to connect to the mobile station under test.
- Commands beginning with SENSe affect settings associated with the input signals to the tester.
- Commands beginning with SOURce affect settings associated with the output signals from the tester.
- Commands beginning with STATus report the internal condition of the tester and determine which error conditions are reported.
- Commands beginning with SYStem control miscellaneous items in the instrument that are unrelated to the measurements made.

Keywords other than the first can also organize groups of commands. For example, commands related to the transmitter quality test, whether for configuring the test, performing the test, or returning additional test results, all contain the keyword TQUality. Likewise, there are particular keywords associated with each of the other tester tests.

Instrument Model

Figure E–2 shows the conceptual model of the tester in terms of the interconnection of SCPI subsystems used in programming the instrument. The model is used to relate programming commands and queries to the areas of the instrument that they control. Commands that relate to a given block often start with the keyword that is the block name. Not all blocks shown necessarily have associated programming commands and queries; some may have fixed, unalterable functions.

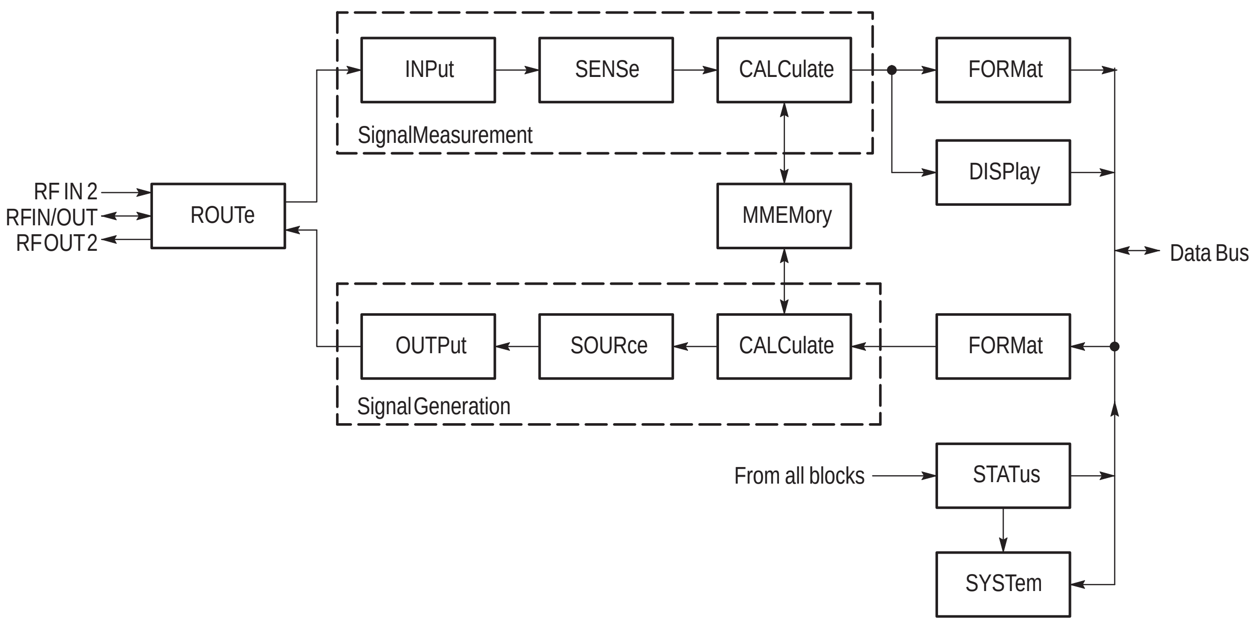


Figure E–2: Instrument concept model

State-Based Operation

At any given time, the tester is in one of several internal states, each of which is related to the state of the mobile station under test. Certain remote commands may be given only in certain states. For example: commands that change the settings of the base station simulator in the tester may only be used when such changes do not cause the tester to lose contact with the mobile station; tests that require that there be an active call to the mobile station may be run only when the tester is in the proper call established state.

The states and the methods that the instrument changes between states are summarized in the Figures E–3 through E–6. The items in parentheses are the mnemonic names by which the states are known.

***NOTE**. Option B82 (Analog Mode) and Option B84 (TDMA Mode) are included in the state diagrams.*

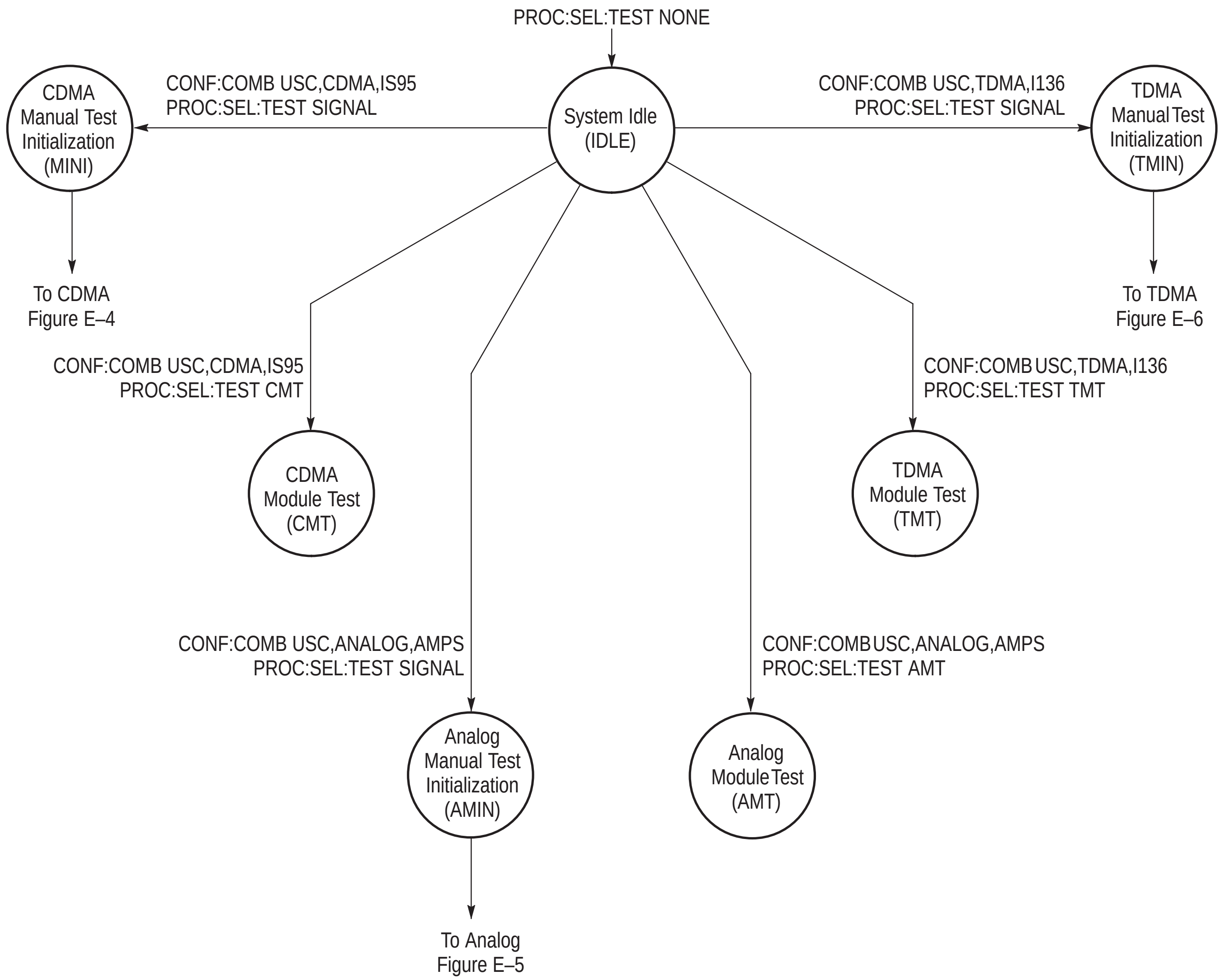


Figure E–3: State-based operation diagram

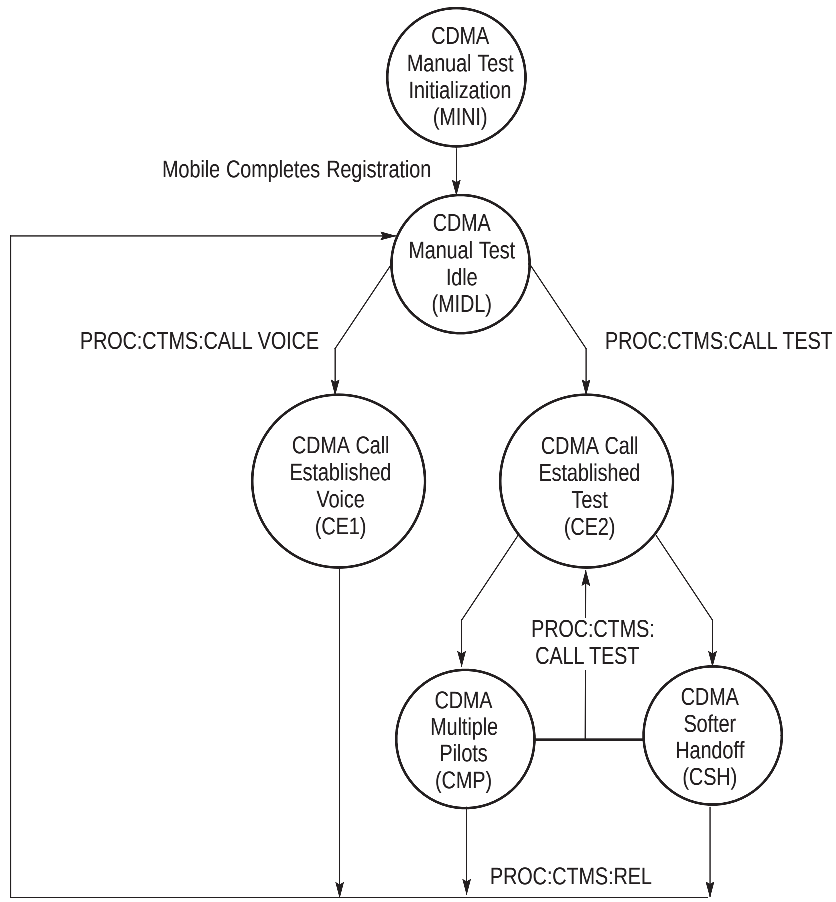


Figure E–4: State-based operation diagram continued (CDMA)

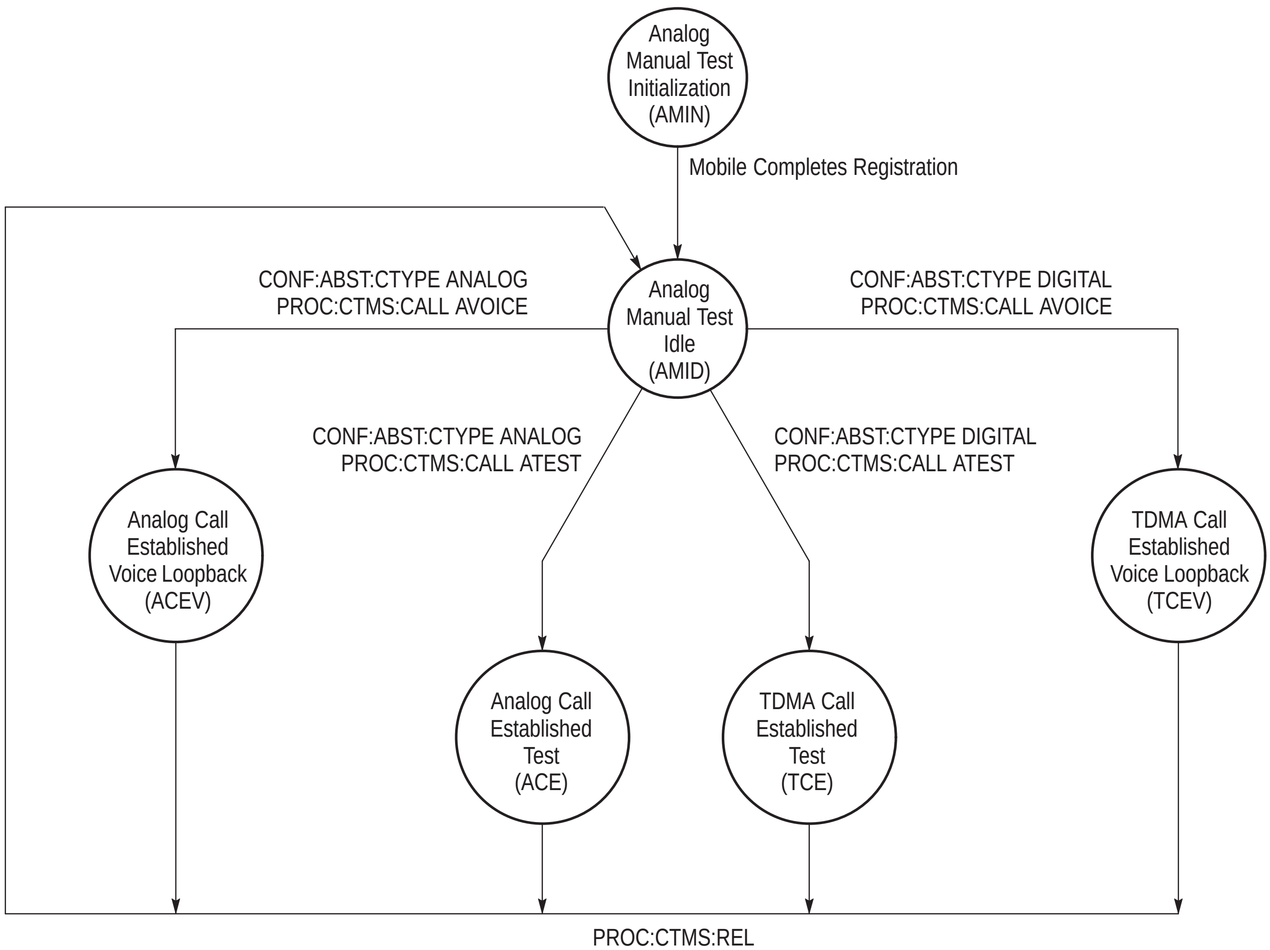


Figure E–5: State-based operation diagram continued (Analog)

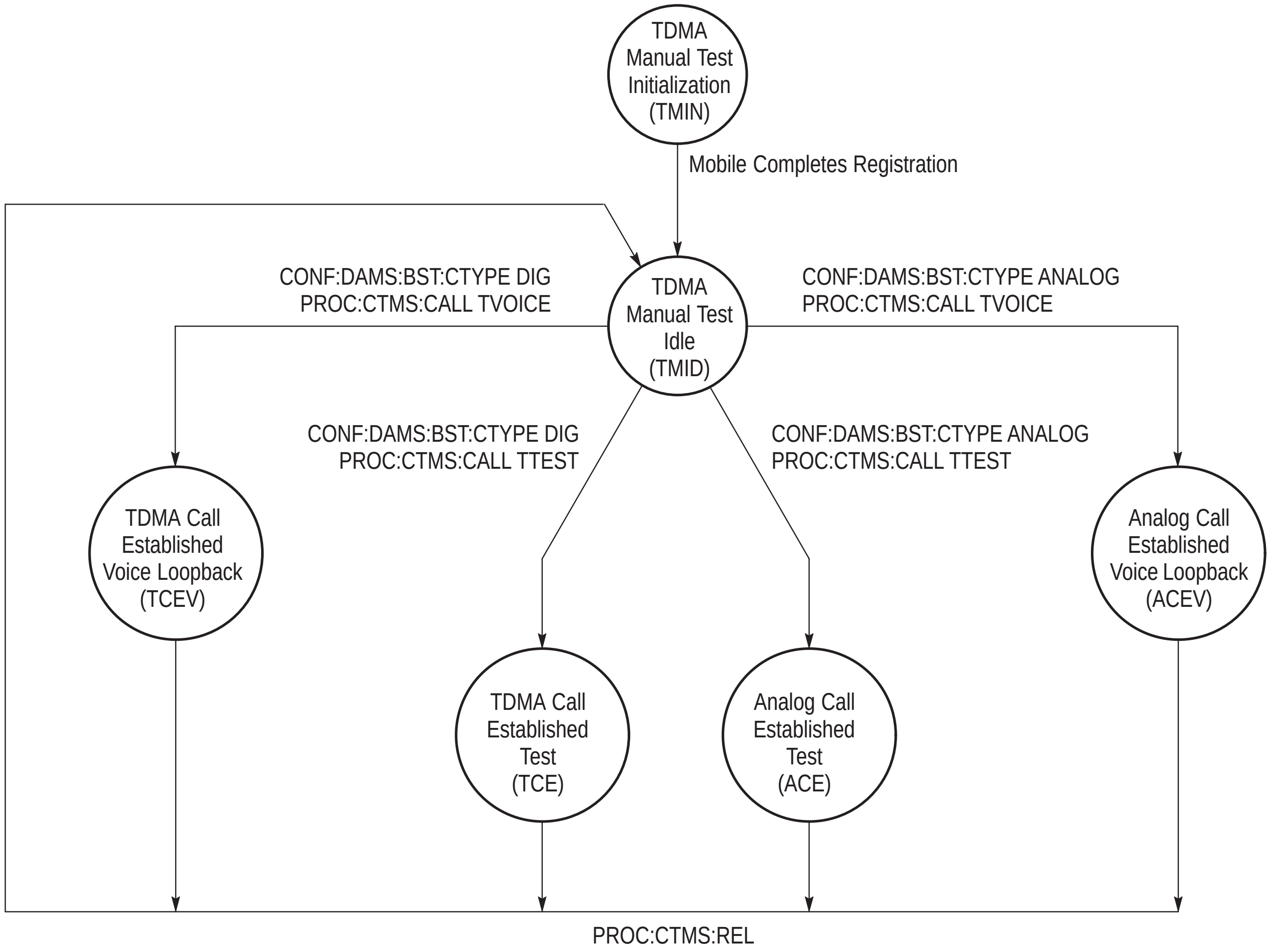


Figure E–6: State-based operation diagram continued (TDMA)

Changing States

The internal state of the tester changes as a result of the actions of the user, either through the front panel or the remote interface, and of the mobile station.

The following example shows the steps in a remote control program that establishes a CDMA mode call with the mobile station using CDMA service Options 2 or 9. This type of call must be made to do most of the tests possible with the tester.

When the tester is first powered up, after a reset (*RST command or SYSTem:PRESet command), or after the PROCedure:SELect:TEST NONE command, the instrument is in the IDLE state. In this state, the instrument is inactive, with its internal RF source turned off. There is no communication with the mobile station under test.

When it receives the PROCedure:SELect:TEST SIGnal command, the tester turns on its CDMA RF source with the setting established by the CONF:COMB and CONFigure:BSTation tree of commands. The instrument then enters the MINI state while it waits for the phone to register.

Registration is the process whereby the mobile station under test receives the signal from the base station simulator in the tester, decodes it, synchronizes to the system timing, and sends back a signal identifying itself. The registration process is under control of the mobile station. However, since most further commands affecting the mobile station cannot be sent until it is registered, a remote control program must know when registration is accomplished. This information can be obtained in several ways, either by polling the tester state until the mobile station registers, or by enabling and then waiting for a GPIB SRQ when the phone registers.

One way of determining registration is through the CMD condition register. Registration causes an event to be recorded in the CMD register that can be read with the STATus:OPERation:CMD[:EVENt]? query. This event can be enabled to cause a GPIB SRQ. (No SRQ is possible when using RS-232 control.) Alternatively to the above, the state of the tester can be read with the STATus:DEVice? query. When registration occurs, the tester automatically changes to the idle state (MIDL, AMID, or TMID depending on the system selection).

In the MIDL state, the PROCedure:CTMStation:CALL TEST command establishes a call to the mobile station using CDMA service Option 2. The state of the tester, as shown by the STATus:DEVice? query, changes to CE2 when the call is established.

***NOTE**. Service Option 9 is used when a call is established using the 13k rate; however, the instrument state is CE2.*

When switching between local and remote, in either direction, the tester goes to the IDLE state.

Analog (Option B82). When the tester receives the PROCedure:SELect:TEST SIGnal command, the tester turns on its Analog RF source with the setting established by the CONF:COMB and CONF:ABSTation tree of commands. The instrument then enters the AMIN state while it waits for the mobile station to register.

Registration is the process where the mobile station under test receives the signal from the base station simulator in the tester, decodes it, and sends back a signal identifying itself. When the mobile station registers, the state of the tester, as shown by the STATus:DEVice? query, will change to AMID.

In the AMID state, the PROCedure:CTMStation:CALL ATESt command establishes a call to the mobile station. The state of the tester, as shown by the STATus:DEVice? query, changes to ACE when the call is established.

TDMA (Option B84). When the tester receives the PROCedure:SELect:TEST SIGnal command, the tester turns on its TDMA RF source with the setting established by the CONF:COMB and CONF:DAMM:ABSTation tree of commands. The instrument then enters the TMIN state while it waits for the mobile station to register.

Registration is the process where the mobile station under test receives the signal from the base station simulator in the tester, decodes it, and sends back a signal identifying itself. When the mobile station registers, the state of the tester, as shown by the STATus:DEVice? query, will change to TMID.

In the TMID state, the PROCedure:CTMStation:CALL TESt command establishes a call to the mobile station. The state of the tester, as shown by the STATus:DEVice? query, changes to TCE when the call is established.

Non-Allowed Commands

A command sent when the tester is in a state when the command is not allowed is ignored.

Non-Allowed Queries

A query sent when the tester is in a state when the query is not allowed returns a response using NANs for the state-specific fields of the response.

Unplanned State Changes

If the mobile station under test is not working properly, it may terminate a call or even lose registration at any time. Such changes affect the state of the tester. Some tests (such as the sensitivity test for receiver quality) involve a low signal level to the mobile station and are more likely to cause problems than others.

If the tester state changes during a test, the behavior is similar to when the instrument is not in the proper state when the command is given. The tester detects the state change, immediately terminates the test, and if there is a query (a READ query) pending, returns a response to the query; however, the response data will contain NANs for the state-specific fields of the response. Proper completion of the test can be checked for by sending a STATus:DEVice? query after the test. The query checks if the tester is still in the same state as when the test started. Another method to verify proper completion is to parse the output results for NAN values.

Command Descriptions

***NOTE**. Some commands are described in groups in which all of the command headers in the group begin with the same keyword or keywords. Commands within the group are described by referring to their final keyword or keywords. Complete commands are formed by combining the beginning keyword(s) and the final keyword(s), using the usual ':' separator. For example, if a command has the beginning keywords of CONFigure:BSTation and final keywords of FREQuency:SELect , the complete command header is: CONFigure:BSTation:FREQuency:SELect*

The same method can be used to form command headers when the keywords of the header are broken into more than two parts.

This section divides the remote commands into different groups, listing the commands in each group and describing them in general terms. The command set can be divided into several categories: common commands that are required by the IEEE and SCPI standards; status reporting commands, also required by these standards; and device specific commands unique to the tester. The device specific commands set up and release calls with the mobile station under test, configure the tester hardware (both in general and in connection with specific tests), set test parameters, and run and return results from predefined tests of the mobile station.

Refer to *Appendix D: Remote Control Command Table* for a listing of all commands and more information about each command than is given in this section. Included are argument ranges, default values, the instrument state or states when the command may be used, and programming notes.

***NOTE**. When operating the tester from the front panel, many predefined tests can run continuously, either in all cases or as the result of a mode selection. However all tests are run in the single-shot mode in remote operation. A test normally runs to completion and reports its results; however, in tests that require a substantial amount of time (for example, 20 seconds), the user may select for the test to terminate early if the tester detects that the test failed.*

Common Commands

Common commands, also known as device independent commands, are not specific to the tester, but rather are specified for all instruments in the IEEE 488.2 standard and/or the SCPI standard. All common commands begin with the character '*.'

The common commands in the tester are: *CLS, *ESE and *ESE?, *ESR?, *IDN?, *IST?, *OPC and *OPC?, *OPT?, *PRE and PRE?, *PSC and *PSC?, *RST, *SRE and *SRE?, STB?, *TST?, and *WAI. The operation of these commands is described in *Appendix B: Remote Control*.

The SYStem:OPTions? query is identical in effect to the *OPT? query.

The SYStem:PREset command (no associated query) is identical in effect to the *RST command.

Status Reporting Commands and Queries

Refer to *Appendix B: Remote Control for* the operation of the commands and queries applied to status operation, questionable registers, and error reporting.

The tester has another status register, known as the CMD register, that records events dealing with the mobile station under test which occur asynchronously with the operation of the instrument. The bits are assigned as follows (bit 0 is the LSB):

- Bit 0 — Mobile station initiated call
- Bit 1 — Mobile station released call
- Bit 2 — Mobile station registered
- Bit 3 — Mobile station lost registration

All other bits are unassigned.

The commands and queries associated with the CMD register are similar to those associated with the status operation register.

- STATus:OPERation:CMD:CONDition? (query only) — This query is included to make the set of queries dealing with the CMD register the same as that dealing with the status operation register. Since the bits in the CMD register represent events, not conditions, the response to this query is always ‘0.’
- STATus:OPERation:CMD:ENABle <number> (query STATus:OPERation:CMD:ENABle?) — controls which events in the tester register are reported to the status operation register. If a bit in the tester enable register corresponding to one of the bits listed above is set, the occurrence of the event assigned to that bit sets the tester register bit (bit 8) in the status operation register. If the bit is cleared, this does not happen.
- STATus:OPERation:CMD:EVENt? (query only) — indicates whether an event has taken place. When one of the events assigned to the CMD register occurs, the corresponding bit is set in the event register. This query clears the register; a query response contains only events that have occurred since the last query.

The SYStem:VERSion? query returns the version of the SCPI standard with which the tester complies. The response has the form YYYY.V , where YYYY is the year of SCPI compliance and V is the version number within the year.

The STATus:DEVice query returns the internal state of the tester. The internal states are diagrammed in Figure E–3 on page E–4. This query returns the mnemonic state names given there.

Settings Store and Recall

Instrument settings can be stored in internal memory or, if the correct option is present, on a memory card. All instrument settings except for the remote interface settings are saved. The commands to store and recall settings that have no associated queries are as follows:

- MMEMory<n>:SAVE saves the present settings in the specified memory.
- MMEMory<n>:RECall recalls new instrument settings from the specified memory.

In the above commands, <n> is a number between 1 and 13 that identifies the storage location to be used. The number is part of the command, not a parameter, and should not be separated with spaces (for example, MMEMory7:SAVE).

The storage location for the instrument settings can be chosen with the MMEMory:TYPE <INTernal | MEMCard> command (query MMEMory:TYPE?). The proper option must be installed to use the MEMCard parameter.

A name can be assigned to each stored setting. The assigned name appears for each setting in the front-panel Save and Recall menus. The MMEMory<n>:SAVE:NAME <name string> command (query MMEMory<n>:SAVE:NAME?) command assigns the name. The assigned name may be up to 29 characters long. The parameter <n> has the same meaning here as it does for the commands listed above.

Settings can be stored separately for up to 14 users. Each user can store up to 13 settings. The following commands are associated with user selection:

- SYSTem:USER:SELect <USER1 | USER2 |... | USER14> (query SYStem:USER:SELect?) — selects the user for the settings that are stored and recalled.
- SYSTem:USER<n>:NAME <name string> (query SYSTem:USER<n>:NAME?) — assigns a user name for the specified user. The assigned name appears in front panel menus. The name may be up to 29 characters long. (<n> is a number between 1 and 14 that identifies the desired user. The number is part of the command, not a parameter, and should not be separated with spaces; for example, SYSTem:USER6:NAME?.)

External Signal Configuration

The tester has a common RF input and output as well as separate input and output connectors. The input and output can be separately set to either the common connector or the alternate connector for the chosen function (input or output). The routing command is ROUTe:IOConnector <parameter>. The allowable values for <parameter> are as follows:

- I1O1 — selects the common input/connector as both the input and output.
- I1O2 — selects the common input/connector as the input to the tester and the alternate output connector as the output from the tester.
- I2O1 — selects the alternate input connector as the input to the tester and the common input/connector as the output from the tester.
- I2O2 — selects the alternate input and output connectors. The common input/output connector is not used.

The tester can compensate for externally applied attenuation or gain at any of the RF inputs or outputs. The signal levels output from the tester are adjusted (within the limits imposed by the hardware) such that the levels after any gain or attenuation are at the levels set by the configuration commands. Also, the levels reported for mobile station power account for attenuation or gain to report the values at the the mobile station.

Attenuation or gain can be accounted for only if its value is reported to the system. In the following commands, positive values indicate attenuation and negative values indicate gain:

- SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIALternate <loss [DB]> (query SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIALternate?) sets the loss (or gain) applied externally to the alternate RF input.
- SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIOutput <loss [DB]> (query SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIOutput?) — sets the loss (or gain) applied externally to the input signal of the common RF input/output.
- SOURce:CORRection:LOSS[:OUTPut]:OFFSet:RIOutput <loss offset [DB]> (query SOURce:CORRection:LOSS[:OUTPut]:OFFSet:RIOutput?) — sets the loss (or gain) applied externally to the output signal of the common RF input/output with respect to the loss (or gain) applied to the input signal of that connector. Because this is a common connector, the loss (or gain) that can be applied to the output signal with respect to that of the input signal is limited.
- SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:RIOutput?) — returns the net loss (or gain) applied externally to the output signal of the common RF input/output. This command is a query only.

- SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:ROALternate <loss [DB]> (query SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:ROALternate?) — sets the loss (or gain) applied externally to the alternate RF output.

CAUTION. *The input can be overdriven resulting in damage to the tester if an external amplifier is connected and the maximum input level is exceeded.*

Miscellaneous Commands

The command DISPlay:ENABle <ON | OFF> (query DISPlay:ENable?) controls whether the remote commands and queries received by the tester are displayed on the front-panel display. When the tester is under remote control, the menus displayed during manual control are replaced by a display indicating that the instrument is in remote mode. If the display enable function is set to on, commands, queries, and responses to queries are a part of this display.

The tester can make several measurements that are not part of the predefined tests. The first set of measurements use the DC voltmeter and DC ammeter inputs on the front panel. The queries associated with the DC meters are as follows:

- READ[:SCALar]:VOLTage[:DC]? — reads the DC voltage.
- READ[:SCALar]:CURRent[:DC][:AVERage]? — reads the average DC current.
- READ[:SCALar]:CURRent[:DC][:MAXimum]? — reads the maximum DC current.
- READ[:SCALar]:CURRent[:DC][:MINimum]? — reads the minimum DC current.

Base Station Configuration

The tester is a multiprotocol tester, so the first step in configuring the instrument is to select which protocol you want to test. You accomplish this with the command CONFigure:COMBination <network>, <system>, <standard> (query, CONFigure:COMBination?). The choices for the network parameter are USCellular, JPCellular, CHCellular, USPCs, KR1Pcs, and KR2Pcs. The system parameter must be CDMA, TDMA, or ANALog. The choices for the standard parameter are IS95, JSTD008, AMPS, JTACS, NTACS, ETACS, TACS, and I136. Note that not all possible combinations of the network, system and standard parameters are valid. Refer to Table E–1 for the supported combinations of parameters.

Table E–1: Available standard choices

NETWORK	SYSTEM	STANDARD
US CELLULAR	CDMA TDMA [1] ANALOG [2]	IS-95 IS-136-A AMPS or NAMPS
US PCS	CDMA TDMA [1]	UB IS-95 or J-STD008 IS-136-A
JAPAN CELLULAR	CDMA ANALOG [2]	IS-95 or T53 NTACS or JTACS
CHINA CELLULAR	CDMA ANALOG [2]	IS-95 ETACS or TACS
KOREA PCS	CDMA	UB IS-95 or J-STD008
KOREA 2 PCS	CDMA	UB IS-95 or J-STD008

1 **Available with Option B84.**

2 **Available with Option B82.**

CDMA. For the CDMA protocols, all command headers for configuring the base station simulator in the tester begin with CONFigure:BSTation. The commands set or query the following parameters:

- Frequency and CDMA channel parameters
- Source level
- Network
- Base station ID
- Preferred rate
- Actual rate (query only)
- Network ID
- System ID

Some of the frequency and CDMA configuration commands can only be used when the tester is in a particular state, while the other commands have different effects in different states. Almost all commands can be used in the IDLE state to set the values with which the base station turns on. In other states the commands are limited to prevent disruption of communication between the base station and the mobile station. The limitations associated with each command are given as part of the command descriptions below. All queries may be used in any system state.

***NOTE**. The PNOFfset, TCHannel, FOFFset, and FREQuency:CHANNel commands will perform a hard handoff to perform the settings change when the instrument is in the CE1 or CE2 state*

The frequency and CDMA configuration commands have the following final header keywords and parameters:

- FOFFset <number> (query FOFFset?) — sets the frame offset for the base station. The frame offset sets the starting position of the traffic frame, in terms of the power control group number. This command is allowed in all states. When in the CE1 or CE2 state, this command changes the current frame offset.
- FREQuency:CHANnel <number> (query FREQuency:CHANnel?) — sets the channel number for the base station simulator. The command response depends on the state of the instrument. When in the IDLE state this command sets or queries the default channel. When in the CE1 or CE2 state, this command changes the current RF channel number. The query always returns the actual channel number being used.
- PNOFfset <number> (query PNOFfset?) — sets the PN offset for the base station. This command may be given only in the IDLE state or one of the call established states, CE1 or CE2.
- CONFigure:BSTation:PREVision <protocol revision number> (query CONFigure:BSTation:PREVision?) — for networks using IS–95, this command is used to select which revision of that standard is to be supported. IS–95 is version 1; IS–95–A is version 2; IS–95–A with TSB–74 is version 3. At the present time, only one version of J–STD–008 is supported.
- TCHannel <number> (query TCHannel?) — sets the CDMA Walsh traffic channel number. This is not a frequency, but rather specifies the Walsh code that is used to encode the traffic channel portion of the CDMA signal. This command may be given in all system states.

The source level configuration commands discussed in this section control the settings of the base station simulator when a test is not being run and during the Current Signal Levels receiver quality test. Commands associated with specific tests can override some of the levels (which ones depends upon the particular test) while the test is being run. These commands are listed as part of the test description for each test.

The level configuration commands can be used in any system state.

The source level configuration commands can be divided into two groups: those that set the relative levels of different components of the signal and a command to set the total absolute signal power.

The commands that set relative levels continue (after the CONFigure:BSTation keywords) with the keywords SOURce[:CDMA]:LEVel. The final keywords for the command headers and the parameters are as follows:

- PAGing <relative level [DB] | MAXimum | MINimum> (query PAGing? [<MAXimum | MINimum>]) — sets the level of the paging channel relative to the total output power of the base station simulator.
- PILot <relative level [DB] | MAXimum | MINimum> (query PILot? [<MAXimum | MINimum>]) — sets the level of the pilot channel relative to the total output power of the base station simulator.
- SYNC <relative level [DB] | MAXimum | MINimum> (query SYNC? [<MAXimum | MINimum>]) — sets the level of the sync channel relative to the total output power of the base station simulator.
- TRAFfic <relative level [DB] | MAXimum | MINimum> (query TRAFfic? [<MAXimum | MINimum>]) — sets the level of the full rate traffic channel relative to the total output power of the base station simulator.
- OCNS? (query only) — returns the level of the orthogonal channel noise source. This level is that of the signal from the base station simulator representing the signals from all other users of the channel. This signal appears as noise to the mobile station under test since the encoding of these other signals is orthogonal (noninterfering) with the encoding of the system under test.

The complete command to set the total base station power is CONFigure:BSTation:SOURce[:CDMA]:POWER <power [DBM] | MAXimum | MINimum>. The query is CONFigure:BSTation:SOURce [:CDMA]:POWER? [<MAXimum | MINimum>].

The command CONFigure:BSTation[:SETTings]:DEFault (no query) sets the configuration values for the base station simulator to their default values.

***NOTE**. The default command always resets the level configuration values. The frequency and CDMA configuration values that are reset are only those with corresponding CDMA commands that may be used in the current state of the tester. Values that may not be changed in the current state are not affected.*

Analog. Analog operation is possible only if Option B82 (Analog Mode) is installed.

All command headers for configuring the analog base station simulator in the tester begin with CONFigure:ABSTation. The commands set or query the following parameters:

- Frequency parameters for the control channel and voice channel
- Source level
- SAT (or DSAT) color code
- SAT (or DSAT) peak deviation
- Mobile attenuation code to control mobile station power level
- Location ID
- System ID
- Paging duration

Some of the configuration commands can only be used when the tester is in a particular state, while the other commands have different effects in different states. Almost all commands can be used in the IDLE state to set the values with which the analog base station turns on. In other states the commands are limited to prevent disruption of communication between the analog base station and the mobile station. The limitations associated with each command are given as part of the command descriptions below. All queries may be used in any system state.

NOTE*. The FREQuency:VCHannel and FREQuency:SCCode commands will perform a handoff to perform the settings change when the instrument is in the ACE state.*

The frequency configuration commands have the following final header keywords and parameters:

- FREQuency:CCHannel <RF channel number> (query FREQuency:CCHannel?) — sets the channel number for the control channel.
- FREQuency:VCHannel <RF channel number> (query FREQuency:VCHannel?) — sets the channel number for the voice channel.
- FREQuency:SCCode <SAT color code number> (query FREQuency:SCCode?) — sets the SAT color code value used when a call is established.
- FREQuency:SYSTem? — returns the system indicator (A or B) for the control channel as defined in IS–95.

The level configuration commands discussed in this subsection control the settings of the analog base station simulator when a test is not being run. Commands associated with specific tests can override some of the levels (which ones depends upon the particular test) while the test is being run. These commands are listed as part of the test description for each test.

The following level configuration commands can be used in any system state.

- SOURce:POWer <analog power level [DBM]> (query SOURce:POWer?) — establishes the analog base station power level.
- CMAC <control channel mobile attenuation code> (query CMAC?) — sets the control channel mobile attenuation code. The mobile station sets its output power level for the reverse control channel according to the control mobile attenuation code.
- VMAC <voice channel mobile attenuation code> (query VMAC?) — sets the voice channel mobile attenuation code. The mobile station sets its output power level for the reverse voice channel according to the voice mobile attenuation code.
- SOURce:FM:DEViation:SAT <SAT peak deviation [HZ]> (query SOURce:FM:DEViation:SAT?) — sets the peak deviation of the SAT when an analog call is established.

The command CONFigure:ABStation[:SETTings]:DEFault (no query) sets the configuration values for the analog base station simulator to their default values.

NOTE. *The default command always resets the level configuration values. The frequency configuration values that are reset are only those with corresponding commands that may be used in the current state of the tester. Values that may not be changed in the current state are not affected.*

TDMA. TDMA operation is possible only if Option B84 (TDMA Mode) and Option B82 (Analog Mode) are installed.

All command headers for configuring the base station simulator in the tester begin with CONFigure:DAMM:BSTation or CONFigure:DAMS:BSTation. The commands set or query the following parameters:

- Frequency parameters for the traffic channel, control channel, and voice channel
- Source level
- Network
- Base station ID

- Preferred data rate
- Actual data rate (query only)
- DVCC (digital verification color code)
- Network ID
- System ID
- Registration period
- Preferred Coder/decoder
- Actual Coder/decoder
- Paging duration
- Mobile attenuation code to control mobile station power level

Some of the configuration commands can only be used when the tester is in a particular state, while the other commands have different effects in different states. Almost all commands can be used in the IDLE state to set the values with which the base station turns on. In other states the commands are limited to prevent disruption of communication between the base station and the mobile station. The limitations associated with each command are given as part of the command descriptions below. All queries may be used in any system state.

The channel and time slot configuration commands have the following final header keywords and parameters:

- DCCH:CHANnel <Value> (query DCCH:CHANnel?) — sets the digital control channel number.
- DTC:CHANnel <Value> (query DTC:CHANnel?) — sets the digital traffic channel number.
- DCCH:SLOT <Value> (query DCCH:SLOT?) — sets the digital control channel slot number (only full rate DCCH channels are supported, and only slot 1 is supported for the DCCH).
- DTC:SLOT <Value> (query DTC:SLOT?) — sets the digital traffic slot number.
- DVCC<Value> (query DVVC?) — sets the base station digital voice color code.

The level configuration commands discussed in this section control the settings of the base station simulator when a test is not being run. Commands associated with specific tests can override some level settings while the test is being run.

The level configuration commands can be used in any system state.

- SOURce:POWer<TDMA power level[DBM]> (query SOURce:POWer?) — sets the output power delivered to the mobile station.
- DCCH:MAC <Value> (query DCCH:MAC?) — Sets the digital control channel mobile attenuation code.
- DTC:MAC <Value> (query DTC:MAC?) — Sets the digital traffic channel mobile attenuation code.

The complete command to set the total base station power is CONFigure:DAMM:BSTation:SOURce:POWer <power level [DBM] | OFF>. The query is CONFigure:DAMM:BSTation:SOURce:POWer?.

The command CONFigure:DAMS:BSTation:PARameters[:SETTings]:DEFault (no query) sets the configuration values for the base station simulator to their default values.

***NOTE**. The default command always resets the level configuration values. The channel and time slot configuration values that are reset are only those with corresponding TDMA commands that may be used in the current state of the tester. Values that may not be changed in the current state are not affected.*

RF Source Control

Before any measurements can be made on the mobile station under test, the RF sources in the tester must be turned on in order to provide synchronizing signals to the mobile station and to cause it to respond. This is accomplished with the command PROCedure:SELect[:TEST] SIGNaling. The corresponding command to turn the RF sources off is PROCedure:SELect[:TEST] NONE. The query PROCedure:SELect[:TEST]? returns the mode that the instrument is in.

***NOTE**. No call shutdown is performed before the RF sources are turned off. If a call is established when the PROCedure:SELect:TEST NONE command is given, the call is immediately terminated.*

The RF sources must be turned off before switching between CDMA, Analog, and TDMA modes of operation (except when performing a CDMA to analog handoff).

Information in the Registered State

When the mobile station registers, it sends identification information to the tester.

CDMA. For CDMA operation, this information is available via the FETCh[:SCALar]:MSINfo[:ALL]? query. This query returns, in order, the mobile station's mobile identification number, serial number, and power class.

When the mobile station is registered but the call is not established, the power transmitted by the mobile station can be obtained for different conditions:

- READ[:SCALar]:IACCess:POWer:APRobe? — returns the power transmitted by the mobile station when it is sending access probes.
- READ[:SCALar]:IACCess:POWer:STANdby? — returns the power transmitted by the mobile station between access probes.

The command CONFigure:IACCess:LIMit:POWer:STANdby <power [DBM]> (query CONFigure:IACCess:LIMit:POWer[:STANdby]?) sets the maximum power that the mobile station is permitted to output in the standby state. The command CONFigure:IACCess[:SETTings]:DEFault (no query) resets this value to its default setting.

A query is available to determine the pass/fail status of the most recent standby power measurement. This query FETCh[:SCALar]:IACCess:POWer:STANdby:LIMit:FAIL? returns 0 for pass or 1 for fail.

The CONFigure:BSTation:RPERiod <S12 | S14 | S17 | S20 | S24 | S29 | S34 | S41 | S49 | S58 | S69 | S82 | S97 | S116 | OFF> (query CONFigure:BSTation:RPERiod?) sets the time interval between timer based registrations. This controls how often access probes will be sent by the mobile station. Ample time should be allowed when access probe power or standby output power measurements are performed.

Analog. When the mobile station registers, it sends identification information to the tester. This information is available via the FETCh[:SCALar]:MSINfo[:ALL]? query. This query returns, in order, the mobile station's mobile identification number, serial number, and power class.

When the mobile station is registered with the analog base station but the call is not established, the power transmitted by the mobile station can be obtained for different conditions:

- READ[:SCALar]:AIACcess:POWer:APRObe? — returns the power transmitted by the mobile station when it is sending access probes.
- READ[:SCALar]:AIACcess:POWer:STANdby? — returns the power transmitted by the mobile station between access probes.

The query FETCh[:SCALar]:AIACcess:POWer:STANdby:LIMit:FAIL? returns 0 for pass or 1 for fail for the most recent standby power measurement.

The command CONFigure:AIACcess:LIMit:POWer:STANdby <power [DBM]> (query CONFigure:AIACcess:LIMit:POWer:STANdby?) sets the maximum power that the mobile station is permitted to output in the standby state. The command CONFigure:AIACcess[:SETTings]:DEFault (no query) resets this value to its default setting.

TDMA. When the mobile station registers, it sends identification information to the tester. This information is available via the FETCh[:SCALar]:MSINfo[:ALL]? query. This query returns, in order, the mobile station's mobile identification number, serial number, and power class.

When the mobile station is registered with the base station but the call is not established, the power transmitted by the mobile station can be obtained for different conditions:

- READ[:SCALar]:DAMS:RDCChannel:POWer[:ALL]? — returns the power transmitted by the mobile station when it is sending RACH information.

The query FETCh[:SCALar]:DAMS:RDCChannel:POWer[:ALL]? returns the most recent RDCCH power measurement.

Establishing a Call

The following subsection discusses the commands used to establish and release calls.

CDMA. Calls are established and released by commands that start with the keywords PROCedure:CTMStation. There are no queries associated with these commands. The final keywords and parameters are as follows:

- CALL <TEST> — establishes a call to the mobile station using service Option 2 for the 8K rate and service Option 9 for 13K rate. This type of call must be established before running the automated tests.
- CALL <VOICe> — establishes a voice call to the mobile station. Voice data packets from the mobile station are stored briefly in the tester and then sent back to the mobile station as a transmission quality check.
- RELease — releases the call to the mobile station.

The identification number of the mobile station under test can be preloaded in the tester to speed registration. Preloading the mobile identification number enables a PROC:CTMS:CALL command to be sent without waiting for the transition from MINItialization to MIDLe. The PROC:CTMS:CALL command can normally only be sent in the MIDL state.

The mobile station only has one mobile identification number. If the mobile station reports a different number during registration than the number sent with the command, this number overwrites the one sent and is returned by the query. The command is PROCedure:CTMStation:MINumber <mobile identification number> (query PROCedure:CTMStation:MINumber?).

The type of identification number of the mobile station should be set when the identification is preloaded. The command used to set the identification type is CONFigure:BSTation:ATYPe <MIN | IMSI> (query CONFigure:BSTation:ATYPe?). Ten digits should be included in the identification number sent to the tester if MIN is selected. Fifteen digits should normally be included in the identification number if IMSI is selected.

If the mobile station reports a different type of identification number during registration than the type sent with the command, this type overwrites the one sent and is returned by the query.

The type of identification number may be restricted for certain standards. For example, J–STD–008 supports only IMSI and the original IS–95 supports only MIN. Subsequent revisions of IS–95 added IMSI support.

The rate set to be used for a call is selected using CONFigure:BSTation:PRSet <RS1 | RS2> (query CONFigure:BSTation:PRSet?). This command configures the preferred rate set. The actual rate set in use for a call may be obtained using the CONFigure:BSTation:ARSet? query. Rate Set 2 is available only if Option B14 is installed.

The vocoder support to be used for a Rate Set 1 voice call is selected using CONFigure:BSTation:PVOCoder <BASic | ENHanced> (query CONFigure:BSTation:PVOCoder?). This command configures the preferred vocoder. The actual vocoder in use for a call may be obtained using the CONFigure:BSTation:AVOCoder? query.

Analog. Calls are established and released by commands that start with the keywords PROCedure:CTMStation. There are no queries associated with these commands.

***NOTE**. If Option B84 (TDMA Mode) is installed in the tester the call type must be established with the command CONFigure:ABSTation:CTYPe <ANALOG | DIGITAL>. When set to ANALOG, an AMPS–mode call is initiated using an Analog (FM) voice channel. When set the DIGITAL, a TDMA (DAMPS) call is initiated using a Digital (TDMA) traffic channel.*

The final keywords and parameters are as follows:

- CALL <ATESt> — establishes a call on the analog voice channel. This type of call must be established before running the automated tests.

- RELease — releases the call to the mobile station on the analog voice channel.

The identification number of the mobile station under test can be preloaded in the tester to speed registration. Preloading the mobile identification number enables a PROC:CTMS:CALL <VOICE> command to be sent without waiting for the transition from AMIN to AMID. The PROC:CTMS:CALL <ATESt> command is normally sent in the AMID state.

The command used to preload the identification number is the same for both CDMA and analog: PROCedure:CTMStation:MINumber <mobile identification number> (query PROCedure:CTMStation:MINumber?).

TDMA. The call type is established with the command CONFigure:DAMS:BSTation:CTYPe <ANALOG | DIGITAL>. When set to ANALOG, an AMPS–mode call is initiated, using and analog (FM) voice channel. When set the DIGITAL, an IS-136 type DAMPS call is initiated, using a digital (TDMA) traffic channel. The call type takes effect when one of the PROCedure:CTMStation:CALL commands is issued.

Calls are established and released by commands that start with the keywords PROCedure:CTMStation. There are no queries associated with these commands. The final keywords and parameters are as follows:

- CALL <TTEST> — establishes a call to the mobile station using a digital traffic channel. This type of call must be established before running the automated tests.
- CALL <TVOICe> — establishes a voice call to the mobile station. Voice data packets from the mobile station are stored briefly in the tester and then sent back to the mobile station as a voice quality check.
- RELease — releases the call to the mobile station.

To speed registration, preload the mobile station's identification number and identification number type into the tester. Use CONFigure:DAMS:BSTation:ATYPe <MIN | IMSI> to set the type and PROCedure:CTMStation:MINumber <mobile identification number> to send the identification number. A MIN number type should have ten digits and an IMSI number type should have fifteen digits.

***NOTE**. A mobile station has only one mobile identification number and type. If the mobile station reports a different number during registration than the number sent with the command, the mobile station's number overwrites the one sent.*

If the mobile station reports a different type of identification number during registration than the type sent with the command, the actual type overwrites the one sent.

To determine the actual identification number and type, use the CONFigure:DAMS:BSTation:ATYPe? and PROCedure:CTMStation:MINumber? queries.

Select the data rate to be used for the DTC using CONFigure:DAMS:BSTation:DTC:PRSet <HALF | FULL> (query CONFigure:DAMS:BSTation:DTC:PRSet?). To determine the actual data rate, use the CONFigure:DAMS:BSTation:DTC:ARSet? query. The tester only supports the FULL data rate for the DCCH.

Select the vocoder support to be used for a DTC voice call using CONFigure:DAMS:BSTation:PCODec <ACEL | VSEL> (query CONFigure:DAMS:BSTation:PCODec?). This command configures the preferred vocoder. To determine the actual vocoder in use for a call, use the CONFigure:DAMS:BSTation:ACODec? query.

Information in Call Established State

After a call has been established, but when no predefined tests are being run, certain information is available from the mobile station through several queries.

CDMA. The following queries are available for CDMA operation:

- READ[:SCALar]:POWer:MSTation[:ALL]? — returns, in order, the total power measured from the mobile station and the power that would be expected for the current base station level.
- READ[:SCALar]:POWer:RPILot? — returns the pilot power that the mobile station is receiving from the base station.
- READ[:SCALar]:WQUality[:ALL]? — returns, in order, the carrier frequency error, the transmit time error, and the waveform quality.

You can obtain the number dialed by the mobile station using the FETCh[:SCALar]:DNUMber? query. Calls originated by the tester return a string containing a single dash (–).

Analog. The following queries are available for analog operation:

- READ[:SCALar]:APOWer:MSTation[:ALL]? — returns, in order, the total power measured from the mobile station and the power that would be expected for the current voice mobile attenuation code.
- READ[:SCALar]:ACEQuality[:ALL]? — returns, in order, the voice channel frequency error, total peak deviation, SAT frequency error, SAT peak deviation, ST frequency error, and ST peak deviation.

When a call has been established, the ST is normally not sent by the mobile station. To force the mobile station to send ST, the PROCedure:CTMStation:ASTForce (no query) may be used. After this command has executed, the mobile station will send ST for approximately 65 seconds and then release the call. If this command is sent again before this time has expired, the mobile station should continue sending ST until 65 seconds have passed since the latest command was sent.

You can obtain the number dialed by the mobile station using the FETCh[:SCALar]:DNUMber? query. Calls originated by the tester return a string containing a single dash (–).

TDMA. The following queries are available for TDMA operation:

- READ[:SCALar]:DAMS:CEQuality[:ALL]? — performs measurements on the call established page. The values are returned in this order: RDTC RMS Power, RDTC RMS Power Additional, Error Message, RDTC Power Expected, RDTC Frequency Expected, RDTC Frequency Error, Transmit Time Error, Error Vector Magnitude, Sync Detected.
- FETCh[:SCALar]:DAMS:CEQuality:LIMit:FAIL[:ALL]? — returns the pass/fail (PASS = 0, FAIL = 1) values for the RDTC Power, RDTC Frequency, Transmit Time, and Error Vector Magnitude measurements.

You can obtain the number dialed by the mobile station using the FETCh[:SCALar]:DNUMber? query. Calls originated by the tester return a string containing a single dash (–).

Receiver Quality Tests

This subsection discusses the tests for receiver quality that are available for the CDMA and analog modes of operation.

CDMA. There are six different receiver quality tests, each of which has a different mnemonic in the command language. These tests measure the frame error rate at the mobile station for a combination of base station signal level and interfering signal levels, which is different for each test. The tests and the corresponding mnemonics are as follows:

- Current signal levels — CLEVels

- Dynamic range — DRANge
- Sensitivity — SENSitivity
- Traffic channel demodulation — TCDemod (requires Additive White Gaussian Noise generator option)
- User defined test 1 — U1Defined
- User defined test 2 — U2Defined

A test is started and the results are returned with the query:

READ[:SCALar]:<xxxx>[:ALL]?

The <xxxx> parameter represents one of the seven test mnemonics listed above. The results returned (in order) are the measured frame error rate in %, the number of transmitted frames, the number of bad frames recorded during the test, and the confidence level in %.

There is a query that returns pass/fail indications for the tests: FETCh[:SCALar]:<xxxx>:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the measured frame error rate, the number of bad frames recorded during the test, and the confidence level.

***NOTE**. The receiver quality tests can require significant time to complete. At the default test duration of 1000 frames, the required time is 20 s. The timeout setting of the controller (for GPIB operation) must be able to handle the interval between the time the query is sent and the time the results are received.*

Test configuration involves setting test parameters and setting base station signal levels. All configuration commands begin with CONFigure:<xxxx> where <xxxx> is replaced by one of the test mnemonics listed above.

The final sections of the commands for test parameter configuration are as follows:

- ASTop <OFF | ON> (query ASTop?) — sets the auto stop function for the test to off or on. If the function is on, the test terminates before the specified number of frames have been sent to the mobile station if the number of bad frames is such that the test fails. For example, if the test duration is 1000 frames and the frame error limit is 1.0%, the auto stop function (if set to on) terminates the test after 10 bad frames.
- BAUD <EIGHth | QUARter | HALF | FULL> (query BAUD?) — sets the data rate of the packets sent to the mobile station.
- DURation <number> (query DURation?) — sets the duration of the test in terms of the number of frames to be transmitted to the mobile station.

- LIMit:CONFidence[:LOWer]<number> (query LIMit:CONFidence [:LOWer]?) — sets the minimum permitted confidence level for the test in percent. If the auto stop function is on, the test terminates if the confidence level is greater than this limit value. This permits a successful test to stop early.
- LIMit:ERRor:FERate <number> (query LIMit:ERRor:FERate?) — sets the maximum permitted frame error rate for the test in percent. If the auto stop function is on, and if the number of bad frames is greater than this percentage of the number of frames specified to be sent to the mobile station during the test, the test terminates.

The final sections of the commands for configuring the base station signal levels during the tests are the following:

- SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])

  The traffic channel level is specified as the FULL rate level. If a different rate level is used, the actual test level must be determined using the following table:

Rate	Correction
FULL	0 dB
HALF	–3 dB
QUARTER	–6 dB
EIGHTH	–9 dB

Real level = displayed + correction.

- SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query SOURce[:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the commands with similar keywords under the heading *Base Station Configuration* on page E–14 for a discussion of the settings affected by these commands.

If the tester has the Additive White Gaussian Noise Generator Option, there is an additional configuration command for the base station sources in connection with the receiver quality tests that is not present for the basic base station configuration. This command has the same initial keyword as the commands given above and the final keywords and parameters SOURce:AWGN:LEVel <number [DB] | MAXimum | MINimum> (query SOURce:AWGN:LEVel?

<MAXimum | MINimum>). The command sets the level of the additive white Gaussian noise generator with respect to the total output power of the CDMA source. The additive noise simulates transmissions to other mobile stations communicating with adjacent cells.

***NOTE**. If the total output power of the CDMA source is within 10 dB of the maximum output power of the tester, the Additive White Gaussian Noise generator turns off. It remains off even if the output power is lowered.*

The command with the complete header CONFigure:<xxxx>[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

Analog. There are four different receiver quality tests, each of which has different mnemonics in the command language.

