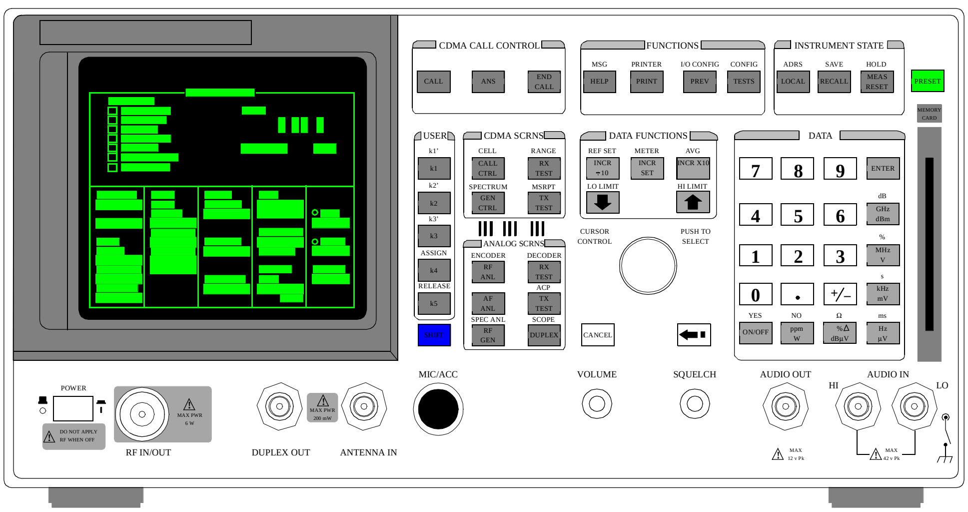
Agilent Technologies
8924E CDMA Mobile Station Test Set

User's Guide

Firmware Version A.03.02 and above



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Notice

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

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Manufacturer’s Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive, from 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB(A).

- Sound Pressure Lp < 70 dB(A).
- At Operator Position.
- Normal Operation.
- According to ISO 7779:1988/EN 27779:1991 (Type Test).

Herstellerbescheinigung

Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlärminformationsverordnung vom 18 Januar 1991.

- Schalldruckpegel Lp < 70 dB(A).
- Am Arbeitsplatz.
- Normaler Betrieb.
- Nach ISO 7779:1988/EN 27779:1991 (Typprüfung).

Safety Considerations

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product has been designed and tested in accordance with *IEC Publication 1010*, "Safety Requirements for Electronic Measuring Apparatus," and has been supplied in a safe condition. This instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

SAFETY EARTH GROUND

A uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

CHASSIS GROUND TERMINAL

To prevent a potential shock hazard, always connect the rear-panel chassis ground terminal to earth ground when operating this instrument from a dc power source.

SAFETY SYMBOLS

⚠ Indicates instrument damage can occur if indicated operating limits are exceeded.

⚡ Indicates hazardous voltages.

⏚ Indicates earth (ground) terminal

WARNING

A WARNING note denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

A CAUTION note denotes a hazard. It calls attention to an operation procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond an CAUTION note until the indicated conditions are fully understood and met.

Safety Considerations for this Instrument

WARNING

This product is a Safety Class I instrument (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited..

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

If this instrument is to be energized via an autotransformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

No operator serviceable parts in this product. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

Servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources while it is being opened.

Adjustments described in the manual are performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

The power cord is connected to internal capacitors that my remain live for 5 seconds after disconnecting the plug from its power supply.

For Continued protection against fire hazard, replace the line fuse(s) only with 250 V fuse(s) or the same current rating and type (for example, normal blow or time delay). Do not use repaired fuses or short circuited fuseholders.

CAUTION:

Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

This product is designed for use in Installation Category II and Pollution Degree 2 per *IEC 1010* and *IEC 664* respectively.

This product has autoranging line voltage input, be sure the supply voltage is within the specified range.

Ventilation Requirements: When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

Product Markings

CE - the CE mark is a registered trademark of the European Community. A CE mark accompanied by a year indicated the year the design was proven.

CSA - the CSA mark is a registered trademark of the Canadian Standards Association.

Hewett-Packard Warranty Statement for Commercial Products

Agilent Technoloiges 8924E CDMA Mobile Station Test Set

Duration of Warranty: 1 year

1. Agilent Technoloiges warrants Agilent Technologies hardware, accessories and supplies against defects in materials and workmanship for the period specified above. If Agilent Technologies receives notice of such defects during the warranty period, Agilent Technologies will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or like-new.
2. Agilent Technologies warrants that Agilent Technologies software will not fail to execute its programming instructions, for the period specified above, due to defects in material and workmanship when properly installed and used. If Agilent Technologies eceives notice of such defects during the warranty period, Agilent Technologies will replace software media which does not execute its programming instructions due to such defects.
3. Agilent Technologies does not warrant that the operation of Agilent Technologies products will be uninterrupted or error free. If Agilent Technologies is unable, within a reasonable time, to repair or replace any product to a condition as warranted, customer will be entitled to a refund of the purchase price upon prompt return of the product.
4. Agilent Technologies products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.
5. The warranty period begins on the date of delivery or on the date of installation if installed by Agilent Technologies. If customer schedules or delays Agilent Technologies installation more than 30 days after delivery, warranty begins on the 31st day from delivery.
6. Warranty does not apply to defects resulting from (a) improper or inadequate maintenance or calibration, (b) software, interfacing, parts or supplies not supplied by Agilent Technologies, (c) unauthorized modification or misuse, (d) operation outside of the published environmental specifications for the product, or (e) improper site preparation or maintenance.

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8. Agilent Technologies will be liable for damage to tangible property per incident up to the greater of $300,000 or the actual amount paid for the product that is the subject of the claim, and for damages for bodily injury or death, to the extent that all such damages are determined by a court of competent jurisdiction to have been directly caused by a defective Agilent Technologies product.

9. TO THE EXTENT ALLOWED BY LOCAL LAW, THE REMEDIES IN THIS WARRANTY STATEMENT ARE CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES. EXCEPT AS INDICATED ABOVE, IN NO EVENT WILL AGILENT TECHNOLOGIES OR ITS SUPPLIERS BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT, OR OTHERWISE.

   FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Agilent 8924E Support Contacts

Repair assistance is available for the Agilent 8924E CDMA Mobile Test Set from the factory by phone and e-mail. Internal Agilent Technoloiges users can contact the factory through cc:Mail© (Lotus Corporation). Parts information is also available from Agilent Technoligies.

When calling or writing for repair assistance, please have the following information ready:

- Instrument model number (Agilent 8924E)
- Instrument Serial Number (tag located on the rear panel).
- Installed options - if any (tag located on the rear panel).
- Instrument firmware revision (displayed at the top of the screen when the Test Set is powered up, and is also displayed on the CONFIGURE screen).

Support Telephone Numbers:

1 800 827 3848 (Spokane Division Service Assistance, U.S. only)
1 509 921 3848 (Spokane Division Service Assistance, International)
1 800 227 8164 (Agilent Direct Parts Ordering, U.S. only)
1 916 783 0804 (Agilent Service Parts Identification, U.S. & Intl.)

Electronic mail (Internet): Spokane_Service@spk.Agilent .com

cc:Mail: SERVICE, SPOKANE /Agilent -Spokane,desk1

Table 1 **Regional Sales and Service Offices**

United States of America: Agilent Technologies Test and Measurement Call Center P.O. Box 4026 Englewood, CO 80155-4026 (tel) 1 800 452 4844	Canada: Agilent Technologies Canada Inc. 5150 Spectrum Way Mississauga, Ontario L4W 5G1 (tel) 1 877 894 4414	Europe: Agilent Technologies European Marketing Organization P.O. Box 999 1180 AZ Amstelveen The Netherlands (tel) (3120) 547 9999
Japan: Agilent Technologies Japan Ltd. Measurement Assistance Center 9-1 Takakura-Cho, Hachioji-Shi, Tokyo 192-8510, Japan (tel) (81) 456-56-7832 (fax) (81) 426-56-7840	Latin America: Agilent Technologies Latin America Region Headquarters 5200 Blue Lagoon Drive, Suite #950 Miami, Florida 33126 U.S. A. (tel) (305) 267 4245 (fax) (305) 267 4286	Australia/New Zealand: Agilent Technologies Australia Pty Ltd. 347 Burwood Highway Forest Hill, Victoria 3131 (tel) 1 800 629 485 (Australia) (fax) (61 3) 9272 0749 (tel) 0 800 738 378 (New Zealand) (fax) (64 4) 802 6881
Asia Pacific: Agilent Technologies 24/F, Cityplaza One, 111 Kings Road, Taikoo Shing, Hong Kong (tel) (852) 3197 7777 (fax) (852) 2506 9233		

In this Book

Throughout this manual the term "Test Set" is used to denote the Agilent Technologies 8924E.

Test Set screens shown in this manual may not match those displayed on the Test Set in every detail.

Chapter 1, Getting Started

This chapter provides basic remote and front-panel operating procedures, a quick check for verifying operation, GP-IB programming procedures, and simple programming examples.

Chapter 2, Configuring Your Test Set

This chapter provides information about setting screen intensity, setting RF voltage interpretation, setting time and date, and setting the beeper’s volume.

Chapter 3, Operating Overview

This chapter explains how to specify units of measure, how to use the analog meter, how to use measurement averaging, how to set a measurement reference, how to set measurement limits, how to enter and change values, how to save and recall instrument setups, how to use the USER keys, and how to set a frequency offset. It also describes some important interactions that occur between screen settings.

Chapter 4, Keys

This chapter provides front-panel key descriptions.

Chapter 5, Connectors

This chapter describes the front and rear panel connectors.

Chapter 6, Screens

This chapter provides a picture of each screen available on the Test Set with an overview of the functions provided.

Chapter 6, Fields

This chapter provides a description of the functions performed by each field.

Chapter 7, Memory Cards, Mass Storage

This chapter describes memory cards and mass storage devices used with the Test Set.

Error Messages

This section discusses error and operating messages.

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1

Getting Started

This chapter will help familiarize you with fundamental Test Set operation, including:

- Accessing screens and fields
- Making a simple measurement
- Preparation for remote operation via GP-IB

Before Connecting a Radio

NOTE: The RF IN/OUT port should be used for all transmitter tests when the radio is connected directly to the Test Set. (All MSUT (Mobile Station Under Test) transmitter power measurements are made through this port). Off-the-air measurements can be made using the highly-sensitive ANT IN port.

CAUTION: *Overpower Damage* — Refer to the Test Set’s front panel for maximum input power level. Exceeding this level can cause permanent instrument damage.

Other Damage — Blocking the fans’s rotation or operating the Test Set in an environment that causes excessive heat may cause damage.

Important: If excessive temperatures are sensed on the power supply regulator assembly, the Test Set’s power supply will shut off. After temperature has lowered to within normal operating range, use the POWER switch to cycle power on. Remove RF power from the RF IN/OUT connector whenever the Test Set is off.

Accessing the Test Set’s Screens

CDMA and Analog Modes

The Test Set has two operating modes, analog and CDMA. In CDMA mode, the Test Set configures itself as a calibrated CDMA base station. In Analog mode, the Test Set has AMPS, NAMPS and TACS analog cellular phone test capability.

CDMA is the default power-up mode. To enter analog mode from CDMA mode:

- press one of the ANLG SCRNS keys, or
- select a screen from the Analog **`To Screen`** menu, or
- programmatically select an analog screen using the display (DISP) GP-IB subsystem, or
- execute a CDMA to Analog handoff.

To enter CDMA mode from analog mode:

- press one of the CDMA SCRNS keys, or
- select a screen from the CDMA **`To Screen`** menu, or
- programmatically select a CDMA screen using the display (DISP) GP-IB subsystem.

Functions Screens

Screens that control various instrument functions such as configuration, access to the Tests subsystem, and the PREV (previous screen) key are found under the front-panel "Functions" bracket.

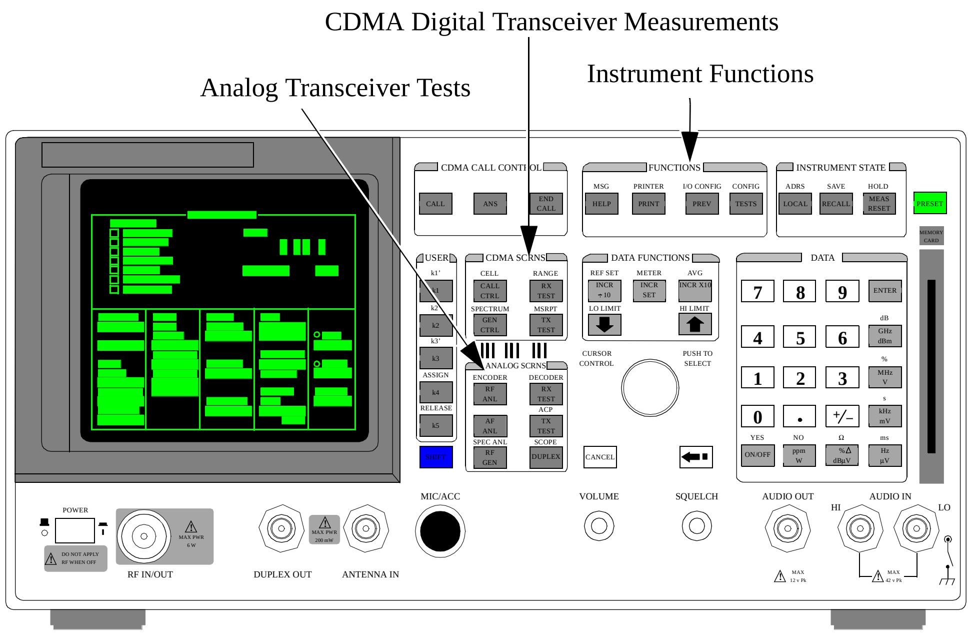
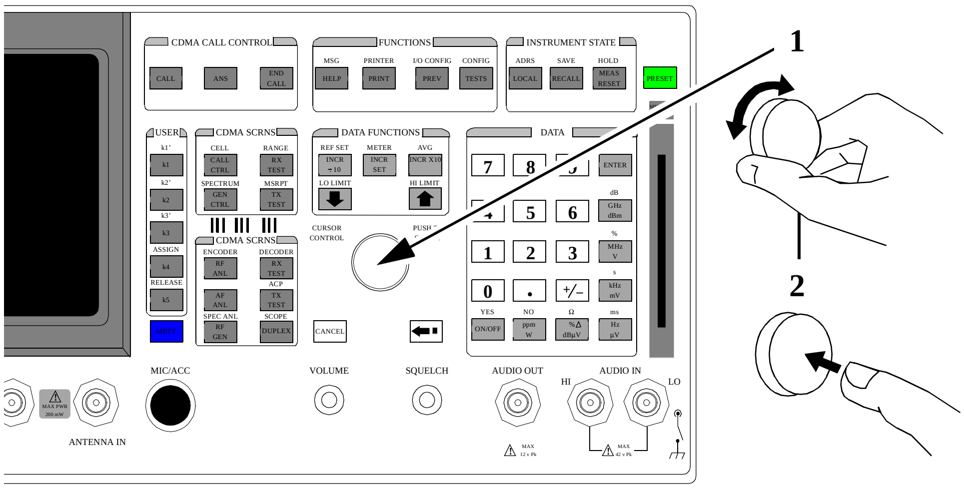


Figure 1 **Accessing Test Set Screens**

Cursor Control



1. Position

To position the cursor, rotate the Cursor Control knob, which moves the cursor from field to field or from menu item to menu item. Normally the cursor appears as a small highlighted rectangular box.

2. Select

To select an item, push the Cursor Control knob. After selection, the background of the item selected becomes highlighted or the item selected appears in an associated field.

Changing A Field’s Setting

There are several types of CRT display fields in the Test Set. This section describes some of the different types of fields, and how they are used.

Units-of-Measure Field

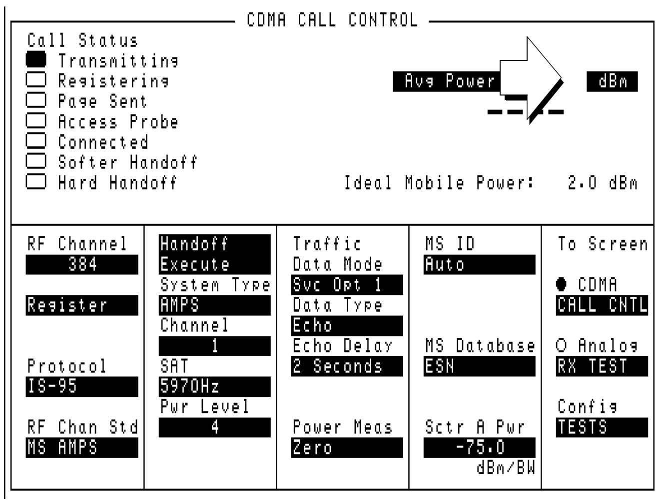
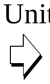


Figure 2 **Units-of-Measure Field**

Units-of-measure fields allow selection of valid units for given measurement. See  in **figure 2** to see an example of a units-of-measure field.

To change a unit-of-measure

1. Position the cursor at the unit field on the display.
2. Press a key labeled with a different unit-of-measure (such as W).
3. If the new units are valid, the measurement value will be displayed in the new unit-of-measure.

Underlined Immediate-Action Field

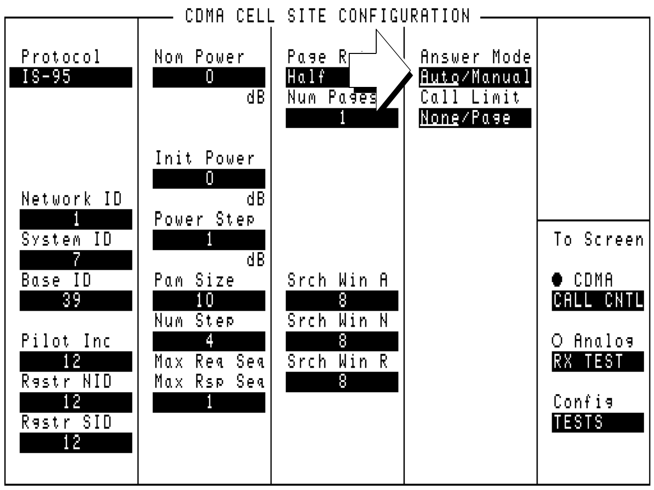
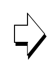


Figure 3 **Underlined Immediate-Action Field**

Underlined immediate action fields provide a choice of two settings. See  in **figure 3** to see an example of an underlined immediate-action field.

To change an underlined entry

1. Position the cursor at the field.
2. Push the CURSOR CONTROL knob or the ENTER key to underline the desired choice.

One-of-Many Field

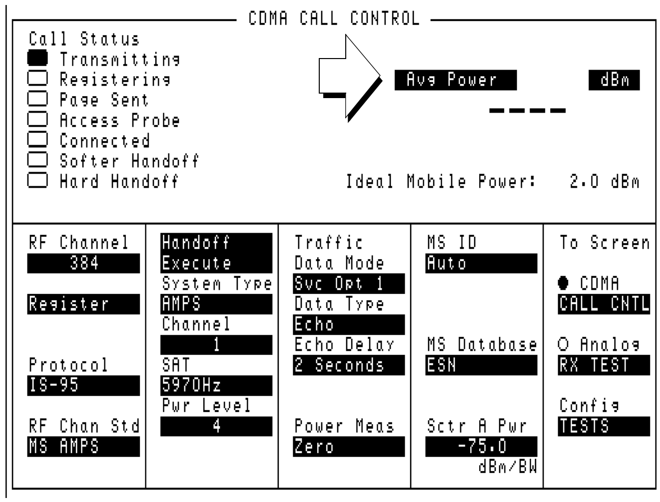
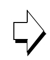


Figure 4 **One-of-Many Field**

One-of-many fields display a list of choices when selected. See  in **figure 4** to see an example of a one-of many field.

To make a one-of-many choice

1. Position the cursor at the field.
2. Push the CURSOR CONTROL knob or the ENTER key to display the choices.
3. Move the cursor through the choices by turning the knob.
4. Push the CURSOR CONTROL knob or the ENTER key to make the choice.

Numeric-Entry Field

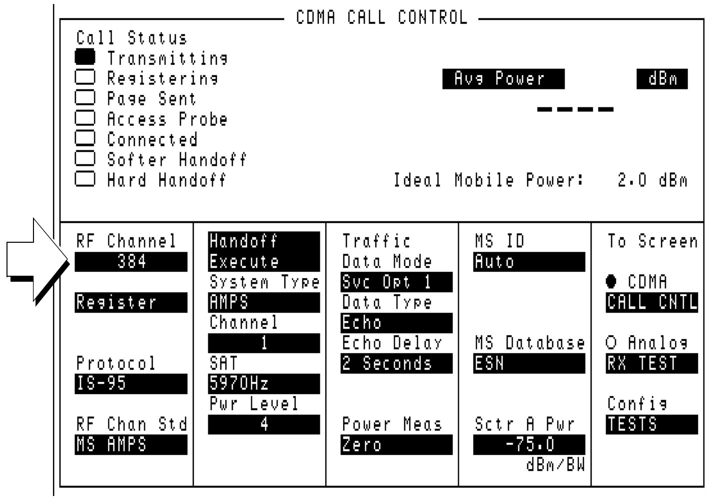
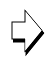


Figure 5 Numeric-Entry Field

Numeric-entry fields contain numeric values. See  in **figure 5** to see an example of a numeric-entry field.

To change a value

1. Position the cursor at the field.
2. Key in the desired number using the DATA keys.
3. Press ENTER to select the choice.

OR

1. Position the cursor at the field.
2. Push the CURSOR CONTROL knob to highlight the desired choice.
3. Turn the knob to increment or decrement the value.
4. Push the CURSOR CONTROL knob or the ENTER key to select the choice.

Obtaining Measurement Results

Setting Up a Call

To obtain CDMA measurements, the Test Set must have the MSUT (Mobile Station Under Test) on a call (the **Connected** annunciator on the CDMA CALL CONTROL screen is lit when the MSUT is on a call).

The procedure for setting up a call is provided in “Setting Up a Call”, found in the *Agilent 8924E Introduction to Operation*. In this guide, there are also procedures for performing CDMA tests.

Triggering and Displaying Measurements

When operated over the front panel (local control), Test Set measurement results are obtained by selecting a screen that displays the desired measurement, arming the measurement if necessary, and observing the displayed value.

When operated remotely, measurement results are obtained via GP-IB by triggering a measurement if necessary and querying the desired measurement field.

NOTE: In CDMA mode, transmitter (TX) measurements and receiver (RX) measurements can run concurrently. For example, an Average Power or Channel Power measurement can be queried while the RX TEST screen is selected and an FER measurement is running.

For a detailed description of triggering measurements, see **"Triggering and Displaying Measurements" on page 34**.

Control Annunciators

The letters and symbols at the top right corner of the display indicate these conditions:

R indicates the Test Set is in remote mode. The Test Set can be put into the remote mode by an external controller or by an IBASIC program running on the built-in IBASIC controller.

- **L** indicates the Test Set has been addressed to listen.
- **T** indicates the Test Set has been addressed to talk.
- **S** indicates the Test Set has sent the require service message by setting the service request (SRQ) bus line true. (See **"Status Reporting" on page 117**).
- **C** indicates the Test Set is currently the active controller on the bus.
- ***** indicates an IBASIC program is running.
- **?** indicates an IBASIC program is waiting for a user response.
- **-** indicates an IBASIC program is paused.

Verifying that the Test Set is Operating Properly

If your Test Set powers-up and displays the CDMA CALL CONTROL screen, but you suspect an instrument problem, the CDMA Mode Quick Check will verify operation of the instrument's basic functions.

The **"CDMA Mode Quick Check" on page 36** requires the Test Set with Option 102 (spectrum analyzer). If your Test Set does not have this option, you will only be able to perform the **"Analog Mode Quick Check" on page 37**.

CDMA Mode Quick Check

NOTE: This procedure assumes that the Test Set is configured for cellular mobile station testing, not PCS. If necessary, access the CONFIGURE screen and turn **PCS Intrfc Control** Off. It will then be necessary to cycle power.

1. Remove any cabling from the front-panel connectors.
2. Turn instrument power on (if it is not already on).
3. Press the PRESET key.
4. Press and release the SHIFT key then the TESTS key to access the CONFIGURE screen.
5. Position the cursor in the **`RF Display`** field, and press the knob to select **`Freq`**. The **`RF Offset`** and **`(Gen)-(Anl)`** fields will appear below **`RF Display`**.
6. Change the **`(Gen)-(Anl)`** value to 0 MHz.
7. Position the cursor in the **`Output Port`** field and Select Dupl.
8. Press GEN CTRL, +/-, 5, 0 ENTER to adjust Sector A Power to -50 dBm/BW.
9. Press and release the SHIFT key then the GEN CTRL key to access the CDMA REVERSE CHANNEL SPECTRUM analyzer screen.
10. Position the cursor in the **`Ref Level`** field, and press +/-, 1, 0, ENTER to enter a reference level of -10 dBm.
11. The display should show a CDMA signal, approximately 1.23 MHz wide.

If no failure is indicated by this test, but you still suspect a problem, refer to the performance tests information in the *Agilent 8924E Assembly Level Repair Manual*.

Analog Mode Quick Check

1. Turn instrument power on (if it is not already on).
2. Press the PRESET key.
3. Press and release the SHIFT key, then the TESTS key to access the CONFIGURE screen.
4. Position the cursor in the **RF Display** field, and press the knob to select **Freq.**
5. The **RF Offset** and **(Gen)-(Anl)** fields will appear below the **RF Display**.
6. Change the **(Gen)-(Anl)** value to 0 MHz.
7. Under the To Screen menu, select the **Analog** drop-down screen list.
8. Select **DUPLEX** to display the DUPLEX TEST screen.
9. Position the cursor in the **Amplitude** field and enter -20.
10. Position the cursor in the **AF Anl In** field, and press the knob. Select **FM Demod** from the **Choices** menu.
11. Position the cursor below the **AFGen1 To** field Off subfield, and use the ON/OFF key to turn AF Generator 1 On (make sure it remains set to FM).
12. Check the FM Deviation measurement. It should be about 2.1 kHz (assuming the **Detector** field is set to RMS).
13. Check the SINAD measurement. It should be about 34 dB.
14. Press the SCOPE key to access the OSCILLOSCOPE screen.
15. Two complete sinewave cycles should be displayed.
16. Peak deviation should be about 3 kHz peak (1.5 units above/below the center line).
17. If a Spectrum Analyzer (Option 102) is installed in your test set, press the SPEC ANL key to access the SPECTRUM ANALYZER.
18. A frequency modulated carrier at the current RF Generator setting should be displayed.

If no failure is indicated by this test, but you still suspect a problem, refer to the Performance Tests information in the *Agilent 8924E Assembly Level Repair Manual*.

2

Configuring Your Test Set

This chapter will help you prepare the Test Set for making measurements. This includes:

- Calibration Guidelines
- Setting screen intensity
- Setting time and date
- Setting beeper volume

Recommended Calibration Procedures

Step-by-step calibration procedures are located in the *Agilent 8924E Introduction to Operation*, “Calibrate the Test Set”.

Use the table below to determine which calibration procedures need to be performed.

Table 2 **Recommended Calibration Procedures**

	CDMA Channel Levels	Channel Power Measurements	RF Generator Levels	Average Power Measurement Zeroing
After 30 minute warm-up period	✓	✓	✓	
After firmware is upgraded	✓	✓	✓	
When the "Uncal" light is flashing			✓	
Before making an Average Power measurement				✓
If the RF connections to the PCS interface are adjusted		✓	✓	
If the ambient temperature changes more 5 degrees C after 30 minute warm-up period	✓	✓	✓	
After calibrating CDMA Channel levels (also known as “PCB CAL”.		✓	✓	

Instrument Display Setup

The following procedures are related to features available on the CONFIGURE screen. The Test Set will retain these settings during power cycles or instrument PRESET.

To Set Screen Intensity

1. Access the CONFIGURE screen.
2. Select the **`Intensity`** field.
3. Rotate the knob to change the setting (1=dim, 8=bright).

To Set the Date and Time

1. Access the CONFIGURE screen.
2. Select the **`Date`** field and use the DATA keys to enter the date in the format shown below the field.
3. Select the **`Time`** field and use the DATA keys to enter the time in the format shown below the field.

The Test Set has a built-in clock that keeps track of the date and time. It is powered by an internal battery to keep it operating when the instrument is off.

To Change the Beeper's Volume

1. Access the CONFIGURE screen.
2. Select the **`Beeper`** field to display the volume choices.
3. Select the desired choice.

The beeper alerts you to important operating and measurement conditions. It beeps any time a message is displayed at the top of the screen. These messages warn you of conditions such as exceeding the RF input level or trying to set a field to an unacceptable value. Therefore, it is recommended that you do not disable the beeper.

3

Operating Overview

The information in this chapter describes how to use many of the operating features of the Test Set, including:

To Change the Measurement Display

To Use the On/Off Function

The on/off function is used for the following operations.

- Measurements that are displayed as numbers, or as meters using the METER function, can be turned on and off.
- The data functions REFerence, METer, HLIMit and LLIMit can be turned on and off.
- Any instrument function that generates a signal can be turned on and off. This includes the CDMA Sector A Power, Sector B Power, and AWGN.
- Trace displays, such as the CDMA Reverse Channel Spectrum Analyzer, cannot be turned off.

The front-panel ON/OFF key is used to turn measurements, instrument functions and data functions on or off.

Front-Panel Example

The following front-panel operation turns **`Avg Power`** off.

1. Move the cursor in front of the unit-of-measure for the **`Avg Power`** measurement.
2. Press the ON/OFF key. The **`Avg Power`** measurement field displays the word **`OFF`** in place of units

To Use the METER Format

The METER function displays measurements graphically. The METER format is available for most measurements. To determine if the METER format is provided for a measurement, position the cursor in front of the measurement's units field and press the knob. If the message "Press ON/OFF, LIMITs, REF, AVG, METER, or units" is displayed, the METER format is provided.

As a measurement is displayed on the meter, the value is also displayed in small digits below the meter. You can specify the high and low end points and number of intervals, or you can use the default meter settings.

1. Position the cursor in front of the measurement's unit-of-measure.
2. Press and release the SHIFT key, then the INCR SET key to select the METER function. The default number of average samples is displayed below the measurement.
3. Select **`On/Off`** from the **`Meters:`** field on the CRT display
4. Repeat steps 1 and 2 then select **`LoEnd`**, **`Hi End`**, or **`Intervals`** to enter each meter end point and the meter intervals.
5. Repeat steps 1, 2, and 3 to cancel the meter function.

Front-Panel Example

The following front panel operation turns on the **`Avg Power`** measurement meter.

1. Move the cursor in front of the unit-of-measure for the **`Avg Power`** measurement).
2. Press and release the SHIFT key, then the INCR SET key to select the METER function, then press the ENTER key. The meter will appear below the measurement units field with default low/high ends and number of intervals. To turn off the measurement meter, repeat this process.

To Set a Measurement Reference

The REF SET function establishes a measurement reference point. This allows you to make a direct comparison between two measurement results, or between a measurement standard and the actual measurement results.

Referenced measurements are displayed as either a ratio (dB) or difference between the measured value and the reference.

1. Position the cursor in front of the unit-of-measure for the measurement you want to set the reference for.
2. Press and release the SHIFT key, then the INCR ÷10 key to select the REF SET function.
3. Enter the reference value.
4. **`Ref`** appears below the measurement value to indicate that a reference has been set. The measurement field may display a different unit-of-measure, and limit choices for units.

Front-Panel Example

The following front-panel operation sets a 10 dBm reference for **`Avg Power`** measurements.

1. Move the cursor in front of the unit-of-measure for the **`Avg Power`** measurement).
2. Press and release the SHIFT key, then the INCR ÷10 key.
3. Enter 10 dBm using the DATA keys.

   The abbreviation **`Ref`** will appear below the **`Avg Power`** measurement field and **`Avg Power`** measurements will be expressed in dB. Absolute power (mW, W) will not be selectable.

To Use Measurement Averaging

The AVG (average) function allows you to reduce the effects of a rapidly changing measurement by displaying the average value of a number of measurements.

1. Position the cursor in front of the measurement's unit-of-measure.
2. Press and release the SHIFT key, then the INCR × 10 key to select the AVG function. The default number of average samples is displayed below the measurement.
   - Enter the desired number of measurement samples to be used for calculating the average, or
   - Press the ON/OFF key to use the currently-displayed number of samples.
3. To turn averaging off, position the cursor in front of the unit-of-measure and press release the SHIFT key, then the INCR × 10 key, then the ON/OFF key to turn averaging off.

Front-Panel Example

The following front-panel operation averages **`Avg Power`** measurements over 10 samples.

1. Move the cursor in front of the unit-of-measure for the **`Avg Power`** measurement.
2. Press and release the SHIFT key, then the INCR × 10 key to select the AVG function.
3. Enter 10 using the DATA keys and press the ENTER key. The abbreviation **`Avg`** will appear below the **`Avg Power`** measurement field.

To Set Measurement Limits

The LO LIMIT and HI LIMIT functions are used to define a measurement "window" to alert you to measurements that are outside these limits. When limits are assigned, **`Lo`** and/or **`Hi`** appear by the measurement.

A measurement that goes above or below the defined limits causes three things to happen:

1. A message appears at the top of the screen indicating a limit was exceeded.
2. The **`Lo`** or **`Hi`** indicator by the measurement flashes.
3. The Beeper beeps if it is has not been turned off in the CONFIGURATION screen.

Limits are helpful when you can't watch the Test Set display while you are making an adjustment on the equipment you are testing or repairing. They are also a convenient way of alerting you to long-term measurement drift without having to observe the screen.

1. Position the cursor in front of the unit-of-measure for the measurement you are setting limits for.
2. Press and release the SHIFT key, then the down-arrow key to select the LO LIMIT function.
3. Enter the measurement's low limit value and unit-of-measure.[1]
4. Press and release the SHIFT key, then the up-arrow key to select the LO LIMIT function.
5. Enter the measurement's high limit value and unit-of-measure.[1]

To *reset* a limit that has been exceeded:

1. Position the cursor in front of the unit-of-measure for the measurement you assigned the limit to.
2. Press and release the SHIFT key, then the down-arrow (LO LIMIT) or up-arrow (HI LIMIT key, or press the MEAS RESET key.

To *remove* a limit you have set:

1. Position the cursor in front of the unit-of-measure for the measurement you assigned the limit to.
2. Press and release the SHIFT key, then the down-arrow (LO LIMIT) or up-arrow (HI LIMIT key, then press the ON/OFF key.

1. The fundamental unit for the LIMITs does not have to be the same as the measurement's units. For instance, when measuring AC Level in Volts, you can set HI and LO LIMITs in units of dBm if desired.

Front-Panel Example

This example sets limits for the **`Avg Power`** measurement. These limits will indicate if the power level is between –5 dBm and +5 dBm.

1. Position the cursor in front of the unit-of-measure for the **`Avg Power`** measurement (the default is **`dBm`**).
2. Press and release the SHIFT key, then the down-arrow key to select the LO LIMIT function.
3. Enter –5 using the DATA keys and press the ENTER key.
4. Press and release the SHIFT key, then the up-arrow key to select the HI LIMIT function.
5. Enter 5 using the DATA keys and press the ENTER key.

The **`Hi`** limit and **`Lo`** limit annunciators will appear below the **`Avg Power`** measurement field.

To Specify Units-of-Measure for CRT Display

Most measurements, data functions, and instrument functions allow you to specify which unit-of-measurement should appear on the CRT display.

1. Position the cursor in front of the present unit-of-measurement.
2. Press the key labeled with the desired unit.

Front-Panel Example

The following front-panel operation causes the Test Set to display **`Avg Power`** in units of Watts instead of dBm.

1. Press the PRESET key.
2. Press the CALL CTRL key to access the CDMA CALL CONTROL screen.
3. Move the cursor in front of the unit-of-measure for the **`Avg Power`** measurement (**`dBm`**).
4. Press the RATIO W key. The measurement value is changed immediately to display in Watts.

To Enter and Change Values

To Enter Decimal Values

Values can be entered and changed using various methods, depending on your testing needs.

1. Position the cursor in front of the numeric entry field to be changed.
2. Either:
   - Enter the number and unit-of-measure directly using the keypad, or
   - Press the CURSOR CONTROL knob or the ENTER key to highlight the field, and use the knob, or
   - Use the down-arrow and up-arrow keys to increment or decrement the present value.

Front-Panel Example

The following front panel operation changes **`Sector A Power`** to -73 dBm/BW.

1. Move the cursor in front of the **`Sector A Power`** field.
2. Enter –73 dBm using the DATA keys.

To Enter Hexadecimal Values

Hexadecimal (Hex) values are used for entering some signaling parameters, such as MIN (Mobile Identification Number). No unit-of-measure is associated with these values.

Hexadecimal values are either entered from the keypad (using the A-F shifted functions), or by using the **`Choices`** menu.

Front-Panel Example

The following front-panel operation enters the Hexadecimal number #H0D2565F15 into the MIN field.

1. Move the cursor to the field below **`MS ID`**.
2. If the field currently says **`Phone Num`** press the ENTER key, use the CURSOR CONTROL knob to select MIN, and press the ENTER key again. (If MIN is already selected, proceed to step 3.)
3. Use the CURSOR CONTROL knob to select the numeric entry field below MIN.
4. Enter 0, then press and release the SHIFT key, then the 3 key (to select D), enter 2565, press and release the SHIFT key, then the 5 key (to select F), enter 15, and then press the ENTER key. This is the hexadecimal code derived from the phone number 321-456-7890.

To Enter Values With Exponents

Front-Panel Example

The following front-panel operation changes **`Confidence`** (limit) to 95.

1. Press the CALL CTRL key.
2. Move the cursor in front of the **`Confidence`** field.
3. Enter 9 EEX 1.

The EEX key can be used to enter values in exponential notation. Exponential notation is only allowed on floating-point entry fields.

To Increment/Decrement Values

Incrementing and decrementing values on the Test Set can be performed from the front panel with the CURSOR CONTROL knob or the up/down arrow keys., or the INCR ÷10 and INCR ×10 keys.

The INCR ÷10, INCR ×10, and INCR SET keys are used to assign a specific increment value. To change an increment/decrement setting:

1. Move the cursor to the numeric entry field to be changed.
2. To change the current increment/decrement setting by a factor of 10, use the INCR ÷10 or INCR ×10 keys.
3. To set a specific increment/decrement value, press INCR SET, and enter the desired value.

Front-Panel Example

The following front panel operation sets the increment value on the **`Sector A Power`** field to 3 dB.

1. Press the CDMA SCRNS, CALL CTRL key.
2. Move the cursor in front of the **`Sector A Power`** field.
3. Press INCR SET, 3, ENTER.
4. Turn the knob or press the up/down arrow keys.

Saving and Recalling Instrument Setups

The save and recall functions allow you to store different instrument setups and retrieve them later, eliminating the task of re-configuring the Test Set.

The number of available save registers depends on how many changes were made to the *BASE* instrument setup for each save. (See **"To Specify a BASE Setting" on page 56**.) The smaller the number of changes, the greater the number of SAVE registers that can be used (typically over 200).

SAVE/RECALL register settings can be saved to several types of mass storage. This allows you to “back up” the settings in case you need to clear them from memory (see **"Memory Considerations" on page 56**) for running large programs, or when a firmware upgrade is performed.

To Save an Instrument Setup

1. Press and release the SHIFT key, then the PREV key to access the I/O CONFIGURE screen. Select the storage media using the **`Save/Recall`** field. (The default storage media is internal memory.)
2. Make any changes to the instrument that you want to save in a register.
3. Press and release the SHIFT key, then the RECALL key to select the SAVE function.
4. Use the DATA keys or the **`Save:`** menu at the bottom right of the screen to enter the save register name.

Front-Panel Example

This example saves the current instrument settings.

1. Press and release the SHIFT key, then the RECALL key to select the SAVE function. A prompt appears at the top of the screen asking you to enter a name.
2. Using the DATA keys, enter 123, then press the ENTER key to assign a name.

To Recall an Instrument Setup

1. Press and release the SHIFT key, then the PREV key to access the I/O CONFIGURE screen and select the media to recall settings from using the **`Save/Recall`** field. (The default is internal memory.)
2. Press the RECALL key.
3. Use the knob to select the desired setup to be recalled from the **`Recall`** menu at the bottom right of the screen.

Front-Panel Example

This example recalls the current instrument settings.

Press RECALL, 1, 2, 3, ENTER. The saved instrument settings are recalled.

To Clear All SAVE Registers

1. Press the RECALL key.
2. Use the knob to position the cursor in front of the entry in the **`Recall`** menu at the bottom right of the screen.
3. Press the knob or the ENTER key. A prompt appears at the top of the screen to verify that you want to clear all registers.
4. Press the ON/OFF key to select YES.

To Remove (Clear) an Individual SAVE Register

1. Specify where the register is stored using the **`Save/Recall`** field on the I/O CONFIGURE screen.
2. Press the RECALL key.
3. Use the knob to position the cursor in front of the register to be removed from the **`Recall`** menu at the bottom right of the screen. The register name and percentage of SAVE memory occupied by that register are indicated at the very top of the screen.
4. Press the ON/OFF key. A prompt appears, asking if you want to delete the save register.
5. Press the ON/OFF key to select YES. (Press the RATIO W key to select NO.)

To Choose a Register Name

You can use any number, letter, or combination of numbers and letters as a name for storing instrument settings. For instance; if you want to save a setup for testing a “Vulcan7” radio, you can save the setting as “VULCAN7”.

Two register names are reserved for special purposes: POWERON and BASE.

To Specify a POWERON Setting

You can specify the instrument setting at power-on by following the procedure described in **"To Save an Instrument Setup" on page 53**, and choosing the register name POWERON. If a SAVE Register named POWERON is detected by the Test Set during its power-on routine, the Test Set will configure itself using the settings stored in the POWERON register.

NOTE: If the Test Set does not successfully complete its power-on routine because of the POWERON settings (e.g., the Test Set displays a message that requires you to cycle power to recover) you must:

1. Turn off the Test Set.
2. Hold down the PRESET and the Hz/uV keys simultaneously.
3. Turn on power while holding the PRESET and the Hz/uV keys down *until the CALL CONTROL screen appears*.

This procedure will clear all SAVE registers, including POWERON.

To Specify a BASE Setting

The *BASE* register contains any field settings the user has SAVEd that are different from the instrument PRESET state. It establishes a reference point for all future SAVEs. (The PRESET state is stored in the BASE register until you SAVE another instrument setup.)

When you SAVE an instrument setup, the new setup is compared to the BASE settings, and any *differences* are stored under the register name you supply. Because only differences are stored, a much larger number of instrument setups can be saved than if the contents of every field was saved.

When you RECALL an instrument setting, every field is reset to the BASE settings. The SAVED settings are then used to re-establish the desired instrument setup.

You can define your own BASE setting. If your desired settings are very different from the PRESET values, you may want to change the BASE register. This will decrease the amount of memory used to SAVE each setup, and allow you to SAVE many more setups.