- Sensitivity. The sensitivity test is started and the results are returned with the query: READ[:SCALar]:ARQuality:SENSitivity?. The return value is the measured SINAD of the audio output of the mobile station.

  The pass/fail indication of the sensitivity test can be obtained with the query: FETCh[:SCALar]:ARQuality:SENSitivity:LIMit:FAIL?. The value returned is 0 for pass or 1 for fail.

  Test configuration involves setting test parameters and setting base station signal levels.

  The commands for test parameter configuration are as follows:

  - CONFigure:ARQuality:SENSitivity:LIMit:SINad <SINAD limit [DB]> (query CONFigure:ARQuality:SENSitivity:LIMit:SINad?) — sets the minimum permitted SINAD value for the test in dB.

  The commands for configuring the base station signal levels during the test are:

  - CONFigure:ARQuality:SENSitivity:SOURce:POWer <power [DBM]> (query CONFigure:ARQuality:SENSitivity:SOURce:POWer?) — sets the tester output power level for the sensitivity test.

  - CONFigure:ARQuality:SENSitivity:SOURce:FREQuency:MODulation <modulation frequency [HZ]> (query CONFigure:ARQuality:SENSitivity:SOURce:FREQuency:MODulation?) — sets the modulation frequency for the sensitivity test.

  - CONFigure:ARQuality:SENSitivity:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> (query CONFigure:ARQuality:SENSitivity:SOURce:FM:DEViation:MODulation?) — sets the peak deviation of the audio modulation for the sensitivity test.

The command CONFigure:ARQuality:SENSitivity[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Hum/Noise. The hum/noise test is started and the results are returned with the query: READ[:SCALar]:ARQuality:HNOise[:ALL]?. The values returned are (in order) the relative level of hum/noise in dB and the audio peak deviation in Hz.

  The pass/fail indications of the hum/noise test can be obtained with the query: FETCh[:SCALar]:ARQuality:HNOise:LIMit:FAIL[:ALL]?. This query returns (in order) 0 (pass) or 1 (fail) indicators for the relative level of hum/noise and the audio peak deviation.

  Test configuration involves setting test parameters and setting base station signal levels.

  The commands for test parameter configuration are as follows:

  - CONFigure:ARQuality:HNOise:LIMit <hum/noise limit [DB]> (query CONFigure:ARQuality:HNOise:LIMit?) — sets the maximum permitted hum/noise value for the test in dB.
  - CONFigure:ARQuality:HNOise:TAPDeviation <target audio peak deviation [HZ]> (query CONFigure:ARQuality:HNOise:TAPDeviation?) — sets the target audio peak deviation for the hum/noise test. The audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range.
  - CONFigure:ARQuality:HNOise:APDerange <audio peak deviation error range [HZ]> (query CONFigure:ARQuality:HNOise:APDerange?) — sets the audio peak deviation error range. The audio peak deviation must be within plus or minus this amount of the target audio peak deviation.

***NOTE**. The tester performs the hum/noise measurement only when the audio peak deviation is within the limits set in the HUM/NOISE configuration menu (refer to* HUM/NOISE on page 3–124).

  The commands for configuring the base station signal levels during the test are as follows:

  - CONFigure:ARQuality:HNOise:SOURce:POWer <power [DBM]> (query CONFigure:ARQuality:HNOise:SOURce:POWer?) — sets the tester output power level for the hum/noise test.
  - CONFigure:ARQuality:HNOise:SOURce:FREQuency:MODulation <modulation frequency [HZ]> (query CONFigure:ARQual-

ity:HNOise:SOURce:FREQuency:MODulation?) — sets the modulation frequency for the hum/noise test.

- CONFigure:ARQuality:HNOise:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> (query CONFigure:ARQuality:HNOise:SOURce:FM:DEViation:MODulation?) — sets the peak deviation of the audio modulation for the hum/noise test.
- CONFigure:ARQuality:HNOise:VMAC <voice channel mobile attenuation code> (query CONFigure:ARQuality:HNOise:VMAC?) — sets the voice channel mobile attenuation code for the hum/noise test.
- CONFigure:ARQuality:HNOise:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> (query CONFigure:ARQuality:HNOise:AFGen:FREQuency[:CW | :FIXed]?) — sets the AF generator frequency for the hum/noise test.
- CONFigure:ARQuality:HNOise:AFGen:VOLTage <AF generator level [V] | OFF> (query CONFIgure:ARQuality:HNOise:AFGen:VOLTage?) — sets the AF generator level for the hum/noise test. Specifying a level turns the AF generator on, specifying OFF turns it off. Audio peak deviation in the mobile station is determined by this level.

The command CONFigure:ARQuality:HNOise[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Harmonic Distortion. The harmonic distortion test is started and the results are returned with the query: READ[:SCALar]:ARQuality:HDIStortion?. The value returned is the harmonic distortion in %.

  The pass/fail indication of the harmonic distortion test can be obtained with the query: FETCh[:SCALar]:ARQuality:HDIStortion:LIMit:FAIL?. The value returned is 0 for pass or 1 for fail.

  Test configuration involves setting test parameters and setting base station signal levels.

  The commands for test parameter configuration are as follows:

  - CONFigure:ARQuality:HDIStortion:LIMit <harmonic distortion limit in %> (query CONFigure:ARQuality:HDIStortion:LIMit?) — sets the maximum permitted harmonic distortion value for the test in %.

  The commands for configuring the base station signal levels during the test are as follows:

  - CONFigure:ARQuality:HDIStortion:SOURce:POWer <power [DBM]> (query CONFigure:ARQuality:HDIStortion:SOURce:POWer?) — sets the tester output power level for the harmonic distortion test.

- CONFigure:ARQuality:HDIStortion:SOURce:FREQuency:MODulation <modulation frequency [HZ]> (query CONFigure:ARQuality:HDIStortion:SOURce:FREQuency:MODulation?) — sets the modulation frequency for the harmonic distortion test.
- CONFigure:ARQuality:HDIStortion:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> (query CONFigure:ARQuality:HDIStortion:SOURce:FM:DEViation:MODulation?) — sets the peak deviation of the audio modulation for the harmonic distortion test.

***NOTE**. The tester performs the harmonic distortion measurement only when the audio peak deviation is within the limits set in the HARMONIC DISTORTION configuration menu (refer to* HARMONIC DISTORTION on page 3–126).

The command CONFigure:ARQuality:HDIStortion[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Audio Frequency Response. The audio frequency response test provides a graph of the mobile station audio output as a function of frequency. The following query starts the test, waits for it to finish, and returns the mobile station audio level in dBm: READ[:SCALar]:ARQuality:AFResponse?.

  After the test has completed, the graphical data of power as a function of frequency can be obtained. Separate queries obtain the ‘x’ (horizontal or frequency) and ‘y’ (vertical or power referenced to the mobile station audio level returned by the READ query) data arrays. Corresponding values from each array (the first, the second, etc.) define the individual points of the graph.

  The query FETCh[:SCALar]:ARQuality:AFResponse:GRAPh:COUNt? obtains the number of points in the graph.

  The query FETCh:ARRay:ARQuality:AFResponse:GRAPh:X? obtains the horizontal data for the graph.

  The query FETCh:ARRay:ARQuality:AFResponse:GRAPh:Y? obtains the vertical data for the graph.

  The query FETCh:ARRay:ARQuality:AFResponse:LIMit:FAIL? obtains 0 (pass) or 1 (fail) indicators for the three horizontal regions of the graph.

  Test configuration involves setting test parameters and setting base station signal levels.

  The commands for test parameter configuration are as follows:

  - CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest <frequency [HZ]> (query CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest?) — sets the lowest frequency used on both of the limit lines of the audio frequency response test.

- CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest <frequency [HZ]> (query CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest?) — sets the highest frequency used on both of the limit lines of the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest <frequency [HZ]> (query CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest?) — sets the lowest middle frequency used in the lower limit line of the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:HIGHest <frequency [HZ]> (query CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:HIGHest?) — sets the highest middle frequency used in the lower limit line of the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:UPPer:LEVel <level [DB]> (query CONFigure:ARQuality:AFResponse:LIMit:UPPer:LEVel?) — sets the level of the upper limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:UPPer <level [DB]> (query CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:UPPer?) — sets the upper level of the lower limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:LOWer <level [DB]> (query CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:LOWer?) — sets the lower level of the lower limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:UPPer:COUNT? returns the number of points which describe the upper limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:UPPer:GRAPh:X? returns the horizontal data for the upper limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:UPPer:GRAPh:Y? returns the vertical data for the upper limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:COUNT? returns the number of points which describe the lower limit line for the audio frequency response test.

- CONFigure:ARQuality:AFResponse:LIMit:LOWer:GRAPh:X? returns the horizontal data for the lower limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:LIMit:LOWer:GRAPh:Y? returns the vertical data for the lower limit line for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:SPOints <sample points> (query CONFIgure:ARQuality:AFResponse:SPOints?) — sets the number of sample points to be taken during the audio frequency response test.

The commands for configuring the base station signal levels during the test areas follows:

- CONFigure:ARQuality:AFResponse:SOURce:POWer <power [DBM]> (query CONFigure:ARQuality:AFResponse:SOURce:POWer?) — sets the tester output power level for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:SOURce:FREQuency:MODulation <modulation frequency [HZ]> (query CONFigure:ARQuality:AFResponse:SOURce:FREQuency:MODulation?) — sets the modulation frequency for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> (query CONFigure:ARQuality:AFResponse:SOURce:FM:DEViation:MODulation?) — sets the peak deviation of the audio modulation for the audio frequency response test.
- CONFigure:ARQuality:AFResponse:FREQuency:SCCode <SAT color code> (query CONFigure:ARQuality:AFResponse:FREQuency:SCCode?) — sets the SAT color code for the audio frequency response test.

The command CONFigure:ARQuality:AFResponse[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

Open Loop Time Response Test (Power Control)

The open loop time response test (CDMA only) provides a graph of the mobile station output power as a function of time when the mobile station is commanded via open loop power control to change its output power. The following query starts the test, waits for it to finish, and returns the initial power of the mobile station at the start of the test:

READ[:SCALar]:OLTResponse?

After the test has completed, the graphical data of power as a function of time can be obtained. Separate queries obtain the ‘x’ (horizontal or time) and ‘y’ (vertical or power referenced to the initial mobile station power) data arrays. Corresponding values from each array (the first, the second, etc.) define the individual points of the graph.

The query FETCh:ARRay:OLTResponse:LIMit:FAIL? returns (in order) 0 (pass) or 1 (fail) indicators for each of the ten horizontal graphical regions of the open loop time response test.

The query FETCh[:SCALar]:OLTResponse:GRAPh:COUNt? obtains the number of points in the graph.

The query FETCh:ARRay:OLTResponse:GRAPh:X? obtains the horizontal data for the graph.

The query FETCh:ARRay:OLTResponse:GRAPh:Y? obtains the vertical data for the graph.

The test limit lines, as established by the applicable mobile station standards, can be obtained for comparison to the curve data obtained as indicated above. As is the case with the graphical results data, the limit lines are defined by straight lines between successive points with ‘x’ and ‘y’ values. Again, the data is returned over the remote interface as separate ‘x’ and ‘y’ arrays.

The beginning keywords of the limit line queries are CONFigure:OLTResponse. The final keywords areas follow:

- LIMit:LOWer:COUNt? — obtains the number of points in the lower limit line.
- LIMit:LOWer:GRAPh:X? — obtains the horizontal data for the lower limit line.
- LIMit:LOWer:GRAPh:Y? — obtains the vertical data for the lower limit line.
- LIMit:UPPer:COUNt? — obtains the number of points in the upper limit line.
- LIMit:UPPer:GRAPh:X? — obtains the horizontal data for the upper limit line.
- LIMit:UPPer:GRAPh:Y? — obtains the vertical data for the upper limit line.

The configuration commands for the test have the same beginning keywords as the limit line queries. The final keywords and parameters are as follows:

- MODE <DECRease | INCRease> (query MODE?) — sets the direction of the power step made by the base station simulator during the test. Because of the open loop power control, the power step made by the mobile station is in the opposite direction. This command also sets the direction of the first test performed using the front panel controls.
- SOURce[:CDMA]:POWer:STEP <power change [DB]> (query SOURce[:CDMA]:POWer:STEP?) — sets the power step that the base station power changes when performing the test.

The initial keywords of the commands for configuring the base station signal levels during the tests are the same as those given above. The final keywords and parameters are as follows:

- SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])
- SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query SOURce[:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the commands with similar keywords in *Base Station Configuration* on page E–14 for a discussion of the settings affected by these commands.

The command CONFigure:OLTResponse[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

Gated Output Test (Power Control)

The gated power output test (CDMA only) measures the mean (average) power of the mobile station during the time it is actually transmitting during a power burst. The following query starts the test, waits for it to finish, and returns the mean power of the mobile station during the burst:

READ[:SCALar]:GOUTput?

***NOTE**. This test reduces the communication data rate to one-eighth of the standard rate.*

After the test has completed, you can obtain the graphical data of the power of the gated burst as a function of time. Separate queries obtain the ‘x’ (horizontal or time) and ‘y’ (vertical or power with respect to the mean output power) data arrays. Corresponding values from each array (the first, the second, etc.) define the individual points of the graph.

The query FETCh:ARRay:GOUTput:LIMit:FAIL? returns (in order) 0 (pass) or 1 (fail) indicators for each of the five horizontal graphical regions of the gated output test.

The query FETCh[:SCALar]:GOUTput:GRAPh:COUNt? obtains the number of points in the graph.

The query FETCh:ARRay:GOUTput:GRAPh:X? obtains the horizontal data for the graph.

The query FETCh:ARRay:GOUTput:GRAPh:Y? obtains the vertical data for the graph.

The commands that configure the parameters of the gated output test all start with the keywords CONFigure:GOUTput. The final header keywords and parameters for the commands are as follows:

- ASTop <ON | OFF> (query ASTop?) — sets the auto stop function for the test to off or on. If the function is on, the test terminates if the rise time, the fall time, or one of the mobile station power limits is exceeded.
- AVERage:COUNt <number> (query AVERage:COUNt?) — sets the number of mobile station power control groups that are averaged to determine the measured results.
- LIMIT:FTIMe[:UPPer] <time [SEC | MS | US] (query LIMit:FTIMe [:UPPer]?) — sets the maximum fall time permitted after the end of the power control group. The fall time starts at the end of the power control group and ends when the output power of the mobile station decreases to its maximum permitted off value.
- LIMit:POWer:OFF:ABSolute[:UPPer] <power [DBM]> (query LIMit: POWer:OFF:ABSolute[:UPPer]? — sets the maximum absolute power that the mobile station may output when it is not transmitting a burst.
- LIMit:POWer:OFF:RELative[:UPPer] <power [DB]> (query LIMit: POWer:OFF:RELative[:UPPer]?) — sets the maximum power (with reference to the mean power of the burst) that the mobile station may output when it is not transmitting a burst. For example, if the value is –30 dB, the power from the mobile station when it is not transmitting a burst must be at least 30 dB below the mean power of the burst.

***NOTE**. The commands LIMit:POWer:OFF:ABSolute and LIMit:POWer:OFF:RELative interact. The limit is set to the value that represents the greatest absolute power level. The tester compares the absolute power to the sum of the relative and mean power output; the greater value is used to set the power limit.*

- LIMit:POWer:ON:RELative[:LOWer] <power [DB] (query LIMit:POWer:ON:RELative[:LOWer]?) — sets the minimum power level that the mobile station may transmit during a burst with reference to the mean power of the burst.
- LIMIT:RTIMe[:UPPer] <time [SEC | MS | US] (query LIMit: RTIMe[:UPPer]?) — sets the maximum risetime permitted before the start of the power control group. The rise time starts when the output power of the mobile station exceeds its maximum permitted off value and ends at the start of the power control group.

The limits established above determine limit lines within which the gated mobile station power must remain before, during, and after the burst. The limit line data can be obtained for comparison to the curve data obtained as indicated above. The limit lines are defined as straight lines drawn between successive points defined by ‘x’ (horizontal) and ‘y’ (vertical) values. As is the case with the gated power curve, the limit data is returned over the remote interface as separate ‘x’ and ‘y’ arrays, and the arrays are interpreted in the same way.

There are only queries associated with the limit lines themselves, since the lines can be set only through the commands listed above. The beginning keywords are the same as those listed above. The final keywords are as follows:

- LIMit:LOWer:COUNt? — obtains the number of points in the lower limit line.
- LIMit:LOWer:GRAPh:X? — obtains the horizontal data for the lower limit line.
- LIMit:LOWer:GRAPh:Y? — obtains the vertical data for the lower limit line.
- LIMit:UPPer:COUNt? — obtains the number of points in the upper limit line.
- LIMit:UPPer:GRAPh:X? — obtains the horizontal data for the upper limit line.
- LIMit:UPPer:GRAPh:Y? — obtains the vertical data for the upper limit line.

The initial keywords of the commands for configuring the base station signal levels during the tests are the same as those given above. The final keywords and parameters are as follows:

- SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])

NOTE. *Since this measurement is conducted at EIGHTH rate and the traffic level is specified at FULL rate, the actual traffic level is 9 dB less than the displayed value.*

- SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query SOURce[:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the commands with similar keywords under the heading *Base Station Configuration* on page E–14 for discussion of the settings affected by these commands.

The command CONFigure:GOUTput[:SETTings]:DEFault (no query) sets the values of all test parameters and source levels to their default values.

Maximum Output Test (Power Control)

The maximum power output test measures the maximum power that the mobile station puts out at a given base station power when the closed loop power control algorithm commands maximum power. The following command starts the test, waits for it to finish, and returns (in order) the power measured from the mobile station and the waveform quality at that power level:

READ[:SCALar]:MAXoutput[:ALL]?

The query FETCh[:SCALar]:MAXoutput:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the maximum output power and waveform quality.

NOTE. *Because of the low output levels that are usually used for this test, it is not uncommon for the call to be dropped if the configured output level is set too low.*

The commands that configure this test begin with the keywords CONFigure:MAXoutput.

One of the items that can be configured for this test is the range of permitted mobile station output power. There are separate limits for each power class of mobile station. The final keywords and parameters for the commands that set the ends of the range are as follows:

- POWer:<class keyword>:LOWer <power [DBM]> (query POWer:<class keyword>:LOWer?) — sets the lower limit of permitted mobile station power for the given power class.
- POWer:<class keyword>:UPPer <power [DBM]> (query POWer:<class keyword>:UPPer?) — sets the upper limit of permitted mobile station power for the given power class.

In the above two commands, <class keyword> is replaced by CONE to set the limits for a Class I mobile station, CTWO to set the limits for a Class II mobile station, or CTHRee to set the limits for a Class III mobile station.

The argument <class keyword> is used to identify the class of mobile station. US Cellular units are identified by CONE, CTWO, or CTHRee. PCS units are identified by PONE, PTWO, PTHRee, PFOur, and PFIVe.

There are other configuration commands with the same initial keywords:

- MAXoutput:ASTop <ALL | FIRSt | OFF> command (query MAXoutput:ASTop?) sets the auto stop function for the test. If the function is set to FIRSt, the test terminates as soon as one test limit is exceeded. If the function is set to ALL, the test terminates if all test limits are exceeded.
- LIMIT:WQUality[:LOWer] <number> (query LIMit:WQUality[:LOWer]?) — sets the minimum permitted waveform quality at the maximum power output of the mobile station.

The initial keywords of the commands for configuring the base station signal levels during the tests are the same as those given above. The final keywords and parameters are as follows:

- SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])
- SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query SOURce[:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the commands with similar keywords under the heading *Base Station Configuration* on page E–14 for discussion of the settings affected by these commands.

The command CONFigure:MAXoutput[:SETTings]:DEFault (no query) sets the values of all test parameters and source levels to their default values.

Minimum Output Test (Power Control)

The minimum power output test (CDMA only) measures the minimum power that the mobile station puts out at a given base station power when the closed loop power control algorithm commands minimum power. The following command starts the test, waits for it to finish, and returns (in order) the power measured from the mobile station and the waveform quality at that power level:

READ[:SCALar]:MINoutput[:ALL]?

The query FETCh[:SCALar]:MINoutput:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the minimum output power and waveform quality.

The commands that configure the parameters of the minimum output test all start with the keywords CONFigure:MINoutput. The final header keywords and parameters for the commands are as follows:

- ASTop <ALL | FIRSt | OFF> command (query ASTop?) — sets the auto stop function for the test. If the function is set to FIRSt, the test terminates as soon as one test limit is exceeded. If the function is set to ALL, the test terminates if all test limits are exceeded.
- LIMit:POWer:[:UPPer] <power [DBM]> (query LIMit:POWer[:UPPer]?) — sets the maximum absolute power that the mobile station may output.
- LIMIT:WQUality[:LOWer] <number> (query LIMit:WQUality[:LOWer]?) — sets the minimum permitted waveform quality at the minimum power output of the mobile station.

The initial keywords of the commands for configuring the base station signal levels during the tests are the same as those given above. The final keywords and parameters are as follows:

- SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query SOURce[:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])
- SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query SOURce[:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the commands with similar keywords under the heading *Base Station Configuration* on page E–14 for discussion of the settings affected by these commands.

The command CONFigure:MINoutput[:SETTings]:DEFault (no query) sets the values of all test parameters and the source levels to their default values.

Transmitter Quality Test

This subsection discusses the tests for transmitter quality that are available for the CDMA and analog modes of operation.

CDMA. The transmitter quality test measures a number of parameters of the signal transmitted by the mobile station to determine how this signal compares to the ideal signal model. These parameters are the phase error, the magnitude error, the error vector magnitude, the carrier feedthrough, the imbalance between the I and Q channels, the carrier frequency error, the transmit time error, and the waveform quality. All measurements are made over 416 μs or 512 PN chips.

There are a number of queries for returning subsets of this test data. You can query the peak and RMS errors (in that order) of each subset using a query of the following form:

READ[:SCALar]:TQUality:ERRor:<test keyword>[:ALL]?

The query starts the test, waits for it to finish, and returns the results. These queries return data on the phase error, the magnitude error, or the error vector magnitude. Queries refer to this data with the test keywords PHASe , MAGNitude, and EVMagnitude , respectively.

After the test has finished, the graphical data of each quantity throughout the frame may be queried. Separate queries obtain the ‘x’ (horizontal) and ‘y’ (vertical) data arrays. Corresponding values from each array (the first, the second, and so on) define the individual points of the graph.

The query FETCh[:SCALar]:TQUality:ERRor:<test keyword>:GRAPh: COUNt? obtains the number of points in the graph.

The query FETCh:ARRay:TQUality:ERRor:<test keyword>:GRAPh:X? obtains the horizontal data for the graph.

The query FETCh:ARRay:TQUality:ERRor:<test keyword>:GRAPh:Y? obtains the vertical data for the graph.

After any of the tests have been run (via the appropriate READ? query), the remainder of the test results can be returned via the FETCh[:SCALar]:TQUality:WQUality[:ALL]? query. The data is returned in the following order:

1. The carrier feedthrough
2. The IQ imbalance
3. The carrier frequency error
4. The transmit time error
5. The waveform quality

The following commands return pass/fail indications for the tests:

- FETCh[:SCALar]:TQUality:EVMagnitude:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the error vector magnitude peak and RMS values for the error vector magnitude test.
- FETCh[:SCALar]:TQUality:MAGNitude:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the magnitude error peak and RMS values for the magnitude error test.
- FETCh[:SCALar]:TQUality:PHASe:LIMit:FAIL[:ALL]? returns (in order) 0 (pass) or 1 (fail) indicators for the phase error peak and RMS values for the phase error test.
- FETCh[SCALar]:TQUality:WQUality:LIMit:FAIL[:ALL? returns (in order) 0 (pass) or 1 (fail) indicators for the carrier feedthrough, IQ imbalance, carrier frequency error, transmit time error, and waveform quality values for the most recent transmitter quality test.

The command CONFigure:TQUality:ASTop <OFF | ON> (query CONFigure:TQUality:ASTop?) sets the auto stop function for the test to off or on. If the function is on, the test terminates if one of the test limits is exceeded.

The command CONFigure:TQUality[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

The remaining configuration commands for the transmitter quality test are divided into a group to set the test limits and a group to set the power levels of the source in the base station simulator. The test limit configuration commands start with the keywords CONFigure:TQUality:LIMit. The final keywords and parameters for these commands are as follows:

- CFEedthrough[:UPPer] <relative feedthrough [DB]> (query CFEedthrough[:UPPer]?) — sets the maximum level of the residual carrier feedthrough relative to the total output power of the mobile station.
- ERRor:CFRequency <maximum frequency error [MHZ|KHZ|HZ]> (query ERRor:CFRequency?) — sets the maximum permitted error in carrier frequency.
- ERRor:EVMagnitude:PEAK <max error> (query ERRor:EVMagnitude:PEAK?) — sets the maximum permitted peak error vector magnitude.
- ERRor:EVMagnitude:RMS <max error> (query ERRor:EVMagnitude:RMS?) — sets the maximum permitted RMS error vector magnitude.
- ERRor:MAGNitude:PEAK <max error> (query ERRor:MAGNitude:PEAK?) — sets the maximum permitted peak magnitude error.
- ERRor:MAGNitude:RMS <max error> (query ERRor:MAGNitude:RMS?) — sets the maximum permitted RMS magnitude error.

- ERRor:PHASe:PEAK <max error in degrees> (query ERRor:PHASe:PEAK?) — sets the maximum permitted peak phase error.
- ERRor:PHASe:RMS <max error in degrees> (query ERRor:PHASe:RMS?) — sets the maximum permitted RMS phase error.
- ERRor:TTIMe <max error [S | MS | US]> (query ERRor:TTIMe?) — sets the maximum permitted transmit time error.
- IMBalance[:UPPer] <max imbalance [DB]> (query IMBalance[:UPPer]?) — sets the maximum permitted imbalance between the I and Q modulation channels.
- WQUality[:LOWer] <min waveform quality> (query WQUality[:LOWer]?) — sets the minimum permitted waveform quality.

The commands for configuring the base station signal levels during the tests areas follow:

- CONFigure:TQUality:SOURce[:CDMA]:LEVel:PILot <number [DB] | MAXimum | MINimum> (query CONFigure:TQUality:SOURce [:CDMA]:LEVel:PILot? [<MAXimum | MINimum>])
- CONFigure:TQUality:SOURce[:CDMA]:LEVel:TRAFfic <number [DB] | MAXimum | MINimum> (query CONFigure:TQUality:SOURce [:CDMA]:LEVel:TRAFfic? [<MAXimum | MINimum>])
- CONFigure:TQUality:SOURce[:CDMA]:POWer <number [DBM] | MAXimum | MINimum> (query CONFigure:TQUality:SOURce [:CDMA]:POWer? <MAXimum | MINimum>)

Refer to the descriptions of the command with similar keywords under the heading *Base Station Configuration* on page E–14 for discussion of the settings affected by these commands.

Analog. There are four different transmitter quality tests, each of which has different mnemonics in the command language.

- Hum/Noise

  The hum/noise test is started and the results are returned with the query: READ[:SCALar]:ATQuality:HNOise[:ALL]?. The values returned are (in order) the relative level of hum/noise in dB and the audio peak deviation in Hz.

  The pass/fail indications of the hum/noise test can be obtained with the query: FETCh[:SCALar]:ATQuality:HNOise:LIMit:FAIL[:ALL]?. This query returns (in order) 0 (pass) or 1 (fail) indicators for the relative level of hum/noise and the audio peak deviation.

Test configuration involves setting test parameters and setting base station signal levels.

The commands for test parameter configuration are as follows:

- CONFigure:ATQuality:HNOise:LIMit <hum/noise limit [DB]> (query CONFigure:ATQuality:HNOise:LIMit?) — sets the maximum permitted hum/noise value for the test in dB.
- CONFigure:ATQuality:HNOise:TAPDeviation <target audio peak deviation [HZ]> (query CONFigure:ATQuality:HNOise:TAPDeviation?) — sets the target audio peak deviation for the hum/noise test. The audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range before the hum/noise measurement will be taken.
- CONFigure:ATQuality:HNOise:APDerange <audio peak deviation error range [HZ]> (query CONFigure:ATQuality:HNOise:APDerange?) — sets the audio peak deviation error range. The audio peak deviation must be within plus or minus this amount of the target audio peak deviation before the hum/noise measurement will be taken.

The commands for configuring the base station signal levels during the test are:

- CONFigure:ATQuality:HNOise:SOURce:POWer <power [DBM]> (query CONFigure:ATQuality:HNOise:SOURce:POWer?) — sets the tester output power level for the hum/noise test.
- CONFigure:ATQuality:HNOise:VMAC <voice channel mobile attenuation code> (query CONFigure:ATQuality:HNOise:VMAC?) — sets the voice channel mobile attenuation code for the hum/noise test.
- CONFigure:ATQuality:HNOise:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> (query CONFigure:ATQuality:HNOise:AFGen:FREQuency[:CW | :FIXed]?) — sets the AF generator frequency for the hum/noise test.
- CONFigure:ATQuality:HNOise:AFGen:VOLTage <AF generator level [V] | OFF> (query CONFIgure:ATQuality:HNOise:AFGen:VOLTage?) — sets the AF generator level for the hum/noise test. Specifying a level turns the AF generator on, specifying OFF turns it off. Audio peak deviation in the mobile station is determined by this level.

The command CONFigure:ATQuality:HNOise[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Modulation Noise/Distortion

  The modulation noise/distortion test is started and the results are returned with the query: READ[:SCALar]:ATQuality:MNDistortion[:ALL]?. The values returned are (in order) the modulation noise/distortion in percent and the audio peak deviation in Hertz.

The pass/fail indications of the modulation noise/distortion test can be obtained with the query: FETCh[:SCALar]:ATQuality:MNDistortion:LIMit:FAIL[:ALL]?. This query returns (in order) 0 (pass) or 1 (fail) indicators for the modulation noise/distortion and the audio peak deviation.

Test configuration involves setting test parameters and setting base station signal levels.

The commands for test parameter configuration are as follows:

- CONFigure:ATQuality:MNDistortion:LIMit <modulation noise/distortion limit> (query CONFigure:ATQuality:MNDistortion:LIMit?) — sets the maximum permitted modulation noise/distortion value for the test in %.
- CONFigure:ATQuality:MNDistortion:TAPDeviation <target audio peak deviation [HZ]> (query CONFigure:ATQuality:MNDistortion:TAPDeviation?) — sets the target audio peak deviation for the modulation noise/distortion test. The audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range before the modulation noise/distortion measurement will be taken.
- CONFigure:ATQuality:MNDistortion:APDerange <audio peak deviation error range [HZ]> (query CONFigure:ATQuality:MNDistortion:APDerange?) — sets the audio peak deviation error range. The audio peak deviation must be within plus or minus this amount of the target audio peak deviation before the modulation noise/distortion measurement will be taken.

The commands for configuring the base station signal levels during the test are:

- CONFigure:ATQuality:MNDistortion:SOURce:POWer <power [DBM]> (query CONFigure:ATQuality:MNDistortion:SOURce:POWer?) — sets the tester output power level for the modulation noise/distortion test.
- CONFigure:ATQuality:MNDistortion:VMAC <voice channel mobile attenuation code> (query CONFigure:ATQuality:MNDistortion:VMAC?) — sets the voice channel mobile attenuation code for the modulation noise/distortion test.
- CONFigure:ATQuality:MNDistortion:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> (query CONFigure:ATQuality:MNDistortion:AFGen:FREQuency[:CW | :FIXed]?) — sets the AF generator frequency for the modulation noise/distortion test.

- CONFigure:ATQuality:MNDistortion:AFGen:VOLTage <AF generator level [V] | OFF> (query CONFIgure:ATQuality:MNDistortion:AF-Gen:VOLTage?) — sets the AF generator level for the modulation noise/distortion test. Specifying a level turns the AF generator on, specifying OFF turns it off. Audio peak deviation in the mobile station is determined by this level.

  The command CONFigure:ATQuality:MNDistortion[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Audio Frequency response

  The audio frequency response test provides a graph of the mobile station transmitted audio as a function of frequency. The following query starts the test, waits for it to finish, and returns the mobile station audio level in dBm: READ[:SCALar]:ATQuality:AFResponse?.

  After the test has completed, the graphical data of power as a function of frequency can be obtained. Separate queries obtain the ‘x’ (horizontal or frequency) and ‘y’ (vertical or power referenced to the mobile station audio level returned by the READ query) data arrays. Corresponding values from each array (the first, the second, etc.) define the individual points of the graph.

  The query FETCh[:SCALar]:ATQuality:AFResponse:GRAPh:COUNt? obtains the number of points in the graph.

  The query FETCh:ARRay:ATQuality:AFResponse:GRAPh:X? obtains the horizontal data for the graph.

  The query FETCh:ARRay:ATQuality:AFResponse:GRAPh:Y? obtains the vertical data for the graph.

  The query FETCh:ARRay:ATQuality:AFResponse:LIMit:FAIL? obtains 0 (pass) or 1 (fail) indicators for the two horizontal regions of the graph.

  Test configuration involves setting test parameters and setting base station signal levels.

  The commands for test parameter configuration are as follows:

  - CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest <frequency [HZ]> (query CONFigure:ATQuality:AFResponse:LIM-it:BOTH:FREQuency:LOWest?) — sets the lowest frequency used on both of the limit lines of the audio frequency response test.

  - CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:HIGH-est <frequency [HZ]> (query CONFigure:ATQuality:AFResponse:LIM-it:BOTH:FREQuency:HIGHest?) — sets the highest frequency used on both of the limit lines of the audio frequency response test.

- CONFigure:ATQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle <frequency [HZ]> (query CONFigure:ATQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle?) — sets the middle frequency used in the lower limit line of the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:UPPer:LEVel <level [DB]> (query CONFigure:ATQuality:AFResponse:LIMit:UPPer:LEVel?) — sets the level of the upper limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:UPPer <level [DB]> (query CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:UPPer?) — sets the upper level of the lower limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:LOWer <level [DB]> (query CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:LOWer?) — sets the lower level of the lower limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:UPPer:COUNT? returns the number of points which describe the upper limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:UPPer:GRAPh:X? returns the horizontal data for the upper limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:UPPer:GRAPh:Y? returns the vertical data for the upper limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:LOWer:COUNT? returns the number of points which describe the lower limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:LOWer:GRAPh:X? returns the horizontal data for the lower limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:LIMit:LOWer:GRAPh:Y? returns the vertical data for the lower limit line for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:SPOints <sample points> (query CONFIgure:ATQuality:AFResponse:SPOints?) — sets the number of sample points to be taken during the audio frequency response test.

- CONFigure:ATQuality:AFResponse:TAPDeviation <target audio peak deviation [HZ]> (query CONFigure:ATQuality:AFResponse:TAPDeviation?) — sets the target audio peak deviation for the audio frequency response test. This value and the audio peak deviation increment determine the audio level input to the mobile station.
- CONFigure:ATQuality:AFResponse:APDincrement <deviation increment [HZ]> (query CONFigure:ATQuality:AFResponse:APDincrement?) — sets the audio peak deviation increment value. This value and the target audio peak deviation determine the audio level input to the mobile station.

The commands for configuring the base station signal levels during the test are as follows:

- CONFigure:ATQuality:AFResponse:SOURce:POWer <power [DBM]> (query CONFigure:ATQuality:AFResponse:SOURce:POWer?) — sets the tester output power level for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:SOURce:FREQuency:MODulation <modulation frequency [HZ]> (query CONFigure:ATQuality:AFResponse:SOURce:FREQuency:MODulation?) — sets the modulation frequency for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> (query CONFigure:ATQuality:AFResponse:SOURce:FM:DEViation:MODulation?) — sets the peak deviation of the audio modulation for the audio frequency response test.
- CONFigure:ATQuality:AFResponse:VMAC <voice channel mobile attenuation code> (query CONFigure:ATQuality:AFResponse:VMAC?) — sets the voice channel mobile attenuation code for the audio frequency response test.

The command CONFigure:ATQuality:AFResponse[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

- Modulation Limiting

  The modulation limiting test is started and the results are returned with the query: READ[:SCALar]:ATQuality:MLIMiting?. The value returned is the audio peak deviation in Hz.

  The pass/fail indications of the modulation limiting test can be obtained with the query: FETCh[:SCALar]:ATQuality:MLIMiting:LIMit:FAIL?. This query returns 0 (pass) or 1 (fail) indicators for the audio peak deviation.

  Test configuration involves setting test parameters and setting base station signal levels.

The commands for test parameter configuration are:

- CONFigure:ATQuality:MLIMiting:LIMit <audio peak deviation limit [HZ]> (query CONFigure:ATQuality:MLIMiting:LIMit?) — sets the maximum permitted audio peak deviation value for the test in Hz.

The commands for configuring the base station signal levels during the test are as follows:

- CONFigure:ATQuality:MLIMiting:SOURce:POWer <power [DBM]> (query CONFigure:ATQuality:MLIMiting:SOURce:POWer?) — sets the tester output power level for the modulation limiting test.
- CONFigure:ATQuality:MLIMiting:VMAC <voice channel mobile attenuation code> (query CONFigure:ATQuality:MLIMiting:VMAC?) — sets the voice channel mobile attenuation code for the modulation limiting test.
- CONFigure:ATQuality:MLIMiting:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> (query CONFigure:ATQuality:MLIMiting:AFGen:FREQuency[:CW | :FIXed]?) — sets the AF generator frequency for the modulation limiting test.
- CONFigure:ATQuality:MLIMiting:AFGen:VOLTage <AF generator level [V] | OFF> (query CONFIgure:ATQuality:MLIMiting:AFGen:VOLTage?) — sets the AF generator level for the modulation limiting test. Specifying a level turns the AF generator on; specifying OFF turns it off. Audio peak deviation in the mobile station is determined by this level.

The command CONFigure:ATQuality:MLIMiting[:SETTings]:DEFault (no query) sets all of the test parameters and source levels to their default values.

Handoffs

When testing a dual mode mobile station, the tester can instruct the mobile station to handoff the call from the digital mode to the analog mode or, in some cases, vise versa. This simulates the handoff of a call from a CDMA or TDMA (Option B84) base station to an analog base station or an analog base station to a TDMA base station. Option B82 (Analog mode) must be installed to support any handoff. Option B84 (TDMA mode) must be installed to support the TDMA digital/analog handoffs.

You must first select which protocol you want to hand off to. You accomplish this with the command CONFigure:HANDoff:COMBination <network>, <system>, <standard> (query, CONFigure:HANDoff:COMBination?). Table E–2 lists the supported handoff combinations of networks, systems, and standards.

The command PROCedure:CTMStation:HANDoff performs the handoff.

Table E–2: Valid network handoffs

Network	Handoff from standard	Valid handoff to standards
US Cellular	CDMA (IS–95)	AMPS or NAMPS
	AMPS	NAMPS
	NAMPS	AMPS
	AMPS	TDMA (IS–136–A)
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US PCS TDMA (IS–136–A)
Japanese Cellular	CDMA (IS–95)	JTACS or NTACS
	J–CDMA (T53)	JTACS or NTACS
	JTACS	NTACS
	NTACS	JTACS
Chinese Cellular	CDMA (IS–95)	ETACS or TACS
US PCS	CDMA (UB IS–95)	AMPS or NAMPS
	CDMA (J–STD–008)	AMPS or NAMPS
	TDMA (IS–136–A)	AMPS
	TDMA (IS–136–A)	US Cellular TDMA (IS–136–A)

The following subsections describe setting up the base stations you intend to make the handoff to.

CDMA Mode Base Station. For the CDMA protocols, all command headers for configuring the base station simulator in the tester for a handoff begin with CONFigure:HANDoff:BSTation. The commands set or query the following parameters:

- Frequency and CDMA channel parameters
- Source level

The CDMA handoff configuration commands and queries can be used when the tester is in any system state. The limitations associated with each command are given as part of the command descriptions below.

The frequency and CDMA configuration commands have the following final header keywords and parameters:

- FOFFset <number> (query FOFFset?) — sets the frame offset for the base station. The frame offset sets the starting position of the traffic frame, in terms of the power control group number. This command is allowed in all states. Once the handoff is complete, this command changes the current frame offset.
- FREQuency:CHANnel <number> (query FREQuency:CHANnel?) — sets the channel number for the base station simulator. The command response depends on the state of the instrument. When in the IDLE state this command sets or queries the default channel. When the handoff is complete, this command changes the current RF channel number. The query always returns the actual channel number being used.
- PNOFfset <number> (query PNOFfset?) — sets the PN offset for the base station. This command may be given only in the IDLE state or one of the call established states, CE1 or CE2.
- TCHannel <number> (query TCHannel?) — sets the CDMA Walsh traffic channel number. This is not a frequency, but rather specifies the Walsh code that is used to encode the traffic channel portion of the CDMA signal. This command may be given in all system states.

The source level configuration commands can be divided into two groups: those that set the relative levels of different components of the signal and a command to set the total absolute signal power.

The commands that set relative levels continue (after the CONFigure:HANDoff:BSTation keywords) with the keywords SOURce[:CDMA]:LEVel. The final keywords for the command headers and the parameters are as follows:

- PAGing <relative level [DB] | MAXimum | MINimum> (query PAGing? [<MAXimum | MINimum>]) — sets the level of the paging channel relative to the total output power of the base station simulator.

- PILot <relative level [DB] | MAXimum | MINimum> (query PILot? [<MAXimum | MINimum>]) — sets the level of the pilot channel relative to the total output power of the base station simulator.
- SYNC <relative level [DB] | MAXimum | MINimum> (query SYNC? [<MAXimum | MINimum>]) — sets the level of the sync channel relative to the total output power of the base station simulator.
- TRAFfic <relative level [DB] | MAXimum | MINimum> (query TRAFfic? [<MAXimum | MINimum>]) — sets the level of the full rate traffic channel relative to the total output power of the base station simulator.

The command CONFigure:HANDoff:BSTation[:SETTings]:DEFault (no query) sets the configuration values for the base station simulator to their default values.

***NOTE**. The default command always resets the level configuration values. The frequency and CDMA configuration values that are reset are only those with corresponding CDMA commands that may be used in the current state of the tester. Values that may not be changed in the current state are not affected.*

Analog Mode Base Station. Handoffs to Analog is possible only if Option B82 (Analog Mode) is installed.

For the Analog protocols, all command headers for configuring the analog base station simulator in the tester for a handoff begin with CONFigure:HANDoff:ABSTation. The commands set or query the following parameters:

- Frequency parameters for the control channel and voice channel
- Source level
- SAT (or DSAT) color code
- SAT (or DSAT) peak deviation
- Mobile attenuation code to control mobile station power level
- Location ID
- System ID
- Paging duration

The handoff configuration commands and queries can be used when the tester is in any system state. The limitations associated with each command are given as part of the command descriptions below.

The frequency configuration commands have the following final header keywords and parameters:

- FREQuency:CCHannel <RF channel number> (query FREQuency:CCHannel?) — sets the channel number for the control channel.
- FREQuency:VCHannel <RF channel number> (query FREQuency:VCHannel?) — sets the channel number for the voice channel.
- FREQuency:SCCode <SAT color code number> (query FREQuency:SCCode?) — sets the SAT color code value used when a call is established.
- FREQuency:SYSTem? — returns the system indicator (A or B) for the control channel.

The level configuration commands discussed in this subsection control the settings of the analog base station simulator when a test is not being run. Commands associated with specific tests can override some of the levels (which ones depends upon the particular test) while the test is being run. These commands are listed as part of the test description for each test.

- SOURce:POWer <analog power level [DBM]> (query SOURce:POWer?) — establishes the analog base station power level.
- CMAC <control channel mobile attenuation code> (query CMAC?) — sets the control channel mobile attenuation code. The mobile station sets its output power level for the reverse control channel according to the control mobile attenuation code.
- VMAC <voice channel mobile attenuation code> (query VMAC?) — sets the voice channel mobile attenuation code. The mobile station sets its output power level for the reverse voice channel according to the voice mobile attenuation code.
- SOURce:FM:DEViation:SAT <SAT peak deviation [HZ]> (query SOURce:FM:DEViation:SAT?) — sets the peak deviation of the SAT when the handoff is completed.

The command CONFigure:HANDoff:ABStation[:SETTings]:DEFault (no query) sets the configuration values for the analog base station simulator to their default values.

NOTE*. The default command always resets the level configuration values. The frequency configuration values that are reset are only those with corresponding commands that may be used in the current state of the tester. Values that may not be changed in the current state are not affected.*

TDMA Mode Base Station. Handoffs to TDMA mode operation is possible only if both Option B84 (TDMA Mode) and Option B82 (Analog Mode) are installed.

For the TDMA protocols, all command headers for configuring the base station simulator in the tester for a handoff begin with CONFigure:HANDoff:DAMS:BSTation. The commands set or query the following parameters:

- Frequency parameters for the traffic channel, control channel, and voice channel
- Source level
- Preferred data rate
- DVCC (digital verification color code)
- System ID
- Preferred coder/decoder
- Paging duration

The configuration commands and queries can be used when the tester is in any system state. The limitations associated with each command are given as part of the command descriptions below.

The channel and time slot configuration commands have the following final header keywords and parameters:

- DCCH:CHANnel <Value> (query DCCH:CHANnel?) — sets the digital control channel number.
- DTC:CHANnel <Value> (query DTC:CHANnel?) — sets the digital traffic channel number.
- DCCH:SLOT <Value> (query DCCH:SLOT?) — sets the digital control channel slot number (only full rate DCCH channels in slot 1 are supported).
- DTC:SLOT <Value> (query DTC:SLOT?) — sets the digital traffic slot number.
- DVCC<Value> (query DVVC?) — sets the base station digital voice color code.

The level configuration commands discussed in this section control the settings of the base station simulator when a test is not being run. Commands associated with specific tests can override some level settings while the test is being run.

- SOURce:POWer<TDMA power level[DBM]> (query SOURce:POWer?) — sets the output power delivered to the mobile station.

- DCCH:MAC <Value> (query DCCH:MAC?) — Sets the digital control channel mobile attenuation code.
- DTC:MAC <Value> (query DTC:MAC?) — Sets the digital traffic channel mobile attenuation code.

The complete command to set the total base station power is CONFigure:HANDoff:DAMM:BSTation:SOURce:POWer <power level [DBM] | OFF>. The query is CONFigure:HANDoff:DAMM:BSTation:SOURce:POWer?.

The command CONFigure:HANDoff:DAMS:BSTation:PARameters[:SETTings]:DEFault (no query) sets the configuration values for the base station simulator to their default values.

Local Transitions

Local transitions cause an established call to change to a different mode or call type within the same system. These commands to not "handoff" the call to another system. The transition commands for each system are described in the following subsections.

CDMA. In CDMA mode, you can make a local transition to a different mode or rate set. The command PROCedure:CTMStation:TRANsition:CDMA followed with the transition type argument causes the transition. These commands are only valid in the CE1 and CE2 system states. The final arguments to make each transition are as follows:

- R1VBasic — Causes a transition to the voice loopback mode in basic rate set 1.
- R1VEnhanced — Causes a transition to the voice loopback mode in the enhanced rate set 1.
- R2VCdg — Causes a transition to the voice loopback mode in rate set 2 (CDMA design group).
- R1Test — Causes a transition to the MS test mode in rate set 1.
- R2Test — Causes a transition to the MS test mode in rate set 2.

Analog. In Analog mode, you can make a local transition to the voice loopback mode or to MS test mode. The command PROCedure:CTMStation:TRANsition:ANALog followed with the transition type argument causes the transition. AVOIce transitions to the voice loopback mode and ATESt transitions to the MS test mode. These commands are only valid in the ACE and ACEV system states.

TDMA. In TDMA mode, you can make a local transition to the voice loopback mode or to MS test mode. The command PROCedure:CTMStation:TRANsition:TDMA followed with the transition type argument causes the transition.

TVOIce transitions to the voice loopback mode and TTESt transitions to the MS test mode. These commands are only valid in the TCE and TCEV system states.

Power Level Maintenance

When testing a mobile station, you may want to repeat a measurement several times. Under normal operation, the tester may change the power level between the base station configuration level and the measurement-specific level. To maintain the measurement-specific level, use the command CONFigure:SPECial:MPOWer[:STATe] ON. To restore normal operation, use the command CONFigure:SPECial:MPOWer[:STATe] OFF. Repeated measurements are done in less time if the power is kept at the measurement-specific level.

Appendix F: Remote Control Command Tables

This appendix contains a listing of the remote command categories and a brief explanation about reading the data in the command tables. An alphabetical listing of the commands (index) begins on page F–168.

Remote Command Groups

The remote commands are organized into the following groups and subgroups:

Common (*) Commands

Use the common commands to set and query registers and machine information.

Instrument State

Use the instrument state commands to set and query the tester setup.

- Configuration and results
- Queries
- External attenuation and gain
- Reference and timing
- String data base
- Save and recall

Additional Measurements

Use the additional measurement commands to take current, voltage, and broadband power measurements.

Network and Test Selection

Use the network and test selection commands to select the network system and standard used in the testing and to invoke the desired tests.

Handoffs

Use the handoff commands to configure the handoff of an established call to another network, system or standard for both local transitions and interstandard handoffs.

- Handoffs from CDMA
- Handoffs to/from Analog
- Handoffs to/from TDMA

CDMA

The following CDMA categories and command groups are standard in the tester.

Base Station. Use these command groups to set and query the base station configuration.

- Configuration
- Parameters

Manual (Signaling) Test. Use these command groups to configure and query the results for manual tests.

- Configuration and results
- Operations
- Power control
  - Gated power
  - Open loop time response
  - Maximum and minimum output power
- Receiver quality
  - Sensitivity
  - Dynamic range
  - Traffic channel demodulation
  - User defined
  - Current signal level
- Transmitter quality

Module Test. Use these command groups to configure and query the results for module tests.

Analog (Option B82)

The following Analog categories and command groups are only available if Option B82 is installed in the tester.

Base Station. Use these command groups to set and query the analog base station configuration.

- Configuration
- Parameter

Manual (Signaling) Test. Use these command groups to configure and query the results for analog manual tests.

- Unregistered and registered states (general measurements)
- Call established state
  - General measurements
  - MS carrier power
  - Receiver quality measurements
    - Sensitivity
    - Hum/Noise
    - Harmonic distortion
    - Audio frequency response
    - Raw audio frequency response
  - Transmitter quality measurements
    - Hum/Noise
    - Modulation noise/distortion
    - Audio frequency response
    - Raw audio frequency response
    - Modulation limiting

Module Test. Use these command groups to perform analog module tests.

- General measurements
- AF generator
- MS carrier power

- Receiver quality measurements
  - Sensitivity
  - Hum/noise
  - Harmonic distortion
  - Audio muting
  - Audio frequency response
  - Raw audio frequency response
- Transmitter quality measurements
  - Hum/noise
  - Modulation noise/distortion
  - Audio muting
  - Audio frequency response
  - Raw audio frequency response

TDMA (Option B84)

The following TDMA categories and command groups are only available if Option B84 is installed in the tester.

Base Station. Use these command groups to set and query the TDMA base station configuration.

- Configuration
- Parameter

Manual (Signaling) Test. Use these command groups to configure and query the results for TDMA signaling tests.

- Unregistered and registered states (general measurements)
- Call established state
  - General measurements

- Receiver quality measurements
  - Sensitivity
  - Dynamic range
  - Current signal level
  - User defined
- Transmitter quality measurements
  - Adjacent channel power
  - Power versus time
  - Phase error
  - Magnitude error
  - Error vector magnitude
- MAHO report

Module Test. Use these command groups to perform TDMA module tests.

- General measurements
- AF generator
- Receiver quality measurements
  - Sensitivity
  - Dynamic range
  - Current signal level
  - User defined
- Transmitter quality measurements
  - Adjacent channel power
  - Power versus time
  - Phase error
  - Magnitude error
  - Error vector magnitude

Interpreting the Command Tables

The headings for the tables in the *Remote Commands* section starting on page F–8 are defined in the following subsections.

Command

This column lists the command string, consisting of the command keywords, separated by colons (:), and possible command arguments. The table uses the general SCPI conventions for short and long forms, optional keywords, and listing parameters (see *Appendix B: Remote Control).*

Values

This column gives the limits of the argument, if any, to the command or which will be returned by the query. If a command has an associated query and the range of values returned by the query is the same as the range accepted by the command (the usual case), no values will be indicated for the query. If the values returned by the query are different or if there is only a query for the function, the possible return values are indicated under the *Values* heading for the query.

The argument equivalent to the value the command will have after reset (or after an “xxxx[:SETTings]:DEFault” command affecting the value) is underlined as follows:

- If the arguments are character arguments, the underlining is done in the *Command* column.
- If the arguments are numeric, the underlining is done in the *Values* column.
- If necessary, an intermediate value will be included in the *Values* column. (For example, assume that a command has possible argument values of –10.0 to 20.0. The default value is underlined. With a default of –10.0, the range is indicated as <u>–10.0</u> to 20.0. With a default of 0.0, the range is indicated as –10.0 to <u>0.0</u> to 20.0.)
- The precision of an argument is equal to the the unit value of the least significant digit of an argument. For example, the precision of an argument with a range of 0 to 999 is 1; the precision of an argument with a range of 0.000 to 0.999 is 0.001.

MAXimum and MINimum Parameters. Commands that accept numeric parameters can also accept the special character parameters “MAXimum” and “MINimum.” These arguments set the value of the command item to the upper or the lower limits of the range accepted by the instrument. Such a command also has associated queries for the maximum and minimum values: if the command header is “<xxxx>,” then the queries are “<xxxx>? MAXimum” and “<xxxx>? MINimum.” These queries give the respective ends of the range and not the current value.

***NOTE**. The STATus and common (*) commands do not accept the MAX or MIN arguments.*

PASS/FAIL. All measurements which must attain a Target Peak Deviation level in order to have actual results computed and returned have the following behavior: If the FETCh command returns “0,1”. the Target Peak Deviation was NOT attained, indicated by the Target Peak Deviation bit being set to “1” (failure).

This means that the measurement has not run. The measurement result will therefore be “NAN”. (The first pass/fail “bit” of the FETCh command will not change from its default setting of “0”. In this case “0” does not indicate “pass”, since no measurement has actually been allowed to run. It must be ignored.)

For example, if READ[:SCALar]:ARQuality:HNOise [:ALL]? returns “NAN, <x>”, where <x> is some number outside the target audio peak deviation, then FETCH[:SCALar]:ARQuality:HNOise:LIMit:FAIL[:ALL]? will return “0, 1” (PASS, FAIL).

States

This column lists the state or states of the tester when the command is valid using the mnemonics shown in Figure E–3 on page E–4. ALL indicates that the command is valid in all states.

***NOTE**. All queries are accepted in all states; however, query results are meaningful only when they are issued in the state specified as valid for the command.*

Notes

The notes indicated in this column contain information that is important in programming with the command.

Device Independent (Common) Commands

Table F–1: Device independent (common) commands

Command	Values	State	Notes
*CLS CLS (Clear Status) sets the status registers (ESR and STB) to zero. The mask register of the service request function (ESE and SRE) is not changed. Clears the output buffer. The present service request is cleared (see *Service Request and Status Registers* on page D–16).		ALL	
*ESE <number for Event Status Enable register> Sets the ESE (event status enable) mask register to the specific value that is interpreted as a decimal number (see *Service Request and Status Registers* on page D–16).	0 to 255	ALL	
*ESE? Returns the contents of the ESE (event status enable) mask register in decimal form.		ALL	
*ESR? Returns the contents of the event status register in decimal form and sets the register to zero.	0 to 255	ALL	
*IDN? Returns the following identification text: Tektronix/Rohde&Schwarz, CMD80,030113/001 AT:X.X BR:X.X LH:X.X Tektronix/Rohde&Schwarz = manufacturer CMD80 = model 030113/001 = reserved for serial number X.X = firmware/software version (for example: 1.2)	See note	ALL	1
*IST? Returns the IST (instrument status) (Refer to *Service Request and Status Registers* on page D–16).	0 | 1	ALL	

1 **The response to the "*IDN?" query is "Tektronix/Rohde&Schwarz, CMD80, {serial number}, AT:a.a BR:b.b LH:l.l." The a's are replaced by the version number of the main instrument software. The b's are replaced by the version number of the boot ROM on the link handler board. The i's are replaced by the version number of the link handler firmware.**

Table F–1: Device independent (common) commands (cont.)

Command	Values	State	Notes
*OPC Sets bit 0 (operation complete) in the ESR, when all previous commands have been processed (see *Command Processing Sequence and Synchronization* on page D–22).		ALL	2
*OPC? This is the operation complete (ready message) query. The message *OPC 1 is entered into the output buffer and bit 4 (message available) set in the status byte when all previous commands have been completely executed. Bit 0 (operation complete) is also set in the ESR (refer to *Command Processing Sequence and Synchronization* on page D–22.	1	ALL	2
*OPT? Returns the options included in the instrument and returns a list of the options installed. The options are separated from each other by means of commas.	See note	ALL	3
*PRE <number for Parallel Poll Enable register> Sets the parallel poll enable mask register to the specified value that is interpreted as a decimal number (refer to *Service Request and Status Registers* on page D–16).	0 to 255	ALL	
*PRE? Returns the contents of the parallel poll enable register in decimal form.		ALL	
*PSC <numeric> This is the power on status clear (reset on power-up) command. If the argument is nonzero, the service request enable mask register (SRE) and the Event Status Enable mask registers (ESE) are cleared at power-up. If the argument is zero, the above mentioned registers retain their contents when the device is switched on and off. This enables a Service Request when the device is switched on.	–32767 to 1 to 32767	ALL	4
*PSC? Power On Status Clear Query Returns the status of the power on clear flags (refer to **PSC*).	0 | 1	ALL	
*RST Reset acts on the tester setting like the RESET key. This command does not change the status of the GPIB-bus interface, the set-GPIB-bus address, the mask register of the Service Request function, or the output buffer. A current service request is reset only if it has not been produced by a message in the output buffer.		ALL	

[2] **Also influences the OPC bit in the event status register.**

[3] **The options string consists of a comma-separated list. There is a position in the list for every option. If the option is present, the option designator is given. If the option is not present, the designator is replaced with a “0.” For example, the response for an instrument with only GPIB installed is “0,0,B60,B61,0,0,0.”**

[4] **Any numeric value is accepted, but the result is rounded to either 0 or 1. A 0 enables the power-on SRQ, while a 1 disables the power-on SRQ.**

Table F–1: Device independent (common) commands (cont.)

Command	Values	State	Notes
*SRE <number for Service Request Enable register> Sets the service request enable mask register to the specified value that is interpreted as a decimal number (refer to *Service Request and Status Registers* on page D–16).	0 to 191	ALL	
*SRE? Returns the contents of the service request enable mask register in decimal form.		ALL	
*STB? Returns the contents of the status byte in decimal form.	0 to 255	ALL	
*TST? Returns the results of the self test. An output value of 0 indicates the completion of the self-test without error.	0 to 255	ALL	
*WAI The wait to continue command sets the tester to process subsequent commands only when all previous commands have been completely executed (refer to *Command Processing Sequence and Synchronization* on page D–22).		ALL	

Instrument State Commands and Queries

Table F–2: Instrument state commands and queries

Command	Values	State	Notes
STATus:OPERation:CMD:ENABle <enable mask>	0 – 32767	ALL	
STATus:OPERation:CMD:ENABle?		ALL	
STATus:OPERation:ENABle <enable mask>	0 – 32767	ALL	
STATus:OPERation:ENABle?		ALL	
STATus:PRESet		ALL	
STATus:QUEStionable:ENABle <enable mask>	0 – 32767	ALL	
STATus:QUEStionable:ENABle?		ALL	
SYSTem:COMMunicate[:SELF]:ADDRess <GPIB address>	0 – 30	ALL	
SYSTem:COMMunicate[:SELF]:ADDRess?	0 – 30	ALL	
SYSTem:DATE<year>,<month>,<day> Establishes the system date.		ALL	1, 2
SYSTem:DATE?		ALL	
SYSTem:PRESet		ALL	3
SYSTem:TIME<hour>,<minute>,<second> Returns broadband power measurement for Analog Module Test.		AMT	1, 4
SYSTem:TIME?		AMT	
DISPlay:ENABle <OFF | ON>		ALL	
DISPlay:ENABle?	OFF, ON	ALL	

[1] **Following a new date or time entry, the change will take effect at the next reboot of the CMD80**
[2] **Format: yyyy,mm,dd (the “year” entry must be four digits).**
[3] **This command is equivalent to “*RST?”**
[4] **Format: hh,mm,ss.**

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
Instrument state queries			
STATus:DEVice?	IDLE, MINI, MIDL, CE1, CE2, CMP, CSH, CMT, AMIN. AMID, ACEV, ACE, AMT, TMIN, TMID, TCEV, TCE, TMT	ALL	5, 6
STATus:OPERation:CMD:CONDition?	0 – 15	ALL	
STATus:OPERation:CMD[:EVENt]?	0 – 15	ALL	
STATus:OPERation:CONDition?	0 – 32767	ALL	
STATus:OPERation[:EVENt]?	0 – 32767	ALL	
STATus:QUEStionable:CONDition?	0 – 32767	ALL	
STATus:QUEStionable[:EVENt]?		ALL	
SYSTem:ERRor[:NEXT]?	–32768 to 32767 and error string	ALL	7
SYSTem:OPTions?		ALL	8
SYSTem:VERSion?	YYYY.V	ALL	9
Instrument state – external attenuation and gain			
ROUTe:IOConnector <I1O1 | I1O2 | I2O1 | I2O2>		IDLE	10
ROUTe:IOConnector?		ALL	10

5 **Status commands do not have, use, or respond to MAX and MIN arguments.**

6 **See the section “State-Based Operation” in appendix E “Remote Control Commands” for further information on these states.**

7 **Negative numbers are SCPI-defined errors. Positive numbers are instrument-specific errors. 0 indicates no errors.**

8 **This query is equivalent to “*OPT?”.**

9 **“YYYY” is the year of SCPI compliance. “V” is the version number within the year.**

10 **In the argument or response “I<x>O<y>,” <x> specifies the input connector and <y> specifies the output connector. In each case, a value of “1” indicates the common RF IN/RF OUT connector, and a value of “2” indicates the separate input or output connector. Only one input and one output are active at any one time; those not selected are unavailable for use.**

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIOutput <loss[DB]> External attenuation/(gain) for the “RF IN/RF OUT” port.	–40.0 dB to 0.0 dB to +50.0 dB	ALL	14, 11, 12
SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIOutput?		ALL	14
SOURce:CORRection:LOSS[:OUTPut]:OFFSet:RIOutput <loss [DB]> RF Out offset.	–10.0 dB to 0.0 dB to +10.0 dB	ALL	14, 11, 13
SOURce:CORRection:LOSS[:OUTPut]:OFFSet:RIOutput?		ALL	14
SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:RIOutput? Total RF Out attenuation/(gain), the sum of the “RF IN/RF OUT” and “RFOut offset” attenuation values. Query only,		ALL	14
SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIALternate <loss [DB]> External attenuation/(gain) for the “RF IN2” port.	–40.0 dB to 0.0 dB to +90.0 dB	ALL	14
SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIALternate?		ALL	14
SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:ROALternate <loss [DB]> External attenuation/(gain) for the “RF OUT2” port.	–40.0 dB to 0.0 dB to +90.0 dB	ALL	14
SOURce:CORRection:LOSS[:OUTPut][:MAGNitude]:ROALternate?		ALL	14

11 Since “RIOutput” represents the common input/output connector, setting the external loss in either the “SENse” or the “SOURce” subsystems will set the loss for this connector in the other subsystem. If both commands are sent, either in the same message or in different messages, the last loss value sent will take effect.

12 The possible values for this command are determined dynamically, based on the current value of the SOURce:CORRection:LOSS[:OUTPut]:OFFSet:RIOutput <loss [DB]> command, such that the total of the two values must also be within the –40 dB to +50 dB range.

13 The possible values for this command are determined dynamically, based on the current value of the SENSe:CORRection:LOSS[:INPut][:MAGNitude]:RIOutput <loss[DB]> command, such that the total of the two values must also be within the –40 dB to +50 dB range of the SENSe command.

14 Negative values indicate gain. Positive values indicate loss.

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
Instrument state – reference and timing			
CONFigure:TSIGnal:SCDivisor <divisor>	1, 4, 8, 12, ...1024	ALL	15
CONFigure:TSIGnal:SCDivisor?		ALL	
CONFigure:TSIGnal:SCLock? (query only)		ALL	16
CONFigure:TSIGnal:SELect <NONE | PP2S | FSUPer | FPAGing | FSYNc | FPControl | SCLock>		ALL	17
CONFigure:TSIGnal:SELect?		ALL	
CONFigure:TSIGnal[:SETTings]:DEFault		ALL	
SENSe:ROSCillator:OUTPut <SREFerence | RIPassthrough>		ALL	18
SENSe:ROSCillator:OUTPut?		ALL	
SENSe:ROSCillator[:SETTings]:DEFault		ALL	
SENSe:ROSCillator:SOURce <I10Mhz | E1MHz | E2MHz | E5MHz | E10Mhz>		ALL	19
SENSe:ROSCillator:SOURce?		ALL	
SOURce:ROSCillator:OUTPut <SREFerence | RIPassthrough>		ALL	18
SOURce:ROSCillator:OUTPut?		ALL	
SOURce:ROSCillator[:SETTings]:DEFault		ALL	
SOURce:ROSCillator:SOURce <I10MHz | E1MHz | E2MHz | E5MHz | E10Mhz>		ALL	19
SOURce:ROSCillator:SOURce?		ALL	
Instrument state – string data base[20]			
MMEMory:SDBase:RDATa <string (≤100 characters) >		ALL	21
MMEMory:SDBase:RDATa?		ALL	22

15 Use this command to select or query the value used to divide the 19.6608 MHz system clock to generate the timing signal when the system clock is selected as the timing signal.

16 Use this query to list the timing signal frequency (in MHz) when the system clock is selected.

17 Use this command to select or query the source of the timing signal.

18 Selects the origin of the reference frequency output signal at the REF OUT connector on the rear panel. The signal can either be the system reference or the signal passed through the REF IN.

19 Selects the source of the reference frequency as either the internal 10 MHz or an external 1, 2, 5, or 10 MHz source applied to the rear panel REF IN connector.

20 The string data base provides a simple data storage system. The data to be stored ust be represented as an ASCII string. The length of a string cannot exceed 100 characters. Up to 100 strings can be saved and recalled.

21 This command stores the string into the record indicated by the most recent MMEMory:SDBase:RNUMber command. this string will replace any previous contents of the record. Sending an empty string will erase the contents of the record.

22 This query returns the string in the record indicated by the most recent MMEMory:SDBase:RNUMber command.

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
MMEMory:SDBase:RNUMber <record number>	1 to 100	ALL	23
MMEMory:SDBase:RNUMber?		ALL	
Instrument state – save and recall			
MMEMory1:RECall		ALL	24
MMEMory2:RECall		ALL	24
MMEMory3:RECall		ALL	24
MMEMory4:RECall		ALL	24
MMEMory5:RECall		ALL	24
MMEMory6:RECall		ALL	24
MMEMory7:RECall		ALL	24
MMEMory8:RECall		ALL	24
MMEMory9:RECall		ALL	24
MMEMory10:RECall		ALL	24
MMEMory11:RECall		ALL	24
MMEMory12:RECall		ALL	24
MMEMory13:RECall		ALL	24
MMEMory1:SAVE		ALL	24
MMEMory2:SAVE		ALL	24
MMEMory3:SAVE		ALL	24
MMEMory4:SAVE		ALL	24
MMEMory5:SAVE		ALL	24
MMEMory6:SAVE		ALL	24
MMEMory7:SAVE		ALL	24
MMEMory8:SAVE		ALL	24
MMEMory9:SAVE		ALL	25
MMEMory10:SAVE		ALL	25
MMEMory11:SAVE		ALL	25
MMEMory12:SAVE		ALL	25
MMEMory13:SAVE		ALL	25

[23] **This command designates from which record the next MMEMory:SDBase:RDATa query will return a string.**

[24] **The short form of the first keyword is formed by the characters “MMEM” with an appended number of from 1 to 13.**

[25] **The short form of the first keyword is formed by the characters “MMEM” with an appended number of from 1 to 13.**

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
MMEMory1:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory1:SAVE:NAME?		ALL	25
MMEMory2:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory2:SAVE:NAME?		ALL	25
MMEMory3:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory3:SAVE:NAME?		ALL	25
MMEMory4:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory4:SAVE:NAME?		ALL	25
MMEMory5:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory5:SAVE:NAME?		ALL	25
MMEMory6:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory6:SAVE:NAME?		ALL	25
MMEMory7:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory7:SAVE:NAME?		ALL	25
MMEMory8:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory8:SAVE:NAME?		ALL	25
MMEMory9:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory9:SAVE:NAME?		ALL	25
MMEMory10:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory10:SAVE:NAME?		ALL	25
MMEMory11:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory11:SAVE:NAME?		ALL	25
MMEMory12:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory12:SAVE:NAME?		ALL	25
MMEMory13:SAVE:NAME <name string (≤30 characters) to be associated with memory>		ALL	25
MMEMory13:SAVE:NAME?		ALL	25
MMEMory:TYPE <INTernal | MEMCard>		ALL	26
MMEMory:TYPE?		ALL	
SYSTem:USER1:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER1:NAME?		ALL	
SYSTem:USER2:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER2:NAME?		ALL	

[26] **The “MEMCard” argument is applicable only with Option B62, Memory Card Interface.**

Table F–2: Instrument state commands and queries (cont.)

Command	Values	State	Notes
SYSTem:USER3:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER3:NAME?		ALL	
SYSTem:USER4:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER4:NAME?		ALL	
SYSTem:USER5:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER5:NAME?		ALL	
SYSTem:USER6:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER6:NAME?		ALL	
SYSTem:USER7:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER7:NAME?		ALL	
SYSTem:USER8:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER8:NAME?		ALL	
SYSTem:USER9:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER9:NAME?		ALL	
SYSTem:USER10:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER10:NAME?		ALL	
SYSTem:USER11:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER11:NAME?		ALL	
SYSTem:USER12:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER12:NAME?		ALL	
SYSTem:USER13:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER13:NAME?		ALL	
SYSTem:USER14:NAME <name string (≤30 characters) to be associated with this user>		ALL	
SYSTem:USER14:NAME?		ALL	
SYSTem:USER:SELect <USer1 | USer2 | USer3 | USer4 | USer5 | USer6 | USer7 | USer8 | USer9 | USer10 | USer11 | USer12 | USer13 | USer14>		ALL	27
SYSTem:USER:SELect?		ALL	

[27] **This value is reset only after a front-panel reset; it is not reset after an *RST command.**

Additional Measurements Commands

Table F–3: Additional measurements

Command	Values	State	Notes
READ[:SCALar]:CURRent[:DC][:AVERage]?	0.000 A to 10.000 A	ALL	
READ[:SCALar]:CURRent[:DC]:MAXimum?	0.000 A to 10.000 A	ALL	
READ[:SCALar]:CURRent[:DC]:MINimum?	0.000 A to 10.000 A	ALL	
READ[:SCALar]:POWer:BBANd? Returns general broadband power measurement.	See note	ALL	1
READ[:SCALar]:VOLTage[:DC]?	0.00 volt to 20.00 volt	ALL	
CONFigure:ACOMbination? Returns the **A**ctual Network, System, and Standard **COMB**ination when a call is established, or at the completion of a handoff.		ALL	

1 **Returns the power as measured by the front end broadband power meter (in dBm). If the input signal is too high, the result is "INF" (infinity); if the input signal is too low, the result is "NINF" (negative infinity).**
Range: 0 dBm to 41 dBm.
Error: $\leq$1.5 dB.

Network and Test Selection Commands

Table F–4: Network and test selection

Command	Values	State	Notes
Network selection			
CONFigure:COMBination <Network>,<System>,<Standard> Establishes the overall system configuration of the tester. With a single command, the Network, System, and Standard parameters may be specified. The selected configuration must match the internal capabilities of the tester, otherwise the command will be rejected.		IDLE	
<Network> can use any of the listed values:	USCellular JPCellular CHCellular USPCs KR1Pcs KR2Pcs		
<System> can use any of the listed values:	CDMA TDMA ANALog		
<Standard> can use any of the listed values:	IS95 JSTD008 I136 AMPS NAMPs TACS ETACs JTACs NTACs		
CONFigure:COMBination? Returns the Network, System, and Standard parameter settings for IDLE state.		ALL	
Test selection – call setup and teardown			
PROCedure:SELect[:TEST] <SIGNaling | MODule | NONE> Selects what mode the tester is to operate within, in the currently specified standard. When the tester communicates directly with the mobile station and is able to establish calls to the mobile station, the SIGNaling mode must be specified. For testing of mobile stations without the capability of establishing a call, or to test a module of the mobile station, the MODule mode must be specified. The NONE mode will turn off all outputs and discontinue all signaling (if active).		IDLE (SIGNaling, MODule) ALL (NONE)	1
PROCedure:SELect[:TEST]? Returns the signaling mode setting.		ALL	

[1] **The “NONE” argument can be given is all states. The “SIGNaling” and “MODule” arguments can be given only in the IDLE state. SIGNAling mode is also referred to as MANUAL test mode.**

Table F–4: Network and test selection (cont.)

Command	Values	State	Notes
PROCedure:CTMStation:MINumber <string containing mobile ID number> Provides the mobile station identification number (MIN or IMSI) so that the tester can page the mobile station to speed up the registration.	Number up to 15 digits	ALL	2
PROCedure:CTMStation:MINumber?		ALL	
PROCedure:CTMStation:CALL <TEST | VOICE | ATEST | AVOICE | TTEST | TVOICE> Initiates a call to the mobile station. The arguments TEST and VOICE are for use with CDMA mobile stations from the MIDL and MINI instrument states. The arguments ATEST and AVOICE are for use when making ANALOG (AMPS, TACS, JTACS, NTACS, ETACS, and NAMPS) type calls from the AMID or AMIN instrument state. The arguments TTEST and TVOICE are for use with TDMA mobile stations from the TMID and TMIN instrument states.		MIDL, MINI, AMID, AMIN, TMID, TMIN	3, 4
PROCedure:CTMStation:RELease Releases an established call.		ALL	

[2] **When the mobile station registers, it provides its internal MIN or IMSI. The tester stores only the last received MIN or IMSI, regardless of its source.**

[3] **Arguments containing TEST place the call in MS TEST mode. Arguments containing VOICE place the call using VOICE LOOPBACK mode.**

[4] **The function of this command is affected by the CONFigure:ABSTation:CTYPe <ANALOG | DIGITAL> command when in AMID, AMIN, TMID, and TMIN instrument states.**

Handoffs and Local Transitions Commands

Table F–5: Handoffs and local transitions

Command	Values	State	Notes
Handoffs (interstandard) – network selection [1]			
CONFigure:HANDoff:COMBination <network>, <system>, <standard> Establishes the network, system, and standard that will be the destination for a subsequent interstandard handoff.		ALL	2
<Network> can use any of the listed values:	USCellular JPCellular CHCellular USPCs KR1Pcs KR2Pcs		
<System> can use any of the listed values:	CDMA TDMA ANALog		
<Standard> can use any of the listed values:	IS95 JSTD008 I136 AMPS NAMPs TACS ETACs JTACs NTACs		
CONFigure:HANDoff:COMBination?	<network>, <system>, <standard>	ALL	
Handoffs (interstandard) – test selection and call setup			
CONFigure:HANDoff:CALL <TEST | VOICe> Specifies which type of call will be established at a subsequent handoff execution.		ALL	
CONFigure:HANDoff:CALL?		ALL	
CONFigure:HANDoff:CDMA:VOICe <R1Vbasic | R1Venhanced | R2Vcdg> If an voice loopback call was specified by CONFigure:HANDoff:CALL <VOICe | TEST>, this command specifies which type of voice loopback call will be established at a subsequent handoff to CDMA.		ALL	

1 **Intrastandard handoff (local transition) cannot be configured here. It must be configured with the local transition commands in the next section of this table.**

2 **Establishes the network protocol and frequency parameters for a subsequent interstandard handoff. “Settings Conflict” is returned if a network selection is made which is not installed, not defined, or for which handoffs are not supported from the current configuration. See Table D–11 for a list of commands that can be used following this command to completely configure the destination base station.**

Table F–5: Handoffs and local transitions (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:CDMA:VOICe?		ALL	
CONFigure:HANDoff:CDMA:TEST <RS1 | RS2> If an MS test call was specified by CONFigure:HANDoff:CALL <VOICe | TEST>, this command specifies which type of MS Test call will be established at a subsequent handoff to CDMA.		ALL	
CONFigure:HANDoff:CDMA:TEST?		ALL	
PROCedure:CTMStation:HANDoff Causes an interstandard handoff to occur from the current voice channel to a voice channel on the network and standard specified by the CONFigure:HANDOFF:COMBination command.		CE1, CE2, ACE, ACEV, TCE, TCEV	3
Local transitions			
PROCedure:CTMStation:TRANsition:CDMA <R1VBasic | R1Venhanced | R2VCdg | R1Test | R2Test> Causes an established call to transition to the selected mode: Voice Loopback, rate set 1 (basic) Voice Loopback, rate set 1 (enhanced) Voice Loopback, rate set 2 (CDMA Design Group) MS Test, rate set 1 MS Test, rate set 2		CE1, CE2	
PROCedure:CTMStation:TRANsition:ANALog <AVOIce | ATESt> Causes an established analog call to transition to Voice Loopback or to MS Test mode.		ACE, ACEV	
PROCedure:CTMStation:TRANsition:TDMA <TVOICE | TTEST> Causes an established TDMA call to transition to Voice Loopback or to MS Test mode.		TCE, TCEV	4

3 When the handoff occurs, the base station configuration, which was specified for the destination network and protocol (via the CONFigure:HANDoff:BSTation or CONFigure:HANDoff:ABSTation command), now becomes the primary base station configuration. Subsequent changes to this base station configuration must be accomplished using the CONFigure:BSTation or CONFigure:ABSTation command. If the call is released at this point, the tester will return to the call established state for the new network and standard. In contrast, the PROCedure:SELect[:TEST] NONE command will return the tester to an idle state and restore the home network, system, and standard that were selected by the most recent CONFigure:COMBination command.

4 The TVOICE argument is only valid when the instrument is in the TCE state (transition from MS Test to Voice Loopback). Likewise, the TTEST argument is only valid when the instrument is in the TCEV state (transition from Voice Loopback to MS Test mode).

Handoff Base Station Signal Configuration Commands

***NOTE**. Before you can configure an interstandard handoff with the commands in this table, the standard that is the destination of the handoff must be specified. Use the CONFigure:HANDoff:COMBination command (see Table F–5) to specify the destination standard.*

Table F–6: Handoff base station signal configuration commands

Command	Values	State	Notes
Handoffs to CDMA – Configuration			
CONFigure: HANDoff:BSTation:FOFFset <frame offset>	0 to 15	ALL	
CONFigure:HANDoff:BSTation:FOFFset?		ALL	
CONFigure:HANDoff:BSTation:FREQuency:BLOCk?	A, B, C, D, E, F	ALL	1
CONFigure:HANDoff:BSTation:FREQuency:CHANnel <RF channel number>	See note	ALL	2
CONFigure:HANDoff:BSTation:FREQuency:CHANnel?		ALL	
CONFigure:HANDoff:BSTation:FREQuency:SYSTem?	A, B	ALL	3
CONFigure: HANDoff:BSTation:PNOFfset <PN offset>	0 to 511	ALL	
CONFigure: HANDoff:BSTation:PNOFfset?		ALL	
CONFigure:HANDoff:BSTation[:SETTings]:DEFault		ALL	4
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:OCNS?		ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:PAGing <relative level {DB}>	–20.0 dB to –12.0 dB to –7.0 dB	ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:PAGing?		ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:PILot <relative level {DB}>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:SYNC <relative level {DB}>	–20.0 dB to –16.0 dB to –7.0 dB	ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:SYNC?		ALL	

[1] **Query only. Returns the PCS block of the currently selected PCS RF channel.**

[2] **US Cellular range is 1 to 283 to 799 and 990 to 1023. PCS range is 0 to 25 to 1199. Korean PCS range is 0 to 25 to 1300. Korean 2 PCS range is 0 to 25 to 699. Chinese Cellular range is 0 to 283 to 1000 and 1329 to 2047. Japan Cellular range is 0 to 25 to 1199.**

[3] **Query only. The value is determined internally from the selected RF channel.**

[4] **The settings associated with the commands which cannot be used in the present state of the tester will not be affected.**

Table F–6: Handoff base station signal configuration commands (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:TRAFFic <relative level {DB}>	–20.0 dB to <u>–14.0 dB</u> to –7.0 dB	ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:LEVel:TRAFFic?		ALL	
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:POWer <relative level {DB}>	See notes	ALL	5, 6, 7
CONFigure:HANDoff:BSTation:SOURce[:CDMA]:POWer?		ALL	7
CONFigure:HANDoff:BSTation:TCHannel <traffic channel>	2 to <u>8</u> to 31, 33 to 63	ALL	
CONFigure: HANDoff:BSTation:TCHannel?		ALL	
Handoffs to Analog – Configuration			
CONFigure:HANDoff:ABSTation:LIDentity <location identity>	0 to <u>1</u> to 4095	ALL	
CONFigure:HANDoff:ABSTation:LIDentity?		ALL	
CONFigure:HANDoff:ABSTation:SIDentity <system identity>	0 to <u>1</u> to 16383	ALL	
CONFigure:HANDoff:ABSTation:SIDentity?		ALL	
CONFigure:HANDoff:ABSTation:PDURation <paging duration [S]>	5 s to <u>20 s</u> to 60 s	ALL	
CONFigure:HANDoff:ABSTation:PDURation?		ALL	
CONFigure:HANDoff:ABSTation:PARameters[:SETTings]:DEFault		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:CCHannel <RF channel number>	See note	ALL	8
CONFigure:HANDoff:ABSTation:FREQuency:CCHannel?		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:VCHannel <RF channel number>	See note	ALL	9
CONFigure:HANDoff:ABSTation:FREQuency:VCHannel?		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:NBVChannel <ABOVe | BELow | CENTer>		ALL	

5 **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to <u>–70.0 dBm</u> to –19.0 dBm. When using the "RF OUT 2" connector under the same conditions, the power range is –113.0 dBm to <u>–70.0 dBm</u> to +1.0 dBm.**

6 **If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to <u>–70 dBm</u> to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

7 **If the tester is in the "IDLE" state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state, the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

8 **Valid range for AMPS and NAMPS is 0 to <u>333</u> to 799, 990 to 1023; JTACS range is 2, 4, 6, …, <u>418</u>, …, 798; NTACS range is 1 to <u>418</u> to 799, 801 to 1039; TACS range is 1 to <u>23</u> to 1000; ETACS range is 0 to <u>23</u> to 600, 1329 to 2047.**

9 **Valid range for AMPS and NAMPS is 0 to <u>312</u> to 799, 990 to 1023; JTACS range is 2, 4, 6, …, <u>442</u>, …, 798; NTACS range is 1 to <u>442</u> to 799, 801 to 1039; TACS range is 1 to <u>44</u> to 1000; ETACS range is 0 to <u>44</u> to 600, 1329 to 2047.**

Table F–6: Handoff base station signal configuration commands (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:ABSTation:FREQuency:NBVChannel?		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:SCCode <SAT color code number>	0 to 1 to 2	ALL	
CONFigure:HANDoff:ABSTation:FREQuency:SCCode?		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:DSCCode <DSAT color code number>	0 to to 6	ALL	
CONFigure:HANDoff:ABSTation:FREQuency:DSCCode?		ALL	
CONFigure:HANDoff:ABSTation:FREQuency:SYSTem? (query only)	A or B	ALL	
CONFigure:HANDoff:ABSTation:SOURce:POWer <analog power level [DBM] | MAXimum | MINimum>	–181.0 dBm to –70.0 dBm to 43.0 dBm	ALL	
CONFigure:HANDoff:ABSTation:SOURce:POWer? (query only)			
CONFigure:HANDoff:ABSTation:SOURce:FM:DEViation:SAT <SAT peak deviation [Hz] | MAXimum | MINimum>		ALL	10
CONFigure:HANDoff:ABSTation:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:HANDoff:ABSTation:SOURce:FM:DEViation:DSAT <DSAT peak deviation [Hz] | MAXimum | MINimum>	630 Hz to 700 Hz to 770 Hz	ALL	
CONFigure:HANDoff:ABSTation:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:HANDoff:ABSTation:CMAC <voice channel mobile attenuation code>	0 to 2 to 7	ALL	
CONFigure:HANDoff:ABSTation:CMAC?		ALL	
CONFigure:HANDoff:ABSTation:VMAC <voice channel mobile attenuation code>	0 to 2 to 7	ALL	
CONFigure:HANDoff:ABSTation:VMAC?		ALL	
CONFigure:HANDoff:ABSTation[:SETTings]:DEFault		ALL	
Handoffs to TDMA – Configuration			
CONFigure:HANDoff:DAMS:BSTation:DCCH:CHANnel <Value> Sets the handoff base station DCCH channel.	1 to 26 to 1023 for Cellular; 800–989 not allowed 1 to 200 to 1999 for PCS	ALL	
CONFigure:HANDoff:DAMS:BSTation:DCCH:CHANnel? Returns the set handoff destination base station DCCH channel.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DCCH:SLOT <Value> Sets the handoff destination base station DCCH slot. The tester only supports full rate DCCH channels in slot 1.	1	ALL	

[10] **Valid SAT frequency deviation range for AMPS and NAMPS is 1800 Hz to 2000 Hz to 2200 Hz; the valid range for JTACS, NTACS, ETACS, and TACS is 1530 Hz to 1700 Hz to 1870 Hz.**

Table F–6: Handoff base station signal configuration commands (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:DAMS:BSTation:DCCH:SLOT? Returns the set handoff destination base station DCCH slot.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:CHANnel <Value> Sets the handoff destination base station DTC channel.	1 to 312 to 1023 for Cellular; 800–989 not allowed 1 to 312 to 1999 for PCS	ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:CHANnel? Returns the set handoff destination base station DTC channel.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:SLOT <Value> Sets the handoff destination base station DTC slot.	1 to 3 for FULL rate 1 to 6 for HALF rate	ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:SLOT? Returns the set handoff destination base station DTC slot.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DVCC <Value> Sets the handoff destination base station digital voice color code.	1 to 255	ALL	
CONFigure:HANDoff:DAMS:BSTation:DVCC? Returns the set handoff destination base station digital voice color code.		ALL	
CONFigure:HANDoff:DAMS:BSTation:SOURce:POWer <Value> Sets the handoff destination base station power that the tester delivers to the mobile station. The limits of this command are dependent on which connector is being used and on the amount of attenuation established elsewhere in the instrument configuration.	–17.0 dBm to –70.0 dBm to –131.0 dBm	ALL	11
CONFigure:HANDoff:DAMS:BSTation:SOURce:POWer? Returns the set handoff destination base station power.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:MAC <Value> Sets the handoff destination base station DTC MAC.	0 to 2 to 10	ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:MAC? Returns the set handoff destination base station DTC MAC.		ALL	

11 **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–6: Handoff base station signal configuration commands (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:DAMS:BSTation:DCCH:MAC <Value> Sets the handoff destination base station DCCH MAC.			
CONFigure:HANDoff:DAMS:BSTation:DCCH:MAC? Returns the set handoff destination base station DCCH MAC.	0 to 2 to 10	ALL	
CONFigure:HANDoff:DAMS:BSTation:DCCH:PRSet <FULL> Sets the handoff destination DCCH preferred data rate.		ALL	12
CONFigure:HANDoff:DAMS:BSTation:DCCH:PRSet? Returns the set handoff DCCH preferred data rate.			
CONFigure:HANDoff:DAMS:BSTation:DTC:PRSet <HALF | FULL> Sets the handoff destination DTC preferred data rate.		ALL	
CONFigure:HANDoff:DAMS:BSTation:DTC:PRSet? Returns the set handoff destination DTC preferred data rate.		ALL	
CONFigure:HANDoff:DAMS:BSTation:PCODec <ACEL | VSEL> Sets the handoff destination preferred CODEC.		ALL	13
CONFigure:HANDoff:DAMS:BSTation:PCODec? Returns the set handoff destination preferred CODEC.		ALL	
CONFigure:HANDoff:DAMS:BSTation:PARameters[:SETTings]:DEFault Sets the values for the handoff signaling configuration page to the default values.		ALL	
CONFigure:HANDoff:DAMS:BSTation:FREQuency:System <A | B> Sets the handoff frequency system.			
CONFigure:HANDoff:DAMS:BSTation:FREQuency:System? Query Only. Returns the handoff frequency system – A | B | C | D | E | F | A,D | D,B | B,E | E,F | F,C | UNUSED.		ALL	
CONFigure:HANDoff:DAMS:BSTation:PDURation <Value> Sets the handoff paging duration (in seconds).	0 to 20 to 60	ALL	
CONFigure:HANDoff:DAMS:BSTation:PDURation? Returns the set handoff paging duration.		ALL	

[12] The tester only supports FULL rate DCCH, and only in slot 1.

[13] The preferred CODEC setting selects the type of CODEC that the base station will attempt to specify in the channel assignment message. However, the base station will also request a capability report from the mobile station prior to the actual assignment of a traffic channel, and the base station will actually use the CODEC type returned from the mobile station in the mobile station's capability response message. This parameter is then available using the CONFigure:DAMS:BSTation:ACODec? query.

Table F–6: Handoff base station signal configuration commands (cont.)

Command	Values	State	Notes
CONFigure:HANDoff:DAMS:BSTation:SIDentity <Value> Sets the handoff destination system identification number.	0 to 1 to 32767	ALL	14
CONFigure:HANDoff:DAMS:BSTation:SIDentity? Returns the set handoff destination system identification number.		ALL	
CONFigure:HANDoff:DAMS:BSTation:ATYPe <IMSI | MIN> Sets the handoff destination system address type.		ALL	
CONFigure:HANDoff:DAMS:BSTation:ATYPe? Returns the set handoff destination system address type used by the mobile station and the base station.		ALL	
CONFigure:HANDoff:DAMS:BSTation:SOCode <Value> Sets the handoff destination base station system operator code.	0 to 4095	ALL	
CONFigure:HANDoff:DAMS:BSTation:SOCode? Returns the set handoff destination base station system operator code.		ALL	

[14] **The System Identification (SID) parameter configuration is tied to the base station control channel selection (CONFigure:DAMS:BSTation:DCCH:CHANnel). For control channels selected in the range for system A (1 to 333, 667 to 716), the SID parameter will be adjusted to be an ODD number, by adding 1 if an even number is sent. For control channels selected in the range for system B, the SID will be adjusted to be an EVEN number, by subtracting 1 if an odd number is sent. Setting the SID parameter and then selecting a control channel, or selecting a control channel and then setting the SID will both result in identical SID values.**

CDMA Base Station Commands

Table F–7: CDMA base station commands

Command	Values	State	Notes
CDMA base station – configuration			
CONFigure:BSTation:FOFFset <frame offset>	0 to 15	ALL	
CONFigure:BSTation:FOFFset?		ALL	
CONFigure:BSTation:FREQuency:CHANnel <RF channel number>	See note	IDLE, CE1, CE2,	1
CONFigure:BSTation:FREQuency:CHANnel?		ALL	
CONFigure:BSTation:FREQuency:BLOCk?	A, B, C, D, E, F	ALL	2
CONFigure:BSTation:FREQuency:SYSTem?	A, B	ALL	3
CONFigure:BSTation:PNOFfset <PN offset>	0 to 511	IDLE, CE1, CE2 – not CMP	
CONFigure:BSTation:PNOFfset?		ALL	
CONFigure:BSTation:PRSet <RS1 | RS1_8K | RS2 | RS2_13K>		IDLE, MINI, MIDL	4
CONFigure:BSTation:PRSet?		ALL	
CONFigure:BSTation[:SETTings]:DEFault		ALL	5
CONFigure:BSTation:SOURce[:CDMA]:LEVel:OCNS?		ALL	6
CONFigure:BSTation:SOURce[:CDMA]:LEVel:PAGing <relative level [DB]>	–20.0 dB to –12.0 dB to –7.0 dB	ALL Except CMP	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:PAGing?		ALL	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL Except CMP	

1 **US Cellular range is 1 to 283 to 799 and 990 to 1023. PCS range is 0 to 25 to 1199. Korean PCS range is 0 to 25 to 1300. Korean 2 PCS range is 0 to 25 to 699. Chinese Cellular range is 0 to 283 to 1000 and 1329 to 2047. Japan Cellular range is 0 to 25 to 1199.**

2 **Query only. Returns the PCS block of the currently selected PCS RF channel.**

3 **Query only. The value is determined internally from the selected RF channel.**

4 **Establishes the user’s preference of the data “rate set” used during a call. The actual rate set may vary from this depending on the mobile station capabilities. Note: The 13k rate is only supported if the option is installed. This value is reset by *RST and SYSTem:PRESet.**

5 **The settings associated with the commands which cannot be used in the present state of the tester will not be affected.**

6 **OCNS is not directly configurable, being determined by the setting of other base station parameters.**

Table F–7: CDMA base station commands (cont.)

Command	Values	State	Notes
CONFigure:BSTation:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:SYNC <relative level [DB]>	–20.0 dB to –16.0 dB to –7.0 dB	ALL Except CMP	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:SYNC?		ALL	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –14.0 dB to –7.0 dB	ALL Except CMP	
CONFigure:BSTation:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:BSTation:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL Except CMP	7, 8, 9
CONFigure:BSTation:SOURce[:CDMA]:POWer?		ALL	9
CONFigure:BSTation:TCHannel <traffic channel>	2 to 8 to 31, 33 to 63	ALL	
CONFigure:BSTation:TCHannel?		ALL	
CDMA base station – parameters			
CONFigure:BSTation:ATYPe <MIN | IMSI>		IDLE	10
CONFigure:BSTation:ATYPe?		ALL	
CONFigure:BSTation:BSIDentity <base station identity>	0 to 1 to 65535	IDLE	
CONFigure:BSTation:BSIDentity?		ALL	
CONFigure:BSTation:NIDentity <network identity>	0 to 1 to 65534	ALL	
CONFigure:BSTation:NIDentity?		ALL	
CONFigure:BSTation:PARameters[:SETTings]:DEFault		ALL	
CONFigure:BSTation:PREVision <protocol revision>	1 to 3 for IS-95, 1 for J-STD-008	IDLE	

7 **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –70.0 dBm to –19.0 dBm. When using the “RF OUT 2” connector under the same conditions, the power range is –113.0 dBm to –70.0 dBm to +1.0 dBm.**

8 **If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:…”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –70 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

9 **If the tester is in the “IDLE” state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the “SOUrce:CORRection:LOSS:…” command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state, the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

10 **The default value depends on the network selection and protocol revision.**

Table F–7: CDMA base station commands (cont.)

Command	Values	State	Notes
CONFigure:BSTation:PREVision?		ALL	
CONFigure:BSTation:SIDentity <system identity>	<u>1</u> to 32767	ALL	
CONFigure:BSTation:SIDentity?		ALL	

CDMA Manual Test (Signaling) Commands

Table F–8: CDMA manual test (signaling) commands

Command	Values	State	Notes
Unregistered and Registered States – General Measurments[1]			
CONFigure:IACCess:APRobe:NOFFset<nominal offset [DB]> The nominal transmit power offset (“NOM_PWR” of the Access Parameters Message). Used in the computation of the mean output power of the access probes.	–8 dB to 0 dB to 7 dB	ALL	
CONFigure:IACCess:APRobe:NOFFset?		ALL	
CONFigure:IACCess:APRobe:IOFFset<initial offset [DB]> The initial power offset for access (“INIT_PWR” of the Access Parameters Message). Used in the computation of the mean output power of the access probes.	–16 dB to 0 dB to 15 dB	ALL	
CONFigure:IACCess:APRobe:IOFFset?		ALL	
CONFigure:IACCess:APRobe:PINCrement<probe increment [DB]> The power increment (“PWR_STEP” of the Access Parameters Message). Establishes the increase in transmit power between successive access probes.	0 dB to 3 dB to 7 dB	ALL	
CONFigure:IACCess:APRobe:PINCrement?		ALL	
CONFigure:IACCess:APRobe:PPSequence<probes per sequence> The number of access probes per sequence (“NUM_STEP” of the Access Parameters Message + 1). Establishes the maximum number of access probes transmitted in a single sequence.	1 to 16	ALL	
CONFigure:IACCess:APRobe:PPSequence?		ALL	
CONFigure:IACCess:APRobe:SPATtempt<sequence per attempt> The number of access probe sequences per access attempt (“MAX_REQ_SEQ” or “MAX_RSP_SEQ” of the Access Parameters Message). Establishes the maximum number of access probe sequences transmitted for either an access channel request or access channel response.	1 to 15	ALL	
CONFigure:IACCess:APRobe:SPATtempt?			
CONFigure:IACCess:APRobe:[:SETTings]:DEFault Resets the access probe parameters to default values.		ALL	
CONFigure:IACCess:APRobe:ACTion<ACKNowledge | IGNore> Establishes whether the access probes will be acknowledged or ignored by the CMD80		MINI	
CONFigure:IACCess:APRobe:ACTion?		ALL	

[1] **The use of “IACCess” within the syntax of these commands refers to the “Idle” and “ACCess” Call Processing states.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:IACCess:ASTop <OFF | ON> Establishes the auto stop state for the standby power measurement done while in the CDMA Idle or Access states, ie. the Unregistered or Registered states.		ALL	
CONFigure:IACCess:ASTop?		ALL	
CONFigure:IACCess:LIMit:POWer:STANdby[:UPPer] <standby power [DBM]> Establishes the limit for the standby power as measured during the CDMA Idle or Access states, ie. the Unregistered or Registered states.	–81.0 dBm to –61.0 dBm to –41.0 dBm	ALL	
CONFigure:IACCess:LIMit:POWer:STANdby[:UPPer]?		ALL	
CONFigure:IACCess[:SETTings]:DEFault Resets all CDMA standby power settings to the default values.		ALL	
READ[:SCALar]:IACCess:POWer:APRobe? Returns the measured power of the next access probe sent by the mobile station during the CDMA Idle or Access states, ie. the Unregistered or Registered states.	See note	MINI	
READ[:SCALar]:IACCess:POWer:STANdby? Returns the measured power of the mobile station between access probes during the CDMA Idle or Access states, ie. the Unregistered or Registered states.	See note	MIDL	
FETCh[:SCALar]:IACCess:POWer:STANdby:LIMit:FAIL? Returns the pass/fail value for the standby power measurement done during the CDMA Idle or Access states, ie. the Unregistered or Registered states.		ALL	
CONFigure:BSTation:RPERiod <S12 | S14 | S17 | S20 | S24 | S29 | S34 | S41 | S49 | S58 | S69 | S82 | S97 | S116 | OFF>		ALL	2
CONFigure:BSTation:RPERiod?		ALL	3
CONFigure:BSTation:PRSet <RS1 | RS1_8K | RS2 | RS2_13K>		IDLE, MINI, MIDL	
CONFigure:BSTation:PRSet?		ALL	
CONFigure:BSTation:PVOCoder <BASic | ENHanced>		ALL	
CONFigure:BSTation:PVOCoder?		ALL	
FETCh[:SCALar]:MSINfo[:ALL]?	See note	ALL	4

2 This command controls the periodic registration time period. The reset value is S12.

3 Returns S12, S14, S17, S20, S24, S29, S34, S41, S49, S58, S69, S82, S97, S116, or OFF.

4 The results returned are: mobile station identification number, serial number, and power class. The values of the mobile station identification number and the serial number are determined by what has been programmed into the mobile station. The value of the power class is 1 to 3 for cellular and 5 for PCS based on the most recent mobile station registration.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
Unregistered and Registered States – authentication checking			
CONFigure:BSTation:AUTHenticate[:STATe]<OFF | ON> Establishes the phone's authentication on/off status("AUTH").		IDLE	
CONFigure:BSTation:AUTHenticate[:STATe]?		ALL	
CONFigure:BSTation:AUTHenticate:RANDom"<eight character hexadecimal string>" Establishes a random challenge value to the phone ("RAND").		ALL	5, 6, 7
CONFigure:BSTation:AUTHenticate:RANDom?		ALL	8
FETCh[:SCALar]:AUTHenticate[:ALL}? Returns the phone's: ▪ authentication on/off status (integer: 0/1) ("AUTH_MODE") ▪ authentication response data (five character hexadecimal digit string) ("AUTHR") ▪ echo of the random challenge value (two character hexadecimal digit string) ("RANDC") ▪ parameter update message count (integer) ("COUNT")		ALL	9
Call Established State – General Measurements			
CONFigure:CALL:BAUD<EIGHth | QUARter | HALF | <u>FULL</u>> Establishes the data transmission rate while in an MS Test (data loopback) call. The call will always be established in the default data rate (FULL). Once the call is established, the data rate may be altered.		CE2	10
CONFigure:CALL:BAUD?		ALL	

5 The entry must be exactly eight hexadecimal characters enclosed in quotes. If not, it will not be accepted and error "–221 Settings Conflict" will be set. The hexadecimal number must be expressed as a simple *unformatted* number (i.e. F1E2D3C4 *rather than* 0xF1E2D3C4).

6 The command should be exercised in "IDLE" state (prior to moving to "MINI") to ensure a proper setup for the "FETCh:AUTHenticate" command.

7 The RAND value is used by the phone in the generation of its AUTHR. If the CMD 80 suppoorted authentication keying, the AUTHR value would then be used in the A–key algorithm to validate the phone. The CMD 80 does *not* currently support A–key phone validation.

8 If the entry has not been accepted (as specified in note 5), the most recent valid entry (having remained unchanged) will be returned. The default, "00000000", will be returned if no valid entries have been accepted.

9 The values are updated at the same time that registration items are updated (i.e. registration, origination, page response, etc.). Although the command can be exercised in any state, it should be exercised after attaining the "MIDL" state to yield the most current status and data for a given phone. Prior to registration, the set of returned values will be 0,"–","–",0.

10 This variation of the data rate is only available temporarily in an established call. The invocation of any test will establish the environment for that test, overriding the current settings, including data rate. Upon return from a test, the data rate for the established call will return to the default of "FULL".

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:CALL:PCBits:MODe<HOLD | AUTO> Establishes the mode of power control bit transmission while in an MS Test (data loopback) call. The call will always be established in the default power control bit transmission mode (“AUTO”). Once the call is established, the mode may be altered.		CE2	11
CONFigure:CALL:PCBits:MODe?		ALL	
CONFigure:TQUality:AVERage:COUNt <averaging interval>	1 to 3 to 10	ALL	12
CONFigure:TQUality:AVERage:COUNt?		ALL	
CONFigure:CALL:[:SETTings]:DEFault Resets the “Call” parameters (“Data Rate”, “Power Control Bits”, and “Tx Quality Averaging Count”) to default values.		ALL	
CONFigure:BSTation:ARSet?	RS1, RS2	ALL	13
CONFigure:BSTation:AVOCoder?	BAS, ENH	ALL	14
CONFigure:BSTation:FREQuency:CHANnel <RF channel number>		IDLE, CE1, CE2	15
CONFigure:BSTation:FREQuency:CHANnel?		ALL	
CONFigure:BSTation:TCHannel <traffic channel>	2 to 8 to 31, 33 to 63	ALL	
CONFigure:BSTation:TCHannel?		ALL	
CONFigure:BSTation:FOFFset <frame offset>	0 to 15	ALL	
CONFigure:BSTation:FOFFset?		ALL	
CONFigure:BSTation:PNOFfset <PN offset>	0 to 511	IDLE, CE1, CE2 (Excluding CMP)	
CONFigure:BSTation:PNOFfset?		ALL	
READ[:SCALar]:POWer:MSTation[:ALL]?	See note	CE2	16

11 **This variation of the power control bits mode is only available temporarily in an established call. The invocation of any test will establish the environment for that test, overriding the current settings, including power control bits mode. Upon return from a test, the power control bits mode for the established call will return to the default of “AUTO”.**

12 **Use this command to set or query the Transmitter Quality Averaging Count used in the computation of the Carrier Frequency Error, Transmit Time Error, and Waveform Quality values displayed in the Call Established – MS Loopback menu. This value is reset by *RST and SYSTem:PRESet.**

13 **Returns the actual data “rate set” used during a call.**

14 **Returns the actual vocoder used during a call.**

15 **US Cellular range is 1 to 283 to 799 and 990 to 1023. PCS range is 0 to 25 to 1199. Korean PCS range is 0 to 25 to 1300. Korean 2 PCS range is 0 to 25 to 699. Chinese Cellular range is 0 to 283 to 1000 and 1329 to 2047. Japan Cellular range is 0 to 25 to 1199.**

16 **The returned results are the measured power from the mobile station and the expected power from the mobile station based on the current power of the base station.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:POWer:RPILot?	See note	CE2	17, 18
READ[:SCALar]:WQUality[:ALL]?	See note	CE2	19
FETCh[:SCALar]:WQUality:LIMit:FAIL[:ALL]?		ALL	20
FETCh[:SCALar]:DNUMber?		ALL	
CDMA manual test (signaling) – power control (gated output power)			
CONFigure:GOUTput:ASTop <OFF | ON>		ALL	
CONFigure:GOUTput:ASTop?		ALL	
CONFigure:GOUTput:AVERage:COUNt <number of power control groups averaged>	2 to 100 to 1000	ALL	
CONFigure:GOUTput:AVERage:COUNt?		ALL	
CONFigure:GOUTput:LIMit:FTIMe[:UPPer] <maximum fall time [US | MS | S | SEC]>	0.0 µs to 6.0 µs to 8.0 µs	ALL	
CONFigure:GOUTput:LIMit:FTIMe[:UPPer]?		ALL	
CONFigure:GOUTput:LIMit:LOWer:COUNt?	4	ALL	
CONFigure:GOUTput:LIMit:LOWer:GRAPh:X?	0 to 131	ALL	21
CONFigure:GOUTput:LIMit:LOWer:GRAPh:Y?	–30 dB to +5 dB	ALL	22
CONFigure:GOUTput:LIMit:POWer:OFF:ABSolute[:UPPer] <maximum mobile station off power [DBM]>	–70.0 dBm to –54.0 dBm to 0.0 dBm	ALL	
CONFigure:GOUTput:LIMit:POWer:OFF:ABSolute[:UPPer]?		ALL	
CONFigure:GOUTput:LIMit:POWer:OFF:RELative[:UPPer] <maximum mobile station off power with respect to mean power [DB]>	–25.0 dB to –20.0 dB to 0.0 dB	ALL	
CONFigure:GOUTput:LIMit:POWer:OFF:RELative[:UPPer]?		ALL	
CONFigure:GOUTput:LIMit:POWer:ON:RELative[:LOWer] <minmum mobile station on power with respect to mean power [DB]>	–25.0 dB to –3.0 dB to 0.0 dB	ALL	
CONFigure:GOUTput:LIMit:POWer:ON:RELative[:LOWer]?		ALL	
CONFigure:GOUTput:LIMit:RTIMe[:UPPer] <maximum rise time [US | MS | S | SEC]>	0.0 µs to 6.0 µs to 8.0 µs	ALL	
CONFigure:GOUTput:LIMit:RTIMe[:UPPer]?		ALL	
CONFigure:GOUTput:LIMit:UPPer:COUNt?	6	ALL	

[17] **Returns the pilot power of the base station as reported by the mobile station.**

[18] **Some mobile stations do not properly report the pilot power. When this happens, this query will never return a response.**

[19] **The results returned are: carrier frequency error, transmit time error, and waveform quality.**

[20] **The values returned are the pass/fail values for the carrier frequency error, transmit time error, and waveform quality measurements.**

[21] **Each unit on the X-axis represents 10 µs.**

[22] **The values are with reference to the mean power of the gated burst.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:GOUTput:LIMit:UPPer:GRAPh:X?	0 to 131	ALL	21
CONFigure:GOUTput:LIMit:UPPer:GRAPh:Y?	–30 dB to +5 dB	ALL	22, 23
CONFigure:GOUTput[:SETTings]:DEFault		ALL	
CONFigure:GOUTput:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:GOUTput:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:GOUTput:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –7.4 dB to –7.0 dB	ALL	
CONFigure:GOUTput:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:GOUTput:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	24, 25, 26
CONFigure:GOUTput:SOURce[:CDMA]:POWer?		ALL	26
READ[:SCALar]:GOUTput?	See note	CE2	27
FETCh:ARRay:GOUTput:GRAPh:X?	0 to 131	CE2	28
FETCh:ARRay:GOUTput:GRAPh:Y?	–30 dB to +5 dB	CE2	29, 30
FETCh:ARRay:GOUTput:LIMit:FAIL?		ALL	31
FETCh[:SCALar]:GOUTput:GRAPh:COUNt?	1664	ALL	

[23] **Returned values may be outside of this range. A value outside of the range indicates that there effectively is no limit.**

[24] **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –75.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –75.0 dBm to +1.0 dBm.**

[25] **If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS: …”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –75.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

[26] **If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the “SOUrce:CORRection:LOSS:…” command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

[27] **The result returned is the mean power (in dBm) of the mobile station during the burst.**

[28] **Each unit on the X-axis represents 10 μs.**

[29] **If the test has not been run, the response will consist of all 0s.**

[30] **The values are with reference to the mean power of the gated burst.**

[31] **The results returned are the pass/fail values for the 5 graphic regions of the gated output measurement.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CDMA manual test (signaling) – power control (open loop time response)			
CONFigure:OLTResponse:LIMit:LOWer:COUNt?	101	ALL	
CONFigure:OLTResponse:LIMit:LOWer:GRAPh:X?	0.0 to 10.0	ALL	32
CONFigure:OLTResponse:LIMit:LOWer:GRAPh:Y?	–5.0 dB to +30.0 dB	ALL	33
CONFigure:OLTResponse:LIMit:UPPer:COUNt?	4	ALL	
CONFigure:OLTResponse:LIMit:UPPer:GRAPh:X?	0.0 to 10.0	ALL	32
CONFigure:OLTResponse:LIMit:UPPer:GRAPh:Y?	–5.0 dB to +30.0 dB	ALL	34
CONFigure:OLTResponse:MODE <DECRease | INCRease>		ALL	
CONFigure:OLTResponse:MODE?		ALL	
CONFigure:OLTResponse[:SETTings]:DEFault		ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –7.4 dB to –7.0 dB	ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	35, 36, 37
CONFigure:OLTResponse:SOURce[:CDMA]:POWer?		ALL	37

32 Each unit on the X-axis represents 10 ms.

33 The values are with reference to the initial mobile station power.

34 The values are with reference to the initial mobile station power.

35 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –60.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –60.0 dBm to +1.0 dBm.