CAUTION: Since each SAVE/RECALL register only contains the differences between the setup being saved and the present BASE register settings, changing the BASE results in all other saved setups being ERASED from memory (including the POWERON setting if one has been saved).

Unless you consistently change the same fields to the same value each time you use the instrument, you should probably not create your own BASE settings.

Memory Considerations

When the **`Save/Recall`** field of the I/O CONFIGURE screen is set to **`Internal`**, instrument setups are saved to the same non-volatile RAM used to create RAM Disk(s) and run IBASIC programs. By saving a large number of instrument setups, you reduce the amount of RAM available to run programs. If you get a “memory overflow” message while trying to load a program, you must clear one or more SAVE/RECALL registers to free RAM space).

Using USER Keys

User keys instantly access instrument settings without using the knob. You can use USER keys to move quickly between fields on the same screen, and to access field settings that are not normally available on the screen you are using.

Local USER keys are used to move between settings on the screen that is displayed. When the USER key is pressed, the cursor instantly moves to, and selects, the assigned field; eliminating the need to turn and push the knob. Five local USER keys are available for each screen: K1, K2, K3, K4, and K5.

Global USER keys are used to access settings that are not available on the current screen. Three global USER keys are available: K1’, K2’, and K3’. (These are shifted functions of the local USER keys.)

When defining USER keys, the *ASSIGN* function is used to create key definitions; the *RELEASE* function removes the definitions. Re-assigning a USER key to a different field setting automatically Releases it from the setting it was previously associated with.

To Assign Local USER Keys

1. Move the cursor to the field you want to assign a local USER key to.
2. Press and release the SHIFT key, then the K4 key to select the ASSIGN function. Press a local USER key (K1-K5). The USER key number appears in front of the field you assigned it to.

Example of Assigning a Local USER Key

Use this example to assign local USER key K1 to the **`Filter 1`** field in the RX TEST screen.

1. Access the RX TEST screen and position the cursor in front of the **`Filter 1`** field.
2. Press and release the SHIFT key, then the K4 key to select the ASSIGN function.
3. Press K1. A small **`1`** appears next to the field indicating that USER key K1 has been assigned to it.
4. Move the cursor to any other field on the screen and press K1. The cursor immediately returns to the **`Filter 1`** field. The field is also highlighted to change the entry using the CURSOR CONTROL knob or arrow keys.

To Release Local USER Keys

1. Display the screen containing the USER key assignment to be removed.
2. Press and release the SHIFT key, then the K5 key to select the RELEASE function.
3. Press the USER key (K1-K5) that you want to release.

To Assign Global USER Keys

1. Move the cursor to the field you want to assign a global USER key to.
2. Press and release the SHIFT key, then the k4 key to select the ASSIGN function.
3. Press a global USER key (K1’ -K3’). Unlike a local USER key, the USER key number *does not* appear in front of the field you assigned a global USER key to. A prompt appears at the top of the screen confirming the key assignment.

Example of Assigning a Global USER Key

Use this example to assign global USER key K1’ to the **`AF Anl In`** field, and then access this field in the OSCILLOSCOPE screen.

1. Access the AF ANALYZER screen and position the cursor in front of the **`AF Anl In`** field.
2. Press and release the SHIFT key, then the K4 key to select the ASSIGN function.
3. Press and release the SHIFT key, then the K1’ key. Notice the prompt **`Global User key 1 assigned.`** at the top of the screen.
4. Access the OSCILLOSCOPE screen.
5. Press SHIFT, K1’.

`AF Anl Input`, **`FM Demod`** is displayed at the top of the screen (assuming the present input is set to FM Demod). To change the input, use the arrow keys, or press the ENTER key to access the **`Choices`** menu.

A field that is accessed using a global USER key is only displayed at the top of the screen while it is being accessed. Moving the cursor to any other field in the screen causes the USER key field to disappear until it is accessed again.

To Release Global USER Keys

1. Move the cursor to the field with the global USER key assigned to it.
2. Press SHIFT, K5, SHIFT, and the USER key to be released (K1’-K3’).

Setting an RF Generator/Analyzer Frequency Offset

You can set a fixed frequency offset between the RF Generator and the RF Analyzer. At power-up and instrument preset this feature is ON with a transmit/receive frequency offset of 45 MHz.

NOTE: A 45 MHz offset is required for making a call or making measurements in CDMA mode.

To Turn Off RF Frequency Offset

1. Access the CONFIGURE screen.
2. Position the cursor below the **`RF Display`** field and select **`Freq`**.
3. Set the **`RF Offset`** to **`Off`**.

To Change the RF Frequency Offset

1. Access the CONFIGURE screen.
2. Position the cursor below the **`RF Display`** field and select **`Freq`**.
3. Set the **`RF Offset`** to **`On`**.
4. Enter an offset frequency (**`(Gen)-(Anl)`**).

Setting an RF Generator/Analyzer Level Offset

You can correct for path loss by setting up an RF Level Offset on the front-panel RF connector(s) used in your application. At power-up and instrument preset this feature is OFF with 0.0 dB loss in all connector fields.

An RF Level Offset is required to ensure proper power levels to the analyzer when testing CDMA mobile stations.

Refer to "Calibrate the Test Set" in the *Agilent 8924E Introduction to Operation*.

Printing A Screen

To Print A Screen's Contents

1. Connect a printer to the appropriate rear-panel connector.
2. Press and release the SHIFT key, then the PRINT key to access the PRINT CONFIGURE screen and set the **`Printer Port`** field to the appropriate type of printer connection.
   - If GP-IB is selected, enter the GP-IB **`Printer Address`** of the printer.
3. Select the type of printer you are using in the **`Model`** field. If your printer is not listed, configure your printer to emulate one that is listed.
4. Enter a **`Print Title`** using the knob (optional). The title will appear at the top of your printout.
5. Display the screen you want to print and press the PRINT key.

To interrupt printing, select the **`Abort Print`** field on the PRINT CONFIGURE screen.

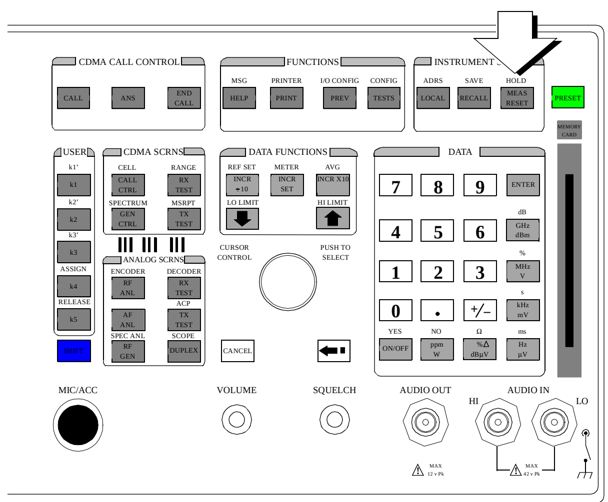
Triggering Analog Measurements In Local Mode (Front Panel Operation)

- **`Repetitive`** re-triggering is the only trigger mode available from the front panel for analog measurements. Single trigger mode can be simulated using the Test Set's measurement HOLD feature. Selecting the HOLD key causes *all* currently displayed measurement results to be held on the screen and stops the current measurement cycle. To resume making measurements press the HOLD key again.

Manual Operation:

1. Press then release the SHIFT key, then press the MEAS RESET key to HOLD measurement results.

2. Select HOLD again to return to Repetitive mode.



Meas Reset begins a measurement cycle, interrupting any measurement in progress.

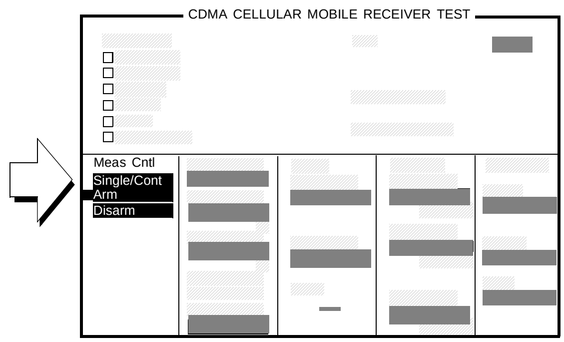
Triggering CDMA Measurements In Local Mode (Front Panel Operation)

For FER and Rho Suite of Measurements

- **`Continuous`** - Once a measurement has completed, the Test Set is internally re-triggered and another measurement cycle begins.
- **`Single`** - Requires selection of the Arm field to be begin a measurement cycle.

Manual Operation:

1. Position the cursor at the Single/Cont field.
2. Press the knob to underline the desired mode.
3. If you selected Single, select the Arm field to trigger a measurement.



When Single is selected, the Arm and Disarm fields are displayed. When Continuous is selected the Arm and Disarm fields will not appear.

4

Description of Keys

The keys are listed in alphabetical order.

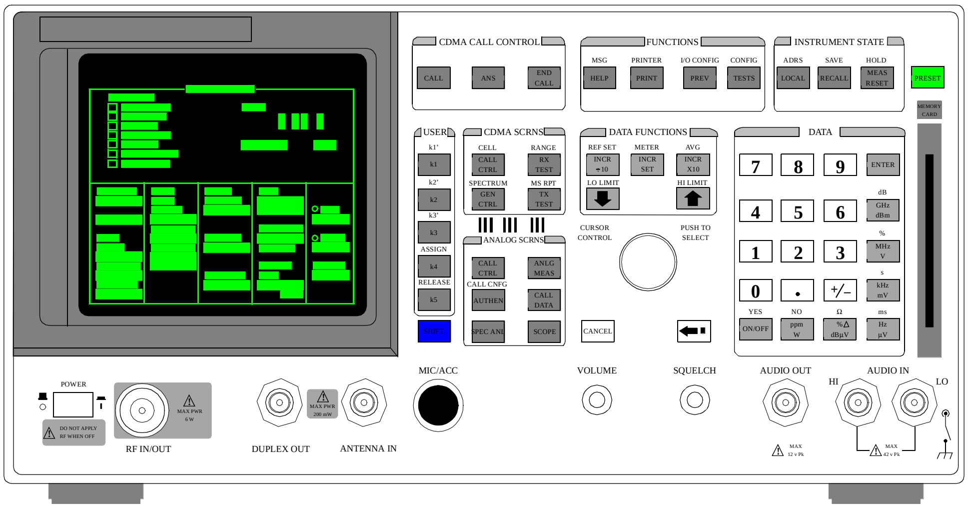


Figure 6 **Agilent 8924E Front Panel**

Keys That Begin with the Letter A

ADRS

Press and release the SHIFT key, then the LOCAL key to display the GP-IB address of the Test Set. There is no equivalent GP-IB command for the ADRS key.

See Also

"I/O Configure Screen" on page 129

ANS

This key functions only when `Answer Mode` is set to `Manual`.

Pressing this key answers CDMA-mode mobile-station-originated calls by removing the ring back tone from the mobile station’s audio path and allowing user conversation or other traffic to be exchanged.

The Test Set will automatically answer calls if `Answer Mode` is set to `Auto`.

AVG

Press and release the SHIFT key, then the INCR x10 key to access the average function. This enables or disables measurement averaging.

See Also

"To Use Measurement Averaging" on page 47

ASSIGN

This key is used to assign the User Keys, K1 through K5, and K1’ through K3’. Press and release the SHIFT key, then the K4 key to select the ASSIGN function.

See Also

"Using USER Keys" on page 57

Keys That Begin with the Letter C

CALL

When this key is pressed, the Test Set attempts a CDMA-mode page to a mobile station. The Call Status annunciators on the CDMA CALL CONTROL screen indicate call flow.

Refer to "Set Up a Call" chapter in the *Agilent 8924E Introduction to Operation.*

CANCEL

CANCEL is used to cancel an entry in progress, or to stop a running IBASIC program. For example, if you press RECALL to recall an instrument setup, and then decide not to recall a setting, pressing CANCEL exits the recall procedure.

Keys That Begin with the Letter E

END CALL

When this key is pressed, the Test Set disconnects any CDMA-mode call that is currently connected.

ENTER

ENTER is used to select a field or screen, and to enter numbers when the unit-of-measure is not specified. This function is identical to pressing the cursor-control knob.

EEX

Press and release the SHIFT key, then the +/- key to access the exponent function. This function is used for entering numbers using scientific notation.

See Also

"To Enter Values With Exponents" on page 51

Keys That Begin with the Letter H

HOLD

Press and release the SHIFT key, then the MEAS RESET key. This stops all measurements. Selecting HOLD again resumes measurements.

The HOLD key is used to hold/resume all active measurements. There is no equivalent GP-IB command for the HOLD key. However, the functionality of the HOLD key can be implemented remotely by using Single Triggering of measurements.

See Also

"Measurement Triggering Process" in the Operating Overview chapter of the *Agilent 8924E User's Guide*.

Keys That Begin with the Letter I

INCR ÷ 10, INCR SET, INCR x10

These keys are used to change the increment/decrement value when changing field values.

The increment divide-by-10 function reduces the increment setting by a factor of 10 (new increment setting = current setting ÷ 10).

The increment setting function sets the increment value for real-number numeric entry fields.

The increment multiply-by-10 function increases the increment setting by a factor of 10 (new increment setting = current setting × 10).

Keys That Begin with the Letter K

K1 - K5, & K1’- K3’

These keys are used to display fields from another screen, or access fields without using the CURSOR CONTROL knob or changing screens.

See Also

"Using USER Keys" on page 57

Keys That Begin with the Letter L

LOCAL

LOCAL returns the instrument to manual control after GP-IB control is used, except when the Test Set is in local-lockout mode. The Test Set returns to Local operation (full front-panel control) when either the Go To Local (GTL) bus command is received, the front-panel LOCAL key is pressed or the REN line goes false. When the Test Set returns to local mode the output signals and internal settings remain unchanged, except that triggering is reset to “repetitive” and settling is reset to “full”. The LOCAL key will not function if the Test Set is in the local lockout mode.

LO LIMIT, HI LIMIT

Press and release the SHIFT key, then the down-arrow key to access the low limit function.Press and release the SHIFT key, then the up-arrow key to access the high limit function. These functions are used to set measurement endpoints. Exceeding the end points causes screen prompts to blink until they are reset.

Keys That Begin with the Letter M

MEAS RESET

MEAS RESET clears the measurement history for all of the instrument's measurement algorithms (such as the averaging and peak hold functions) to restart all measurements that are in progress.

METER

The METER function displays measurements graphically. The METER format is available for most measurements. To determine if the METER format is provided for a measurement, position the cursor in front of the measurement's units field and press the knob. If the message "Press ON/OFF, LIMITs, REF, AVG, METER, or units" is displayed, the METER format is provided.

Keys That Begin with the Letter O

ON/OFF

ON/OFF is used to enable and disable measurements, and to turn numeric fields (such as **`Amplitude`**) on and off.

See Also

"To Use the On/Off Function" on page 44

Keys That Begin with the Letter P

PRESET

PRESET restores most of the instrument’s settings to their factory default states, although most CONFIGURE screen changes are not affected. Instrument self-diagnostics are not run when PRESET is pressed.

PREV

PREV accesses the previous screen.

PRINT

Pressing PRINT outputs the entire contents of the displayed screen, the time and date, and any print title defined in the PRINT CONFIGURE screen. To print measurement results through GP-IB, the program must query the measurement and print the result in a format determined by the programmer.

See Also

"Print Configure Screen" on page 131
"Printing A Screen" on page 62

POWER

POWER turns the instrument’s power on and off.

Keys That Begin with the Letter R

RECALL

RECALL is used to recall instrument setups saved in SAVE/RECALL registers.

Programming RECALL

The GP-IB commands :REGister:RECall are used to select this function programmatically. The SAVE/RECALL mass storage device is selected using the **`SAVE/RECALL`** field on the I/O CONFIGURE screen.

See Also

"Saving and Recalling Instrument Setups" on page 53

REF SET

Press and release the SHIFT key, then the INCR÷10 key to access the reference set function. This function is used to enter or remove a measurement reference for relative AF and RF measurements.

RELEASE

This key is used to delete the assignment of the User Keys, K1 through K5, and K1’ through K3’. Press and release the SHIFT key, then the K5 key to select the RELEASE function.

See Also

"Using USER Keys" on page 57

Keys That Begin with the Letter S

SAVE

Press and release the SHIFT key, then the RECALL key to access the save function. This stores instrument setups.

SHIFT

SHIFT is used to selected the blue-labeled functions listed above some keys (such as PRINTER, CONFIG, RELEASE, EEX, and so forth).

Keys That Begin with the Letter Y

YES, NO

YES and NO are used to confirm selected operations before they are executed. Press and release the SHIFT key, then the ON/OFF key to access the YES function. Press and release the SHIFT key, then the RATIO W key to access the NO function.

Keys That Begin with a Number

0 to 9, decimal point (.), +/-, and A to F

These keys are for entering and changing values. A through F are shifted functions. Press and release the SHIFT key, then the appropriate key (0 through 5) to select the letter A through F.

See Also

"To Enter and Change Values" on page 50

Symbol Keys

BACKSPACE

The backspace key is used to move the cursor to the left when entering numbers in a field, such as **`RF Gen Freq`**. Each press of this key moves the cursor one place to the left, erasing the previous character.

Down-Arrow, Up-Arrow

These keys increment (up-arrow) or decrement (down-arrow) field values. The increment value is determined by the INCR SET (:INCRement) data function.These keys are also used to select alternate field entries without displaying the **`Choices`** menu used by some fields. They are also used to move the cursor in string entry fields (such as the **`Print Title`** field on the PRINT CONFIGURE screen).

Programming Increment Up/Down (Arrow Keys)

See Also

"To Increment/Decrement Values" on page 52

Units-of-Measure Keys

The units keys are for entering and changing the unit-of-measure (such as GHz, V, dBm, %, mW, and so forth) for measurements or field entries. Milliwatts (mW) is a shifted function. Press and release the SHIFT key, then the ENTER key to select mW.

See Also

"To Specify Units-of-Measure for CRT Display" on page 49

Miscellaneous Hardware

Knobs

CURSOR CONTROL

CURSOR CONTROL has three functions:

- Moving the cursor.
- Selecting fields, screens, and settings from a list of choices.
- Changing numeric field values.

VOLUME

VOLUME controls the speaker volume for monitoring the AF Analyzer's selected input. The volume is also affected by the **`Speaker Vol`** and **`Speaker ALC`** fields in the analog AF ANALYZER screen.

SQUELCH

SQUELCH adjusts the squelch level when demodulating AM, FM, or SSB signals. The squelch level is affected by the **`Squelch`** field in the analog RF ANALYZER screen.

DATA FUNCTIONS Keys

The DATA FUNCTIONS keys can be divided into two groups; those which affect measurements (REF SET, METER, AVG, HI LIMIT and LO LIMIT), and those which affect numeric entry fields (INCR÷10, INCR SET, INCR×10, up-arrow, down-arrow). For measurements, the data functions enable the programmer to change the way measurements are calculated and displayed, and provide measurement limit detection. For numeric entry fields, the data functions enable the programmer to set, scale, and change the field's increment value.

USER Keys

User keys instantly access instrument settings without using the knob. You can use user keys to move quickly between fields on the same screen, and to access field settings that are not normally available on the screen you are using.

Local user keys are used to move between settings on the screen that is displayed. When the user key is pressed, the cursor instantly moves to, and selects, the assigned field; eliminating the need to turn and push the knob. Five local user keys are available for each screen: k1, k2, k3, k4, and k5.

Five factory-assigned local user keys are available in each screen; however, using these keys removes any other local user keys you may have already set up.

Global user keys are used to access settings that are not available on the current screen. Three global user keys are available: k1’, k2’, and k3’. (These are shifted functions of the local user keys.)

When defining user keys, the *ASSIGN* function is used to create key definitions; the *RELEASE* function removes the definitions. Re-assigning a user key to a different field setting automatically releases it from the setting it was previously associated with.

5

Description of Connectors

The connectors are listed in alphabetical order.

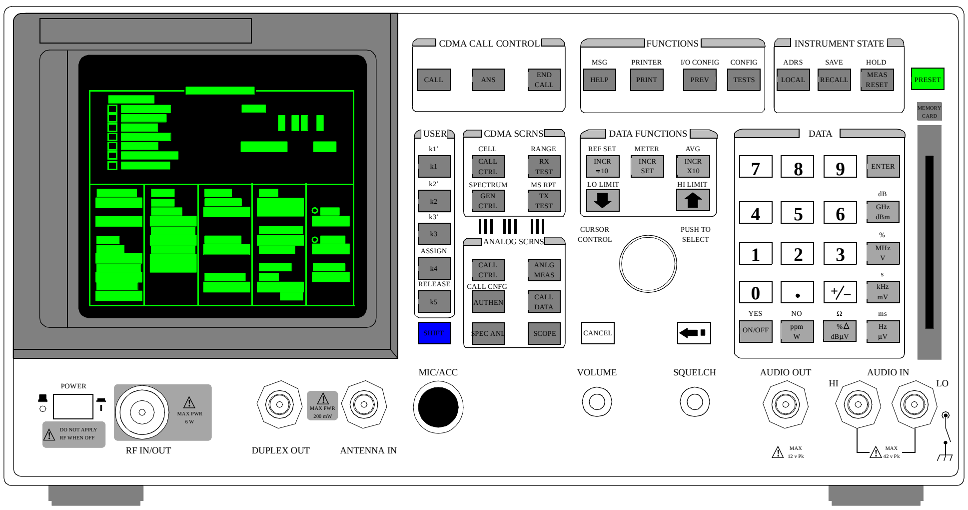


Figure 7 **Agilent 8924E Front Panel**

Connectors That Begin with the Letter A

ANTENNA IN

The antenna input is used to analyze low-power RF signals (≤ 200 mW), and is typically used for off-the-air measurements. This port can be selected in the analog TX TEST, DUPLEX TEST, RF ANALYZER, or SPECTRUM ANALYZER screens.

Operating Considerations

- BNC
- Input impedance = 50Ω
- TX Power cannot be measured using this port; use the RF IN/OUT port. However, low power levels can be measured using this port with the spectrum analyzer.
- Additional sensitivity for this port is available using the **`Sensitivity`** field in the analog RF ANALYZER and SPECTRUM ANALYZER screens.

CAUTION: Connecting a signal of >200 mW to the ANT IN port can cause instrument damage (although internal protection circuits can typically withstand a short-duration signal of 1 or 2 Watts).

If the over-power circuit is triggered (signified by a warning message at the top of the screen), remove the signal from the ANT IN port, and press the MEAS RESET key, or turn the Test Set off and on to reset it.

AUDIO IN LO, HI

The audio inputs are used to input audio signals to the AF Analyzer.

- AUDIO IN HI is the main audio signal input connection.
- AUDIO IN LO is used for the audio signal reference. Three choices are available using the AF ANALYZER screen's **`Audio In Lo`** field:
  - Gnd - connects the center pin through approximately 100Ω to chassis ground
  - Float - provides a floating input.
  - 600 To Hi - provides a 600 internal load to match an audio source with an output.

The measured level is the potential between the HI and LO center pins. The shells of both connectors are at chassis ground.

Operating Considerations

- BNC
- Input impedance switchable between
  - 1 MΩ in parallel with 95 pF,
  - 600Ω floating.
- This port is selected as the AF Analyzer's input using the **`AF Anl In`** field in the analog TX TEST screen, DUPLEX TEST screen, AF ANALYZER screen, and various ENCODER screens. This port is always the AF Analyzer's input when the analog RX TEST screen is displayed.
- Signals input to the AF Analyzer are routed through different filters, amplifiers, and detectors that affect the displayed measurement.

CAUTION: The maximum level between the HI and LO center pins is 42 V peak (approximately 30 Vrms). Exceeding this value can cause permanent instrument damage.

See Also

`AF Anl In` field description, on page 143
`Audio In Lo` field description, on page 151

AUDIO OUT

The audio output is used to output signals from AF Generators 1 and 2, including the Encoder functions

Operating Considerations

- BNC
- Output impedance <1Ω
- Maximum output current = 20 mA peak
- Maximum reverse voltage = 12 V peak
- The output level is set by the AF Generators, and it is not affected by the front-panel VOLUME control.
- AC/DC coupling is selected using the **`Audio Out`** field. This field is available in the DUPLEX TEST screen, RF GENERATOR screen, and various ENCODER screens.

AUD MONITOR OUTPUT

The audio monitor output provides an external output from various tap points in the AF Analyzer.

Operating Considerations

- BNC
- Output impedance is < 1 kΩ
- The **`Scope To`** field in the analog AF ANALYZER screen determines the source of this signal.
- The level is not affected by the front-panel VOLUME knob.

Connectors That Begin with the Letter C

CELL SITE/TRIGGERS

This is a 37-pin connector. It provides CDMA triggers and digital cell diagnostics. Four pins are not used.

A cable adapter is provided for protocol logging. Refer to "Protocol Logging" chapter in the *Agilent 8924C Application Guide*, for a description of using this feature. The adapter consists of a ribbon cable with 1 sub-miniature type-D, female, 15-pin connector and 2 male, 9-pin connectors.

Operating Considerations

- Pin 1 - GND
- Pin 2 - GND
- Pin 3 - 1.25 ms Frame Clock

  The 1.25 ms Frame Clock provides a clock output that is aligned with power control group timeslots.

  See also - **"CDMA CLOCK MUX OUTPUT" on page 93**.

- Pin 4 - 26.667 ms Frame Clock

  The 26.667 ms Frame Clock provides a clock that is aligned with the short (Pilot PN) spreading sequence and the Sync Channel frame structure.

  See also - **"CDMA CLOCK MUX OUTPUT" on page 93**.

- Pin 5 - EVEN_SEC_OUT

  The Even Second Clock provides a clock that is aligned with the timing reference for CDMA frame clocks. The even second reference is input on the rear-panel connector, EVEN SEC IN.

- Pin 6 - SAT0
- Pin 7 - SAT2
- Pin 8 - PROTO_TRIG2
- Pin 9 - A_RI_2

  Part of cell site #2 diagnostic port.

Pin 10 - A_CTS_2

Part of cell site #2 diagnostic port.

- Pin 11 - A_RTS_2

  Part of cell site #2 diagnostic port.

- Pin 12 - A_DSR_2

  Part of cell site #2 diagnostic port.

- Pin 13 - Ground
- Pin 14 - A_DTR_1

  Part of cell site #1 diagnostic port.

- Pin 15 - A_TXD_1

  Part of cell site #1 diagnostic port.

- Pin 16 - A_RXD_1

  Part of cell site #1 diagnostic port.

- Pin 17 - A_SD_1

  Part of cell site #1 diagnostic port.

- Pins 18, 19 - Not connected
- Pins 20, 21 - Ground
- Pin 22 - 20 ms Frame Clock

  The 20 ms Frame Clock provides a clock output that is aligned with Traffic and Access Channel frames.

  See also - **"CDMA CLOCK MUX OUTPUT" on page 93**.

- Pin 23 - 80 ms Frame Clock

  The 80 ms Frame Clock provides a clock that is aligned with the Paging Channel Slots (referring to mobile station slotted mode operation) and the Sync Channel Superframe.

  See also - **"CDMA CLOCK MUX OUTPUT" on page 93**.

- Pin 24 - DSP_TRIG_OUT

  A true condition on this connector indicates the DSP Analyzer was triggered. The DSP analyzer can be triggered by a signal on the EXT DSP TRIGGER rear-panel BNC connector, or by the user arming a measurement.

  See Also -
  `Meas Cntl` field description, on page 221

- Pin 25 - SAT1
- Pin 26 - PROTO_TRIG1
- Pin 27 - Ground
- Pin 28- A_DTR_2

  Part of cell site #2 diagnostic port.

- Pin 29- A_TXD_2

  Part of cell site #2 diagnostic port.

- Pin 30- A_RXD_2

  Part of cell site #2 diagnostic port.

- Pin 31- A_SD_2

  Part of cell site #2 diagnostic port.

- Pin 32- A_RI_1

  Part of cell site #1 diagnostic port.

- Pin 33- A_CTS_1

  Part of cell site #1 diagnostic port.

- Pin 34- A_RTS_1

  Part of cell site #1 diagnostic port.

- Pin 35- A_DSR_1

  Part of cell site #1 diagnostic port.

- Pins 36, 37 - Not Connected

CDMA CLOCK MUX OUTPUT

The CDMA frame clocks provide the CDMA timing references for generating and demodulating CDMA signals. The CDMA clock MUX output provides the following CDMA frame clocks on a multiplexed output.

1.25 ms
20.00 ms
26.67 ms
80.00 ms
2.00 s

Each of these CDMA frame clocks is available by selecting from the list of choices displayed on the CONFIGURE screen.

The CELLSITE/TRIGGERS connector, a rear-panel miniature D-type 15-pin connector provides all of the above frame clock outputs simultaneously. The timing of these frame clocks may be offset slightly from the timing of the CDMA CLOCK MUX OUTPUT's frame clocks due to propagation delays.

Operating Considerations

- BNC
- Select which frame clock will be output on the CDMA CLOCK MUX OUTPUT connector by pressing and releasing the SHIFT key, then the TESTS key to select the CONFIGURE screen, then selecting the **`Frame Clock`** field to display the list of choices.
- Nominal output level is >+5 dBm
- Output impedance is 50Ω
- All frame clocks are locked to the Test Set's internal 10 MHz reference. Frequency stability is the same as the signal applied to the REF INPUT connector.

See Also

`Frame Clock` field description, on page 203

COMPOSITE VIDEO

The composite video output provides a signal for using an external video monitor. The signal provides a duplicate of the Test Set's screen.

Operating Considerations

- BNC
- A multi-sync monitor must be used to match the video sync rate of 19.2 kHz. Example monitors include - Electrohome ECM 1410-DMS 14-inch color monitor and the EVM 1242-P4VID 12-inch monochrome monitor.

Connectors That Begin with the Letter D

DC CURRENT MEAS

The current sense input is used in series with a dc supply and load to provide a 0 to 10 amp dc current meter.

Operating Considerations

- Dual-Banana Jack
- The dc-current meter is designed to measure *positive* current (the connector's polarity is marked on the rear panel). Negative current of ≤10 amps will not damage the instrument, but will cause inaccurate positive current measurements (due to magnetic memory within the current-sensing element).
- To re-calibrate the current meter after negative current has been applied

1. Connect a 10-amp positive current.
2. Disconnect the current
3. Access the analog AF ANALYZER screen.
4. Select the **`DC Current Zero`** field to zero the meter.

DUPLEX OUT

The duplex output is an output for the RF Generator and Tracking Generator.

When testing CDMA mobile stations, it is important to enter an RF Level Offset for the selected input and output ports. Refer to "Calibrating the Test Set" chapter in the *Agilent 8924C Application Guide*.

Operating Considerations

- BNC
- Output impedance = 50Ω
- The RF Generator's output is selected in the **`Output Port`** field. This field is available on the CONFIGURE, RX TEST, DUPLEX TEST, RF GENERATOR, and SPECTRUM ANALYZER screens.

CAUTION: Connecting an RF source of >200 mW to this connector can permanently damage the instrument.

Connectors That Begin with the Letter H

GP-IB

The main GP-IB port allows communication between the Test Set and other instruments or computers using the Hewlett-Packard Interface Bus (GP-IB).

Operating Considerations

- 36-pin GPIB

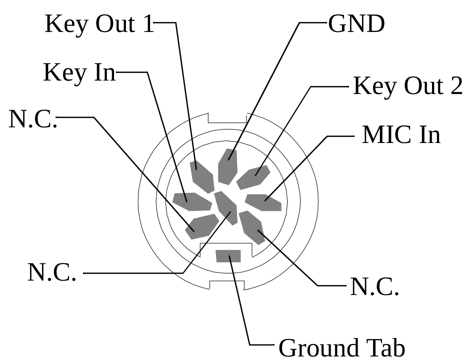
See Also

`GP-IB Adrs` field description, on page 208

Connectors That Begin with the Letter M

MIC/ACC

The microphone/accessory connector is used for several functions:



- Mic In is used to modulate the RF Generator when the Key In line is grounded. This signal is summed with the external modulation input signal. The **`Mod In To`** field of the RF GENERATOR screen sets the type of modulation (AM or FM) and sensitivity (%AM/Vpk or kHz/Vpk) for this connection.
- Key In provides control of the RF Generator's output state (on or off) and automatic switching between the TX TEST and RX TEST screens (if the CONFIGURE screen's **`RX/TX Cntl`** functions are set to **`Auto`** and **`PTT`**). Screen switching occurs when this line is grounded.
- Key Out 1 and Key Out 2 provide a switch path to control external equipment (such as keying a transmitter). Key Out 1 and Key Out 2 are connected when the **`Ext TX key`** field is set to **`On`**.

To Use the Microphone

1. Connect the microphone to the MIC/ACC connector.
2. Access the analog RF GENERATOR screen.
3. Enter the carrier frequency in the **`RF Gen Freq`** field.
4. Enter the RF Generator **`Amplitude`**.
5. Select the **`Output Port`** (**`RF OUT`** or **`DUPL`**).
6. Connect the selected output port to your receiver or antenna.
7. Using the **`Mod In To`** field
   a. Select the type of modulation: **`FM (/Vpk)`**
   b. Enter the modulation sensitivity to a 1 V peak signal (usually 1 kHz for microphone use).

Operating Considerations

- 8-pin DIN
- Input impedance = 100 kΩ
- Maximum input level = 10 V peak
- Full scale input = 10 mV
- Bandwidth is limited to 3 kHz.
- The MIC IN signal is filtered and amplified to provide a stable deviation-limited signal to the RF Generator.
- 750µs microphone pre-emphasis is selected in the analog RF GENERATOR screen.

See Also

"Configure Screen" on page 128

MODULATION INPUT

The modulation input provides an external modulation connection to the RF Generator.

Operating Considerations

- BNC
- Input threshold = 2.5 V
- Max input level = 20 V peak
- Input impedance
  - 100 kΩ (input < 5.6 V peak)
  - 5 kΩ (input > 5.6 V peak)
- The **`Mod In To`** field of the analog RF GENERATOR screen sets the type of modulation (AM or FM) and sensitivity (%AM/Vpk or kHz/Vpk) for this connection.
- This signal is summed with the microphone's input signal from the MIC/ACC connector.
- The **`FM Coupling`** field in the RF GENERATOR, DUPLEX TEST, and various ENCODER screens selects AC or DC coupling of this signal for FM operation.

Connectors That Begin with the Letter P

PARALLEL PORT

This port is used with printers requiring a parallel interface when printing screen images or test results. Set the **`Printer Port:`** field (on the PRINT CONFIGURE screen or TESTS (Printer Setup) screen) to **`Parallel`** to print to this port. Use address 15 when sending data to this port from IBASIC programs.

Pin numbers are embossed on the connector.

1. nStrobe
2. Data 1 (Least Significant Bit)
3. Data 2
4. Data 3
5. Data 4
6. Data 5
7. Data 6
8. Data 7
9. Data 8 (Most Significant Bit)
10. nAck
11. Busy
12. PError
13. Select
14. nAutoFd
15. nFault
16. nInit
17. nSelectIn
18. Signal Ground (nStrobe)
19. Signal Ground (Data 1 and Data 2)
20. Signal Ground (Data 3 and Data 4)
21. Signal Ground (Data 5 and Data 6)
22. Signal Ground (Data 7 and Data 8)
23. Signal Ground (Busy and nFault)
24. Signal Ground (PError, Select, and nAck)
25. Signal Ground (nAutoFd, nSelectIn, and nInit)

Operating Considerations

- 25-pin Centronics

POWER DET

The POWER DET input routes a dc-coupled signal from the average power detector on the HP 83236 PCS Interface to the DSP Analyzer in the Test Set. This signal, which is multiplexed with other power measurements, cannot be selected by the user.

Operating Considerations

- SMA
- If a frequency translator is connected to the Test Set, the POWER DET input must be connected to the POWER DET output from the frequency translator to make average power measurements.

See Also

`TX Power` field description, on page 291

PROTOCOL DIAG

The protocol logging, cell site 1, RS-232 port is not implemented at this time.

Operating Considerations

- 9-pin sub-miniature D

Connectors That Begin with the Letter R

REF INPUT

This input is normally connected to the 10 MHz oven output. A BNC-to-BNC semi-rigid coaxial cable is provided with the Test Set to make this connection.

This input is routed to a reference phase-locked-loop that generates 10 MHz reference signals for all digital and analog phase-locked-loops. This reference phase-locked-loop will lock to many frequencies other than 10 MHz, including selected multiples of the CDMA chip clock.

A 10 MHz REF OUTPUT from the reference phase-locked-loop is provided on a rear-panel BNC connector.

Operating Considerations

- BNC
- A high-stability REF INPUT is a requirement for testing cellular phones. REF INPUT is normally brought in from the 10 MHz OVEN OUT, a high-stability ovenized oscillator. A BNC-to-BNC semi-rigid connector is provided with the Test Set for this purpose.
- The entry in the **`External Reference`** field located on the CONFIGURE screen must be the same as the REF INPUT. (The default setting for **`External Reference`** is 10.0000 MHz.) The Configure screen is accessed by pressing and releasing the SHIFT key, then the TESTS key to select the CONFIG function, or by selecting CONFIG from the **`To Screen`** menu.
- The following frequencies can be selected from the **`External Reference`** field:
  - 1.0000 MHz
  - 1.2288 MHz
  - 2.0000 MHz
  - 2.4576 MHz
  - 4.9152 MHz
  - 5.0000 MHz
  - 9.8304 MHz
  - 10.0000 MHz
  - 15.0000 MHz
  - 19.6608 MHz
- Input level must be >0.15 Vrms.
- Input impedance ≈ 50Ω.
- Duty Cycle must be ≈10%

See Also

"10 MHz OVEN OUT" on page 106
"10 MHz REF OUTPUT" on page 106
"Configure Screen" on page 128
"REF SET" on page 77

RF IN/OUT

The RF IN/OUT port allows full-duplex interaction, or the RF IN portion can be used with DUPLEX OUT, providing more output power.

Operating Considerations

When testing CDMA mobile stations, it is important to enter an RF Level Offset for the selected input and output ports. Refer to “Calibrating the Test Set” chapter in the *Agilent 8924C Application Guide*.

- Type-N
- This port must be used when measuring transmitter (RF) power.
- This port can be selected in the CONFIGURE screen, or the analog TX TEST, DUPLEX TEST, RF ANALYZER, or SPECTRUM ANALYZER screens.
- Signals ≤ 200 mW can be input to the ANT IN connector for all RF measurements except transmitter power.

Over-Power Damage. Refer to the Test Set's front panel for maximum input power level. Exceeding this level can cause permanent instrument damage.

CAUTION: If the RF power at the RF IN/OUT port exceeds allowable limits, a loud warning signal sounds and a message appears at the top of the screen.

If this occurs, disconnect the RF power, press the MEAS RESET key, and allow the Test Set to cool off for approximately 2 minutes before making any other measurements on this port.

Connectors That Begin with the Letter S

SERIAL PORT

This connector is used for serial control of an HP 83236 PCS Interface, or for serial data exchange with some other device. A serial cable is provided with the HP 83236 to connect the SERIAL PORT to a DB-15 connector on the HP 83236. Other applications for the SERIAL PORT might include; entering IBASIC programs, printing tests results and screen images, or sending test results from the IBASIC controller to a connected controller, disk drive, or terminal.

If you are using this connector to enter programs, or you would like to see a diagram of the connectors and pin-outs to the serial port, refer to "Interfacing to the IBASIC Controller using Serial Ports" in IBASIC Controller chapter of the *Agilent 8924C Application Guide.*

Operating Considerations

- RJ-11(see **figure 8 on page 104**)
- The serial communications settings are defined on the I/O CONFIGURE screen.
- The IBASIC controller sends and receives data to the serial ports using address **9** for the primary port (A), and address **10** for the secondary port (B). For example, to enter data from the primary serial port (A) into a program variable named SDATA, you could use the command:
  `ENTER 9;SDATA`
- Using Port B: The secondary serial port (B) is only used with IBASIC programs to communicate with other equipment when the primary serial port is used for printing or data collection. Port B cannot be used for printing screens, and its communication settings can only be changed using IBASIC commands.

  Unless you are writing IBASIC programs that require serial printing *and* other serial data transfer at the same time, we recommend that you only use the primary serial port (A).
- To send data from your program out of the primary serial port (A), you could use the command:
  `OUTPUT 9;SDATA`
- Use an RJ-11/25-pin RS-232 adapter (HP P/N 98642-66508) and RJ-11cable (HP P/N 98642-66505) to connect the Test Set to a serial printer or terminal/computer.

NOTE: RJ-11 Connectors: RJ-11 cables and adapters can be wired several ways by the cable manufacturer. If you buy a cable or adapter other than the HP parts listed, verify the connections for the pins indicated in **table 3 on page 104** before connecting cables to the instruments.

- **Table 3 on page 104** lists connections for the primary serial port (address 9). When using both ports at the same time, you need to locate or fabricate an adapter to provide the necessary connections.

Table 3 **Serial Port Connections**

Test Set RJ-11 Serial Port		**Terminal/PC 25-pin RS-232**		**Terminal/PC 9-pin RS-232**
Pin 2 (RX)	to	pin 2 (TX)	or	pin 3 (TX)
Pin 5 (TX)	to	pin 3 (TX)	or	pin 2 (TX)
Pin 4 (GND)	to	pin 7 (GND)	or	pin 5 (GND)

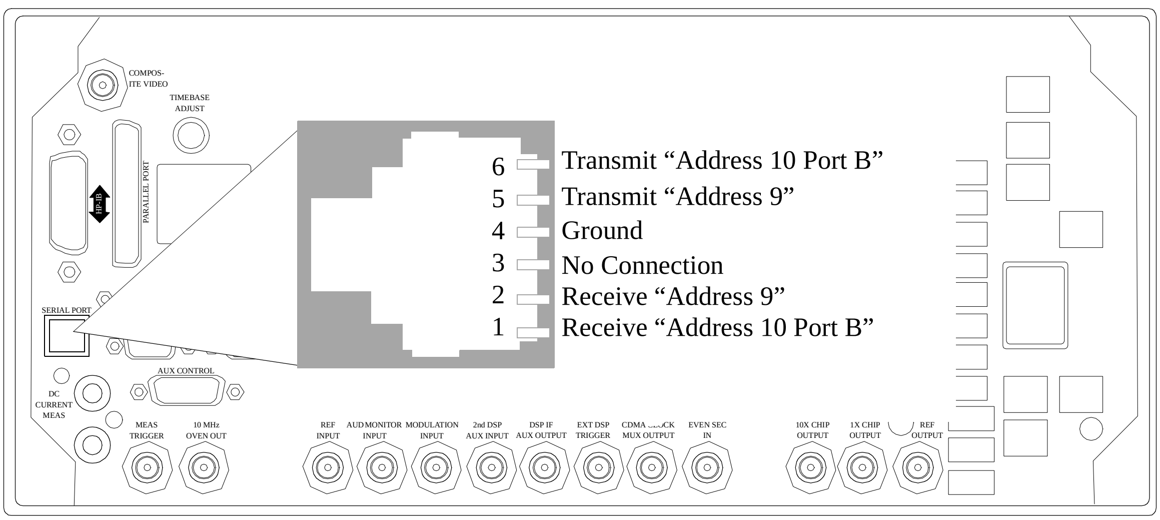


Figure 8 **Serial Port Pinout**

SPECTRUM ANALYZER TRIGGER OUT

This connector provides a trigger signal for measuring a mobile station’s time response to open loop power control using an external spectrum analyzer.