36 If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –60.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

37 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:OLTResponse:SOURce[:CDMA]:POWer:STEP <base station power step [DB]>	10.0 dB to 20.0 dB to 30.0 dB	ALL	
CONFigure:OLTResponse:SOURce[:CDMA]:POWer:STEP?		ALL	
READ[:SCALar]:OLTResponse?		ALL	38
FETCh:ARRay:OLTResponse:GRAPh:X?	0.0 to 10.0	CE2	39
FETCh:ARRay:OLTResponse:GRAPh:Y?	–5.0 dB to +30.0 dB	CE2	40, 41
FETCh:ARRay:OLTResponse:LIMit:FAIL?		ALL	42
FETCh[:SCALar]:OLTResponse:GRAPh:COUNt?	320	ALL	
CDMA manual test (signaling) – power control (maximum output power)			
CONFigure:MAXoutput:ASTop <ALL | FIRSt | OFF>		ALL	
CONFigure:MAXoutput:ASTop?		ALL	
CONFigure:MAXoutput:AVERage.COUNt <number of power control groups>	1 to 1 to 100	ALL	
CONFigure:MAXoutput:AVERage.COUNt?		ALL	
CONFigure:MAXoutput:LIMit:POWer:CONE:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +31.0 dBm to +40.0 dBm	ALL	43, 44
CONFigure:MAXoutput:LIMit:POWer:CONE:LOWer?		ALL	44
CONFigure:MAXoutput:LIMit:POWer:CONE:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +38.0 dBm to +40.0 dBm	ALL	43, 44
CONFigure:MAXoutput:LIMit:POWer:CONE:UPPer?		ALL	44
CONFigure:MAXoutput:LIMit:POWer:CTHRee:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +23.0 dBm to +40.0 dBm	ALL	43, 44
CONFigure:MAXoutput:LIMit:POWer:CTHRee:LOWer?		ALL	44

38 **The value returned is the initial mobile station power. Defective mobiles can produce power spikes which result in digitizer overflow in the CMD80. This READ command returns “INF” for this overflow condition instead of “NAN”. “NAN” indicates no measurement has been made. If “INF” is returned the GPIB results data buffer is not updated; it retains the values from the last successful measurement and should be ignored.**

39 **Each unit on the X-axis represents 10 ms.**

40 **The values are with reference to the initial mobile station power.**

41 **If the test has not been run, the response will consist of all 0s.**

42 **The values returned are the pass/fail values for the 10 graphic regions of the open loop time response measurement.**

43 **The upper power limit must be greater than or equal to the lower power limit. If a power limit is entered which would violate this restriction, the other limit will be changed as needed.**

44 **Used for US Cellular and Up Banded PCS operation only.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MAXoutput:LIMit:POWer:CTHRee:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +30.0 dBm to +40.0 dBm	ALL	43, 44
CONFigure:MAXoutput:LIMit:POWer:CTHRee:UPPer?		ALL	44
CONFigure:MAXoutput:LIMit:POWer:CTWO:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +27.0 dBm to +40.0 dBm	ALL	45, 44
CONFigure:MAXoutput:LIMit:POWer:CTWO:LOWer?		ALL	45
CONFigure:MAXoutput:LIMit:POWer:CTWO:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +34.0 dBm to +40.0 dBm	ALL	45, 44
CONFigure:MAXoutput:LIMit:POWer:CTWO:UPPer?		ALL	44
CONFigure:MAXoutput:LIMit:POWer:PFIVe:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to + 8.0 dBm to +40.0 dBm	ALL	46, 47
CONFigure:MAXoutput:LIMit:POWer:PFIVe:LOWer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PFIVe:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +21.0 dBm to +40.0 dBm	ALL	46, 48
CONFigure:MAXoutput:LIMit:POWer:PFIVe:UPPer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PFOur:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +13.0 dBm to +40.0 dBm	ALL	46, 49
CONFigure:MAXoutput:LIMit:POWer:PFOur:LOWer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PFOur:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +24.0 dBm to +40.0 dBm	ALL	46, 50
CONFigure:MAXoutput:LIMit:POWer:PFOur:UPPer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PONE:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +28.0 dBm to +40.0 dBm	ALL	46, 51
CONFigure:MAXoutput:LIMit:POWer:PONE:LOWer?		ALL	46

[45] **The upper power limit must be greater than or equal to the lower power limit. If a power limit is entered which would violate this restriction, the other limit will be changed as needed.**

[46] **Used for PCS (J-STD-008) operation only.**

[47] **Use this command to set or query the lower result limit for PCS Class Five (V) mobile stations.**

[48] **Use this command to set or query the upper result limit for PCS Class Five (V) mobile stations.**

[49] **Use this command to set or query the lower result limit for PCS Class Four (IV) mobile stations.**

[50] **Use this command to set or query the upper result limit for PCS Class Four (IV) mobile stations.**

[51] **Use this command to set or query the lower result limit for PCS Class One (I) mobile stations.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MAXoutput:LIMit:POWer:PONE:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +33.0 dBm to +40.0 dBm	ALL	52, 46
CONFigure:MAXoutput:LIMit:POWer:PONE:UPPer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PTHRee:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +18.0 dBm to +40.0 dBm	ALL	46, 53
CONFigure:MAXoutput:LIMit:POWer:PTHRee:LOWer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PTHRee:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +27.0 dBm to +40.0 dBm	ALL	46, 54
CONFigure:MAXoutput:LIMit:POWer:PTHRee:UPPer?		ALL	46
CONFigure:MAXoutput:LIMit:POWer:PTWO:LOWer <minimum mobile station output power [DBM]>	–70.0 dBm to +23.0 dBm to +40.0 dBm	ALL	55, 56
CONFigure:MAXoutput:LIMit:POWer:PTWO:LOWer?		ALL	55
CONFigure:MAXoutput:LIMit:POWer:PTWO:UPPer <maximum mobile station output power [DBM]>	–70.0 dBm to +30.0 dBm to +40.0 dBm	ALL	55, 57
CONFigure:MAXoutput:LIMit:POWer:PTWO:UPPer?		ALL	55
CONFigure:MAXoutput:LIMit:WQUality[:LOWer] <minimum waveform quality>	0.000 to 0.944 to 1.000	ALL	
CONFigure:MAXoutput:LIMit:WQUality[:LOWer]?		ALL	
CONFigure:MAXoutput[:SETTings]:DEFault		ALL	58
CONFigure:MAXoutput:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:MAXoutput:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:MAXoutput:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –7.4 dB to –7.0 dB	ALL	
CONFigure:MAXoutput:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	

52 Use this command to set or query the upper result limit for PCS Class One (I) mobile stations.

53 Use this command to set or query the lower result limit for PCS Class Three (III) mobile stations.

54 Use this command to set or query the upper result limit for PCS Class Three (III) mobile stations.

55 Used for PCS (J-STD-008) operation only.

56 Use this command to set or query the lower result limit for PCS Class Two (II) mobile stations.

57 Use this command to set or query the upper result limit for PCS Class Two (II) mobile stations.

58 Default values used are dependent on current network configuration.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MAXoutput:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	59, 60, 61
CONFigure:MAXoutput:SOURce[:CDMA]:POWer?		ALL	61
READ[:SCALar]:MAXoutput[:ALL]?	See note	CE2	62
FETCh[:SCALar]:MAXoutput:LIMit:FAIL[:ALL]?		ALL	63
CDMA manual test (signaling) – power control (minimum output power)			
CONFigure:MINoutput:ASTop <ALL | FIRSt | OFF>		ALL	
CONFigure:MINoutput:ASTop?		ALL	
CONFigure:MINoutput:AVERage.COUNt <number of power control groups>	1 to 100	ALL	
CONFigure:MINoutput:AVERage.COUNt?		ALL	
CONFigure:MINoutput:LIMit:POWer[:UPPer] <maximum mobile station output power [DBM]>	–70.0 dBm to –50.0 dBm to +40.0 dBm	ALL	
CONFigure:MINoutput:LIMit:POWer[:UPPer]?		ALL	
CONFigure:MINoutput:LIMit:WQUality[:LOWer] <minimum waveform quality>	0.000 to 0.944 to 1.000	ALL	
CONFigure:MINoutput:LIMit:WQUality[:LOWer]?		ALL	
CONFigure:MINoutput[:SETTings]:DEFault		ALL	
CONFigure:MINoutput:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:MINoutput:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:MINoutput:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –7.4 dB to –7.0 dB	ALL	

59 **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –105.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –105.0 dBm to +1.0 dBm.**

60 **If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –105.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

61 **If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

62 **Results are returned in the following order: mobile station measured power, and waveform quality at measured power.**

63 **The results returned are the pass/fail values for the maximum output power and waveform quality measurements.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MINoutput:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:MINoutput:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	64, 65, 66
CONFigure:MINoutput:SOURce[:CDMA]:POWer?		ALL	66
READ[:SCALar]:MINoutput[:ALL]?	See note	CE2	67
FETCh[:SCALar]:MINoutput:LIMit:FAIL[:ALL]?		ALL	68
CDMA manual test (signaling) – receiver quality (sensitivity)			
CONFigure:SENSitivity:ASTop <OFF | ON>		ALL	
CONFigure:SENSitivity:ASTop?		ALL	
CONFigure:SENSitivity:BAUD <EIGHth | QUARter | HALF | FULL>		ALL	
CONFigure:SENSitivity:BAUD?		ALL	
CONFigure:SENSitivity:DURation <number of frames in test>	25 to 1000 to 20,000	ALL	
CONFigure:SENSitivity:DURation?		ALL	
CONFigure:SENSitivity:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF>	–50,000 Hz to 0 Hz to 50,000 Hz	ALL	
CONFigure:SENSitivity:FREQuency:OFFSet?		ALL	
CONFigure:SENSitivity:LIMit:CONFidence[:LOWer] <confidence limit in %>	85.0 to 95.0 to 99.9	ALL	
CONFigure:SENSitivity:LIMit:CONFidence[:LOWer]?		ALL	
CONFigure:SENSitivity:LIMit:ERRor:FERate <max frame error rate in %>	0.10 to 0.50 to 5.00	ALL	
CONFigure:SENSitivity:LIMit:ERRor:FERate?		ALL	
CONFigure:SENSitivity[:SETTings]:DEFault		ALL	

64 **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –25.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –25.0 dBm to +1.0 dBm.**

65 **If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:…”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –29.0 dBm. Note that in this case, the default power with no attenuation could not be maintained with the specified attenuation, so the default changed to the closest value possible.**

66 **If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the “SOUrce:CORRection:LOSS:…” command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

67 **Results are returned in the following order: mobile station measured power, and waveform quality at measured power.**

68 **The results returned are the pass/fail values for the minimum output power and waveform quality measurements.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:SENSitivity:SOURce:AWGN:LEVel <relative level [DB] | OFF>	–20.0 dB to +6.0 dB	ALL	69, 70
CONFigure:SENSitivity:SOURce:AWGN:LEVel?		ALL	70
CONFigure:SENSitivity:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:SENSitivity:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:SENSitivity:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –15.6 dB to –7.0 dB	ALL	
CONFigure:SENSitivity:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:SENSitivity:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	71, 72, 73
CONFigure:SENSitivity:SOURce[:CDMA]:POWer?		ALL	73
READ[:SCALar]:SENSitivity[:ALL]?	See note	CE2	74
FETCh[:SCALar]:SENSitivity:LIMit:FAIL[:ALL]?		ALL	75
CDMA manual test (signaling) – receiver quality (dynamic range)			
CONFigure:DRANge:ASTop <OFF | ON>		ALL	
CONFigure:DRANge:ASTop?		ALL	
CONFigure:DRANge:BAUD <EIGHth | QUARter | HALF | FULL>		ALL	
CONFigure:DRANge:BAUD?		ALL	
CONFigure:DRANge:DURation <number of frames in test>	25 to 1000 to 20,000	ALL	

69 **If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.**

70 **This command is only applicable if the tester has Option B81, AWGN generator.**

71 **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –105.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –105.0 dBm to +1.0 dBm.**

72 **If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –105.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

73 **If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

74 **Values are returned in the following order: FER (%), transmitted frames, frame errors, and the confidence level.**

75 **The results returned are the pass/fail values for the sensitivity FER, frame errors, and confidence level measurements.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:DRANge:DURation?		ALL	
CONFigure:DRANge:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF>	–50,000 Hz to <u>0 Hz</u> to 50,000 Hz	ALL	
CONFigure:DRANge:FREQuency:OFFSet?		ALL	
CONFigure:DRANge:LIMit:CONFidence[:LOWer] <confidence limit in %>	85.0 to <u>95.0</u> to 99.9	ALL	
CONFigure:DRANge:LIMit:CONFidence[:LOWer]?		ALL	
CONFigure:DRANge:LIMit:ERRor:FERate <max frame error rate in %>	0.10 to <u>0.50</u> to 5.00	ALL	
CONFigure:DRANge:LIMit:ERRor:FERate?		ALL	
CONFigure:DRANge[:SETTings]:DEFault		ALL	
CONFigure:DRANge:SOURce:AWGN:LEVel <relative level [DB] | <u>OFF</u>>	–20.0 dB to +6.0 dB	ALL	**76, 77**
CONFigure:DRANge:SOURce:AWGN:LEVel?		ALL	**77**
CONFigure:DRANge:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to <u>–7.0 dB</u> to –5.0 dB	ALL	
CONFigure:DRANge:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:DRANge:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to <u>–15.6 dB</u> to –7.0 dB	ALL	
CONFigure:DRANge:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:DRANge:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	**78, 79, 80**
CONFigure:DRANge:SOURce[:CDMA]:POWer?		ALL	**80**

76 If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.

77 This command is only applicable if the tester has Option B81, AWGN generator.

78 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to <u>–25.0 dBm</u> to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to <u>–25.0 dBm</u> to +1.0 dBm.

79 If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to <u>–25 dBm</u> to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

80 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:DRANge[:ALL]?	See note	CE2	81
FETCh[:SCALar]:DRANge:LIMit:FAIL[:ALL]?		ALL	82
CDMA manual test (signaling) – receiver quality (traffic channel demodulation)			
CONFigure:TCDemod:ASTop <OFF | ON>		ALL	
CONFigure:TCDemod:ASTop?		ALL	
CONFigure:TCDemod:BAUD <EIGHth | QUARter | HALF | FULL>		ALL	
CONFigure:TCDemod:BAUD?		ALL	
CONFigure:TCDemod:DURation <number of frames in test>	25 to 1000 to 20,000	ALL	
CONFigure:TCDemod:DURation?		ALL	
CONFigure:TCDemod:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF>	–50,000 Hz to 0 Hz to 50,000 Hz	ALL	
CONFigure:TCDemod:FREQuency:OFFSet?		ALL	
CONFigure:TCDemod:LIMit:CONFidence[:LOWer] <confidence limit in %>	85.0 to 95.0 to 99.9	ALL	
CONFigure:TCDemod:LIMit:CONFidence[:LOWer]?		ALL	
CONFigure:TCDemod:LIMit:ERRor:FERate <max frame error rate in %>	0.10 to 0.50 to 5.00	ALL	
CONFigure:TCDemod:LIMit:ERRor:FERate?		ALL	
CONFigure:TCDemod[:SETTings]:DEFault		ALL	
CONFigure:TCDemod:SOURce:AWGN:LEVel <relative level [DB] | OFF>	–20.0 dB to +1.0 dB to +6.0 dB	ALL	83, 84
CONFigure:TCDemod:SOURce:AWGN:LEVel?		ALL	84
CONFigure:TCDemod:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:TCDemod:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:TCDemod:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –15.6 dB to –7.0 dB	ALL	
CONFigure:TCDemod:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	

81 **Values are returned in the following order: FER (%), transmitted frames, frame errors, and the confidence level.**

82 **The returned results are the pass/fail values for the dynamic range FER, frame errors, and confidence level measurements.**

83 **If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.**

84 **This command is only applicable if the tester has Option B81, AWGN generator.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:TCDemod:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	85, 86, 87
CONFigure:TCDemod:SOURce[:CDMA]:POWer?		ALL	87
READ[:SCALar]:TCDemod[:ALL]?	See note	CE2	88
FETCh[:SCALar]:TCDemod:LIMit:FAIL[:ALL]?		ALL	89
CDMA manual test (signaling) – receiver quality (user defined)			
CONFigure:U1Defined:ASTop <OFF | ON>		ALL	
CONFigure:U1Defined:ASTop?		ALL	
CONFigure:U1Defined:BAUD <EIGHth | QUARter | HALF | FULL>		ALL	
CONFigure:U1Defined:BAUD?		ALL	
CONFigure:U1Defined:DURation <number of frames in test>	25 to 1000 to 20,000	ALL	
CONFigure:U1Defined:DURation?		ALL	
CONFigure:U1Defined:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF>	–50,000 Hz to 0 Hz to 50,000 Hz	ALL	
CONFigure:U1Defined:FREQuency:OFFSet?		ALL	
CONFigure:U1Defined:LIMit:CONFidence[:LOWer] <confidence limit in %>	85.0 to 95.0 to 99.9	ALL	
CONFigure:U1Defined:LIMit:CONFidence[:LOWer]?		ALL	
CONFigure:U1Defined:LIMit:ERRor:FERate <max frame error rate in %>	0.10 to 0.50 to 5.00	ALL	
CONFigure:U1Defined:LIMit:ERRor:FERate?		ALL	
CONFigure:U1Defined[:SETTings]:DEFault		ALL	

[85] **The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –75.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –75.0 dBm to +1.0 dBm.**

[86] **If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:…”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –75.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.**

[87] **If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the “SOUrce:CORRection:LOSS:…” command tree. If the output power is set outside of the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.**

[88] **Values are returned in the following order: FER (%), transmitted frames, frame errors, and the confidence level.**

[89] **The returned results are the pass/fail values for the traffic channel demodulation FER, frame errors, and confidence level measurements.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:U1Defined:SOURce:AWGN:LEVel <relative level [DB] | OFF>	–20.0 dB to +6.0 dB	ALL	90, 91
CONFigure:U1Defined:SOURce:AWGN:LEVel?		ALL	91
CONFigure:U1Defined:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:U1Defined:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:U1Defined:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –14.0 dB to –7.0 dB	ALL	
CONFigure:U1Defined:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:U1Defined:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	92, 93, 94
CONFigure:U1Defined:SOURce[:CDMA]:POWer?		ALL	94
READ[:SCALar]:U1Defined[:ALL]?	See note	CE2	95
FETCh[:SCALar]:U1Defined:LIMit:FAIL[:ALL]?		ALL	96
CONFigure:U2Defined:ASTop <OFF | ON>		ALL	
CONFigure:U2Defined:ASTop?		ALL	
CONFigure:U2Defined:BAUD <EIGHth | QUARter | HALF | FULL>		ALL	
CONFigure:U2Defined:BAUD?		ALL	
CONFigure:U2Defined:DURation <number of frames in test>	25 to 1000 to 20,000	ALL	

90 If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.

91 This command is only applicable if the tester has Option B81, AWGN generator.

92 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –70.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –70.0 dBm to +1.0 dBm.

93 If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –70.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

94 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

95 The results returned are: FER (%), transmitted frames, frame errors, and the confidence level.

96 The returned results are the pass/fail values for the first user defined FER, frame errors, and confidence level measurements.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:U2Defined:DURation?		ALL	
CONFigure:U2Defined:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF>	–50,000 Hz to 0 Hz to 50,000 Hz	ALL	
CONFigure:U2Defined:FREQuency:OFFSet?		ALL	
CONFigure:U2Defined:LIMit:CONFidence[:LOWer] <confidence limit in %>	85.0 to 95.0 to 99.9	ALL	
CONFigure:U2Defined:LIMit:CONFidence[:LOWer]?		ALL	
CONFigure:U2Defined:LIMit:ERRor:FERate <max frame error rate in %>	0.10 to 0.50 to 5.00	ALL	
CONFigure:U2Defined:LIMit:ERRor:FERate?		ALL	
CONFigure:U2Defined[:SETTings]:DEFault		ALL	
CONFigure:U2Defined:SOURce:AWGN:LEVel <relative level [DB] | OFF>	–20.0 dB to +6.0 dB	ALL	97, 98
CONFigure:U2Defined:SOURce:AWGN:LEVel?		ALL	98
CONFigure:U2Defined:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>	–10.0 dB to –7.0 dB to –5.0 dB	ALL	
CONFigure:U2Defined:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:U2Defined:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to –14.0 dB to –7.0 dB	ALL	
CONFigure:U2Defined:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:U2Defined:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	99, 100, 101
CONFigure:U2Defined:SOURce[:CDMA]:POWer?		ALL	101

97 If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.

98 This command is only applicable if the tester has Option B81, AWGN generator.

99 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to –70.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –70.0 dBm to +1.0 dBm.

100 If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to –70.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

101 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range that can be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOURce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

Table F–8: CDMA manual test (signaling) commands (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>READ[:SCALar]:U2Defined[:ALL]?</td><td>See note</td><td>CE2</td><td>102</td></tr>
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<tr><td colspan="4">CDMA manual test (signaling) – receiver quality (current signal level)</td></tr>
<tr><td>CONFigure:CLEVels:ASTop <OFF | ON></td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:ASTop?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:BAUD <EIGHth | QUARter | HALF | FULL></td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:BAUD?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:DURation <number of frames in test></td><td>25 to 1000 to 20,000</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:DURation?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF></td><td>–50,000 Hz to 0 Hz to 50,000 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:FREQuency:OFFSet?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:LIMit:CONFidence[:LOWer] <confidence limit in %></td><td>85.0 to 95.0 to 99.9</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:LIMit:CONFidence[:LOWer]?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:LIMit:ERRor:FERate <max frame error rate in %></td><td>0.10 to 0.50 to 5.00</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:LIMit:ERRor:FERate?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels[:SETTings]:DEFault</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:CLEVels:SOURce:AWGN:LEVel <relative level [DB] | OFF></td><td>–20.0 dB to +6.0 dB</td><td>ALL</td><td>104, 105</td></tr>
<tr><td>CONFigure:CLEVels:SOURce:AWGN:LEVel?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>READ[:SCALar]:CLEVels[:ALL]?</td><td>See note</td><td>CE2</td><td>106</td></tr>
<tr><td>FETCh[:SCALar]:CLEVels:LIMit:FAIL[:ALL]?</td><td></td><td>ALL</td><td>107</td></tr>
<tr><td colspan="4">CDMA manual test (signaling) – transmitter quality</td></tr>
<tr><td>CONFigure:TQUality:ASTop <OFF | ON></td><td></td><td>ALL</td><td></td></tr>
</table>

[102] The results returned are: FER (%)m transmitted frames, frame errors, and the confidence level.

[103] The returned results are the pass/fail values for the second user defined FER, frame errors, and confidence level measurements.

[104] If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.

[105] This command is only applicable if the tester has Option B81, AWGN generator.

[106] Values are returned in the following order: FER (%), transmitted frames, frame errors, and confidence level.

[107] The results returned are the pass/fail values for the current signal level FER, frame errors, and confidence level measurements.

Table F–8: CDMA manual test (signaling) commands (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>CONFigure:TQUality:ASTop?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:FREQuency:OFFSet <offset frequency in Hz [HZ] | OFF></td><td>–50,000 Hz to
0 Hz to
50,000 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:FREQuency:OFFSet?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:CFEedthrough[:UPPer] <maximum carrier feedthrough [DB]></td><td>–120.0 dB to
–40.0 dB to
–20.0 dB</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:CFEedthrough[:UPPer]?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:CFRequency
<maximum carrier frequency error [HZ | KHZ | MHZ]></td><td>0 Hz to
300 Hz to
1000 Hz</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:CFRequency?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:EVMagnitude:PEAK
<maximum peak error vector magnitude></td><td>0.0% to 17.7%
to 100.0%</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:EVMagnitude:PEAK?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:EVMagnitude:RMS
<maximum RMS error vector magnitude></td><td>0.0% to 12.5%
to 100.0%</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:EVMagnitude:RMS?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:MAGNitude:PEAK <maximum peak magnitude error></td><td>0.0% to 17.7%
to 100.0%</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:MAGNitude:PEAK?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:MAGNitude:RMS <maximum RMS magnitude error></td><td>0.0% to 12.5%
to 100.0%</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:MAGNitude:RMS?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:PHASe:PEAK <maximum peak phase error></td><td>0.0° to 10.2° to
45.0°</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:PHASe:PEAK?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:PHASe:RMS <maximum RMS phase error></td><td>0.0° to 7.2° to
45.0°</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:PHASe:RMS?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:TTIMe
<maximum transmit time error [US | MS | S | SEC]></td><td>0.0 μs to
1.0 μs to
10.0 μs</td><td>ALL</td><td>108</td></tr>
<tr><td>CONFigure:TQUality:LIMit:ERRor:TTIMe?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:IMBalance[:UPPer] <maximum carrier imbalance [DB]></td><td>–120.0 dB to
–30.0 dB to
–20.0 dB</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:TQUality:LIMit:IMBalance[:UPPer]?</td><td></td><td>ALL</td><td></td></tr>
</table>

108 **The absolute value of the test result is compared to the value selected.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:TQUality:LIMit:WQUality[:LOWer] <minimum waveform quality>	0.000 to <u>0.944</u> to 1.000	ALL	
CONFigure:TQUality:LIMit:WQUality[:LOWer]?		ALL	
CONFigure:TQUality[:SETTings]:DEFault		ALL	
CONFigure:TQUality:SOURce:AWGN:LEVel <relative level [DB | <u>OFF</u>]>	–20.0 dB to +6.0 dB	ALL	109, 110
CONFigure:TQUality:SOURce:AWGN:LEVel?	–20.0 dB to +6.0 dB	ALL	
CONFigure:TQUality:SOURce[:CDMA]:LEVel:PILot <relative level [DB]>		ALL	
CONFigure:TQUality:SOURce[:CDMA]:LEVel:PILot?		ALL	
CONFigure:TQUality:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB]>	–20.0 dB to <u>–7.4 dB</u> to –7.0 dB	ALL	
CONFigure:TQUality:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	
CONFigure:TQUality:SOURce[:CDMA]:POWer <power level [DBM]>	See notes	ALL	111, 112, 113
CONFigure:TQUality:SOURce[:CDMA]:POWer?		ALL	113
READ[:SCALar]:TQUality:ERRor:EVMagnitude[:ALL]?	See note	CE2	114
READ[:SCALar]:TQUality:ERRor:MAGNitude[:ALL]?	See note	CE2	114
READ[:SCALar]:TQUality:ERRor:PHASe[:ALL]?	See note	CE2	114

109 If the power of the CDMA source is within 10 dB of the maximum power available with the current instrument settings, the AWGN will be turned off. It will remain off even if the power is lowered.

110 This command is only applicable if the tester has Option B81, AWGN generator.

111 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –132.0 dBm to <u>–75.0 dBm</u> to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to <u>–75.0 dBm</u> to +1.0 dBm.

112 If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:…"), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –142.0 dBm to <u>–75.0 dBm</u> to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

113 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimum queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the "SOUrce:CORRection:LOSS:…" command tree. If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

114 The results returned are the peak value and the RMS value of the requested measurement.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
FETCh:ARRay:TQUality:ERRor:EVMagnitude:GRAPh:X?	0 to 5.12	CE2	115
FETCh:ARRay:TQUality:ERRor:EVMagnitude:GRAPh:Y?	0% to 50%	CE2	116
FETCh:ARRay:TQUality:ERRor:MAGNitude:GRAPh:X?	0 to 5.12	CE2	115
FETCh:ARRay:TQUality:ERRor:MAGNitude:GRAPh:Y?	–50% to 50%	CE2	116
FETCh:ARRay:TQUality:ERRor:PHASe:GRAPh:X?	0 to 5.12	CE2	115
FETCh:ARRay:TQUality:ERRor:PHASe:GRAPh:Y?	–30° to 30°	CE2	116
FETCh[:SCALar]:TQUality:ERRor:EVMagnitude:GRAPh:COUNt?	512	ALL	
FETCh[:SCALar]:TQUality:ERRor:MAGNitude:GRAPh:COUNt?	512	ALL	
FETCh[:SCALar]:TQUality:ERRor:PHASe:GRAPh:COUNt?	512	ALL	
FETCh[:SCALar]:TQUality:EVMagnitude:LIMit:FAIL[:ALL]?		ALL	117
FETCh[:SCALar]:TQUality:MAGNitude:LIMit:FAIL[:ALL]?		ALL	118
FETCh[:SCALar]:TQUality:PHASe:LIMit:FAIL[:ALL]?		ALL	119
FETCh[:SCALar]:TQUality:WQUality[:ALL]?	See note	ALL	120
FETCh[:SCALar]:TQUality:WQUality:LIMit:FAIL[:ALL]?	See note	ALL	121

[115] **Each unit on the X-axis represents 81.25 μs or 100 PN chips.**

[116] **If the test has not been run, the response will consist of all 0s.**

[117] **The values returned are the pass/fail values (0=pass, 1=fail) for the error vector magnitude peak and RMS measurements.**

[118] **The values returned are the pass/fail values (0=pass, 1=fail) for the magnitude error peak and RMS measurements.**

[119] **The values returned are the pass/fail values (0=pass, 1=fail) for the phase error peak and RMS measurements.**

[120] **Data is returned in the following order: carrier feedthrough (in dB), IQ imbalance (in dB), carrier frequency error (in Hz), transmit time error (in seconds), and waveform quality. The data is refreshed whenever any of the three transmitter quality tests are run.**

[121] **The values returned are the pass/fail values (0=pass, 1=fail) for the five measurements returned by the FETCh[:SCALar]:TQUality:WQUality[:ALL]? query as detailed in note 120. The pass/fail values are refreshed whenever any of the three transmitter tests are run.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CDMA manual test (signaling) – multiple pilots configuration – Pilot Levels			
CONFigure:MPILots:POWer <power level [dBm] | MIN | MAX> Establishes the CDMA Total Power level for the Multiple Pilots test.	–133.0 dBm to <u>–70.0 dBm</u> to –19.0 dBm	ALL	122, 123, 124
CONFigure:MPILots:POWer?		All	
CONFigure:MPILots:P1Level <relative level [DB] | MIN | MAX | OFF> Sets the relative code power for pilot 1.	–20.0 dB to <u>–7.0 dB</u> to –5.0 dB	All	
CONFigure:MPILots:P1Level? returns <Pilot 1 Power, Gain error>.		All	125
CONFigure:MPILots:P2Level <relative level [DB] | MIN | MAX| OFF> Sets the relative code power level for pilot 2.	–20.0 dB to <u>–11.0 dB</u> to –5.0 dB	All	
CONFigure:MPILots:P2Level? returns <Pilot 2 Power, Gain error>.		All	125
CONFigure:MPILots:P3Level <relative level [DB] | MIN | MAX| OFF> Sets the relative code power level for pilot 3.	–20.0 dB to <u>–15.0 dB</u> to –5.0 dB	All	
CONFigure:MPILots:P3Level? returns <Pilot 3 Power, Gain error>.		All	125
CONFigure:MPILots:P4Level <relative level [DB] | MIN | MAX| OFF> Sets the relative code power level for pilot 4.	–30.0 dB to <u>–18.0 dB</u> to –7.0 dB	All	126

[122] The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –133.0 dBm to –70.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –70.0 dBm to +1.0 dBm.

[123] If external gain or attenuation is used (through the command tree ”SOURce:CORRection: LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –143.0 dBm to –70.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

[124] If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimim queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the ”SOURce:CORRection:LOSS...” command tree (–183.0 dBm to –70.0 dBm to 41.0 dBm). If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

[125] The “Gain error” is the same as that returned by the query ”CONFIGure”MPILots:GAINerror?”. See its description and footnote for further information.

[126] If the associated gain setting “CONFIGure:MPILots:p4gain” (or “p5gain”) has been set to HIGH, the limits are –20 dB to –18 dB to –5.0 dB.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MPILots:P4Level? returns <Pilot 4 Power, Gain error>.		All	125
CONFigure:MPILots:P5Level <relative level [DB] | MIN | MAX| OFF> Sets the relative code power level for pilot 5.	–30.0 dB to <u>–18.0 dB</u> to –7.0 dB	All	126
CONFigure:MPILots:P5Level? returns <Pilot 5 Power, Gain error>.		All	125
CONFigure:MPILots:GAINerror? Returns ’OK’, ’OVER”, or ’UNDER’ dependend on the sum of the code power of the CDMA channels (sync, paging, traffic, and pilots 1 through 5). Query only.		All	127
CONFigure:MPILots:OCNS? Returns the relative value of the OCNS in dB. “NAN” is returned if the gain error returned by “CONFigure:MPILots:GAINerror?” is *not* ’OK’ (i.e. “OVER” or “UNDER”). Query only.		All	
CONFIGure:MPILots:P4Gain <LOW, HIGH> Sets the power setting range of pilot 4.		All	
CONFIGure:MPILots:P4Gain?		All	
CONFIGure:MPILots:P5Gain <LOW, HIGH> Sets the power setting range of pilot 5.		All	
CONFIGure:MPILots:P5Gain?		All	
CONFIGure:MPILots:TADD <relative level [DB] | MIN | MAX> Establishes the T_ADD value for the transition of pilots from the Neighbor Set to the Candidate Set.	(T_DROP + 0.5) dB to <u>–14.0 dB</u> to –0.5 dB	All	128
CONFIGure:MPILots:TADD?		All	
CONFIGure:MPILots:TDRop <relative level [DB] | MIN | MAX> Establishes the T_DROP value for the transition of pilots from the Candidate Set to the Neighbor Set, or the issuance of a Pilot Strength Measurement Message for pilots in the active set.	–31.5 dB to <u>–16.0 dB</u> to (T_ADD – 0.5) dB	All	128
CONFIGure:MPILots:TDRop?		All	

[127] **If the CDMA power allocation is being ‘over’ driven, one or more of the pilot levels should be reduced. If it is being ‘under’ driven, one or more of the pilot levels should be increased, or the gain type of pilot 4 and/or 5 should be switched from high to low.**

[128] **T_ADD must be a greater value than T_DROP.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:MPILots:LEVels[:SETTings]:DEFault Sets all power levels, T_ADD, T_DROP, and the Pilot 4 and 5 Gain Types to the default values.		All	
CDMA manual test (signaling) – multiple pilots configuration – PN Offsets			
CONFigure:MPILots:P2Pnoffset <PN Offset> Sets the pilot 2 PN offset.	0 to <u>10</u> to 511	All	129
CONFigure:MPILots:P2Pnoffset?			
CONFigure:MPILots:P3Pnoffset <PN Offset> Sets the pilot 3 PN offset.	0 to <u>20</u> to 511	All	129
CONFigure:MPILots:P3Pnoffset?			
CONFigure:MPILots:P4Pnoffset <PN Offset> Sets the pilot 4 PN offset.	0 to <u>30</u> to 511	All	129
CONFigure:MPILots:P4Pnoffset?			
CONFigure:MPILots:P5Pnoffset <PN Offset> Sets the pilot 5 PN offset.	0 to <u>40</u> to 511	All	129
CONFigure:MPILots:P5Pnoffset?			
CONFigure:MPILots:PNOFfsets[:SETTings]:DEFault Sets the PN offsets of pilots 2 – 5 to the default values.		All	
CDMA manual test (signaling) – Multiple Pilots – Execution			
PROCedure:CTMStation:MPILots Puts an ”MS Tests” Call (state ”CE2”) into the multiple pilot state (”CMP”). This is required in order to perform the multiple pilots measurement.		CE2	130
READ[:SCALar]:MPILots[:ALL]? Returns <Gain Error, {Reported Pilot 1 Power, Pilot 1 keep bit, Pilot 1 chip offset}, ... {Reported Pilot 5 Power, Pilot 5 keep bit, Pilot 5 chip offset}>		CMP	

[129] **The PN Offset of any pilot can *not* be set to a PN Offset that is already used by another pilot.**

[130] **Use PROCedure:CTMStation:CALL TEST to return to the “CE2” state.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CDMA manual test (signaling) – Softer Handoff configuration			
CONFigure:SHANdoff:POWer <total power [dBm] | MINimum | MAXimim> Establishes the CDMA Total Power level for the Softer Handoff test.	–133.0 dBm to <u>–70.0 dBm</u> to –19.0 dBm	All	131, 132, 133
CONFigure:SHANdoff:POWer			
CONFigure:SHANdoff:PSPNoffset? Query only.			134
CONFigure:SHANdoff:PSTChan? Query only			134
CONFigure:SHANdoff:SSPNoffset <PN offset> Secondary sector PN Offset	<u>0</u> to 511	See note.	135
CONFigure:SHANdoff:SSPNoffset ?		All	
CONFigure:SHANdoff:SSTChan <traffic channel> Secondary sector traffic channel	2 to <u>16</u> to 31, 33 to 63	See note.	136
CONFigure:SHANdoff:SSTChan?		All	
CONFigure:SHANdoff:FDURation <FER duration in frames> Establishes the number of frames transmitted during the Softer Handoff FER measurement (“READ:SHAN:FER?”)	25 to <u>400</u> to 8000	All	137

131 The power available from the tester depends on the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –133.0 dBm to –70.0 dBm to –19.0 dBm. When using the RF OUT 2 connector under the same conditions, the power range is –113.0 dBm to –70.0 dBm to +1.0 dBm.

132 If external gain or attenuation is used (through the command tree ”SOURce:CORRection: LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However the limits will change. For example, if there is 10 dB of external loss (attenuation), the output range for the RF IN/RF OUT connector will be –143.0 dBm to –70.0 dBm to –29.0 dBm. Note that the default power remains the same provided that the tester can output the required power, given the external attenuation or gain.

133 If the tester is in the IDLE state, the power range accepted as defined by the MAXimum and MINimum arguments, or as returned in response to the MAXimum or MINimim queries, is the widest range which can ever be obtained using either RF output and the full range of attenuation and gain values accepted by the ”SOURce:CORRection:LOSS...” command tree (–183.0 dBm to –70.0 dBm to 41.0 dBm). If the output power is set outside the limits that the tester can produce, when the instrument leaves the IDLE state the power will be set to the closest end of the range for the output connector and external attenuation (or gain) in use.

134 Value must be changed using the BS configuration command.

135 The secondary PN Offset can only be set if there is no power in the secondary sector. It cannot have the same value as the primary sector PN Offset. If the primary sector PN Offset is changed to the value of the secondary sector, the secondary sector will be adjusted to the next higher value to avoid conflict. If the next higher value is out of range, the next lower value will be used instead.

136 The secondary traffic channel can only be set if there is no power in the secondary sector.

137 This is the same as “FER Interval” in the Softer Handoff Configuration menu. Changes via the remote interface will appear in the menu, and vice–versa.

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:SHANdoff:FDURation?		All	
CONFigure:SHANdoff:LIMit:ERRor:FERate <frame error rate in %> Establishes the Frame Error Rate limit for the Softer Handoff FER measurement (“READ:SHAN:FER?”)	0.1 to 0.5 to 5.0	All	138
CONFigure:SHANdoff:LIMit:ERRor:FERate?		All	
CONFigure:SHANdoff:TADD <relative level [dB] | MINimim | MAXimum> Establishes the T_ADD value for the transition of pilots from the Neighbor Set to the Candidate Set.	(T_DROP + 0.5) dB to –14.0 dB to –0.5 dB	All	139
CONFigure:SHANdoff:TADD ?			
CONFigure:SHANdoff:TDRop <relative level [dB] | MINimim | MAXimum> Establishes the T_DROP value for the transition of pilots from the Candidate Set to the Neighbor Set, or the issuance of a *Pilot Strength Measurement Message* for pilots in the Active Set.	–31.5 dB to –16.0 dB to (TADD – 0.5) dB	All	139
CONFigure:SHANdoff:TDRop ?		All	
CONFigure:SHANdoff[:SETTings]:DEFault Resets all the softer handoff configuration items to their default values.		All	
CDMA manual test (signaling) – Softer Handoff – Execution			
PROCedure:CTMStation:SHANdoff Puts an ”MS Tests” Call (state ”CE2”) into the softer handoff state (”CSH”). This is required in order to perform the softer handoff measurements.		CE2	140
CONFigure:SHANdoff:PRATio <INCRease | DECRese> Increments or decrements the secondary/primary power–ratio to the next step.		CSH	
CONFigure:SHANdoff:PRATio? Returns the secondary/primary power–ratio, pilot levels, and traffic levels.		CSH	141
READ[:SCALar]:SHANdoff:LEVels[:ALL}? Returns the power levels and keep bit for both secotrs, and the current power–ratio.		CSH	142

138 **This is the same as “MAXimim FER” in the Softer Handoff Configuration menu. Use “FETch:SHAN:LIM:FAIL?” to obtain the pass/fail status of the FER measurement for the current power–ratio.**

139 **T_ADD must be a greater value than T_DROP.**

140 **Use PROCedure:CTMStation:CALL TEST to return to the “CE2” state.**

141 **Values are returned in the following order: power–ratio, primary sector pilot level, primary sector traffic level, secondary sector pilot level, secondary sector traffic level. The secondary/primary power–ratio is expressed as a value in dB if both sectors are active. It is expressed as OFF if the secondary sector is *in*active, and FULL if the secondary sector *alone* is active.**

142 **Values are returned in the following order: primary sector reported pilot power, primary sector keep bit,secondary sector reported pilot power, secondary sector keep bit, and current power–ratio.**

Table F–8: CDMA manual test (signaling) commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:SHANdoff:FER[:ALL]? Initiates the FER measurement for the current power–ratio step, and returns the results.		CSH	143
FETCh[:SCALar]:SHANdoff:LIMit:FAIL[:ALL]? Returns the pass/fail value for the current power–ratio's FER measurement.		All	

[143] **Values are returned in the following order: FER (%), transmitted frames, frame errors, and current power–ratio.**

CDMA Module Test Commands

Table F–9: CDMA module test commands

Command	Values	State	Notes
CDMA module test			
CONFigure:AMTest:CCFerror<Network>,<Channel> Establishes the Network and Channel for the **C**dma **C**arrier **F**requency **error** measurement. <Network> can use any of the listed values: <Channel> is an integer whose limits depend on the selected network.	 USCellular JPCellular CHCellular USPCs KR1Pcs KR2Pcs XXX to 312 to ZZZ	CE2	
CONFigure:AMTest:CCFerror?	<Network> <Channel>	ALL	
CONFigure:CMTest:BAUD <EIGHth | QUARter | HALF | FULL>		IDLE, CMT	1
CONFigure:CMTest:BAUD?	FULL, HALF, QUAR, EIGH	ALL	
CONFigure:CMTest:FOFFset <frame offset>	0 to 15	IDLE, CMT	2
CONFigure:CMTest:FOFFset?		ALL	
CONFigure:CMTest:FREQuency:CHANnel <RF channel number>	See note	IDLE, CMT	3
CONFigure:CMTest:FREQuency:CHANnel?		ALL	
CONFigure:CMTest:LIMit:CFEedthrough[:UPPer] <maximum carrier feedthrough [DB]>	–120.0 dB to –40.0 dB to –20.0 dB	ALL	4
CONFigure:CMTest:LIMit:CFEedthrough[:UPPer]?		ALL	
CONFigure:CMTest:LIMit:ERRor:CFRequency <maximum carrier frequency error [HZ | KHZ | MHZ]>	0 Hz to 300 Hz to 1000 Hz	ALL	4
CONFigure:CMTest:LIMit:ERRor:CFRequency?		ALL	

1 **Use this command to set the CDMA forward traffic channel frame rate. Any argument but FULL reduces the actual output power of the tester. This command affects the information content of the forward traffic channel frame.**

2 **Use this command to change the frame offset of the CDMA forward traffic channel. This command does no handoffs.**

3 **Use this command to change the RF channel for the module test system. This command does no handoffs. The following ranges are valid RF channel values: US Cellular, 1 to to 283 to 799 and 990 to 1023; PCS, 0 to 25 to 1199; Korean PCS, 0 to 25 to 1300; Korean 2 PCS, 0 to 25 to 699; Chinese Cellular, 0 to 283 to 1000 and 1329 to 2047; Japan Cellular, 0 to 25 to 1199.**

4 **Use this command to set the error limit for the measurement. The displayed value (in LOCAL control) goes to reverse video when the error limit is exceeded.**

Table F–9: CDMA module test commands (cont.)

Command	Values	State	Notes
CONFigure:CMTest:LIMit:ERRor:POWer:MSTation <error limit [DB]>	0.0 dB to 3.5 dB to 10.0 dB	ALL	4
CONFigure:CMTest:LIMit:ERRor:POWer:MSTation?		ALL	
CONFigure:CMTest:LIMit:ERRor:TTIMe <maximum transmit time error> [S | SEC | MS | US]	0.0 µs to 1.0 µs to 10.0 µs	ALL	4
CONFigure:CMTest:LIMit:ERRor:TTIMe?		ALL	
CONFigure:CMTest:LIMit:IMBalance[:UPPer] <maximum carrier imbalance [DB]>	–120.0 dB to –30.0 dB to –20.0 dB	ALL	4
CONFigure:CMTest:LIMit:IMBalance[:UPPer]?		ALL	
CONFigure:CMTest:LIMit:WQUality[:LOWer] <minimum waveform quality>	0.000 to 0.944 to 1.000	ALL	5
CONFigure:CMTest:LIMit:WQUality[:LOWer]?		ALL	
CONFigure:CMTest:OCNS[:STATe] <OFF | ON>		ALL	
CONFigure:CMTest:OCNS[:STATe]?	OFF, ON	ALL	
CONFigure:CMTest:PCBits:MODE <OFF | HOLD | ADOWn | AUP | RTESt>		IDLE, CMT	6
CONFigure:CMTest:PCBits:MODE?	OFF, HOLD, ADOWn, AUP, RTESt	ALL	
CONFigure:CMTest:PNOFfset <PN offset value>	0 to 511	IDLE, CMT	7
CONFigure:CMTest:PNOFfset?		ALL	
CONFigure:CMTest:POWer:MSTation:MANual <power level> [DBM]	–88.0 dBm to 0.0 dBm to 31.0 dBm	CMT	8
CONFigure:CMTest:POWer:MSTation:MANual?	MAX, MIN	CMT	
CONFigure:CMTest:POWer:MSTation:MODE <MANual | OLOop>		CMT	9

[5] Use this command to set the error limit for the measurement. The displayed value (in LOCAL control) goes to reverse video when the error limit is exceeded.

[6] Use this command to select how the power control bits in the forward CDMA traffic channel are calculated. The OFF mode disables the insertion of power control bits. The HOLD mode sends alternating up/down power control bits. The ALL DOWN mode forces the power control bit to the down state. The ALL UP mode forces the power control bit to the up state. The RANGE TEST mode sends eight frames of UP power bits followed by eight frames of DOWN power bits.

[7] Use this command to set the PN offset of the tester. This command immediately changes the sync channel timing and content, and the paging channel content and long code mask. Changes are performed without any handoff.

[8] Use this command to set the expected power from the mobile station when you are using CONFigure:CMTest:POWer:MSTation:MODE in the MANual mode.

[9] Use this command to set the method for determining the expected power from the mobile station. The MANual mode requires that the user enter the expected value; the OLOop mode estimates the open loop power using the network type and the NOMINAL BS TOTAL POWER setting.

Table F–9: CDMA module test commands (cont.)

Command	Values	State	Notes
CONFigure:CMTest:POWer:MSTation:MODE?	MAN, OLO	CMT	
CONFigure:CMTest:POWer:MSTation:OLOop?		CMT	10
CONFigure:CMTest:RSET <RS1 | RS1_8K | RS2 | RS2_13K>		IDLE, CMT	11
CONFigure:CMTest:RSET?	RS1, RS2	ALL	
CONFigure:CMTest[:SETTings]:DEFault		ALL	12
CONFigure:CMTest:SOURce:AWGN:LEVel <relative level [DB] | OFF>	–20.0 dB to +6.0 dB	IDLE, CMT	13
CONFigure:CMTest:SOURce:AWGN:LEVel?		ALL	
CONFigure:CMTest:SOURce[:CDMA]:LEVel:OCNS?		ALL	14, 15
CONFigure:CMTest:SOURce[:CDMA]:LEVel:PAGing <relative level [DB] | OFF >	–20.0 dB to –12.0 dB to –7.0 dB	IDLE, CMT	15, 16
CONFigure:CMTest:SOURce[:CDMA]:LEVel:PAGing?		ALL	17
CONFigure:CMTest:SOURce[:CDMA]:LEVel:PILot <relative level [DB] | OFF>	–10.0 dB to –7.0 dB to –5.0 dB	IDLE, CMT	15
CONFigure:CMTest:SOURce[:CDMA]:LEVel:PILot?		ALL	15, 18
CONFigure:CMTest:SOURce[:CDMA]:LEVel:SYNC <relative level [DB] | OFF>	–20.0 dB to –16.0 dB to –7.0 dB	IDLE, CMT	15, 19

10 This query returns the expected power from the mobile station when you are using CONFigure:CMTest:POWer:MSTation:MODE in the OLOop mode.

11 Use this command to set the forward channel frame rate. The command changes the encoding and information of the CDMA forward traffic channel, setting the preferred rate set and immediately negotiating a transition. This command requires installation of Option B14.

12 Use this command to reset the Module Test configuration menu parameters to the default settings. This command does not affect the settings in the Module Test main menu.

13 Use this command to set the power level of the AWGN channel. The power level is expressed as the ratio of the AWGN output power to the nominal CDMA forward channel power. The “OFF” argument disables the AWGN channel. Enabling the AWGN channel increases the actual power output of the tester. This command requires installation of Option B81.

14 Use this query to return the current power level of the OCNS channel. “OFF” is returned if the OCNS channel is disabled.

15 The power level of a CDMA channel in the Module Test mode is set relative to the nominal CDMA forward channel power (with all of the CDMA channels present and active). The actual level of a CDMA channel does not change when another CDMA channel is disabled in the Module Test mode.

16 Use this command to set the power level of the pilot channel. Use the “OFF” argument to disable the channel and reduce the actual output power of the tester.

17 Use this query to return the current power setting for the pilot channel. The query returns “OFF” if the pilot channel has been disabled.

18 Use this query to return the current power level of the pilot channel. “OFF” is returned if the pilot channel is disabled.

19 Use this command to set the power level of the sync channel. Use the “OFF” argument to disable the channel and reduce the actual output power of the tester.

Table F–9: CDMA module test commands (cont.)

Command	Values	State	Notes
CONFigure:CMTest:SOURce[:CDMA]:LEVel:SYNC?		ALL	15, 20
CONFigure:CMTest:SOURce[:CDMA]:LEVel:TRAFfic <relative level [DB] | OFF>	–20.0 dB to –14.0 dB to –7.0 dB	IDLE, CMT	15, 21
CONFigure:CMTest:SOURce[:CDMA]:LEVel:TRAFfic?		ALL	22, 23
CONFigure:CMTest:SOURce[:CDMA]:POWer:ACTual?		CMT	22, 24
CONFigure:CMTest:SOURce[:CDMA]:POWer:NOMinal <relative level [DBM] | OFF>	See note	IDLE, CMT	25, 26
CONFigure:CMTest:SOURce[:CDMA]:POWer:NOMinal?		IDLE, CMT	26
CONFigure:CMTest:TCHannel <traffic channel>	2 to 8 to 31, 33 to 63	IDLE, CMT	27
CONFigure:CMTest:TCHannel?		ALL	

[20] Use this query to return the current power setting for the sync channel. The query returns "OFF" if the sync channel has been disabled.

[21] Use this command to set the power level of the forward traffic channel. The "OFF" argument turns off the channel and reduces the actual power output from the tester. The power level of the traffic channel is based on a full rate traffic channel; the actual output power of the tester is reduced when the traffic channel is configured to operate at frame rates other than FULL.

[22] The power level of a CDMA channel in the Module Test mode is set relative to the nominal CDMA forward channel power (with all of the CDMA channels present and active). The actual level of a CDMA channel does not change when another CDMA channel is disabled in the Module Test mode.

[23] Use this query to return the current power setting for the forward traffic channel. The query returns "OFF" if the sync channel has been disabled. This query always returns the power level for a full rate traffic channel even if the traffic channel is not operating at the full rate.

[24] Use this query to return the actual output power (dBm) of the tester when in the Module Test mode. The actual power differs from the nominal power when one or more CDMA channels are disabled, the frame rate is not FULL, or the AWGN system is in use. The query returns "OFF" if there is no output power when in the Module Test mode.

[25] Use this command to set the nominal output power of the tester when in the Module Test mode. The actual power differs from the nominal power when one or more CDMA channels are disabled, the frame rate is not FULL, or the AWGN system is in use. Use the "OFF" argument to disable the transmitter.

The output power range values assume no external gain or attenuation. RF IN/RF OUT: –132 dBM to –70 dBM to –19 dBM; RF OUT 2: –113 dBM to –70 dBM to +1 dBM.

The tester maintains commanded power when external attenuation or gain using SOURce:CORRection:LOSS:... commands is specified; however, the range of available power will change. For example: the output rate at the RF IN/ RF OUT connector changes to –142 dBm to –70 dBm to –29 dBm when an external attenuation of 10 dB is commanded. Note that the default power remains constant provided that the tester can produce it given the external gain or attenuation.

[26] When the tester is in the IDLE mode the power range accepted or defined by the MAX/MIN arguments is the widest range possible using either of the RF outputs along with the maximum external gain or attenuation values set by SOURce:CORRection:LOSS:... commands. If the output power is set outside the limits that the tester can produce, the power is set to the closest end of the range for the output connector and external attenuation (or gain) in use when the instrument leaves the IDLE state.

[27] Use this command to change the channel (Walsh code) for the forward traffic channel. The tester automatically shifts an OCNS channel if channel conflicts occur (no handoff is performed).

Table F–9: CDMA module test commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:AMTest:CCFerror Returns the **C**dma **C**arrier **F**requency **error** as a single integer value.	<Network> <Channel>	AMT	28, 29
READ[:SCALar]:CMTest:POWer:MSTation?	See note	CMT	30
READ[:SCALar]:CMTest:WQUality[:ALL]?	See note	CMT	31
FETCh[:SCALar]:CMTest:POWer:MSTation:LIMit:FAIL?		ALL	32
FETCh[:SCALar]:CMTest:WQUality:LIMit:FAIL[:ALL]?		ALL	33

28 This measurement is only active in Analog Module Test (state "AMT"). Upon receiving the "READ" command, the synthesizer will be set with the band definitions indexed by <Network>, and the channel number set by <Channel>. The Netwrok and Channel active just prior to the "READ" will be restored upon completion of the measurement.

29 Advisory: If the frequency being measured is over ≈30 kHz either side of the expected carrier, numbers are returned that look misleadingly reasonable.

30 Query returns the mobile station transmit power in dBm. Returns "INF" if the signal level is too high; returns "NINF" if the signal level is too low.

31 Results are returned in the following order: carrier feedthrough, I/Q imbalance, carrier frequency error, transmit time error, and waveform quality. "NAN" is returned for measurements that cannot be completed.

32 Returns the pass/fail value for module test MS power measurement.

33 The results returned are the pass/fail values for the carrier feedthrough, I/Q imbalance, carrier frequency error, transmit time error, and waveform quality measurements.

Analog Base Station Commands

Table F–10: Analog base station commands

Command	Values	State	Notes
Configuration			
CONFigure:ABSTation:CMAC <control channel mobile attenuation code> Establishes the control channel mobile attenuation code.	0 to 2 to 7	ALL	
CONFigure:ABSTation:CMAC?		ALL	
CONFigure:ABSTation:FREQuency:CCHannel <RF channel number> Establishes the control channel value.	1 to 333 to 1023	IDLE	
CONFigure:ABSTation:FREQuency:CCHannel?		ALL	
CONFigure:ABSTation:FREQuency:DSCCode <DSAT color code number> Establishes the DSAT color code value for NAMPS or NTACS voice channels.	0 to 6	ALL	
CONFigure:ABSTation:FREQuency:DSCCode?		ALL	
CONFigure:ABSTation:FREQuency:NBVChannel <ABOVe | BELow | CENTer> Establishes the narrowband voice subchannel for NAMPS or NTACS voice channels.		ALL	
CONFigure:ABSTation:FREQuency:NBVChannel?	ABOV, BEL, CENT	ALL	
CONFigure:ABSTation:FREQuency:SCCode <SAT color code number> Establishes the SAT color code value.	0 to 1 to 2	ALL	1
CONFigure:ABSTation:FREQuency:SCCode?		ALL	
CONFigure:ABSTation:FREQuency:SYSTem? Query only. Returns the analog system type, which is determined internally from the selected RF control channel. A similar query exists for CDMA and TDMA.	A or B	ALL	
CONFigure:ABSTation:FREQuency:VCHannel <RF channel number> Establishes the voice channel value.	1 to 312 to 1023	ALL	
CONFigure:ABSTation:FREQuency:VCHannel?		ALL	
CONFigure:ABSTation[:SETTings]:DEFault Resets all analog base station settings to the default values.		ALL	2
CONFigure:ABSTation:SOURce:FM:DEViation:DSAT <DSAT peak deviation [Hz] | MAXimum | MINimum> Establishes the peak deviation of the subaudible control channel, which is present on narrowband (NAMPS or NTACS) voice channels.	630 Hz to 700 Hz to 770 Hz	ALL	
CONFigure:ABSTation:SOURce:FM:DEViation:DSAT?		ALL	

1 **A SAT code of 0 corresponds to a frequency of 5970 Hz, 1 corresponds to 6000 Hz, 2 corresponds to 6030 Hz.**

2 **The settings associated with the commands which cannot be used in the present state of the tester will not be affected.**

Table F–10: Analog base station commands (cont.)

Command	Values	State	Notes
CONFigure:ABSTation:SOURce:FM:DEViation:SAT <SAT peak deviation [HZ]> Establishes the SAT peak deviation value.	1800 Hz to 2000 Hz to 2200 Hz	ALL	
CONFigure:ABSTation:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:ABSTation:SOURce:POWer <analog power level [DBM]> Establishes the base station power level. A similar command exists for CDMA.	–131.0 dBm to –70.0 dBm to –17 dBm	ALL	3
CONFigure:ABSTation:SOURce:POWer?		ALL	
CONFigure:ABSTation:VMAC <voice channel mobile attenuation code> Establishes the voice channel mobile attenuation code.	0 to 2 to 7	ALL	
CONFigure:ABSTation:VMAC?		ALL	
Parameters			
CONFigure:ABSTation:LIDentity <location identity> Establishes the location identity value.	0 to 1 to 4095	IDLE	
CONFigure:ABSTation:LIDentity?		ALL	
CONFigure:ABSTation:PARameters[:SETTings]:DEFault Resets all analog base station parameter settings to the default values.		ALL	4
CONFigure:ABSTation:PDURation <paging duration [US | MS | S | SEC]> Establishes the paging duration in seconds.	5 s to 20 s to 60 s	ALL	
CONFigure:ABSTation:PDURation?		ALL	
CONFigure:ABSTation:SIDentity <system identity> Establishes the analog mode system identity value. A similar command exists for CDMA.	0 to 32767	IDLE	
CONFigure:ABSTation:SIDentity?		ALL	

[3] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

[4] **The settings associated with the commands which cannot be used in the present state of the tester will not be affected.**

Table F–10: Analog base station commands (cont.)

Command	Values	State	Notes
CONFigure:ABSTation:CTYPe <ANALOG | DIGITAL> Sets the call type. This call type takes effect when the PROCedure:CTMStation:CALL ATEST | AVOICE is issued. When set to ANALOG, an AMPS–mode call is initiated, using an Analog (FM) voice channel. When set the DIGITAL, a TDMA (DAMPS) call is initiated, using a Digital (TDMA) traffic channel.		AMID, AMIN	
CONFigure:ABSTation:CTYPe? Returns the set call type.		ALL	

Analog Manual Test (Signaling) Commands

Table F–11: Analog manual test (signaling) commands

Command	Values	State	Notes
Unregistered and Registered States – General Measurements			
CONFigure:AIACcess:ASTop <OFF | ON> Establishes the auto stop state for the standby power measurement done while in the Analog Idle or Access states, ie. the Unregistered or Registered states.		ALL	
CONFigure:AIACcess:ASTop?		ALL	
CONFigure:AIACcess:LIMit:POWer:STANdby[:UPPer] <maximum mobile station standby power [DBM]> Establishes the limit for the standby power measurement done while in the Analog Idle or Access states, ie. the Unregistered or Registered states.	–80.0 dBm to –60.0 dBm to –40.0 dBm	ALL	
CONFigure:AIACcess:LIMit:POWer:STANdby[:UPPer]?		ALL	
CONFigure:AIACcess:[SETTings]:DEFault Resets all Analog standby power settings to the default values.		ALL	
READ[:SCALar]:AIACCess:POWer:ACTive? Measures and returns the active access power measured during the Analog Idle or Access states, ie. the Unregistered or Registered states. A similar command exists for CDMA.	See note	AMID	1
READ[:SCALar]:AIACCess:POWer:STANdby? Measures and returns the standby access power measured during the Analog Idle or Access states, ie. the Unregistered or Registered states. A similar command exists for CDMA.	See note	AMID	2
FETCh[:SCALar]:AIACCess:POWer:STANdby:LIMit:FAIL? Returns the pass/fail value for the standby power measurement done while in the Analog Idle or Access states, ie. the Unregistered or Registered states.		ALL	
FETCh[:SCALar]:MSINfo[:ALL]?	See note	ALL	3
Call Established State – General Measurements			
CONFigure:ACEQuality:LIMit:ERRor:CFRequency <carrier frequency error range [HZ]> Frequency difference between the expected and measured carrier frequency.	0 Hz to 4000 Hz to 10000 Hz	ALL	
CONFigure:ACEQuality:LIMit:ERRor:CFRequency?		ALL	
CONFigure:ACEQuality:LIMit:ERRor:FREQuency:SAT <SAT frequency error range [HZ]> Maximum frequency error allowed for SAT. (Expected frequency ± this number.)	0 Hz to 1 Hz to 500 Hz	ALL	
CONFigure:ACEQuality:LIMit:ERRor:FREQuency:SAT?		ALL	

1 **The result returned is the measured power of the last access probe sent by the mobile station.**

2 **The result returned is the measured power of the mobile station between access probes.**

3 **The results returned are: mobile station identification number, serial number, and power class. The values of the mobile station identification number and the serial number are determined by what has been programmed into the mobile station.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ACEQuality:LIMit:ERRor:FREQuency:ST <ST frequency error range [HZ]> Maximum frequency error allowed for SAT. (Expected frequency ± this number.)	0 Hz to <u>1 Hz</u> to 500 Hz	ALL	
CONFigure:ACEQuality:LIMit:ERRor:FREQuency:ST?		ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:SAT <SAT peak deviation error range [HZ]> Maximum peak deviation error for SAT. (Expected deviation ± this number.)	0 Hz to <u>200 Hz</u> to 1000 Hz	ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:SAT?		ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:ST <ST peak deviation error range [HZ]> Maximum peak deviation error for ST. (Expected deviation ± this number.)	0 Hz to <u>800 Hz</u> to 2000 Hz	ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:ST?		ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:DSAT <expected deviation ± this number>		ALL	
CONFigure:ACEQuality:LIMit:ERRor:PDEViation:DSAT?		ALL	
CONFigure:ACEQuality:LIMit:PDEViation[:TOTal][:UPPer] <total peak deviation upper limit [HZ]> Maximum total peak deviation limit.	0 Hz to <u>12000 Hz</u> to 16000 Hz	ALL	
CONFigure:ACEQuality:LIMit:PDEViation[:TOTal][:UPPer]?		ALL	
CONFigure:ACEQuality[:SETTings]:DEFault Sets all limits to default.		ALL	
CONFigure:ASTest:HOLDoff <holdoff time [S] | OFF> Sets the Analog test holdoff time for all AF call established (signaling) measurements.	0.0 S to 60.0 S or <u>OFF</u>	ALL	4
CONFigure:ASTest:HOLDoff?		ALL	
PROCedure:CTMStation:ASTForce Forces the mobile (through a maintenance order) to produce the ST tone, which will last until the mobile's timer expires (approximately 60 seconds). During this time the user may send a READ[:SCALar]:ACEQuality[:ALL]? command. After the mobile's timer expires, the call will be dropped.		ACE	

4 **This command inserts a time delay between the start of an AF analog call established tests and the start (or change) of the FM modulator or AF generator.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
PROCedure:CTMStation:CALL <TEST | VOICE | ATEST | AVOICE | TTEST | TVOICE> Initiates a call to the mobile station. The arguments TEST and VOICE are for use with CDMA mobile stations from the MIDL and MINI instrument states. The arguments ATEST and AVOICE are for use when making ANALOG (AMPS, TACS, JTACS, NTACS, ETACS, and NAMPS) type calls from the AMID or AMIN instrument state. The arguments TTEST and TVOICE are for use with TDMA mobile stations from the TMID and TMIN instrument states.		MIDL, MINI, AMID, AMIN, TMID, TMIN, CE1, CE2	5, 6
PROCedure:CTMStation:CALL[TEST | ATESt | VOICe] Establishes a call to a mobile station under analog test mode. Tests of the MS power control, receiver, transmitter, etc. can then be made. Voice loopback will also be active.		AMID, AMIN, MIDL, MINI, CE1, CE2	
READ[:SCALar]:ACENquality[:ALL]? Measures and returns the narrowband voice channel frequency error, voice channel peak deviation, DSAT sequence, and DSAT peak deviation.	See note	ACE	7
READ[:SCALar]:ACEQuality[:ALL]? Measures and returns the voice channel frequency error, voice channel peak deviation, SAT frequency error, SAT peak deviation, ST frequency error, and ST peak deviation.		ACE	
READ[:SCALar]:APOWer:BBANd? Returns broadband power measurement for Analog Manual Test.	See note	ACE	8, 9
READ[:SCALar]:APOWer:MSTation[:ALL]? Measures and returns the analog mode mobile station power and the expected mobile station power (based on the voice MAC value).	See note	ACE	10

5 Arguments containing TEST place the call in MS TEST mode. Arguments containing VOICE place the call using VOICE LOOPBACK mode.

6 The function of this command is affected by the CONFigure:ABSTation:CTYPe <ANALOG | DIGITAL> command when in AMID, AMIN, TMID, and TMIN instrument states.

7 The DSAT sequence returned by this command is one of the following ASCII strings: "2556CB", "255B2B", "256A9B", "25AD4D", "26AB2B", "26B2AD", "2969AB", or "–". If the actual 24–bit DSAT sequence measured by the tester matches one of the seven standard DSAT sequences with either 0 or 1 bit errors, the corresponding standard string (not the actual sequence) will be returned. If one of the seven DST sequences (with either 0 or 1 bit error) is measured, the DSAT sequence which is the inverse of the DST will be returned. If the measured subaudible bitstream does not contain one of the seven DSAT or seven DST patterns with either 0 or 1 bit error, then the dash string ("–") will be returned.

8 Range: 0 dBm to 41 dBm
Error: $\leq$ 1.5 dB

9 Returns the power as measured by the front end broadband power meter (in dBm). If the input signal is too high, the result is "INF" (infinity); if the input signal is too low, the result is "NINF" (negative infinity).

10 The returned results are the measured power from the mobile station and the expected power from the mobile station based on the current power of the base station.

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:ACEQuality:LIMit:FAIL[:ALL]? Returns the pass/fail value for the voice channel frequency error, voice channel peak deviation, SAT frequency error, SAT peak deviation, ST frequency error, and ST peak deviation.		ALL	
FETCh[:SCALar]:ACENquality:LIMit:FAIL[:ALL]? Returns the pass/fail value for the narrowband voice channel frequency error, voice channel peak deviation, DSAT sequence, and DSAT peak deviation.	See note	ALL	11
FETCh[:SCALar]:DNUMber? Returns a string containg the number dialed by the mobile station when the mobile station originates a call. Calls originated by the tester return a string containing a single dash (–).		ALL	
Call Established State – MS Carrier Power			
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:LOWer <lower limit [DB]>	–10.0 dB to <u>–4.0 dB</u> to –0.1 dB	ALL	
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:LOWer?		ALL	
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:NOUTput <output [DBM]>	–40.0 dBm to 40.0 dBm	ALL	12
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:NOUTput?		ALL	
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:UPPer <upper limit [DB]>	0.2 dB to <u>2.0 dB</u> to 10.0 dB	ALL	
CONFigure:ACPower:LIMit:P[1–3]CLass:M[0–7]ACode:UPPer?		ALL	
CONFigure:ACPower[:SETTings]:DEFault		ALL	
READ[:SCALar]:APOWer:MSTation[:ALL]?		ACE	
FETch[:SCALar]:APOWer:MSTation:LIMit:FAIL?		ALL	
Call Established State – Receiver Quality Measurements – Sensitivity			
CONFigure:ARQuality:SENSitivity:ASTop <<u>OFF</u> | ON> Establishes the auto stop state for the sensitivity measurement.		ALL	

11 The third value returned will always be 0 (zero), since there is currently no way to set a DSAT sequence tolerance.

12 The default value depends on the selected MAC and the selected power class values as shown in the following table:

MAC	Power Class 1	Power Class 2	Power Class 3
0	36.0 dBm	32.0 dBm	28.0 dBm
1	32.0 dBm	32.0 dBm	28.0 dBm
2	28.0 dBm	28.0 dBm	28.0 dBm
3	24.0 dBm	24.0 dBm	24.0 dBm
4	20.0 dBm	20.0 dBm	20.0 dBm
5	16.0 dBm	16.0 dBm	16.0 dBm
6	12.0 dBm	12.0 dBm	12.0 dBm
7	8.0 dBm	8.0 dBm	8.0 dBm

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:SENSitivity:ASTop?		ALL	
CONFigure:ARQuality:SENSitivity:AVERage:COUNt <averaging interval>		ALL	
CONFigure:ARQuality:SENSitivity:AVERage:COUNt?	1 to 100	ALL	
CONFigure:ARQuality:SENSitivity:LIMit:SINad < sinad limit [DB]> Establishes the limit for the sensitivity measurement's SINAD value. The SINAD must be this value or greater.	0.0 dB to 12.0 dB to 30.0 dB	ALL	
CONFigure:ARQuality:SENSitivity:LIMit:SINad?		ALL	
CONFigure:ARQuality:SENSitivity:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the sensitivity measurement.	0.0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:ARQuality:SENSitivity:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:ARQuality:SENSitivity:SOURce:POWer <power [DBM]> Establishes the base station power level for the sensitivity measurement.	–131.0 dBm to –116.0 dBm to –17.0 dBm	ALL	13
CONFigure:ARQuality:SENSitivity:SOURce:POWer?		ALL	
CONFigure:ARQuality:SENSitivity[:SETTings]:DEFault Resets all receiver quality sensitivity settings to the default values.		ALL	
READ[:SCALar]:ARQuality:SENSitivity? Measures and returns a SINAD value as an indication of sensitivity of the mobile station's reciever.		ACE	
FETCh[:SCALar]:ARQuality:SENSitivity:LIMit:FAIL? Returns the pass/fail value for the sensitivity measurement.		ALL	
Call Established State – Receiver Quality Measurements – Hum / Noise			
CONFigure:ARQuality:HNOise:AFGen:FREQuency[:CW | :FIXed] <af generator frequency [HZ]> Establishes the AF Generator frequency for the hum/noise measurement.	300 Hz to 1100 Hz to 3000 Hz	ALL	
CONFigure:ARQuality:HNOise:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:ARQuality:HNOise:AFGen:VOLTage <af generator level [V]> Establishes the AF Generator voltage level for the hum/noise measurement. Specifying a level turns the AF Generator on; specifying 0 V turns it off. Audio peak deviation in the mobile station is determined by this level.	0.0 V to 5.000 V	ALL	

[13] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:HNOise:AFGen:VOLTage?		ALL	
CONFigure:ARQuality:HNOise:ASTop <OFF | ON> Establishes the auto stop state for the hum/noise measurement.		ALL	
CONFigure:ARQuality:HNOise:ASTop?		ALL	
CONFigure:ARQuality:HNOise:LIMit <hum/noise limit [DB]> Establishes the limit for the hum/noise measurement. The hum/noise must be this level or lower.	0 dB to –32.0 dB to –80.0 dB	ALL	14
CONFigure:ARQuality:HNOise:LIMit?		ALL	
CONFigure:ARQuality:HNOise:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the hum/noise measurement. Audio peak deviation must be within plus or minus this amount of the target audio peak deviation.	100 Hz to 800 Hz to 4000 Hz	ALL	
CONFigure:ARQuality:HNOise:LIMit:ERRor:APDeviation?		ALL	
CONFigure:ARQuality:HNOise[:SETTings]:DEFault Resets all receiver quality hum / noise settings to the default values.		ALL	
CONFigure:ARQuality:HNOise:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the hum/noise measurement.	0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:ARQuality:HNOise:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:ARQuality:HNOise:SOURce:FREQuency:MODulation <modulation frequency [HZ]> Establishes the base station modulation frequency for the hum/noise measurement.	800 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:ARQuality:HNOise:SOURce:FREQuency:MODulation?		ALL	
CONFigure:ARQuality:HNOise:SOURce:POWer <power [DBM]> Establishes the base station power level for the hum/noise measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	15
CONFigure:ARQuality:HNOise:SOURce:POWer?		ALL	
CONFigure:ARQuality:HNOise:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the hum/noise measurement. Audio Peak Deviation must approach this value and be within the range specified by the audio peak deviation error range.	0 Hz to 8000 Hz to 14,000 Hz	ALL	

14 The Rx Hum/Noise minimum limit values changed from –50.0 dB to –75 dB in the 3.0.1.1E release.

15 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:HNOise:TAPDeviation?		ALL	
CONFigure:ARQuality:HNOise:VMAC <voice channel mobile attenuation code> Establishes the voice channel mobile attenuation code for the hum/noise measurement.	0 to 2 to 7	ALL	
CONFigure:ARQuality:HNOise:VMAC?		ALL	
READ[:SCALar]:ARQuality:HNOise[:ALL]? Measures and returns the relative level of hum/noise (dB), and the current audio peak deviation (Hz), as an indication of the residual audio output of the mobile station's receiver.		ACE	
FETCh[:SCALar]:ARQuality:HNOise:LIMit:FAIL[:ALL]? Returns the pass/fail values for the hum/noise measurement.		ALL	
Call Established State – Receiver Quality Measurements – Harmonic Distortion			
CONFigure:ARQuality:HDIStortion:ASTop <OFF | ON> Establishes the auto stop state for the harmonic distortion measurement.		ALL	
CONFigure:ARQuality:HDIStortion:ASTop?		ALL	
CONFigure:ARQuality:HDIStortion:LIMit <harmonic distortion limit in %> Establishes the limit for the harmonic distortion measurement. The harmonic distortion must be this value or lower.	0 % to 5.0 % to 30.0 %	ALL	
CONFigure:ARQuality:HDIStortion:LIMit?		ALL	
CONFigure:ARQuality:HDIStortion:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the harmonic distortion measurement.	0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:ARQuality:HDIStortion:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:ARQuality:HDIStortion:SOURce:POWer <power [DBM]> Establishes the base station power level for the harmonic distortion measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	16
CONFigure:ARQuality:HDIStortion:SOURce:POWer?		ALL	
CONFigure:ARQuality:HDIStortion[:SETTings]:DEFault Resets all receiver quality harmonic distortion settings to the default values.		ALL	
READ[:SCALar]:ARQuality:HDIStortion? Measures and returns a value for harmonic distortion (%) as an indication of the contribution of the harmonic components to the total output of the mobile station's receiver.		ACE	

16 **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:ARQuality:HDIStortion:LIMit:FAIL? Returns the pass/fail value for the harmonic distortion measurement.		ALL	
Call Established State – Receiver Quality Measurements – Audio Frequency Response			
CONFigure:ARQuality:AFResponse:ASTop <OFF | ON> Establishes the auto stop state for the audio frequency response measurement.		ALL	
CONFigure:ARQuality:AFResponse:ASTop?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest <highest frequency of both limit lines [HZ]> Establishes the highest frequency used in both of the limit lines of the audio frequency response measurement.	435 Hz to <u>3000 Hz</u> to 4000 Hz	ALL	17
CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest <lowest frequency of both limit lines [HZ]> Establishes the lowest frequency used in both of the limit lines of the audio frequency response measurement.	50 Hz to <u>240 Hz</u> to 365 Hz	ALL	17
CONFigure:ARQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:COUNt? Query only. Returns the number (count) of points which designate the lower limit line of the audio frequency response measurement.	6	ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle: HIGHest <highest middle frequency of lower limit line [HZ]> Establishes the highest middle frequency used in the lower limit line of the audio frequency response measurement.	435 Hz to <u>2400 Hz</u> to 2965 Hz	ALL	17
CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:HIGHest?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest <lowest middle frequency of lower limit line [HZ]> Establishes the lowest middle frequency used in the lower limit line of the audio frequency response measurement.	275 Hz to <u>400 Hz</u> to 2365 Hz	ALL	17
CONFigure:ARQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:GRAPh:X? Returns the horizontal (X–axis) graph positions for each of the points which designate the lower limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph positions for each of the points which designate the lower limit line of the audio frequency response measurement.		ALL	

17 **Some Limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:LOWer <lower level of lower limit [DB]> Establishes the lower level of the lower limit line for the audio frequency response measurement.	–150 dB to –6.0 dB to 0.9 dB	ALL	17
CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:LOWer?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:UPPer <upper level of lower limit [DB]> Establishes the upper level of the lower limit line for the audio frequency response measurement.	–150.0 dB to –3.0 dB to 0.9 dB	ALL	18
CONFigure:ARQuality:AFResponse:LIMit:LOWer:LEVel:UPPer?		ALL	
CONFigure:ARQuality:AFResponse:LIMit:UPPer:COUNt? Query only. Returns the number (count) of points which designate the upper limit line for the audio frequency response measurement.	4	ALL	
CONFigure:ARQuality:AFResponse:LIMit:UPPer:GRAPh:X? Query only. Returns the horizontal (X–axis) graph positions for each of the points which designate the upper limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:ARQuality:AFResponse:LIMit:UPPer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph positions for each of the points which designate the upper limit line of the audio frequency response measurement.		ALL	
CONFigure:ARQuality:AFResponse:LIMit:UPPer:LEVel <upper limit level [DB]> Establishes the level of the upper limit line for the audio frequency response measurement.	–2.9 dB to 1.0 dB to 4.0 dB	ALL	18
CONFigure:ARQuality:AFResponse:LIMit:UPPer:LEVel?		ALL	
CONFigure:ARQuality:AFResponse[:SETTings]:DEFault Resets all receiver quality audio frequency response settings to the default values.		ALL	
CONFigure:ARQuality:AFResponse:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the audio frequency response measurement.	0 Hz to 2900 Hz to 8800 Hz	ALL	
CONFigure:ARQuality:AFResponse:SOURce:FM:DEViation:MODulation?		ALL	

[18] **Some Limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:AFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the audio frequency response measurement.	–131 dBm to <u>–50.0 dBm</u> to –17.0 dBm	ALL	19
CONFigure:ARQuality:AFResponse:SOURce:POWer?		ALL	
CONFigure:ARQuality:AFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the audio frequency response measurement.	2 to <u>14</u> to 100	ALL	
CONFigure:ARQuality:AFResponse:SPOints?		ALL	
READ[:SCALar]:ARQuality:AFResponse? Invokes the receiver quality audio frequency response measurement and returns the MS Audio level in volts$_{RMS}$ at the reference frequency. Other values relative to the MS audio level (in dB) and their frequency designations are then available via the corresponding “FETCh” command. These values denote the audio frequency response of the MS receiver.		ACE	
FETCh:ARRay:ARQuality:AFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the audio frequency response values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values returned is equal to the number of sample points set by the user (2 to 100 with 14 the default).	50 Hz to 4000 Hz	ACE	
FETCh:ARRay:ARQuality:AFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the audio frequency response of the mobile station’s receiver. The number of values returned is equal to the number of sample points set by the user (2 to 100 with 14 the default).		ACE	
FETCh:ARRay:ARQuality:AFResponse:LIMit:FAIL? Returns the pass/fail values for the audio frequency response measurements.		ALL	
Call Established State – Receiver Quality Measurements – Raw Audio Frequency Response			
CONFigure:ARQuality:RAFResponse[:SETTings]:DEFault Resets all receiver quality raw audio frequency response settings to the default values.		ALL	
CONFigure:ARQuality:RAFResponse:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the raw audio frequency response measurement.	0 Hz to <u>2900 Hz</u> to 8800 Hz	ALL	
CONFigure:ARQuality:RAFResponse:SOURce:FM:DEViation:MODulation?		ALL	

[19] The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:MODulation <modulation reference frequency [HZ]> Establishes the modulation reference frequency for the raw audio frequency response measurement. All measurements are referenced to this frequency's measured level.	300 Hz to 1004 Hz to 2998 Hz	ALL	20
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:MODulation?		ALL	
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:STARt <modulation start frequency [HZ]> Establishes the modulation start frequency for the raw audio frequency response measurement.	50 Hz to 240 Hz to 1003 Hz	ALL	21
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:STARt?		ALL	
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:STOP <modulation stop frequency [HZ]> Establishes the modulation stop frequency for the raw audio frequency response measurement.	1006 Hz to 3000 Hz to 4000 Hz	ALL	21
CONFigure:ARQuality:RAFResponse:SOURce:FREQuency:STOP?		ALL	
CONFigure:ARQuality:RAFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the raw audio frequency response measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	22
CONFigure:ARQuality:RAFResponse:SOURce:POWer?		ALL	
CONFigure:ARQuality:RAFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the raw audio frequency response measurement.	3 to 14 to 100	ALL	
CONFigure:ARQuality:RAFResponse:SPOints?		ALL	
READ[:SCALar]:ARQuality:RAFResponse? Invokes the receiver quality raw audio frequency response measurement and returns the absolute MS audio level in Volts RMS at the modulation reference frequency. Other values relative to this audio level, and their frequency designations, are then available via the corresponding "FETCh" commands. These values denote the raw audio frequency response of the mobile station's receiver. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		ACE	

[20] **Some limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

[21] **Some limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

[22] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
FETCh:ARRay:ARQuality:RAFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the audio frequency response values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		ACE	
FETCh:ARRay:ARQuality:RAFResponse:GRAPh:Y? Returns the raw audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the raw audio frequency response of the mobile station’s receiver. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		ACE	
Call Established State – Transmitter Quality Measurements – Hum/Noise			
CONFigure:ATQuality:HNOise:AFGen:FREQuency[:CW | :FIXed] <afgenerator frequency [HZ]> Establishes the AF Generator frequency for the hum/noise measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:ATQuality:HNOise:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:ATQuality:HNOise:AFGen:VOLTage <af generator level [V]> Establishes the AF Generator voltage level for the hum/noise measurement. Specifying a level turns the AF Generator on; specifying 0 V turns it off. Audio peak deviation in the mobile station is determined by this level.	0.0 V to 5.0 V	ALL	
CONFigure:ATQuality:HNOise:AFGen:VOLTage?		ALL	
CONFigure:ATQuality:HNOise:ASTop <OFF | ON> Establishes the auto stop state for the hum/noise measurement.		ALL	
CONFigure:ATQuality:HNOise:ASTop?		ALL	
CONFigure:ATQuality:HNOise:LIMit <hum / noise [DB]> Establishes the limit for the hum/noise measurement. The hum/noise must be this level or lower.	–75.0 dB to –32.0 dB to 0 dB	ALL	[23]
CONFigure:ATQuality:HNOise:LIMit?		ALL	
CONFigure:ATQuality:HNOise:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the hum/noise measurement. Audio peak deviation must be within plus or minus this amount of the target audio peak deviation.	100 Hz to 800 Hz to 4000 Hz	ALL	
CONFigure:ATQuality:HNOise:LIMit:ERRor:APDeviation?		ALL	
CONFigure:ATQuality:HNOise[:SETTings]:DEFault Resets all transmitter quality settings to the default values for the hum/noise measurement.		ALL	

[23] **The default value for JPCellular and CHCellular is –26 dB.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:HNOise:SOURce:POWer <power[DBM]> Establishes the base station power level for the hum/noise measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	24
CONFigure:ATQuality:HNOise:SOURce:POWer?		ALL	
CONFigure:ATQuality:HNOise:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the hum/noise measurement. Audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range.	0 Hz to 8000 Hz to 14,000 Hz	ALL	
CONFigure:ATQuality:HNOise:TAPDeviation?		ALL	
CONFigure:ATQuality:HNOise:EXPandor <OFF | ON>		ALL	
CONFigure:ATQuality:HNOise:EXPandor?		ALL	
CONFigure:ATQuality:HNOise:VMAC <voice channel mobile attenuation code> Establishes the voice channel mobile attenuation code for the hum/noise measurement.	0 to 7	ALL	
CONFigure:ATQuality:HNOise:VMAC?		ALL	
READ[:SCALar]:ATQuality:HNOise[:ALL]? Measures and returns the relative level of hum/noise (dB) and the current audio peak deviation (Hz) as an indication of the residual FM generated by the mobile station's transmitter.		ACE	
FETCh[:SCALar]:ATQuality:HNOise:LIMit:FAIL[:ALL]? Returns the pass/fail values for the hum/noise level and audio peak deviation measurements.		ALL	
FETCh[:SCALar]:ATQuality:HNOise:MMValue? Returns the **M**inimum **M**easurement **V**alue for the most recent Analog Manual Test – Transmitter Quality – Hum/Noise Measurement		ACE	
Call Established State – Transmitter Quality Measurements – Modulation Noise/Distortion			
CONFigure:ATQuality:MNDistortion:AFGen:VOLTage <af generator level [V]> Establishes the AF Generator voltage level for the modulation noise/distortion measurement. Specifying a level turns the AF Generator on; specifying 0 V turns it off. Audio peak deviation in the mobile station is determined by this level.	0.0 V to 5.0 V	ALL	
CONFigure:ATQuality:MNDistortion:AFGen:VOLTage?		ALL	
CONFigure:ATQuality:MNDistortion:ASTop <OFF | ON> Establishes the auto stop state for the modulation noise/distortion measurements.		ALL	

[24] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:MNDistortion:ASTop?		ALL	
CONFigure:ATQuality:MNDistortion:LIMit <modulation noise / distortion in %> Establishes the limit for the modulation noise/distortion measurement. The Modulation Noise / Distortion must be this value or lower.	0 % to <u>5.0 %</u> to 30 %	ALL	
CONFigure:ATQuality:MNDistortion:LIMit?		ALL	
CONFigure:ATQuality:MNDistortion:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the modulation noise/distortion measurement. Audio peak deviation must be within plus or minus this amount of the target audio peak deviation.	100 Hz to <u>800 Hz</u> to 4000 Hz	ALL	
CONFigure:ATQuality:MNDistortion:LIMit:ERRor:APDeviation?		ALL	
CONFigure:ATQuality:MNDistortion[:SETTings]:DEFault Resets all transmitter quality settings to the default values for the modulation noise/distortion measurement.		ALL	
CONFigure:ATQuality:MNDistortion:SOURce:POWer <power[DBM]> Establishes the base station power level for the modulation noise/distortion measurement.	–131.0 dBm to <u>–50.0 dBm</u> to –17.0 dBm	ALL	25
CONFigure:ATQuality:MNDistortion:SOURce:POWer?		ALL	
CONFigure:ATQuality:MNDistortion:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the modulation noise/distortion measurement. Audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range.	0 Hz to <u>8000 Hz</u> to 14,000 Hz	ALL	
CONFigure:ATQuality:MNDistortion:TAPDeviation?		ALL	
CONFigure:ATQuality:MNDistortion:VMAC <voice channel mobile attenuation code> Establishes the voice channel mobile attenuation code for the modulation noise/distortion measurement.	0 to <u>2</u> to 7	ALL	
CONFigure:ATQuality:MNDistortion:VMAC?		ALL	
READ[:SCALar]:ATQuality:MNDistortion[:ALL]? Measures and returns the modulation noise/distortion (%) and the current audio peak deviation (Hz) of the mobile station's transmitter.		ACE	

[25] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:ATQuality:MNDistortion:LIMit:FAIL[:ALL]? Returns the pass/fail values for the modulation noise/distortion and audio peak deviation measurements.		ALL	
Call Established State – Transmitter Quality Measurements – Audio Frequency Response			
CONFigure:ATQuality:AFResponse:AFGen:FREQuency[:CW | :FIXed] <frequency [HZ]> Establishes the AF generator frequency at which the 0 dB reference will be set for the measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:ATQuality:AFResponse:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:ATQuality:AFResponse:AFGen:VOLTage <af generator level [V]> Sets the audio peak deviation from the mobile station. This is the 0 dB reference level.	0.0 V to 5.0 V	ALL	
CONFigure:ATQuality:AFResponse:AFGen:VOLTage?		ALL	
CONFigure:ATQuality:AFResponse:ASTop <OFF | ON> Establishes the auto stop state for the audio frequency response measurement.		ALL	
CONFigure:ATQuality:AFResponse:ASTop?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest <highest frequency of both limit lines [HZ]> Establishes the highest frequency used in both of the limit lines of the audio frequency response measurement.	405 Hz to 4000 Hz	ALL	26
CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:HIGHest?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest <lowest frequency of both limit lines [HZ]> Establishes the lowest frequency used in both of the limit lines of the audio frequency response measurement.	50 Hz to 300 Hz to 2895 Hz	ALL	26
CONFigure:ATQuality:AFResponse:LIMit:BOTH:FREQuency:LOWest?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:ERRor:APDeviation <deviation range [HZ]>	100 Hz to 290 Hz to 4000 Hz	ALL	
CONFigure:ATQuality:AFResponse:LIMit:ERRor:APDeviation?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:COUNt? Returns the number (count) of points which designate the lower limit line of the audio frequency response measurement.	6	ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle <middle frequency of lower limit line [HZ]> Establishes the middle frequency used in the lower limit line of the audio frequency response measurement.	405 Hz to 3000 Hz to 3895 Hz	ALL	

[26] **Some Limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:AFResponse:LIMit:LOWer:FREQuency:MIDDle?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:GRAPh:X? Returns the horizontal (X–axis) graph positions for each of the points which designate the lower limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:GRAPh:Y? Returns the vertical (Y–axis) graph positions for each of the points which designate the lower limit line of the audio frequency response measurement.		ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:LOWer <lower level of lower limit [DB]> Establishes the lower level of the lower limit line for the audio frequency response measurement.	–150.0 dB to –12.0 dB to 0.9 dB	ALL	27
CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:LOWer?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:UPPer <upper level of lower limit [DB]> Establishes the upper level of the lower limit line for the audio frequency response measurement.	–150.0 dB to –3.0 dB to 0.9 dB	ALL	27
CONFigure:ATQuality:AFResponse:LIMit:LOWer:LEVel:UPPer?		ALL	
CONFigure:ATQuality:AFResponse:LIMit:UPPer:COUNt? Returns the number (count) of points which designate the upper limit line for the audio frequency response measurement.	4	ALL	
CONFigure:ATQuality:AFResponse:LIMit:UPPer:GRAPh:X? Returns the horizontal (X–axis) graph positions for each of the points which designate the upper limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:ATQuality:AFResponse:LIMit:UPPer:GRAPh:Y? Returns the vertical (Y–axis) graph positions for each of the points which designate the upper limit line of the audio frequency response measurement.		ALL	
CONFigure:ATQuality:AFResponse:LIMit:UPPer:LEVel <upper limit level [DB]> Establishes the level of the upper limit line for the audio frequency response measurement.	–2.9 dB to 1.0 dB to 4.0 dB	ALL	27
CONFigure:ATQuality:AFResponse:LIMit:UPPer:LEVel?		ALL	
CONFigure:ATQuality:AFResponse[:SETTings]:DEFault Resets all transmitter quality audio frequency response settings to the default values.		ALL	

[27] **Some Limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:AFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the audio frequency response measurement.	–131.0 dBm to <u>–50.0 dBm</u> to –17.0 dBm	ALL	28
CONFigure:ATQuality:AFResponse:SOURce:POWer?		ALL	
CONFigure:ATQuality:AFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the audio frequency response measurement.	2 to <u>14</u> to 100	ALL	
CONFigure:ATQuality:AFResponse:SPOints?		ALL	
CONFigure:ATQuality:AFResponse:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the audio frequency response measurement.	0 Hz to <u>2900 Hz</u> to 14,000 Hz	ALL	
CONFigure:ATQuality:AFResponse:TAPDeviation?		ALL	
CONFigure:ATQuality:AFResponse:VMAC <voice channel mobile attenuation code> Establishes the voice channel mobile attenuation code for the audio frequency response measurement.	0 to <u>2</u> to 7	ALL	
CONFigure:ATQuality:AFResponse:VMAC?		ALL	
READ[:SCALar]:ATQuality:AFResponse? Invokes the transmitter quality audio frequency response measurement and returns the measured audio peak deviation value from the mobile station (at the reference frequency). The other peak deviation values and their frequency designations are then available via the corresponding “FETCh” commands. These values denote the audio frequency response of the mobile station’s transmitter.		ACE	
FETCh:ARRay:ATQuality:AFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the Audio Frequency Response values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values is determined with CONF:ATQ:AFR:SPO?.	50 Hz to 4000 Hz	ACE	
FETCh:ARRay:ATQuality:AFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS power level obtained via the corresponding “READ” command. These values denote the audio frequency response of the mobile station’s transmitter.		ACE	
FETCh:ARRay:ATQuality:AFResponse:LIMit:FAIL? Returns the pass/fail values for the audio frequency response measurements.		ALL	

[28] The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
Call Established State – Transmitter Quality Measurements – Raw Audio Frequency Response			
CONFigure:ATQuality:RAFResponse:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> Establishes the AF generator frequency at which the 0 dB reference will be set for the measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:ATQuality:RAFResponse:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:ATQuality:RAFResponse:AFGen:VOLTage <AF generator level [V]> Established the AF generator voltage at which the 0 dB reference will be established. The voltage is in volts RMS.	0.0 V to 5.0 V	ALL	
CONFigure:ATQuality:RAFResponse:AFGen:VOLTage?		ALL	
CONFigure:ATQuality:RAFResponse:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the measurement. The mobile station's audio peak deviation modulation must be within the target audio peak deviation plus or minus this value before the test completes.	100 Hz to 290 Hz to 4000 Hz	ALL	29
CONFigure:ATQuality:RAFResponse:LIMit:ERRor:APDeviation?		ALL	
CONFigure:ATQuality:RAFResponse[:SETTings]:DEFault Resets all the parameters that effect this measurement to their nominal default values		ALL	
CONFigure:ATQuality:RAFResponse:SOURce:FREQuency:STARt <modulation start frequency [HZ]> Establishes the audio start frequency for the frequency sweep.	50 Hz to 300 Hz to 1003 Hz	ALL	29
CONFigure:ATQuality:RAFResponse:SOURce:FREQuency:STARt?		ALL	
CONFigure:ATQuality:RAFResponse:SOURce:FREQuency:STOP <modulation stop frequency [HZ]> Establishes the audio stop frequency for the frequency sweep.	1006 Hz to 3000 Hz to 4000 Hz	ALL	29
CONFigure:ATQuality:RAFResponse:SOURce:FREQuency:STOP?		ALL	
CONFigure:ATQuality:RAFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the measurement.	–17.0 dBm to –50.0 dBm to –131.0 dBm	ALL	29, 30
CONFigure:ATQuality:RAFResponse:SOURce:POWer?		ALL	

[29] Some limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).

[30] The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:RAFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the raw audio frequency response measurement.	3 to 14 to 100	ALL	
CONFigure:ATQuality:RAFResponse:SPOints?		ALL	
CONFigure:ATQuality:RAFResponse:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the audio frequency response measurement.	0 Hz to 2900 Hz to 14,000 Hz	ALL	
CONFigure:ATQuality:RAFResponse:TAPDeviation?		ALL	
CONFigure:ATQuality:RAFResponse:VMAC <voice MAC> Establishes the voice channel mobile attenuation code for the measurement.	0 to 2 to 7	ALL	
CONFigure:ATQuality:RAFResponse:VMAC?		ALL	
READ[:SCALar]:ATQuality:RAFResponse? Invokes the transmitter quality audio frequency response measurement and returns the measured audio peak deviation value from the mobile station (at the reference frequency). The other peak deviation values and their frequency designations are then available via the corresponding “FETCh” commands. These values denote the audio frequency response of the mobile station’s transmitter.		ACE	
FETCh:ARRay:ATQuality:RAFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the AFR:GRAPh:Y values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values is determined with CONF:ATQ:RAFR:SPO?.	50 Hz to 4000 Hz	ACE	
FETCh:ARRay:ATQuality:RAFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the audio frequency response of the mobile station’s transmitter. The number of data points returned is equal to the “SPOints” value.		ACE	
Call Established State – Transmitter Quality Measurements – Modulation Limiting			
CONFigure:ATQuality:MLIMiting:AFGen:VOLTage <level [V]> Controls the AF Generator level.	0.0 V to 5.0 V	ALL	
CONFigure:ATQuality:MLIMiting:AFGen:VOLTage?		ALL	
CONFigure:ATQuality:MLIMiting:ASTop <OFF | ON> Controls the auto stop function.		ALL	
CONFIgure:ATQuality:MLIMiting:ASTop?		ALL	

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
CONFigure:ATQuality:MLIMiting:LIMit:FREQuency:DEViation <deviation [HZ]> Configures the maximum permitted deviation expected.	0 Hz to 12,000 Hz to 16,000 Hz	ALL	31
CONFigure:ATQuality:MLIMiting:LIMit:FREQuency:DEViation?		ALL	
CONFigure:ATQuality:MLIMiting:LIMit:FREQuency:HIGHest <audio freq [HZ]> Controls the highest AF Generator frequency.	405 Hz to 3000 Hz to 4000 Hz	ALL	31
CONFigure:ATQuality:MLIMiting:LIMit:FREQuency:HIGHest?		ALL	
CONFIgure:ATQuality:MLIMiting:LIMit:FREQuency:LOWest <audio freq [HZ]> Controls the lowest AF Generator frequency.	50 Hz to 300 Hz to 2895 Hz	ALL	31
CONFigure:ATQuality:MLIMiting:LIMit:FREQuency:LOWest?		ALL	
CONFigure:ATQuality:MLIMiting:LIMit[:UPPer]:COUnt? Returns the number of points in the limit graph.	2	ALL	
CONFigure:ATQuality:MLIMiting:LIMit[:UPPer]:GRAPh:X? Returns the X values of the limit graph.		ALL	
CONFigure:ATQuality:MLIMiting:LIMit[:UPPer]:GRAPh:Y? Returns the Y values of the limit graph.		ALL	
CONFigure:ATQuality:MLIMiting[:SETTings]:DEFault Resets the modulation limiting parameters to default values.		ALL	
CONFigure:ATQuality:MLIMiting:SOURce:POWer <output power [DBM]> Controls the tester output power.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	32
CONFigure:ATQuality:MLIMiting:SOURce:POWer?		ALL	
CONFigure:ATQuality:MLIMiting:SPOints <number of sample points> Controls the number of sample points.	2 to 14 to 100	ALL	
CONFigure:ATQuality:MLIMiting:SPOints?		ALL	
CONFigure:ATQuality:MLIMiting:VMAC <voice MAC> Controls the voice MAC.	0 to 2 to 7	ALL	
CONFigure:ATQuality:MLIMiting:VMAC?		ALL	

[31] **Some Limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

[32] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–11: Analog manual test (signaling) commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:ATQuality:MLIMiting? Returns the maximum peak deviation measured.		ACE	
FETCh:ARRay:ATQuality:MLIMiting:GRAPh:X? Returns the result graph X values.		ACE	33
FETCh:ARRay:ATQuality:MLIMiting:GRAPh:Y? Returns the result graph Y values.		ACE	33
FETCh:ARRay:ATQuality:MLIMiting:LIMit:FAIL? Returns the pass (0) / fail (1) value for the peak deviation.		ACE	

[33] **The number of points returned is equal to the number of sample points (2 to 100).**

Analog Module Test Commands

Table F–12: Analog module test commands

Command	Values	State	Notes
Analog Module Test – General Measurements			
CONFigure:AMTest:AFGen:FREQuency[:CW | :FIXed] <AF gen frequency [HZ]> Establishes the frequency of the audio generator.	50 Hz to 1004 Hz to 4000 Hz	ALL	
CONFigure:AMTest:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:AFGen:VOLTage <AF gen level [V]> Establishes the output voltage of the audio generator (RMS Volts).	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:AFGen:VOLTage?		ALL	
CONFigure:AMTest:FREQuency:OFFSet <offset frequency in Hz [HZ]>	See note	ALL	1
CONFigure:AMTest:FREQuency:OFFSet?		ALL	
CONFigure:AMTest:FREQuency:SCCode <SAT color code> Establishes the SAT color code of base station.	0 to 1 to 2	ALL	
CONFigure:AMTest:FREQuency:SCCode?		ALL	
CONFigure:AMTest:FREQuency:VCHannel <voice channel> Establishes the voice channel value.	1 to 312 to 1023	ALL	
CONFigure:AMTest:FREQuency:VCHannel?		ALL	
CONFigure:AMTest:FREQuency:NBVCHannel <ABOVe | BELow | CENTer>		ALL	
CONFigure:AMTest:FREQuency:NBVCHannel?		ALL	
CONFigure:AMTest:HOLDoff <holdoff time [S] | OFF> Sets the Analog test holdoff time for all AF module test measurements	0.0 S to 60.0 S or OFF	ALL	2
CONFigure:AMTest:HOLDoff?		ALL	
CONFigure:AMTest:LIMit:ERRor:CFRequency <carrier freq limit [HZ]> Establishes the maximum ± error limit around the expected carrier frequency.	0 Hz to 4000 Hz to 10000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:CFRequency?		ALL	
CONFigure:AMTest:LIMit:ERRor:FREQuency:SAT <SAT frequency limit [HZ] | OFF> Establishes the maximum ± error limit around the expected SAT frequency (set by the color code).	0 Hz to 1 Hz to 500 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:FREQuency:SAT?		ALL	
CONFigure:AMTest:LIMit:ERRor: FREQuency:ST <ST frequency limit [HZ]> Establishes the maximum ± error limit around the expected ST frequency (10000 Hz).	0 Hz to 1 Hz to 500 Hz	ALL	

1 **Values are ± 50kHz from the selected voice channel frequency.**

2 **This command inserts a time delay between the start of all AF analog module tests and the start (or change) of the FM modulator or AF generator.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:LIMit:ERRor:FREQuency:ST?		ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:AUDio[:UPPer] <audio deviation limit [HZ]> Establishes the maximum value of the expected audio peak deviation.	0 Hz to 2400 Hz to 14000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:AUDio[:UPPer]?		ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:SAT <SAT deviation limit [HZ] | OFF> Establishes the maximum ± error limit around the expected SAT peak deviation (2000 Hz).	0 Hz to 200 Hz to 1000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:SAT?		ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:DSAT <DSAT deviation limit [HZ] | OFF> Establishes the maximum ± error limit around the expected DSAT peak deviation (700 Hz).	0 Hz to 70 Hz to 1000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:DSAT?			
CONFigure:AMTest:LIMit:ERRor:PDEViation:ST <ST deviation limit [HZ]> Establishes the maximum ± error limit around the expected ST peak deviation (8000 Hz).	0 Hz to 200 Hz to 1000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:ST?		ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:TOTal[:UPPer] <total deviation limit [HZ]> Establishes the maximum value of the total expected peak deviation.	0 Hz to 4000 Hz to 16000 Hz	ALL	
CONFigure:AMTest:LIMit:ERRor:PDEViation:TOTal[:UPPer]?		ALL	
CONFigure:AMTest[:SETTings]:DEFault Resets the base station parameters to the default value.		ALL	
CONFigure:AMTest:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation.	0 Hz to 12000 Hz	ALL	
CONFigure:AMTest:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:SOURce:FM:DEViation:SAT <SAT peak deviation [HZ] | OFF> Establishes the SAT peak deviation value.	See note	ALL	3
CONFigure:AMTest:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:SOURce:FREQuency:MODulation <frequency [HZ]> Establishes the base station modulation frequency.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:SOURce:FREQuency:MODulation?		ALL	

3 **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:SOURce:POWer <BS power [DBM]> Establishes the base station power level.	–17.0 dBm to –70.0 dBm to –131 dBm	ALL	4
CONFigure:AMTest:SOURce:POWer?		ALL	
CONFigure:AMTest:POWer:MSTation <expected power [DBM] | OFF> Sets the power expected from the mobile station. If off is selected, the tester autoranges to determine the power.	–80 dBm to 28.0 dBm to 39.0 dBm	ALL	5
CONFigure:AMTest:POWer:MSTation?		ALL	
READ[:SCALar]:AMTest:POWer:BBANd? Measures and returns the carrier power of the mobile station using the broadband power meter.		AMT	6
READ[:SCALar]:AMTest:POWer:MSTation? Measures and returns the carrier power of the mobile station using DSP measurement resources.		AMT	
READ[:SCALar]:AMTest:QUALity[:ALL]? Measures and returns all the parameters. The order returned is: {Carrier frequency error, Total peak deviation, SAT frequency error, SAT peak deviation, ST frequency error, ST peak deviation, and Audio peak deviation}.		AMT	
READ[:SCALar]:AMTest:QUALity:ST? Measures and returns the ST peak deviation (AMPS, TACS, ETACS, and JTACS) or DSAT peak deviation (NAMPS or NTACS).		AMT	

4 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

5 Limits are dependent on external attenuation and offset.

**6 Returns the transmit power of the mobile station as measured by the front end broadband power meter (in dBm). If the input signal is too high, the result is "INF" (infinity); if the input signal is too low, the result is "NINF" (negative infinity).
Range: 0 dBm to 41 dBm.
Error: $\leq$ 1.5 dB**

Table F–12: Analog module test commands (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>READ[:SCALar]:AMTest:NQUAlity[:ALL]?

Returns, in the following order, the narrowband voice channel frequency error, voice channel total peak deviation, DSAT sequence, DSAT peak deviation, and audio peak deviation.</td><td>See note</td><td>AMT</td><td>7</td></tr>
<tr><td>FETCh[:SCALar]:AMTest:QUALity:LIMit:FAIL[:ALL]?

Returns the pass(0)/fail(1) value for all measurements on page. The order of measurements is the same as for READ:AMT:QUAL?.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>FETCh[:SCALar]:ACENquality:LIMit:FAIL[:ALL]?</td><td>See note</td><td>ALL</td><td>8</td></tr>
<tr><td colspan="4">Analog Module Test – MS Carrier Power</td></tr>
<tr><td>READ[:SCALar]:AMTest:POWer:MSTation?</td><td></td><td>AMT</td><td></td></tr>
<tr><td colspan="4">Analog Module Test – Receiver Quality Measurements – Sensitivity</td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:ASTop <OFF | ON>

Establishes the auto stop state for the sensitivity measurement.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:ASTop?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:AVERage:COUNt <averaging interval></td><td>1 to 100</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:AVERage:COUNt?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:LIMit:SINad <sinad limit [DB]>

Establishes the limit for the sensitivity measurement's SINAD value. The SINAD must be this value or greater.</td><td>0.0 dB to
12.0 dB to
32.0 dB</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:LIMit:SINad?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity[:SETTings]:DEFault

Resets all receiver quality sensitivity settings to the default values.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:MODulation
<peak deviation [HZ]>

Establishes the base station modulation peak deviation for the sensitivity measurement.</td><td>0 Hz to 8000 Hz
to 8800 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:MODulation?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:SAT
<SAT deviation [HZ] | OFF>

Establishes the base station SAT deviation for the sensitivity measurement.</td><td>See note</td><td>ALL</td><td>9</td></tr>
</table>

7 The DSAT sequence returned by this command is one of the following ASCII strings: "2556CB", "255B2B", "256A9B", "25AD4D", "26AB2B", "26B2AD", "2969AB", or "-". If the actual 24-bit DSAT sequence measured by the tester matches one of the seven standard DSAT sequences with either 0 or 1 bit errors, the corresponding standard string (not the actual sequence) will be returned. If one of the seven DST sequences (with either 0 or 1 bit error) is measured, the DSAT sequence which is the inverse of the DST will be returned. If the measured subaudible bitstream does not contain one of the seven DSAT or seven DST patterns with either 0 or 1 bit error, then the dash string ("-") will be returned.

8 The third value returned will always be 0 (zero), since there is currently no way to set a DSAT sequence tolerance.

9 Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.

Table F–12: Analog module test commands (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:SAT?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF>

Establishes the base station DSAT deviation for the sensitivity measurement.</td><td>0 Hz to 700 Hz to 4000 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FM:DEViation:DSAT?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FREQuency:MODulation <modulation frequency [HZ]>

Establishes the base station modulation frequency for the sensitivity measurement.</td><td>1003 Hz to 1004 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:FREQuency:MODulation?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:POWer <power [DBM]>

Establishes the base station power level for the sensitivity measurement.</td><td>–131.0 dBm to –116.0 dBm to –17.0 dBm</td><td>ALL</td><td>10</td></tr>
<tr><td>CONFigure:AMTest:RQUality:SENSitivity:SOURce:POWer?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>READ[:SCALar]:AMTest:RQUality:SENSitivity?

Measures and returns a SINAD value as an indication of sensitivity of the mobile station’s receiver.</td><td></td><td>AMT</td><td></td></tr>
<tr><td>FETCh[:SCALar]:AMTest:RQUality:SENSitivity:LIMit:FAIL?

Returns the pass/fail value for the sensitivity measurement.</td><td></td><td>AMT</td><td></td></tr>
<tr><td colspan="4">Analog Module Test – Receiver Quality Measurements – Hum/Noise</td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:AFGen:FREQuency[:CW | :FIXed] <af generator frequency [HZ]>

Establishes the frequency at which the hum/noise test will be performed.</td><td>300 Hz to 1100 Hz to 3000 Hz</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:AFGen:FREQuency[:CW | :FIXed]?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:AFGen:VOLTage <af generator level [V]>

Establishes the AF Generator voltage level for the hum/noise measurement. The audio peak deviation modulation level of the mobile station is determined by this level.</td><td>0.0 V to 5.0 V</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:AFGen:VOLTage?</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:ASTop <OFF | ON>

Establishes the auto stop state for the hum/noise measurement.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:AMTest:RQUality:HNOise:ASTop?</td><td></td><td>ALL</td><td></td></tr>
</table>

10 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:HNOise:LIMit <hum/noise limit [DB]> Establishes the limit for hum/noise measurement. Hum/noise must be this level or lower.	0.0 dB to –32.0 dB to –80.0 dB	ALL	11
CONFigure:AMTest:RQUality:HNOise:LIMit?		ALL	
CONFigure:AMTest:RQUality:HNOise:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the hum/noise measurement. Audio peak deviation must be within plus or minus this amount of the target audio peak deviation.	100 Hz to 800 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:HNOise:LIMit:ERRor:APDeviation?		ALL	
CONFigure:AMTest:RQUality:HNOise[:SETTings]:DEFault Resets all receiver quality hum/noise settings to the default value.		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the hum/noise measurement.	0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:SAT <SAT peak deviation [HZ] | OFF> Establishes the base station SAT deviation for the hum/noise measurement.	See note	ALL	12
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:RQUality:HNoise:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:HNoise:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FREQuency:MODulation <modulation frequency [HZ]> Establishes the base station modulation frequency for the hum/noise measurement.		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FREQuency:MODulation?		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:POWer <power [DBM]> Establishes the base station power level for the hum/noise measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	13

[11] **The Rx Hum/Noise minimum limit values changed from –50.0 dB to –75 dB in the 3.0.1.1E release.**

[12] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

[13] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:HNOise:SOURce:POWer?		ALL	
CONFigure:AMTest:RQUality:HNOise:TAPDeviation <target audio peak deviation [HZ]> Establishes target audio peak deviation for hum/noise measurement. Audio Peak Deviation must approach this value and be within range specified by audio peak deviation error range.	0 Hz to 8000 Hz to 14000 Hz	ALL	
CONFigure:AMTest:RQUality:HNOise:TAPDeviation?		ALL	
READ[:SCALar]:AMTest:RQUality:HNOise[:ALL]? Measures and returns the relative level of hum/noise (dB), and the current audio peak deviation (Hz), as an indication of the residual audio output of the mobile station's receiver.		AMT	
FETCh[:SCALar]:AMTest:RQUality:HNOise:LIMit:FAIL[:ALL]? Returns the pass/fail values for the hum/noise measurement.		AMT	
Analog Module Test – Receiver Quality Measurements – Harmonic Distortion			
CONFigure:AMTest:RQUality:HDIStortion:ASTop <OFF | ON> Establishes the auto stop state for the harmonic distortion measurement.		ALL	
CONFigure:AMTest:RQUality:HDIStortion:ASTop?		ALL	
CONFigure:AMTest:RQUality:HDIStortion:LIMit <harmonic distortion limit in percent> Establishes the limit for the harmonic distortion measurement. The harmonic distortion must be this value or lower.	0 % to 5 % to 30 %	ALL	
CONFigure:AMTest:RQUality:HDIStortion:LIMit?		ALL	
CONFigure:AMTest:RQUality:HDIStortion[:SETTings]:DEFault Resets all the parameters to their default values for this measurement.		ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:MODulation <modulation peak deviation [HZ]> Establishes the base station modulation amplitude in peak Hertz.	0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the amplitude of the Supervisory Audio Tone in peak Hertz.	See note	ALL	14
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FM:DEViation:DSAT?		ALL	

[14] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FREQuency:MODulation <modulation frequency [HZ]> The frequency of the fundamental tone used In the harmonic distortion measurement. May not be changed.	1004 Hz	ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:FREQuency:MODulation?		ALL	
CONFigure:AMTest:RQUality:HDIStortion:SOURce:POWer <power [DBM]> Establishes the base station power level for the harmonic distortion measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	15
CONFigure:AMTest:RQUality:HDIStortion:SOURce:POWer?		ALL	
READ[:SCALar]:AMTest:RQUality:HDIStortion? Measures and returns a value for the harmonic distortion (in %) as ratio of the harmonic components of the fundamental frequency to the fundamental frequency.		AMT	
FETCh[:SCALar]:AMTest:RQUality:HDIStortion:LIMit:FAIL? Returns the pass / fail value for the harmonic distortion measurement.		AMT	
Analog Module Test – Receiver Quality Measurements – Audio Muting			
CONFigure:AMTest:RQUality:AMUTing:LIMit:AMUTing <muting limit [DB]> Establishes the limit for the audio muting measurement. Audio muting must be this level or lower.	0.0 dB to –40.0 dB to –60.0 dB	ALL	
CONFigure:AMTest:RQUality:AMUTing:LIMit:AMUTing?		ALL	
CONFigure:AMTest:RQUality:AMUTing[:SETTings]:DEFault Resets all receiver quality muting settings to the default values.		ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:MODulation <deviation [HZ]> Establishes the frequency at which the muting test will be performed.	0 Hz to 8000 Hz to 8800 Hz	ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the amplitude of the Supervisory Audio Tone in peak Hertz.	See note	ALL	16
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:SAT?		ALL	

[15] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

[16] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FREQuency:MODulation <modulation reference frequency [HZ]> Establishes the base station modulation amplitude in peak Hertz.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:FREQuency:MODulation?		ALL	
CONFigure:AMTest:RQUality:AMUTing:SOURce:POWer <power [DBM]> Establishes the base station power level for the measurement.	–17.0 dBm to –50.0 dBm to –131.0 dBm	ALL	17
CONFigure:AMTest:RQUality:AMUTing:SOURce:POWer?		ALL	
READ[:SCALar]:AMTest:RQUality:AMUTing[:ALL]? Invokes the Module Test Receiver Quality Audio Muting measurement and returns the filtered audio level (RMS), the unfiltered audio level (RMS), and muting level, in order, from the mobile station.		AMT	18
FETCh[:SCALar]:AMTest:RQUality:AMUTing:LIMit:FAIL? Returns the pass/fail indication for the muting level.		AMT	
Analog Module Test – Receiver Quality Measurements – Audio Frequency Response			
CONFigure:AMTest:RQUality:AFResponse:ASTop <ON | OFF>		ALL	
CONFigure:AMTest:RQUality:AFResponse:ASTop?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:BOTH:FREQuency:HIGHest <freq [HZ]> Establishes the highest frequency used in both of the limit lines.	435 Hz to 3000 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:BOTH:FREQuency:HIGHest?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:BOTH:FREQuency:LOWest <freq [HZ]> Establishes the lowest frequency used in both of the limit lines.	50 Hz to 240 Hz to 365 Hz	ALL	

17 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

18 In order to arrive at an audio muting level, a preliminary call of the measurement must be made, establishing the measured audio level as the audio level reference. The mobile’s audio muting function must then be invoked, and a subsequent call to the measurement made. The muting level will be computed as the difference between the audio level of the previous measurement (the ”audio level reference”) and the audio level of the current measurement. The audio muting level of this second call will be the muting level achieved by the mobile’s audio mute function. The audio muting level of the preliminary call is invalid, and will likely be returned as ”NAN”.