Operating Considerations

- BNC
- Trigger occurs 180 microseconds before the RF power changes
- Trigger rise time is negligible (approximately 600 ns).

Connectors That Begin with a Number

10 MHz OVEN OUT

The 10 MHz oven output is normally connected to the reference input. A BNC to BNC semi-rigid coaxial cable is provided with the Test Set to make this connection.

Operating Considerations

- BNC

10 MHz REF OUTPUT

The 10 MHz reference output is one output of a reference phase-locked-loop that generates 10 MHz reference signals for all of the digital and analog phase-locked-loops in the Test Set. This reference phase-locked-loop has a fractional divider, enabling it to lock to many frequencies, which are listed in the description of the REF INPUT connector.

Operating Considerations

- BNC
- This reference signal will be phase-locked to the reference input if the operating conditions specified in the REF INPUT connector description are met.
- Nominal output level is >+5 dBm
- Output impedance is 50Ω
- Frequency stability is the same as the signal applied to the REF INPUT connector.

See Also

`External Reference` field description, on page 199
"REF INPUT" on page 101

6

Description of Screens

These screens are listed in alphabetical order.

Analog Meas Screen

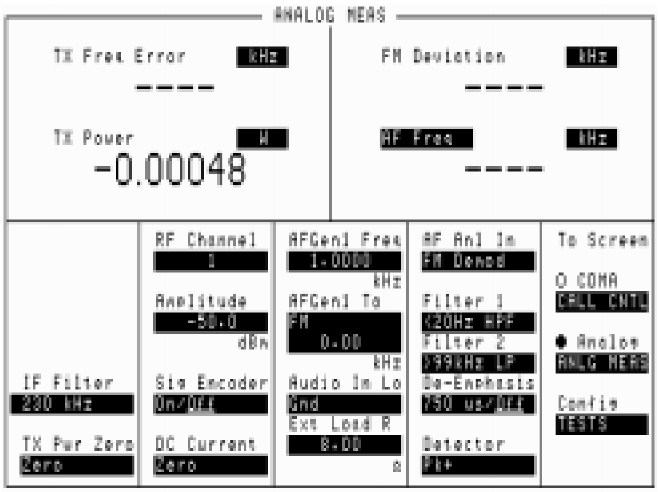


Figure 9 **The Analog Meas Screen**

Analog Meas Block Diagram

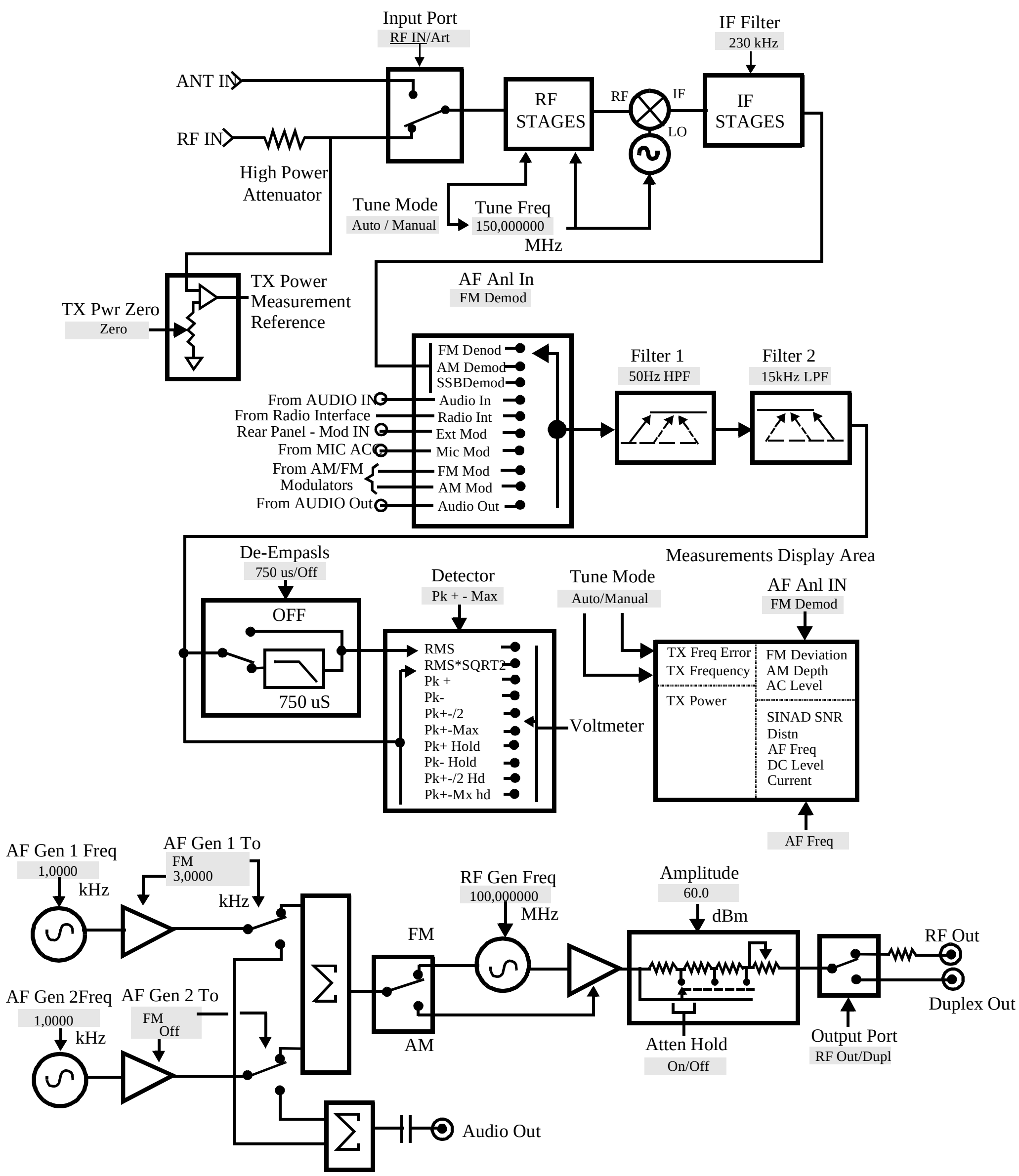


Figure 10 **Analog Meas Functional Block Diagram**

Authentication (Call Control)

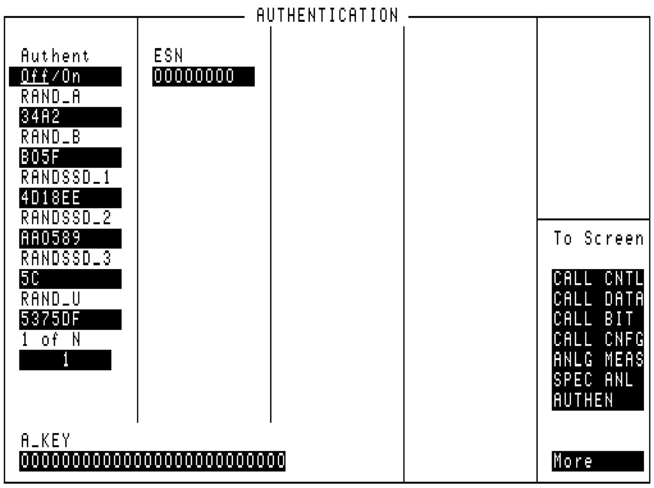


Figure 11 **The AUTHENTICATION Screen**

The AUTHENTICATION screen allows you to enter parameters for authentication into the Test Set. These parameters are used by the Cave algorithm during Call Processing functions such as registration, page, and originate to verify a valid call.

Call Configure (Call Control)

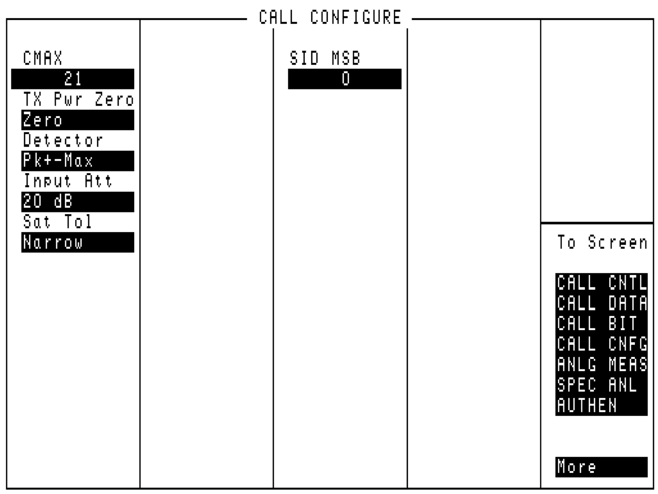


Figure 12 **The CALL CONFIGURE Screen**

NOTE: The number of fields displayed on the CALL CONFIGURE screen depends on the selected system type.

This screen is used to set some of the less commonly used Test Set configuration parameters.

When the CALL CONFIGURE screen is displayed and the Call Processing Subsystem is in the connect state, the Test Set constantly monitors the mobile station’s transmitted carrier power. If the power falls below 0.0005Watts, the error message **`RF Power Loss indicates loss of Voice Channel`** will be displayed and the Test Set will terminate the call and return to the active state.

NOTE: In order to ensure that the Test Set makes the correct decisions regarding the presence of the mobile stations’s RF carrier, the Test Set’s RF power meter should be zeroed before using the Call Processing Subsystem. Failure to zero the power meter can result in erroneous RF power measurements.

Call Control Screen

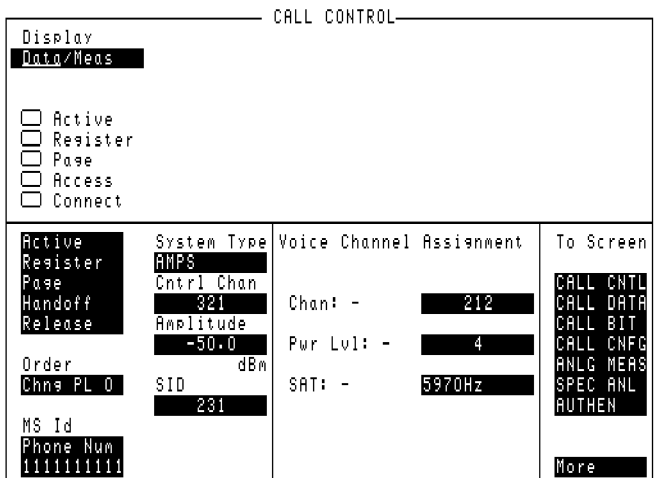


Figure 13 **The CALL CONTROL Screen**

The CALL CONTROL screen is the primary Call Processing Subsystem screen. It contains the most often used call processing configuration and command fields. **Figure 13** shows the CALL CONTROL screen for NAMPS.

The top right-hand portion of the CALL CONTROL screen is used to display the following information:

- decoded data messages received from the mobile station on the reverse control channel or the reverse voice channel
- modulation quality measurements made on the mobile station's RF carrier while on a voice channel
- raw data message bits, displayed in hexadecimal format, received from the mobile station on the reverse control channel or reverse voice channel when a decoding error occurs

The type of information to be displayed is selected using the **`Display`** field. Refer to the **`Display` field description, on page 183** for further information.

Call Data (Call Control)

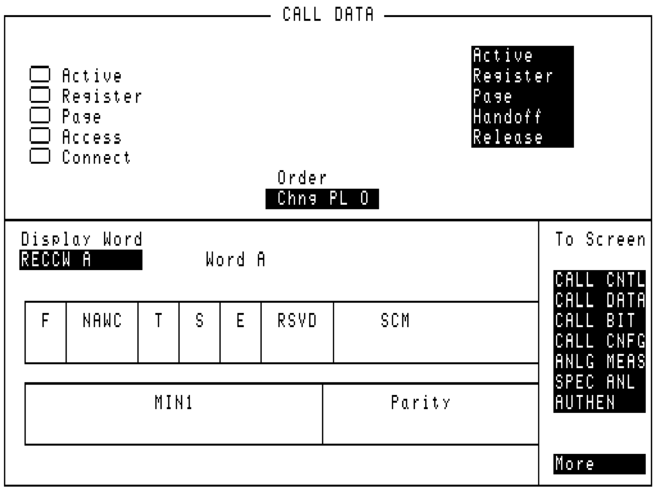


Figure 14 **The CALL DATA Screen**

This screen displays the decoded reverse control channel and reverse voice channel signaling messages received by the Test Set from the mobile station. Thirteen different decoded messages can be viewed on this screen. The message to be viewed is selected using the **`Display Word`** field.

The messages which can be viewed are:

- Reverse Control Channel Messages for Paging, Origination, Orders, and Order Confirmation.
    - **`RECCW A`** - Word A - Abbreviated Address Word
    - **`RECCW B`** - Word B - Extended Address Word
    - **`RECCW C`** - Word C - Serial Number Word
    - **`RECCW D`** - Word D - First Word of the Called-Address
    - **`RECCW E`** - Word E - Second Word of the Called-Address
- Reverse Voice Channel Messages for Order Confirmation.
    - **`RVCOrdCon`** - Reverse Voice Channel Order Confirmation Message
- Reverse Control Channel Authentication Messages.
    - **`BSChalOrd`** - Word C - Base Station Challenge Word
    - **`AuthWORD`** - Word C - Authentication Word
    - **`UniqChCon`** - Word C - Unique Challenge Order Confirmation Word
- Reverse Voice Channel Authentication Messages.
    - **`RVCOrd`** - Word one - Reverse Voice Channel Generic Order
    - **`RVCBSChal`** - Word 2 - Reverse Voice Channel Base Station Challenge Order
- NAMPS Reverse Voice Channel Messages.
    - **`NRVC Ord`** - Narrow Order or Order Confirmation Message
    - **`MRI Ord`** - MRI Order message

When the CALL DATA screen is displayed and the Call Processing Subsystem is in the connected state, the Test Set constantly monitors the mobile station’s transmitted carrier power. If the power falls below 0.0005Watts, the error message **`RF Power Loss indicates loss of Voice Channel`** will be displayed and the Test Set will terminate the call and return to the active state.

NOTE: In order to ensure that the Test Set makes the correct decisions regarding the presence of the mobile stations’s RF carrier, the Test Set’s RF power meter should be zeroed before using the Call Processing Subsystem. Failure to zero the power meter can result in erroneous RF power measurements.

Call Data Screen Message and Field Names

Table 4 lists the message names used to access each of the signaling messages available on the **CALL DATA** screen.

Table 4 CALL DATA Screen Signaling Message Names

Message	Message Name
RECCW A	RECA
RECCW B	RECB
RECCW C	RECC
RECCW D	RECD
RECCW E	RECE
RVCOrdCon	RCOConfirm
BSChalOrd	BSCOrder
AuthWORD	AWORD
UniqChCon	UCConfirmation
RVCOrd	RVCOrder
RVCBSChal	RVCBSChallenge
NRVC Ord	NOConfirm
MRI Ord	MRIOrder

CDMA Authentication Screen

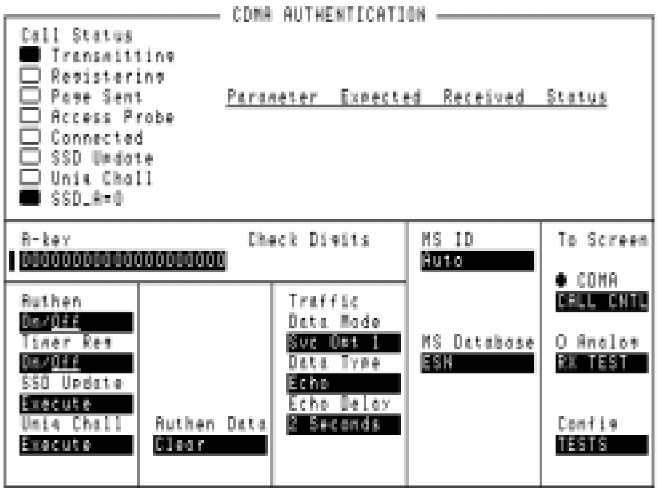


Figure 15 The CDMA Authentication Screen

The CDMA Authentication screen provides the necessary features for testing a CDMA mobile station’s ability to perform call-processing functions with authentication. Once a mobile station is registered, valid A-Key Check Digits can be generated, and a table displays the authentication parameters sent by the mobile station, along with the expected value and a passed/failed indication.

CDMA Call Control Screen

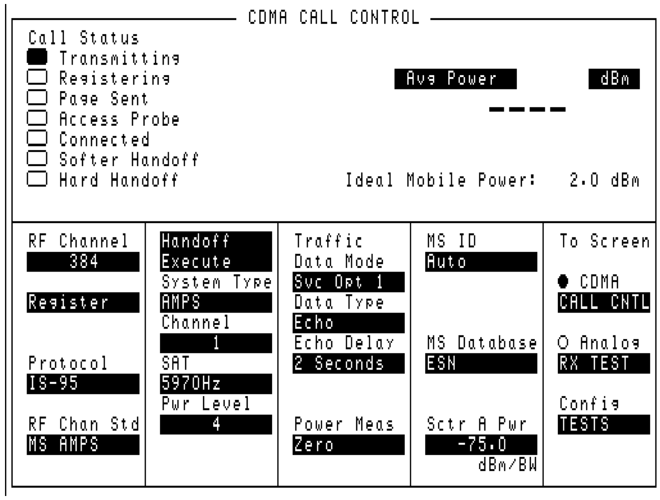


Figure 16 **The CDMA Call Control Screen**

This screen allows you to establish a call, terminate a call, and perform handoffs.

CDMA Cell Site Configuration Screen

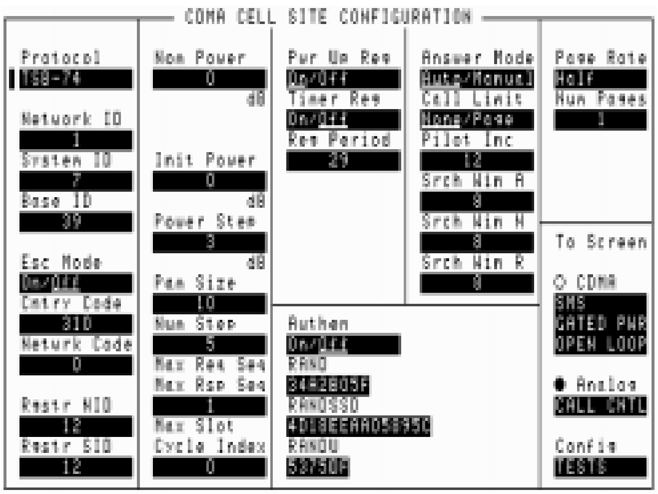


Figure 17 **The CDMA Cell Site Configuration Screen**

This screen provides fields for setting up CDMA cell site system parameters and fields for setting up an analog cell site voice channel for digital to analog handoffs.

CDMA Cellular Mobile Receiver Test Screen

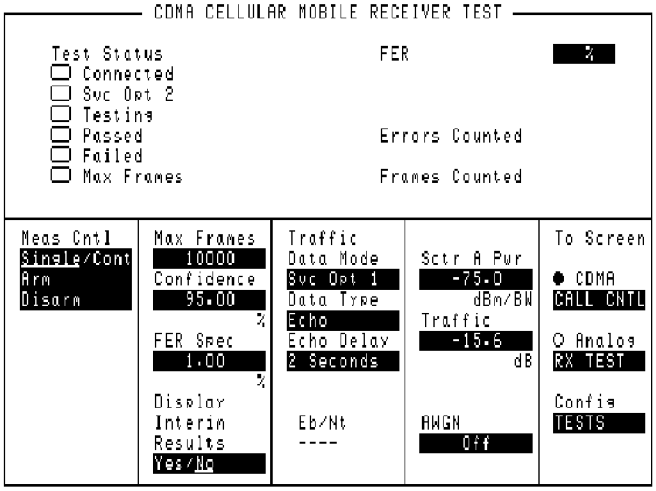
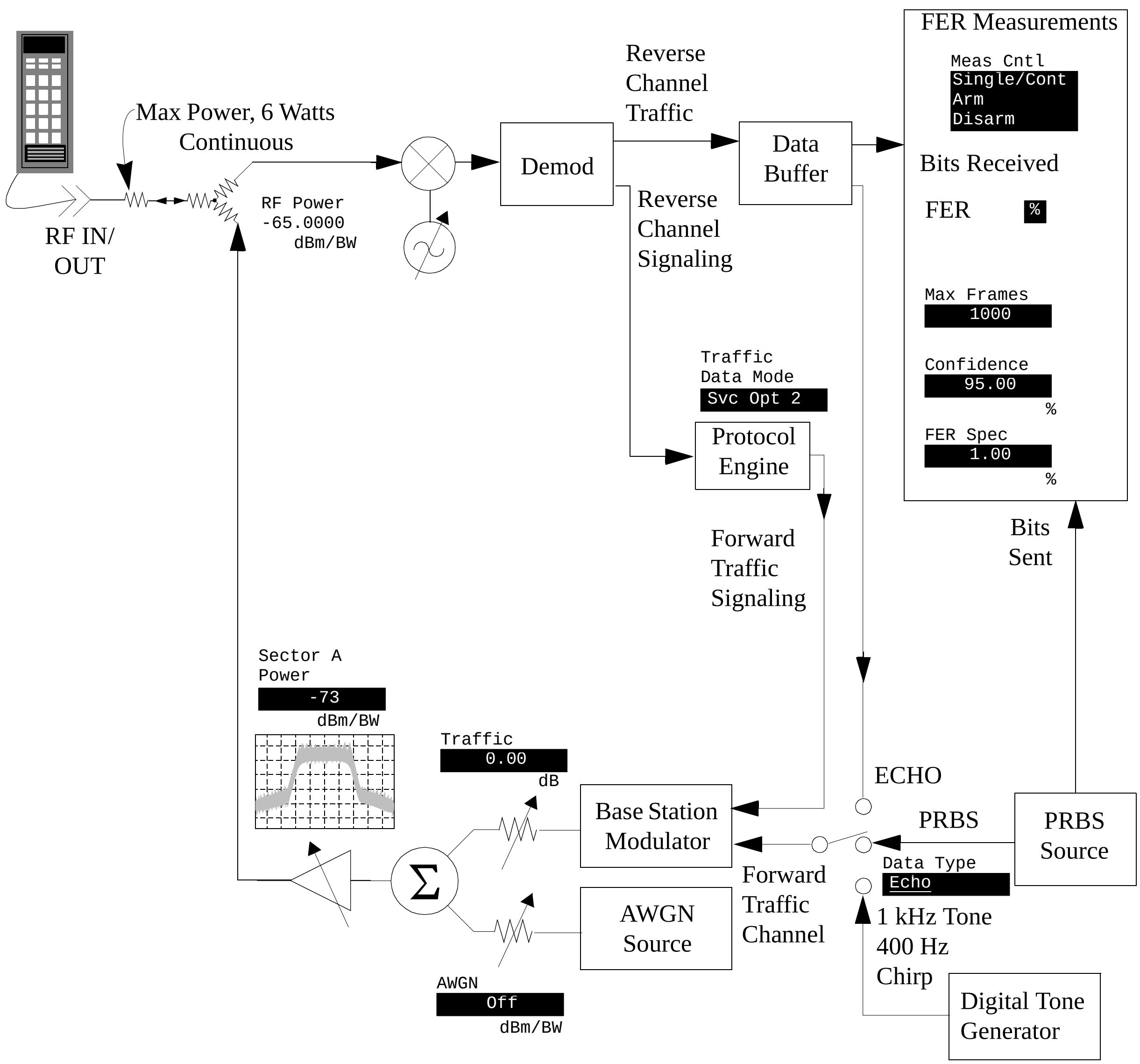


Figure 18 **The CDMA Cellular Mobile Receiver Test Screen**

This screen allows receiver (FER) test setup, controls start and stop of receiver tests, and displays call status and FER results.

CDMA Cellular Mobile Receiver Block Diagram



CDMA Cellular Mobile Transmitter Test Screen

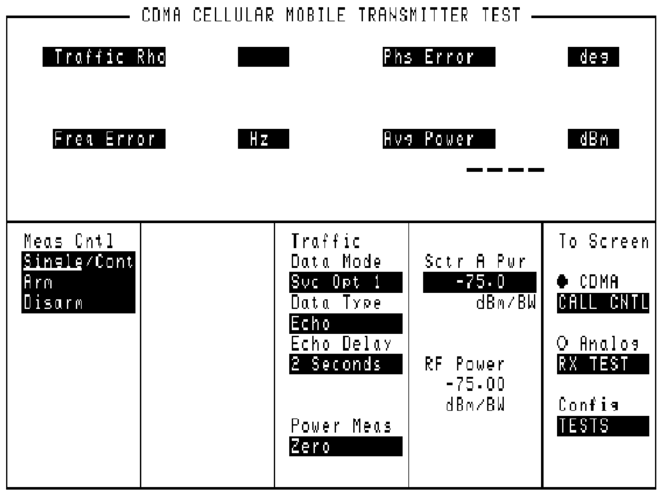


Figure 19 **The CDMA Cellular Mobile Transmitter Test Screen**

This screen reports measurements of the mobile’s transmitter.

CDMA Generator Control Screen

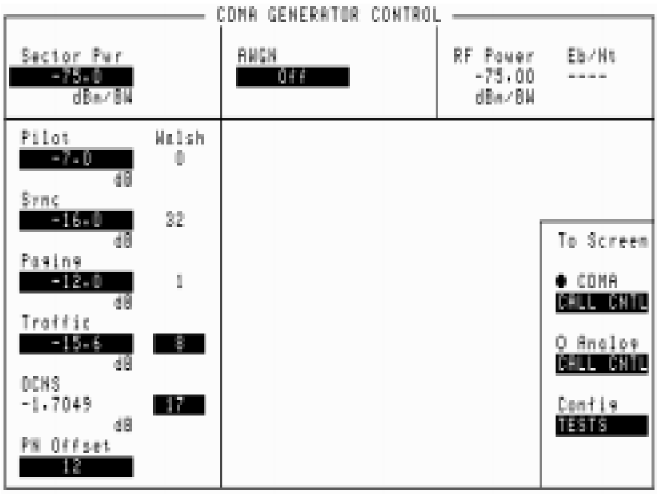
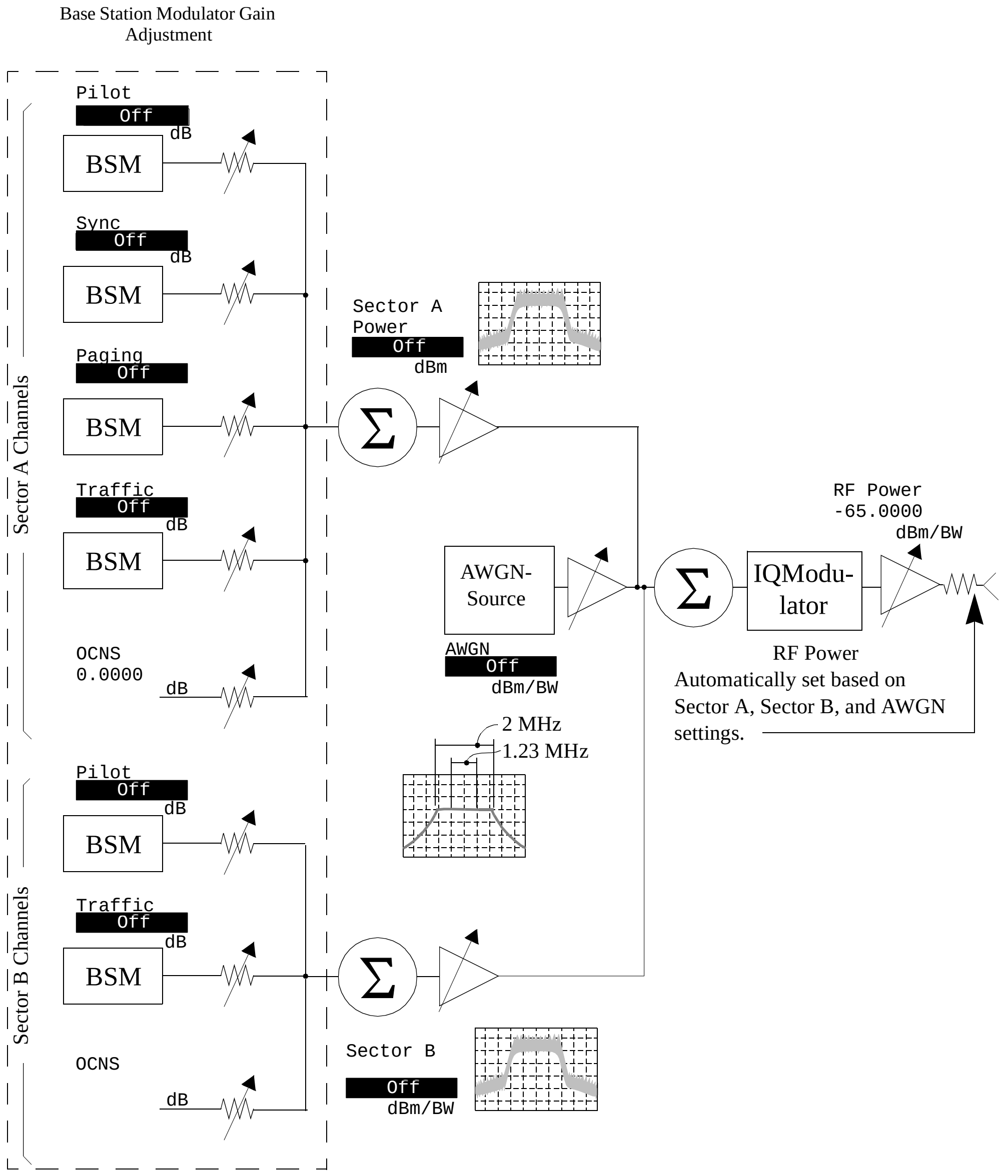


Figure 20 **The CDMA Generator Control Screen**

This screen controls the output power of the Test Set.

CDMA Generator Control Block Diagram



CDMA Mobile Reporting Screen

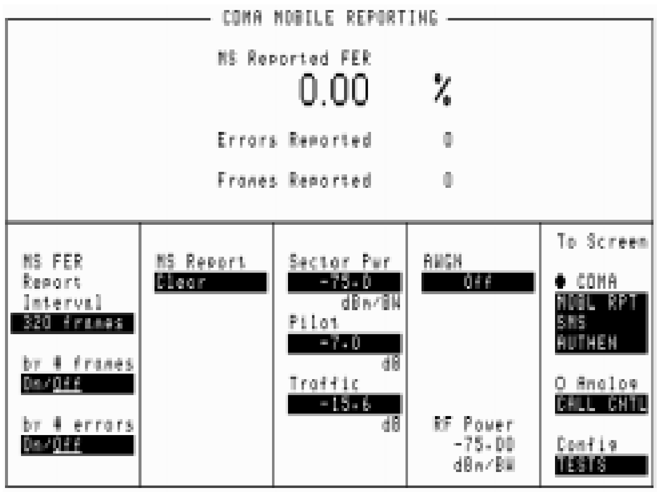


Figure 21 **The CDMA Mobile Reporting Screen**

This screen displays FER as reported from the mobile station. It also controls the mobile station report interval.

CDMA Reverse Channel Spectrum Screen

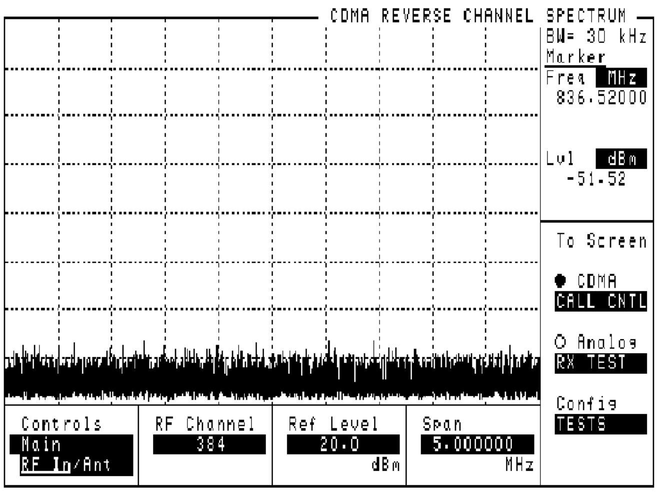


Figure 22 **The CDMA Reverse Channel Spectrum Screen**

CDMA Short Message Service Screen

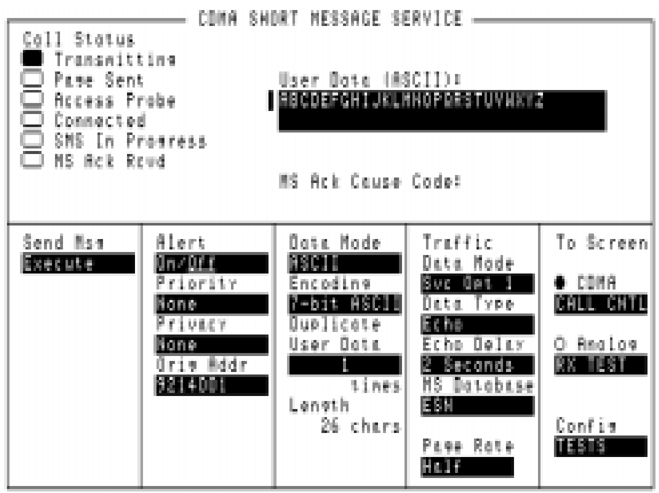


Figure 23 **The CDMA Short Message Service Screen**

The CDMA Short Message Service screen provides fields for entering and sending messages to the mobile station over both the Traffic and Paging channels. The Test Set also indicates whether the mobile station acknowledged reception of the message.

CDMA Transmitter Power Range Test Screen

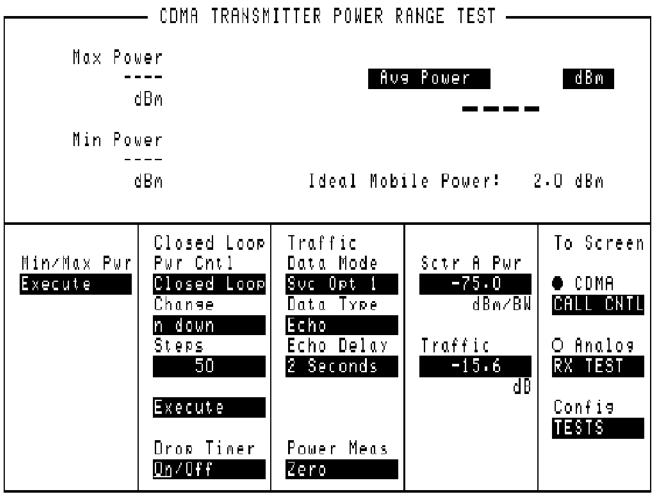


Figure 24 **The CDMA Transmitter Power Range Screen**

Configure Screen

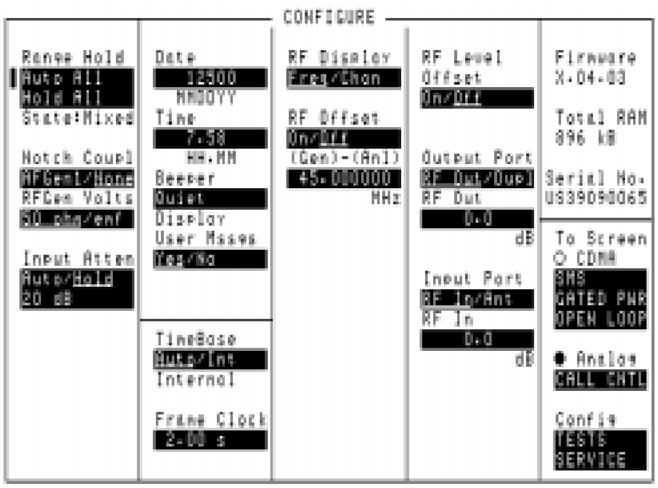


Figure 25 **The Configure Screen**

The CONFIGURE screen defines a number of general operating functions, such as date and time, screen intensity, and beeper volume. It is also used to define some RF signal parameters, such as RF Generator/Analyzer offset, channel standards and characteristics, and signal loss/gain compensation.

I/O Configure Screen

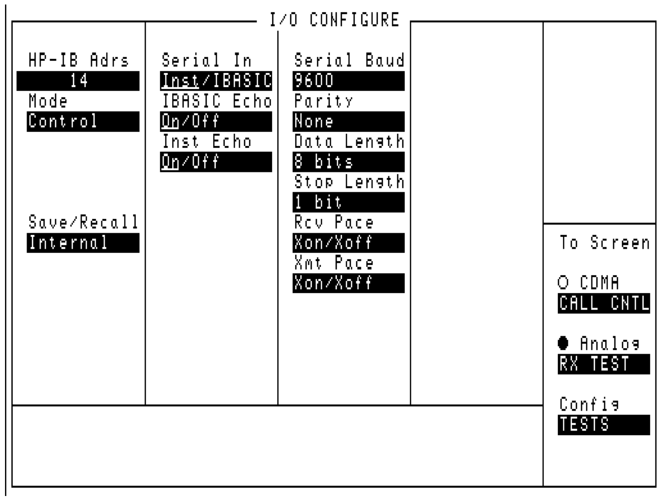


Figure 26 **The I/O Configure Screen**

The I/O CONFIGURE screen’s fields are used to specify GP-IB and serial communications settings.

Oscilloscope Screens

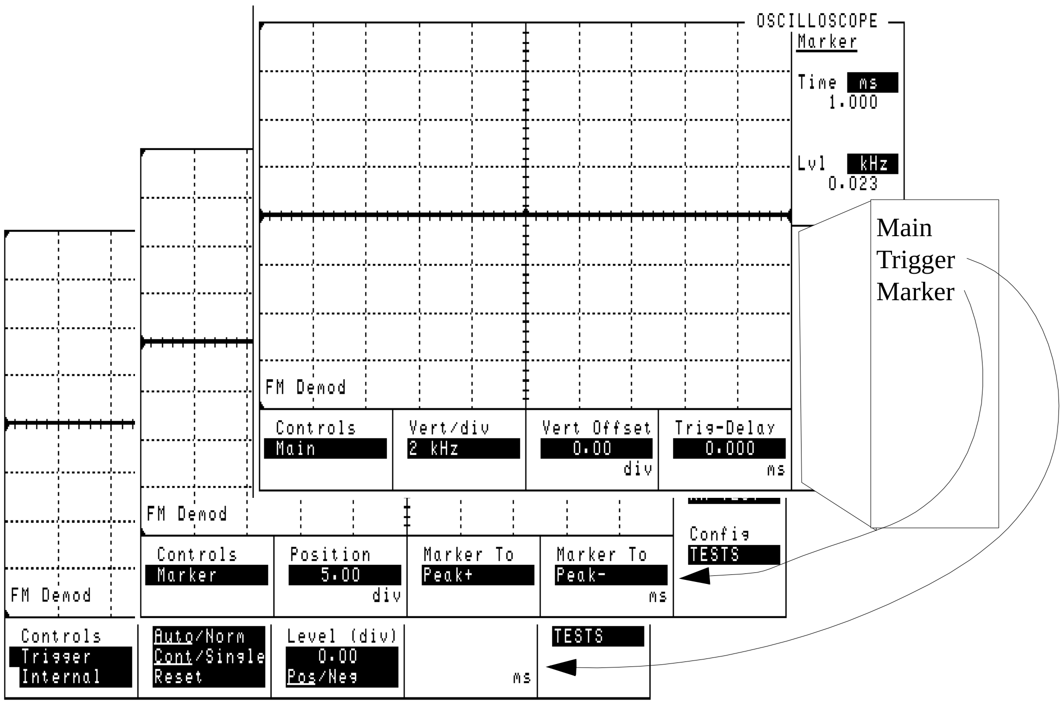


Figure 27 **The Oscilloscope Screen and Menus**

The OSCILLOSCOPE screen's controls are arranged by menu. The menus are accessed using the **`Controls`** field.

Assigning global USER keys to the most-used functions on the menus allows you to access the functions without having to change menus during operation.

Print Configure Screen

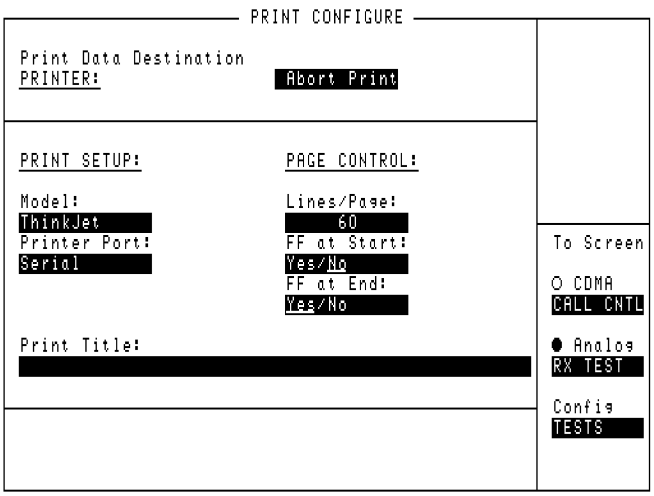


Figure 28 **The Printer Configurations Screen**

This screen configures the Test Set to print screen images with your printer. Images are printed using either the front-panel PRINT function (see **"Printing A Screen" on page 62“** or the **`Print All`** USER key available on some TESTS environment screens.