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:AFResponse:LIMit:BOTH:FREQuency:LOWest?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:COUNt? Query only. Returns the number (count) of points that designate the lower limit line.	6	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:HIGHest <freq [HZ]> Establishes the highest middle frequency used in the lower limit line.	435 Hz to 2400 Hz to 2965 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:HIGHest?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest <freq [HZ]> Establishes the lowest middle frequency used in the lower limit line.	275 Hz to 400 Hz to 2365 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle:LOWest?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:GRAPh:X? Query only. Returns the horizontal (X–axis) graph positions for each of the points which designate the lower limit line.	50 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph positions for each of the points which designate the lower limit line.		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:LEVel:LOWer <level [DB]> Establishes the lower level of the lower limit line.	–150.0 dB to –6.0 dB to 0.9 dB	ALL	19
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:LEVel:LOWer?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:LEVel:UPPer <level [DB]> Establishes the upper level of the lower limit line.	–150.0 dB to –3.0 dB to 0.9 dB	ALL	19
CONFigure:AMTest:RQUality:AFResponse:LIMit:LOWer:LEVel:UPPer?		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:UPPer:COUNt? Query only. Returns the number (count) of points that designate the upper limit line.	4	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:UPPer:GRAPh:X? Query only. Returns the horizontal (X–axis) graph positions for each of the points which designate the upper limit line.	50 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:UPPer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph positions for each of the points which designate the upper limit line.		ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:UPPer:LEVel <level [DB]> Establishes the level of the upper limit line.	–2.9 dB to 1.0 dB to 4.0 dB	ALL	
CONFigure:AMTest:RQUality:AFResponse:LIMit:UPPer:LEVel?		ALL	

19 **Some limit values are dynamic and depend on the settings for associated limits on the same axis.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:RQUality:AFResponse[:SETTings]:DEFault Resets all receiver quality audio frequency response settings to the default values.		ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:MODulation <deviation [HZ]> Establishes the base station modulation peak deviation for this test. This is defines the 0 dB reference point.	0 Hz to 2900 Hz to 8800 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:SAT <deviation [HZ] | OFF> Establishes the base station SAT peak deviation for this test.	See note	ALL	20
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FREQuency:MODulation <freq [HZ]> Establishes the base station modulation frequency for this test. This is defines the 0 dB reference point.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:FREQuency:MODulation?		ALL	
CONFigure:AMTest:RQUality:AFResponse:SOURce:POWer <power [DBM]>	–17.0 dBm to –50.0 dBm to 131.0 dBm	ALL	21
CONFigure:AMTest:RQUality:AFResponse:SOURce:POWer?		ALL	
CONFigure:AMTest:RQUality:AFResponse:SPOints <number of points> Establishes the number of sample points to be taken during the measurement.	2 to 14 to 100	ALL	
CONFigure:AMTest:RQUality:AFResponse:SPOints?		ALL	
READ[:SCALar]:AMTest:RQUality:AFResponse? Invokes the receiver quality audio frequency response measurement and returns the MS audio level in volts RMS at the reference frequency. Other values relative to the MS audio level (in dB), and their frequency designations, are then available via the corresponding “FETCh” command. These values denote the audio frequency response of the MS receiver.		AMT	

[20] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

[21] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
FETCh:ARRay:AMTest:RQUality:AFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the AFR:GRAPh:Y values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values is determined with CONF:AMT:TQU:AFR:SPO?.	50 Hz to 4000 Hz	AMT	
FETCh:ARRay:AMTest:RQUality:AFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the auto frequency response of the mobile station’s receiver. The number of values returned is equal to the number of sample points set by the user (2 to 100 with 14 the default).		AMT	
FETCh:ARRay:AMTest:RQUality:AFResponse:LIMit:FAIL? Returns the pass (0) or fail (1) results from the measurement, based upon the limit lines. Returns 8 data points, corresponding to the frequency regions 0 Hz to 499 Hz, 500 Hz to 999 Hz, ... , 3499 Hz to 4000 Hz.		AMT	
Analog Module Test – Receiver Quality Measurements – Raw Audio Frequency Response			
CONFigure:AMTest:RQUality:RAFResponse[:SETTings]:DEFault Resets all receiver quality raw audio frequency response settings to the default values.		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:MODulation <peak deviation [HZ]> Establishes the base station modulation peak deviation for the raw audio frequency response measurement.	0 Hz to 2900 Hz to 8800 Hz	ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:MODulation?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the amplitude of the Supervisory Audio Tone in peak Hertz.	See note	ALL	22
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FM:DEViation:DSAT?		ALL	

[22] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTestRQUality:RAFResponse:SOURce:FREQuency:MODulation <modulation reference frequency [HZ]> Establishes the modulation reference frequency for the raw audio frequency response measurement. All measurements are referenced to this frequency's measured level.	300 Hz to 1004 Hz to 2998 Hz	ALL	23
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FREQuency:MODulation?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FREQuency:STARt <modulation start frequency [HZ]> Establishes the modulation start frequency for the raw audio frequency response measurement.	50 Hz to 240 Hz to 1003 Hz	ALL	24
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FREQuency:STARt?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FREQuency:STOP <modulation stop frequency [HZ]> Establishes the modulation stop frequency for the raw audio frequency response measurement.	1006 Hz to 3000 Hz to 4000 Hz	ALL	24
CONFigure:AMTest:RQUality:RAFResponse:SOURce:FREQuency:STOP?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the raw audio frequency response measurement.	–131.0 dBm to –50.0 dBm to –17.0 dBm	ALL	25
CONFigure:AMTest:RQUality:RAFResponse:SOURce:POWer?		ALL	
CONFigure:AMTest:RQUality:RAFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the raw audio frequency response measurement.	3 to 14 to 100	ALL	
CONFigure:AMTest:RQUality:RAFResponse:SPOints?		ALL	

[23] **Some limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

[24] **Some limit values are dynamic and depend on the settings for associated limits (limit settings on the same axis of the graph).**

[25] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:AMTest:RQUality:RAFResponse? Invokes the receiver quality raw audio frequency response measurement and returns the absolute MS audio level (dBm) at the modulation reference frequency. Other values relative to this audio level, and their frequency designations, are then available via the corresponding “FETCh” commands. These values denote the raw audio frequency response of the mobile station’s receiver. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		AMT	
FETCh:ARRay:AMTest:RQUality:RAFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the audio frequency response values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		AMT	
FETCh:ARRay:AMTest:RQUality:RAFResponse:GRAPh:Y? Returns the raw audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the raw audio frequency response of the mobile station’s receiver. The number of values returned is equal to the number of sample points set by the user (3 to 100 with 14 the default).		AMT	
Analog Module Test – Transmitter Quality Measurements – Hum/Noise			
CONFigure:AMTest:TQUality:HNOise:AFGen:FREQuency[:CW | :FIXed] <af generator frequency [HZ]> Establishes the AF generator frequency for the hum/noise measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:TQUality:HNOise:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:TQUality:HNOise:AFGen:VOLTage <af generator level [V]> Establishes the AF generator voltage level for the hum/noise measurement. Specifying a level turns the AF generator on; specifying 0 V turns it off. Audio peak deviation in the mobile station is determined by this level.	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:TQUality:HNOise:AFGen:VOLTage?		ALL	
CONFigure:AMTest:TQUality:HNOise:ASTop <OFF | ON> Establishes the auto stop state for the hum/noise measurement.		ALL	
CONFigure:AMTest:TQUality:HNOise:ASTop?		ALL	
CONFigure:AMTest:TQUality:HNOise:LIMit <hum/noise [DB]> Establishes the limit for the hum/noise measurement. The hum/noise must be this level or lower.	–50.0 dB to –32.0 dB to 0.0 dB	ALL	
CONFigure:AMTest:TQUality:HNOise:LIMit?		ALL	
CONFigure:AMTest:TQUality:HNOise:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the hum/noise measurement. Audio peak deviation must be within plus or minus this amount of the target audio peak deviation.	100 Hz to 800 Hz to 4000 Hz	ALL	

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:HNOise:LIMit:ERRor:APDeviation?		ALL	
CONFigure:AMTest:TQUality:HNOise[:SETTings]:DEFault Resets all transmitter quality settings to the default values for the hum/noise measurement.		ALL	
CONFigure:AMTest:TQUality:HNOise:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the base station SAT deviation for the hum/noise measurement.	See note	ALL	26
CONFigure:AMTest:TQUality:HNOise:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:TQUality:HNOise:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to <u>700 Hz</u> to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:HNOise:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to <u>700 Hz</u> to 4000 Hz	ALL	
CONFigure:AMTest:RQUality:HNOise:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:TQUality:HNOise:SOURce:POWer <power [DBM]> Establishes the base station power level for the hum/noise measurement.	–131.0 dBm to <u>–50.0 dBm</u> to –17.0 dBm	ALL	27
CONFigure:AMTest:TQUality:HNOise:SOURce:POWer?		ALL	
CONFigure:AMTest:TQUality:HNOise:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the hum/noise measurement. Audio peak deviation must approach this value and be within the range specified by the audio peak deviation error range.	0 Hz to <u>8000 Hz</u> to 14000 Hz	ALL	
CONFigure:AMTest:TQUality:HNOise:TAPDeviation?		ALL	
CONFigure:AMTest:TQUality:HNOise:EXPandor <OFF | <u>ON</u>> Enables or disables the base station receiver's audio expandor for this test.		ALL	
CONFigure:AMTest:TQUality:HNOise:EXPandor?		ALL	

26 Valid ranges are: 0 Hz to <u>2000 Hz</u> to 4000 Hz for AMPS; 0 Hz to <u>1700 Hz</u> 4000 Hz for TACS, ETACS, and NTACS.

27 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:AMTest:TQUality:HNOise[:ALL]? Measures and returns the relative level of hum/noise (dB) and the current audio peak deviation (Hz) as an indication of the residual FM generated by the mobile station's transmitter.		AMT	
FETCh[:SCALar]:AMTest:TQUality:HNOise:LIMit:FAIL[:ALL]? Returns the pass/fail values for the hum/noise level and audio peak deviation measurements.		AMT	
FETCh[:SCALar]:AMTest:TQUality:HNOise:MMValue? Returns the **M**inimum **M**easurement **V**alue for the most recent Analog Module Test – Transmitter Quality – Hum/Noise Measurement		AMT	
Analog Module Test – Transmitter Quality Measurements – Modulation Noise/Distortion			
CONFigure:AMTest:TQUality:MNDistortion:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> The AF Generator frequency for modulation noise and distortion test . May not be changed.	1004 Hz	ALL	
CONFigure:AMTest:TQUality:MNDistortion:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:AFGen:VOLTage <AF generator level [V]> Establishes the AF Generator voltage level for the modulation noise/distortion measurement. The audio peak deviation modulation level of the mobile station is determined by this level.	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:TQUality:MNDistortion:AFGen:VOLTage?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:ASTop <OFF | ON> Establishes the auto stop state for the modulation noise/distortion measurement.		ALL	
CONFigure:AMTest:TQUality:MNDistortion:ASTop?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:LIMit <modulation noise/distortion limit in percent> Establishes the AD Generator voltage level for the measurement. Results must be no greater than this value or an error condition will be set.	0 % to 5 % to 30 %	ALL	
CONFigure:AMTest:TQUality:MNDistortion:LIMit?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the measurement. The mobile station's audio peak deviation modulation must be within the target audio peak deviation plus or minus this value before the test completes.	100 Hz to 800 Hz to 3200 Hz	ALL	
CONFigure:AMTest:TQUality:MNDistortion:LIMit:ERRor:APDeviation?		ALL	
CONFigure:AMTest:TQUality:MNDistortion[:SETTings]:DEFault Resets all the parameters that effect this measurement to their nominal default values.		ALL	

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:MNDistortion:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the base station SAT deviation for this test.	See note	ALL	28
CONFigure:AMTest:TQUality:MNDistortion:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:MNDistortion:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:SOURce:POWer <power [DBM]> Establishes the base station power level for this measurement.	–17.0 dBm to –50.0 dBm to –131.0 dBm	ALL	29
CONFigure:AMTest:TQUality:MNDistortion:SOURce:POWer?		ALL	
CONFigure:AMTest:TQUality:MNDistortion:TAPDeviation <target audio peak deviation [HZ]> The nominal value of the audio peak deviation the mobile station must transmit (plus or minus the audio peak deviation error range) before the test will return results.	0 Hz to 8000 Hz to 14000 Hz	ALL	
CONFigure:AMTest:TQUality:MNDistortion:TAPDeviation?		ALL	
READ[:SCALar]:AMTest:TQUality:MNDistortion[:ALL]? Measures and returns the modulation noise/distortion (%) and the current audio peak deviation (Hz) to the mobile station's transmitter.		AMT	
FETCh[:SCALar]:AMTest:TQUality:MNDistortion:LIMit:FAIL[:ALL]? Returns the pass / fail values for the measurement results audio peak deviation.		AMT	
Analog Module Test – Transmitter Quality Measurements – Audio Muting			
CONFigure:AMTest:TQUality:AMUTing:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> Establishes the frequency at which the muting test will be performed.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:TQUality:AMUTing:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:TQUality:AMUTing:AFGen:VOLTage <AF generator level [V]> Establishes the AF Generator voltage level for the muting measurement. The audio peak deviation modulation level of the mobile station is determined by this level.	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:TQUality:AMUTing:AFGen:VOLTage?		ALL	

[28] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

[29] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:AMUTing:LIMit <muting limit [DB]> Establishes the limit for the audio muting measurement. Audio muting must be this level or lower.	0.0 dB to –40.0 dB to –60.0 dB	ALL	
CONFigure:AMTest:TQUality:AMUTing:LIMit?		ALL	
CONFigure:AMTest:TQUality:AMUTing:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the measurement. The mobile station's audio peak deviation modulation must be within the target audio peak deviation plus or minus this value before the test completes.	100 Hz to 800 Hz to 3200 Hz	ALL	
CONFigure:AMTest:TQUality:AMUTing:LIMit:ERRor:ADPeviation?		ALL	
CONFigure:AMTest:TQUality:AMUTing[:SETTings]:DEFault Resets all transmitter quality muting settings to the default values.		ALL	
CONFigure:AMTest:TQUality:AMUTing:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the amplitude of the Supervisory Audio Tone in peak Hertz.	See note	ALL	30
CONFigure:AMTest:TQUality:AMUTing:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:TQUality:AMUTing:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF> Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:AMUTing:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:TQUality:AMUTing:SOURce:POWer <power [DBM]> Establishes the base station power level for the measurement.	–17.0 dBm to –50.0 dBm to –131.0 dBm	ALL	31
CONFigure:AMTest:TQUality:AMUTing:SOURce:POWer?		ALL	
CONFigure:AMTest:TQUality:AMUTing:TAPDeviation <target audio peak deviation [HZ]> The nominal value of the audio peak deviation the mobile station must transmit (plus or minus the audio peak deviation error range) before the test will return results.	0 Hz to 8000 Hz to 14,000 Hz	ALL	
CONFigure:AMTest:TQUality:AMUTing:TAPDeviation?		ALL	

30 **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

31 **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
READ[:SCALar]:AMTest:TQUality:AMUTing[:ALL]? Invokes the Module Test Transmitter Quality Audio Muting measurement and returns the filtered audio deviation (RMS), the audio peak deviation, and muting level, in order, from the mobile station.		AMT	32
FETCh[:SCALar]:AMTest:TQUality:AMUTing:LIMit:FAIL[:ALL]? Returns the pass/fail information for the audio peak deviation and muting level, in order.		AMT	
Analog Module Test – Transmitter Quality Measurements – Audio Frequency Response			
CONFigure:AMTest:TQUality:AFResponse:AFGen:FREQuency[:CW | :FIXed] <freq [HZ]> Establishes the AF generator frequency at which the 0 dB reference will be set for the measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:TQUality:AFResponse:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:TQUality:AFResponse:AFGen:VOLTage <level [V]> Established the AF generator voltage at which the the 0 dB reference will be established. The voltage is in peak RMS.	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:TQUality:AFResponse:AFGen:VOLTage?		ALL	
CONFigure:AMTest:TQUality:AFResponse:ASTop <OFF | ON> Establishes the auto stop state for the audio frequency response measurement.		ALL	
CONFigure:AMTest:TQUality:AFResponse:ASTop?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:BOTH:FREQuency:HIGHest <freq [HZ]> Establishes the highest frequency used in both of the limit lines of the audio frequency response measurement.	405 Hz to 4000 Hz to 4000 Hz	ALL	33
CONFigure:AMTest:TQUality:AFResponse:LIMit:BOTH:FREQuency:HIGHest?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:BOTH:FREQuency:LOWest <freq [HZ]> Establishes the lowest frequency used in both of the limit lines of the audio frequency response measurement.	50 Hz to 300 Hz to 2895 Hz	ALL	33
CONFigure:AMTest:TQUality:AFResponse:LIMit:BOTH:FREQuency:LOWest?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:ERRor:APDeviation <deviation range [HZ]> Establishes the audio peak deviation error range for the measurement. The mobile station's audio peak deviation modulation must be within the target audio peak deviation plus or minus this value before the test completes.	100 Hz to 290 Hz to 4000 Hz	ALL	33

[32] **In order to arrive at an audio muting level, a preliminary call of the measurement must be made, establishing the measured audio peak deviation as the audio peak deviation reference. The mobile's voice path muting must then be enabled, and a subsequent call to the measurement made. The muting level will be computed as the difference between the audio peak deviation of the previous measurement (the "audio peak deviation reference") and the audio peak deviation of the current measurement. The audio muting level of this second call will be the muting level achieved by the mobile's voice path muting. The audio muting level of the preliminary call is invalid, and will likely be returned as "NAN".**

[33] **Some limit values are dynamic and depend on settings for associated limits (limit settings on the same axis of the graph).**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:AFResponse:LIMit:ERRor:APDeviation?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle <freq [HZ]> Establishes the middle frequency used in the lower limit line of the audio frequency response measurement.	405 Hz to 3000 Hz to 3895 Hz	ALL	33
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:FREQuency:MIDDle?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:COUNt? Query only. Returns the number (count) of points which designate the lower limit line of the audio frequency response measurement.	6	ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:GRAPh:X? Query only. Returns the horizontal (X–axis) graph position for each of the points which designate the lower limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph position for each of the points which designate the lower limit line of the audio frequency response measurement.		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:LEVel:LOWer <level [DB]> Establishes the lower level of the lower limit line for the audio frequency response measurement.	–150.0 dB to –12.0 dB to 0.9 dB	ALL	33
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:LEVel:LOWer?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:LEVel:UPPer <level [DB]> Establishes the upper level of the lower limit line for the audio frequency response measurement.	–150.0 dB to –3.0 dB to 0.9 dB	ALL	33
CONFigure:AMTest:TQUality:AFResponse:LIMit:LOWer:LEVel:UPPer?		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:UPPer:COUNt? Query only. Returns the number (count) of points which designate the upper limit line for the audio frequency response measurement.	4	ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:UPPer:GRAPh:X? Query only. Returns the horizontal (X–axis) graph position for each of the points which designate the upper limit line of the audio frequency response measurement.	50 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:UPPer:GRAPh:Y? Query only. Returns the vertical (Y–axis) graph position for each of the points which designate the upper limit line of the audio frequency response measurement.		ALL	
CONFigure:AMTest:TQUality:AFResponse:LIMit:UPPer:LEVel <level [DB]> Establishes the level of the upper limit line for the audio frequency response measurement.	–2.9 dB to –3.0 dB to 4.0 dB	ALL	34
CONFigure:AMTest:TQUality:AFResponse:LIMit:UPPer:LEVel?		ALL	

[34] **Some limit values are dynamic and depend on settings for associated limits (limit settings on the same axis of the graph).**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:AFResponse[:SETTings]:DEFault Returns configuration parameters to their default value.		ALL	
CONFigure:AMTest:TQUality:AFResponse:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF Establishes the base station SAT deviation for this test.	See note	ALL	35
CONFigure:AMTest:TQUality:AFResponse:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:TQUality:AFResponse:SOURce:FM:DEViation:DSAT <DSAT deviation [HZ] | OFF Establishes the base station DSAT deviation for this test.	0 Hz to 700 Hz to 4000 Hz	ALL	
CONFigure:AMTest:TQUality:AFResponse:SOURce:FM:DEViation:DSAT?		ALL	
CONFigure:AMTest:TQUality:AFResponse:SPOints <number of points> Establishes the number of sample points to be taken during the audio frequency response measurement.	2 to 14 to 100	ALL	
CONFigure:AMTest:TQUality:AFResponse:SPOints?		ALL	
CONFigure:AMTest:TQUality:AFResponse:TAPDeviation <target deviation [HZ]> Establishes the target audio peak deviation for the audio frequency response measurement.	0 Hz to 2900 Hz to 14,000 Hz	ALL	
CONFigure:AMTest:TQUality:AFResponse:TAPDeviation?		ALL	
READ[:SCALar]:AMTest:TQUality:AFResponse? Invokes the module test transmitter quality audio frequency response measurement and returns the measured audio peak deviation value from the mobile station (at the reference frequency). The other peak deviation values and their frequency designations are then available via the corresponding “FETCh” commands. These values denote the audio frequency response of the mobile station’s transmitter.		AMT	
FETCh:ARRay:AMTest:TQUality:AFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the AFR:GRAPh:Y values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values is determined with CONF:ATQ:AFR:SPO?.	50 Hz to 4000 Hz	AMT	
FETCh:ARRay:AMTest:TQUality:AFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS power level obtained via the corresponding “READ” command. These values denote the audio frequency response of the mobile station’s transmitter. The number of data points returned is equal to the “SPOints” value.		AMT	
FETCh:ARRay:AMTest:TQUality:AFResponse:LIMit:FAIL? Returns the pass (0) or fail (1) results from the measurement, based upon the limit lines. Returns 8 data points, corresponding to the frequency regions 0 Hz to 499 Hz, 500 Hz to 999 Hz, ... , 3499 Hz to 4000 Hz.		AMT	

[35] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:AMTest:TQUality:AFResponse:LIMit:FAIL? Returns the pass(0)/fail(1) indication for the measured audio peak deviation.		AMT	
Analog Module Test – Transmitter Quality Measurements – Raw Audio Frequency Response			
CONFigure:AMTest:TQUality:RAFResponse:AFGen:FREQuency[:CW | :FIXed] <AF generator frequency [HZ]> Establishes the AF generator frequency at which the 0 dB reference will be set for the measurement.	300 Hz to 1004 Hz to 3000 Hz	ALL	
CONFigure:AMTest:TQUality:RAFResponse:AFGen:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:AFGen:VOLTage <AF generator level [V]> Established the AF generator voltage at which the 0 dB reference will be established. The voltage is in volts RMS.	0.0 V to 5.0 V	ALL	
CONFigure:AMTest:TQUality:RAFResponse:AFGen:VOLTage?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:LIMit:ERRor:APDeviation <audio peak deviation error range [HZ]> Establishes the audio peak deviation error range for the measurement. The mobile station's audio peak deviation modulation must be within the target audio peak deviation plus or minus this value before the test completes.	100 Hz to 290 Hz to 4000 Hz	ALL	36
CONFigure:AMTest:TQUality:RAFResponse:LIMit:ERRor:APDeviation?		ALL	
CONFigure:AMTest:TQUality:RAFResponse[:SETTings]:DEFault Resets all transmitter quality audio frequency response test settings to their default values.		ALL	
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FM:DEViation:SAT <SAT deviation [HZ] | OFF> Establishes the amplitude of the Supervisory Audio Tone in peak Hertz.	See note	ALL	37
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FM:DEViation:SAT?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FREQuency:STARt <modulation start frequency [HZ]> Establishes the audio start frequency for the frequency sweep.	50 Hz to 300 Hz to 1003 Hz	ALL	38
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FREQuency:STARt?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FREQuency:STOP <modulation stop frequency [HZ]> Establishes the audio stop frequency for the frequency sweep.	1006 Hz to 3000 Hz to 4000 Hz	ALL	38
CONFigure:AMTest:TQUality:RAFResponse:SOURce:FREQuency:STOP?		ALL	

[36] **Some limit values are dynamic and depend on settings for associated limits (limit settings on the same axis of the graph).**

[37] **Valid ranges are: 0 Hz to 2000 Hz to 4000 Hz for AMPS; 0 Hz to 1700 Hz 4000 Hz for TACS, ETACS, and NTACS.**

[38] **Some limit values are dynamic and depend on settings for associated limits (limit settings on the same axis of the graph).**

Table F–12: Analog module test commands (cont.)

Command	Values	State	Notes
CONFigure:AMTest:TQUality:RAFResponse:SOURce:POWer <power [DBM]> Establishes the base station power level for the measurement.	–17.0 dBm to –50.0 dBm to –131.0 dBm	ALL	39
CONFigure:AMTest:TQUality:RAFResponse:SOURce:POWer?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:SPOints <sample points> Establishes the number of sample points to be taken during the raw audio frequency response measurement.	3 to 14 to 100	ALL	
CONFigure:AMTest:TQUality:RAFResponse:SPOints?		ALL	
CONFigure:AMTest:TQUality:RAFResponse:TAPDeviation <target audio peak deviation [HZ]> Establishes the target audio peak deviation for the audio frequency response measurement.	0 Hz to 2900 Hz to 14,000 Hz	ALL	
CONFigure:AMTest:TQUality:RAFResponse:TAPDeviation?		ALL	
READ[:SCALar]:AMTest:TQUality:RAFResponse? Invokes the module test transmitter quality audio frequency response measurement and returns the measured audio peak deviation value from the mobile station (at the reference frequency). The other peak deviation values and their frequency designations are then available via the corresponding “FETCh” commands. These values denote the audio frequency response of the mobile station’s transmitter.		AMT	
FETCh:ARRay:AMTest:TQUality:RAFResponse:GRAPh:X? Returns the frequency designations (Hz) which pair with the AFR:GRAPh:Y values obtained via the corresponding “FETCh” command. These values denote the frequencies at which the audio frequency response values were obtained. The number of values is determined with CONF:ATQ:RAFR:SPO?.	50 Hz to 4000 Hz	AMT	
FETCh:ARRay:AMTest:TQUality:RAFResponse:GRAPh:Y? Returns the audio frequency response values (dB) relative to the MS audio level obtained via the corresponding “READ” command. These values denote the audio frequency response of the mobile station’s transmitter. The number of data points returned is equal to the “SPOints” value.		AMT	

39 The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.

TDMA IS-136-A Base Station Commands

Table F–13: TDMA IS-136-A signaling configuration

Command	Values	State	Notes
CONFigure:DAMS:BSTation:PDURation <Value> Sets the paging duration. This is the period of time the base station sends a paging message over the control channel to the mobile station when a call is being established. If this time is set too short, the signal search algorithm of the mobile station may take longer than the paging duration, and the call setup may fail.	0 to 20 to 60	ALL	
CONFigure:DAMS:BSTation:PDURation? Returns the set paging duration.		ALL	
CONFigure:DAMS:BSTation:ATYPe <IMSI | MIN> Sets the system address type used by the mobile station and the base station.		IDLE	
CONFigure:DAMS:BSTation:ATYPe? Returns the set system address type.		ALL	
CONFigure:DAMS:BSTation:SIDentity <Value> Sets the TDMA base station system identification number.	0 to (1 or 2) to 32767	IDLE	1, 2
CONFigure:DAMS:BSTation:SIDentity? Returns the set system identification number.		ALL	
CONFigure:DAMS:BSTation:SOCode <Value> Sets the TDMA base station system operator code.	0 to 4095	ALL	
CONFigure:DAMS:BSTation:SOCode? Returns the set base station system operator code.		ALL	
CONFigure:DAMS:BSTation:DCCH:CHANnel <Value> Sets the digital control channel number.	1 to 26 to 1023 for Cellular; 800–989 not allowed 1 to 200 to 1999 for PCS	IDLE, TCE, TCEV	2
CONFigure:DAMS:BSTation:DCCH:CHANnel? Returns the set digital control channel number.		ALL	

[1] **All of the available standards NETWORK types carry their own System Identification parameter, which may be independently configured.**

[2] **The System Identification (SID) parameter configuration is tied to the base station control channel selection (CONFigure:DAMS:BSTation:DCCH:CHANnel). For control channels selected in the range for system A (1 to 333, 667 to 716), the SID parameter will be adjusted to be an ODD number, by adding 1 if an even number is sent. For control channels selected in the range for system B, the SID will be adjusted to be an EVEN number, by subtracting 1 if an odd number is sent. Setting the SID parameter and then selecting a control channel, or selecting a control channel and then setting the SID will both result in identical SID values. The default values, 1 or 2, indicate system A or B respectively.**

Table F–13: TDMA IS-136-A signaling configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:BSTation:DCCH:SLOT <Value> Sets the digital control channel slot.	1	IDLE, TCE, TCEV	3
CONFigure:DAMS:BSTation:DCCH:SLOT? Returns the set digital control channel slot.		ALL	
CONFigure:DAMS:BSTation:DCCH:MAC <Value> Sets the digital control channel mobile attenuation code.	0 to 2 to 10	ALL	
CONFigure:DAMS:BSTation:DCCH:MAC? Returns the set digital control channel mobile attenuation code.		ALL	
CONFigure:DAMS:BSTation:DCCH:PRSet <FULL> Sets the digital control channel preferred data rate.			3
CONFigure:DAMS:BSTation:DCCH:PRSet? Returns the set digital control channel preferred data rate.			
CONFigure:DAMS:BSTation:FREQuency:System? Query Only. Returns the frequency system – A | B | C | D | E | F | A,D | D,B | B,E | E,F | F,C | UNUSED.		ALL	
CONFigure:DAMS:BSTation:DCCH:ESYNc? Returns the digital control channel expected sync.	1 to 3	ALL	
CONFigure:DAMS:BSTation:PCODec <ACEL | VSEL> Sets the preferred coder/decoder.		ALL except TCE and TCEV	4
CONFigure:DAMS:BSTation:PCODec? Returns the set preferred coder/decoder.		ALL except TCE and TCEV	4
CONFigure:DAMS:BSTation:ACODec? Returns the actual coder/decoder type employed in the call established state.		TCE, TCEV	4
CONFigure:DAMS:BSTation:DTC:MAC <Value> Sets the digital traffic channel mobile attenuation code.	0 to 2 to 10	ALL	
CONFigure:DAMS:BSTation:DTC:MAC? Returns the set digital traffic channel mobile attenuation code.		ALL	

3 **The tester only supports full rate DCCH channels, and the DCCH is only supported in slot 1.**

4 **The preferred CODEC setting selects the type of CODEC that the base station will attempt to specify in the channel assignment message. However, the base station will also request a capability report from the mobile station prior to the actual assignment of a traffic channel, and the base station will actually use the CODEC type returned from the mobile station in the mobile station's capability response message. This parameter is then available using the CONFigure:DAMS:BSTation:ACODec? query.**

Table F–13: TDMA IS-136-A signaling configuration (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:ESYNc?

Returns the digital traffic channel expected sync, which is based on the selected DTC slot. The sync values correspond directly to the slot numbers selected.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:PRSet <HALF | FULL>

Sets the digital traffic channel preferred data rate.</td><td></td><td>ALL except TCE and TCEV</td><td>5</td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:PRSet?

Returns the set digital traffic channel preferred data rate.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:ARSet?

Returns the digital traffic channel actual data rate, reported from the mobile station.</td><td></td><td>TCE, TCEV</td><td>5</td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:CHANnel <Value>

Sets the digital traffic channel.</td><td>1 to 312 to 1023 for Cellular; 800–989 not allowed

1 to 312 to 1999 for PCS</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:CHANnel?

Returns the set digital traffic channel channel.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DVCC <Value>

Sets the digital voice color code value.</td><td>1 to 255</td><td>IDLE</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DVCC?

Returns the set digital voice color code value.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:SLOT <Value>

Sets the digital traffic channel slot for the call established state. In the call established states (TCE or TCEV), changing this value initiates a handoff.</td><td>1 to 3 for FULL rate

1 to 6 for HALF rate</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:BSTation:DTC:SLOT?

Returns the set digital traffic channel slot.</td><td></td><td>ALL</td><td></td></tr>
</table>

5 **The preferred data rate setting selects the rate that the base station will attempt to specify in the channel/slot assignment message. However, the base station will also request a capability report from the mobile station prior to the actual assignment of a traffic channel. If the mobile station supports the preferred data rate, as determined from the mobile station in the mobile station's capability response message, then the assigned channel will use the preferred data rate. Otherwise the data rate will default to the rate supported by mobile station. This parameter is then available using the CONFigure:DAMS:BSTation:DTC:ARSet? query.**

Table F–13: TDMA IS-136-A signaling configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:BSTation:SOURce:POWer <TDMA power level[dBm]> Sets the base station power. Sets the output power that the tester delivers to the mobile station. The limits of this command are dependent on which connector is being used and on the amount of attenuation established elsewhere in the instrument configuration.	–17.0 dBm to <u>–70.0 dBm</u> to –131 dBm	ALL	6
CONFigure:DAMS:BSTation:SOURce:POWer? Returns the set base station power.		ALL	
CONFigure:DAMS:BSTation:CTYPe <ANALOG | DIGITAL> Sets the call type. This call type takes effect when the PROCedure:CTMStation:CALL TTEST | TVOICE is issued. When set to ANALOG, an AMPS–mode call is initiated, using and Analog (FM) voice channel. When set the DIGITAL, an IS-136 type DAMPS call is initiated, using a digital (TDMA) traffic channel.		TMID, TMIN	
CONFigure:DAMS:BSTation:CTYPe? Returns the set call type.		ALL	
CONFigure:DAMS:BSTation:RPERiod <Value> Sets the registration period for the mobile station. Upon expiration of this timer, the base station will toggle the FOREG bit in the overhead message to cause the mobile station to register.	5 to <u>15</u> to 300 seconds or OFF	ALL	
CONFigure:DAMS:BSTation:RPERiod? Returns the set registration period.			
CONFigure:DAMS:BSTation:PARameters[:SETTings]:DEFault Sets the values for the signaling configuration page to their default values.		ALL	
CONFigure:DAMS:SMS:USERmessage “<ASCII text string>” Sets the string to be sent in the user-defined SMS message. This string may be up to 239 characters long, and must only contain ASCII text/numbers. The default user-defined message is: `TEKTRONIX CMD80 DEFAULT USER DEFINED SMS MESSAGE`		ALL	
CONFigure:DAMS:SMS:USERmessage? Returns the string for the user defined SMS message.		ALL	

[6] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–13: TDMA IS-136-A signaling configuration (cont.)

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>CONFigure:DAMS:SMS:TYPe <SMSUSER | SMSDEF>

Sets the SMS message type to send when using the PROCedure:SMS:SSEND command to send an SMS message to the mobile station. SMSUSER selects the user-defined SMS message (refer to CONFigure:DAMS:SMS:USERmessage). SMSDEF selects the default SMS message, which is 239 characters in length. The default SMS message is:
<code>Tektronix CMD80 Short Message Service Default</code>
<code>Message   THE QUICK BROWN FOX JUMPS OVER THE LAZY</code>
<code>DOG 9876543210   the quick brown fox jumps over the</code>
<code>lazy dog 9876543210   )!@#$%^&*(+?-   This message</code>
<code>uses a total of 239 characters</code></td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:SMS:DEFmessage?

Returns the string for the default SMS message.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS:SMS:STATus?

Returns the status of the SMS message. IDLE indicates no message has been sent. ACK RECVD indicates the tester has received an R-DATA ACK message from the mobile station. REJECTED indicates the tester has received an R-DATA REJECT message from the mobile station. SENDING indicates an SMS message is being (or has been) transmitted over the DCCH. NO RESP indicates the tester has sent an SMS message but has not received a response message from the mobile station (within a five second time-out).</td><td>IDLE
ACK RECVD
REJECTED
SENDING
NO RESP</td><td></td><td></td></tr>
<tr><td>PROCedure:SMS:SSENd

Sends the Short Message Service (SMS) message to the mobile station, using a DCCH R-DATA message.</td><td></td><td>TMID</td><td></td></tr>
<tr><td>READ[:SCALar]:DAMS:RDCChannel:POWer[:ALL]?

Returns three values: the expected power, the measured power transmitted by the mobile station when it is transmitting on the RACH channel, and the error code. If the mobile station has not made an access on the RACH channel, the measurement returns “NAN” indicating the measurement could not be completed.</td><td></td><td>TMID</td><td>7</td></tr>
</table>

Table F–13: TDMA IS-136-A signaling configuration (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMS:RDCChannel:POWer[:ALL]? Returns the most recent RDCCH power measurements. Three values are returned: the expected power, the measured power transmitted by the mobile station when it is transmitting on the RACH channel, and the error code. If the mobile station has not made an access on the RACH channel, the measurement returns "NAN" indicating the measurement could not be completed.		ALL	7
FETCh[:SCALar]:MSINfo[:ALL]?	See note	ALL	8

7 **The RMS power numbers are returned as valid numbers only when valid bursts are received within the correct expected power level range. When the tester detects anything other than a valid burst, the RMS power measurement parameter will return NAN, and the Additional RMS power measurement parameter will be calculated according to the following table:**

	Return parameter	
Burst status	**RMS**	**Error code**
Valid burst	**RMS**	**0 (no error)**
Burst power too low	**NAN**	**1 (low power)**
No power ramp detected	**NAN**	**2 (no power ramp)**
Invalid burst length, but power ramp detected	**NAN**	**3 (invalid burst)**

8 **The results returned are: mobile station identification number, serial number, and power class. The values of the mobile station identification number and the serial number are determined by what has been programmed into the mobile station.**

TDMA IS-136-A Manual Test (Signaling) Commands

Table F–14: TDMA IS-136-A signaling menu: call established test – main page

Command	Values	State	Notes
READ[:SCALar]:DAMS:RBSPower? Returns the Reported Base Station Power.		TCE	
READ[:SCALar]:DAMS:CEQuality[:ALL]? Performs measurements on the call established page. The values are returned in this order: RDTC RMS Power, RDTC RMS Power Additional, Error Message, RDTC Power Expected, RDTC Frequency Expected, RDTC Frequency Error, Transmit Time Error, Error Vector Magnitude, Sync Detected.		TCE	1
FETCh[:SCALar]:DAMS:CEQuality:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the RDTC Power, RDTC Frequency, Transmit Time, and Error Vector Magnitude measurements.		ALL	
FETCh[:SCALar]:DNUMber? Returns a string containing the number dialed by the mobile station when the mobile station originates a call. Calls originated by the tester return a string containing a single dash (–).		TCE, TCEV	

1 The RMS power numbers are returned as valid numbers only when valid bursts are received within the correct expected power level range. When this is true, the Additional RMS measurement will be identical to the RMS power return value, and the Error Message number will be 0. When the tester detects anything other than a valid burst, the RMS power measurement parameter will return NAN, and the Additional RMS power measurement parameter will be calculated according to the following table:

	Return parameter		
Burst status	**RMS**	**Additional RMS measurement**	**Error code**
Valid burst	**RMS**	**RMS**	**0 (no error)**
Burst power too low	**NAN**	**RMS measured over one acquisition frame (6+ slots)**	**1 (low power)**
No power ramp detected	**NAN**	**RMS measured over one acquisition frame**	**2 (no power ramp)**
Invalid burst length, but power ramp detected	**NAN**	**RMS measured from ramp edge to end of valid slot duration time**	**3 (invalid burst)**

Table F–15: TDMA IS-136-A signaling menu: call established test – configuration

Command	Values	State	Notes
CONFigure:DAMS:CEQuality:LIMit:POWer:UPPer < value > Sets the RDTC MS power upper limit. This limit is a relative value applied to the MS Expected power. The MS Expected power is calculated based on the MS power class and the current DTC MAC setting.	0 dB to 2 dB to 10 dB	ALL	
CONFigure:DAMS:CEQuality:LIMit:POWer:UPPer? Returns the RDTC MS power upper limit.		ALL	
CONFigure:DAMS:CEQuality:LIMit:POWer:LOWer < value > Sets the RDTC MS power lower limit. This limit is a relative value applied to the MS Expected power. The MS Expected power is calculated based on the MS power class and the current DTC MAC setting.	0 dB to –4 dB to –10 dB	ALL	
CONFigure:DAMS:CEQuality:LIMit:POWer:LOWer? Returns the RDTC MS power lower limit		ALL	
CONFigure:DAMS:CEQuality:LIMit:ERRor:CFRequency <frequency error> Sets the limits of the RDTC Carrier Frequency (in Hz).	0 300 4000	ALL	
CONFigure:DAMS:CEQuality:LIMit:ERRor:CFRequency? Returns the set RDTC carrier frequency limit.		ALL	
CONFigure:DAMS:CEQuality:LIMit:EVMagnitude:RMS[:upper] <magnitude error> Sets the limits of the Error Vector Magnitude (given in percent).	0 12.5 100	ALL	
CONFigure:DAMS:CEQuality:LIMit:EVMagnitude:RMS[:upper]? Returns the set error vector magnitude limit.		ALL	
CONFigure:DAMS:CEQuality:LIMit:ERRor:TTIMe <transmit error> Sets the limits of the Transmit Time, in half–symbol increments.	–10 0.5 10	ALL	
CONFigure:DAMS:CEQuality:LIMit:ERRor:TTIMe? Returns the set transmit time limit.		ALL	
CONFigure:DAMS:CEQuality[:SETTings]:DEFault Resets the configuration parameters Call Established page limits to their default values.		ALL	

Table F–16: TDMA IS-136-A signaling menu: power vs. time

Command	Values	State	Notes
READ[:SCALar]:DAMS[:TQUality]:PVTime:S1Test[:ALL]? Performs a measurement and returns the current values for the nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak), and the sync detected. S1Test sets the oversampling factor of the acquired signal curve to one.		TCE	
READ[:SCALar]:DAMS[:TQUality]:PVTime:S8Test[:ALL]? Performs a measurement and returns the current values for the nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak) and the sync detected. S8Test sets the oversampling factor of the acquired signal curve to eight.		TCE	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:S1Test[:ALL]? Returns the current values for the power vs. time test (oversampling factor set to one).		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:S8Test[:ALL]? Returns the current values for the power vs. time test (oversampling factor set to eight).		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:LIMit:S1Test:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power versus time test (oversampling factor set to one).		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:LIMit:S8Test:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power versus time test (oversampling factor set to eight).		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:GRAPh:S1Test:COUNt? Returns the number of points (with oversampling factor set to one) that the commands FETC:ARR:DAMS[:TQU]:PVT:GRAP:S1T:X? and FETC:ARR:DAMS[:TQU]:PVT:GRAP:S1T:Y? return.		ALL	
FETCh:ARRay:DAMS[:TQUality]:PVTime:GRAPh:S1Test:X? Obtains the X-axis graphical information from the most recent power vs. time measurement (oversampling factor set to one).		ALL	
FETCh:ARRay:DAMS[:TQUality]:PVTime:GRAPh:S1Test:Y? Obtains the Y-axis graphical information from the most recent power vs. time measurement (oversampling factor set to one).		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PVTime:GRAPh:S8Test:COUNt? Returns the number of points (with oversampling factor set to eight) that the commands FETC:ARR:DAMS[:TQU]:PVT:GRAP:S8T:X? and FETC:ARR:DAMS[:TQU]:PVT:GRAP:S8T:Y? return.		ALL	

Table F–16: TDMA IS-136-A signaling menu: power vs. time (cont.)

Command	Values	State	Notes
FETCh:ARRay:DAMS[:TQUality]:PVTime:GRAPh:S8Test:X? Obtains the X-axis graphical information from the most recent power vs. time measurement (oversampling factor set to eight).		ALL	
FETCh:ARRay:DAMS[:TQUality]:PVTime:GRAPh:S8Test:Y? Obtains the Y-axis graphical information from the most recent power vs. time measurement (oversampling factor set to eight).		ALL	

Table F–17: TDMA IS-136-A signaling menu: power vs. time – configuration

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:PVTime:ASTop[?] Sets the autostop for the Power vs. Time test.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:ASTop <ON | OFF> Sets the autostop for the Power vs. Time test on or off.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:BLENgth <NORMal | SHORtened> Sets the burst lenght/type used for a Power vs. Time measurement. In shortened burst mode, the tester automatically performs a handoff every five seconds to maintain the call.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:BLENgth? Returns the burst lenght/type setting used for a Power vs. Time measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:BURSt:COUNt <number of bursts> Sets the number of bursts to be accumulated during a Power vs. Time measurement. If the number of bursts is set to one, the AVERage, MAXimum, and MINimum forms of commands in the Power vs. Time measurement system return the same data as the CURRent mode.	1 <u>100</u> 1000	ALL	
CONFigure:DAMS[:TQUality]:PVTime:BURSt:COUNt? Returns the set number of bursts to be accumulated during a Power vs. Time measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:GRAPh <<u>CURRent</u> | AVERage | MAXimum | MINimum> Sets the display mode of the waveform for the Power vs. Time measurement. This setting affects both the display of the data on the front panel of the tester and the type of data returned via the GPIB interface.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:GRAPh? Returns the display mode setting for the Power vs. Time measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LOWer:COUNt? Returns the number of graphical points the commands CONF:DAMS[:TQU]:PVT:LIM:LOW:GRAP:X? and CONF:DAMS[:TQU]:PVT:LIM:LOW:GRAP:Y? return.		ALL	

Table F–17: TDMA IS-136-A signaling menu: power vs. time – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LOWer:GRAPh:X? Obtains the X-axis graphical information from the power vs. time lower limits measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LOWer:GRAPh:Y? Obtains the Y-axis graphical information from the power vs. time lower limits measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:UPPer:COUNt? Returns the number of graphical points the commands CONF:DAMS[:TQU]:PVT:LIM:UPP:GRAP:X? and CONF:DAMS[:TQU]:PVT:LIM:UPP:GRAP:Y? return.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:UPPer:GRAPh:X? Obtains X-axis graphical information from the power vs. time upper limits measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:UPPer:GRAPh:Y? Obtains Y-axis graphical information from the power vs. time upper limits measurement.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:A <Value> Sets the limit value for level A. See Figure F–1 on page F–149.	–40	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:A? Returns the set limit value for level A. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:B <Value> Sets the limit value for level B. See Figure F–1 on page F–149.	6.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:B? Returns the set limit value for level B. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:C <Value> Sets the limit value for level C. See Figure F–1 on page F–149.	4.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:C? Returns the set limit value for level C. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:D <Value> Sets the limit value for level D. See Figure F–1 on page F–149.	6.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:D? Returns the set limit value for level D. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:E <Value> Sets the limit value for level E. See Figure F–1 on page F–149.	–40.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:E? Returns the set limit value for level E. See Figure F–1 on page F–149.		ALL	

Table F–17: TDMA IS-136-A signaling menu: power vs. time – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:F <Value> Sets the limit value for level F. See Figure F–1 on page F–149.	–20.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LEVel:F? Returns the set limit value for level F. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:NOUTput:LOWer <Value> Sets the lower bounds for the nominal output power.	–80 22.0 Upper Limit	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:NOUTput:LOWer? Returns the set lower bounds for the nominal output power.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:NOUTput:UPPer <Value> Sets the upper bounds for the nominal output power.	Lower Limit 30.0 39.0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:NOUTput:UPPer? Returns the set upper bounds for the nominal output power.		ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LPOWer <Value> Sets the upper bounds for the leakage power to be within tolerance.	–80.0 –60.0 0	ALL	
CONFigure:DAMS[:TQUality]:PVTime:LIMit:LPOWer? Returns the set upper bounds for the leakage power to be within tolerance.		ALL	
CONFigure:DAMS[:TQUality]:PVTime[:SETTings]:DEFault Resets the configuration parameters for each power vs. time test to the default values.		ALL	

Table F–18: TDMA IS-136-A signaling menu: modulation – error vector magnitude

Command	Values	State	Notes
READ[:SCALar]:DAMS[:TQUality]:EVMagnitude:CURRent[:ALL]? Performs a measurement and returns the current values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:EVMagnitude:AVERage[:ALL]? Performs a measurement and returns the average values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:EVMagnitude:MAXimum[:ALL]? Performs a measurement and returns the maximum values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	

Table F–18: TDMA IS-136-A signaling menu: modulation – error vector magnitude (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:CURRent[:ALL]? Returns the current values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:AVERage[:ALL]? Returns the average values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:MAXimum[:ALL]? Returns the maximum values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:MAXimum:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the maximum EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:EVMagnitude:GRAPh:COUNt? Returns the number of EVM graph points the commands FETC:ARR:DAMS[:TQU]:EVM:GRAP:X? and FETC:ARR:DAMS[:TQU]:EVM:GRAPh:Y? return.		ALL	
FETCh:ARRay:DAMS[:TQUality]:EVMagnitude:GRAPh:X? Obtains the X-axis graphical information from the most recent EVM measurement.		ALL	
FETCh:ARRay:DAMS[:TQUality]:EVMagnitude:GRAPh:Y? Obtains the Y graphical information from the most recent EVM measurement.		ALL	
CONFigure:DAMS[:TQUality]:EVMagnitude:BURSt:COUNt <number of bursts> Specifies the number of bursts to be collected during a measurement.	1 100 1000	ALL	
CONFigure:DAMS[:TQUality]:EVMagnitude:BURSt:COUNt? <bursts> Returns the set number of bursts to be collected during a measurement.		ALL	

Table F–18: TDMA IS-136-A signaling menu: modulation – error vector magnitude (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:EVMagnitude:GRAPh <CURRent | AVERage | MAXimum> Specifies the type of data that is returned by the graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMS[:TQUality]:EVMagnitude:GRAPh? Returns the specified type of data returned by the graphical queries.		ALL	

Table F–19: TDMA IS-136-A signaling menu: modulation – phase error

Command	Values	State	Notes
READ[:SCALar]:DAMS[:TQUality]:PERRor:CURRent[:ALL]? Performs a measurement and returns the current values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:PERRor:AVERage[:ALL]? Performs a measurement and returns the average values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:PERRor:MAXMin[:ALL]? Performs a measurement and returns the maximum and minimum values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:CURRent[:ALL]? Returns the current values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:AVERage[:ALL]? Returns the average values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:MAXMin[:ALL]? Returns the maximum and minimum values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, and frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	

Table F–19: TDMA IS-136-A signaling menu: modulation – phase error (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:MAXMin:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the maximum and minimum Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:PERRor:GRAPh:COUNt? Returns the number of graphical points the commands FETC:ARR:DAMS[:TQU]:PERR:GRAP:X? and FETC:ARR:DAMS[:TQU]:PERR:GRAP:Y? return.		ALL	
FETCh:ARRay:DAMS[:TQUality]:PERRor:GRAPh:X? Obtains the X-axis graphical information from the most recent phase error measurement.		ALL	
FETCh:ARRay:DAMS[:TQUality]:PERRor:GRAPh:Y? Obtains the Y-axis graphical information from the most recent phase error measurement.		ALL	
CONFigure:DAMS[:TQUality]:PERRor:BURSt:COUNt <number of bursts> Specifies the number of bursts that are to be collected during a measurement.	1 100 1000	ALL	
CONFigure:DAMS[:TQUality]:PERRor:BURst:COUNt? Returns the set number of bursts that are to be collected during a measurement.		ALL	
CONFigure:DAMS[:TQUality]:PERRor:GRAPh <CURRent | AVERage | MAXimum> Specifies the type of data that is returned by the graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMS[:TQUality]:PERRor:GRAPh? Returns the set type of data that is returned by the graphical queries.		ALL	

Table F–20: TDMA IS-136-A signaling menu: modulation – magnitude error

Command	Values	State	Notes
READ[:SCALar]:DAMS[:TQUality]:MERRor:CURRent[:ALL]? Performs a measurement and returns the current values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:MERRor:AVERage[:ALL]? Performs a measurement and returns the average values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
READ[:SCALar]:DAMS[:TQUality]:MERRor:MAXMin[:ALL]? Performs a measurement and returns the max/min values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TCE	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:CURRent[:ALL]? Returns the current values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:AVERage[:ALL]? Returns the average values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:MAXMin[:ALL]? Returns the max/min values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, and frequency error from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:MAXMin:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the max/min Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:MERRor:GRAPh:COUNt? Returns the number of points the commands FETC:ARR:DAMS[:TQU]:MERR:GRAP:X? and FETC:ARR:DAMS[:TQU]:MERR:GRAP:Y? return.		ALL	

Table F–20: TDMA IS-136-A signaling menu: modulation – magnitude error (cont.)

Command	Values	State	Notes
FETCh:ARRay:DAMS[:TQUality]:MERRor:GRAPh:X? Obtains the X-axis graphical information from the most recent magnitude error measurement.		ALL	
FETCh:ARRay:DAMS[:TQUality]:MERRor:GRAPh:Y? Obtains the Y-axis graphical information from the most recent magnitude error measurement.		ALL	
CONFigure:DAMS[:TQUality]:MERRor:BURSt:COUNt <number of bursts> Specifies the number of bursts that are to be collected during a measurement.	1 <u>100</u> 1000	ALL	
CONFigure:DAMS[:TQUality]:MERRor:BURst:COUNt? Returns the set number of bursts that are to be collected during a measurement.		ALL	
CONFigure:DAMS[:TQUality]:MERRor:GRAPh <<u>CURRent</u> | AVERage | MAXimum> Specifies the type of data to be returned by graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMS[:TQUality]:MERRor:GRAPh? Returns the type of data set to be returned by the graphical queries.		ALL	

Table F–21: TDMA IS-136-A signaling menu: modulation – configuration limits

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:LIMit:EVMagnitude:RMS[:UPPer] <maximum RMS EVM> Sets the upper RMS limit on the Error Vector Magnitude specific measurement results.	0 <u>12.5</u> 100	ALL	
CONFigure:DAMS[:TQUality]:LIMit:EVMagnitude:RMS[:UPPer]? Returns the set upper RMS limit on the Error Vector Magnitude specific measurement results.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:EVMagnitude:PEAK[:UPPer] <maximum peak EVM> Sets the upper peak limit on the Error Vector Magnitude specific measurement results.	0 <u>17.7</u> 100	ALL	
CONFigure:DAMS[:TQUality]:LIMit:EVMagnitude:PEAK[:UPPer]? Returns the set upper peak limit on the Error Vector Magnitude specific measurement results.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:PERRor:RMS <maximum RMS phase error> Sets the RMS Pass/Fail threshold for the absolute value of the Phase Error measurement result.	0 <u>7.2</u> 180	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:PERRor:RMS? Returns the set Pass/Fail threshold value of the RMS Phase Error measurement results.		ALL	

Table F–21: TDMA IS-136-A signaling menu: modulation – configuration limits (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:LIMit:ERRor:PERRor:PEAK <maximum peak phase error> Sets the peak Pass/Fail threshold for the absolute value of the Phase Error measurement result.	0 <u>10.2</u> 180	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:PERRor:PEAK? Returns the set Pass/Fail threshold value of the peak Phase Error measurement results.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:MERRor:RMS <maximum RMS magnitude error> Sets the Pass/Fail RMS threshold for the Magnitude Error measurement result.	0 <u>12.5</u> 100	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:MERRor:RMS? Returns the set Pass/Fail RMS threshold for the Magnitude Error measurement result.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:MERRor:PEAK <maximum peak magnitude error> Sets the Pass/Fail peak threshold for the Magnitude Error measurement result.	0 <u>17.7</u> 100	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:MERRor:PEAK? Returns the set Pass/Fail peak threshold for the Magnitude Error measurement result.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:CFEedthrough[:UPPer] <maximum carrier feedthrough [DB]> Sets the Pass/Fail carrier feedthrough threshold for measurement results common to all Modulation measurements.	–80 <u>–20</u> 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:CFEedthrough[:UPPer]? Returns the set Pass/Fail carrier feedthrough threshold for measurement results common to all Modulation measurements.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:IQIMbalance[:UPPer] <maximum carrier imbalance [DB]> Sets the Pass/Fail carrier imbalance threshold for measurement results common to all Modulation measurements.	–80 <u>–20</u> 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:IQIMbalance[:UPPer]? Returns the set Pass/Fail carrier imbalance threshold for measurement results common to all Modulation measurements.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:FREQuency <maximum frequency error [HZ | KHZ | MHZ]> Sets the Pass/Fail carrier frequency error threshold for measurement results common to all Modulation measurements.	0 <u>300</u> 4000	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ERRor:FREQuency? Returns the set Pass/Fail carrier frequency threshold for measurement results common to all Modulation measurements.		ALL	

Table F–21: TDMA IS-136-A signaling menu: modulation – configuration limits (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:LIMit:ADRoop? Specifies the limit for the amplitude droop.	0 3 25	ALL	
CONFigure:DAMS[:TQUality]:ASTop? Specifies the auto stopping ability for the measurement.		ALL	
CONFigure:DAMS[:TQUality][:SETTings]:DEFault? Resets the all limits to the default values for the measurements.		ALL	

Table F–22: TDMA IS-136-A signaling menu: adjacent channel power

Command	Values	State	Notes
READ[:SCALar]:DAMS[:TQUality]:ACPower[:ALL]? Performs the Adjacent Channel power measurement and returns the RMS and Peak power in each of the observed channels. This will return the power of the last burst in the specified number of bursts. The power for the current channel, and all other values as well, will be returned in dBm. The order of the results are Channel–3, Channel–2, Channel–1, Current Channel, Channel+1, Channel+2, Channel+3. For each channel, first the RMS value is sent, followed by the Peak value. This will produce a response with 14 results.		TCE	
FETCh[:SCALar]:DAMS[:TQUality]:ACPower:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power within each of the adjacent channels from the most recent Adjacent Channel power measurement of the last burst in the specified number of bursts. The order of the results are Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, first the Pass/Fail result for the RMS value will be sent, followed by the Pass/Fail value for the Peak value. This will produce a response with 12 results. There are no power levels returned for the Current Channel.		TCE	
FETCh[:SCALar]:DAMS[:TQUality]:ACPower:STATistics[:ALL]? Returns the statistics associated with each of the adjacent channels for all of the bursts. The order of the results are Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, the RMS, Peak, RMS_Average, RMS_Peak, Peak_Peak result will be returned (in this order). This will produce a response with 30 results. The measurements are all expressed in dBm.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:ACPower:STATistics:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the statistics associated with each of the adjacent channels for all of the bursts. The order of the results are Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, the RMS, Peak, RMS_Average, RMS_Peak, Peak_Peak result will be returned (in this order). This will produce a response with 30 results.		ALL	
FETCh[:SCALar]:DAMS[:TQUality]:ACPower:GRAPh:COUNt? Returns the number of points the commands FETC:ARR:DAMS[:TQU]:ACP:GRAP:X? and FETC:ARR:DAMS[:TQU]:ACP:GRAP:Y? return.		ALL	

Table F–22: TDMA IS-136-A signaling menu: adjacent channel power (cont.)

Command	Values	State	Notes
FETCh:ARRay:DAMS[:TQUality]:ACPower:GRAPh:X? Obtains the graphical waveform data from the time domain display of the Focus channel from the most recent Adjacent Power measurement on the tester. The FOCus value must be configured before a READ is done so that the proper channel is captured.		ALL	
FETCh:ARRay:DAMS[:TQUality]:ACPower:GRAPh:Y? Obtains the graphical waveform data from the time domain display of the Focus channel from the most recent Adjacent Power measurement on the tester. The FOCus value must be configured before a READ is done so that the proper channel is captured.		ALL	

Table F–23: TDMA IS-136-A signaling menu: adjacent channel power – configuration

<table>
<tr><th>Command</th><th>Values</th><th>State</th><th>Notes</th></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:ASTop <ON | OFF>

Sets the autostop for the ACP test.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:ASTop?

Gets the autostop for the ACP test.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower[:SETTings]:DEFault

Sets the configuration parameters for the ACP to the default values.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:FREQuency:CHANnel:FOCus <focus channel>

Sets the Focus channel with the Adjacent Power measurement. The Focus channel may be set to any integer value between –3 and +3, inclusive.</td><td>–3
<u>–1</u>
3</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:FREQuency:CHANnel:FOCus?

Returns the set Focus channel with the Adjacent Power measurement.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:BURSt:COUNt <number of bursts>

Sets the number of bursts that are accumulated during an Adjacent Power measurement. If the number of bursts is set to one, the results of the :STATistics query will return the values from the single burst measurements.</td><td>1
<u>100</u>
1000</td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:BURSt:COUNt?

Returns the set number of bursts that are accumulated during an Adjacent Power measurement.</td><td></td><td>ALL</td><td></td></tr>
<tr><td>CONFigure:DAMS[:TQUality]:ACPower:GRAPh <CURRent | AVERage | MAXimum>

Sets the display mode of the time domain waveform for the Adjacent Power measurement. This setting will affect both the display of the data on the front panel of the tester and the type of data that is returned, via the GPIB interface.</td><td></td><td>ALL</td><td></td></tr>
</table>

Table F–23: TDMA IS-136-A signaling menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:ACPower:GRAPh? Returns the set display mode of the time domain waveform for the Adjacent Power measurement.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH3Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is three channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH3Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is three channels below the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH3Minus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is three channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH3Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is three channels below the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH2Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is two channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH2Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is two channels below the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH2Minus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is two channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH2Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is two channels below the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH1Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is one channel below the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH1Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is one channel below the current channel.		ALL	

Table F–23: TDMA IS-136-A signaling menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH1Minus[:UPPer]<peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is one channel below the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH1Minus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is one channel below the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH1Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is one channel above the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH1Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is one channel above the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH1Plus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is one channel above the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH1Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is one channel above the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH2Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is two channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH2Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is two channels above the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH2Plus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is two channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH2Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is two channels above the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH3Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is three channels above the current channel.	–80.0 –45.0 0	ALL	

Table F–23: TDMA IS-136-A signaling menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS[:TQUality]:LIMit:ACPower:RMS:CH3Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the RMS power limit measurement for the channel that is three channels above the current channel.		ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH3Plus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is three channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMS[:TQUality]:LIMit:ACPower:PEAK:CH3Plus[:UPPer]? Returns the set Pass/Fail upper threshold for the numeric results of the peak power limit measurement for the channel that is three channels above the current channel.		ALL	

Table F–24: TDMA IS-136-A signaling menu: BER

Command	Values	State	Notes
READ[:SCALar]:DAMS:RQUality:CLEVels[:ALL]? Performs a measurement and returns the current values (levels) for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TCE	1
READ[:SCALar]:DAMS:RQUality:DRANge[:ALL]? Performs a measurement and returns the current values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TCE	1
READ[:SCALar]:DAMS:RQUality:SENSitivity[:ALL]? Performs a measurement and returns the current values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TCE	1
READ[:SCALar]:DAMS:RQUality:U1Defined[:ALL]? Performs a measurement and returns the current values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TCE	1
READ[:SCALar]:DAMS:RQUality:U2Defined[:ALL]? Performs a measurement and returns the current values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TCE	1

1 **The signaling BER test requires the user to manually place the mobile station in data loopback mode. There is no over-air command defined to cause the mobile station to loop back its data, and the BER measurement will fail (with very high BER results) if the mobile station is not looped back.**

Table F–24: TDMA IS-136-A signaling menu: BER (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMS:RQUality:CLEVels:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current levels Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMS:RQUality:DRANge:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the dynamic range Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMS:RQUality:SENSitivity:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the sensitivity Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMS:RQUality:U1Defined:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the U1defined Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMS:RQUality:U2Defined:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the user 2 defined Bit Error Rate test.		ALL	

Table F–25: TDMA IS-136-A signaling menu: BER configuration

Command	Values	State	Notes
CONFigure:DAMS:RQUality:CLEVels:ASTop <ON | OFF> Sets the autostop for the current levels BER test. If the auto stop is set to “ON” then the BER test will stop if the BER limit is exceeded. If auto stop is set to “OFF” the BER test will finish when the configured number of frames are transmitted.		ALL	
CONFigure:DAMS:RQUality:CLEVels:ASTop? Gets the autostop for the current levels BER test.		ALL	
CONFigure:DAMS:RQUality:DRANge:ASTop <ON | OFF> Sets the autostop for the dynamic range BER test. If the auto stop is set to “ON” then the BER test will stop if the BER limit is exceeded. If auto stop is set to “OFF” the BER test will finish when the configured number of frames are transmitted.		ALL	
CONFigure:DAMS:RQUality:DRANge:ASTop? Gets the autostop for the dynamic range BER test.		ALL	
CONFigure:DAMS:RQUality:SENSitivity:ASTop <ON | OFF> Sets the autostop for the sensitivity BER test. If the auto stop is set to “ON” then the BER test will stop if the BER limit is exceeded. If auto stop is set to “OFF” the BER test will finish when the configured number of frames are transmitted.		ALL	
CONFigure:DAMS:RQUality:SENSitivity:ASTop? Sets the autostop for the sensitivity BER test.		ALL	

Table F–25: TDMA IS-136-A signaling menu: BER configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:RQUality:U1Defined:ASTop <ON | OFF> Sets the autostop for the user 1 defined BER test. If the auto stop is set to "ON" then the BER test will stop if the BER limit is exceeded. If auto stop is set to "OFF" the BER test will finish when the configured number of frames are transmitted.		ALL	
CONFigure:DAMS:RQUality:U1Defined:ASTop? Gets the autostop for the user 1 defined BER test.		ALL	
CONFigure:DAMS:RQUality:U2Defined:ASTop <ON | OFF> Sets the autostop for the user 2 defined BER test. If the auto stop is set to "ON" then the BER test will stop if the BER limit is exceeded. If auto stop is set to "OFF" the BER test will finish when the configured number of frames are transmitted.		ALL	
CONFigure:DAMS:RQUality:U2Defined:ASTop? Gets the autostop for the user 2 defined BER test.		ALL	
CONFigure:DAMS:RQUality:CLEVels:DURation [Frames] Sets the duration (total number of frames transmitted) for the current levels BER test.	<u>100</u> 500	ALL	
CONFigure:DAMS:RQUality:CLEVels:DURation? Gets the set duration (total number of frames transmitted) for the current levels BER test.		ALL	
CONFigure:DAMS:RQUality:DRANge:DURation [Frames] Sets the duration (total number of frames transmitted) for the dynamic range BER test.	<u>100</u> 500	ALL	
CONFigure:DAMS:RQUality:DRANge:DURation? Gets the duration (total number of frames transmitted) for the dynamic range BER test.		ALL	
CONFigure:DAMS:RQUality:SENSitivity:DURation [Frames] Sets the duration (total number of frames transmitted) for the sensitivity BER test.	<u>100</u> 500	ALL	
CONFigure:DAMS:RQUality:SENSitivity:DURation? Gets the duration (total number of frames transmitted) for the sensitivity BER test.		ALL	
CONFigure:DAMS:RQUality:U1Defined:DURation [Frames] Sets the duration (total number of frames transmitted) for the user 1 defined BER test.	<u>100</u> 500	ALL	
CONFigure:DAMS:RQUality:U1Defined:DURation? Gets the duration (total number of frames transmitted) for the user 1 defined BER test.		ALL	
CONFigure:DAMS:RQUality:U2Defined:DURation [Frames] Sets the duration (total number of frames transmitted) for the user 2 defined BER test.	<u>100</u> 500	ALL	
CONFigure:DAMS:RQUality:U2Defined:DURation? Sets the duration (total number of frames transmitted) for the user 2 defined BER test.		ALL	
CONFigure:DAMS:RQUality:CLEVels:LIMit:ERRor:BERate [Percent] Sets the maximum acceptable BER current levels limit.	0.10 <u>3.0</u> 5.0	ALL	

Table F–25: TDMA IS-136-A signaling menu: BER configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:RQUality:CLEVels:LIMit:ERRor:BERate? Gets the maximum acceptable BER current levels limit.		ALL	
CONFigure:DAMS:RQUality:DRANge:LIMit:ERRor:BERate [Percent] Sets the maximum acceptable BER dynamic range limit.	0.10 3.0 5.0	ALL	
CONFigure:DAMS:RQUality:DRANge:LIMit:ERRor:BERate? Gets the maximum acceptable BER dynamic range limit.		ALL	
CONFigure:DAMS:RQUality:SENSitivity:LIMit:ERRor:BERate [Percent] Sets the maximum acceptable BER sensitivity limit.	0.10 3.0 5.0	ALL	
CONFigure:DAMS:RQUality:SENSitivity:LIMit:ERRor:BERate? Gets the maximum acceptable BER sensitivity limit.		ALL	
CONFigure:DAMS:RQUality:U1Defined:LIMit:ERRor:BERate [Percent] Sets the maximum acceptable BER user 1 defined test limit.	0.10 3.0 5.0	ALL	
CONFigure:DAMS:RQUality:U1Defined:LIMit:ERRor:BERate? Gets the maximum acceptable BER user 1 defined test limit.		ALL	
CONFigure:DAMS:RQUality:U2Defined:LIMit:ERRor:BERate [Percent] Sets the maximum acceptable BER user 2 defined test limit.	0.10 3.0 5.0	ALL	
CONFigure:DAMS:RQUality:U2Defined:LIMit:ERRor:BERate? Gets the maximum acceptable BER user 2 defined test limit.		ALL	
CONFigure:DAMS:RQUality:CLEVels[:SETTings]:DEFault Sets the configuration parameters for the current levels BER test.		ALL	
CONFigure:DAMS:RQUality:DRANge[:SETTings]:DEFault Sets the configuration parameters for the dynamic range BER test.		ALL	
CONFigure:DAMS:RQUality:SENSitivity[:SETTings]:DEFault Sets the configuration parameters for the Sensitivity BER test.		ALL	
CONFigure:DAMS:RQUality:U1Defined[:SETTings]:DEFault Sets the configuration parameters for the user 1 defined BER test.		ALL	
CONFigure:DAMS:RQUality:U2Defined[:SETTings]:DEFault Sets the configuration parameters for the user 2 defined BER test.		ALL	

Table F–25: TDMA IS-136-A signaling menu: BER configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:RQUality:DRANge:SOUrce:POWer <power level dBm> Sets the base station power for dynamic range the BER test.	–17.0 <u>–107.0</u> –131.0	ALL	1
CONFigure:DAMS:RQUality:DRANge:SOUrce:POWer? Gets the base station power for dynamic range the BER test.		ALL	
CONFigure:DAMS:RQUality:SENSitivity:SOUrce:POWer <power level dBm> Sets the base station power for sensitivity the BER test.	–17.0 <u>–107.0</u> –131.0	ALL	1
CONFigure:DAMS:RQUality:SENSitivity:SOUrce:POWer? Gets the base station power for sensitivity the BER test.		ALL	
CONFigure:DAMS:RQUality:U1Defined:SOUrce:POWer <power level dBm> Sets the base station power for the user 1 defined BER test.	–17.0 <u>–107.0</u> –131.0	ALL	2
CONFigure:DAMS:RQUality:U1Defined:SOUrce:POWer? Gets the base station power for the user 1 defined BER test.		ALL	
CONFigure:DAMS:RQUality:U2Defined:SOUrce:POWer <power level dBm> Sets the base station power for the user 2 defined BER test.	–17.0 <u>–107.0</u> –131.0	ALL	2
CONFigure:DAMS:RQUality:U2Defined:SOUrce:POWer? Gets the base station power for the user 2 defined BER test.		ALL	

[1] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

[2] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–26: TDMA IS-136-A signaling menu: time alignment

Command	Values	State	Notes
READ[:SCALar]:DAMS:TALignment[:ALL]? Returns the values used to control the time alignment measurement. The values are returned in this order: power measurement, measured timing advance value, and timing advance error value.		TCE	
FETCh[:SCALar]:DAMS:TALignment:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the time alignment measurement results in the following order: timing advance value and timing advance error value.		TCE	

Table F–27: TDMA IS-136-A signaling menu: time alignment – configuration

Command	Values	State	Notes
CONFigure:DAMS:TALignment:EADVance <Value> Sets, in symbol periods, the expected time alignment advance. Increment is 0.5 symbol periods.	<u>0.0</u> 10.0	ALL	
CONFigure:DAMS:TALignment:LIMit:ADVance? Returns the set maximum acceptable time advance limit value.		ALL	
CONFigure:DAMS:TALignment:LIMit:ERRor <Value> Sets, in symbol periods, the maximum acceptable time advance error limit value. Increment is 0.01 symbol periods.	0.0 <u>0.25</u> 10.0	ALL	
CONFigure:DAMS:TALignment:LIMit:ERRor? Returns the set maximum acceptable time advance error limit value.		ALL	
CONFigure:DAMS:TALignment[:SETTings]:DEFault Sets the configuration parameters for the time alignment test to the default values.		ALL	

Table F–28: TDMA IS-136-A signaling menu: MAHO report

Command	Values	State	Notes
READ[:SCALar]:DAMS:MAHO[:ALL]? Initiates a Mobile Assisted Handoff (MAHO) measurement sequence. The command returns 13 values: the current channel, current RSSI, BER range, base station channel 1, RSSI for channel 1, base station channel 2, RSSI for channel 2, base station channel 3, RSSI for channel 3, base station channel 4, RSSI for channel 4, base station channel 5 and RSSI for channel 5.		TCE	
FETCh [:SCALar]:DAMS:MAHO[:ALL]? Retrieves the results of a MAHO measurement. It assumes the “READ” command was done. The command returns 13 values: the current channel, current RSSI, BER range, base station channel 1, RSSI for channel 1, base station channel 2, RSSI for channel 2, base station channel 3, RSSI for channel 3, base station channel 4, RSSI for channel 4, base station channel 5 and RSSI for channel 5.		ALL	

Table F–29: TDMA IS-136-A signaling menu: MAHO configuration

Command	Values	State	Notes
CONFigure:DAMS:MAHO:NNEighbors <Value> Sets the number of neighbor channels to be sent in the MEASUREMENT ORDER message to the mobile station.	1 to 5		[1]
CONFigure:DAMS:MAHO:NNEighbors? Returns the set number of neighbor channels for the MAHO report			
CONFigure:DAMS:MAHO:C1TYpe <PCS | CELLULAR> Sets the channel type (frequency band) for the specific neighbor channel 1.	PCS CELLULAR	ALL	
CONFigure:DAMS:MAHO:C1TYpe? Returns the channel type (frequency band) for the specified neighbor channel 1.		ALL	
CONFigure:DAMS:MAHO:C2TYpe <PCS | CELLULAR> Sets the channel type (frequency band) for the specific neighbor channel 2.	PCS CELLULAR	ALL	
CONFigure:DAMS:MAHO:C2TYpe? Returns the channel type (frequency band) for the specified neighbor channel 2.		ALL	
CONFigure:DAMS:MAHO:C3TYpe <PCS | CELLULAR> Sets the channel type (frequency band) for the specific neighbor channel 3.	PCS CELLULAR	ALL	
CONFigure:DAMS:MAHO:C3TYpe? Returns the channel type (frequency band) for the specified neighbor channel 3.		ALL	

[1] **Although this command specifies the number of neighbor channels to be sent to the mobile station, all the neighbor channels may be configured.**

Table F–29: TDMA IS-136-A signaling menu: MAHO configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:MAHO:C4TYpe <PCS | CELLULAR> Sets the channel type (frequency band) for the specific neighbor channel 4.	PCS CELLULAR	ALL	
CONFigure:DAMS:MAHO:C4TYpe? Returns the channel type (frequency band) for the specified neighbor channel 4.		ALL	
CONFigure:DAMS:MAHO:C5TYpe <PCS | CELLULAR> Sets the channel type (frequency band) for the specific neighbor channel 5.	PCS CELLULAR	ALL	
CONFigure:DAMS:MAHO:C5TYpe? Returns the channel type (frequency band) for the specified neighbor channel 5.		ALL	
CONFigure:DAMS:MAHO:BS1Channel <Value> Sets the channel number for neighbor channel 1.	1 to 333 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS		
CONFigure:DAMS:MAHO:BS1Channel? Returns the set channel number for neighbor channel 1.			
CONFigure:DAMS:MAHO:BS2Channel <Value> Sets the channel number for neighbor channel 2.	1 to 333 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS		
CONFigure:DAMS:MAHO:BS2Channel? Returns the set channel number for neighbor channel 2.			
CONFigure:DAMS:MAHO:BS3Channel <Value> Sets the channel number for neighbor channel 3.	1 to 333 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS		
CONFigure:DAMS:MAHO:BS3Channel? Returns the set channel number for neighbor channel 3.			
CONFigure:DAMS:MAHO:BS4Channel <Value> Sets the channel number for neighbor channel 4.	1 to 333 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS		

Table F–29: TDMA IS-136-A signaling menu: MAHO configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMS:MAHO:BS4Channel? Returns the set channel number for neighbor channel 4.			
CONFigure:DAMS:MAHO:BS5Channel <Value> Sets the channel number for neighbor channel 5.	1 to 333 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS		
CONFigure:DAMS:MAHO:BS5Channel? Returns the set channel number for neighbor channel 5.			
CONFigure:DAMS:MAHO[:SETTings]:DEFault Resets the configuration parameters for the MAHO Report Menu to the default values.			

TDMA IS-136-A Module Test Commands

Table F–30: TDMA IS-136-A module test configuration

Command	Values	State	Notes
CONFigure:DAMM:BSTation:SOURce:POWer <power level [DBM] | OFF> Sets the output power that the tester delivers to the mobile station. The limits of this command are dependent on which connector is being used and on the amount of attenuation established elsewhere in the instrument configuration (refer to SENS:CORR:LOSS commands).	–17.0 dBm to –70.0 dBm to –131.0 dBm	ALL	1
CONFigure:DAMM:BSTation:SOURce:POWer? Returns the output power setting.		ALL	
CONFigure:DAMM:BSTation:SIGNal <UNModulated | BERTest> Specifies the type of output signal that is to be generated by the tester when in the IS-136-A Module Test state. An unmodulated (CW) signal may be generated or a special BER test pattern transmitted in the proper format for IS-136-A.		ALL	2, 3
CONFigure:DAMM:BSTation:SIGNal? Returns output signal type setting.		ALL	
CONFigure:DAMM:POWer:MSTation <power level [DBM]> Specifies the expected power of the mobile station being tested. This specifies the power present at the mobile station RF interface. The additional attenuation in cabling or fixtures should be compensated with the normal attenuation commands.	–80.0 28.0 39.0	ALL	4
CONFigure:DAMM:POWer:MSTation? Returns the expected power (from the mobile station) setting.		ALL	

1 **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to –141.0 dBm to –27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

2 **The BER test signal is based upon a PRBS9 pseudo-random binary sequence.**

3 **The BER test signal simulates three full rate users with the following time-slot and DVCC configurations. The mobile station may need to be reconfigured accordingly, in order to attain the synchronization necessary to run the BER tests.**

User	1	2	3
Time-slot	1, 4	2, 5	3, 6
DVCC	1	2	3

4 **For valid power measurements, the expected power should be set equal to or slightly higher than the power expected to be received from the mobile station. There is a dynamic “window” for the measurement accuracy of about +2 to 3 dB above the expected power setting and approximately 15 dB below the expected power setting.**

Table F–30: TDMA IS-136-A module test configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM:FREQuency:CHANnel <channel number> Specifies the RF channel number that the tester uses for all transmitter and receiver tests. The limits of the value are determined by the Network setting of the tester.	1 to 312 to 1023 for Cellular; 800–990 not allowed 1 to 468 to 1999 for PCS	ALL	
CONFigure:DAMM:FREQuency:CHANnel? Returns the RF channel number setting that the tester uses for tests.		ALL	
CONFigure:DAMM:SYNCword:EXPected <NONE | S1 | S2 | S3 | S4 | S5 | S6 | ANY> Specifies the Sync pattern that the mobile station transmits. If the Sync pattern is not known, the NONE keyword should be used. NONE mode slows down measurement operations since the tester must determine the proper sync pattern by examining the input signal.		ALL	
CONFigure:DAMM:SYNCword:EXPected? Returns the Sync pattern setting the mobile station is expected to be transmitting.		ALL	
CONFigure:DAMM:TRIGger <FREE | RSLope> Specifies the trigger mode to use with IS-136-A measurements. FREE mode causes the tester to look for a sync pattern by continuously examining the input data. RSLope (Rising Slope) mode causes the tester to wait for the rising edge of a burst from the mobile station before looking for the sync pattern. Once the sync pattern is found, the measurement proceeds.		ALL	
CONFigure:DAMM:TRIGger? Returns the trigger mode setting used for IS-136-A measurements.		ALL	

Table F–31: TDMA IS-136-A module test menu: module test – main page

Command	Values	State	Notes
READ[:SCALar]:DAMM:POWer:MSTation? Performs a power measurement of the mobile station being tested. This represents the amount of power present at the mobile station RF interface. The additional attenuation in cabling or fixtures should be compensated with the normal attenuation commands. Five values are returned: Peak, RMS, Additional Peak, Additional RMS, and Error Message number.		TMT	1

1 **The PEAK and RMS numbers are returned as valid numbers only when valid bursts are received within the correct expected power level range. When this is true, the Additional Peak and Additional RMS measurement will be identical, respectively to the PEAK and RMS return values, and the Error Message number will be 0. When the tester detects anything other than a valid burst, the PEAK and RMS measurement parameters will return NAN, and the Additional measurement parameters will be calculated according to the following table:**

	Return parameter				
Burst status	**Peak**	**RMS**	**Additional Peak measurement**	**Additional RMS measurement**	**Error code**
Valid burst	**PEAK**	**RMS**	**PEAK**	**RMS**	**0 (no error)**
Burst power too low	**NAN**	**NAN**	**Peak measured over one acquisition frame (6+ slot)**	**RMS measured over one acquisition frame (6+ slot)**	**1 (low power)**
No power ramp detected	**NAN**	**NAN**	**Peak measured over one acquisition frame**	**RMS measured over one acquisition frame**	**2 (no power ramp)**
Invalid burst length, but power ramp detected	**NAN**	**NAN**	**Peak measured from ramp edge to end of valid slot duration time**	**RMS measured from ramp edge to end of valid slot duration time**	**3 (invalid burst)**

Table F–32: TDMA IS-136-A module test menu: power vs. time

Command	Values	State	Notes
READ[:SCALar]:DAMM[:TQUality]:PVTime:S1Test[:ALL]? Performs a measurement and returns the current values for the nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak), and the MS sync detected. S1Test sets the oversampling factor of the acquired signal curve to one.		TMT	
READ[:SCALar]:DAMM[:TQUality]:PVTime:S8Test[:ALL]? Performs a measurement and returns the current values for the nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak) and the MS sync detected. S8Test sets the oversampling factor of the acquired signal curve to eight.		TMT	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:S1Test[:ALL]? Returns the current values for the power vs. time test (oversampling factor set to one): nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak), and the MS sync detected.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:S8Test[:ALL]? Returns the current values for the power vs. time test (oversampling factor set to eight): nominal output power, the percent bursts out of range, the leakage power (RMS), the leakage power (Peak) and the MS sync detected.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:LIMit:S1Test:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power versus time test (oversampling factor set to one).		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:LIMit:S8Test:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power versus time test (oversampling factor set to eight).		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:GRAPh:S1Test:COUNt? Returns the number of points (with oversampling factor set to one) the commands FETC:ARR:DAMM[:TQU]:PVT:GRAP:S1T:X? and FETC:ARR:DAMM[:TQU]:PVT:GRAP:S1T:Y? return.		ALL	
FETCh:ARRay:DAMM[:TQUality]:PVTime:GRAPh:S1Test:X? Obtains the X-axis graphical information from the most recent power vs. time measurement (oversampling factor set to one).		ALL	
FETCh:ARRay:DAMM[:TQUality]:PVTime:GRAPh:S1Test:Y? Obtains the Y-axis graphical information from the most recent power vs. time measurement (oversampling factor set to one).		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PVTime:GRAPh:S8Test:COUNt? Returns the number of points (with oversampling factor set to one) the commands FETC:ARR:DAMM[:TQU]:PVT:GRAP:S8T:X? and FETC:ARR:DAMM[:TQU]:PVT:GRAP:S8T:Y? return.		ALL	

Table F–32: TDMA IS-136-A module test menu: power vs. time (cont.)

Command	Values	State	Notes
FETCh:ARRay:DAMM[:TQUality]:PVTime:GRAPh:S8Test:X? Obtains the X-axis graphical information from the most recent power vs. time measurement (oversampling factor set to eight).		ALL	
FETCh:ARRay:DAMM[:TQUality]:PVTime:GRAPh:S8Test:Y? Obtains the Y-axis graphical information from the most recent power vs. time measurement (oversampling factor set to eight).		ALL	

Table F–33: TDMA IS-136-A module test menu: power vs. time – configuration

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:PVTime:ASTop <ON | OFF> Sets the autostop for the Power vs. Time test on or off.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:ASTop? Returns the autostop setting for the Power vs. Time test.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:BLENgth <NORMal | SHORtened> Sets the burst lenght/type used for a Power vs. Time measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:BLENgth? Returns the burst lenght/type setting used for a Power vs. Time measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:BURSt:COUNt <number of bursts> Sets the number of bursts to be accumulated during a Power vs. Time measurement. If the number of bursts is set to one, the AVERage, MAXimum, and MINimum forms of commands in the Power vs. Time measurement system return the same data as the CURRent mode.	1 <u>100</u> 1000	ALL	
CONFigure:DAMM[:TQUality]:PVTime:BURSt:COUNt? Returns the set number of bursts to be accumulated during a Power vs. Time measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:GRAPh <<u>CURRent</u> | AVERage | MAXimum | MINimum> Sets the display mode of the waveform for the Power vs. Time measurement. This setting affects both the display of the data on the front panel of the tester and the type of data returned via the GPIB interface.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:GRAPh? Returns the display mode setting for the Power vs. Time measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LOWer:COUNt? Returns the number of graphical points the commands CONF:DAMM[:TQU]:PVT:LIM:LOW:GRAP:X? and CONF:DAMM[:TQU]:PVT:LIM:LOW:GRAP:Y? return.		ALL	

Table F–33: TDMA IS-136-A module test menu: power vs. time – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LOWer:GRAPh:X? Obtains the X-axis graphical information from the power vs. time lower limits measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LOWer:GRAPh:Y? Obtains the Y-axis graphical information from the power vs. time lower limits measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:UPPer:COUNt? Returns the number of graphical points the commands CONF:DAMM[:TQU]:PVT:LIM:UPP:GRAP:X? and CONF:DAMM[:TQU]:PVT:LIM:UPP:GRAP:Y? return.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:UPPer:GRAPh:X? Obtains X-axis graphical information from the power vs. time upper limits measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:UPPer:GRAPh:Y? Obtains Y-axis graphical information from the power vs. time upper limits measurement.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:A <Value> Sets the limit value for level A, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	–40	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:A? Returns the set limit value for level A. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:B <Value> Sets the limit value for level B, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	6.0	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:B? Returns the set limit value for level B. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:C <Value> Sets the limit value for level C, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	4.0	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:C? Returns the set limit value for level C. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:D <Value> Sets the limit value for level D, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	6.0	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:D? Returns the set limit value for level D. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:E <Value> Sets the limit value for level E, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	–40.0	ALL	

Table F–33: TDMA IS-136-A module test menu: power vs. time – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:E? Returns the set limit value for level E. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:F <Value> Sets the limit value for level F, referenced to the RMS average burst power (in dBc). See Figure F–1 on page F–149.	–20.0	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LEVel:F? Returns the set limit value for level F. See Figure F–1 on page F–149.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:NOUTput:LOWer <Value> Sets the lower bounds for the nominal output power.	–80 4.0 Upper Limit	ALL	1
CONFigure:DAMM[:TQUality]:PVTime:LIMit:NOUTput:LOWer? Returns the set lower bounds for the nominal output power.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:NOUTput:UPPer <Value> Sets the upper bounds for the nominal output power.	Lower Limit 10.0 39.0	ALL	1
CONFigure:DAMM[:TQUality]:PVTime:LIMit:NOUTput:UPPer? Returns the set upper bounds for the nominal output power.		ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LPOWer <Value> Sets the upper bounds for the leakage power to be within tolerance.	–80.0 –60.0 0	ALL	
CONFigure:DAMM[:TQUality]:PVTime:LIMit:LPOWer? Returns the set upper bounds for the leakage power to be within tolerance.		ALL	
CONFigure:DAMM[:TQUality]:PVTime[:SETTings]:DEFault Resets the configuration parameters for each Power vs. Time tests to the default values.		ALL	

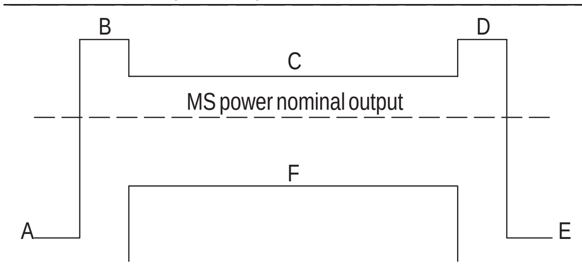

Figure F–1: Power versus time limit relationships

1 **In order for the template limits to be applied correctly to the measured bursts, the upper and lower nominal output power settings must bracket the average RMS power received from the mobile station (expected power). For example, for an expected power setting of 28 dBm (RMS power from the mobile station), the upper nominal output power limit could be set to +32 dBm, and the lower nominal power limit could be set to +24 dBm.**

Table F–34: TDMA IS-136-A module test menu: modulation – error vector magnitude

Command	Values	State	Notes
READ[:SCALar]:DAMM[:TQUality]:EVMagnitude:CURRent[:ALL]? Performs a measurement and returns the current values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:EVMagnitude:AVERage[:ALL]? Performs a measurement and returns the average values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:EVMagnitude:MAXimum[:ALL]? Performs a measurement and returns the maximum values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:CURRent[:ALL]? Returns the current values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:AVERage[:ALL]? Returns the average values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:MAXimum[:ALL]? Returns the maximum values for EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:MAXimum:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the maximum EVM RMS, EVM peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:EVMagnitude:GRAPh:COUNt? Returns the number of EVM graph points that the commands FETCh:ARRay:DAMM[:TQUality]:EVMagnitude:GRAPh:X? and FETCh:ARRay:DAMM[:TQUality]:EVMagnitude:GRAPh:Y? will return.		ALL	

Table F–34: TDMA IS-136-A module test menu: modulation – error vector magnitude (cont.)

Command	Values	State	Notes
FETCh:ARRay:DAMM[:TQUality]:EVMagnitude:GRAPh:X? Obtains the X-axis graphical information from the most recent EVM measurement.		ALL	
FETCh:ARRay:DAMM[:TQUality]:EVMagnitude:GRAPh:Y? Obtains the Y graphical information from the most recent EVM measurement.		ALL	
CONFigure:DAMM[:TQUality]:EVMagnitude:BURSt:COUNt <number of bursts> Specifies the number of bursts to be collected during a measurement.	1 100 1000	ALL	
CONFigure:DAMM[:TQUality]:EVMagnitude:BURSt:COUNt? <bursts> Returns the set number of bursts to be collected during a measurement.		ALL	
CONFigure:DAMM[:TQUality]:EVMagnitude:GRAPh <CURRent | AVERage | MAXimum> Specifies the type of data that is returned by the graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMM[:TQUality]:EVMagnitude:GRAPh? Returns the specified type of data returned by the graphical queries.		ALL	

Table F–35: TDMA IS-136-A module test menu: modulation – phase error

Command	Values	State	Notes
READ[:SCALar]:DAMM[:TQUality]:PERRor:CURRent[:ALL]? Performs a measurement and returns the current values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:PERRor:AVERage[:ALL]? Performs a measurement and returns the average values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:PERRor:MAXMin[:ALL]? Performs a measurement and returns the maximum and minimum values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:CURRent[:ALL]? Returns the current values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	

Table F–35: TDMA IS-136-A module test menu: modulation – phase error (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:AVERage[:ALL]? Returns the average values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:MAXMin[:ALL]? Returns the maximum and minimum values for Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, and frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error , and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:MAXMin:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the maximum and minimum Phase Error RMS, Phase Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:PERRor:GRAPh:COUNt? Returns the number of graphical points the commands FETC:ARR:DAMM[:TQU]:PERR:GRAP:X? and FETC:ARR:DAMM[:TQU]:PERR:GRAP:Y? return.		ALL	
FETCh:ARRay:DAMM[:TQUality]:PERRor:GRAPh:X? Obtains the X-axis graphical information from the most recent phase error measurement.		ALL	
FETCh:ARRay:DAMM[:TQUality]:PERRor:GRAPh:Y? Obtains the Y-axis graphical information from the most recent phase error measurement.		ALL	
CONFigure:DAMM[:TQUality]:PERRor:BURSt:COUNt <number of bursts> Specifies the number of bursts that are to be collected during a measurement.	1 100 1000	ALL	
CONFigure:DAMM[:TQUality]:PERRor:BURst:COUNt? Returns the set number of bursts that are to be collected during a measurement.		ALL	
CONFigure:DAMM[:TQUality]:PERRor:GRAPh <CURRent | AVERage | MAXimum> Specifies the type of data that is returned by the graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMM[:TQUality]:PERRor:GRAPh? Returns the set type of data that is returned by the graphical queries.		ALL	

Table F–36: TDMA IS-136-A module test menu: modulation – magnitude error

Command	Values	State	Notes
READ[:SCALar]:DAMM[:TQUality]:MERRor:CURRent[:ALL]? Performs a measurement and return the current values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:MERRor:AVERage[:ALL]? Performs a measurement and return the average values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
READ[:SCALar]:DAMM[:TQUality]:MERRor:MAXMin[:ALL]? Performs a measurement and return the max/min values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop.		TMT	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:CURRent[:ALL]? Returns the current values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:AVERage[:ALL]? Returns the average values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:MAXMin[:ALL]? Returns the max/min values for Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, detected sync, and amplitude droop (in this order) from the most recent measurement.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:CURRent:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the current Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:AVERage:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the average Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, and frequency error from the most recent measurement when compared to the configured limits.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:MAXMin:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the max/min Magnitude Error RMS, Magnitude Error peak, carrier feedthrough, I/Q imbalance, frequency error, and amplitude droop from the most recent measurement when compared to the configured limits.		ALL	

Table F–36: TDMA IS-136-A module test menu: modulation – magnitude error (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMM[:TQUality]:MERRor:GRAPh:COUNt? Returns the number of points that the commands FETC:ARR:DAMM[:TQU]:MERR:GRAP:X? and FETC:ARR:DAMM[:TQU]:MERR:GRAP:Y? return.		ALL	
FETCh:ARRay:DAMM[:TQUality]:MERRor:GRAPh:X? Obtains the X-axis graphical information from the most recent magnitude error measurement.		ALL	
FETCh:ARRay:DAMM[:TQUality]:MERRor:GRAPh:Y? Obtains the Y-axis graphical information from the most recent magnitude error measurement.		ALL	
CONFigure:DAMM[:TQUality]:MERRor:BURSt:COUNt <number of bursts> Specifies the number of bursts that are to be collected during a measurement.	1 100 1000	ALL	
CONFigure:DAMM[:TQUality]:MERRor:BURst:COUNt? Returns the set number of bursts that are to be collected during a measurement.		ALL	
CONFigure:DAMM[:TQUality]:MERRor:GRAPh <CURRent | AVERage | MAXimum> Specifies the type of data to be returned by graphical queries. If the number of bursts are set to 1, then the data returned in all modes is equivalent to the CURRent mode data.		ALL	
CONFigure:DAMM[:TQUality]:MERRor:GRAPh? Returns the type of data set to be returned by the graphical queries.		ALL	

Table F–37: TDMA IS-136-A module test menu: modulation – limit configuration

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:LIMit:EVMagnitude:RMS[:UPPer] <maximum RMS EVM> Sets the upper RMS limit (given in percent) on the Error Vector Magnitude specific measurement results.	0 12.5 100	ALL	
CONFigure:DAMM[:TQUality]:LIMit:EVMagnitude:RMS[:UPPer]? Returns the set upper RMS limit on the Error Vector Magnitude specific measurement results.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:EVMagnitude:PEAK[:UPPer] <maximum peak EVM> Sets the upper peak limit (given in percent) on the Error Vector Magnitude specific measurement results.	0 17.7 100	ALL	
CONFigure:DAMM[:TQUality]:LIMit:EVMagnitude:PEAK[:UPPer]? Returns the set upper peak limit on the Error Vector Magnitude specific measurement results.		ALL	

Table F–37: TDMA IS-136-A module test menu: modulation – limit configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:LIMit:ERRor:PERRor:RMS <maximum RMS phase error> Sets the RMS Pass/Fail threshold for the absolute value of the Phase Error measurement (given in degrees) result.	0 7.2 180	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:PERRor:RMS? Returns the set Pass/Fail threshold value of the RMS Phase Error measurement results.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:PERRor:PEAK <maximum peak phase error> Sets the peak Pass/Fail threshold for the absolute value of the Phase Error measurement (given in degrees) result.	0 10.2 180	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:PERRor:PEAK? Returns the set Pass/Fail threshold value of the peak Phase Error measurement results.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:MERRor:RMS <maximum RMS magnitude error> Sets the Pass/Fail RMS threshold for the Magnitude Error measurement (given in percent) result.	0 12.5 100	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:MERRor:RMS? Returns the set Pass/Fail RMS threshold for the Magnitude Error measurement result.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:MERRor:PEAK <maximum peak magnitude error> Sets the Pass/Fail peak threshold for the Magnitude Error measurement (given in percent) result.	0 17.7 100	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:MERRor:PEAK? Returns the set Pass/Fail peak threshold for the Magnitude Error measurement result.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:CFEedthrough[:UPPer] <maximum carrier feedthrough [DB]> Sets the Pass/Fail carrier feedthrough threshold for measurement results common to all Modulation measurements (units are dBc).	–80 –20 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:CFEedthrough[:UPPer]? Returns the set Pass/Fail carrier feedthrough threshold for measurement results common to all Modulation measurements.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:IQIMbalance[:UPPer] <maximum carrier imbalance [DB]> Sets the Pass/Fail carrier imbalance threshold for measurement results common to all Modulation measurements (units are dBc).	–80 –20 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:IQIMbalance[:UPPer]? Returns the set Pass/Fail carrier imbalance threshold for measurement results common to all Modulation measurements.		ALL	

Table F–37: TDMA IS-136-A module test menu: modulation – limit configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:LIMit:ERRor:FREQuency <maximum frequency error [HZ | KHZ | MHZ]> Sets the Pass/Fail carrier frequency error threshold for measurement results common to all Modulation measurements (units in Hz).	0 300 4000	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ERRor:FREQuency? Returns the set Pass/Fail carrier frequency threshold for measurement results common to all Modulation measurements.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ADRoop? Specifies the limit for the amplitude droop (units in dB).	0 3 25	ALL	
CONFigure:DAMM[:TQUality]:ASTop <ON | OFF> Sets the Autostop parameter for the test. If Autostop is ON, the measurement will halt and return results if any of the test limits are exceeded prior to acquisition of the total number of bursts specified for the measurement. If Autostop is OFF, the measurement will run to completion, acquiring and measuring the specified number of bursts.		ALL	
CONFigure:DAMM[:TQUality]:ASTop? Returns the Autostop setting for the modulation measurements.		ALL	
CONFigure:DAMM[:TQUality][:SETTings]:DEFault? Resets all limits to the default values for the measurements.		ALL	

Table F–38: TDMA IS-136-A module test menu: adjacent channel power

Command	Values	State	Notes
READ[:SCALar]:DAMM[:TQUality]:ACPower[:ALL]? Performs the Adjacent Channel power measurement and returns the RMS and Peak power in each of the observed channels. This returns the power of the last burst in the specified number of bursts. The power for the current channel, and all other values as well, is returned in dBm. The order of the results are: Channel–3, Channel–2, Channel–1, Current Channel, Channel+1, Channel+2, Channel+3. For each channel, the RMS value is sent, then the Peak value, followed by the detected sync. A total of 15 results are returned.		TMT	
FETCh[:SCALar]:DAMM[:TQUality]:ACPower:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the power within each of the adjacent channels from the most recent Adjacent Channel power measurement of the last burst in the specified number of bursts. The order of the results are: Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, first the Pass/Fail result for the RMS value will be sent, followed by the Pass/Fail value for the Peak value. A total of 12 results are returned. There are no power levels returned for the Current Channel.		ALL	

Table F–38: TDMA IS-136-A module test menu: adjacent channel power (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMM[:TQUality]:ACPower:STATistics[:ALL]? Returns the statistics associated with each of the adjacent channels for all of the bursts. The order of the results are: Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, the RMS, Peak, RMS_Average, RMS_Peak, Peak_Peak result will be returned (in this order). A total of 30 results are returned. The measurements are all expressed in dBm.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:ACPower:STATistics:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the statistics associated with each of the adjacent channels for all of the bursts. The order of the results are: Channel–3, Channel–2, Channel–1, Channel+1, Channel+2, Channel+3. For each channel, the RMS, Peak, RMS_Average, RMS_Peak, Peak_Peak result will be returned (in this order).). A total of 30 results are returned.		ALL	
FETCh[:SCALar]:DAMM[:TQUality]:ACPower:GRAPh:COUNt? Returns the number of graphical waveform points that the commands FETCh:ARRay:DAMM[:TQUality]:ACPower:GRAPh:X? and FETCh:ARRay:DAMM[:TQUality]:ACPower:GRAPh:Y? return.		ALL	
FETCh:ARRay:DAMM[:TQUality]:ACPower:GRAPh:X? Obtains the X-axis graphical waveform data from the time domain display of the Focus channel from the most recent Adjacent Power measurement. The FOCus value must be configured before a READ is done so that the proper channel is captured.		ALL	
FETCh:ARRay:DAMM[:TQUality]:ACPower:GRAPh:Y? Obtains the Y-axis graphical waveform data from the time domain display of the Focus channel from the most recent Adjacent Power measurement. The FOCus value must be configured before a READ is done so that the proper channel is captured.		ALL	

Table F–39: TDMA IS-136-A module test menu: adjacent channel power – configuration

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:ACPower:ASTop <ON | OFF> Sets the autostop for the ACP test. If Autostop is ON, the measurement will halt and return results immediately if any of the test limits are exceeded. If Autostop is OFF, the measurement will run to completion, acquiring and measuring the specified number of bursts.		ALL	
CONFigure:DAMM[:TQUality]:ACPower:ASTop? Gets the autostop for the ACP test.		ALL	
CONFigure:DAMM[:TQUality]:ACPower[:SETTings]:DEFault Sets the configuration parameters for the ACP to the default (underlined) values.		ALL	

Table F–39: TDMA IS-136-A module test menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:ACPower:FREQuency:CHANnel:FOCus <focus channel> Sets the Focus channel with the Adjacent Power measurement. The Focus channel may be set to any integer value between –3 and +3, inclusive.	3 –1 3	ALL	
CONFigure:DAMM[:TQUality]:ACPower:FREQuency:CHANnel:FOCus? Returns the set Focus channel with the Adjacent Power measurement.		ALL	
CONFigure:DAMM[:TQUality]:ACPower:BURSt:COUNt <number of bursts> Sets the number of bursts accumulated during an Adjacent Power measurement. If the number of bursts is set to one, the results of the :STATistics query will return the values from the single burst measurements.	1 100 1000	ALL	
CONFigure:DAMM[:TQUality]:ACPower:BURSt:COUNt? Returns the set number of bursts accumulated during an Adjacent Power measurement.		ALL	
CONFigure:DAMM[:TQUality]:ACPower:GRAPh <CURRent | AVERage | MAXimum> Sets the display mode of the time domain waveform for the Adjacent Power measurement. This setting affects both the display of the data on the front panel of the tester and the type of data returned via the GPIB interface.		ALL	
CONFigure:DAMM[:TQUality]:ACPower:GRAPh? Returns the set display mode of the time domain waveform for the Adjacent Power measurement.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH3Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH3Minus represents the channel that is three channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH3Minus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the current channel minus three.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH3Minus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH3Minus represents the channel that is three channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH3Minus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the current channel minus three.		ALL	

Table F–39: TDMA IS-136-A module test menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH2Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH2Minus represents the channel that is two channels below the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH2Minus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the current channel minus two.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH2Minus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH2Minus represents the channel that is two channels below the current channel.	–20.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH2Minus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the current channel minus two.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH1Minus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH1Minus represents the channel that is one channel below the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH1Minus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the current channel minus one.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH1Minus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH1Minus represents the channel that is one channel below the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH1Minus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the current channel minus one.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH1Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH1Plus represents the channel that is one channel above the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH1Plus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the channel that is one channel above the current channel.		ALL	

Table F–39: TDMA IS-136-A module test menu: adjacent channel power – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH1Plus[:UPPer]<peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH1Plus represents the channel that is one channel above the current channel.	–80.0 –26.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH1Plus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the channel that is one channel above the current channel.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH2Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH2Plus represents the channel that is two channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH2Plus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the channel that is two channels above the current channel.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH2Plus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH2Plus represents the channel that is two channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH2Plus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the channel that is two channels above the current channel.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH3Plus[:UPPer] <RMS power limit [DBC]> Sets the Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement. The keyword CH3Plus represents the channel that is three channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:RMS:CH3Plus[:UPPer]? Returns the set Pass/Fail RMS threshold of the frequency domain Adjacent Power measurement of the channel that is three channels above the current channel.		ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH3Plus[:UPPer] <peak power limit [DBC]> Sets the Pass/Fail peak threshold of the frequency domain Adjacent Power measurement. The keyword CH3Plus represents the channel that is three channels above the current channel.	–80.0 –45.0 0	ALL	
CONFigure:DAMM[:TQUality]:LIMit:ACPower:PEAK:CH3Plus[:UPPer]? Returns the set Pass/Fail peak threshold of the frequency domain Adjacent Power measurement of the channel that is three channels above the current channel.		ALL	

Table F–40: TDMA IS-136-A module test menu: BER

Command	Values	State	Notes
READ[:SCALar]:DAMM:RQUality:CLEVels[:ALL]? Performs a measurement using the current setting for TDMA power from the tester and returns the measured values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TMT	1, 2
READ[:SCALar]:DAMM:RQUality:DRANge[:ALL]? Performs a measurement and returns the measured values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TMT	1, 2
READ[:SCALar]:DAMM:RQUality:SENSitivity[:ALL]? Performs a measurement and returns the measured values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TMT	1, 2
READ[:SCALar]:DAMM:RQUality:U1Defined[:ALL]? Performs a measurement and returns the measured values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TMT	1, 2
READ[:SCALar]:DAMM:RQUality:U2Defined[:ALL]? Performs a measurement and returns the measured values for Bit Error Rate, the number of frames transmitted, the number of bit errors, the mobile station power measured, the carrier frequency error, which mobile station sync was detected, and the mobile station sync quality.		TMT	1, 2
FETCh[:SCALar]:DAMM:RQUality:CLEVels:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMM:RQUality:DRANge:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMM:RQUality:SENSitivity:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the Bit Error Rate test.		ALL	

[1] **For all Receiver Quality BER measurements, the mobile station must be configured for data loopback mode in order to provide an accurate measurement.**

[2] **The BER test signal simulates three full rate users with the following time-slot and DVCC configurations. The mobile station may need to be reconfigured accordingly, in order to attain the synchronization necessary to run the BER tests.**

User	1	2	3
Time-slot	1, 4	2, 5	3, 6
DVCC	1	2	3

Table F–40: TDMA IS-136-A module test menu: BER (cont.)

Command	Values	State	Notes
FETCh[:SCALar]:DAMM:RQUality:U1Defined:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the Bit Error Rate test.		ALL	
FETCh[:SCALar]:DAMM:RQUality:U2Defined:LIMit:FAIL[:ALL]? Returns the pass/fail (PASS = 0, FAIL = 1) values for the Bit Error Rate test.		ALL	

Table F–41: TDMA IS-136-A module test menu: BER – configuration

Command	Values	State	Notes
CONFigure:DAMM:RQUality:CLEVels:ASTop <ON | OFF> Sets the autostop for the current signal level BER test. If the auto stop is set “ON” then the BER test stops if the BER limit is exceeded. If auto stop is set “OFF” the BER test finishes when the configured number of frames are transmitted.		ALL	
CONFigure:DAMM:RQUality:CLEVels:ASTop? Returns the autostop setting for the Current signal LEVels BER test.		ALL	
CONFigure:DAMM:RQUality:DRANge:ASTop <ON | OFF> Sets the autostop for the dynamic range BER test. If the auto stop is set “ON” then the BER test stops if the BER limit is exceeded. If auto stop is set “OFF” the BER test finishes when the configured number of frames are transmitted.		ALL	
CONFigure:DAMM:RQUality:DRANge:ASTop? Returns the autostop setting for the Dynamic RANge BER test.		ALL	
CONFigure:DAMM:RQUality:SENSitivity:ASTop <ON | OFF> Sets the autostop for the sensitivity BER test. If the auto stop is set “ON” then the BER test stops if the BER limit is exceeded. If auto stop is set “OFF” the BER test finishes when the configured number of frames are transmitted.		ALL	
CONFigure:DAMM:RQUality:SENSitivity:ASTop? Returns the autostop setting for the sensitivity BER test.		ALL	
CONFigure:DAMM:RQUality:U1Defined:ASTop <ON | OFF> Sets the autostop for the user defined 1 BER test. If the auto stop is set “ON” then the BER test stops if the BER limit is exceeded. If auto stop is set “OFF” the BER test finishes when the configured number of frames are transmitted.		ALL	
CONFigure:DAMM:RQUality:U1Defined:ASTop? Returns the autostop setting for the user 1 defined BER test.		ALL	
CONFigure:DAMM:RQUality:U2Defined:ASTop <ON | OFF> Sets the autostop for the user defined 2 BER test. If the auto stop is set “ON” then the BER test stops if the BER limit is exceeded. If auto stop is set “OFF” the BER test finishes when the configured number of frames are transmitted.		ALL	

Table F–41: TDMA IS-136-A module test menu: BER – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM:RQUality:U2Defined:ASTop? Returns the autostop setting for the user 2 defined BER test.		ALL	
CONFigure:DAMM:RQUality:CLEVels:DURation[Frames] Sets the duration, in frames, of the BER test for each configuration. It sets the total number of frames to be transmitted during the test, which corresponds to the time duration of the measurement.	100 500	ALL	
CONFigure:DAMM:RQUality:CLEVels:DURation? Returns the number of frames transmitted during the current levels BER test.		ALL	
CONFigure:DAMM:RQUality:DRANge:DURation[Frames] Sets the duration of the BER test for each configuration. It sets the total number of frames to be transmitted during the test.	100 500	ALL	
CONFigure:DAMM:RQUality:DRANge:DURation? Returns the number of frames transmitted during the dynamic range BER test.		ALL	
CONFigure:DAMM:RQUality:SENSitivity:DURation[Frames] Sets the duration of the BER test for each configuration. It sets the total number of frames to be transmitted during the test.	100 500	ALL	
CONFigure:DAMM:RQUality:SENSitivity:DURation? Returns the number of frames transmitted during the sensitivity BER test.		ALL	
CONFigure:DAMM:RQUality:U1Defined:DURation[Frames] Sets the duration of the BER test for each configuration. It sets the total number of frames to be transmitted during the test.	100 500	ALL	
CONFigure:DAMM:RQUality:U1Defined:DURation? Returns the number of frames transmitted during the user 1 defined BER test.		ALL	
CONFigure:DAMM:RQUality:U2Defined:DURation[Frames] Sets the duration of the BER test for each configuration. It sets the total number of frames to be transmitted during the test.	100 500	ALL	
CONFigure:DAMM:RQUality:U2Defined:DURation? Returns the number of frames transmitted during the user 2 defined BER test.		ALL	
CONFigure:DAMM:RQUality:CLEVels:LIMit:ERRor:BERate[Percent] Sets the maximum acceptable BER limit for current levels BER measurement.	0.10 3.0 5.0	ALL	
CONFigure:DAMM:RQUality:CLEVels:LIMit:ERRor:BERate? Returns the BER limit for current levels setting.		ALL	
CONFigure:DAMM:RQUality:DRANge:LIMit:ERRor:BERate[Percent] Sets the maximum acceptable BER limit for dynamic range BER measurement.	0.10 3.0 5.0	ALL	

Table F–41: TDMA IS-136-A module test menu: BER – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM:RQUality:DRANge:LIMit:ERRor:BERate? Returns the BER limit for dynamic range setting.		ALL	
CONFigure:DAMM:RQUality:SENSitivity:LIMit:ERRor:BERate[Percent] Sets the maximum acceptable BER limit for sensitivity BER measurement.	0.10 3.0 5.0	ALL	
CONFigure:DAMM:RQUality:SENSitivity:LIMit:ERRor:BERate? Returns the BER limit for the sensitivity setting.		ALL	
CONFigure:DAMM:RQUality:U1Defined:LIMit:ERRor:BERate[Percent] Sets the maximum acceptable BER limit for the user 1 defined test.	0.10 3.0 5.0	ALL	
CONFigure:DAMM:RQUality:U1Defined:LIMit:ERRor:BERate? Returns the BER limit for the user 1 defined test setting.		ALL	
CONFigure:DAMM:RQUality:U2Defined:LIMit:ERRor:BERate[Percent] Sets the maximum acceptable BER limit for user 2 defined test.	0.10 3.0 5.0	ALL	
CONFigure:DAMM:RQUality:U2Defined:LIMit:ERRor:BERate? Returns the BER limit for the user 2 defined test setting.		ALL	
CONFigure:DAMM:RQUality:CLEVels[:SETTings]:DEFault Resets the BER test configuration parameter for current levels to the default setting.		ALL	
CONFigure:DAMM:RQUality:DRANge[:SETTings]:DEFault Resets the BER test configuration parameter for dynamic range to the default setting.		ALL	
CONFigure:DAMM:RQUality:SENSitivity[:SETTings]:DEFault Resets the BER test configuration parameter for sensitivity to the default setting.		ALL	
CONFigure:DAMM:RQUality:U1Defined[:SETTings]:DEFault Resets the BER test configuration parameter for the user 1 defined test to the default setting.		ALL	
CONFigure:DAMM:RQUality:U2Defined[:SETTings]:DEFault Resets the BER test configuration parameter for the user 2 defined test to the default setting.		ALL	
CONFigure:DAMM:RQUality:DRANge:SOUrce:POWer <power level dBm> Sets the base station power for the dynamic range BER test.	–17.0 –107.0 –131.0	ALL	1

1 **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree “SOURce:CORRection:LOSS:...”), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to -141.0 dBm to -27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Table F–41: TDMA IS-136-A module test menu: BER – configuration (cont.)