Spectrum Analyzer Screens (Opt 012 only)

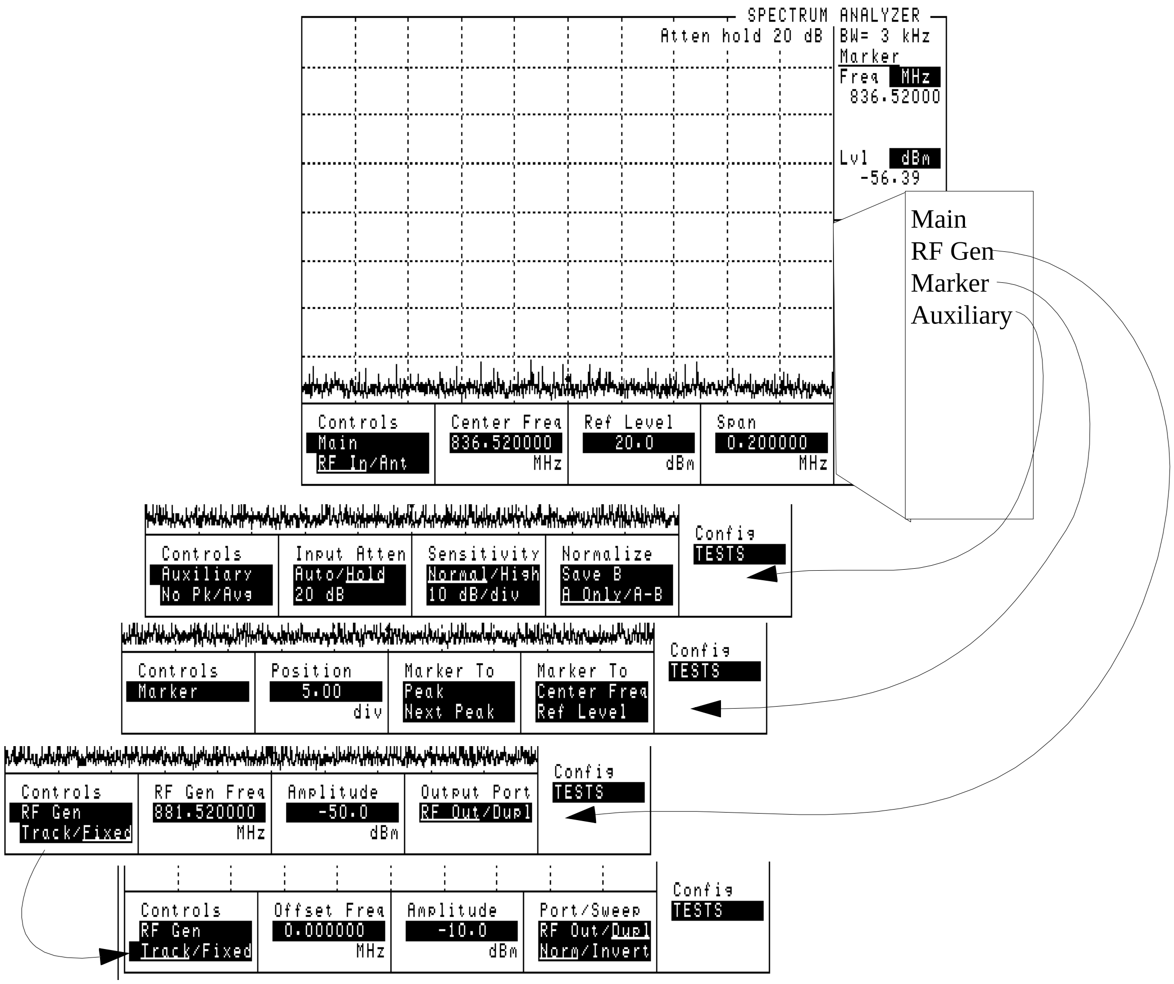


Figure 29 **The Spectrum Analyzer Screen and Menus**

The SPECTRUM ANALYZER screen's controls are arranged in four menus. The menus are accessed using the **`Controls`** field.

Assigning global USER keys to the most-used functions on the menus allows you to access the functions without having to change menus.

Using the Spectrum Analyzer

Automatic Calibration

During operation, the Spectrum Analyzer pauses for approximately 2 seconds every 5 minutes to recalibrate itself. This does not affect the accuracy of displayed measurements, but does cause a brief interruption of the displayed information during the process.

Setting Resolution Bandwidth and Sweep Rate

The resolution bandwidth and sweep rate are determined by the span setting, and cannot be set independently.

These settings are listed in the following table.

Table 5 Relationship Between Span, Resolution Bandwidth, and Sweep Rate

Span	Resolution BW (kHz)	Sweep Rate
<50 kHz	0.3	28.6 kHz/second
<200 kHz	1.0	329.0 kHz/second
<1.5 MHz	3.0	3.0 MHz/second
<3 MHz	30.0	21.4 MHz/second
<18 MHz	30.0	36.3 MHz/second
<200 MHz	300.0	257.0 MHz/second
1 GHz	300.0	1.0 GHz/second

7

Description of Fields

These fields are listed in alphabetical order.

Fields That Begin with the Letter A

Abort Print

Select this field to interrupt the print in progress.

Screen(s) Where Field is Present

PRINT CONFIGURE

Access (annunciator)

When lit, the **`Access`** annunciator indicates the Test Set is signaling the mobile station with command information on the forward voice channel. This is a transitory state.

The state of the **`Access`** annunciator is reflected in the Call Processing Status Register Group Condition Register bit 4.

The Test Set's speaker is turned off when in the access state. This is done to eliminate any possible audio feedback which may occur if the mobile station's microphone is open.

Screen(s) Where Field is Present

CALL CONTROL

Acc Prb Pwr

This power measurement displays mobile station access probe power. This field is accessed by highlighting the currently displayed power measurement (listed below) and selecting Acc Prb Pwr from the list of choices.

This measurement must be cross-calibrated just as the Channel Power measurements. An **`Uncal`** annunciator will flash below this field when the Access Probe Power measurement has not been calibrated for the frequency band selected in the RF Chan Std field. See "Calibration Procedures" in the "*Agilent 8924E CDMA Mobile Station Test Set Introduction to Operation*.

The following list describes the purpose for each Agilent 8924E power measurement. For more detail, refer to the field description for the power measurement you choose.

- Chan Power

  `Chan Power` (Channel Power) displays lower level RF power by analyzing the downconverted IF at the Test Set's DSP analyzer's input. The amplitude range of this measurement is from -50 dBm to +35 dBm. This measurement is limited to a 1.23 MHz bandwidth.

- Avg Power

  `Avg Power` (Average Power) displays the average power measured from all demodulated "on" power control groups transmitted by the mobile station under test. The specified amplitude range of this measurement is from -10 dBm to +40 dBm, and the input frequency range is from 30 MHz to 1000 MHz. This measurement is more accurate than the Chan Power measurement.

- Acc Prb Pwr

  `Acc Prb Pwr` (Access Probe Power) displays access probes from the mobile station by automatically triggering a power measurement each time the mobile station registers, performs a mobile station originated call, or performs a mobile station terminated call. (Access Probe Power will also be displayed when SMS (Short Message Service) or Authentication procedures are attempted on the Paging channel.

Operating Considerations

A sequence of access probes is transmitted as part of the mobile station's attempt to gain access to a CDMA system. To determine a mobile station's access probe power, select Acc Prb Pwr from the list of power measurement choices. Press then release the blue SHIFT key, then press the CALL CTRL key to access the CDMA CELL SITE CONFIGURATION screen. Select Page in the Call limit field. This will prevent a call from going to the Connected state, resulting in the mobile station transmitting all access probes in its pre-defined sequence. Several field settings affect the number of access probes and power levels of each access probe. These fields are listed below.

See also

"RF Power" field on page 269
"Sector Pwr" field on page 274
"Nom Power" field on page 233
"Nom Pwr Ext" field on page 233
"Init Power" field on page 210
"Power Step" field on page 249
"Num Step" field on page 238
"Max Req Seq, Max Rsp Seq" field on page 220

Screens Where Field is Present

CDMA CALL CONTROL
CDMA CELLULAR MOBILE TRANSMITTER TEST
CDMA TRANSMITTER POWER RANGE TEST

Access Probe (annunciator)

This annunciator lights when the mobile station transmits an access probe. This annunciator will remain lit until the call has been terminated.

A sequence of access probes is transmitted as part of the mobile station's attempt to gain access to a CDMA system. A mobile station originated call or a mobile station terminated call each require the mobile station to transmit access probes.

Screen(s) Where Field is Present

CDMA CALL CONTROL

Acc Prb Pwr

This power measurement displays mobile station access probe power. This field is accessed by highlighting the currently displayed power measurement (listed below) and selecting Acc Prb Pwr from the list of choices.

This measurement must be cross-calibrated just as the Channel Power measurements. An **Uncal** annunciator will flash below this field when the Access Probe Power measurement has not been calibrated for the frequency band selected in the RF Chan Std field. See "Channel Power Measurement Calibration" in the "Calibration Procedures" chapter of the *Agilent 8924E Application Guide*.

The following list describes the purpose for each Agilent 8924E power measurement. For more detail, refer to the field description for the power measurement you choose.

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  Acc Prb Pwr (Access Probe Power) displays access probe power from the mobile station by automatically triggering a power measurement each time the mobile station registers, performs a mobile station originated call, or performs a mobile station terminated call. (Access Probe Power will also be displayed when SMS (Short Message Service) or Authentication procedures are attempted on the Paging channel.

Operating Considerations

A sequence of access probes is transmitted as part of the mobile station's attempt to gain access to a CDMA system. To determine a mobile station's access probe power, select Acc Prb Pwr from the list of power measurement choices. Press then release the blue SHIFT key, then press the CALL CTRL key to access the CDMA CELL SITE CONFIGURATION screen. Select Page in the Call limit field. This will prevent a call from going to the Connected state, resulting in the mobile station transmitting all access probes in its pre-defined sequence. Several field settings affect the number of access probes and power levels of each access probe. These fields are listed below.

See also

"RF Power" field on page 269
"Sector Pwr" field on page 274
"Nom Power" field on page 233
"Nom Pwr Ext" field on page 233
"Init Power" field on page 210
"Power Step" field on page 249
"Num Step" field on page 238
"Max Req Seq, Max Rsp Seq" field on page 220

Screens Where Field is Present

CDMA CALL CONTROL
CDMA CELLULAR MOBILE TRANSMITTER TEST
CDMA TRANSMITTER POWER RANGE TEST

AC Level

This field displays the AC level of the selected audio source. The field labeled AC Level is visible only when the AF Anl In field is set to **SSB Demod,Audio In, Radio Int,Ext Mod, Mic Mod,** or **Audio Out**.

This measurement displays either rms voltage or audio power (Watts or dBm).

Operating Considerations

When the unit-of-measure is changed to measure AF power, the external load resistance must be specified. Refer to the **Ext Load R field description, on page 200**.

The input for the ac level measurement on this screen is always the AUDIO IN connectors.

Screen(s) Where Field is Present

ANALOG MEAS

Active

This field is used to turn on the forward control channel of the Test Set or to force a return to the **Active** state from any other state (Register, Page, Access, Connect).

Screen(s) Where Field is Present

CALL CONTROL

Active (annunciator)

When lit, the **`Active`** annunciator indicates the control channel of the Test Set is turned on.

If this annunciator is lit, the base station is transmitting system parameter overhead messages on the assigned control channel. If the annunciator is not lit, the base station is not active.

NOTE: The Test Set may still be outputting a modulated RF carrier but the Test Set's firmware is not active and no communication can occur between a mobile station and the Test Set.

The **`Active`** annunciator is not programmable.

Screen(s) Where Field is Present

CALL CONTROL

Addr

This field is used to enter the instrument's remote address. For GP-IB instruments, enter the full 3-digit address (such as 704).

Screen(s) Where Field is Present

TESTS (External Devices)

AF Anl In

This field selects the Test Set’s audio frequency analyzer input.

Signals can be analyzed from three different types of inputs:

- The output of the AM, FM, or SSB demodulators.
- The AUDIO IN, MODULATION INPUT, MIC/ACC, and AUDIO OUT connectors.
- The signal present at the AM or FM modulators for the RF Generator.

Operating Considerations

The selection you make in this field will also determine the audio measurement displayed in the upper-right area of the ANALOG MEAS screen. For instance, if FM Demod is selected, the audio measurement displayed will be FM Deviation. If AM Demod is selected, AM Depth will be displayed.

Screen(s) Where Field is Present

ANALOG MEAS

AF Freq

This field is a one-of-many field used to select the type of measurement to be made by the Audio Frequency Analyzer on the audio signal being measured.

Selecting this field displays the following measurement choices:

SINAD
Distortion
SNR (Signal to Noise Ratio)
AF Frequency
DC Level
Current - DC only

Operating Considerations

When the CALL CONTROL screen is selected, the **AF Freq** field is displayed only when the **Display** field is set to **Meas**. A numeric value will be present only when the Test Set's **Connected** annunciator is lit

SNR Operation

- The mobile station must have an audio (ear) output connected to the Test Set's AUDIO IN port (set the **AF Anl In** field to **Audio In**).
- Selecting SNR turns off the other audio measurement.
- AFGen1 is automatically turned on and off repeatedly during this measurement.

Screen(s) Where Field is Present

CALL CONTROL
ANALOG MEAS

AFGen1 Freq

This field sets the output frequency of Audio Frequency Generator #1.

Screen(s) Where Field is Present

ANALOG MEAS

AFGen1 To

This field has two fields:

- the upper field sets the destination port for Audio Frequency Generator 1
  - **`FM`** -RF Generator FM modulator
  - **`AM`** -RF Generator AM modulator
  - **`Audio Out`** -AUDIO OUT connector on front panel of Test Set
- the lower field sets the:
  - FM modulation deviation if the upper field set to **`FM`**
  - AM modulation depth if the upper field set to **`AM`**
  - amplitude of audio signal (volts RMS) at the AUDIO OUT connector if upper field is set to **`Audio Out`**

Screen(s) Where Field is Present

ANALOG MEAS

A_Key

Manually, this field is used to enter the mobile station's A_key into the Test Set. The user must obtain a valid **A_Key** from the mobile station's manufacturer, service provider or must generate a valid A_key to test authentication procedures, otherwise the authentication process will fail.

Entering an A_key Directly into the Test Set.

The :AKEY command is used to enter an A_key into the Test Set.

The query form of the command (that is, :AKEY?) can be used to determine the Test Set's current A_key value. The length of the returned value requires declaring the variable length at 26. This command does not return the mobile station's current A_key.

Generating a New A_key.

The :Generate command is only available through the remote users interface. No field is displayed for this function on the test set.

The :GENerate command is used to generate a new A_key for use in the mobile station. This is an immediate action command. The resultant check sum value will be displayed on the AUTHENTICATION screen in the last six digits of the **A_key** field.

There in no query form of the GENerate command. Use the query form of **"A_Key" field on page 146** to determine the value of the A_key which was generated.

Screens Where Field is Present

AUTHENTICATION

A-Key Digits

This field is used to enter the decimal digits used to generate the A_Key. When a number is entered, the Test Set will add leading zeroes if necessary to fill the field with 20 digits. The default setting is all zeroes.

Operating Considerations

When a new value for A_Key is entered into the **`A_Key`** field field, the Test Set's Shared Secret Data (SSD_A) is initialized to zero.

Check Digits are computed and displayed if a valid ESN is present in the **`MS Database`** when a number is entered in the **`A_Key`** field.

NOTE: Check Digits are not affected by ESN when Kor PCS is selected in the **Protocol** field.

See also

"SSD Update" field on page 278
"Check Digits" field on page 169

Screens Where Field is Present

CDMA AUTHENTICATION

Alert

This field sets the Alert parameter in SMS messages.

Operating Considerations

Some mobile stations require this field to be set to On for the mobile station to alert the user (through audio tones or vibration for example) that a message has been received.

Screen(s) Where Field is Present

CDMA SHORT MESSAGE SERVICE

Alt Pwr Ms Cal Bands

The frequency band occupied by the RF channel standard entered in this field will be included in the frequency coverage of the channel power calibration routine.

- **None**
- **All Bands** (if PCS Interface is present)
- **Cell Bands**
- **PCS Bands** (if PCS Interface is present)
- **MS AMPS**
- **Japan CDMA**
- **MSL NAMPS**
- **MSM NAMPS**
- **MSU NAMPS**
- **MS TACS**
- **MS ETACS**
- **MS NTACS**
- **MS JTACS**

Screens Where Field is Present

CONFIGURE

AM Depth

This field displays the depth of modulation (in units of percen) of the AM signal. The field is only visible when the **AF ANL In** field is set to **AM MOD** or **AM DEMOD**.

Screen(s) Where Field is Present

ANALOG MEAS

Ampl Error

This field is displayed when Ampl Error is selected from the list of choices available when the unnamed field displaying one of the following choices is displayed:

- frequency error
- amplitude error
- time offset measurement

Amplitude error is an indication of the quality of the amplitude component in the reverse link OQPSK (offset quadrature phase shift keyed) signal. It is the expressed as a percent difference between the magnitude of the ideal amplitude vector and the magnitude of the amplitude vector transmitted from the mobile station.

Operating Considerations

These measurements, along with rho, phase error, and carrier feedthrough are made by DSP analysis techniques. The **`Meas Cntl`** field controls these measurements.

See Also

`Freq Error` field description, on page 205
`Meas Cntl` field description, on page 221
`Time Offset` field description, on page 285

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITTER TEST

Amplitude

This field sets the output power of the Test Sets's transmitter (that is, the output power of the Test Set's RF Generator).

The :AMPLitude command is used to control this field.

To query the current setting of the amplitude field use the :AMPLitude? command.

Screen(s) Where Field is Present

CALL CONTROL
ANALOG MEAS

Antenna In

This field is used to indicate losses or gains between the ANT IN port and the device-under-test.

Enter a *positive* value to indicate a gain (such as an amplifier). The Spectrum Analyzer's marker level (**`Lvl`**) measurement is automatically reduced by that amount. The Spectrum Analyzer's **`Ref Level`** is automatically decreased by the same amount, so the trace position does not appear to change.

Enter a *negative* value to indicate a loss (such as cable loss). The Spectrum Analyzer Marker's Level (**`Lvl`**) measurement is automatically increased by that amount. The Spectrum Analyzer's **`Ref Level`** is automatically increased by the same amount, so the trace position does not appear to change.

This field is only used when the **`RF Level Offset`** field is set to **`On`**.

See Also

"RF Level Offset" field on page 267

Screen(s) Where Field is Present

CONFIGURE

Arm

This field triggers a single measurement. It is only displayed when the **`Meas Cntl`** field is set to **`Single`**. *This field is not updated to show the Meas Cntl mode when the Test Set is operated remotely.*

Operating Considerations

Sending a command to trigger a measurement will re-start a measurement if there is one in progress.

When any of the CDMA screens are selected, all measurements are active. This eliminates the need to display specific screens to get measurement results.

See Also

`Disarm` field description, on page 182

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Audio In Lo

This field sets the AUDIO IN LO connector's state.

Gnd causes the center pin of the connector to be connected directly to chassis ground.

Float isolates the center pin of the connector from ground, providing a floating input to the AF Analyzer.

600 To Hi establishes a 600-ohm impedance between the center pins of the AUDIO IN LO and AUDIO IN HI connectors. Also, the **Ext Load R** field is removed, since the load is now fixed to 600 ohms.

Screen(s) Where Field is Present

ANALOG MEAS

Authen

This field turns CDMA authentication **On** or **Off**.

When CDMA authentication is **On**, the Test Set signals the mobile station to go into authentication mode ($AUTH_s$ is set to '01') when registrations, call originations, pages, or data bursts are performed.

The results of authentication procedures will be displayed in the Authentication Data Table. **See "Authentication Data Table" on page 152**.

Operating Considerations

When **Authen** is **On**, the Test Set will display the authentication parameters which the mobile station is required to send to a base station as part of the protocol's authentication procedures.

When **Authen** is **Off**, the expected AUTH_MODE parameter will be '0', and any other authentication parameters displayed in the **Authentication Data Table** will be dashes (-).

Screens Where Field is Present

CDMA AUTHENTICATION

Authen Data Clear

Selecting **`Clear`** removes any data present in the Authentication Data Table.

See Also

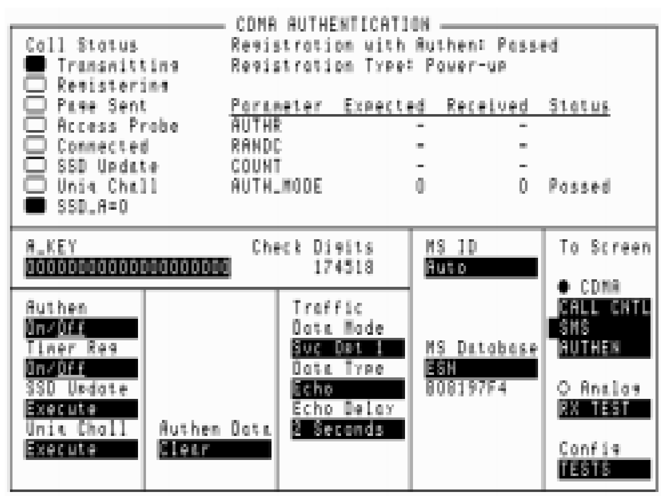
"Authentication Data Table" field on page 152

Screens Where Field is Present

CDMA AUTHENTICATION

Authentication Data Table

The Authentication Data Table, located on the CDMA AUTHENTICATION screen, displays pass/fail results and authentication parameters associated with the last authentication procedure performed.



A dash indicates that no valid table entry is currently available.

Operating Considerations

If the **`Authen`** field is **<u>`Off`</u>**, all Parameters displayed will be dashes (-), except for AUTH_MODE, which will be "0".

See Also

"Authen" field on page 151
"Authen Data Clear" field on page 152

Screens Where Field is Present

CDMA AUTHENTICATION

Auto/Norm

This field is displayed when Trigger is selected in the Controls field on the OSCILLOSCOPE screen. This field specifies how the Oscilloscope trigger level is set.

- **`Auto`** automatically triggers if a triggering signal is not detected within approximately 50 ms of the last trigger.
- **`Norm`** requires a specific triggering signal before triggering.

Operating Considerations

Automatic triggering should be used for signals >20 Hz. Normal triggering should be used for signals ≤20 Hz.

Screen(s) Where Field is Present

OSCILLOSCOPE

Avg Power

This field allows you to choose the CDMA Average Power Measurement or the CDMA Channel Power Measurement.

The Avg Power measurement can only be made on a signal from the RF IN/OUT connector on the Test Set or an Agilent 83236 PCS Interface. The power meter must be zeroed to correct for internal amplitude offsets. See **`Power Meas` field description, on page 248**.

NOTE: *Under certain conditions, the Average Power measurement will display a power level measurement when low (or no) signal power is applied to the RF Input*! This measurement is a result of the power detector sensing the Test Set's RF Power (source) when the RF generator's output port selection is **`RF Out`**. Always use the Channel Power measurement when the RF Power is at a level that will power-control the mobile station to levels below -10 dBm to avoid this condition.

Avg Power

`Avg Power` (Average Power) displays the average power measured from all demodulated "on" power control groups transmitted by the mobile station under test. The specified amplitude range of this measurement is from -10 dBm to +40 dBm.

- Chan Power

Chan Power (Channel Power) displays lower level RF power by analyzing the downconverted IF at the Test Set's DSP analyzer's input. The amplitude range of this measurement is from -50 dBm to +10 dBm. This measurement is limited to a 1.23 MHz bandwidth.

Operating Considerations for the Average Power Measurement

The Test Set compensates for internal amplitude offsets by zeroing the power meter when the **Zero** field is selected. Average power measurements should be zeroed *at least* as often as the following conditions arise:

- 5 °C change in operating temperature
- Power cycle
- Daily

Average Power measurements are made using a factory-calibrated power detector. If the Test Set is configured for PCS band operation, the detector is located in the Agilent 83236 PCS Interface. Otherwise, the detector is located in the Test Set.

The detector measures power during the time that power control groups are gated on. Each Average Power measurement is computed from data taken during a 10 ms (one-half of one traffic frame) sampling period, ensuring that at least one out of the eight available power control groups in the half-frame will be gated on, even if the transmit data rate is 1200 bps.

For example, if the data rate is 9600 bps (full-rate) average power will be measured during all eight available power control groups. If the data rate is 1200 bps, Average Power will be measured during only one power control group. (The Test Set is able to determine the pseudo-random positioning of the power control groups that are gated on). The benefit of this measurement process is that measurement results will be consistent across all possible transmit data rates.

Use the "TRIG" command to trigger Average Power measurements when using single trigger mode. (The command "TRIG:AST 'Arm'" will not trigger Average Power measurements).

See Also

"Chan Power" field on page 165

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITER POWER RANGE TEST
CDMA CELLUALR MOBILE TRANSMITTER TEST

Authent

This field is used to activate the authentication process within the Test Set. With this field set to **On**, the Test Set issues system parameter overhead messages including **SPC WORD1**, **SPC WORD2**, **ACCESS**, **RandChalA**, and **RandChalB** to the mobile station.

The :AUTHentcate command instructs the Test Set to issue system parameter overhead messages with the AUTH bit set to one.

The query form of the command (that is, :AUTHenticate?) can be used to determine the current setting of the test set.

Screens Where Field is Present

AUTHENTICATION

AWGN

This field controls the Additive White Gaussian Noise (AWGN) generator's level.

Operating Considerations

AWGN is summed with Sector A power and Sector B power. The total power is displayed in the **RF Power** field. When AWGN is turned on, E_b/N_t will be displayed unless the **Data Type** field is set to Echo.

This field is duplicated on the CDMA CELLULAR MOBILE RECEIVER TEST.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL
CDMA CELLULAR MOBILE RECEIVER TEST

Fields That Begin with the Letter B

Band Class

The Band Class field is displayed on the CDMA CALL CONTROL screen when the **"Protocol" field on page 250** is set to TIA/EIA-95B and the **"RF Chan Std" field on page 261** is set to USER-DEF. This field allows entry of the BAND_CLASS parameter.

The range of values that can be entered in this field is 0 to 4.

Operating Considerations

The value entered in the Band Class field affects Test Set operation only when the **"Protocol" field on page 250** is set to TIA/EIA-95B and the **"RF Chan Std" field on page 261** is set to USER-DEF.

The BAND_CLASS parameter, which affects forward channel messages, is a function of Protocol and **RF Chan Std** field settings.

When the **RF Chan Std** field is set to USER-DEF (user defined) the user is expected to select a band class number from 0 to 5.

Screens Where Field is Present

CDMA CALL CONTROL

Beeper

This field changes the audio beeper volume by selecting the desired level from a list of choices. The beeper always beeps when the instrument is turned on, regardless of this setting.

Operating Considerations

The beeper alerts you any time a message is displayed. Since a message may be removed from the screen before you notice it, it is better to leave the beeper on to alert you to errors during operation.

The beeper’s volume setting is retained when the instrument is turned off.

Screen(s) Where Field is Present

CONFIGURE

BER Thresh

This field is displayed only when NAMPS is selected in the System Type field.

BER Thresh is used to set the bit error rate (BER) threshold. Exceeding the BER threshold causes the mobile station to send an MRI order to the base station containing it's current BER and RSSI.

The :BSETting command is used to control this field.

The query form of the command (that is, :BSETting?) can be used to determine the current control channel setting.

Screen(s) Where Field is Present

CALL CONFIGURE

BW=

This field displays the resolution bandwidth of the CDMA spectrum analyzer.

Operating Considerations

This field is coupled to the **Span** field's setting.

Range of Values

- 1 kHz
- 3 kHz
- 30 kHz

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

by # errors

When this field is **On**, the mobile station reports FER at least as often as the number of errors entered in the numeric entry portion below On/Off.

The numeric entry portion of the by # errors field is field is not displayed when this selection is **Off**.

Operating Considerations

If **by # frames** is **On**, it is possible that mobile station reported FER will occur more frequently than the error count specified in **by # errors**.

Range of values: 1 through 15

See Also

by # frames field description, on page 158

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

by # frames

When this field is **On**, the mobile station will report FER at least as often as the mobile station’s frame counter cycles through the number of frames entered in the **MS FER Report Interval** field.

Operating Considerations

If **by # errors** is **On**, FER reporting can occur more frequently than the frame count specified by **MS FER Report Interval**.

See Also

by # errors field description, on page 158

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

Fields That Begin with the Letter C

Called Number:

This field displays the called phone number, in decimal form, received from the mobile station on the reverse control channel when the mobile station originates a call. The **Called Number:** field is displayed only when the **Display** field is set to **Data** and a reverse control channel message has been decoded when the mobile originates a call.

Refer to the **"Display" field on page 183** for information on how to read measurement results from this field.

Screen(s) Where Field is Present

CALL CONTROL

Call Limit

This field is used for measuring access probe power levels.

- **Page, base originated call is attempted, the Test Set will not respond to access probes. In this state, a call cannot be connected. This causes the mobile station to continue with an access attempt until it has completed its prescribed number of access probe sequences.**
- **None**,- the Test Set will respond to access probes and acquire the reverse traffic channel.

See Also

Max Req Seq, Max Rsp Seq field description, on page 220

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Call Status

The labels under **`Call Status`** are highlighted by annunciators. When lit, these annunciators indicate that an event took place or that a condition exists. The CDMA Status Condition Register bits that correspond with **`Call Status`** annunciators are shown in **table 6**.

All call status annunciators can be queried over GP-IB.

Table 6 **CDMA Status Register Bit Definitions**

Status LED	CDMA Status Condition Register Bit
Transmitting	2
Registering	No Condition Register Bit available. See Registering annunciator description, below.
Page Sent	1
Access Probe	0
Connected	3
Softer Handoff	5
Hard Handoff	6

See Also

`RF Channel` field description, on page 260
`PN Offset` field description, on page 246
`Traffic` field description, on page 286

Screen(s) Where Field is Present

CDMA CALL CONTROL

Carrier

This field is displayed when Carrier is selected from the list of choices available when the unnamed field displaying one of the following choices is displayed:

- phase error measurement
- carrier feedthrough measurement

Operating Considerations

These measurements, along with rho, frequency error, amplitude error, and time offset are made by DSP analysis techniques. The **Meas Cntl** field triggers these measurements.

See Also

`Meas Cntl` field description, on page 221
`Phs Error` field description, on page 245

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITER TEST

CC Order

The CC Order field is only visible when authentication is set to **ON** on the AUTHENTICATION screen and the Test Set is in the Active state.

This field is used to send an order on the forward overhead control channel to the mobile station when authentication is turned on. There are two orders available:

- The SSD Update ensures that the data contained in the mobile station and the base station is identical. At the completion of the SSD Update process the mobile station and the Test Set will contain identical copies of shared secret data.
- The Unique Challenge order challenges the mobile station's shared secret data through a series of algorithm data output comparisons. A successful challenge confirms the validity of a mobile station's shared secret data.

The :CCORder command is used to send an order type mobile station control message to the mobile station. The **Access** annunciator will light momentarily while the Test Set is sending the mobile station control message.

The query form of the command (that is, :CCORder?) can be used to determine the last order sent to the mobile station using the :CCORder command.

Screen(s) Where Field is Present

CALL CONTROL

Center Freq

This field sets the center frequency of the spectrum analyzer (Opt 012 only). This field is displayed when the **`Controls`** field is set to **`Main and the RF Display field on the CONFIGURE screen is set to Freq`**.

Operating Considerations

This field is coupled to **"Tune Freq" field on page 289**.

See Also

`RF Display` field description, on page 263
"Tune Freq" field on page 289

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM
SPECTRUM ANALYZER

Chan: -

`Chan:` is divided into two fields:

- The left-hand field displays the voice channel number assignment being used by the Test Set and the mobile station.

  A numeric value is only displayed when the Test Set's **`Connected`** annunciator is lit (connected state). A "-" is displayed if a mobile station is not actively connected on a voice channel.

  This is a read only field.

  The :AVCNumber? query command is used to query the contents of the left-hand field.

  There is no command form of the :AVCNumber? query.

- The right-hand field (highlighted field) is used to set the voice channel number which will be assigned to the mobile station by the Test Set as either an initial voice channel assignment or as a handoff voice channel assignment.

  The :VCHannel command is used to control the right-hand subfield.

  The query form of the command (that is, :VCHannle?) can be used to determine the current voice channel setting.

Screen(s) Where Field is Present

CALL CONTROL

Channel (CDMA to Analog or Interband Handoffs)

This field allows entry of an analog voice channel for CDMA-to-analog handoffs, or a CDMA traffic channel for CDMA-to-CDMA hard handoffs.

GPIB Example

`"CDMA:CALL:AHAN:CHAN 1"`

sets the Channel field to 1.

Operating Considerations

- During a CDMA-to-analog handoff, the Test Set commands the mobile station to re-tune to this analog voice channel. A CDMA-to-analog handoff attempt will occur when AMPS is selected in the System Type field and the Execute field (see **`Execute (Handoff)` field description, on page 198**) is selected.
- During a CDMA-to-CDMA interband handoff, the Test Set passes control and connection of the mobile station from one band class to another (see the **`System Type (CDMA-to-CDMA or CDMA-to-Analog Handoff)` field description, on page 281**). A CDMA-to-CDMA hard handoff attempt will occur when TIA/EIA-95B is selected in the **System Type** field and the **Execute** field (see **`Execute (Handoff)` field description, on page 198**) on the CDMA Call Control screen is selected.

Range of values when TIA/EIA-95B is selected in the System Type field:

Table 7 TIA/EIA-95B Range of Values

Destination Chan Std Selection	Channel Range	Default Channel
MS AMPS	1 to 799 or 990 to 1023	384
US PCS	1 to 1199	525
MS TACS	1 to 1000	384
MS JTACS	1 to 798	76
Japan CDMA	1 to 799, 801 to 1039, or 1041 to 1199	76
Kor PCS P0	0 to 1300	384
Kor PCS P1	1 to 1300	384

Screens Where Field is Present

CDMA CALL CONTROL

Chan Power

This field allows you to choose the CDMA Channel Power Measurement or the CDMA Average Power Measurement.

The CDMA Channel Power Measurement can be made on a signal connected to the Test Set's RF IN/OUT or ANTENNA IN connector, or to a signal connected to the Agilent 83236 PCS Interface RF IN/OUT connector.

This measurement must be cross-calibrated to the Average Power Meter. See "Calibrating Channel Power Measurements" in the *Agilent 8924E Mobile Station Test Set Introduction to Operation*.

An "Uncal" annunciator will flash below this field when the Channel Power measurement has not been calibrated for the frequency band selected in the RF Chan Std field.

- Avg Power

  `Avg Power` (Average Power) displays the average power measured from all demodulated "on" power control groups transmitted by the mobile station under test. The specified amplitude range of this measurement is from -10 dBm to +40 dBm, and the input frequency range is from 30 MHz to 1000 MHz.

- Chan Power

  `Chan Power` (Channel Power) displays lower level RF power by analyzing the downconverted IF at the Test Set's DSP analyzer's input. The amplitude range of this measurement is from -50 dBm to +10 dBm. This measurement is limited to a 1.23 MHz bandwidth.

Operating Considerations for the Channel Power Measurement

The cross-calibration process is performed by connecting a cable between the DUPLEX OUT port and the RF IN/OUT port, then selecting the **`Calibrate`** field. Refer to "Calibration Procedures" in the *Agilent 8924E CDMA Mobile Station Test Set Introduction to Operation.* Channel power measurements must be calibrated whenever any of the following conditions occur:

- "Uncal" annunciator is flashing
- 5 °C change in operating temperature
- Test Set power cycle
- Daily

The Average Power measurement, which is used during cross-calibration, is automatically zeroed during the calibration procedure.

No special measurement triggers are required for Channel Power measurements.

See Also

`Avg Power` field description, on page 153

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE TRANSMITER TEST

Chan Power Meas Intrvl

This field is displayed only when the **Traffic Data Mode** field is set to Svc Opt 2 or Svc Opt 9 and the **Data Rate** field is set to Full. This field allows you to adjust the sample period for channel power measurements.

Operating Considerations

By default, channel power measurements are made using a sampling interval 10 milliseconds long. This field allows the user to decrease the sampling interval, thereby speeding up the time it takes to display a measurement

Range of values: 1 to 10 milliseconds.

See Also

`Chan Power` field description, on page 165

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE TRANSMITER TEST

Chan Std

This field is displayed when TIA/EIA-95B is selected in the **Protocol** field and the **System Type** field. It is used during CDMA-to-CDMA (interband) handoffs to specify the handoff's destination cell band and channel standard.

Range of Values

- MS AMPS
- US PCS
- Kor PCS P0
- Kor PCS P1
- Japan CDMA
- MS TACS
- MS JTACS

Operating Considerations

An interband CDMA-to-CDMA hard handoff is performed by selecting TIA/EIA-95B in both the **Protocol** and **System Type** fields, then selecting the **Execute** field. A procedure is provided in the Application Guide chapter labeled Intersystem Handoffs.

Screens Where Field is Present

CDMA CALL CONTROL

Ch Loc:

The **Ch Loc:** field (NAMPS and NTACS system types only) sets the analog channel location that will be assigned to the mobile station by the Test Set as either an initial voice channel location or as a handoff channel location assignment.

For NAMPS systems, the choices are:

- Lower - 10 kHz below standard wide analog channel
- Middle - centered at the wide analog channel
- Upper - 10 kHz above the standard wide analog channel
- Wide - standard 25 kHz AMPS channel width

For NTACS systems, the choices are:

- Narrow - standard narrow band NTACS channel, the default value
- Wide - the JTACS channel

The :CEXT:SETT command is used to set the new channel location.

The query form of the command (that is, :CEXT:SETT?), can be used to determine the current setting of the Ch Loc right-hand field and CEXT:ACT? can be used to determine the actual setting of the **Ch Loc:** left-hand field.

Screen(s) Where Field is Present

CALL CONTROL

Check Digits

This field displays the six A_Key check digits. Check digits are calculated when a valid ESN is entered in the **`MS Database`** field (usually through Registration). Check digits provide a method for checking the validity of A-Key numbers.

See the **`A-Key Digits`** **field description, on page 147** for more information.

NOTE: Check digits are not affected by ESN when Kor PCS is selected in the **Protocol** field.

See also

"MS Database" field on page 227
"Register" field on page 257
"Timer Reg" field on page 285
"Pwr Up Reg" field on page 253

Screens Where Field is Present

CDMA AUTHENTICATION

Closed Loop Pwr Cntl

This field sets the power control mode.

- **`Open Loop`** mode causes the Test Set to send an alternating sequence of up/down power-control bits to the mobile station during periods when no other power-control operation is being performed. For example, if the **Execute** field is selected while the Test Set is in **Open Loop** mode, the mobile station will adjust its power according to the sequence of power control bits entered in the **`Change`** and **`Steps`** field. As soon as the number of power control bits entered in the **Steps** field have been sent, an alternating sequence of up/down power-control bits resumes, attempting to hold the mobile station's power level at the value the mobile station was driven to by the **Change** and **Steps** fields.

NOTE: Make sure that the Test Set power level is not reduced to a level where the mobile station receives bad frames when using Open Loop power control mode. If the mobile station receives a bad frame, it will assume the power control bit was a down bit and reduce its power by 1 dB. When the power control mode is Open Loop, the alternating sequence of power control bits will attempt to hold the mobile station's power level at the reduced power level. As more bad frames are received, the mobile station can continue to lower its power level until the call is eventually dropped. **See "Drop Timer" on page 187**.

- **`Off`** disables the power control subchannel.
- **`Closed Loop`** sends power control bits to the mobile station in an attempt to drive the mobile station's power level to a set-point based on the power transmitted from the Test Set and the open loop estimate.
- **`Always Up`** forces the power control subchannel to send continuous "up" power control bits (0's).
- **`Always Down`** forces the power control subchannel to send continuous "down" bits. (1's).

Operating Considerations for Closed Loop Pwr Cntl

The power control operations performed when the **Execute** field is selected, such as "n up" or "ramp" take precedence over the power control bit sequence expected when a mode, such as "always up" is selected. For example, if the choice in the **Change** field is "n down" and the power control mode is "Always Up", the number of "down" power control bits entered in the **Steps** field will be sent when the **Execute** field is selected. The Test Set will then resume sending continuous "up" power control bits.

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Cntrl Chan

The **`Cntl Channel`** field is an immediate action field. That is, whenever the :CCHannel command is sent, the change is reflected immediately in the physical configuration of the Test Set (the control channel is immediately deactivated, reconfigured, and then reactivated to reflect the change) and causes an immediate change to the current state of the Call Processing Subsystem (the state is set to **`Active`**).

NOTE: If the Test Set is in the **`Connect`** state and a change is made to the **`Cntl Channel`** field the **`Connect`** state will be lost.

This field is used to set the control channel number used by the Test Set.

The :CCHannel command is used to control this field.

The query form of the command (that is, :CCHannel?) can be used to determine the current control channel setting.

Screen(s) Where Field is Present

CALL CONTROL

Cntry Code

This field sets the base station's country code. This field is displayed when the field **"Protocol" field on page 250** has IS-95A, TSB-74, or J-STD-008 selected and the Esc Mode field is set to Off.

Operating Considerations

The Test Set sends the base station country code in the MCC field of the Extended System Parameters Message.

See Also

`Protocol` field description, on page 250

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Confidence

This field determines whether a confidence interval is turned on during receiver (FER) testing. If this field is “On”, a confidence interval of 95% is applied to the value entered in the **FER Spec** field.

Operating Considerations

The confidence interval provides the Test Set operator with a feature to decrease test cycle time by allowing an FER test to complete before the number of frames entered in the **Max Frames** field are tested. Each frame error rate test will halt as soon as it becomes probable that the specified frame error rate will (in the case of a passing test) or will not (in the case of a failed test) be achieved.

The Test Set provides the **FER Spec** field to enter the targeted FER percentage that is specified for a particular test. Testing can end (with a Pass or Fail indication) when the Confidence level entered in this field is achieved.

See Also

FER Spec field description, on page 202
Test Status field description, on page 282

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Connect (annunciator)

When lit, the **Connect** annunciator indicates that the mobile station is connected to the Test Set on a voice channel.

NOTE: When the CALL CONTROL screen is displayed and the Call Processing Subsystem is in the connected state (**Connect** annunciator is lit), the Test Set constantly monitors the mobile station's transmitted carrier power. If the power falls below 0.0005 Watts the Test Set will terminate the call and return to the active state (**Active** annunciator is lit). The mobile station's transmitted carrier power is monitored on all Call Processing Subsystem screens except the ANALOG MEAS screen.

If the Test Set is in the connected state (**Connect** annunciator is lit) and a change is made to the **Cntl Channel** field the **connect**ed state will be lost.

The state of the **Connect** annunciator is reflected in the Call Processing Status Register Group Condition Register bit 5.

The **Connect** annunciator is not programmable.

Screen(s) Where Field is Present

CALL CONTROL

Connected (annunciator)

This annunciator indicates that the Test Set and a mobile station have completed the signaling steps required to establish a CDMA call, and the Test Set has not had any indication that the call has ended or should end.

- For a Service Option 1 or Service Option 9 call to the mobile station (initiated by the Test Set), the mobile station must be answered before this annunciator will light. When using Service Option 2 or Service Option 32768, the mobile station will automatically answer a call and the Connected annunciator will light.
- For a call to the Test Set (initiated by the mobile station), the Test Set will automatically answer the call (if the Answer Mode field on the CDMA CELL SITE CONFIGURATION screen is set to Auto), and the Connected annunciator will light. If the Answer Mode field is set to Manual, a message will appear prompting you to press the ANS key. After pressing the ANS key, the Connected annunciator will light.

When a call is terminated, this annunciator will go out.

NOTE: When a Service Option 1 or Service Option 9 call is initiated from the Test Set, and the mobile station has acquired the traffic channel, the mobile station will start ringing. During this time, bit 4 (Alerting) in the CDMA condition register will be set. When a Service Option 1 or Service Option 9 call is initiated from the mobile station, and Manual is selected in the Answer Mode field on the CDMA CELL SITE CONFIGURATION screen, a message on the display will prompt you to press the ANS key. Until the mobile station is answered, bit 4 (Alerting) in the CDMA condition register will be set.

Screen(s) Where Field is Present

CDMA CALL CONTROL

Controls

This field is used to choose which of the spectrum analyzer’s menus is displayed.

- **`Main`** controls RF channel, input port, span, and RF level.
- **`CDMA Gen`** controls RF power, RF channel, and output port.
- **`Marker`** controls the position of the markers on the display.
- **`Auxiliary`** controls input attenuation, peak hold, video averaging, trace comparison (normalize), and sensitivity.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

Controls

This field is used to choose which of the spectrum analyzer's menus is displayed.