Command	Values	State	Notes
CONFigure:DAMM:RQUality:DRANge:SOUrce:POWer? Returns the base station power setting for dynamic range of the BER test.		ALL	
CONFigure:DAMM:RQUality:SENSitivity:SOUrce:POWer <power level dBm> Sets the base station power for sensitivity of the BER test.	–17.0 –70.0 –131.0	ALL	2
CONFigure:DAMM:RQUality:SENSitivity:SOUrce:POWer? Returns the base station power setting for sensitivity of the BER test.		ALL	
CONFigure:DAMM:RQUality:U1Defined:SOUrce:POWer <power level dBm> Sets the base station power for the user defined 1 BER test.	–17.0 –70.0 –131.0	ALL	2
CONFigure:DAMM:RQUality:U1Defined:SOUrce:POWer? Returns the base station power setting for user defined 1 BER test.		ALL	
CONFigure:DAMM:RQUality:U2Defined:SOUrce:POWer <power level dBm> Sets the base station power for user defined 2 BER test.	–17.0 –70.0 –131.0	ALL	2
CONFigure:DAMM:RQUality:U2Defined:SOUrce:POWer? Returns the base station power setting for user defined 2 BER test.		ALL	

[2] **The power available from the tester depends upon the connector in use. When using the RF IN/RF OUT connector, the power range, assuming no external attenuation or gain, is –131.0 dBm to –17.0 dBm. When using the RF OUT2 connector under these same conditions, the power range is –112.0 dBm to +3.0 dBm. If external gain or attenuation is used (through the command tree "SOURce:CORRection:LOSS:..."), the internal power of the tester is adjusted to maintain the commanded power after the attenuation or gain. However, the limits will change. For example, if there is 10 dB of external loss added through the SOURce:CORRection:LOSS:... command, the output range for the RF IN/RF OUT connector will change to -141.0 dBm to -27.0 dBm. Note that the default value (–70.0 dBm) remains the same.**

Audio Measurement Commands

Table F–42: Audio measurements

Command	Values	State	Notes
CONFigure:AFTest:HOLDoff <holdoff time [S] | OFF>	0.0 S to 60.0 s or OFF	ALL	1
CONFigure:AFTest:HOLDoff?		ALL	
CONFigure:AFTest:HDIStortion:AFILter <CMESsage | CCITt>		ALL	
CONFigure:AFTest:HDIStortion:AFILter?		ALL	
CONFigure:AFTest:HDIStortion:HTYPe <ALL | THIRd>		ALL	
CONFigure:AFTest:HDIStortion:HTYPe?		ALL	
CONFigure:AFTest:HDIStortion:SOURce:VOLTage <level [V] | OFF>	0.0 V to 5.0 V	ALL	
CONFigure:AFTest:HDIStortion:SOURce:VOLTage?		ALL	
CONFigure:AFTest:HDIStortion:SOURce:FREQuency[:CW | :FIXed] <frequency [HZ]>	300 Hz to 1004 Hz to 1600 Hz	ALL	
CONFIgure:AFTest:HDIStortion:SOURce:FREQuency[:CW|:FIXed]?		ALL	
CONFigure:AFTest:HDIStortion:LIMit:DB <dB limit [DB]>	–60 dB to –26 dB to –10.5 dB	ALL	
CONFigure:AFTest:HDIStortion:LIMit:DB?		ALL	
CONFIgure:AFTest:HDIStortion:LIMit:PERCent <percent limit>	30 % to 5 % to 0 %	ALL	
CONFigure:AFTest:HDIStortion:LIMit:PERCent?		ALL	
CONFigure:AFTest:HDIStortion:TLEVel <target level [V]>	0.0 V to 2.5 V to 5.0 V	ALL	
CONFigure:AFTest:HDIStortion:TLEVel?		ALL	
CONFigure:AFTest:HDIStortion:LIMit:ERRor:TLEVel <target level error [V]>	0.0001 V to 2.5 V to 5.0 V	ALL	
CONFigure:AFTest:HDIStortion:LIMit:ERRor:TLEVel?		ALL	
CONFigure:AFTest:HDIStortion:ASTop <OFF | ON>		ALL	
CONFIgure:AFTest:HDIStortion:ASTop?		ALL	
CONFigure:AFTest:HDIStortion[:SETTings]:DEFault		ALL	
CONFigure:AFTest:VOLTage:AFILter <CMESsage | CCITt>		ALL	
CONFigure:AFTest:VOLTage:AFILter?		ALL	
CONFigure:AFTest:VOLTage:SOURce:VOLTage <level [V] | OFF>	0.0 V to 0.0 V to 5.0 V	ALL	
CONFigure:AFTest:VOLTage:SOURce:VOLTage?		ALL	

1 **This command inserts a time delay between the start of an audio test and the start (or change) of the FM modulator or AF generator.**

Table F–42: Audio measurements (cont.)

Command	Values	State	Notes
CONFigure:AFTest:VOLTage:SOURce:FREQuency[:CW | :FIXed] <frequency [HZ]>	50 Hz to 1004 Hz to 4000 Hz	ALL	
CONFIgure:AFTest:VOLTage:SOURce:FREQuency[:CW | :FIXed]?		ALL	
CONFigure:AFTest:VOLTage[:SETTings]:DEFault		ALL	
READ[:SCALar]:AFTest:HDIStortion[:ALL]? Measures and returns the harmonic distortion in dB, the harmonic distortion in %, and the input level.		ALL	
READ[:SCALar]:AFTest:VOLTage[:ALL]? Measures and returns the filtered peak input level, the filtered RMS input level, and the unfiltered peak input level.		ALL	
FETCh[:SCALar]:AFTest:HDIStortion:LIMit:FAIL[:ALL]? Returns the pass(0)/fail(1) results for the harmonic distortion in dB, the harmonic distortion in %, and the input level.		ALL	

Alphabetical Listing of Commands

This subsection lists the GPIB commands in alphabetical order and the pages in this appendix on which the descriptions of the commands appear. Arguments for the commands are not given in this listing.

C

D

E

F

I

M

O

P

R

S

T

W

Appendix G: Special Remote Commands

The tester's remote interface includes special commands that provide low-level instrument control that is not available from the front panel.

***NOTE**. These commands cause the tester to produce nonstandard output signals that result in incorrect responses to some tester configuration queries. These commands should be used with caution and only when their effects and the desired results are well understood.*

The settings of these commands are not saved with instrument settings. Recalling any setting resets these commands to their default states.

Command table G–1 is interpreted in the same manner as the command tables in Appendix D. Refer to page F–6 for an explanation of interpreting the command tables.

Table G–1: Special remote commands

Command	Values	State	Notes
CONFigure:SPECial:DCLDetection[:STATe] <OFF | ON>		CE1, CE2	1
CONFigure:SPECial:DCLDetection[:STATe]?		ALL	
CONFigure:SPECial:FPCHold[:STATe] <OFF | ON>		CE1, CE2	2
CONFigure:SPECial:FPCHold[:STATe]?		ALL	
CONFigure:SPECial:MPOWer[:STATe] <OFF | ON>			3
CONFigure:SPECial:MPOWer[:STATe]?			

1 The ON argument Disables Call Loss Detection. When the system is disabled, the tester is unable to detect that the mobile station has lost the connection. This does not affect the intentional release of a call. The argument is set to OFF by default at the beginning of each call.

2 The ON argument Forces the Power Control system into a Hold mode repeating power up and down decisions. The argument is set to OFF by default at the beginning of each call and during measurements that require special power control modes. NOTE: Operation in the CE1 instrument state is not recommended.

3 ON maintains the tester output power when a call is established after a measurement to the level used during that measurement. OFF restores the tester output power to the CDMA BS Signal Configuration level. The argument is set to OFF by default when the tester is in local mode. The tester output power level when a call is not established is the CDMA BS Signal Configuration level.

Table G–1: Special remote commands (cont.)

Command	Values	State	Notes
CONFigure:SPECial:OCNS[:STATe] <OFF | ON>		ALL	4
CONFigure:SPECial:OCNS[:STATe]?		ALL	
CONFigure:SPECial:OCW[:STATe] <OFF | ON>		MINI, MIDL, CE1, CE2, CMT	5
CONFigure:SPECial:OCW[:STATe]?	OFF, ON	ALL	
CONFigure:SPECial:OPILot[:STATe] <OFF | ON>		MINI, MIDL, CE1, CE2, CMT	6
CONFigure:SPECial:OPILot[:STATe]?	OFF, ON	ALL	
CONFigure:SPECial:PCBits:MODE <AUTO | HOLD | ADOWn | AUP | RTESt>		CE1, CE2	7
CONFigure:SPECial:PCBits:MODE?	AUTO, HOLD, ADOW, AUP, RTES	ALL	
CONFigure:SPECial:PCONtrol[:STATe] <OFF | ON>		CE1, CE2	8
CONFigure:SPECial:PCONtrol[:STATe]?		ALL	

4 **This command controls the generation of the OCNS signals that contribute a portion of the total power sent to the mobile station. The total power specified for the base station simulator includes the power of the OCNS signals; when these signals are removed (“OFF”), the total output power of the base station simulator is less than that set by the configuration commands. The power values returned by “CONFigure:. . .:POWer?” queries are in error since the responses include the power in the OCNS signals.**

5 **“ON” generates a CW tone at the center frequency of the current RF channel. “OFF” restores normal CDMA operation.**

6 **“ON” disables all CDMA channels except the pilot channel. “OFF” restores all channels to normal operation.**

7 **This command selects different algorithms to control the closed loop power. Calls are established using the AUTO mode. The HOLD argument sends a pattern of alternating up and down power control bits. The ADOWn argument generates a pattern of continuous down power control bits. The AUP argument generates a pattern of continuous up power control bits. The RTESt arguments generates a pattern of eight frames of up power control bits followed by eight frames of down power control bits.**

The “HOLD” argument sets CONFigure:SPECial:FPCHold to “ON”. The remaining arguments set CONFigure:SPECial:FPCHold to “OFF”.

The “AUTO” mode uses the current state of CONFigure:SPECial:DCLDetection to control the state of the reverse traffic channel receiver. The remaining modes disable the reverse traffic channel receiver. The AUTO mode is enabled whenever a call is terminated.

Using this command in the CE1 state is not recommended since this command requires a stable reverse link frame rate.

8 **This command, when used with the “OFF” argument, removes the normal power control bits from the CDMA forward traffic channel. The “ON” argument restores normal operation. Whenever a call is placed or released, the power control bits revert to normal (on). The “OFF” argument must be sent while a call is established to have any effect. Since the resulting signal produced by the tester is not a standard CDMA signal, the mobile station must be expecting and be prepared to handle this signal. The probability of dropping a call is increased.**

Table G–1: Special remote commands (cont.)

Command	Values	State	Notes
CONFigure:SPECial:ARQuality:HDIStortion:GENerator <OFF | ON>		ACE	9, 20
CONFigure:SPECial:ARQuality:HDIStortion:GENerator?		ACE	
CONFigure:SPECial:ARQuality:SENSitivity:GENerator <OFF | ON>		ACE	10, 20
CONFigure:SPECial:ARQuality:SENSitivity:GENerator?		ACE	
CONFigure:SPECial:ATQuality:HNOise:GENerator <OFF | ON>		ACE	11, 20
CONFigure:SPECial:ATQuality:HNOise:GENerator?		ACE	
CONFigure:SPECial:ATQuality:MNDistortion:GENerator <OFF | ON>		ACE	12, 20
CONFigure:SPECial:ATQuality:MNDistortion:GENerator?		ACE	
CONFigure:SPECial:AMTest:GENerator <OFF | ON>		AMT	13, 20
CONFigure:SPECial:AMTest:GENerator?		AMT	
CONFigure:SPECial:AMTest:RQUality:AMUTing:GENerator <OFF | ON>		AMT	14, 20
CONFigure:SPECial:AMTest:RQUality:AMUTing:GENerator?		AMT	
CONFigure:SPECial:AMTest:RQUality:HDIStortion:GENerator <OFF | ON>		AMT	15, 20
CONFigure:SPECial:AMTest:RQUality:HDIStortion:GENerator?		AMT	
CONFigure:SPECial:AMTest:RQUality:SENSitivity:GENerator <OFF | ON>		AMT	16, 20
CONFigure:SPECial:AMTest:RQUality:SENSitivity:GENerator?		AMT	
CONFigure:SPECial:AMTest:TQUality:AMUTing:GENerator <OFF | ON>		AMT	17, 20
CONFigure:SPECial:AMTest:TQUality:AMUTing:GENerator?		AMT	
CONFigure:SPECial:AMTest:TQUality:HNOise:GENerator <OFF | ON>		AMT	18, 20
CONFigure:SPECial:AMTest:TQUality:HNOise:GENerator?		AMT	

[9] **This command turns the AF modulator on or off for the Analog receiver harmonic distortion manual test.**

[10] **This command turns the AF modulator on or off for the Analog receiver sensitivity manual test.**

[11] **This command turns the AF modulator on or off for the Analog transmitter hum and noise manual test.**

[12] **This command turns the AF generator on or off for the Analog transmitter mod noise/distortion manual test.**

[13] **This command turns the AF generator and modulator on or off for the Analog module test.**

[14] **This command turns the AF modulator on or off for the Analog receiver audio muting module test.**

[15] **This command turns the AF modulator on or off for the Analog receiver harmonic distortion module test.**

[16] **This command turns the AF modulator on or off for the Analog receiver sensitivity module test.**

[17] **This command turns the AF generator on or off for the Analog transmitter audio muting module test.**

[18] **This command turns the AF generator on or off for the Analog transmitter hum and noise module test.**

Table G–1: Special remote commands (cont.)

Command	Values	State	Notes
CONFigure:SPECial:AMTest:TQUality:MNDistortion:GENerator <OFF | ON>		AMT	19, 20
CONFigure:SPECial:AMTest:TQUality:MNDistortion:GENerator?		AMT	

[19] This command turns the AF generator on or off for the Analog transmitter mod noise and hum module test.

[20] This command initializes the associated test resources (generators, filter setups, ect.) starts the generator, and then drops to an idle state — never checking the DSP to see if the measurement results are ready. The analog test holdoff timer interacts with the generator/modulator control since the holdoff timer starts when the generator/modulator is started. This interaction speeds up the return of test results. Note the following interactions between tests and generators:

1. If a generator is started, and a test other than the one directly associated with the generator is invoked, the generator will be turned OFF.
2. If a generator is started and its associated test is invoked, the generator will be left ON at the end of the test.
3. If a generator is running, and a command to turn on a different generator is invoked, the first generator setup will be turned off and the second generator setup will run in its place.

Generator frequency or amplitude may be changed on the fly over GPIB. This change, or practically any parameter change, will cause approximately 100 ms of dead time. This is due to the fact that generators and other resources are always programmed form the base state (amplitude and frequency at zero).

Appendix H: GPIB Error Codes

Table H–1 lists the error codes and associated messages that may occur when you are using the remote control commands.

SCPI Command Reference – "Section 21.8 :ERRor?" (1995)

Table H–1: Error codes

Error Code	Message
Command Errors	
0	No error
–100	Command error
–101	Invalid character
–102	Syntax error
–103	Invalid separator
–104	Data type error
–105	GET not allowed
–108	Parameter not allowed
–109	Missing parameter
–111	Header separator error
–112	Program mnemonic too long
–113	Undefined header
–114	Header suffix out of range
–120	Numeric data error
–121	Invalid character in number
–123	Exponent too large
–124	Too many digits
–128	Numeric data not allowed
–131	Invalid suffix
–134	Suffix too long
–138	Suffix not allowed
–141	Invalid character data
–144	Character data too long
–148	Character data not allowed
–151	Invalid string data

Table H–1: Error codes (cont.)

Error Code	Message
–158	String data not allowed
–161	Invalid block data
–168	Block data not allowed
–171	Invalid expression
–178	Expression data not allowed
–180	Macro error
Execution Errors	
–200	Execution error
–211	Trigger ignored
–221	Setting conflict
–222	Data out of range
–223	Too much data
–224	Illegal parameter value
–230	Data corrupt or stale
–240	Hardware error
–241	Hardware missing
–250	Mass storage error
–251	Missing mass storage
–252	Missing media
–253	Corrupt media
–254	Media full
–255	Directory full
–256	File name not found
–257	File name error
–258	Media protected
Device-Specific Errors	
–300	Device-specific error
–310	System error
–311	Memory error
–313	Calibration memory lost
–314	Save/recall memory lost
–315	Configuration memory lost
–330	Self test failed

Table H–1: Error codes (cont.)

Error Code	Message
–350	Queue overflow
–360	Communication error
–361	Parity error in program message
–362	Framing error in program message
–363	Input buffer overrun
Query Errors	
–400	Query error
–410	Query INTERRUPTED
–420	Query UNTERMINATED
–430	Query DEADLOCKED
–440	Query UNTERMINATED after indefinite response
Instrument dependent errors	
1	Device dependent error
2	Reference not locked

Appendix I: Autorun

The CMD80 includes a capability to run test sequences automatically. The application controls the CMD80 through GPIB Commands that are issued internally, just as if it were under remote control.

Running the application

When first powered on, the tester displays the home menu, as shown in Figure I–1.

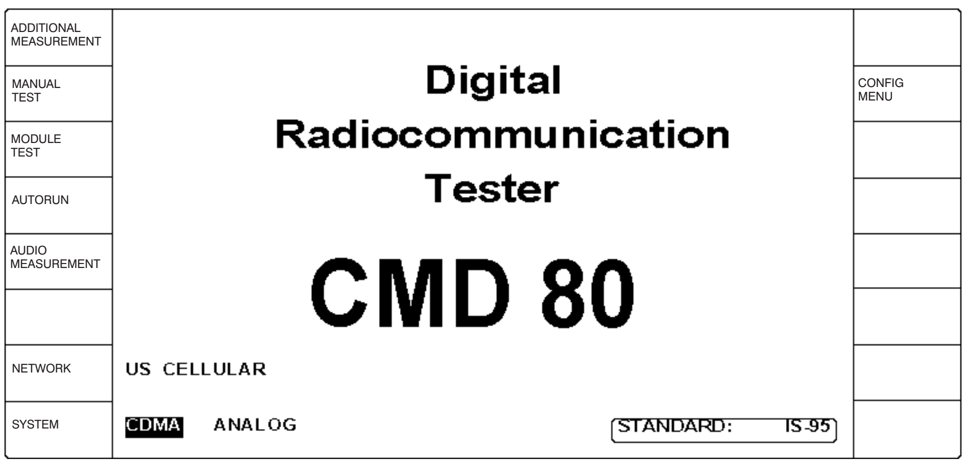

Figure I–1: Home menu display

To start the application, press the Autorun softkey in the Home Menu. The Autorun menu then appears, see Figure I–2.

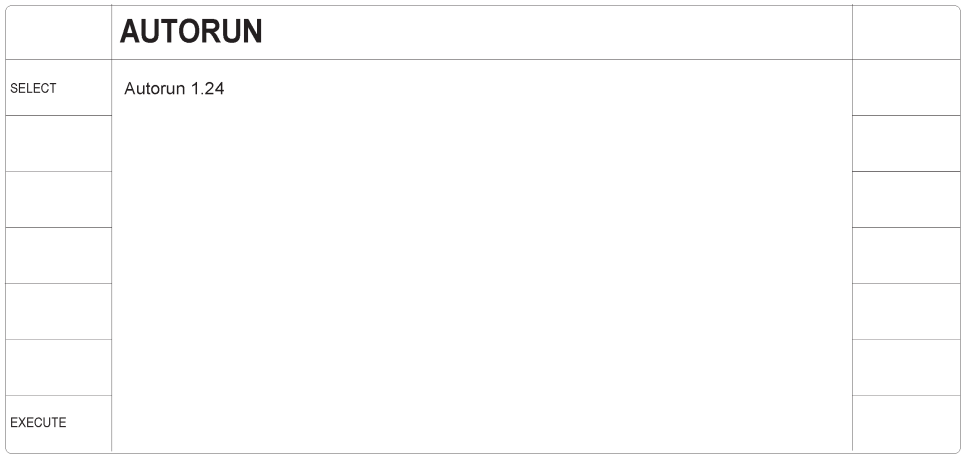

Figure I–2: Autorun menu

The CMD80 can store up to 100 different application programs. Pressing the SELECT softkey will highlight SELECT in the Autorun menu. Now you are able to select the desired application with the spin wheel.

When you press the EXECUTE softkey in the Autorun menu, the selected application is started. You can only run one application at a time. If you would like to start another application, you have to stop the currently executing program with the STOP / BREAK key on your CMD80.

Autorun MS Test menu

Once Autorun has started, the tester displays the Autorun MS Test menu, as shown in Figure I–3.

Figure I–3: Autorun home menu

Some of the menu selections available on the Autorun MS Test menu have several levels of submenus associated with them. Figure I–4 shows the Autorun menu structure. The different menus are described in the remainder of this appendix.

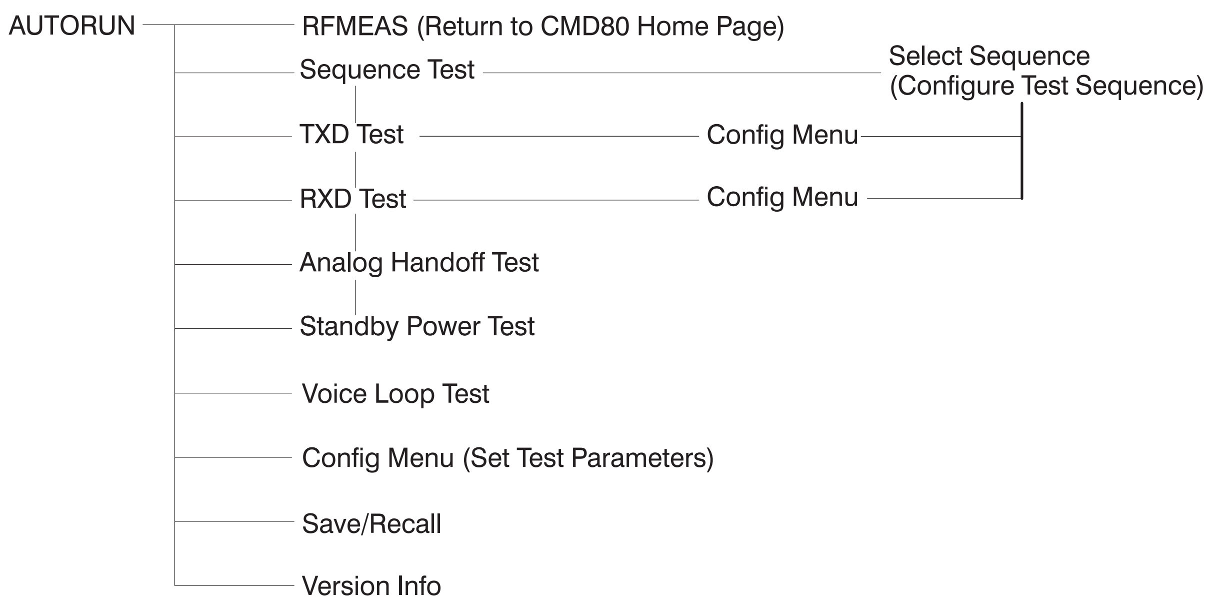

Figure I–4: Autorun menu tree

Autorun config menu

The Config Menu (Set Test Parameters) provides the opportunity to establish some of the basic CMD80 parameters, see Figure I–5. If your CMD80 is not fully optioned, some configurations are not possible.

- **ATTEN:** External Attenuation for the RF IN/OUT Connector
- **BS POWER:** Base Station Power
- **RF CHANNEL:** RF channel is one of the following RF channels:
  - **US Cellular:** 1 to 799, 990 to 1023 (only with Option K1)
  - **Japan Cellular:** 0 to 1199 (only with Option K1)
  - **China Cellular:** 0 to 2047 (only with Option K1)
  - **US PCS:** 0 to 1199 (only with Option K2)
  - **Korean PCS:** 0 to 1300 (only with Option K2)
- **TRAFFIC CHANNEL:** Traffic channel ranges from 2 through 31 and 33 through 63, inclusive.
- **RATE SET VOCODER:** Select the preferred Rate Set and the preferred Vocoder
  - Rate Set 1(8k)/Basic
  - Rate Set 1(8k)/Enhanced
  - Rate Set 2 (only with Option B14)

- **NET TYPE:** Set the Net Type by toggling the NET TYPE softkey
- **NID:** Network identifier ranges from 0 to 65534
- **SID:** System identifier ranges from 1 to 32767
- **TIMEOUT:** Timeout for Mobile Registration

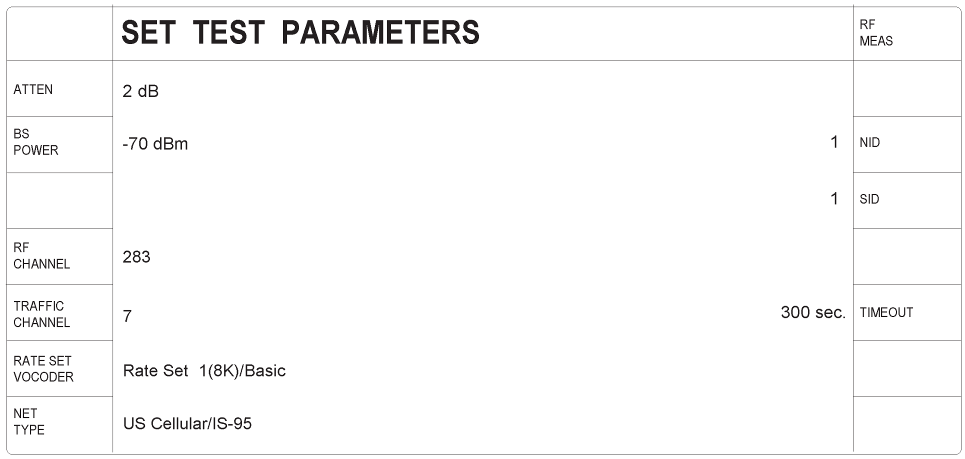

Figure I–5: Autorun Config menu

Autorun save/recall menu

The Save/Recall Menu (see Figure I–6) is used to save all Parameters used in Autorun. Once all the parameters have been established, this menu allows you to save and recall up to 50 different user settings.

- **SELECT CONFIG:** Select the user file <userx.cnf> by toggling the softkey.
- **>>:** The number of the user is incremented by 10.
- **<<:** The number of the user is decremented by 10.
- **SAVE CONFIG:** The current parameter settings are saved into the selected user file.
- **LOAD CONFIG:** The parameters of the selected user file are loaded into the CMD80.
- **FACTORY SETTINGS:** All the parameters which can be set in Autorun are reset to the factory default values.

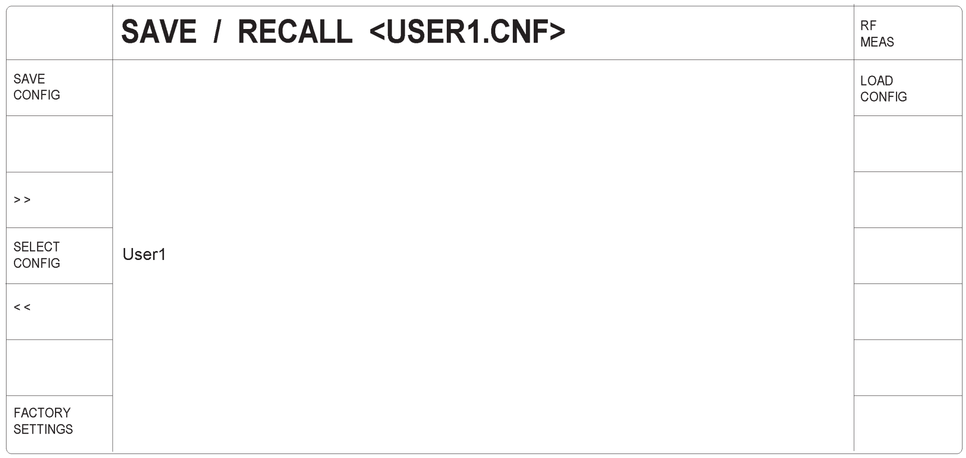

Figure I–6: Autorun Save/Recall menu

Autorun version info

This menu shows the software version of the Autorun application and the version of the UAI library used in Autorun. See Figure I–7.

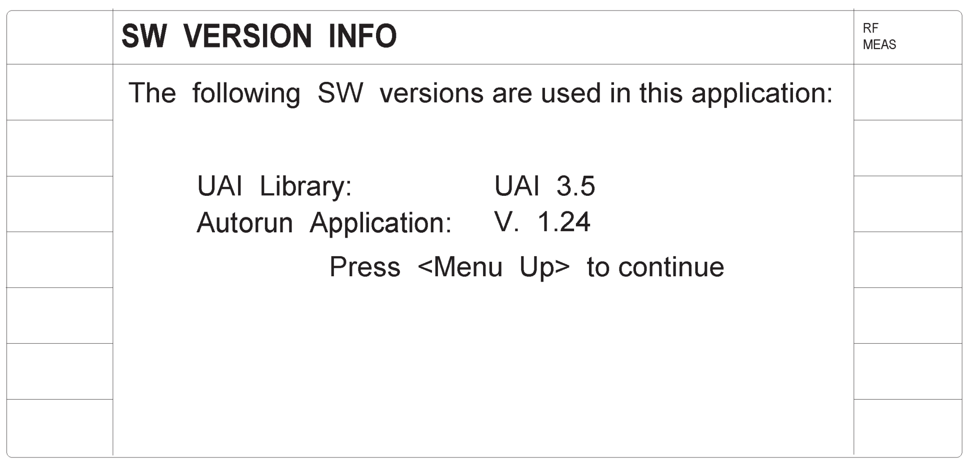

Figure I–7: Autorun version info menu

Autorun tests

After selecting a test (Sequence, RXD, TXD, Handoff Analog, Voice Loop, Standby Power) you can fill in some special text strings to customize the test report; see Figure I–8.

- **MS Type**
- **Tested By**
- **Test Location**
- **Company Name**

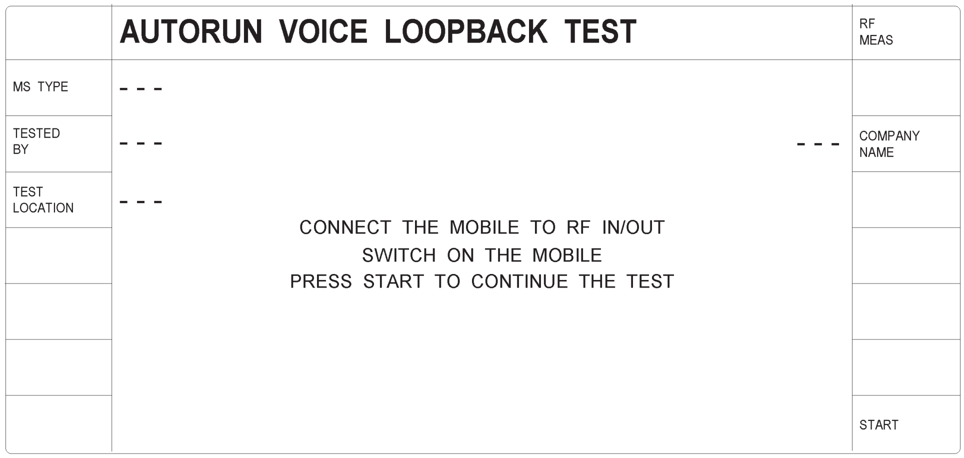

Figure I–8: Autorun test menu

Use the internal editor to edit these fields. After pressing the COMPANY NAME softkey for example, the editor shown in Figure I–9 appears. You select a character by toggling the softkey on which it appears, until the character appears on the display. After selecting each character, move the cursor using the LEFT and RIGHT softkeys, and select the next character. Continue in this manner until the text string is complete. After you have finished entering the text, press the MENU UP key next to the spin wheel.

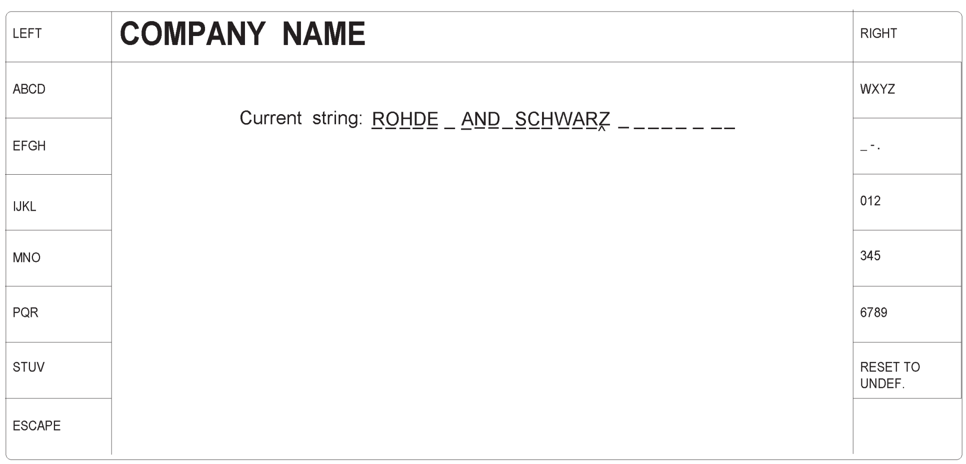

Figure I–9: Autorun editor menu

The text you entered will appear in the Test menu as shown in Figure I–10: Autorun test menu. Fill in the other string fields in the same way. After editing the strings, it is recommended that you immediately save them. You are able to save the strings just as you save the other parameters used in Autorun with the save/recall function, described in Save/Recall Menu on page I–4. Once you have finished editing, every test menu will display your text strings.

Before starting the selected test, a text message advises you to connect the mobile to RF IN/OUT and switch on the mobile. After you have done so, start the test by pressing the START softkey.

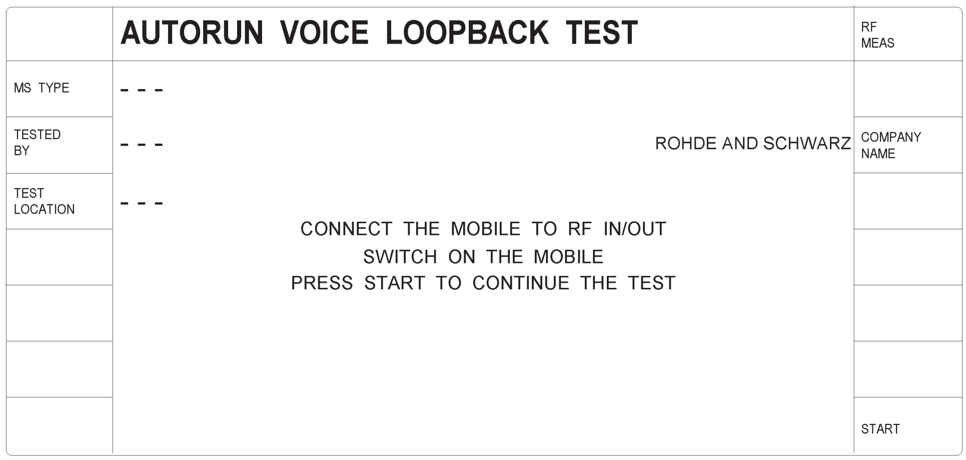

Figure I–10: Autorun test menu

Autorun voice loop test

After selecting the Voice Loop Test in the Autorun MS Test Menu, and starting the test with the START softkey, the tester will automatically establish a call with the configured settings. The tester display will report the current state of the Voice Loopback Test, or advise you on specific actions to take. After the call is established, a message spoken into the mobile phone will be returned in approximately two seconds.

To release the call and terminate the test, press the MENU UP key next to the spin wheel.

Autorun test results menu

After a test is finished, the test results are shown at once on the display of the tester, see Figure I–11 for an example of TxD test results.

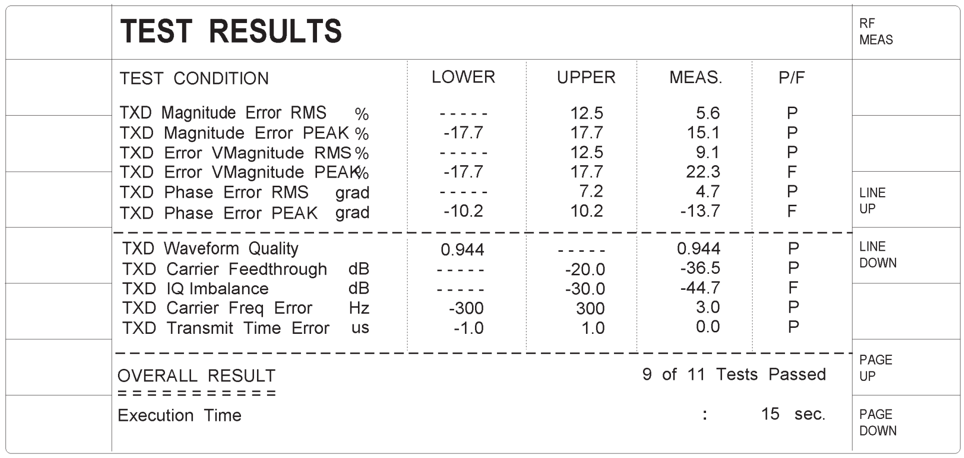

Figure I–11: Autorun test results menu (TxD)

Pressing the PAGE UP and PAGE DOWN or the LINE UP and LINE DOWN softkey will scroll the test report.

To leave this menu press the MENU UP key.

Autorun printer menu

After leaving the test results menu with the MENU UP key, the printer menu appears, see Figure I–12. The printer menu offers the opportunity to print the test results via the parallel port of the CMD80.

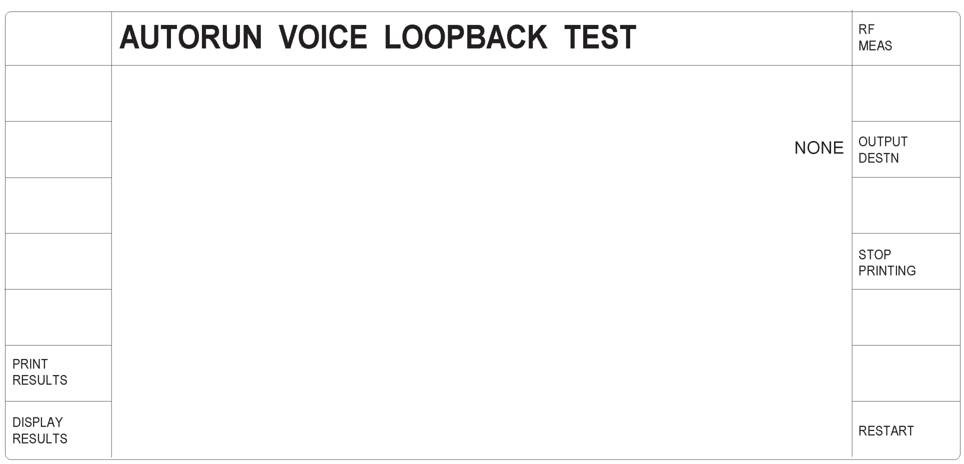

Figure I–12: Autorun printer menu

- **OUTPUT DSTN:** Pressing the OUTPUT DSTN softkey will switch the output destination between None, Printer, Internal, and Memcard. Saved files (whose output destination was Internal or Memcard) may be accessed from the Printer Output Configuration menu, located in the Main Configuration menu, which is available from the Home menu page.

- **STOP PRINTING:** Stops the printing.
- **RESTART:** Restarts the previous test.
- **PRINT RESULTS:** Outputs the results to the destination specified by the OUTPUT DSTN softkey.
- **DISPLAY RESULTS:** Goes back to the previous menu and displays the test results on the tester display.

To go back to the Autorun MS Test Menu, press the MENU UP key twice.

Autorun standby power test

When the mobile station is registered but a call is not yet established, the mobile station's tranmission power is at standby levels between access probes. Use this test to obtain the Standby Power of the mobile phone. The limits of the Standby Power are hard coded in Autorun.

Standby Power Min: –90.0 dBm.

Standby Power Max: –61.0 dBm.

Autorun TXD test (CDMA)

Use this test to obtain the mobile station Transmitter Quality. The transmitter quality test measures a number of parameters of the signal transmitted by the mobile station, and determines how this signal compares to the ideal signal model.

This Test checks the following values:

- Phase Error RMS/Peak
- Magnitude Error RMS/Peak
- Error Vector Magnitude RMS/Peak
- Carrier Feedthrough and I/Q Imbalance
- Carrier Frequency Error and Transmit Time Error
- Waveform Quality

The values are checked against the limits set in the Config Menu, shown in Figure I–13.

	SET TEST LIMITS		RF MEAS
MAGNIT RMS	12.5	-30.0	CARRIER IMBAL
MAGNIT PEAK	17.7	300	CARRIER FREQ
PHASE RMS	7.2	1	TRANSMIT TIME
PHASE PEAK	10.2	0.944	WAVE QUALITY
EVM RMS	12.5		
EVM PEAK	17.7		
C-FEED THROUGH	-20.0		

Figure I–13: Autorun TXD test config menu

- **MAGNIT RMS:** sets the maximum permitted RMS magnitude error [%]
  Values: 0.0% to 100.0%
- **MAGNIT PEAK:** sets the maximum permitted Peak magnitude error [%]
  Values: 0.0% to 100.0%
- **PHASE RMS:** sets the maximum permitted RMS phase error [°]
  Values: 0.0° to 45.0°
- **PHASE PEAK:** sets the maximum permitted Peak phase error [°]
  *Values: 0.0° to 45.0°*V
- **EVM RMS:** sets the maximum permitted RMS error vector magnitude [%]
  Values: 0.0% to 100.0%
- **EVM PEAK:** sets the maximum permitted Peak error vector magnitude [%]
  Values: 0.0% to 100.0%
- **C–FEEDTHROUGH:** sets the maximum level of the residual carrier feedthrough relative to the total output power of the mobile station [dB]
  Values: –120.0 dB to –20.0 dB
- **CARRIER IMBAL:** sets the maximum permitted imbalance between the I and Q modulation channels [dB]
  Values: –120.0 dB to –20.0 dB
- **CARRIER FREQU:** sets the maximum permitted carrier Frequency error [Hz]
  Values: 0Hz to 1000Hz
- **TRANSMIT TIME:** sets the maximum permitted transmit time error [μSec.]
  Values: 0.0 μSec. to 10.0 μSec.
- **WAVE QUALITY:** sets the minimum permitted waveform quality
  Values: 0.000 to 1.000

To leave this config menu press the MENU UP key next to the spin wheel.

To start the transmitter test, press the START softkey. During the test, the current state of the test is displayed on the screen of the tester.

After the transmitter test is finished, the test results are displayed on-screen. Press the MENU UP key to leave the test results menu. The printer menu is then displayed automatically.

Autorun RXD test (CDMA)

Use this test to obtain the mobile station Receiver Quality. The RXD Test performs the following Receiver Quality Tests:

- Sensitivity
- Dynamic Range
- Traffic Channel Demodulation

Table I–1: Traffic channel demodulation tests

	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Test 11	Test 12
Max. FER	3.0%	1.0%	0.5%	1.0%	1.0%	1.0%	3.0%	1.0%	0.5%	1.0%	1.0%	1.0%
Total Power	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm	–55 dBm
Traffic Level	–16.3 dB	–15.8 dB	–15.6 dB	–16.1 dB	–15.6 dB	–15.5 dB	–13.0 dB	–12.7 dB	–12.4 dB	–14.3 dB	–14.8 dB	–15.4 dB
Pilot Level	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB	–7.0 dB
AWGN Level	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB	1.0 dB
Data Rate	Full	Full	Full	Half	Quarter	Eight	Full	Full	Full	Half	Quarter	Eight
Rate Set	1	1	1	1	1	1	2	2	2	2	2	2

The configuration submenu of the RXD test allows the setting of different test parameters. The configuration menu for the receiver test is shown in Figure I–14.

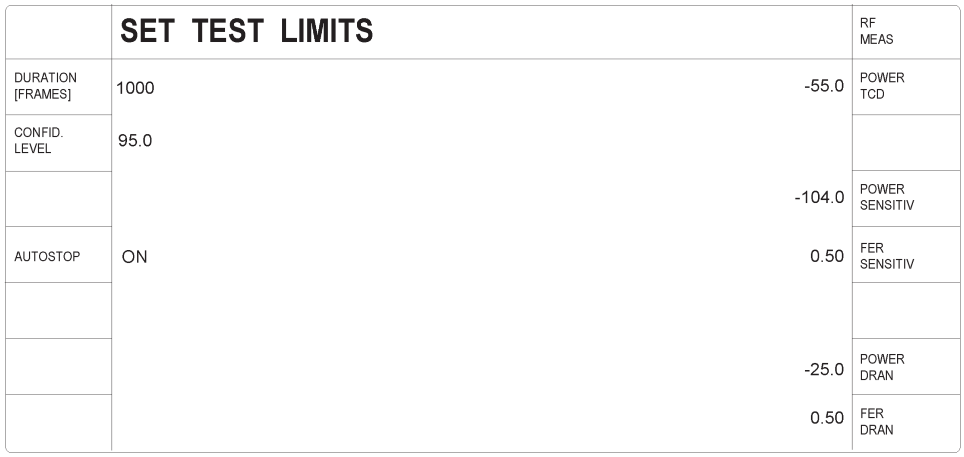

Figure I–14: Autorun RXD test config menu

- **DURATION [FRAMES]:** sets the duration of the test in terms of the number of frames to be transmitted to the mobile station.
  Values: 25 to 20000
- **CONFID. LEVEL [%]:** sets the minimum permitted confidence level for the test in percent. If the auto stop function is on, the test terminates if the confidence level is greater than this limit value. This permits a successful test to stop early.
  *Values: 85.0% to 99.9%*F
- **AUTOSTOP:** sets the Autostop function for the test to “OFF” or “ON”. If the function is “ON”, the test terminates before the specified number of frames have been sent to the mobile station if the number of bad frames is such that the test fails. For example, if the test duration is 1000 frames and the frame error limit is 1.0%, the auto stop function (if set to “ON”) terminates the test after 10 bad frames.
- **POWER TCD:** sets the power of the BS for the Traffic Channel Demodulation test.

  FER’s for TCD are hard-coded, and are shown in Table I–1, on page I–11.
- **POWER SENSITIV:** sets the power of the BS for the Sensitivity test.
- **FER SENSITIV:** sets the maximum FER for the Sensitivity Test.
- **POWER DRAN:** sets the power of the BS for the Dynamic Range test.
- **FER DRAN:** sets the maximum FER for the Dynamic Range Test.

To leave this config menu, press the MENU UP key next to the spin wheel.

To start the receiver test, press the START softkey. During the test, the current state of the test is displayed at the screen of the tester. After the receiver test is finished, the test results are displayed.

Press the MENU UP key to leave the test results menu. The printer menu is then automatically displayed.

Autorun sequence test (CDMA)

The sequence test allows you to configure a user defined test sequence. You activate or deactivate a single test by toggling the softkey next to it in the SELECT SEQUENCE (CONFIGURE TEST SEQUENCE menu).

After choosing individual tests, you can also save the sequence setting with the save/recall option.

The Sequence Test allows you to select transmitter and receiver tests. Therefore, access to the transmitter and receiver configuration menus is provided.

In the SELECT SEQUENCE (CONFIGURE TEST SEQUENCE) menu are two softkeys for setting the test parameters:

- **CONFIG TXD:** Config menu described in the TXD Test (CDMA) section of this appendix, page I–9.
- **CONFIG RXD:** Config menu described in the RXD Test (CDMA) section of this appendix, page I–11.

The menus accessible via the CONFIG TXD and CONFIG RXD softkeys are identical to those shown on pages I–10 and I–12, respectively. Because of this, any change in one menu will cause the same change in the other menu display.

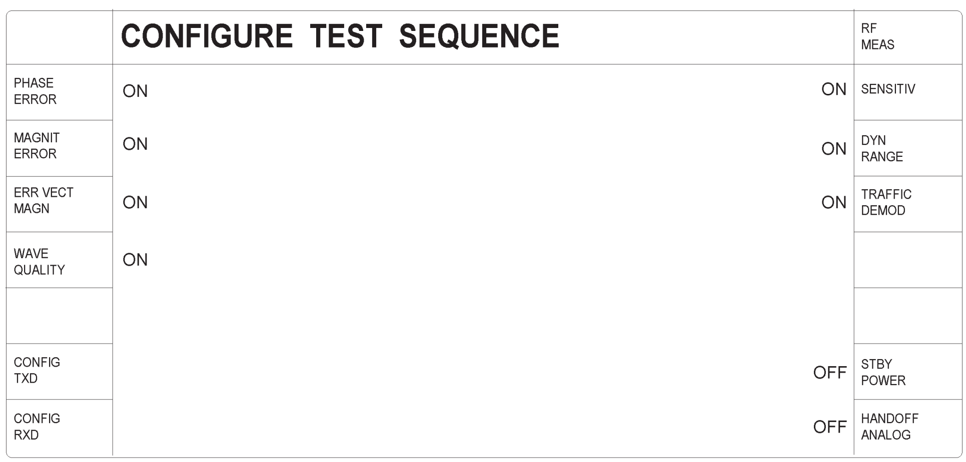

Figure I–15: Autorun select sequence (configure test sequence) menu

To leave this config menu press the MENU UP key next to the spin wheel.

To start the Sequence Test, press the START softkey. During the test, the current state of the test is progressively displayed.

After the Sequence Test is finished, the test results are displayed at once.

Press the MENU UP key to leave the Test Results menu. The Printer Menu is then automatically displayed (see Printer Menu on page I–8).

Autorun analog handoff

When you press the START softkey of the Analog Handoff Test, the tester first establishes a CDMA Call (CE2). Once in the CE2 state, a handoff to analog is performed. If the Analog Handoff is successful, the tester transitions to the ACE (Analog Call Established) state. See Figure I–16. After a successful handoff, the tester releases the analog call.

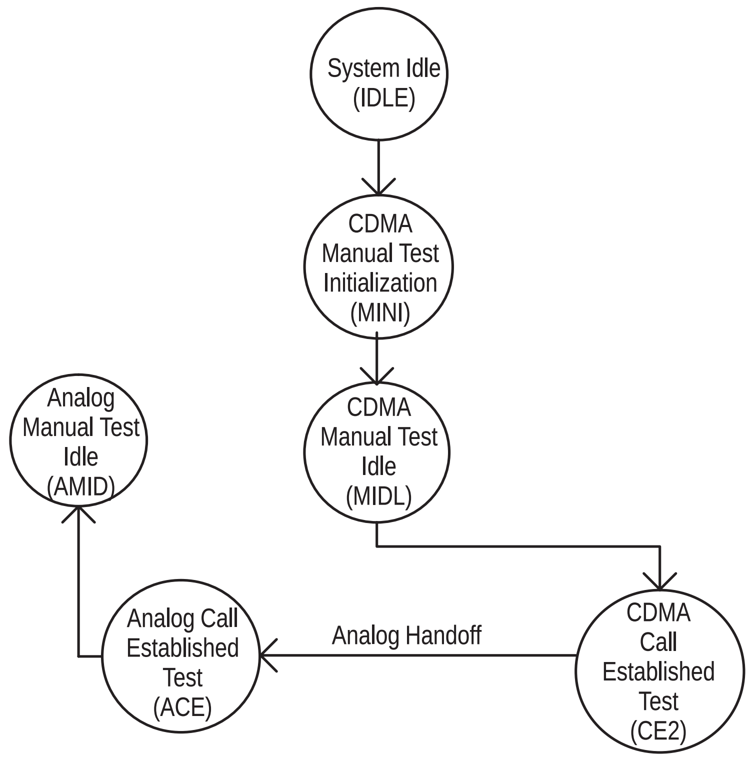

Figure I–16: Autorun analog handoff

After the Analog Handoff Test is finished, the test results are displayed at once.

Press the MENU UP key to leave the Analog Handoff menu. The Printer Menu is then automatically displayed.

Glossary

ACC
Analog Control Channel. Generic reference to AMPS control channel, including both forward and reverse directions.

AMPS
Advanced Mobile Phone System

ASK
Amplitude Shift Keying

AVC
Analog Voice Channel. AMPS mode voice / data traffic channel.

AWGN
Additive White Gaussian Noise source used to simulate the noise from users on adjacent cells.

BER
Bit Error Rate

BPSK
Binary Phase Shift Keying

CDMA
Code Division Multiple Access. A form of mobile communication that uses a specific frequency plus a unique code to distinguish users. This allows simultaneous use by multiple users on the same frequency.

CW
Continuous Wave

CODEC
Coder/decoder

DCCH
Digital Control Channel. Generic reference to IS–136 digital mode control channel, encompassing both forward and reverse directions.

DCCH
Digital Control Channel

DDS
Direct Digital Synthesis

DTC
Digital Traffic Channel. IS–136 TDMA voice/data traffic channel.

DQPSK
Differential Quadrature Phase–shift keying. Modulation method employed by IS–136 systems.

DSAT
Digital Supervisory Audit Tone. Used in NAMPS and NTACS modes as signaling, and to distinguish between different base stations sharing the same channel.

DVCC
Digital Voice Color Code

ETACS
Extended Total Access Communications System

FACCH
Fast associated control channel. Signaling messages sent in place of voice data on the IS–136 DTC.

FBCCH
Forward Broadcast Control Channel (IS–136 TDMA control channel)

FER
Frame Erasure Rate

FOCC
Forward Overhead Control Channel (AMPS control channel)

FOREG
DCCH broadcast parameter (single bit) used to cause mobile to initiate a registration. Toggling the bit initiates the action.

FSK
Frequency Shift Keying. Modulation method whereby a specific frequency transmission represents a value (in this case binary 0 or 1).

GPIB
General Purpose Instrument Bus

I/Q
In phase/Quadrature phase

JTACS
Japanese Total Access Communications System

MAC
Mobile Attenuation Code

MIN
Mobile Station Identification Number. A 34–bit ID number used over the control channel to identify messages destined for a specific mobile

MSCM
Mobile Station Control Message. message sent to mobile over FOCC, used specifically for call processing

NAMPS
Narrowband Advanced Mobile Phone System

NEXTREG
Mobile internal parameter used to calculate when the mobile should next register, based on the broadcast value of REGID.

NTACS
Narrowband Total Access Communications System

OCNS
Orthogonal Channel Noise Source

Paging Channel
The Paging Channel is the control channel for the forward link. The inverse of the Paging Channel is the access channel for the reverse link.

PCS
Personal Communication System

Pilot Channel
The Pilot Channel is a phase reference used by all mobile stations linked to a cell.

PN
Pseudo Noise

PRBS
Pseudo Random Bit Sequence

QPSK
Quadrature Phase Shift Keying

REGID
Registration ID Parameter. contained in FOCC, FBCCH. Periodically updated to new value. Mobiles use this to determine when to register.

SACCH
Slow associated control channel. Signaling messages sent between MS and BS within the DTC. Simultaneous with voice data transmission.

SAT
Supervisory Audit Tone. Used in AMPS mode as signaling, and to distinguish between different base stations sharing the same channel.

SID
System Identification Code. Broadcast parameter used to determine HOME/ROAM status for mobile.

SMS
Short Message Service

SOC
System Operator Code. Broadcast parameter used to determine HOME/ROAM status for mobile.

ST
Signaling Tone. Used by mobiles in AMPS mode for on–hook/off–hook status, other signaling and acknowledgement purposes.

Sync Channel
The Sync Channel transmits time information to align the mobile and base station clocks.

TACS
Total Access Communications System

TDMA
Time Division Multiple Access – A form of mobile communication that uses a specific frequency at a specific time to distinguish users. This allows simultaneous use by multiple users on the same frequency.

Traffic Channel
Equivalent to an analog voice channel where conversations take place.

Waveform Quality "ρ" (Greek letter rho)
The CDMA transmitter figure of merit. It is a measure of the percentage of transmitter power within the desired code domain related to the ideal value.

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