- `Main`
- `RF Gen`
- `Marker`

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Controls

This field is used to choose which of the oscilloscope's menus is displayed.

- `Main`
- `Trigger`
- `Marker`

Screen(s) Where Field is Present

OSCILLOSCOPE

Cont/Single

This field specifies whether the oscilloscope is continuously triggered (`Cont`), or if it is only triggered each time `Reset` is selected (`Single`).

Screen(s) Where Field is Present

OSCILLOSCOPE

Current

The `Current` measurement is selected by highlighting the lower field in the upper-right portion of the ANALOG MEAS screen and choosing `Current` from the list of choices. This field only displays the DC current measured at the DC input port on the back of the Test Set. Any offset can be removed by selecting `Zero` in the `DC Current` field.

Screen(s) Where Field is Present

ANALOG MEAS

Fields That Begin with the Letter D

Data Length

This field specifies the number of bits used for each word of serial data when using the rear-panel serial port.

This setting is retained when the instrument is turned off.

Screen(s) Where Field is Present

I/O CONFIGURE

Data Mode

This field allows you to select the data format for the User Data field.

- **`ASCII`** selects ASCII character entry.
- **`Hex`** selects hexadecimal character entry. This choice is available for sending messages that require non-English language character sets.

When the **User Data** field is selected, the front-panel knob is used to enter characters.

GP-IB Example

`"CDMA:SMS:MDM 'Hex'"`

sets the **User Data** field data format to hexadecimal.

Operating Considerations

If you select Hex the Test Set expects an even number of hex characters to be entered in the **User Data** field. Each pair of hex characters represents a byte of data. If an odd number of hex characters is entered in the User Data field , the least significant four bits of the last byte will consist of zeroes.

See Also

`User Data (ASCII or Hex)` field description, on page 294

Screen(s) Where Field is Present

CDMA SHORT MESSAGE SERVICE

Data Mode

This field allows you to select the data format for the User Data field.

- **ASCII** selects ASCII character entry.
- **Hex** selects hexadecimal character entry. This choice is available for sending messages that require non-English language character sets.

When the **User Data** field is selected, the front-panel knob is used to enter characters.

Operating Considerations

If you select Hex the Test Set expects an even number of hex characters to be entered in the **User Data** field. Each pair of hex characters represents a byte of data. If an odd number of hex characters is entered in the User Data field , the least significant four bits of the last byte will consist of zeroes.

Screen(s) Where Field is Present

CDMA SHORT MESSAGE SERVICE

Data Rate

This field is displayed only when the **Traffic Data Mode field is set to Svc Opt 2 or Svc Opt 9, or when the Traffic Data Mode field is set to Svc Opt 1, Svc Opt 3, or SO 32768** and the **Data Type** field is set to **PRBS**. It allows the selection of various traffic channel data-transmission rates from the Test Set.

When the **Traffic Data Mode field is set to Svc Opt 1, Svc Opt 2, or Svc Opt 3 the following data rates are available:**

- **Full** - 9600 bps data rate
- **Half** - 4800 bps data rate
- **Quarter** - 2400 bps data rate
- **Eighth** - 1200 bps data rate
- **Random** - The Test Set will pseudorandomly choose a data rate on a frame-by-frame basis.

When the **Traffic Data Mode field is set to Svc Opt 9 or Svc Opt 32768 (and the Data Type field is set to PRBS) the following data rates are available:**

- **Full** - 14400 bps data rate
- **Half** - 7200 bps data rate
- **Quarter** - 3600 bps data rate
- **Eighth** - 1800 bps data rate
- **Random** - The Test Set will pseudorandomly choose a data rate on a frame-by-frame basis.

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER RANGE TEST
CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Data Type

This field selects the data type. This field appears only when **Traffic Data Mode** is set to **Svc Opt 1, Svc Opt 3,** or.

- **PRBS** - a pseudorandom bit sequence
- **Echo** - a reformatted and returned traffic packet (originated by the MSUT, received and reformatted by the Test Set, then returned to the MSUT).
- **1 kHz Tone** - a mathematically generated 1 kHz sine wave fed through a voice coder by simulation software.
- **400Hz** - a vocoded 400 Hz tone sent as the forward traffic data.
- **Chirp** - a vocoded chirp, with a duration of approximately 3 seconds, sent on the forward traffic channel. The Chirp repeats after about 0.5 seconds delay.

Operating Considerations

The 1 kHz Tone, 400 Hz, and audio Chirp require the mobile station to have an IS-96-A vocoder. Some mobile stations will distort the 1 kHz tone after a few seconds.

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Date

This field specifies the current date for the internal clock. The date can be read by a controller using GP-IB and printed on test results.

The format is MMDDYY (Month Day Year), using two digits for each term. When entering months January through September (01-09), the leading zero is not displayed when entered. Example; May 5, 1993 is entered as 050593, but is displayed as 50593.

The internal clock still functions when the instrument is turned off.

Screen(s) Where Field is Present

CONFIGURE

DC Current

DC current measurement zero removes any measurement offset present before making a dc-current measurement. The measurement is zeroed by selecting **`Zero`**, and pressing the ENTER key or the Cursor Control knob.

NOTE: The current source must be disconnected before zeroing for accurate operation.

Screen(s) Where Field is Present

ANALOG MEAS

DC Level

The **`DC Level`** measurement is selected by highlighting the lower field in the upper-right portion of the ANALOG MEAS screen and choosing **`DC Level`** from the list of choices.

This field displays the DC voltage at the DC input port on the back of the Test Set.

Screen(s) Where Field is Present

ANALOG MEAS

De-Emphasis

This field is used to select or bypass the 750 uSec de-emphasis filter network used to condition the audio signal before being analyzed by the Audio Frequency Analyzer.

Screen(s) Where Field is Present

ANALOG MEAS

Detector

This field is used to select the type of detector used to measure the amplitude of the audio signal being analyzed by the Audio Frequency Analyzer.

Detector Types

- **RMS** displays the RMS value of signals.
- **RMS*SQRT2** displays the RMS value of a signal multiplied by $\sqrt{2}$.
- **Pk+** displays the positive peak value.
- **Pk–** displays the negative peak value.
- **Pk±/2** adds the positive and negative peak values, and divides the sum by 2.
- **Pk±Max** compares the positive and negative peaks and displays the greater value (polarity is not indicated).
- **Pk+ Hold** displays and holds the positive peak value until the measurement is reset. To reset, press the MEAS RESET key, select a different detector, or re-select the same detector.
- **Pk– Hold** displays and holds the negative peak value until the measurement is reset. To reset, press the MEAS RESET key, select a different detector, or re-select the same detector.
- **Pk±/2 Hold** divides the sum of the positive and negative peak values by 2, and displays the value until the measurement is reset. To reset, press the MEAS RESET key, select a different detector, or re-select the same detector.
- **Pk±Mx Hold** compares the positive and negative peaks and displays the greater value until the measurement is reset. To reset, press the MEAS RESET key, select a different detector, or re-select the same detector.

Screen(s) Where Field is Present

ANALOG MEAS

Disarm

This field stops a measurement in progress. It is only displayed when the **`Meas Cntl`** field is set to **`Single`**. *This field is not updated to show the Meas Cntl mode when the Test Set is operated remotely.*

Operating Considerations

The ‘DISARM’ command *does not prevent subsequent measurements from being triggered when the Test Set is in REPetitive triggering mode.*

If **`Disarm`** is selected with no measurement in progress, it will have no effect on the display.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Display

The top right-hand portion of the **CALL CONTROL** screen is used to display:

- Decoded data messages received from the mobile station on the reverse control channel or the reverse voice channel. If a decoding error occurs the raw data message bits received from the mobile station are displayed in hexadecimal format.
- Modulation quality measurements made on the mobile station's RF carrier while on a voice channel.

The **Display** field is used to select the type of mobile station information to be displayed.

Setting the Display Field to Meas

When the **Display** field is set to **Meas** the top right-hand portion of the **CALL CONTROL** screen is used to display modulation quality measurements made on the mobile station's RF carrier while on a voice channel.

- For system type AMPS, TACS, AND JTACS the following parameters are measured when the Test Set is in the connect state. See **Figure 30** .
  - TX Freq Error
  - TX Power
  - FM Deviation
  - AF Frequency

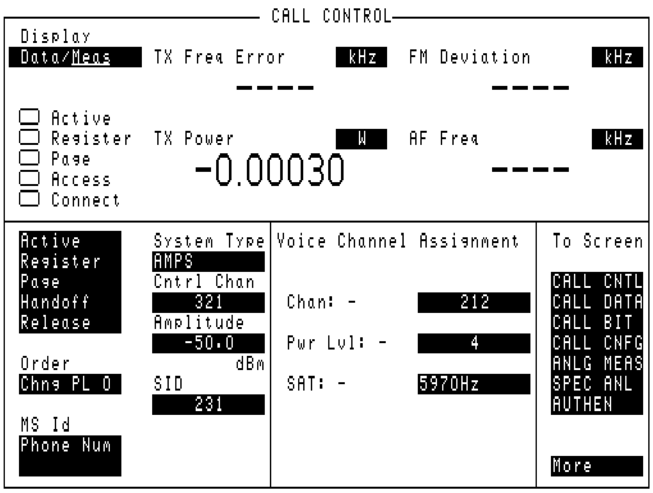


Figure 30 **CALL CONTROL Screen with Meas Selected**

- For system type NAMPS the following parameters are measured when the Test Set is in the connect state. See **Figure 31** .
  - TX Freq Error
  - TX Power
  - FM Deviation
  - DSAT/DST

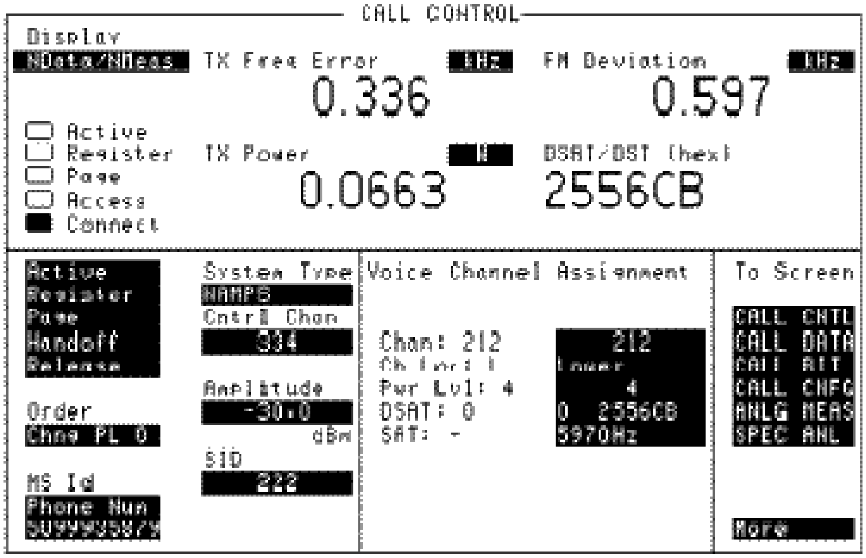


Figure 31 **CALL CONTROL Screen with NMeas Selected**

Reading The Modulation Quality Measurement Fields The **`MEAS`** selection brings some of the Test Set's Audio Analyzer fields and some of the Test Set's RF Analyzer fields onto the **`CALL CONTROL`** screen for the purpose of making modulation quality measurements on the mobile station's RF carrier while on a voice channel.

Screen(s) Where Field is Present

ANALOG MEAS
CALL CONTORL

Display Interim Results

This field allows the display of the current FER, errors, and number of frames counted while a measurement is in progress.

- **`Yes`** displays periodic updates from the cell site's processor.
- **`No`** display one measurement result at the end of the test.

Operating Considerations

This field must have **`Yes`** selected to display interim results.

If **`Display Interim Results`** is **`Yes`**, and a measurement result is queried over GP-IB during a measurement, an interim measurement will be returned.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Distn

The **`Distn`** measurement is selected by highlighting the lower field in the upper-right portion of the ANALOG MEAS screen and choosing **`Distn`** from the list of choices.

This field displays the percent of distortion for a 1 kHz siganl tone.

Screen(s) Where Field is Present

ANALOG MEAS

Drop Timer

This field turns the call drop timer on or off.

- **`On - the call drop timer is activated. If, during a call, the Test Set does not receive a signal from the MSUT for a period of 256 frames, the call is dropped`**
- **`Off-the call drop timer is de-activated`**.

Operating Considerations

When a call is connected and the Test Set fails to decode a traffic frame, the Test Set begins a counter that will increment with each bad frame. This counter is referred to as the “call drop” timer. When the Call Drop field is **`On`**, the call drop timer allows 256 bad frames in sequence before dropping the call. If you want to disable the Test Set’s call drop timer, set this field to **`Off`** .

With the Call Drop timer off and a call connected, the Test Set will continue to transmit the CDMA forward channel even in the absence of a reverse link. For example, if a mobile station has been power-controlled to a level that is too low for the Test Set to decode (and therefore acknowledge) signaling messages, the mobile station could drop the call but the Connected annunciator will still be lit.

With the Call Drop timer off, the Connected annunciator can still go out:

- if a procedure that requires signaling, such as Hard Handoff, was initiated but could not be completed, or
- if the END CALL key is pressed, or
- if the CDMA:CALL:END command is sent via GP-IB, or
- if the mobile station sends a *Release Order* message and the Test Set is able to decode it.

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

DSAT:

The **DSAT:** field (NAMPS and NTACS system types only), located in the **Voice Channel Assignment** field, is divided into two fields:

- The left-hand field displays the current DSAT control message being broadcast by the base station. A numeric value is displayed only when the **Ch Loc:** is set to Lower, Middle or Upper and a mobile station is actively connected on a voice channel (that is, the **Connect** annunciator is lit). A "-" is displayed if a mobile station is not actively connected on a voice channel or the **Ch Loc:** is set to Wide. When the **Ch Loc:** is set to Wide the **SAT** field displays the current SAT frequency being broadcast by the Test Set.

  The left-hand field is a read only field and is displayed only when the selected system type is NAMPS.

  The :DSAT:ACTual? query command is used to query the contents of the left-hand field.

  There is no command form of the query :DSAT:ACTual? .

- The right-hand field (highlighted field) is used to set one of the 7 valid DSAT sequences to be used on the designated voice channel (the channel number entered into the **Chan:** right-hand field).

  The :DSAT command is used to control the right-hand field.

  The query form of the command (that is, :DSAT:SETTing?) can be used to determine the current Test Set DSAT setting.

Screen(s) Where Field is Present

CALL CONTROL

DSAT/DST (hex)

The **DSAT/DST** field is displayed only when the **System Type** field is set to **NAMPS** and the **Display** field is set to **NMeas**.

The DSAT/DST field displays the received **DSAT/DST** sequence from the mobile station on the reverse voice channel. The received sequence is displayed in hexadecimal and can be checked against the DSAT value displayed in the DSAT right-hand DSAT field. Four dashes (----) indicate no carrier is present to measure. A numeric value would only be displayed when the Test Set's **Connected** annunciator is lit (connected state).

The :DSAT:MEASurement? query command is used to query the contents of the left-hand subfield.

There is no command form of the :MEASurement? query.

Screen(s) Where Field is Present

CALL CONTROL

DSAT Meas

This field is displayed only when the **System Type** field is set to **NAMPS** or **NTACS**.

This field is used to select what the signaling decoder will decode. The choices are:

- **DSAT**
- **Data**

When DSAT is selected, the signaling decoder decodes DSAT (Digital Supervisory Audio Tone) transponded from the mobile station currently connected on a call.

When Data is selected, the signaling decoder decodes and displays reverse voice channel data and acts upon messages from the mobile station currently connected on a call.

Operating Considerations

To verify that the mobile station is transponding the correct DSAT, make sure DSAT is selected in this field, and select “NMeas” in the Display field. The decoded DSAT will be displayed in the DSAT/DST (hex) field. .

To set up the signaling decoder to decode and display signaling messages that are transmitted on the reverse voice channel, make sure that “Data” is selected in this field, then select “NData” in the Display field. Messages generated by signaling events, such as when a call is ended by the mobile station, will now be decoded and displayed. If this field is not set to “Data”, and a call is ended by the mobile station, the Test Set will drop the call when it detects that the mobile station is no longer on the call.

Screen(s) Where Field is Present

CALL CONTROL (when NAMPS is selected in the System Type field)

Duplex Out

This field is used to indicate losses or gains between the DUPLEX OUT port and the device-under-test.

- Enter a *positive* value to indicate a gain (such as an amplifier gain). The RF Generator's level is automatically set that amount *below* what is indicated in the RF Generator's **Amplitude** field. (Example; if this value is 10 dB, and the **Amplitude** field shows 0 dBm, the actual level out this port is –10 dBm.) The value at the output of the external amplifier should then be at the level indicated in the **Amplitude** field.
- Enter a *negative* value to indicate a loss (such as cable loss). The RF Generator's level is automatically set that amount *above* what is indicated in the RF Generator's **Amplitude** field to compensate. The value at the opposite end of the cable (loss) should then be at the level indicated in the **Amplitude** field; unless the resulting RF Generator setting exceeds the maximum output level, then an error occurs: **Input value out of range**. In that case, reduce the **Amplitude** setting, or decrease the **Duplex Out** value.

This field is only used when the **RF Level Offset** field is set to **On**.

Screen(s) Where Field is Present

CONFIGURE

Duplicate User Data

This field is used to determine the maximum number of copies of user data that will be sent in an SMS message.

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Fields That Begin with the Letter E

Eb/Nt

This field is displayed when AWGN is “On” and the **Data Type** field on the CDMA CALL CONTROL screen or the CDMA CELLULAR MOBILE RECEIVER TEST screen to **PRBS,1 kHz Tone**, **400 Hz,** or **Chirp.**

Operating Considerations

To display a value for E_b/N_t, turn on **AWGN** and set the **Data Type** field on the CDMA CALL CONTROL screen or the CDMA CELLULAR MOBILE RECEIVER TEST screen to **PRBS,1 kHz Tone**, **400 Hz,** or **Chirp.**

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL
CDMA CELLULAR MOBILE RECEIVER TEST

Echo Delay

This field is displayed only when the **Data Type** field is set to **Echo**. This field allows selection of the time period between when you talk into the mobile station and when you hear your voice echoed back.

- **0 Seconds**
- **2 Seconds**
- **5 Seconds**

Screens Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Encoding

This field determines how the characters in the User Data field will be encoded in the SMS message. The choices currently available are:

- **`Octet`** causes each character to be encoded as a byte (8-bits).
- **`7-bit ASCII`** causes each character to be encoded in 7-bit lengths.
- **`Shift-JIS`** allows Kanji and Kana characters to be sent. Arib T53 must be selected in the **Protocol** field before this choice is available.

Operating Considerations

If you select Octet and the **Data Mode** field is set to Hex, the Test Set will put each byte of data from the **User Data** field in the SMS message without translation.

If you select 7-bit ASCII and the **Data Mode** field is set to Hex, the Test Set will truncate the most significant bit of each byte of data from the **User Data** field, then put the resulting 7-bit data in the SMS message without translation.

If the **Data Mode** field set to ASCII, the Test Set will translate the data from the **User Data** field using the ASCII code chart, then put the resulting data in the SMS message in 7-bit or byte format depending on the selection you make in this field.

The data that comes from characters entered in the **User Data** field are put in the CHARi fields of the User Data subparameter of the SMS message as described in Section 4.5.2 of IS-637 and TSB79. This field affects this subparameter as shown in **table 8**.

Table 8

Encoding field selection	MSG_ENCODING field value	CHARi field length (bits)
Octet	0	8
7-bit ASCII	2	7

The encoding to be used by mobile stations for the Octet encoding type is unspecified in the IS-637 and TSB79 standards. While some mobile stations use ASCII encoding, others may use a different encoding or may not implement the Octet encoding type at all. Consequently, using ‘Octet’ encoding to send ASCII User Data to a mobile station may cause the mobile station to display the message using a different character set or the mobile station may not display a message at all.

See Also

`User Data (ASCII or Hex)` field description, on page 294

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Enter Procedure Filename

This field is used to enter the name of the file you want to save or delete.

Operating Considerations

When you save a procedure file, you can use any name with up to 9 characters.

You can also delete previously-saved files to be able to resave a file using the same file name.

Screen(s) Where Field is Present

TESTS (Save/Delete Procedure)

Errors Counted

This field displays the number of frame errors counted during or after an FER test. A Service Option 2 (mobile station data loopback) call must be connected before running an FER test.

Operating Considerations

A measurement result will be displayed at the end of a test if Display Interim Results is **`No`**. Measurement results will be displayed continuously if Display Interim Results is **`Yes`**.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Errors Reported

Indicates the number of errors detected during an FER report interval.

Operating Considerations

The report interval is specified in terms of error count or frame count.

See Also

`by # errors` field description, on page 158
`by # frames` field description, on page 158
`MS FER Report Interval` field description, on page 229

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

Esc Mode

This field is displayed when the field called **"Protocol" field on page 250** has IS-95A, TSB-74, or J-STD-008 selected.

This field, when set to “On”, configures the Test Set as a base station that is compatible with any Country Code/Network Code combination that a mobile station is programmed with.

- **`On`** (enables escape mode)
- **`Off`** (disables escape mode)

Operating Considerations

When Escape Mode is “On”, the **Cntry Code** and **Netwrk Code** fields are no longer needed and are removed from the Cell Site Configuration screen. The mobile station may still require a specific **Network ID** and **System ID** setting to find service from the Test Set.

See Also

`Protocol` field description, on page 250

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

ESN (dec):

This field displays the electronic serial number (ESN), in decimal form, received from the mobile station on the reverse control channel in response to a forward control channel message. The **`ESN (dec):`** field is displayed only when the **`Display`** field is set to **`Data`** and a reverse control channel message containing this information has been decoded.

Refer to the **"Display" field on page 183** for information on how to read measurement results from this field.

Screen(s) Where Field is Present

CALL CONTROL

ESN (hex):

This field displays the electronic serial number (ESN), in hexadecimal form, received from the mobile station on the reverse control channel in response to a forward control channel message. The **`ESN (hex):`** field is displayed only when the **`Display`** field is set to **`Data`** and a reverse control channel message containing this information has been decoded.

Refer to the **"Display" field on page 183** for information on how to read measurement results from this field.

Screen(s) Where Field is Present

CALL CONTROL

ESN

This field is used to enter the electronic serial number (ESN) of the mobile station into the Test Set. There are two methods which can be used to enter the **`ESN`**. The serial number can be captured by the Test Set through a registration order, or the serial number can be entered as an 8-digit hexadecimal value directly into this field.

To capture the electronic serial number through a registration , see **`Register`** **field description, on page 256** for further information.

To enter the serial number directly use the :ESNumber command.

The query form of the command (that is, :ESNumber?) can be used to determine the current setting of the ESN field.

Screen(s) Where Field is Present

AUTHENTICATION

Execute (Handoff)

This field executes a CDMA-to-analog or CDMA-to-CDMA interband handoff.

Operating Considerations

If AMPS (or any of the other analog systems) is selected in the System Type field, a CDMA to Analog handoff is executed. A CDMA call must be connected to execute a CDMA to Analog handoff.

If TIA/EIA-95B is selected in the **System Type** field, a CDMA-to-CDMA interband handoff to the channel selected in the **Channel** field is performed when the **Execute** field is selected. An EIA/TIA-95B CDMA call must be connected to execute a CDMA-to-CDMA interband handoff.

See Also

`System Type (CDMA-to-CDMA or CDMA-to-Analog Handoff)` field description, on page 281
`Protocol` field description, on page 250
`Chan Std` field description, on page 167
`Channel (CDMA to Analog or Interband Handoffs)` field description, on page 163

Screens Where Field is Present

CDMA CALL CONTROL

External Disk Specification

This field is used when storing and loading procedures on an external disk.

Operating Considerations

The GP-IB path entered in the **`External Disk Specification`** field is used by the **`Select Procedure Location:`** field on the TESTS (Main Menu) screen when **`Disk`** is selected.

Screen(s) Where Field is Present

TESTS (External Devices)

External Reference

This field is used to select the reference frequency for the REF INPUT rear-panel connector. The CDMA Reference section of the Test Set will lock to this frequency, and all CDMA frame clocks will be derived from it.

Operating Considerations

The 10 MHz OVEN OUT is connected to the REF INPUT rear-panel connector when the Test Set is shipped from the factory.

If the entry in this field does not match the frequency of the reference frequency on the REF INPUT connector, the message “Reference unlocked, check reference connection and frequency” will be displayed.

See Also

"REF INPUT" field on page 101
"10 MHz OVEN OUT" field on page 106

Screen(s) Where Field is Present

CONFIGURE

Ext Load R

External Load Resistance is used to calculate and display AF power. Power is calculated using the voltage measured at the AUDIO IN connections and the resistance value you enter into this field.

Operating Considerations

This field is not displayed when the `Audio In Lo` field is set to `600 To Hi`; the load resistance is internally fixed to 600 ohms.

See Also

`AC Level` field description, on page 141
`Audio In Lo` field description, on page 151

Screen(s) Where Field is Present

ANALOG MEAS

Fields That Begin with the Letter F

FER

This field displays the current frame error rate (FER) measured by the Test Set. A Service Option 2 (mobile station data loopback) call must be connected before running an FER test.

A measurement result will be displayed at the end of a test if Display Interim Results is **`No`**. (The Passed, Failed, or Max Frames annunciator will light when a test is done.) Measurement results will be displayed continuously, and queries will be returned based on interim results if Display Interim Results is **`Yes`**.

Operating Considerations

To measure FER, the mobile station must be on a traffic channel and looping data back. The Connected and Svc Opt 2 annunciators are lit when the mobile station is looping data back.

The CDMA Status Register provides status bits for the Passed, Failed, and Max Frames Test Status indicators.

See Also

`Meas Cntl` field description, on page 221

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

FER Spec

This field allows entry of the specified frame error rate (FER) the Test Set will apply Confidence interval testing to.

Operating Considerations

This field is only displayed when the **`Confidence`** field is on.

See Also

`Confidence` field description, on page 172

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Filter 1

This field selects one of several standard or optional audio frequency filters which can be used to condition the audio signal before being analyzed by the Audio Frequency Analyzer.

Screen(s) Where Field is Present

ANALOG MEAS

Filter 2

This field selects one of several standard or optional audio frequency filters which can be used to condition the audio signal before being analyzed by the Audio Frequency Analyzer.

Screen(s) Where Field is Present

ANALOG MEAS

Firmware

This field displays the current firmware revision for your Test Set. The revision number is automatically changed when updated firmware is installed.

Screen(s) Where Field is Present

CONFIGURE

FM Deviation

The **FM Deviation** field is displayed on the CALL CONTROL screen when the **Display** field is set to **Meas**, and on the ANALOG MEAS screen when FM Demod or FM Mod is selected in the AF Anl In field

This field displays the measured FM deviation of the carrier being transmitted by the mobile station. Four dashes (----) indicate that no carrier is present to measure.

NOTE: It is recommended that FM deviation measurements requiring full Test Set FM deviation accuracy be made on the **ANALOG MEAS** screen. The audio frequency gains stages are set to autorange while on these screens and post detection filters can be selected to optimize deviation measurements. **See "Filter 1" on page 202** and **"Filter 2" field on page 202**

Screen(s) Where Field is Present

ANALOG MEAS
CALL CONTROL

Frame Clock

This field is used to select the CDMA frame clock output frequency on the rear-panel CDMA CLOCK MUX OUTPUT.

Operating Considerations

The CDMA frame clocks provide the CDMA timing references for generating and demodulating CDMA signals.

The CELLSITE/TRIGGERS connector, a rear-panel miniature D-type 15-pin connector provides all of the above frame clock outputs simultaneously. The timing of these frame clocks may be offset slightly from the timing of the CDMA CLOCK MUX OUTPUT’s frame clocks due to propagation delays.

See Also

"CELL SITE/TRIGGERS" field on page 90
"CDMA CLOCK MUX OUTPUT" field on page 93

Screen(s) Where Field is Present

CONFIGURE

Frames Counted

This field displays the number of frames tested during a FER measurement.

Operating Considerations

A measurement result will be displayed at the end of a test if **`Display Interim Results`** is **`No`**. Measurement results will be displayed continuously if **`Display Interim Results`** is **`Yes`**.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Frames Reported

This field indicates the number of frames counted during the mobile station's reporting interval.

Operating Considerations

The reporting interval is specified in terms of error count or frame count.

See Also

`by # errors` **field description, on page 158**
`by # frames` **field description, on page 158**
`MS FER Report Interval` **field description, on page 229**

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

Freq Error

This field is displayed when Freq Error is selected from the list of choices available when the unnamed field displaying one of the following choices is displayed:

- frequency error
- amplitude error
- time offset measurement

Operating Considerations

These measurements, along with rho, phase error, and carrier feedthrough are made by DSP analysis techniques. The `Meas Cntl` field controls these measurements.

Frequency error is referred to as ΔF.

See Also

`Meas Cntl` field description, on page 221
`Ampl Error` field description, on page 149
`Time Offset` field description, on page 285

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITTER TEST

Fields That Begin with the Letter G

(Gen)-(Anl)

This field is used with the **`RF Offset`** field to specify the amount of frequency offset between the RF Generator and RF Analyzer.

This field is displayed when the **`RF Display`** field is set to **`Freq`**.

Screen(s) Where Field is Present

CONFIGURE

Fields That Begin with the Letter H

Handoff

This field is used to initiate a handoff.

The voice channel number to hand the mobile station off to, the initial power level to use on the new voice channel and the SAT tone frequency to transpond on the new voice channel are specified using the **`Chan:`**, **`Ch Loc:`**, **`Pwr Lvl:`**, **`DSAT:`**, and **`SAT:`** fields under the **`Voice Channel Assignment`** section of the **`CALL CONTROL`** screen.

The :HANDoff command is used to control this field.

There is no query form of the :HANDoff command.

Screen(s) Where Field is Present

CALL CONTROL

Handoff

This field is displays the choice of signaling events that will occur when the Execute field is selected. At the time of this printing, Handoff was the only choice available.

- **`Handoff`** (CDMA to Analog Call Control handoff)

Operating Considerations

A CDMA to Analog handoff to the voice channel selected in the Channel field is performed when the Execute field is selected. A CDMA call must be in progress to execute a CDMA to Analog handoff.

Screen(s) Where Field is Present

CDMA CALL CONTROL

Hard Handoff (annunciator)

This annunciator is lit when a change is made to the RF channel number while a call is connected. It remains lit until the Test Set acquires the new reverse traffic channel, or the call is terminated

Screen(s) Where Field is Present

CDMA CALL CONTROL

GP-IB Adrs

This field is used to display and change the GP-IB address of the Test Set.

Operating Considerations

The address can be set from 0 to 30 by using the DATA keys, or by pushing and then turning the cursor-control knob.

This setting is retained when the instrument is turned off.

Screen(s) Where Field is Present

I/O CONFIGURE

Fields That Begin with the Letter I

Ideal Mobile Power

This field displays the power level that a mobile station on a call should be transmitting to the Test Set. The value displayed for Ideal Mobile Power should closely match the value for Average or Channel Power, providing the following conditions are met:

- The Average Power measurement is zeroed, if you are making an Average Power measurement.
- The Channel Power measurement is calibrated, if you are making a Channel Power measurement.
- The Power Control mode is Closed Loop.

Ideal Mobile Power is a calculated value based on an equation found in the EIA/TIA IS-95 standard under "Estimated Open Loop Output Power". To calculate Ideal Mobile Power, the Test Set sums the following values:

-RF Power
-73
+Nom Pwr
+Init Pwr

Example:

If Sector A Power is set at -73 dBM/BW, and Sector B Power and AWGN are OFF, RF Power will be -73 dBm. If Nom Pwr and Init Pwr are both set to 0, the Ideal Mobile Power will be 0 dBm/BW.

-(-73 dBm/BW)
-73
+0 db
+0 dB
=0 dBm/BW

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST

IF Filter

This field selects the desired IF filter bandwidth.

Screens Where Field is Present

ANALOG MEAS

Init Power

This field allows entry of the initial power offset for system access (INIT_PWR).

Operating Considerations

This field specifies a correction factor the mobile station adds to the estimated open-loop output power for setting the power level of the first (initial) access probe in an access probe sequence.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Input Atten

Input Attenuation sets the amount of input attenuation for the RF IN/OUT and ANT IN connectors. This function controls two settings:

- The upper field determines if you want the Test Set to set the attenuation automatically (**`Auto`**), or if you want to set the value manually (**`Hold`**).
- The lower field displays the present attenuation value, and is used to set the desired attenuation level when the upper area is set to **`Hold`**.

Operating Considerations

When the Test Set has a mobile station on a CDMA call (the “Connected” annunciator is lit), it is important that **`Auto`** is selected in this field. This allows the Test Set to configure the RF analyzer signal path with the correct attenuation for the mobile station’s transmitted power level, according to the open loop power control formula. See "Ideal Mobile Power" on page 209.

When **`Auto`** is selected in this field and the output power is set to a very high level (greater than -35 dBm/BW) and the PCS Interface’s RF IN/OUT port is being used, the choice labeled 20 dB Low Compression is automatically selected to prevent effects from the leakage from the output path to the input path of the RF IN/OUT port.

NOTE: After a signal is input to the Test Set, the RF autoranging function (**`Auto`**) takes a small amount of time to determine the required input attenuator setting. When trying to capture the initial modulation waveform of a signal on the Oscilloscope, set the upper field to **`Hold`** and set the lower field to an appropriate level for the signal being decoded (start with 40 dB).

Screen(s) Where Field is Present

CONFIGURE
SPECTRUM ANALYZER (Opt 012 only, **Auxiliary** must be selected in **Controls** field)
CDMA REVERSE CHANNEL SPECTRUM ANALYZER (Opt 012 only, **Auxiliary** must be selected in **Controls** field)

Input Gain

This field displays and selects the gain of the AF Analyzer’s input amplifier.

Screen(s) Where Field is Present

AF ANALZYER

Input Port

This field is not displayed when the Test Set is configured to operate with an Agilent 83236B PCS Interface.

This field selects the RF IN/OUT or ANT IN port.

Operating Considerations

Maximum power levels for each port are printed on the Test Set's front panel. If the RF power at the RF IN/OUT port exceeds allowable limits, a warning signal sounds and a message appears at the top of the screen. If this occurs, disconnect the RF power, press the MEAS RESET key, and allow the Test Set to cool off for approximately two minutes before making any other measurements on this port.

The ANT IN (antenna input) connector provides a highly-sensitive input for very low level signals (such as "off the air" measurements). You cannot measure TX (RF) Power, Average Power, Channel Power, or ACP Level on this screen using the ANT IN port.

CAUTION: Connecting a signal of >200 mW to the ANT IN port can cause instrument damage (although internal protection circuits can typically withstand a short-duration signal of 1 or 2 Watts).

If the overpower circuit is triggered (signified by a warning message at the top of the screen), remove the signal from the ANT IN port, and press the MEAS RESET key or turn the Test Set off and on to reset it.

See Also

`Sensitivity` field description, on page 275
`RF In/Ant` field description, on page 265
"PCS Intrfc Control" field on page 244

Screen(s) Where Field is Present

CONFIGURE

Intensity

This field adjusts the screen intensity from a setting of 1 (very dim) to 8 (bright). If the setting is set too low, the screen can no longer be read. If you can't read the screen, and you don't know where the cursor is (or even what screen is displayed), press PRESET, and re-access the CONFIGURE screen. The cursor automatically goes to this field at that point. Press 8, ENTER to set the maximum intensity, and re-adjust if desired.

This setting is retained when the instrument is turned off.

Screen(s) Where Field is Present

CONFIGURE

Internal

This field selects the trigger source.

- **`Internal`** uses the signal being displayed for triggering.
- **`External`** uses the rear-panel EXT SCOPE TRIGGER INPUT for triggering. This is a TTL level trigger (approximately 2.5 V).
- **`ENCODER`** uses the signaling encoder for triggering. The encoder must be sending its signal to trigger the oscilloscope.

Screen(s) Where Field is Present

OSCILLOSCOPE

Fields That Begin with the Letter L

Length

This field displays the total message length, in characters, of a SMS message multiplied by the number entered in the **Duplicate User Data** field.

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Level (div)

This control is divided into two fields:

The upper field (**`0.00`**) sets the *internal* trigger level as a function of vertical divisions. The trigger level is indicated by small pointers that appear on each side of the screen (only used for internal triggering).

The lower field (**`Pos/Neg`**) specifies whether triggering happens when the waveform being measured is positive-going (**`Pos`**), or negative-going (**`Neg`**).

Screen(s) Where Field is Present

OSCILLOSCOPE

Lower Limit

This field is used to set the lower limit to be compared with the measured results. If the measured result is below this limit, the test will fail.

Screen(s) Where Field is Present

TESTS (Pass/Fail Limits)

Fields That Begin with the Letter M

Main Menu

Selecting this field returns you to the TESTS (Main Menu) screen.

Screen(s) Where Field is Present

TESTS (Channel Information)
TESTS (Test Parameters)
TESTS (Order of Tests)
TESTS (Pass/Fail Limits)
TESTS (Save/Delete Procedures)
TESTS (Execution Conditions)
TESTS (External Devices)
TESTS (Printer Setup)
TESTS (IBASIC Controller)

Marker: Freq

Marker frequency displays the frequency at the marker’s present position.

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Marker: Freq

This field displays the frequency at the marker’s present position.

Operating Considerations

The marker can be positioned using the `Marker Pos` field.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

Marker: Lvl

This measurement field displays the signal level of the current marker position.

Operating Considerations

The unit-of-measure for this field is dependent on the source of the signal being measured. For instance; when measuring a signal from the AUDIO IN connector, the amplitude is measured in Volts. When looking at a signal from the FM demodulator, the amplitude is given in units of kHz.

When the **`Vert Offset`** field is ≠0.00, the displayed marker level is referenced to the center line generated by the vertical offset feature, not the center line of the screen.

The REF SET function can be used with this measurement to display levels relative to a specific value.

Screen(s) Where Field is Present

OSCILLOSCOPE
SPECTRUM ANALYZER

Marker: Lvl

This field displays the amplitude at the marker's present position.

Operating Considerations

The marker position can be adjusted using the **`Marker Pos`** field.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

Marker Pos

This field is displayed when the **`Controls`** field is set to **`Marker`**. This field sets the marker's position, referenced to the left side of the display.

Operating Considerations

The position is settable in units of divisions.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

Marker: Time

This measurement displays the time elapsed from the trigger point to the current marker position.

The REF SET function can be used with this measurement to display time relative to a specific position.

Screen(s) Where Field is Present

OSCILLOSCOPE

Marker To:

`Peak+` causes the marker to move to the maximum value of the *average* level measured on the display.

`Peak`– causes the marker to move to the minimum value of the *average* level measured on the display.

Because these functions look at the average value for each displayed pixel, the marker may not appear directly on the displayed peak of a noisy signal.

Screen(s) Where Field is Present

OSCILLOSCOPE

Marker To:

- `Peak` moves the marker to the highest peak and enters the location in the `Position` field.
- `Next Peak` moves the marker to the next peak to the right and enters the location in the `Position` field.
- `Center Freq` changes the center frequency value to match the current position of the marker.
- `Ref Level` changes the reference level setting to match the current position of the marker.

Screen(s) Where Field is Present

SPECTRUM ANALYZER
CDMA REVERSE CHANNEL SPECTRUM

Max Frames

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

Operating Considerations

FER measurements will be made on the number of frames entered in this field unless the test terminates because a confidence limit is reached.

Range of values: 25 through 10000000

See Also

`Confidence` **field description, on page 172**

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Max Power

The value shown under the Max Power label in the upper left portion of the display is the maximum power measurement result obtained the last time a Min/ Max Power measurement was executed.

Operating Considerations

While a mobile station is on a call, the mobile station's range of power levels can be obtained by selecting the Execute field under the Min/Max Pwr label. Before Min/Max Power is executed, make sure that the Average Power measurement is zeroed, and the Channel Power measurement is calibrated.

The Test Set will measure the mobile station's minimum power first. Using a procedure that closely follows the EIA/TIA IS-98 test "Minimum Controlled Output Power", the Test Set sets Sector A power to -3535 dBm/BW and Traffic E_c/Ior to -7.4, then sends "Always Down" power control bits to drive the mobile station to its minimum power level. A Channel Power measurement is made, and the Test Set is returned to closed loop power control mode.

Then, to measure maximum power, the Test Set sets Sector A power to -104 dBm/ BW, turns the Call Drop Timer "Off", and sends "Always Up" power control bits to the mobile station, using a procedure similar to the EIA/TIA IS-98 test "Maximum RF Output Power". An Average Power measurement is made, and the Test Set is returned to closed loop power control mode.

See Also

`Min/Max Pwr` field description, on page 223
`Min Power` field description, on page 222

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Max Req Seq, Max Rsp Seq

This field allows simultaneous entry of the maximum number of access probe sequences for an access channel request and the maximum number of access probe sequences for an access channel response (MAX_REQ_SEQ or MAX_RSP_SEQ). These are separate parameters in the CDMA specification but the Test Set sets both parameters to a single value.

Operating Considerations

This field indicates the maximum number of access probe sequences sent by the mobile when the mobile is requesting service (Max Req Seq) or when the mobile has been paged (Max Rsp Seq). If the **Call Limit** field on the CDMA Call Control screen is set to “Page”, the mobile station will transmit the number of access probe sequences entered in this field.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Max Slot Cycle Index

Max Slot Cycle Index allows you to set the slot cycle used by the Test Set to page a mobile station. It is set by integer values, which correspond to time using the following formula: $T = 1.28 \times 2^i$ seconds, where i has integer values from 0 to 7 (0 is default).

The Test Set will use the lesser of the value entered in this field and the slot cycle index of the mobile station when the MS ID field is set to Auto mode and the mobile station has registered.

NOTE When i = 7, the value is quite large at 163.84 seconds. You may not want to wait this long during normal testing.

Screens Where Field is Present

CDMA CELL CONFIGURE

Meas Cntl

This field allows the selection of either single or continuous measurements.

- **`Single`** causes a measurement to be made each time the **`Arm`** field is selected.
- **`Cont`** causes measurements to re-arm automatically until **`Single`** is selected or the call is terminated.

Operating Considerations

During remote operation, the default measurement-control setting is continuous. The displayed mode (Single or Cont) only applies to local (front-panel) operation. This field does not update when the Test Set is operated remotely.

During manual operation, the default measurement-control setting is single.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Min Power

The value shown under the Min Power label in the upper left portion of the display is the minimum power measurement result obtained the last time a Min/Max Power measurement was executed.

Operating Considerations

While a mobile station is on a call, the mobile station's range of power levels can be obtained by selecting the Execute field under the Min/Max Pwr label. Before Min/Max Power is executed, make sure that the Average Power measurement is zeroed, and the Channel Power measurement is calibrated.

The Test Set will measure the mobile station's minimum power first. Using a procedure that closely follows the EIA/TIA IS-98 test "Minimum Controlled Output Power", the Test Set sets Sector A power to -3535 dBm/BW and Traffic E_c/Ior to -7.4, then sends "Always Down" power control bits to drive the mobile station to its minimum power level. A Channel Power measurement is made, and the Test Set is returned to closed loop power control mode.

Then, to measure maximum power, the Test Set sets Sector A power to -104 dBm/BW, turns the Call Drop Timer "Off", and sends "Always Up" power control bits to the mobile station, using a procedure similar to the EIA/TIA IS-98 test "Maximum RF Output Power". An Average Power measurement is made, and the Test Set is returned to closed loop power control mode.

See Also

`Min/Max Pwr` field description, on page 223
`Max Power` field description, on page 219

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Min/Max Pwr

This field allows execution of mobile station minimum and maximum power measurements.

Operating Considerations

While a mobile station is on a call, the mobile station's range of power levels can be obtained by selecting the Execute field under the Min/Max Pwr label. Before Min/Max Power is executed, make sure that the Average Power measurement is zeroed, and the Channel Power measurement is calibrated.

The Test Set will measure the mobile station's minimum power first. Using a procedure that closely follows the EIA/TIA IS-98 test "Minimum Controlled Output Power", the Test Set sets Sector A power to -35 dBm/BW and Traffic E_c/I_{or} to -7.4, then sends "Always Down" power control bits to drive the mobile station to its minimum power level. A Channel Power measurement is made, and the Test Set is returned to closed loop power control mode.

Then, to measure maximum power, the Test Set sets Sector A power to -104 dBm/BW, turns the Call Drop Timer "Off", and sends "Always Up" power control bits to the mobile station, using a procedure similar to the EIA/TIA IS-98 test "Maximum RF Output Power". An Average Power measurement is made, and the Test Set is returned to closed loop power control mode.

See Also

`Max Power` field description, on page 219
`Min Power` field description, on page 222

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Mobile Power Mode

This field allows selection between two CDMA Channel Power modes, providing for Channel Power measurements without a call connected. The choices available are:

- Normal (call connected)
- User (requires user input)

When “User” is selected, the Mobile Pwr field is displayed below it. When the Mobile Pwr field is displayed, the Test Set requires the approximate mobile power level to be entered in the Mobile Pwr field for Channel Power measurements.

Operating Considerations

When this field is set to “User”, the Test Set’s normal power control capabilities are disabled. The Test Set does not expect a mobile station to be on a call and relies on the entry in this field to set up analyzer path attenuation correctly. The value entered must Beuthen 3 dB of the actual power level.

See Also

`Mobile Pwr` field description, on page 224

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Mobile Pwr

This field is displayed when the Mobile Power Mode field is set to “User”. When this field is displayed, the Test Set requires an estimated mobile station power level to make CDMA Channel Power measurements.

Operating Considerations

The Test Set uses the value entered in this field to set up analyzer path attenuation.

See Also

`Mobile Power Mode` field description, on page 224

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

MS Ack Cause Code:

This field displays the value of the cause code if the mobile station sent one with a SMS (short message service) acknowledgment.

Operating Considerations

The MS Ack Cause Code field displays an integer, and the integer represents one of the following text messages.

Table 9

Integer Value Displayed in MS Ack Cause Code Field	Text Message
no value displayed	blank field
32	No page response
33	Destination busy
34	No acknowledgment
35	Destination resource shortage
36	SMS delivery postponed
37	Destination out of service
38	Destination not at this address
39	Other terminal problem
96	Encoding problem
97	SMS origination denied
98	SMS termination denied
99	Service not supported
100	SMS not supported
102	Missing expected parameter
103	Missing mandatory parameter
104	Unrecognized parameter value
15	Unexpected parameter value

Table 9

Integer Value Displayed in MS Ack Cause Code Field	Text Message
106	User Data size error
107	Other general problems

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

MS Ack Received (annunciator)

If the mobile station successfully receives the SMS message, it sends an SMS received acknowledgment to the Test Set, lighting the **MS Ack Received** annunciator.

Operating Considerations

When the SMS message acknowledgment is received by the Test Set, the **`SMS In Progress`** annunciator will go out. See **"SMS In Progress (annunciator)" field on page 277**

Screens Where Annunciator is Present

CDMA SHORT MESSAGE SERVICE

MS Database

This field displays information obtained from the mobile station during registration. Depending on the settings of the `Protocol` field and the `RF Channel Std` field, some combination of the following modes are available, with `ESN` as the default displayed parameter.

- `ESN` - Electronic Serial Number, a permanent, physical attribute of the mobile station.
- `MCC` - Mobile Country Code - displayed when IS-95A or J-STD-008 is selected in the **"Protocol" field on page 250**.
- `MNC` - Mobile Network Code - displayed when IS-95A or J-STD-008 is selected in the **"Protocol" field on page 250**.
- `MSIN` - Mobile Station Identification Number - displayed when IS-95A or J-STD-008 is selected in the **"Protocol" field on page 250**.
- `MIN1` - Part of the Mobile IdeNtification number, a permanent NAM value - displayed when IS-95 is selected in the **"Protocol" field on page 250**.
- `MIN2` - Part of the Mobile IdeNtification number, a permanent NAM value - displayed when IS-95 is selected in the **"Protocol" field on page 250**.
- `Phone Num` - The 10-digit directory telephone number.
- `Dual Mode` - Part of the mobile stations' SCM, a permanent, physical attribute of the mobile station.
- `Slot Class` -Part of the mobile stations' SCM, a permanent, physical attribute of the mobile station
- `Pwr Class` - Part of the mobile stations' SCM, a permanent, physical attribute of the mobile station
- `Tx Mode - Part of the mobile stations' SCM, a permanent, physical attribute of the mobile station`
- `C Max EIRP` - Cellular (BAND_CLASS 0, 2, or 3) MAX_EIRP (Maximum Effective Isotropic Radiated Power) expressed in dBW (MAX_EIRP +60 dBW). Values range from 0 to 255. Displayed when TIA/EIA-95B is selected in the **"Protocol" field on page 250**.
- `P Max EIRP` - PCS (BAND_CLASS 1 or 4) MAX_EIRP (Maximum Effective Isotropic Radiated Power) expressed in dBW (MAX_EIRP +60 dBW). Displayed when TIA/EIA-95B is selected in the **"Protocol" field on page 250**.
- `C Op Modes`- Cellular (BAND_CLASS 0 , 2, or 3) OP_MODE_INFO. Bits that are set are displayed in MS Database as comma-separated numeric character string (e.g. If OP_MODE0 and OP_MODE1 are set, the displayed string will be 0,1). Displayed when TIA/EIA-95B is selected in the **"Protocol" field on page 250**.
- `P Op Modes`- PCS (band class 1 or 4) OP_MODE_INFO. Bits that are set are displayed in MS Database as comma-separated numeric character string (e.g. If OP_MODE0 and OP_MODE1 are set, the displayed string will be 0,1). Displayed when TIA/EIA-95B is selected in the **"Protocol" field on page 250**.

- **`Pwr Step`** - MIN_PWR_CNTL_STEP. Minimum closed loop power control step size supported by mobile station. Possible values are: 1 dB, 0.5 dB, or 0.25 dB (message parameters 0, 1, 2 respectively). Displayed when TIA/EIA-95B is selected in the **"Protocol" field on page 250**
- **`Called Num`** - The number dialed on the mobile station handset during the last mobile station originated call.
- **`*Clr All*`** - Selecting this Choice clears all MSDatabase values, allowing verification that information currently displayed is not from a previous registration.

GPIB Example

`“DISP CCNT;CDMA:MOBile:DAT ‘ESN’;:CDMA:MOBile:DAT:VALue?“`

sets the desired indicator to “ESN” and returns the 4-digit value for ESN.

Operating Considerations

These indicators are updated each time a mobile registration occurs.

The database is cleared whenever the protocol is changed. (See **"Protocol" field on page 250** for more information about changing protocol.)

Screens Where Field is Present

CDMA CALL CONTROL
CDMA SHORT MESSAGE SERVICE
CDMA AUTHENTICATION

MS Reported FER

This field displays the mobile station’s reported FER (frame error rate). The number displayed is a ratio of bad frames to total frames.

The mobile station can be commanded through the Test Set to change its periodic FER reporting intervals through the **`MS FER Report Interval`** field.

See Also

`MS FER Report Interval` field description, on page 229
`by # errors` field description, on page 158
`by # frames` field description, on page 158

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

MS FER Report Interval

This field sets the number of frames the mobile station will count before reporting frame error rate (FER) when the **by # frames** field is **On**.

Operating Considerations

This setting may affect FER measurement speed and will affect the display rate of the **MS FER Report** field.

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

MS Id

This field is used to enter the identification number of the mobile station. The **MS Id** field has two fields. The content of the lower field is automatically updated upon successful completion of a mobile station registration.

The upper field is a one-of-many selection field and is used to select the format for entering the identification number. The :NMODe command is used to set the upper field. Two formats are available: **Phone Num** for entering a 10 digit phone number or **MIN2 MIN1** for entering the mobile identification number.

The lower field is a numeric entry field and is used to enter the identification number in the format selected using the upper field.

There are two formats which can be used to enter the identification number in the lower field.

- The identification number can be entered as the 10 digit phone number in decimal (i.e. 5095551212). The :PNUMber command is used to enter the 10 digit phone number.
- The identification number can be entered as the mobile identification number (MIN) in hexadecimal (i.e. AAABBBBBB). The MIN number is entered as the 3 character MIN2 (AAA) followed by the 6 character MIN1 (BBBBBB). The :MINumber command is used to enter the MIN number.

The formats are coupled, that is, if the **Phone Num** format is selected and the 10 digit phone number is entered, the **MIN2 MIN1** information is automatically updated, and vice versa.

NOTE: The preset values for the **MS Id** fields are:

- **Phone Num** = 1111111111
- **MIN2 MIN1** = 000000400

An all zero MIN number (000000000), which does not represent a valid phone number, will convert to the following phone number: 111111?111.

The query form of the programming commands (that is, the ? form) can be used to interrogate the contents of each field.

Screen(s) Where Field is Present

CALL CONTROL

MS Report (Clear)

The `MS Report (Clear)` field clears the contents of the CDMA Mobile Reporting table.

Operating Considerations

All numbers displayed in the CDMA Mobile Reporting table reflect the last pilot strength message received from a mobile station. A Pilot Strength Message is sent from the mobile station when a Softer Handoff is executed, ended, or when the mobile station detects a change in pilot levels that affects the assignment of pilots to the mobile station's Active, Candidate, or Neighbor sets. Use MS Report (Clear) to ensure that the currently displayed CDMA Mobile Reporting table

See Also

`PN Offset` field description, on page 246

Screen(s) Where Field is Present

CDMA MOBILE REPORTING

Fields That Begin with the Letter N

Network ID

This field allows entry of the cell site's network identification (NID).

Operating Considerations

The mobile station stores the NID number it receives from the cell site and compares it with its home NID to determine if it is roaming.

Screen(s) Where Field is Present

`CDMA CELL SITE CONFIGURATION`

Netwrk Code

This field is displayed when the field called **"Protocol" field on page 250** has IS-95A, TSB-74, or J-STD-008 selected, and the Esc Mode field is set to Off.

This field sets the base station's network code.

Operating Considerations

The Test Set sends the base station network code in the IMSI_11_12 field of the Extended System Parameters Message.

See Also

`Protocol` field description, on page 250

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Nom Power

This field allows entry of the nominal transmit power offset (NOM_PWR).

Operating Considerations

Nom Power is an adjustment to the mobile station's open loop power level. The mobile station obtains this value prior to transmitting, as part of the *Access Parameters Message*.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Nom Pwr Ext

This field allows entry of the extended nominal transmit power (NOM_PWR_EXT). This field is displayed only when the field **"Protocol" field on page 250** is set to "J-STD-008".

Operating Considerations

Entering a 0 in this field sets the range of the open loop power control correction factor from -8 dB to 7 dB inclusive. Entering a 1 extends the correction factor from -24 to -9 dB inclusive. The mobile station obtains this value prior to transmitting, as part of the *Access Parameters Message*.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

No Pk/Avg

This field is displayed when the **Controls** field is set to **Auxiliary**. This field performs two functions: peak hold, and video averaging.

Pk Hold (peak hold) prevents the Spectrum Analyzer from erasing the previous trace each time it sweeps. This causes the traces to ‘build-up’ on the screen until **Off**, **No Pk/Avg** or the MEAS RESET key is selected. This allows the capture of transient signals that are not displayed long enough to view during normal operation.

Avg 1 through (video averaging) enables the Spectrum Analyzer to display a trace representing the average of several measurements. The number of samples used for measurement averaging range from 1 to 100 (see below). **No Pk/Avg** and **Off** function identically. **Off** is provided to maintain backwards compatibility with earlier firmware and software.

- **No Pk/Avg** means that peak hold and video averaging are off.
- **Pk Hold** means that peak hold is on.
- **Avg [n]** enables video averaging over [n] measurements, where n = 1, 2, 3, 4, 5, 10, 20, 50, or 100
- **Off** means that peak hold and video averaging are off.

Operating Considerations

After capturing the desired signal, you can use the HOLD function (press and release the SHIFT key, then the MEAS RESET key) to prevent additional signals from building-up on the display.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

No Pk/Avg

This field performs two functions:

`Pk Hold` (peak hold) prevents the Spectrum Analyzer from erasing the previous trace each time it sweeps. This causes the traces to ‘build-up’ on the screen until `Off`, `No Pk/Avg` or the MEAS RESET key is selected. This allows the capture of transient signals that are not displayed long enough to view during normal operation.

`Avg 1` through `Avg 100` (video averaging) enables the Spectrum Analyzer to display a trace representing the average of several measurements. The number of samples used for measurement averaging range from 1 to 100 (see below). `No Pk/Avg` and `Off` function identically. `Off` is provided to maintain backwards compatibility with earlier firmware and software.

- `No Pk/Avg` means that peak hold and video averaging are off.
- `Pk Hold` means that peak hold is on.
- `Avg [n]` enables video averaging over [n] measurements, where n = 1, 2, 3, 4, 5, 10, 20, 50, or 100
- `Off` means that peak hold and video averaging are off.

Operating Considerations

After capturing the desired signal, you can use the HOLD function (press and release the SHIFT key, then the PREV key) to prevent additional signals from building-up on the display.

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Normalize

This field is displayed when the **`Controls`** field is set to **`Auxiliary`**. This area performs three display operations:

- **`Save B`** saves the currently-displayed trace for the A-B operation.
- **`A only`** provides a continuously-updated display (the “normal” mode of operation).
- **`A-B`** displays the difference between the trace saved using **`Save B`** and the currently-displayed trace. The comparison can yield either losses or gains in amplitude.

Operating Considerations

The A-B function works correctly only if the Center Frequency and Span settings are the same for both signals.

The Ref Level can be changed to move the trace below the top line of the display if the A-B function results in a gain.

The HOLD key can be used to “freeze” the display at any time. This allows you to view a trace before performing the Save or A-B functions.

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM

Normalize

This area performs three display operations:

`Save B` saves the currently-displayed trace for the A-B operation.

- **`A only`** provides a continuously-updated display (the “normal” mode of operation).
- **`A-B`** displays the difference between the trace saved using **`Save B`** and the currently displayed trace. The comparison can yield either losses or gains in amplitude.

Operating Considerations

The A-B function works correctly only if the center frequency and span settings are the same for both signals.

The reference level (**`Ref Level`**) can be changed to move the trace below the top line of the display if the A-B function results in a gain.

The the HOLD key can be used to “freeze” the display at any time. This allows you to view a trace before performing the Save B or A-B functions.

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Notch Freq

This field sets the center frequency for the variable frequency notch filter, used for distortion and SINAD measurements.

This field is not displayed if your Test Set does not have this feature.

Screen(s) Where Field is Present

ANALOG MEAS

Num Step

This field allows entry of the number of power steps in an access probe sequence (NUM_STEP).

Operating Considerations

This field allows the Test Set to set the maximum number of access probes the mobile-station-under-test will transmit in each access probe sequence. The number of probes transmitted will be *1 + NUM_STEP*.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Fields That Begin with the Letter O

OCNS

This field displays OCNS (Orthogonal Channel Noise Simulator). The Walsh code can be specified for OCNS, but OCNS power is not settable.

Operating Considerations

OCNS is automatically adjusted so that the total power levels of pilot, sync, paging, traffic, and OCNS add up to sector power, I_{or}.

Allowable values for OCNS include Walsh codes 8 through 63. If a Walsh value is entered that matches the Traffic or Sync channel setting, an error message will be displayed.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL

Offset Freq

Frequency offset (RF Generator) sets the difference between the instantaneous frequencies of the Tracking Generator and the center frequency of the Spectrum Analyzer.

Operating Considerations

The offset can be a positive or negative value. When set to zero, the Tracking Generator produces a sweeping signal that matches the Spectrum Analyzer’s tune frequency.

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Order

This field is used to send an order type mobile station control message on the forward voice channel to the mobile station. The orders available are:

- Change Power to Power Level 0 - 7
- Maintenance (put the mobile station in maintenance mode)
- Alert (alert the mobile station)
- MRI (mobile reported interference) request (**NAMPS** system type only)

The ORDER field is updated with two separate GP-IB commands depending on the selected system type. The commands are:

- :ORDER for system types AMPS, TACS, AND JTACS. This command is used to send an order type mobile station control message to the mobile station. The **Access** annunciator will light momentarily while the Test Set is sending the mobile station control message.

  A mobile station must be actively connected on a voice channel to the Test Set (that is, the **Connect** annunciator lit) before attempting to send an order to a mobile station.

  The query form of the command (that is, :ORDer?) can be used to determine the last order sent to the mobile station using the :ORDer command.

- :NORDer for system types NAMPS. This command is used to send an order type mobile station control message to the mobile station. The **Access** annunciator will light momentarily while the Test Set is sending the mobile station control message

  The :NORDer command is used to send an order type mobile station control message to the mobile station. The **Access** annunciator will light momentarily while the Test Set is sending the mobile station control message.

  A mobile station must be actively connected on a voice channel to the Test Set (that is, the **Connect** annunciator lit) before attempting to send an order to a mobile station.

  The query form of the command (that is, :NORDer?) can be used to determine the last order sent to the mobile station using the :NORDer command.

Screen(s) Where Field is Present

CALL CONTROL

Orig Addr

This field allows entry of an originating phone’s address, identified by its phone number, which the mobile station will use when acknowledging reception of a SMS message.

Operating Considerations

Refer to TIA/EIA IS-637 for detailed information about the Originating Address parameter in SMS point-to-point messages.

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Output Atten Hold

This field, when set to “On”, prevents the output attenuators in either the Test Set or the PCS INTERFACE from switching in and out, avoiding temporary loss of the output signal as the RF Power level is changed.

- **On**
- **Off**

Operating Considerations

Always adjust the RF Power level (the sum of **Sctr A Pwr**, **Sctr B Pwr**, and **AWGN**) to the highest power level in the range of values you will be testing, then turn **Output Atten Hold** “On”.

When the Test Set is configured for PCS mobile station testing, and the Output Atten Hold field is set to “On”, the Agilent 83236 PCS INTERFACE’s attenuators are not allowed to switch. The Test Set’s attenuators are allowed to switch to provide an adequate range of power for testing the range of open loop power control.

When the Test Set is not configured for PCS mobile station test, and the Output Atten Hold field is set to “On”, the Test Set’s attenuators are not allowed to switch, and the RF Power is restricted to a range of 15 dB below the RF power level setting at the time Output Atten Hold was turned “On”.

Screen(s) Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

Output Port

This field selects the RF output port on the Test Set or the Agilent 83236 PCS Interface, depending on the PCS Mode setting.

- **RF Out** selects the RF IN/OUT port on the Test Set's front panel when the PCS Mode field is set to "Off".
- **RF Out** selects the RF IN/OUT port on the PCS Interface when the PCS Mode field is set to "On", and power has been cycled to configure the Test Set for PCS band testing.
- **Dupl** selects the DUPLEX OUT port on the Agilent 8924E front panel. This selection is available when the PCS Mode field is set to "Off"
- **only** selects the RF OUT Only port on the Agilent 83236 PCS Interface. This choice is displayed only when the PCS Mode field is set to "On", an Agilent 83236 PCS Interface is installed, and power has been cycled to configure the Test Set for PCS band testing.

Operating Considerations

When the PCS Mode field on the CONFIGURE screen is "On", and the Test Set has been configured for PCS band testing by cycling power, Output Port settings are in reference to the PCS Interface front panel. There is no separate analyzer path available on the PCS Interface (for example, Antenna In), so the RF Out choice, by default, selects the RF IN/OUT port on the PCS Interface as *both* RF output *and* RF input.

Maximum signal levels at each port are printed on the front panel. The Duplex Out port provides higher power.

CAUTION: Applying reverse RF power to the DUPLEX OUT connector can damage the instrument. (A message is displayed when an overpower conditions occurs.) Whenever possible, use the RF IN/OUT connector when testing transceivers to prevent damage from accidental transmitter keying.
If a reverse-power condition triggers the internal protection circuit, remove the reverse-power signal and press the MEAS RESET key or turn the Test Set off and on to reset it.

Screen(s) Where Field is Present

CONFIGURE
CDMA REVERSE CHANNEL SPECTRUM (Option 012 only)
SPECTRUM ANALYZER (Option 012 only)

Fields That Begin with the Letter P

Page

This field is used to initiate a page to the mobile station connected to the Test Set.

The Test Set must be in the active state (that is, **Active** annunciator lit) and the **MS Id** information must be correct before attempting to page a mobile station.

The :PAGE command is used to control this field.

There is no query form of the :PAGE command.

Screen(s) Where Field is Present

CALL CONTROL

Page (annunciator)

When lit, the **Page** annunciator indicates that the mobile station connected to the Test Set is currently being paged on the forward control channel.

The **Page** annunciator is not programmable.

The state of the **Page** annunciator is reflected in the Call Processing Status Register Group Condition Register bit 3.

Screen(s) Where Field is Present

CALL CONTROL

Page Rate

This field sets the modulation data rate for the forward paging channel. The quarter (2400) and eighth (1200) rates are not allowed on the paging channel.

- **Full** - 9600 bps
- **Half** - 4800 bps

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Page Sent (annunciator)

This annunciator lights when the CALL key is pressed. If the call proceeds to connected, the **`Page Sent`** annunciator remains lit until the call is terminated. This annunciator will not remain lit if an attempted call is unsuccessful.

See Also

"CALL" field on page 68

Screen(s) Where Field is Present

CDMA CALL CONTROL

Paging (Sector A Power)

This field allows the entry of paging E_c, the paging channel energy per PN chip relative to the total Sector A power.

Operating Considerations

As the paging level is varied, OCNS is automatically adjusted so that the total power levels of pilot, sync, paging, traffic, and OCNS add up to Sector A power, I_{or}.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL

PCS Intrfc Control

This field allows you to establish serial communication between the Test Set and an Agilent 83236B PCS Interface.

Operating Considerations

Power to the Test Set must be cycled after changes to this field. The Agilent 83236 PCS Interface must be configured correctly, connected to the Test Set as shown in the Agilent 83236B User’s Guide, and power must be turned on.

NOTE: Settings to this field cannot be saved to or recalled from a Save/Recall register.

Screen(s) Where Field is Present

CONFIGURE

Phone Num:

This field displays the decoded MIN number received from the mobile station on the reverse control channel in response to a forward control channel message. The **Phone Num:** field is displayed only when the **Display** field is set to **Data** and a reverse control channel message containing this information has been decoded.

CAUTION: Do not confuse the **Phone Num:** field, which is displayed in the upper right-hand portion of the **CALL CONTROL** screen, with the **Phone Num** selection of the **MS Id** field.

Screen(s) Where Field is Present

CALL CONTROL

Phs Error

This field is displayed when Freq Error is selected from the list of choices available when the unnamed field displaying one of the following choices is displayed:

- phase error measurement
- carrier feedthrough measurement

Operating Considerations

These measurements, along with Rho, frequency error, amplitude error, and time offset are made by DSP analysis techniques. The **Meas Cntl** field controls these measurements.

See Also

Meas Cntl field description, on page 221
Carrier field description, on page 161

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITTER TEST

Pilot

This field allows the entry of pilot E_c, the pilot channel energy per PN chip relative to the Sector Power level.

Operating Considerations

As the pilot level is varied, OCNS is automatically adjusted so that the total power levels of pilot, sync, paging, traffic, and OCNS add up to Sector A power, I_{or}.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL
CDMA MOBILE REPORTING

PN Offset

This field allows entry of the PN sequence offset.

Operating Considerations

The PN offset is relative to the Test Set's even-second clock.

Allowable values include 0 through 511.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL

Port/Sweep

This control performs two functions:

- The upper field specifies the output port of the Tracking Generator.
- The lower field specifies whether the Tracking Generator sweeps from low-to-high frequencies (**`Norm`**), or from high-to-low frequencies (**`Invert`**). (The Spectrum Analyzer always sweeps from low to high frequencies.) The swept frequency range is determined by the **`Span`** setting in the Spectrum Analyzer's Main Menu.

Operating Considerations

When using the Tracking Generator, if the output port is set **`RF Out`**, or the main menu **`Input Port`** is set to **`RF In`**, internal instrument coupling can occur. For the best isolation between the Tracking Generator and the Spectrum Analyzer, use **`Dupl`** for the output, and **`Ant`** for the input.

For measurements on high-power devices, such as amplifiers, use the RF IN/OUT port for the input.

Screen(s) Where Field is Present

SPECTRUM ANALYZER

Position

This field indicates the number of scale divisions from the left side of the screen to the marker.

Use the DATA keys or cursor-control knob to move the marker to any point on the displayed signal.

Screen(s) Where Field is Present

OSCILLOSCOPE
SPECTRUM ANALYZER

Power Meas

This field provides Average Power zeroing (when **Average Power** is selected) and Channel Power calibration (when **Channel Power** is selected).

- **Calibrate**

  Refer to the **Chan Power field description, on page 165**.

- **Zero**

  Refer to the **Avg Power field description, on page 153**.

Operating Considerations, Power Zero

The **Power Zero** field is displayed when **Avg Power** is selected in the **Avg Power/Chan Power** field. To zero Average Power measurements, select **Power Zero**. If the message “Zero degraded. Reduce generator level for best results" appears, reduce or use the ON/OFF key to reduce RF Power, which is the sum of the Sector A, Sector B, and AWGN sources.

See Also

“Calibration Procedures” in the *Agilent 8924E Mobile Station Test Set Introduction to Operation.*

Operating Consideration, Calibrate

The **Calibrate** field is displayed when **Chan Power** is selected in the **Avg Power/Chan Power** field. To calibrate Channel Power measurements, connect the DUPLEX OUT connector to the RF IN/OUT connector and select **Calibrate**.

A flashing "Uncal" annunciator will be displayed below the Chan Power field when the Channel Power measurement has not been calibrated for the frequency band selected in the RF Chan Std field.

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Power Step

This field allows entry of the power increment (PWR_STEP).

Operating Considerations

This field specifies the step increase in transmit power between each access probe within an access probe sequence from a mobile station.

To make power level measurements during an access attempt, set the **`Call Limit`** field on the CDMA CALL CONTROL screen to **`Page`**. With **`Call Limit`** set to **`Page`**, the base station's response to access probes is inhibited, and the mobile station will continue with an access attempt until its maximum number of access probe sequences has been transmitted.

See Also

`Call Limit` field description, on page 159

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Priority

This field sets the Priority Indicator parameter in SMS messages.

- None
- Normal
- Interactive
- Urgent
- Emergency

Operating Considerations

Each of these choices represent different levels of call priority. Refer to TIA/EIA IS-637 for detailed information about the Priority Indicator and its effect on the operation of the MSUT.

Screen(s) Where Field is Present

CDMA SHORT MESSAGE SERVICE

Privacy

This field sets the Privacy Indicator parameter in SMS messages. The choices available are:

- None
- No Restrict
- Restricted
- Confidential
- Secret

Operating Considerations

Each of these choices represent different levels of privacy. Refer to TIA/EIA IS-637 for detailed information about the Privacy Indicator and its effect on the operation of the MSUT.

Screen(s) Where Field is Present

CDMA SHORT MESSAGE SERVICE

Protocol

This field provides a choice of these protocol selections.

- **IS-95**
- **IS-95A**
- **TSB-74**
- **J-STD-008**
- **ARIB T53**
- **KOR PCS**
- **TIA/EIA-95B**

Operating Considerations

The protocol selection must be made before the mobile station is powered on. The list of choices under **"MS Database" field on page 227** is based on the selected protocol, as are some of the fields available for configuring the cell site found on the **"CDMA Cell Site Configuration Screen" field on page 118**. For example, selecting IS-95A provides fields for entering the mobile station's IMSI in the MS ID field, and provides fields for entering the country code and network code on the CDMA Cell Site Configuration screen.

Screen(s) Where Field is Present

CDMA CALL CONTROL

Power Cntl Step Size

This field is displayed only when the **"Protocol" field on page 250** is set to TIA/EIA-95B.

This field allows entry of the following closed loop power control step sizes:

- **`1 dB`**
- **`0.5 dB`**
- **`0.25 dB`**

Operating Considerations,

The power control step size entered in this field must not be less than the minimum step size supported by the mobile station under test.

The value entered in this field will be sent to the mobile station in the Power Control Message PWR_CNTL_STEP field during call setup or while on a traffic channel (call connected).

The mobile station's minimum step size, MIN_PWR_CNTL_STEP, is retrieved by the Test Set during registration and displayed in the **"MS Database" field on page 227** under Pwr Step.

The message "Mobile's minimum power step > selected Power Cntl Step Size" will be displayed if a value is entered into the Power Cntl Step Size field that the Test Set determines is unacceptable

Screens Where Field is Present

CDMA TRANSMITTER POWER RANGE TEST

See Also

`Protocol` field description, on page 250
"MS Database" field on page 227

Pwr Level

This field allows entry of the voice mobile station attenuation code (VMAC).

Operating Considerations

During a CDMA-to-analog handoff, the Test Set sends a message to the mobile station telling it to adjust its power to the level that corresponds to the value in this field. A CDMA-to-analog handoff attempt will occur when the Execute field on the CDMA Call Control screen is selected. The value entered in this field is referred to as the VMAC (voice mobile attenuation code).

Screen(s) Where Field is Present

CDMA CALL CONTROL

Pwr Lvl: -

The **`Pwr Lvl:`** field is divided into two fields:

- The left-hand field displays the mobile station’s output power level assignment for the voice channel currently being used by the Test Set and the mobile station.

  A numeric value is only displayed when a mobile station is actively connected on a voice channel (that is, the **`Connect`** annunciator is lit). A “-” is displayed if a mobile station is not actively connected on a voice channel.

  This is a read only field.

  The :AVCPower? command is used to query the contents of the left-hand subfield.

  There is no command form of the :AVCPower? command.

- The right-hand subfield (highlighted field) is used to enter the Voice Mobile Attenuation Code (VMAC). The VMAC determines the mobile station power level to be used on the designated voice channel (the channel number entered into the **`Chan:`** right-hand subfield) A value entered in the right-hand subfield causes a mobile station that is actively connected on a voice channel to change power levels when the **`Handoff`** field on the CALL CONTROL screen is selected.

  The :VMACode command is used to control the right-hand subfield.

  The query form of the command (that is, :VMACode?) can be used to determine the current VMAC setting.

Screen(s) Where Field is Present

CALL CONTROL

Pwr Up Reg

This field determines if, at power-up, the mobile station will attempt to register with the Test Set.

- **`On`** - the mobile station will perform a power-up registration
- **`Off - the mobile station will not perform a power-up registration`**

Operating Considerations

This field provides the option of performing a zone-based registration when a mobile station finds service (**`Register` field description, on page 257**) instead of waiting for the power-up registration.

This field should be set to the desired mode before a mobile station finds CDMA service.

When this field is “On” the Test Set instructs the mobile station to attempt a registration upon power-up. This instruction is sent as part of the paging channel overhead message *System Parameters*, and is received by the mobile station soon after the mobile station finds service.

See Also

“Setting up a Call” chapter in the *Agilent 8924E Introduction to Operation*

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Fields That Begin with the Letter R

RAND

The 32-bit value entered in this field, Random Challenge Value, will be used by the mobile station during authentication procedures. RAND is sent to the mobile station on the Paging Channel Access Parameters Message.

See also

Screens Where Field is Present

CDMA AUTHENTICATION

RANDSSD

This field contains random data for computation of SSD (Shared Secret Data). RANDSSD is sent to the mobile station when an SSD Update is executed.

See also

"SSD Update" field on page 278

Screens Where Field is Present

CDMA AUTHENTICATION

RANDU

RANDU is the 24-bit random number issued by the base station in the Unique Challenge Order. RANDU is entered as a 6-digit hexadecimal value. RANDU is user definable.

See also

"Uniq Chall" field on page 293

Screens Where Field is Present

CDMA AUTHENTICATION

Rcv Pace

The receive pace field is used when receiving serial data.

- **Xon/Xoff** lets the Test Set "talk" to the transmitting device to alter the rate of the data being sent.
- **None** disables the Xon/Xoff function.

This setting is retained when the instrument is turned off.

Screen(s) Where Field is Present

I/O CONFIGURE

Ref Level

This field is displayed when the **Controls** field is set to Main. Reference level sets the amplitude reference level for the top line of the display. All signals displayed are referenced to this line.

Operating Considerations

The unit-of-measure for the reference can be changed as needed. For instance, 0 dBm, 0.224 V, 107.0 dBmV, and 0.00100 W can all be used to represent the same level.

Screen(s) Where Field is Present

SPECTRUM ANALZYER
CDMA REVERSE CHANNEL SPECTRUM

Reg Period

This field sets the interval for timer-based registrations. The default value for this field, 29, provides registration intervals of approximately 12 seconds. Selecting higher numbers increases this interval.

Table 10 Timer-based registration time periods

Reg Period field setting	Registration Period
29	12.16
30	14.48
331	17.2
32	20.48
38	57.92
62	3707.2
84	167772.16

Operating Considerations

The range of values that can be entered in this field is 29 through 85.

See Also

`Timer Reg` field description, on page 285

Screens Where Field is Present

CDMA CELL SITE CONFIGURATION

Register

This field is used to initiate a registration of the mobile station that is connected to the Test Set. The Test Set must be in the active state (that is, the **`Active`** annunciator must be lit) before you can attempt to register the mobile station.

The :REGister command is used to control this field.

There is no query form of the :REGister command.

Screen(s) Where Field is Present

CALL CONTROL

Register

Selecting this field causes the mobile station to perform a zone-based registration.

The Test Set first transmits an alternate SID/NID pair that causes the mobile station to respond by registering, as if the mobile station were moving into a new zone. This SID/NID pair, used in the System Parameters Overhead Message, settable (see **`Rgstr NID` field description, on page 269** and **`Rgstr SID` field description, on page 270**).

After the mobile station has registered the first time, the Test Set sends another SID/NID pair, this time using the values set in Network ID and System ID fields (see the **"CDMA Cell Site Configuration Screen" field on page 118**). These are the main SID and NID, and the mobile station will register again and set its roam status according to these values.

Operating Considerations

Mobile station registration can occur as a result of the following events:

- The mobile station power is cycled
- The "Register" feature is selected by selecting this field or sending the GP-IB command shown above.
- A call is made by pressing the CALL key with the MS ID mode Auto.
- A mobile-station initiated call is made. This event causes an implicit registration to be performed.

When the **`Register`** field is selected, the **`Registering`** annunciator will light until the registration is successful, or the registration attempt times-out.

See Also

"Setting up a Call" chapter in the *Agilent 8924E Introduction to Operation*

Screen(s) Where Field is Present

CDMA CALL CONTROL

Register (annunciator)

When lit, the **`Register`** annunciator indicates that the mobile station connected to the Test Set is being commanded to register with the Test Set.

The **`Register`** annunciator is not programmable.

The state of the **`Register`** annunciator is reflected in the Call Processing Status Register Group Condition Register bit 1.

Screen(s) Where Field is Present

CALL CONTROL

Registering (annunciator)

This annunciator lights when the Register field is selected. The annunciator goes out when the registration is successful, when the registration attempt times out, or when the END CALL key is pressed.

See Also

`Register` field description, on page 257

Screen(s) Where Field is Present

CDMA CALL CONTROL

Release

This field is used to terminate an active voice channel connection with the mobile station. When the **`Release`** field is selected, a mobile station control message with a release order is sent to the mobile station on the forward voice channel. A mobile station must be actively connected on a voice channel to the Test Set (that is, the **`Connect`** annunciator must be lit) before you can attempt to send a release order to the mobile station.

The :RELease command is used to control this field.

There is no query form of the :RELease command.

Screen(s) Where Field is Present

CALL CONTROL

Reset

See the **`Cont/Single` field description, on page 175**

Screen(s) Where Field is Present

OSCILLOSCOPE

RF Channel

This field is displayed on the screens listed below when the RF Display field on the CONFIGURE screen is set to Chan.

The `RF Channel` field tunes the Test Set's generator/analyzer to a frequency pair determined by the number entered in this field and selection entered in the **RF Chan Std** field.

If a CDMA call is currently connected, changing the number in this field initiates a CDMA-to-CDMA hard handoff

Operating Considerations

If you are setting up the Test Set to make a CDMA call, this field must be set to an RF channel that the mobile station under test will to find CDMA service on. If this requirement is met, the mobile station will indicate that it has found CDMA (digital) service soon after it is powered up.

The RF Display field on the CONFIGURE screen must be set to Chan

Screen(s) Where Field is Present

CDMA CALL CONTROL
CONFIGURE
ANALOG MEAS
SPECTRUM ANALYZER (Opt 012 only)

RF Chan Std

This field is displayed when Chan is selected in the RF Display field on the CONFIGURE screen.

Use the RF channel standard field to select the channel standard for the radio-under-test. The RF Generator's and the RF Analyzer's frequencies are automatically set to correspond to the channel number entered in the **RF Channel** field.

Some of the RF Chan Std choices require that the Test Set is configured to operate with a specific Agilent 83236 model (**table 11 on page 262**). The choices displayed will be limited to the RF channel standard's your hardware is capable of providing. If you do not know if you Agilent 83236B is equipped with Option 007, one way to find out is to query the Test Set using the GP-IB Common Command, *IDN? (refer to the *GP-IB Quick Reference Guide* for a detailed description of this command). If you have Option 007, the word "WIDEBAND" will be included in the string returned by the Test Set.

Operating Considerations

For the NAMPS standards, a third letter is added indicating which frequency band is used: upper, middle, or lower. For example, when testing a mobile station using the lower band, choose **MSL NAMPS**.

The **USER-DEF** selection is used to define your own channel assignments. When **USER-DEF** is selected, you enter the **Base Freq**, **Chan Space**, and **(Gen)-(Anl)** settings, found on the Configure screen.

Screen(s) Where Field is Present

CDMA CALL CONTROL

CONFIGURE

Table 11 Mobile Test Channel

Standard	Valid Channel Numbers	Offset Freq (MHz)	Channel Spacing (MHz)	Base Transmit Freq Range (MHz) (8924E Generate)	Mobile Transmit Freq Range (MHz) (8924E Receive)
MS- AMPS	1-799,990-1023	45.0	0.03	869.01 - 893.97	824.01 - 848.97
MS- N AMPS	1-799,990-1023	45.0	0.03	869.01 -893.97	824.01 - 848.97
MSL- N AMPS	1-799,990-1023	45.0	0.03	869.00 - 893.96	824.00 - 848.96
MSU- N AMPS	1-799,999-1023	45.0	0.03	869.02 - 893.98	824.02 - 848.98
MS-TACS[a]	1-1000	45.0	0.025	935.0125 - 959.9875	890.0125 - 914.9875
MS-ETACS **"Requires Agilent 83236B Opt. 007 (Wideband)" field on page 263**	1-1000,1329-2047	45.0	0.025	917.0125 - 959.9857	872.0125 - 914.9875
MS-NTACS **"Requires Agilent 83236B Opt. 007 (Wideband)" field on page 263**	1-798,801-2141	-55.0	0.0125	843.0125 - 869.975	898.0125 - 924.975
MS-JTACS **"Requires Agilent 83236B Opt. 007 (Wideband)" field on page 263**	1-798	-55.0	0.0125	860.0125 - 869.972	915.0125 - 924.9725
Japan CDMA **"Requires Agilent 83236B Opt. 007 (Wideband)" field on page 263**	1-799,801-1039,1041-1199	-55.0	0.0125	832.0125 - 869.9875	887.0125 - 924.9875
KOR PCS P0[b]	0-1300	90.0	0.05	1805.0 - 1870.0	1715.0 - 1780.0

Table 11 Mobile Test Channel

KOR PCS P1**"Requires Agilent 83236B" field on page 263**	1-1300	90.0	0.05	1805.05 - 1870.0	1715.05 1780.0
US PCS	0-1199	80.0	0.05	1930.00 - 1989.95	1850.00 - 1909.95
User Def	0-4095	- 1000.0 - 1000.0	-1.000- 1.000	790.0 - 969.999999* 1700.0 -1999.999999*	790.0 - 969.999999* 1700.0 - 1999.999999*

a. Requires Agilent 83236B Opt. 007 (Wideband)
b. Requires Agilent 83236B

RF Display

This field selects the format for entering the CDMA generator/analyzer frequency selection. Selecting Chan allows frequency selection through channel numbers according to a standard. (**See "RF Chan Std" on page 261**).

This field has no effect when the Test Set is operating in analog mode.

Operating Considerations

This field has no effect when the Test Set is operating in analog mode.

See Also

`RF Chan Std` field description, on page 261

Screen(s) Where Field is Present

CONFIGURE

RF Gen Freq

This field sets the frequency of the CDMA generator. This field is displayed when the **`RF Display field on the CONFIGURE screen is set to Freq`**.

See Also

`RF Display` field description, on page 263

Screen(s) Where Field is Present

ANALOG MEAS

RF Gen Lvl

This field is displayed only when the PCS Mode field is set to “On”, an Agilent 83236 PCS Interface is installed, and power has been cycled to configure the Test Set for PCS band testing. When this field is selected, the RF generator amplitude levels are calibrated across the frequency bands made available by the Agilent 83236 PCS Interface.

Operating Considerations

RF generator level calibration should be performed whenever operating temperature changes more the 5 deg C, or when power is cycled to the Agilent 83236 PCS Interface, and before a call is set up. This calibration process takes approximately 15 seconds.

Screen(s) Where Field is Present

CONFIGURE

RF Gen Volts

This field specifies whether you want RF voltages expressed as the voltage across a 50 ohm load, or the open circuit voltage (emf).

Operating Considerations

This setting affects the RF Generator’s and the Tracking Generator’s amplitudes.

Screen(s) Where Field is Present

CONFIGURE

RF In/Ant

This field is not displayed when the Test Set is configured to operate with an Agilent 83236B PCS Interface.

This field selects the RF IN/OUT or ANT IN port for making RF measurements.

Operating Considerations

Maximum power levels for each port are printed on the Test Set's front panel. If the RF power at the RF IN/OUT port exceeds allowable limits, a warning signal sounds and a message appears at the top of the screen. If this occurs, disconnect the RF power, press the MEAS RESET key, and allow the Test Set to cool off for approximately two minutes before making any other measurements on this port.

The ANT IN (antenna input) connector provides a highly-sensitive input for very low level signals (such as “off the air” measurements). You cannot measure TX (RF) Power or ACP Level on this screen using the ANT IN port.

CAUTION: Connecting a signal of >200 mW to the ANT IN port can cause instrument damage (although internal protection circuits can typically withstand a short-duration signal of 1 or 2 Watts).

If the overpower circuit is triggered (signified by a warning message at the top of the screen), remove the signal from the ANT IN port, and press the MEAS RESET key or turn the Test Set off and on to reset it.

See Also

`Sensitivity` field description, on page 275

`Input Port` field description, on page 212

Screen(s) Where Field is Present

SPECTRUM ANALYZER
CDMA REVERSE CHANNEL SPECTRUM

RF In/Out

This field is used to indicate losses or gains between the RF IN/OUT port and the device-under-test. If an Agilent 83236 PCS Interface is installed on the Test Set, the loss or gain is applied to the PCS Interface RF IN/OUT port.

- Enter a *positive* value to indicate a gain (such as an amplifier gain). When the RF IN/OUT port is used as an output, the RF Generator's (or Tracking Generator's) level is automatically set the specified amount *below* what is indicated in the RF Generator's **`Amplitude`** field. Example; if this value is 10 dB, and the **`Amplitude`** field shows 0 dBm, the actual level out of this port is –10 dBm.

  When this port is used as an input, the **`TX Power`** measurement and Spectrum Analyzer's Marker Level (**`Lvl`**) are automatically *reduced* by that amount.

- Enter a *negative* value to indicate a loss (such as cable loss). The RF Generator's (or Tracking Generator's) level out this port is automatically set that amount *above* what is indicated in the RF Generator's **`Amplitude`** field.

  When used as an input, the **`TX Power`** and the Spectrum Analyzer's marker level (**`Lvl`**) measurements are *increased* by that amount.

This field is only used when the **`RF Level Offset`** field is set to **`On`**.

See Also

`RF Level Offset` field description, on page 267

Screen(s) Where Field is Present

CONFIGURE

RF Level Offset

This field enables/disables the RF level offsets entered in the **RF In/Out**, **Duplex Out**, and **Antenna In** fields below it.

- When set to **On**, the RF Generator's amplitude and RF Analyzer's power measurement are offset by the values entered in these fields.
- When set to **Off**, the values in these fields are ignored.

See Also

Antenna In field description, on page 150
Duplex Out field description, on page 191
RF In/Out field description, on page 266

Screen(s) Where Field is Present

CONFIGURE

RF Offset

This field is displayed when the RF Display field has Freq selected.

This field enables/disables the CDMA generator–analyzer frequency offset specified in the **(Gen)-(Anl)** field below it.

Operating Considerations

RF Offset is applicable only when the Test Set is in CDMA mode. When an analog screen is selected, the generator-analyzer tuning and offset is determined by the control channel (**"Cntrl Chan" field on page 171**) and voice channel (**"Chan: -" field on page 162**)

Screen(s) Where Field is Present

CONFIGURE

RF Out only

This field is displayed only when the PCS Mode field is set to “On”, an Agilent 83236 PCS Interface is installed, and power has been cycled to configure the Test Set for PCS band testing. This field is used to indicate losses or gains between the RF OUT Only port and the device-under-test.

- Enter a *positive* value to indicate a gain (such as an amplifier gain). When the RF IN/OUT port is used as an output, the RF Generator’s (or Tracking Generator’s) level is automatically set the specified amount *below* what is indicated in the RF Generator’s **`Amplitude`** field. Example; if this value is 10 dB, and the **`Amplitude`** field shows 0 dBm, the actual level out of this port is −10 dBm.

  When this port is used as an input, the **`TX Power`** measurement and Spectrum Analyzer’s Marker Level (**`Lvl`**) are automatically *reduced* by that amount.

- Enter a *negative* value to indicate a loss (such as cable loss). The RF Generator’s (or Tracking Generator’s) level out this port is automatically set that amount *above* what is indicated in the RF Generator’s **`Amplitude`** field.

  When used as an input, the **`TX Power`** and the Spectrum Analyzer’s marker level (**`Lvl`**) measurements are *increased* by that amount.

This field is only used when the **`RF Level Offset`** field is set to **`On`**.

See Also

`RF Level Offset` **field description, on page 267**

Screen(s) Where Field is Present

CONFIGURE

RF Power

This field displays I_o, the total power spectral density of Sector Power and AWGN.

Operating Considerations

RF Power is controlled by settings in the **`Sector Pwr`** and **`AWGN`** fields. It is not directly settable.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL
CDMA MOBILE REPORTING
CDMA REVERSE CHANNEL SPECTRUM
CDMA CELLULAR MOBILE TRANSMITTER TEST

Rgstr NID

This field allows entry of the cell site's alternate network identification (NID), used only for registration.

Operating Considerations

The Test Set will send the Rgstr NID and Rgstr SID during the registration process (when the **Register** field is selected) in an attempt to cause a zone-based registration to occur. Immediately following the zone-based registration, another registration is performed using the NID and SID in the **Network ID** and **System ID** fields. The latter values will determine if the mobile station is roaming.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

Rgstr SID

This field allows entry of the cell site’s alternate system identification (SID), used only for registration.

Operating Considerations

The Test Set will send the Rgstr NID and Rgstr SID during the registration process (when the **Register** field is selected) in an attempt to cause a zone-based registration to occur. Immediately following the zone-based registration, another registration is performed using the NID and SID in the **Network ID** and **System ID** fields. The latter values will determine if the mobile station is roaming.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

RSSI Thresh

This field is displayed only for NAMPS system type.

This field is used to set the received signal strength threshold of the mobile station. Exceeding the **RSSI** threshold and **BER** threshold causes the mobile station to send an **MRI** message to the base station reporting it’s current **RSSI** and **BER**.

Screen(s) Where Field is Present

CALL CONTROL

Fields That Begin with the Letter S

SAT

This field allows entry of the SAT color code for CDMA to analog handoffs.

- **5970Hz**
- **6000Hz**
- **6030Hz**

Operating Considerations

During a CDMA-to-analog handoff, the Test Set sends a message to the mobile station assigning this supervisory audio tone to the analog call.

A CDMA-to-analog handoff attempt will occur when the Execute field on the CDMA Call Control screen is selected.

Range of values: 0 through 2

Screen(s) Where Field is Present

CDMA CALL CONTROL

SAT:

The **SAT:** field is divided into two fields:

- The left-hand field displays the current SAT tone frequency assignment for the current voice channel being used by the Test Set and the mobile station.

  The Sat field only displays a value when the system type is set to AMPS, TACS, JTACS or when NAMPS Ch Loc: is set to Wide. The Test Set must also be actively connected on a voice channel (that is, the **Connect** annunciator is lit). A “-” is displayed if a mobile station is not actively connected on a voice channel or the system type is NAMPS and Ch Loc: is set to Lower, Middle, or Upper.

  This is a read only field.

  The :AVCSat? query command is used to query the contents of the left-hand subfield.

  There is no command form of the :AVCSat? command.

- The right-hand field (highlighted field) is used to set the SAT Color Code (SCC) to be used on the designated voice channel (the channel number entered into the **Chan:** right-hand subfield).

  The :SATone command is used to control the right-hand subfield.

  The query form of the command (that is, :SATone?) can be used to determine the current SAT Color Code (SCC) setting.

Screen(s) Where Field is Present

CALL CONTROL

Save/Recall

This field specifies which memory device the Test Set accesses when the save and recall functions are used.

- **Internal** is a section of internal RAM. RAM is also used for running IBASIC programs, which may require you to delete the Save/Recall registers if the program is very large.
- **Card** is the front-panel MEMORY CARD slot. A **Save/Recall Device is not Present** message is displayed if you try to save or recall an instrument setup when a write-able memory card is not installed in the Test Set.
- **RAM** refers to RAM disks that you can create on internal RAM. For information on creating RAM disks, see the “Memory Cards/Mass Storage” chapter . This is part of the same memory used when “internal” is specified, and may have to be erased when loading very large IBASIC programs. A **Save/Recall Device is not initialized** message is displayed if you try to save or recall an instrument setup when a RAM disk has not been created.
- **Disk** is used with external disk drives. The **Mode** field must be set to **Control** to access the drive. Also, the GP-IB address of the drive must be entered in the **External Disk Specification** field of the TESTS (External Devices) screen.

Screen(s) Where Field is Present

I/O CONFIGURE

SCM:

This field displays the decoded station class mark information received from the mobile station on the reverse control channel in response to a forward control channel message. The decoded SCM consists of: the mobile station power class (Class I, II, or III), the transmission type (continuous/discontinuous), and the transmission bandwidth (20 MHz or 25 MHz).

The **SCM:** field is only displayed when the **Display** field is set to **Data** and a reverse control channel message has been decoded.

Refer to the **"Display" field on page 183** for information on how to read measurement results from this field.

Screen(s) Where Field is Present

CALL CONTROL

Sector Pwr

This field provides control of the Test Set's forward CDMA channel generator output level. Forward CDMA channel power is expressed in units of dBm in a 1.23 MHz bandwidth.

Operating Considerations

Sector Power and AWGN are summed together and output on the selected output connector. The total power in a 1.23 MHz bandwidth centered at the RF channel setting is displayed in the **RF Power** field.

Screen(s) Where Field is Present

CDMA CALL CONTROL
CDMA GENERATOR CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA MOBILE REPORTING
CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST

Send Msg

When **Execute** is selected, this field sends the message entered in the **User Data (ASCII)** or **User Data (Hex)** fields.

Operating Considerations

After **Execute** has been selected, the **SMS Sent** annunciator will light while the Test Set waits for an SMS message acknowledgment from the mobile station. See "MS Ack Received (annunciator)" field on page 226.

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Sensitivity

This area performs two functions:

- The upper field selects **`Normal`** or **`High`** sensitivity for the RF input. The **`High`** setting adds about 6 dB of sensitivity to the ANT IN port for looking at very low level signals. However, this setting can cause measurements to be uncalibrated (indicated by a message on the screen). **`High`** sensitivity can also cause high-level AM signals to be distorted.
- The lower field selects the vertical resolution of the display. You can choose from 1 dB, 2 dB, or 10 dB per graticule.

Screen(s) Where Field is Present

SPECTRUM ANALZYER
CDMA REVERSE CHANNEL SPECTRUM

Serial No.

This field displays the serial number of the Test Set.

Screen(s) Where Field is Present

CONFIGURE

SID

This field is used to set the system identification number (SID) of the Test Set. The **`SID`** field is an immediate action field. If the field is selected and changed, the signaling message(s) being sent on the forward control channel are immediately changed. No change occurs to the current state (that is, active, register, page, access, connect) of the Call Processing Subsystem.

This field is used to set the system identification number (SID) of the Test Set.

The :SIDentify command is used to control this field.

The query form of the command (that is, :SIDentify?) can be used to determine the current system identification number (SID) setting.

Screens Where Field is Present

CALL CONTROL

Sig Encoder

This field allows you to turn on or turn off the Test Set's audio frequency signaling encoder.

Operating Considerations

When the CALL CONTROL screen is selected, the Test Set is automatically configured to emulate an analog cell site (the Active annunciator indicates that the forward control channel is active). After the CALL CONTROL screen is selected, the Test Set's signaling encoder modulates the Test Set's RF carrier with FSK signaling data and, if the Connect annunciator is lit, the SAT tone.

If it becomes necessary to test a mobile station's analog performance without an RF signaling link established (no call connected), access the ANALOG MEAS screen, select **Off** in the **Sig Encoder** field to disable the Test Set's audio source used to perform signaling, and use the fields **AFGen1 Freq** and **AFGen1 To** to set up the modulation frequency, type, and levels needed for testing.

Returning to the CALL CONTROL screen will automatically turn the **Sig Encoder** field back **On**, and return the **AFGen1 Freq** and **AFGen1 To** settings to a disabled state.

Screen(s) Where Field is Present

ANALOG MEAS

SINAD

The `SINAD` measurement is selected by highlighting the lower field in the upper-right portion of the ANALOG MEAS screen and choosing `SINAD` from the list of choices.

Operating Considerations

The radio's receiver's audio output must be connected to the AUDIO IN port (set the `AF Anl in` field to `Audio In`).

.

Screen(s) Where Field is Present

ANALOG MEAS

SMS In Progress (annunciator)

This annunciator indicates that the mobile station has been sent an SMS Data Burst Message, and the Test Set is waiting for an SMS message acknowledgement.t.

Screens Where Annunciator is Present

CDMA SHORT MESSAGE SERVICE

SNR

The **SNR** measurement is selected by highlighting the lower field in the upper-right portion of the ANALOG MEAS screen and choosing **SNR** from the list of choices.

Screen(s) Where Field is Present

ANALOG MEAS

Span

This field is displayed when the **Controls** field is set to **Main**. This field sets the span of frequencies to be displayed on the spectrum analyzer's display.

Operating Considerations

The span setting is coupled to the **BW=** field.

Range of values: 10 kHz to 5 MHz

Screen(s) Where Field is Present

CDMA REVERSE CHANNEL SPECTRUM (Opt. 012 only)
SPECTRUM ANALYZER

SSD_A=0 (annunciator)

This annunciator, when lit, indicates that SSD (Shared Secret Data) in the Test Set is 0. SSD_A=0 is the default value for SSD_A. Entering a new A-Key initializes SSD_A to 0. Performing a successful SSD Update causes this annunciator to be turned off.

See Also

`Call Status` field description, on page 160
`SSD Update` field description, on page 278

Screens Where Field is Present

CDMA AUTHENTICATION

SSD Update

NOTE: An SSD update can be performed on the paging/access channels or on the traffic channel.

When **`SSD Update Execute`** is selected, an SSD Update Message is sent to the mobile station, and the **`SSD Update`** annunciator is lit. In response to the SSD Update Message, the mobile sends back a Base Station Challenge Order.

If the Test Set does not receive the Base Station Challenge Order from the mobile within 20 seconds, the Test Set will beep and the following message will be displayed: **`No response from mobile to SSD Update request`**, and the **`SSD Update`** annunciator will be turned off.

If the Test Set receives the Base Station Challenge Order, it sends a Base Station Challenge Confirmation Order to the mobile station. This order includes the 18-bit parameter, AUTHBS. After determining whether AUTHBS sent from the Test Set matches its computed value, the mobile station sends an SSD Update Confirmation (or Rejection) Order to the Test Set, and a message indicating the Pass/Fail status is displayed. The **`SSD Update`** annunciator will then be turned off.

If the SSD_A=0 annunciator was lit before the SSD Update was executed, it will be turned off.

Operating Considerations

A successful SSD Update requires the mobile station's A-Key to be entered in the A-Key field. The mobile station's ESN must also be entered in the **`MS Database`** field. If a valid ESN is not found, the Test Set will beep and display the following message: **`Cannot perform SSD Update until the phone has registered`**.

Screens Where Field is Present

CDMA AUTHENTICATION

Stop Length

This field specifies the number of stop bits used for serial communications when using the rear-panel serial port. Selecting this field displays a list of stop bit choices.

This setting is maintained after the instrument is turned off.

Screen(s) Where Field is Present

I/O CONFIGURE

Sync (Sector A Power)

This field allows the entry of Sync E_c, the sync channel energy per PN chip relative to the total sector power.

Operating Considerations

As the sync level is varied, OCNS is automatically adjusted so that the total power levels of pilot, sync, paging, traffic, and OCNS add up to Sector A power, I_{or}.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL

System ID

This field allows entry of the system identification (SID).

Operating Considerations

The mobile station stores the SID number it receives from the cell site and compares it with its home SID/NID to determine if it is roaming.

Screen(s) Where Field is Present

CDMA CELL SITE CONFIGURATION

System Type

This field is used to select the type of cellular system (AMPS, NAMPS, TACS, JTACS, NTACS, DAMPS, DCCH) to be simulated.

The **System Type** field is an immediate action field. That is, whenever the **System Type** field is changed, the change is reflected immediately in the physical configuration of the Test Set. The analog control channel is immediately de-activated, reconfigured, and then re-activated to reflect the change. This change causes the Test Set to enter the ACTIVE state.

NOTE: If the Test Set is in the connected state (**Connect** annunciator is lit) and a change is made to the **System Type** field, the connected state will be lost.

Screen(s) Where Field is Present

CALL CONTROL

System Type (CDMA-to-CDMA or CDMA-to-Analog Handoff)

This field selects the type of system that the Test Set will attempt to handoff the mobile station to when the field titled **"Execute (Handoff)" field on page 198** is selected.

- **`AMPS`**
- **`NAMPS Low`**
- **`NAMPS Mid`**
- **`NAMPS Uppr`**
- **`NAMPS Wide`**
- **`TACS`**
- **`TIA/EIA-95B`** (available only when the **Protocol** field is set to TIA/EIA-95B)
- **`NTACS Nrw`** (available only when the **Protocol** field is set to ARIB T53)
- **`NTACS Wide`** (available only when the **Protocol** field is set to ARIB T53)
- **`JTACS`** (available only when the **Protocol** field is set to ARIB T53)

GPIB Example

```
“CDMA:CALL:AHANdoff:CHANnel:STYPe ‘AMPS’“
```

selects the AMPS system type for a CDMA to analog handoff.

Screens Where Field is Present

CDMA CALL CONTROL

Fields That Begin with the Letter T

Test Status

The labels under **`Test Status`** are highlighted by annunciators. When lit, these annunciators indicate that an event took place or that a condition exists. All status annunciators can be queried over GP-IB.

"Connected (annunciator)" field on page 282
"Svc Opt 2/9 (annunciator)" field on page 282
"Testing (annunciator)" field on page 282
"Passed (annunciator)" field on page 283
"Failed (annunciator)" field on page 283
"Max Frames (annunciator)" field on page 283

Connected (annunciator)

This annunciator indicates that the Test Set and a mobile station have completed the signaling steps required to establish a CDMA call, and the Test Set has not had any indication that the call has ended or should end.

- For a call to the mobile station (initiated by the Test Set), the mobile station must ring and then be answered before this annunciator will light. When using Service Option 2, the mobile station will automatically answer a call and go to the Connected state.
- For a call to the Test Set (initiated by the mobile station), the Test Set will automatically answer the call (if the **`Answer Mode`** field is set to Auto), and the Connected annunciator will light. If the **`Answer Mode`** field is set to Manual, a message will appear prompting you to press the ANS key.

When a call is terminated, this annunciator will go out.

This field is duplicated on the CDMA CALL CONTROL screen.

Svc Opt 2/9 (annunciator)

This annunciator is lit when the Test Set is on a service option 2 (mobile station data loopback) call.

See Also

`Traffic Data Mode` field description, on page 287

Testing (annunciator)

This annunciator is lit when a FER test is in progress

Passed (annunciator)

This annunciator is lit when an FER test has passed. An FER test passes when the measured FER is less than the target FER (as set in the FER Spec field) with the specified confidence level (as set in the Confidence field).

Example "Passed" FER measurement

`FER Spec` set to **`1`**%
`Confidence` set to **`95`**%
Measured **`FER`** is displayed as **`0.6`**%

With the parameters specified above, **`Passed`** means that the measured value of 0.6% indicates a true FER of less than 1% with a confidence level of 95%.

Failed (annunciator)

This annunciator is lit when an FER test has failed. An FER test fails when the measured FER is greater than the target FER with the specified confidence level, according to the criteria established by the confidence level and FER specification.

Example "Failed" FER measurement

`FER Spec` set to **`1`**%
`Confidence` set to **`95`**%
Measured **`FER`** is displayed as **`1.4`**%

With the parameters specified above, **`Failed`** means that the measured value of 1.4% indicates a true FER of greater than 1% with a confidence level of 95%.

Max Frames (annunciator)

This annunciator is lit when an FER test terminates by reaching the number of frames entered for maximum frames to test. In this case, the measured FER neither passed nor failed the FER specification with the specified confidence level within the number of frames entered into the **`Max Frames`** field.

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE RECEIVER TEST

Time

This field sets the time-of-day for the instrument’s 24 hour clock. (Example, 4:53 PM is entered **`16:53`**)

Operating Considerations

The internal clock still functions when the instrument is turned off.

Screen(s) Where Field is Present

CONFIGURE

Time/div

This field selects the horizontal sweep time per division.

Operating Considerations

The time-per-division is selected from a list of choices.

Screen(s) Where Field is Present

OSCILLOSCOPE

Time Offset

This field is displayed when Freq Error is selected from the list of choices available when the unnamed field displaying one of the following choices is displayed:

- frequency error
- amplitude error
- time offset measurement

The time offset measurement is the timing difference between the beginning of a Test Set generated frame, as measured at the Test Set's front panel connector, and the beginning of the same frame received on the reverse link.

Operating Considerations

These measurements, along with rho, phase error, and carrier feedthrough are made by DSP analysis techniques. The **`Meas Cntl`** field controls these measurements.

Time offset is referred to as time alignment in the *Waveform Quality and Frequency Accuracy Definition* (IS-98).

See Also

`Meas Cntl` field description, on page 221
`Ampl Error` field description, on page 149
`Freq Error` field description, on page 205

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITTER TEST

Timer Reg

When **`Timer Reg`** is **`On`**, the MSUT will perform periodic timer-based registrations.

Screens Where Field is Present

CDMA AUTHENTICATION

To Screen

These fields are used to choose which of the Test Set's screens to display.

CDMA

- **CALL CNTL**
- **CELL CONF**
- **CDMA GEN**
- **RX TEST**
- **TX TEST**
- **MOBL RPT**
- **RNG TEST**
- **REV SPEC** (Opt. 012 only)

Analog

- **SPEC ANL** (Opt. 012 only)
- **SCOPE**
- **CALL CNTL**
- **ANALOG MEAS**

Config

- **TESTS**
- **CONFIG**
- **IO CONFIG**
- **PRNT CNFG**
- **CELL CONF**

Traffic

This field allows the entry of traffic E_c/I_{or}, the energy per PN chip for the forward traffic channel level relative to the total sector power. A Walsh code can also be specified for the traffic channel.

Operating Considerations

As the traffic level is varied, OCNS is automatically adjusted so that the total power levels of pilot, sync, paging, traffic, and OCNS add up to Sector A power, I_{or}.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL
CDMA CELLULAR MOBILE RECEIVER TEST

Traffic Data Mode

This field selects the desired service option. “Rate set 2” refers to vocoders that operate at 14.4 kips full rate.

- **`Svc Opt 1`** - normal traffic
- **`Svc Opt 2`** - data loopback
- **`Svc Opt 3`** - service redirection
- **`Svc Opt 6`** - short message service (for rate set 1)
- **`Svc Opt 9`** - data loopback (for rate set 2 vocoders, displayed when the **Protocol** field is set to TSB-74 or J-STD-008)
- **`Svc Opt 14`** - short message service (for rate set 2)
- **`Svc Opt 32768`** - normal traffic (for rate set 2 vocoders, displayed when the **Protocol** field is set to TSB-74 or J-STD-008)

Operating Considerations

Data loopback is used during most mobile station tests.

The desired service option can be selected at any time. If a service option change is attempted while a call is connected, and the mobile station does not respond to the message, a beep will sound and the service option will not change.

This field is duplicated on the CDMA CELLULAR MOBILE TRANSMITTER TEST, CDMA CALL CONTROL, CDMA CELLULAR MOBILE RECEIVER TEST, CDMA AUTHENTICATION, and CDMA SHORT MESSAGE SERVICE screens.

Screens Where Field is Present

CDMA CALL CONTROL
CDMA TRANSMITTER POWER RANGE TEST
CDMA CELLULAR MOBILE RECEIVER TEST
CDMA CELLULAR MOBILE TRANSMITTER TEST
CDMA SHORT MESSAGE SERVICE
CDMA AUTHENTICATION

Traffic Rho

Screen(s) Where Field is Present

CDMA CELLULAR MOBILE TRANSMITTER TEST

Transmitting (annunciator)

This annunciator lights when the Test Set is transmitting a forward CDMA channel.

When an analog screen is selected the status of the `Transmitting` annunciator when queried over GP-IB is "Off."

Screen(s) Where Field is Present

CDMA CALL CONTROL

Trig-Delay

The trigger delay is used to specify the time relationship between the trigger and displayed signal.

- `Positive` values delay the measurement trigger by a specific period. The delayed trigger point is the left edge of the screen.
- `Negative` values perform a pre-trigger function, displaying a section of the waveform before the trigger point. The trigger point is indicated by small pointers that appear at the top and bottom of the screen.

Operating Considerations

Negative Values. The maximum negative delay cannot exceed ten divisions of the current Time/Div setting. For example; if the `Time/Div` field is set to 1 ms, the maximum allowed negative delay is -10 ms. Larger negative numbers cause an `Excessive negative Trig-Delay will be truncated.` message.

Positive Values. For `Time/Div` settings of 50 ms/Div and smaller, the maximum delay is 400 ms.

For `Time/Div` settings of 100 ms/Div and larger, the maximum delay is 3200 ms.

Resolution. For delays of 400 ms and less, the resolution is 6.4 ms. For delays greater than 400 ms, the resolution is 51.2 ms. All entries are rounded to the nearest multiple of 6.4 ms or 51.2 ms (depending on the delay value).

Screen(s) Where Field is Present

OSCILLOSCOPE

Tune Freq

This field is displayed on the screens listed below when the RF Display field on the CONFIGURE screen is set to Freq.

Tune Freq adjusts the Test Set’s analyzer to the frequency of an RF transmitter under test.

Operating Considerations

If the **`Tune Mode`** field is set to **`Auto`**, the tune frequency is automatically set to the strongest RF signal above –36 dBm within the bandwidth of the RF Analyzer.

If the **`Tune Mode`** is set to **`Manual`**, the operator must enter the desired frequency.

This field is coupled to **"Center Freq" field on page 162"Center Freq" field on page 162**

See Also

`Tune Mode` field description, on page 290

Screens Where Field is Present

ANALOG MEAS

Tune Mode

This field is displayed on the screens listed below when the RF Display field on the CONFIGURE screen is set to “Freq”.

This field selects Automatic or Manual tuning of the RF Analyzer.

`Auto` tuning causes the RF Analyzer to find the signal with the greatest amplitude >-36 dBm, and to set the Tune Frequency for that signal.

`Manual` tuning requires the operator to set the Tune Frequency for the RF signal to be analyzed.

Operating Considerations

Changing the **`Tune Mode`** also changes the RF frequency display. Automatic tuning enables the **`TX Frequency`** measurement. Manual tuning enables the **`TX Freq Error`** measurement.

After autotuning to the desired signal, select **`Manual`** tuning to prevent the **`Tune Freq`** from changing when the signal is no longer applied.

Screens Where Field is Present

ANALOG MEAS

TX Freq Error

This field is displayed when Freq is selected in the RF Display field, and Manual is selected in the Tune Mode field.

This field displays the frequency error (error = assigned carrier frequency - measured carrier frequency) of the carrier being transmitted by the mobile station. Four dashes (----) indicates that there is no carrier frequency present to measure.

Screen(s) Where Field is Present

CALL CONTROL
ANALOG MEAS

TX Power

This field displays RF power measured at the RF IN/OUT port.

Operating Considerations

Only the RF IN/OUT port can be used for measuring TX Power. When the **`Input Port`** is set to **`Ant`**, four dashes (`----`) appear in place of digits for this measurement.

During an analog call (the Connect annunciator on the CALL CONTROL screen is lit) a mobile station adjusts it power according to the number entered in the Pwr Lvl field. **See "Pwr Lvl: -" on page 252**.

Use the Spectrum Analyzer to measure low-level RF power (≤200 mW) at the ANT IN port.

CAUTION: Connecting a signal of >200 mW to the ANT IN port can cause instrument damage (although internal protection circuits can typically withstand a short-duration signal of 1 or 2 Watts). If the overpower circuit is triggered (signified by a warning message at the top of the screen), remove the signal from the ANT IN port, and press the MEAS RESET key or turn the Test Set off and on to reset it.

See Also

`Input Port` field description, on page 212
`TX Power` field description, on page 291
`TX Pwr Zero` field description, on page 292
"Pwr Lvl: -" field on page 252

Screen(s) Where Field is Present

ANALOG MEAS
CALL CONTROL

TX Pwr Zero

The **`TX Pwr Zero`** function establishes a 0.0000 W reference for measuring analog RF power at the RF IN/OUT port.

CAUTION: RF power must not be applied while zeroing. Also, set the **`Amplitude`** field to “Off” to prevent internal cross-coupling into the power detector while zeroing.

Operating Considerations

This field zeroes analog power measurements. CDMA power measurements are zeroed using a field on the CDMA CALL CONTROL screen. See **"Power Meas" field on page 248**.

When power is applied to the RF IN/OUT connector, the temperature of the internal circuitry increases. This can cause changes in the TX Power measurement when low power levels are measured immediately following high power measurements.

When alternately making high and low power measurements, always zero the power meter immediately before making the low power measurements; this provides the best measurement accuracy.

Screen(s) Where Field is Present

ANALOG MEAS

Type

The Type field allows you to set the FOR_TRAFFIC and REV_TRAFFIC parameters in the base station to ‘0’ (None), or ‘1’ (Primary). It appears only when Service Option 6 or Service Option 14 are selected in the Traffic Data Mode field.

Screens Where Field is Present

CDMA CALL CONTROL
CDMA RX TEST
CDMA TX TEST
CDMA RANGE TEST

Fields That Begin with the Letter U

Uniq Chall

NOTE: A Unique Challenge can be performed on the paging/access channels or on the traffic channel.

When **Uniq Chall Execute** is selected, this field sends an Authentication Challenge Message to the mobile station, and the **SSD Update** annunciator is lit. In response, the mobile station sends back an Authentication Challenge Response Message (including the parameter AUTHU).

If the Test Set does not receive the Authentication Challenge Response from the mobile within 20 seconds, the Test Set will beep and the following message will be displayed: **No mobile response to Unique Challenge**. The **SSD Update** annunciator will be turned off.

If the Test Set receives the Authentication Challenge Response, it compares the **Received** parameter AUTHU to its **Expected** (computed) AUTHU value. If the values match, the **Status** column is set to **Passed** and the message , **Unique Challenge on Paging [Traffic]: Passed.** is displayed in the Authentication Data Table. The **Uniq Chall** annunciator will be turned off.

Operating Considerations

A Unique Challenge verifies that the mobile station and Test Set possess the same sets of Shared Secret Data (SSD).

If a valid ESN is not found in the **MS Database** field, the Test Set will beep and display the following message: **Cannot perform SSD Update until the phone has registered**.

Screens Where Field is Present

CDMA AUTHENTICATION

Units

The `Units` column indicates the unit-of-measure used for the limits (%, dBm, kHz, and so forth).

Screen(s) Where Field is Present

TESTS (Pass/Fail Limits)

User Data (ASCII or Hex)

This field accepts up to 64 ASCII or up to 128 Hex characters to be sent in an SMS Data Burst Message.

Operating Considerations

The **Data Mode** field determines which data format, ASCII or Hex, is selected for the **User Data** field.

Screens Where Field is Present

CDMA SHORT MESSAGE SERVICE

Fields That Begin with the Letter V

VC Order

This field is used to send an order on the forward voice channel to the Mobile Station with authentication active. The **VC Order** field is only visible when authentication is activated and the mobile is assigned a voice channel.

The orders available are:

- Change Power to Power Level 0 - 7
- Maintenance (put the mobile station in maintenance mode)
- Alert (alert the mobile station)
- SSD Update (shared secret data update)
- Uniq Ch (unique challenge)

The :VCORDer command is used to send an order type mobile station control message to the mobile station. The **Access** annunciator will light momentarily while the Test Set is sending the mobile station control message.

A mobile station must be actively connected on a voice channel to the Test Set (that is, the **Connect** annunciator is lit) before attempting to send an voice channel order to a mobile station.

The query form of the command (that is, :VCORDer?) can be used to determine the last order sent to the mobile station using the :VCORDer command.

Screen(s) Where Field is Present

CALL CONTROL

Vert/div

Vertical sensitivity sets the vertical amplitude per division.

Operating Considerations

The value for this field is selected from a list of choices.

Depending on the AF Analyzer's **AF Anl In** setting, the units for this field may be in Volts, kHz, or Percent (AM). For example; if the **AF Anl In** field is set to **FM Demod**, the amplitude is displayed in kHz/div.

Screen(s) Where Field is Present

OSCILLOSCOPE

Vert Offset

Vertical offset moves the displayed signal above or below the oscilloscope's fixed centerline.

Operating Considerations

A centerline is displayed for the signal when an offset is used.

When the vertical offset is ≠0.00, the marker level is referenced to the center line generated by the vertical offset feature, not the center line of the screen.

Screen(s) Where Field is Present

OSCILLOSCOPE

Fields That Begin with the Letter W

Walsh

This column of fields displays the Walsh code for the Pilot, Sync, and Paging channels, and provides an entry field for Traffic and OCNS Walsh codes.

Operating Considerations

The Test Set will display a warning if duplicate Walsh codes are set.

Screen(s) Where Field is Present

CDMA GENERATOR CONTROL

Fields That Begin with a Number

1 of N

The 1 of N field instructs the Test Set how many times to send a system parameter overhead message. The message contains RAND values, RAND_A and RAND_B. The RAND values are difficult for phones which do not support authentication to parse. This field allows for testing of these phones along with the testing of phones which support authentication by altering the number of times the system parameter message is sent to the mobile station.

Screen(s) Where Field is Present

AUTHENTICATION

8

Memory Cards/Mass Storage

This chapter contains information about using the mass storage devices available in the Test Set for storing and retrieving program and data files.

Using Memory Cards

OTP (One Time Programmable) cards provide removable read-only storage. File editing and erasure are not possible. These cards cannot be programmed by the Test Set; they require a special memory card programmer to save files.

SRAM cards provide removable read/write memory for your files, similar to a flexible disk. Data can be stored, re-stored, read, or erased as needed.

SRAM memory cards require a battery to maintain stored information.

Table 12 Memory Card Part Numbers

Memory	Type	Part Number
64 kilobytes	SRAM	HP 83230A
1 Mbyte	SRAM	HP 83231A

Inserting and Removing Memory Cards

Figure 32 illustrates how to insert a memory card into the Test Set's front panel. To remove a memory card, simply pull it out.

Memory cards may be inserted and removed with the Test Set powered on or off.

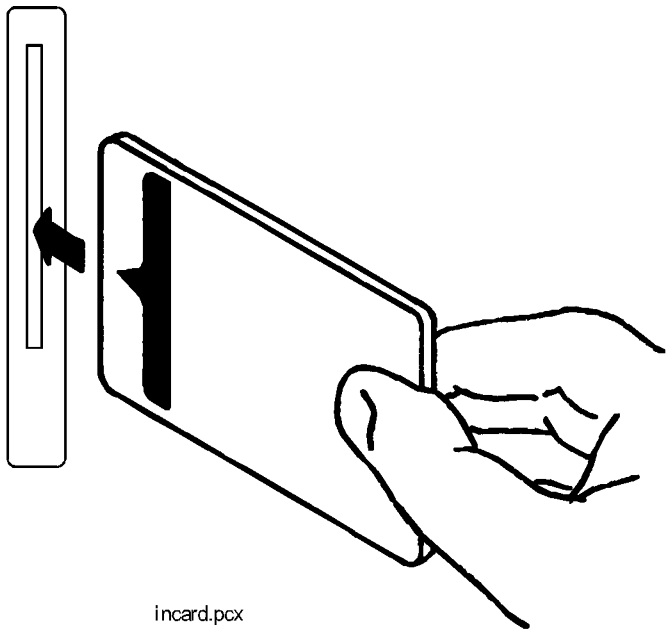


Figure 32 **Inserting a Memory Card**

The Memory Card Battery

SRAM memory cards use a lithium battery to power the card. SRAM cards typically retain data for over 1 year at 25° C. To retain data, the battery should be replaced annually. The part number for the SRAM Card Battery is CR2025 or HP part number 1420-0509.

Replacing the Battery

1. Turn the Test Set on and insert the memory card. An inserted memory card takes power from the Test Set, preventing the card's contents from being lost.
2. Hold the memory card in the slot with one hand and pull the battery holder out with your other hand. (See **figure 33** .)

NOTE: The HP SRAM cards have a Battery Holder Lock switch immediately above the Write-Protect switch. If the switch is in the locked position the battery cannot be removed. Ensure that the Battery Holder Lock switch is in the unlocked position before trying to remove the battery.

3. Install the battery with the side marked "+" on the same side marked "+" on the battery holder. Avoid touching the flat sides of the battery, finger oils may contaminate battery contacts in the memory-card.
4. Re-insert the battery holder into the memory card.

NOTE: The HP SRAM cards have a Battery Holder Lock switch immediately above the Write-Protect switch. Ensure that the Battery Holder Lock switch is in the locked position after installing the new battery.

5. Remove the memory card from the Test Set.

Figure 33 **Replacing the Memory Card's Battery**

WARNING: **Do not mutilate, puncture, or dispose of batteries in fire. The batteries can burst or explode, releasing hazardous chemicals. Discard unused batteries according to the manufacturer's instructions.**

Setting the Write-Protect Switch

The SRAM memory card's write-protect switch lets the user secure its contents from being overwritten or erased. The switch has two positions (see **figure 34**):

- *Read-write* – The memory-card contents can be changed or erased, and new files may written on the card.
- *Read-only* – The memory-card contents can be read by the Test Set, but cannot be changed or erased.

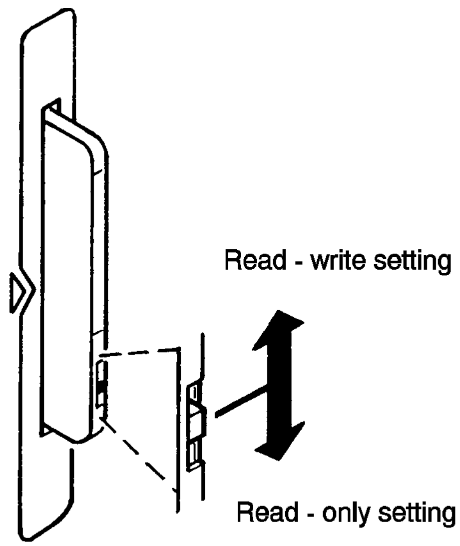


Figure 34 **Setting the SRAM Write-Protect Switch**

Memory Card Mass Storage Volume Specifier

The front-panel memory card slot's mass storage volume specifier is ":INTERNAL,4" and is the default mass storage device for the Test Set. For example, to catalogue the contents of a memory card from the TESTS (IBASIC Controller) screen, execute the following IBASIC command:

```
CAT ":INTERNAL,4"
```

or, if the mass storage location has not been changed,

```
CAT
```

If the MSI (Mass Storage Is) command has been used to change the mass storage location to a different device, the ":INTERNAL,4" designation must be used to access the memory card slot. Any changes to the mass storage location made with the MSI (Mass Storage Is) command are lost when the Test Set is turned off.

Memory Card Initialization

All new SRAM cards must be initialized before they can be used to store information. The RAM_MNG procedure stored on the internal ROM Disk can be used to quickly initialize any SRAM memory card.

SRAM Memory Cards can also be initialized from the TESTS (IBASIC Controller) screen by inserting the memory card into the front-panel slot and executing the following IBASIC command:

```
INITIALIZE "<volume type>:INTERNAL,4"
```

where the <volume type> can be LIF or DOS. To verify that the memory card has been properly initialized, execute the IBASIC command:

```
CAT ":INTERNAL,4"
```

If the error message **`ERROR 85 Medium uninitialized`** appears on the screen the memory card has not been properly initialized. Check the SRAM battery to ensure that it's charged and inserted correctly in the battery holder.

Backing Up Procedure and Library Files

Making a backup copy of procedure and library files helps guard against file loss due to memory card (or battery) failure.

Using the COPY_PL ROM Program

The COPY_PL procedure on the internal ROM Disk will make backup copies of TESTS Subsystem's Procedure and Library files onto a second SRAM memory card, and can also initialize an uninitialized SRAM memory card. This program does not make backup copies of TESTS Subsystem's code files, or copy any type of file to OTP memory cards.

The COPY_PL procedure is designed for use with Agilent 83217 software to make backup copies of Agilent Technologies supplied or user-generated Procedure and Library files.

To Run COPY_PL

1. Access the TESTS (Main Menu) screen.
2. Select the **`Select Procedure Location:`** field and choose **`ROM`**.
3. Select the **`Select Procedure Filename:`** field and select **`IB_UTIL`**.
4. Select the **`Run Test`** softkey to start the procedure.
5. Follow the displayed instructions.

Copying Files Using IBASIC Commands

Files can be copied from one mass storage device to another using the IBASIC COPY command. For example, to copy a file from a memory card to the left drive of an external dual-disk drive with a mass storage volume specifier of ":,702,0", execute the following IBASIC command from the TESTS (IBASIC Controller) command line:

```
COPY "FM_TEST:INTERNAL,4" TO "FM_TEST:,704,0"
```

"Stored" or "saved" files on one memory card can be copied to another memory card as follows:

- Insert the memory card containing the file to be copied.
- LOAD or GET[1] the desired file from the memory card into the Test Set.
- Remove the original memory card.
- Insert the destination memory card in the Test Set.
- STORE or SAVE[1] the file to the destination memory card.

Copying an Entire Volume

An entire volume can be copied from one mass storage device to the same type of mass storage device using the volume copy form of the COPY command. The destination volume must be as large as, or larger than, the source volume. The directory and any files on the destination volume are destroyed. The directory size on the destination volume becomes the same size as the source media. Disc-to-disc copy time is dependent on the mass storage device type. The volume copy form of the COPY command was designed to copy like-media to like-media and like-file-systems to like-file-systems. For example, to copy the entire contents of one internal RAM disk to another internal RAM disk, execute the following IBASIC command from the TESTS (IBASIC Controller) command line:

```
COPY ":MEMORY,0,0" TO ":MEMORY,0,1"
```

1. See "Storing Code Files" on page 325 for information about the LOAD, GET, STORE, and SAVE commands.

NOTE: Using the volume copy form of the COPY command can produce unexpected results. For example, using the volume copy form to copy the contents of a 64-KB SRAM card to an external GP-IB 630-KB floppy disk will result in the external floppy disk having a capacity of only 64 KB when the volume copy is finished. Furthermore all files on the floppy disk before the volume copy was executed will be lost and *are not recoverable*. Additionally, the file system type on the source media (LIF or DOS) is forced onto the destination media. Caution should be exercised when using the volume copy form of the COPY command.

The Test Set only supports the following types of volume copy using the volume copy form of the COPY command:

1. Like- media to like-media (RAM disk to RAM disk, external floppy to external floppy, and so forth)
2. Like-file-system to like-file-system (DOS to DOS, LIF to LIF)

All other types of volume copy are unsupported and will produce unexpected results or system errors.

Using wildcards in the COPY command can eliminate the need to use the volume form of the COPY command. Refer to the *HP Instrument BASIC User's Handbook* for further information on wildcards and their use in the COPY command.

Default File System

The Test Set's default file system is the Microsoft®[1] Disk Operating System (MS-DOS®). The DOS file system is used on IBM-compatible personal computers. (See **"DOS File Naming Conventions" on page 321** for further information on the DOS file system.) This implies that the Test Set expects a DOS formatted media for operations as shown in **table 13 on page 310**. If a LIF formatted media is used for the activities outlined in **table 13** (with the exception of IBASIC mass storage operations), erroneous operation will result.

The IBASIC file system supports both LIF (Hewlett-Packard's Logical Interchange Format) and DOS. The media format (DOS or LIF) is determined automatically by the IBASIC file system when the mass storage device is first accessed, and the appropriate format is used from then on for IBASIC mass storage operations. File system operation defaults to DOS upon exiting from IBASIC.

NOTE: The IBASIC INITIALIZE command defaults to LIF format. Any media (RAM Disk, SRAM Cards, External Hard Disk Drive, or 3.5-inch floppy) formatted using the default conditions of the INITIALIZE command will be the LIF format and will be unusable except for IBASIC mass storage operations. Refer to **"Initializing Media for DOS or LIF File System" on page 324** for information on formatting media for the DOS file system.

The IBASIC WILDCARDS command defaults to WILDCARDS OFF. To use DOS wildcards while in IBASIC execute the WILDCARDS DOS command upon entering the IBASIC environment.

1. Microsoft® and MS-DOS ® are U.S. registered trademarks of Microsoft Corp.

Table 13 **Test Set Default File System**

Activity	Default File System
Manual front-panel operations **a.** SAVE/RECALL register access **b.** TESTS Subsystem file access **c.** Signaling Decoder NMT file access	DOS
IBASIC mass storage operations LIF is default, DOS is also supported	LIF
GP-IB commands for **a** SAVE/RECALL register access **b.** TESTS Subsystem file access **c.** Signaling Decoder NMT file access	DOS
TESTS Subsystem **a** Procedure files **b.** Library files **c.** Code files	DOS

Mass Storage Device Overview

As shown in **figure 35 on page 312**, the Test Set has both internal and external mass storage devices. There are five types of mass storage devices in the Test Set:

- On-board random-access memory disk (RAM disk) located on the Test Set's internal memory board
- On-board read-only memory disk (ROM disk) located on the Test Set's internal memory board
- External disk drives connected to the Test Set's external GP-IB
- Internal static random access memory (SRAM) cards which are inserted into the Test Set's front-panel Memory Card slot

NOTE: The hardware for reading-from and writing-to memory cards is located internal to the Test Set. Therefore, the static random access memory (SRAM) cards and the read only memory (ROM) cards are considered internal to the Test Set even thought the physical media must be inserted into the Test Set's front-panel Memory Card slot.

Programs and data can be retrieved from any of these mass storage devices. Programs and data can only be stored to RAM disk, external disk, or SRAM card mass storage devices. The IBASIC file system supports both the LIF file system and the MS-DOS file system.

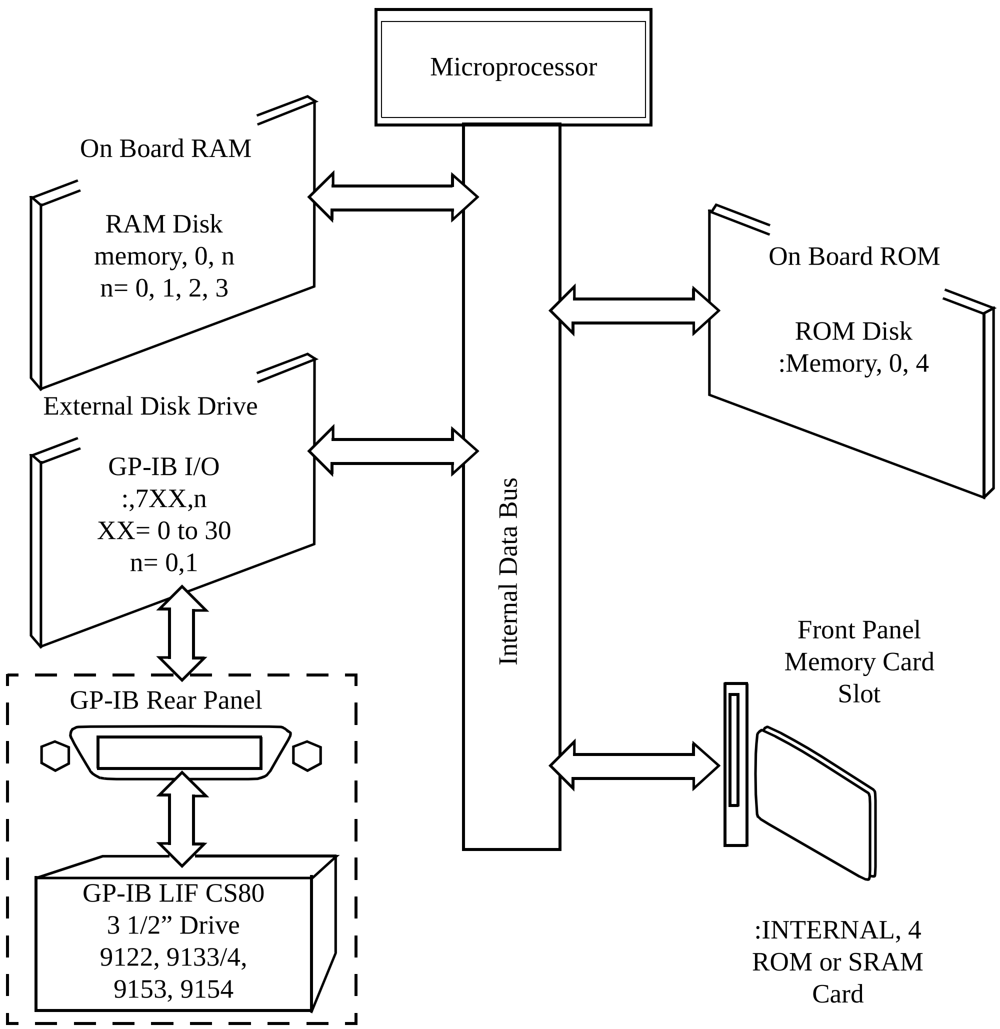


Figure 35 **Internal and External Mass Storage Devices**

Mass Storage Device Types

The following paragraphs provide an overview of the five types of mass storage devices.

Table 14 RAM Disk Mass Storage Overview

Mass Storage Name	Mass Storage Type	Physical Location	Mass Storage Volume Specifier	Media Type	Supported File System(s)
RAM Disk	Non-volatile random access memory	Test Set’s internal memory board	":MEMORY,0,unit number" unit number = 0, 1, 2, or 3 default = 0	N/A	LIF, DOS

Typical Uses

- Temporary program and data storage
- Temporary Save/Recall register storage

Comments

- Easily overwritten or erased
- Not recommended for permanent program or data storage
- Unit 0 can be overwritten by the RAM_MANAGER utility program (ROM Disk)
- Unit 1 can be overwritten by the COPY_PL utility program (ROM Disk)
- Units 2 and 3 are not overwritten by any ROM Disk utility program

Table 15 ROM Disk Mass Storage Overview

Mass Storage Name	Mass Storage Type	Physical Location	Mass Storage Volume Specifier	Media Type	Supported File System(s)
ROM Disk	Read-only memory	Test Set internal memory board	":MEMORY,0,4"	N/A	DOS

Typical Uses

- Permanent storage of factory supplied utility programs
- Permanent storage of factory supplied diagnostic programs

Comments

- Non-erasable
- Not available for user program or data storage
- Not available for Save/Recall register storage

Table 16 External Disk Mass Storage Overview

Mass Storage Name	Mass Storage Type	Physical Location	Mass Storage Volume Specifier	Media Type	Supported File System(s)
External Disk	GP-IB Hard disk drive GP-IB Floppy disk drive	Connected to Test Set’s external GP-IB	":,7xx,n" xx = device address (0-30) n = unit number (range device dependent)	Hard disk = NA Floppy disk 3.5-in DS Disk	LIF, DOS

Typical Uses

- Permanent program and data storage
- Permanent Save/Recall register storage

Comments

- High capacity (device dependent)
- Slowest access time of Test Set’s mass storage devices

Table 17 SRAM Card Mass Storage Overview

Mass Storage Name	Mass Storage Type	Physical Location	Mass Storage Volume Specifier	Media Type	Supported File System(s)
SRAM Memory Card	Static Random-Access Memory Card	Plugs into Memory Card slot on front panel of Test Set	":INTER-NAL,4"	PCMCIA Type 1 or Type 2 SRAM Memory Card	LIF, DOS

Typical Uses

- Semi-permanent program and data storage
- Semi-permanent Save/Recall register storage

Comments

- Low capacity
- Contents retained by on-card lithium battery
- Contents lost if on-card battery removed while card not in Test Set Memory Card slot
- Recommended as primary mass storage device for program and data storage

Table 18 ROM Card Mass Storage Overview

Mass Storage Name	Mass Storage Type	Physical Location	Mass Storage Volume Specifier	Media Type	Supported File System(s)
ROM or OTP Memory Card	Read-only Memory Card	Plugs into Memory Card slot on front panel of Test Set	":INTERNAL,4"	PCMCIA Type 1 or Type 2 EPROM Memory Card	DOS

Typical Uses

- Permanent storage of factory supplied application programs
- Permanent storage of factory supplied utility programs
- Permanent storage of factory supplied diagnostic programs

Comments

- Non-erasable
- Not available for user program or data storage
- Not available for Save/Recall register storage

Default Mass Storage Locations

Save/Recall Registers

The default mass storage location for the Save/Recall registers is the Test Set's internal RAM (no mass storage volume specifier) after any of the following conditions:

- Power-up
- Initializing RAM with the SERVICE screen's **RAM Initialize** function
- Resetting the Test Set using the front-panel PRESET key
- Resetting the Test Set using the *RST GP-IB Common Command

The mass storage location for Save/Recall registers can be changed using the **Save/Recall** field in the I/O CONFIGURE screen. The default mass storage volume specifiers for the Save/Recall register mass storage locations are as follows:

- Internal selection - (no mass storage volume specifier, registers are saved to allocated RAM space)
- Card selection (not changeable) - ":INTERNAL,4"
- RAM selection (not changeable) - ":MEMORY,0,0"
- Disk selection - the **External Disk Specification** field in the TESTS (External Devices) screen.

External Disk Drive

The default mass storage volume specifier for the external disk drive is set using the **External Disk Specification** field in the TESTS (External Devices) screen.

TESTS Subsystem

The default mass storage location for the TESTS Subsystem is set using the **`Select Procedure Location:`** field on the TESTS (Main Menu) screen. The default mass storage volume specifiers for the TESTS Subsystem mass storage locations are as follows:

- Card selection (not changeable) - ":INTERNAL,4"
- ROM selection (not changeable) - ":MEMORY,0,4"
- RAM selection (not changeable) - ":MEMORY,0,0"
- Disk selection - the **`External Disk Specification`** field in the TESTS (External Devices) screen.

Selecting the Mass Storage Location

The IBASIC mass storage location is selected using the IBASIC Mass Storage Is command. The mass storage volume specifier for the desired mass storage location is appended to the Mass Storage Is command. Refer to the *HP Instrument BASIC User's Handbook* for further information regarding the Mass Storage Is command.

For example, to change the default mass storage location to RAM Disk unit 2, execute the following command:

Mass Storage Is ":MEMORY,0,2"

The Mass Storage Is command is keyboard and program executable; however, any changes made are lost when the Test Set is turned off or when the SERVICE screen's **`RAM Initialize`** function is executed.

Mass Storage Access

Program and data files stored on the Test Set's various mass storage locations can be selectively accessed from the following screens:

- The TESTS (IBASIC Controller) screen.

  Any type of file can be accessed from this screen, either through an IBASIC program or the IBASIC command line.

- The TESTS (Main Menu) screen using the **`Select Procedure Location:`** and **`Select Procedure Filename:`** fields.

  Only *procedure* files shipped with Agilent 83217 software or procedure files created using the TESTS (Save/Delete Procedure) screen of the TESTS Subsystem can be accessed using these fields. When created, procedure file names are prefixed with a lower case *.PRC* file extension (FM_TEST.PRC).

  A corresponding *code* file - prefixed with *.PGM* (FM_TEST.PGM must reside on the same media for the procedure to work.

- The TESTS (Save/Delete Procedure) screen using the **`Select Procedure Location:`** and **`Enter Procedure Filename:`** fields.

  This screen is used to create "procedure" files. When created, procedure file names are prefixed with a *.PRC* file extension (FM_TEST.PRC).

Save/Recall register files, stored on the Test Set's various mass storage locations, can be accessed using the front-panel SAVE and RECALL keys.

DOS and LIF File System Considerations

Program and data files can be stored and retrieved from IBASIC using either the DOS or LIF file system. The media format (DOS or LIF) is determined automatically by the IBASIC file system when the mass storage device is first accessed, and the appropriate format is used from then on. DOS and LIF use different file naming conventions. In addition, the Test Set uses certain file naming conventions which are unique to the Test Set. Unexpected file operation can occur if proper consideration is not given to the file naming conventions.

File Naming Conventions

LIF File Naming Conventions

The LIF file system is used by Hewlett-Packard BASIC on the HP 9000 Series 200/300 Workstations. It is a flat file system, which means that it has no subdirectories. The LIF file system allows up to 10-character file names which are case sensitive. The LIF file system preserves the use of uppercase and lowercase characters for file storage and retrieval. For example, the file names File1, FILE1, file1 and FiLe1 could represent different files. LIF files cannot start with a space, and any file name longer than 10 characters is considered an error.

NOTE: The Test Set's file system does not support the HFS (hierarchical file system) used with HP BASIC. Therefore, no directory path information can be used during mass storage operations with LIF files.

DOS File Naming Conventions

The DOS file system is used on IBM compatible personal computers. The DOS file system is hierarchical, which means it supports subdirectories. The DOS file system allows up to 8-character file names with an optional extension of up to 3 characters. The file name is separated from the extension (if it exists) with a period (.). DOS file names are case independent. The characters are stored as upper case ASCII in the DOS directory but the files may be referenced without regard to case. The DOS file system always converts any lowercase characters to uppercase when files are stored. For example, the file names File1, FILE 1 , file1 and FiLe1 all represent the single DOS file FILE1 .

The period (.) may appear in the name but only to separate the file name from the extension. The period is not considered part of the file name itself. If the name portion of a DOS file name is longer than 8 characters, it is truncated to 8 characters and no error is generated. Similarly, if the extension is longer than 3 characters, it is truncated to 3 characters and no error is given.

Test Set File Naming Conventions

The TESTS Subsystem uses the following file naming conventions:

- The *.PGM* extension is used to indicate a code file and is automatically appended onto the file name when the program code file is stored for use by the TESTS Subsystem.
- The *.PRC* extension is used to indicate a procedure file and is appended onto the file name when the file is stored by the TESTS Subsystem
- The *.LIB* extension is used to indicate a library file and is appended onto the file name when the file is created for use with the TESTS Subsystem

The Save/Recall register subsystem uses the following file naming convention:

- The *.SAV* extension is used to indicate a stored Save/Recall register file and is appended onto the file name when the file is created

Test Set File Entry Field Width

The TESTS Subsystem and the Save/Recall register subsystem have fields into which the operator enters a file name. These fields are used by the operator to enter the name of a file to be stored or loaded. The width of these fields is 8 characters and was chosen to support the DOS file naming convention of 8 characters. Consequently these fields will *not* hold a 10-character file name which is allowed in the LIF file system.

Potential File Name Conflicts

Unexpected file operation can occur if proper consideration is not given to the different file system naming conventions and the file entry field width.

- A full DOS file name is 12 characters
  (8-character file name + . + 3 character extension).
  A full DOS file name will not fit in the Test Set's file entry field.
- On a DOS formatted disk, any file with the *.PGM* extension is considered a TESTS Subsystem code file. If the TESTS Subsystem attempts to retrieve a file which is not a code file, the following error will be generated: **`Error reading code file. Check file and media.`**
- On a DOS formatted disk, any file with the *.PRC* extension is considered a TESTS Subsystem procedure file. If the TESTS Subsystem attempts to retrieve a file which is not a procedure file, the following error will be generated: **`Error reading procedure file. Check file and media.`**
- On a DOS formatted disk, any file with the *.LIB* extension is considered a TESTS Subsystem library file. If the TESTS Subsystem attempts to retrieve a file which is not a library file, the following error will be generated: **`Error reading library file. Check file and media.`**
- When copying LIF named files to a DOS formatted media, the file name is silently truncated to 8 characters since DOS only allows 8-character file names. This could result in **`ERROR 54 Duplicate File Name`**.
- When storing or deleting files to a DOS formatted media, the file name is silently truncated to 8 characters since DOS only allows 8-character file names. This could result in **`ERROR 54 Duplicate File Name`**.

File Naming Recommendations

If switching between media types (DOS and LIF) or operating exclusively in DOS the following naming conventions are recommended.

- Ensure that only TESTS Subsystem procedure files use the .PRC file extension.
- Ensure that only TESTS Subsystem library files use the .LIB file extension.
- Ensure that only TESTS Subsystem code files use the .PGM file extension.
- Ensure that only user-written NMT test files use the .NMT file extension.
- Ensure that only Save/Recall register files use the .SAV file extension.

Initializing Media for DOS or LIF File System

The INITIALIZE command is used to initialize a media (external hard disk, external 3.5-inch floppy disk, Epson SRAM Card, PCMCIA SRAM Card and RAM Disk) for use with the DOS or LIF file system. The DOS or LIF file system is specified with the parameter. LIF is the default.

For example, to initialize a PCMCIA SRAM card for the DOS file system, perform the following steps:

1. Put the PCMCIA SRAM card into the Test Set’s front-panel Memory Card slot.
2. Display the TESTS (IBASIC Controller) screen.
3. Using the rotary knob or an external terminal, execute the following command from the IBASIC Controller command line:

   ```
   INITIALIZE "DOS:INTERNAL,4"
   ```

Test Set File Types

The Test Set file system supports the following file types:

- ASCII - files containing ASCII characters
- BDAT - files containing binary data
- DIR - DOS subdirectory
- DOS - SAVEd code file
- IBPRG - STOREd code file

Storing Code Files

Two IBASIC commands are available for storing program code to a mass storage location: SAVE and STORE. The type of file created by the Test Set's file system when the program code is stored, is dependent upon the format of the media being used. The type of file created verses the media format is outlined in **table 19**. The IBASIC 2.0 file system can distinguish between DOS files that have been "saved" and those that were "stored."

Table 19 Sorted Program Code File Types

	DOS Formatted Media	LIF Formatted Media
SAVE	DOS	ASCII
STORE	IBPRG	IBPRG

Files that have been stored using the SAVE command must be retrieved using the GET command:

```
SAVE "FM_TEST:,704,1"
GET "FM_TEST:,704,1"
```

Files that have been stored using the STORE command must be retrieved using the LOAD command:

```
STORE "FM_TEST:,704,1"
LOAD "FM_TESTS:,704,1"
```

Using the ROM Disk

The Test Set comes with several Test Procedures stored on the internal ROM disk. These Test procedures provide instrument diagnostic utilities, periodic calibration utilities, memory management utilities, a variety of general purpose utilities, and several IBASIC demonstration programs.

To see a brief description of what each procedure does perform the following steps:

1. Display the TESTS (Main Menu) screen by selecting the front-panel TESTS key.
2. Using the rotary knob, select the **`Select Procedure Location:`** field and choose ROM from the choices.
3. Using the rotary knob, select the **`Select Procedure Filename`** field. A list of Test Procedures stored on the ROM disk is displayed in the **`Choices:`** field. Using the rotary knob, select the Test Procedure of interest.
4. A brief description of the Test Procedure will be displayed in the **`Description`** field.

ROM DISK cannot be written to for user storage.

The ROM Disk's mass storage volume specifier is ":MEMORY,0,4"

For example, to catalogue the contents of the ROM Disk from the TESTS (IBASIC Controller) screen enter:

```
CAT ":MEMORY,0,4"
```

Using RAM Disk

RAM Disk is a section of the Test Set's internal RAM memory that has been set aside for use as a mass storage device. RAM Disk acts much the same as an external disk drive; that is, program and data files can be stored, re-stored, erased, and retrieved from the RAM Disk.

The RAM Disk is partitioned into four separate units: 0-3. Each unit is treated as a separate "disk." The size of each disk can be specified in 256-byte increments.

The four RAM Disk units are designated ":MEMORY,0,0" to ":MEMORY,0,3". For example, to catalog the contents of RAM Disk unit "0" from the TESTS (IBASIC Controller) screen, execute the following command:

```
CAT ":MEMORY,0,0"
```

Volume 0's contents can be viewed and loaded from the TESTS (IBASIC Controller) screen, the TESTS (Main Menu) screen, the TESTS (Save/Delete Procedure) screen and the Signaling Decoder screen in NMT mode. Volumes 1, 2, and 3 can *only* be accessed from the TESTS (IBASIC Controller) screen.

NOTE: **RAM Disk Erasure.** The contents of RAM Disk are easily lost. Unit 0 can be overwritten by the RAM_MNG utility program (ROM Disk). Unit 1 can be overwritten by the COPY_PL utility program (ROM Disk). The contents of all units are lost when the SERVICE screen's **`RAM Initialize`** function is executed. Therefore, RAM Disk should only be used for non-permanent, short-term storage of program or data files.

Initializing RAM Disks

Each RAM Disk unit must be initialized before it can be used. Unit 0 can be initialized using the RAM_MNG procedure stored on internal ROM Disk. Volumes 1, 2, and 3 must be initialized from the TESTS (IBASIC Controller) screen.

The optional “unit size” parameter in the following procedure specifies the memory area, in 256 byte blocks, set aside for each disk unit.

Follow these steps to initialize volumes 1, 2, or 3:

1. Access the TESTS (IBASIC Controller) screen.
2. Using the rotary knob or an external terminal, enter and execute the IBASIC command:

   ```
   INITIALIZE ":MEMORY,0,<unit number 1-3>",<unit size>
   ```

   For example:

   ```
   INITIALIZE ":MEMORY,0,1",50
   ```

NOTE: The IBASIC INITIALIZE command defaults to LIF format. Any media (RAM Disk, SRAM Cards, External Hard Disk Drive, or 3.5-inch floppy) formatted using the default conditions of the INITIALIZE command will be the LIF format and will be unusable in the Test Set, except for IBASIC mass storage operations. Refer to **"Initializing Media for DOS or LIF File System" on page 324** for information on formatting media for the DOS file system.

Using External Disk Drives

The Test Set supports only GP-IB external disk drives. Certain configuration information is required by the Test Set to access external disk drives.

The I/O CONFIGURE screen's GP-IB **`Mode`** field must be set to Control any time an external disk drive is used by the Test Set.

To load files from the TESTS screens or NMT Signaling Decoder screen, the disk's mass storage volume specifier must be entered in the **`External Disk Specification`** field on the TESTS (External Devices) screen (for example, **`:,702,1`**).

Initializing External Disks

All new external disk media must be initialized before it can be used to store information. External disk media can be initialized for either LIF (Logical Interchange Format) or DOS (Disk Operating System) format using the Test Set. (See **"DOS and LIF File System Considerations" on page 321**.)

External disk media can be initialized from the TESTS (IBASIC Controller) screen by inserting the new media into the external disk drive and executing the following IBASIC command:

```
INITIALIZE "<volume type>:<external disk mass storage volume specifier>"
```

where the <volume type> can be LIF or DOS

For example:

```
INITIALIZE "DOS:,702,1").
```

To verify that disk media has been properly initialized, execute the IBASIC command:

```
CAT "<external disk mass storage volume specifier>"
```

For example:

```
CAT ":,702,1"
```

NOTE: The IBASIC INITIALIZE command defaults to LIF format. Any media (RAM Disk, SRAM Cards, External Hard Disk Drive or 3.5-inch floppy) formatted using the default conditions of the INITIALIZE command will be the LIF format and will be unusable in the Test Set, except for IBASIC mass storage operations. Refer to **"Initializing Media for DOS or LIF File System" on page 324** for information on formatting media for the DOS file system.

A

Error Messages

This chapter will familiarize you with the different types of error messages the Test Set provided, and will explain the meaning of error messages that require explanation.

General Information About Error Messages

The format of the displayed message determines which manual contains information about the error message. There are four basic error message formats:

- Positive numbered error messages
- IBASIC error messages
- GP-IB error messages
- Text only error messages

Positive Numbered Error Messages

Positive numbered error messages are generally associated with IBASIC. Refer to the *HP Instrument BASIC User's Handbook* for information on IBASIC error messages.

Positive numbered error messages take the form: **`ERROR XX Message Text`**

For example:

- **`Error 54 Duplicate file name`**
  - or
- **`Error 80 in 632 Medium changed or not in drive`**

IBASIC Error Messages

IBASIC Error Messages are associated with IBASIC operation. IBASIC error messages can have both positive and negative numbers.

IBASIC error messages take the form: **`IBASIC Error: -XX Message Text`**

For example:

- **`IBASIC Error: -286 Program runtime error`**

Text Only Error Messages

Text only error messages are generally associated with manual operation of the Test Set. See **"The Message Display" on page 336** for more information about messages displayed on the Test Set's display.

Un-numbered (text only) GP-IB error messages are generally self-explanatory. For example, trying to retrieve a saved register that does not exist generates the following error message:

`GP-IB Error: Register does not exist.`

Text only error messages can also be displayed while running the Test Set's built-in diagnostic or calibration utility programs.

Text only error messages take the form: **`This is an error message.`**

For example:

- **`Input value out of range.`**

The Message Display

During instrument operation, various messages may appear on the Test Set's display. Prompt-type messages generally appear on the first line of the Test Set's display. General operating and error messages usually appear on the second line of the display. Some messages are persistent; they remain displayed, pending correction of the error condition, or until another persistent message with greater priority occurs. Other messages are only displayed when the error first occurs; they are removed when a key is pressed or the knob is turned, or when an GP-IB command is received. Many of the messages are displayed on the MESSAGE screen until the instrument is turned off.

Messages that are about error conditions may tell you what to do to correct the error (turn something off, reduce a field's value, press a certain key, and so forth). Messages and prompts are sometimes accompanied by a beep or warble.

NOTE:

Warbles and Beeps

A warble sound indicates that an instrument-damaging event is occurring. Beeps often occur only with the first occurrence of the message. Prompts are generally silent.

Non-Recoverable Firmware Error

This error, also referred to as an “assert” occurs when the Test Set encounters a condition that the firmware cannot proceed from - causing the Test Set to halt operation until power is cycled. The message appears in the center of the Test Set’s display and (except for the two lines in the second paragraph) has the form:

```
   Non-recoverable firmware error.  Please record the 2 lines of
   text below and contact Hewlett Packard through your local
   service center. In the U.S., you may call the factory at
  (800) 827-3848.

    ‘Address error exception’
     at line number 0

   To continue operation, turn POWER off and back on.
```

Unfortunately, you will not be able to recover from this condition without turning the Test Set off. If the failure reoccurs when you attempt to repeat the operation that caused the failure in the first place, you should record exactly what the configuration of the instrument was when the error appeared, and contact Agilent. This information will help us determine the proper course of action for your repair.

If The Non-Recoverable Firmware Error Occurs at Power-up

If the Test Set displays this error when first powered up, disabling Test Set operation, it could be related to the **Autostart** field on the main TESTS screen, or a POWERON Save/Recall register. This field causes the Test Set to automatically run the last program loaded in memory when the Test Set is powered up. If the program is corrupted, the Test Set will automatically “lock up”.

The only way to recover from this condition is to clear the Test Set’s operating RAM. This will clear any IBASIC program, Save/Recall registers, and RAM disks that have been saved, as well as three calibration factors. The calibration factors are easily re-entered; the IBASIC programs, Save/Recall registers, and RAM disks must be re-loaded or re-initialized after clearing memory.

To Clear the Test Set’s RAM:

1. Turn the Test Set off.
2. Hold the PRESET and HZ/uV buttons down.
3. Turn the power on (with the buttons still held down) and wait until the CDMA CALL CONTROL screen is displayed.

Re-enter the Calibration Factors Erased when RAM is Cleared

Use this procedure to re-enter the three calibration factors that were erased when RAM is cleared. Use the ANLG SCRNS keys (to the left of the cursor control knob) to access the required screens.

1. Access the RF GENERATOR screen and select the **`DC FM Zero`** field (under **`FM Coupling`**).
2. Disconnect any cables to the ANT IN or RF IN/OUT connectors.
3. Access the TX TEST screen and select **`Zero`** under the **`TX Pwr Zero`** field.
4. Access the AF ANALYZER screen and select **`Zero`** under the **`DC Current`** field.

Numbered GP-IB Error Descriptions

The following GP-IB errors can be generated under any of the following conditions:

- controlling the Test Set with an IBASIC program running on the built-in IBASIC controller
- controlling GP-IB devices/instruments, connected to the Test Set's external GP-IB bus, with an IBASIC program running on the built-in IBASIC controller
- controlling the Test Set with a program running on an external controller
- using the Test Set manually to print to an external GP-IB printer
- using the Test Set manually to access procedure/library/code files stored on an external GP-IB disk

The negative numbers which precede the error message text correspond to the error conditions outlined in the Standard Commands for Programmable Instruments (SCPI). For more information on SCPI, order the following book,

A Beginner's Guide to SCPI Addison-Wesley Publishing Company ISBN 0-201-56350-9 HP P/N 5010-7166

NOTE: **GP-IB Parser.** The term "Parser" is used in the following error message descriptions. It refers to the Test Set's GP-IB command parser.

Error –100 **Command error**

This code indicates only that a Command Error as defined in *IEEE 488.2, 11.5.1.1.4* has occurred.

Error –101 **Invalid character**

A syntactic element contains a character which is invalid for that type.

Error –102 **Syntax error**

An unrecognized command or data type was encountered; for example, a string value was received when the *device* does not accept strings.

Error –103 **Invalid separator**

The parser was expecting a separator and encountered an illegal character. For example, the colon used to separate the FREQ and AMPL commands should be omitted in the following command:

RFG:FREQ 850 MHZ**:**;AMPL -35

Error –104 **Data type error**

The parser recognized a data element different than one allowed. For example, numeric or string data was expected but block data was encountered.

Error –105 **GET not allowed**

A Group Execute Trigger was received within a program message (see *IEEE 488.2, 7.7)*.

Error –108 **Parameter not allowed**

More parameters were received than expected for the header. For example, the *ESE common command only accepts one parameter; receiving *ESE 36,1 is not allowed.

Error –109 **Missing parameter**

Fewer parameters were received than required for the header. For example, the *ESE common command requires one parameter; receiving *ESE is not allowed.

Error –110 **Command header error**

An error was detected in the header.

Error –111 **Header separator error**

A character which is not a legal header separator was encountered while parsing the header.

Error –112 **Program mnemonic too long**

The header contains more than twelve characters (see IEEE 488.2,7.6.1.4).

Error –113 **Undefined header**

The header is syntactically correct, but it is undefined for this specific *device*. For example, *XYZ is not defined for any *device*.

Error –114 **Header suffix out of range**

Indicates that a nonheader character has been encountered in what the parser expects is a header element.

Error –120 **Numeric data error**

This error, as well as errors –121 through –128, are generated when parsing a data element which appears to be numeric, including the nondecimal numeric types.

Error –121 **Invalid character in number**

An invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a “9” in octal data.

Error –123 **Exponent too large**

The magnitude of the exponent was larger than 32000 (see *IEEE 488.2, 7.7.2.4.1).*

Error –124 **Too many digits**

The mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros (see *IEEE 488.2, 7.7.2.4.1)*.

Error –128 **Numeric data not allowed**

A legal numeric data element was received, but the *device* does not accept one in this position for the header.

Error –130 **Suffix error**

This error, as well as errors –131 through –138, are generated when parsing a suffix.

Error –131 **Invalid suffix**

The suffix does not follow the syntax described in *IEEE 488.2 7.7.3.2*, or the suffix is inappropriate for this *device*.

Error –134 **Suffix too long**

The suffix contained more than 12 characters (see *IEEE 488.2, 7.7.3.4*).

Error –138 **Suffix not allowed**

A suffix was encountered after a numeric element which does not allow suffixes.

Error –140 **Character data error**

This error, as well as errors –141 through –148, are generated when parsing a character data element.

Error –141 **Invalid character data**

Either the character data element contains an invalid character or the particular element received is not valid for the header.

Error –144 **Character data too long**

The character data element contains more than twelve characters (see *IEEE 488.2, 7.7.1.4*).

Error –148 **Character data not allowed**

A legal character data element was encountered where prohibited by the *device*.

Error –150 **String data error**

This error, as well as errors –151 through –158, are generated when parsing a string element.

Error –151 **Invalid string data**

A string data element was expected, but was invalid for some reason (see *IEEE 488.2, 7.7.5.2*). For example, an END message was received before the terminal quote character.

Error –158 **String data not allowed**

A string data element was encountered but was not allowed by the *device* at this point in parsing.

Error –160 **Block data error**

This error, as well as errors -161 through -168, are generated when parsing a block data element.

Error –161 **Invalid block data**

A block data element was expected, but was invalid for some reason (see *IEEE 488.2 7.7.6.2*). For example, an END message was received before the length was satisfied.

Error –168 **Block data not allowed**

A legal block data element was encountered but was not allowed by the *device* at this point in parsing.

Error –170 **Expression error**

This error, as well as errors -171 through -178, are generated when parsing an expression data element.

Error –171 **Invalid expression**

The expression data element was invalid (see *IEEE 488.2, 7.7.7.2*); for example, unmatched parentheses or an illegal character.

Error –178 **Expression data not allowed**

A legal expression data was encountered but was not allowed by the *device* at this point in parsing.

Error –180 **Macro error**

This error, as well as errors -181 through -184, are generated when defining a macro or executing a macro.

Error –181 **Invalid outside macro definition**

Indicates that a macro parameter placeholder was encountered outside of a macro definition.

Error –183 **Invalid inside macro definition**

Indicates that the program message unit sequence, sent with a *DDT or *DMC command, is syntactically invalid (see *10.7.6.3)*.

Error –184 **Macro parameter error**

Indicates that a command inside the macro definition had the wrong number or type of parameters.

Error –200 **Execution error**

This code indicates only that an Execution Error as defined in *IEEE 488.2, 11.5.1.1.5* has occurred.

Error –201 **Invalid while in local**

Indicates that a command is not executable while the *device* is in local due to a hard local control (see *IEEE 488.2, 5.6.1.5*). For example, a *device* with a rotary switch receives a message which would change the switches state, but the *device* is in local so the message can not be executed.

Error –202 **Settings lost due to rtl**

Indicates that a setting associated with a hard local control (see *IEEE 488.2, 5.6.1.5*) was lost when the *device* changed to LOCS from REMS or to LWLS from RWLS.

Error –210 **Trigger error**

Error –211 **Trigger ignored**

Indicates that a GET, *TRG, or triggering signal was received and recognized by the device but was ignored because of device timing considerations. For example, the device was not ready to respond.

Error –212 **Arm ignored**

Indicates that an arming signal was received and recognized by the *device* but was ignored.

Error –213 **Init ignored**

Indicates that a request for a measurement initiation was ignored as another measurement was already in progress.

Error –214 **Trigger deadlock**

Indicates that the trigger source for the initiation of a measurement is set to GET and subsequent measurement query is received. The measurement cannot be started until a GET is received, but the GET would cause an INTERRUPTED error.

Error –215 **Arm deadlock**

Indicates that the arm source for the initiation of a measurement is set to GET and subsequent measurement query is received. The measurement cannot be started until a GET is received, but the GET would cause an INTERRUPTED error.

Error –220 **Parameter error**

Indicates that a program data element related error occurred.

Error –221 **Settings conflict**

Indicates that a legal program data element was parsed but could not be executed due to the current device state (see *IEEE 488.2, 6.4.5.3 and 11.5.1.1.5*).

Error –222 **Data out of range**

Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the *device* (see *IEEE 488.2, 11.5.1.1.5*).

Error –223 **Too much data**

Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device- specific requirements.

Error –224 **Illegal parameter value**

Used where exact value, from a list of possibles, was expected.

Error –230 **Data corrupt or stale**

Possibly invalid data; new reading started but not completed since last access.

Error –231 **Data questionable**

Indicates that measurement accuracy is suspect.

Error –240 **Hardware error**

Indicates that a legal program command or query could not be executed because of a hardware problem in the *device*.

Error –241 **Hardware missing**

Indicates that a legal program command or query could not be executed because of missing *device* hardware. For example, an option was not installed.

Error –250 **Mass storage error**

Indicates that a mass storage error occurred.

Error –251 **Missing mass storage**

Indicates that a legal program command or query could not be executed because of missing mass storage. For example, an option that was not installed.

Error –252 **Missing media**

Indicates that a legal program command or query could not be executed because of a missing media. For example, no disk.

Error –253 **Corrupt media**

Indicates that a legal program command or query could not be executed because of corrupt media. For example, bad disk or wrong format.

Error –254 **Media full**

Indicates that a legal program command or query could not be executed because the media was full. For example, there is no room on the disk.

Error –255 **Directory full**

Indicates that a legal program command or query could not be executed because the media directory was full.

Error –256 **File name not found**

Indicates that a legal program command or query could not be executed because the file name on the device media was not found. For example, an attempt was made to read or copy a nonexistent file.

Error –257 **File name error**

Indicates that a legal program command or query could not be executed because the file name on the device media was in error. For example, an attempt was made to copy to a duplicate file name.

Error –258 **Media protected**

Indicates that a legal program command or query could not be executed because the media was protected. For example, the write-protect switch on a memory card was set.

Error –260 **Expression error**

Indicates that an expression program data element related error occurred.

Error –261 **Math error in expression**

Indicates that a syntactically legal expression program data element could not be executed due to a math error. For example, a divide-by-zero was attempted.

Error –270 **Macro error**

Indicates that a macro-related execution error occurred.

Error –271 **Macro syntax error**

Indicates that a syntactically legal macro program data sequence, according to *IEEE 488.2, 10.7.2*, could not be executed due to a syntax error within the macro definition (see *IEEE 488.2, 10.7.6.3*).

Error –272 **Macro execution error**

Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition (see *IEEE 488.2, 10.7.6.3)*.

Error –273 **Illegal macro label**

Indicates that the macro label defined in the **DMC* command was a legal string syntax, but could not be accepted by the *device* (see *IEEE 488.2, 10.7.3 and 10.7.6.2*). For example, the label was too long, the same as a common command header, or contained invalid header syntax.

Error –274 **Macro parameter error**

Indicates that the macro definition improperly used a macro parameter placeholder (see *IEEE 488.2, 10.7.3*).

Error –275

Macro definition too long

Indicates that a syntactically legal macro program data sequence could not be executed because the string of block contents were too long for the device to handle (see *IEEE 488.2, 10.7.6.1*).

Error –276

Macro recursion error

Indicates that a syntactically legal macro program data sequence could not be executed because the device found it to be recursive (see *IEEE 488.2 10.7.6.6*).

Error –277

Macro redefinition not allowed

Indicates that syntactically legal macro label in the *DMC command could not be executed because the macro label was already defined (see *IEEE 488.2, 10.7.6.4*).

Error –278

Macro header not found

Indicates that a syntactically legal macro label in the *GMC? query could not be executed because the header was not previously defined.

Error –280

Program error

Indicates that a downloaded program-related execution error occurred.

Error –281

Cannot create program

Indicates that an attempt to create a program was unsuccessful. A reason for the failure might include not enough memory.

Error –282

Illegal program name

The name used to reference a program was invalid. For example, redefining an existing program, deleting a nonexistent program, or in general, referencing a nonexistent program.

Error –283

Illegal variable name

An attempt was made to reference a nonexistent variable in a program.

Error –284 **Program currently running**

Certain operations dealing with programs are illegal while the program is running. For example, deleting a running program is not possible.

Error –285 **Program syntax error**

Indicates that syntax error appears in a downloaded program.

Error –286 **Program runtime error**

Error –300 **Device-specific error**

This code indicates only that a Device-Dependent Error as defined in *IEEE 488.2, 11.5.1.1.6* has occurred.

Error –310 **System error**

Indicates that some error, termed “system error” by the device, has occurred.

Error –311 **Memory error**

Indicates that an error was detected in the *device’s* memory.

Error –312 **PUD memory lost**

Indicates that the protected user data saved by the *PUD command has been lost.

Error –313 **Calibration memory lost**

Indicates that nonvolatile calibration data used by the *CAL? command has been lost.

Error –314 **Save/recall memory lost**

Indicates that the nonvolatile data saved by the *SAV command has been lost.

Error –315 **Configuration memory lost**

Indicates that nonvolatile configuration data saved by the *device* has been lost.

Error –330 **Self-test failed**

Error –350 **Queue overflow**

This code indicates that there is no room in the queue and an error occurred but was not recorded. This code is entered into the queue in lieu of the code that caused the error.

Error –400 **Query error**

This code indicates only that a Query Error as defined in *IEEE 488.2 11.5.1.1.7 and 6.3* has occurred.

Error –410 **Query INTERRUPTED**

Indicates that a condition causing an INTERRUPTED Query error occurred (see *IEEE 488.2, 6.3.2.3*). For example, a query followed by DAB or GET before a response was completely sent.

This message appears when you query a measurement without immediately entering the returned value into a variable. For example, the following program lines query the TX Frequency measurement and enter its value into a variable (Rf_freq):

```
OUTPUT 714;"MEAS:RFR:FREQ:ABS?"
ENTER 714;Rf_freq
```

Error –420 **Query UNTERMINATED**

Indicates that a condition causing an UNTERMINATED Query error occurred (see *IEEE 488.2, 6.3.2.2.*). For example, the *device* was addressed to talk and an incomplete program message was received.

This message usually appears when trying to access a measurement that is not active. For example, you cannot query the DTMF Decoder measurements from the DUPLEX TEST screen, or query the TX Frequency measurement when the **`TX Freq Error`** measurement is displayed.

Error –430 **Query DEADLOCKED**

Indicates that a condition causing a DEADLOCKED Query error occurred (see *IEEE 488.2, 6.3.1.7*). For example, both input buffer and output buffer are full and the device cannot continue.

Error –440 **Query UNTERMINATED after indefinite response**

Indicates that a query was received in the same program message after a query requesting an indefinite response was executed (see *IEEE 488.2, 6.5.7.5.7*).

Error –606 **Update of Input Module Relay Switch Count file failed.**

Indicates that the Test Set was not able to update the Input Module Relay Switch Count EEPROM file with the current switch count data from the non-volatile RAM switch count array. This error is most probably generated as a result of a hardware error or failure. Refer to the *Agilent 8924C Assembly Level Repair Manual* for diagnostic information.

Error –607 **Checksum of Non-Volatile RAM Relay Count data bad.**

Indicates that the Test Set was not able to generate the proper checksum for the Input Module Relay Switch Count data from the non-volatile RAM switch count array. This error is most probably generated as a result of a hardware error or failure. Refer to the *Agilent 8924C Assembly Level Repair Manual* for diagnostic information.

Error –608 **Initialization of Input Module Relay Count file failed.**

Indicates that the Test Set was not able to initialize the Input Module Relay Switch Count EEPROM file during installation of a new input module. This error is most probably generated as a result of a hardware error or failure. Refer to the *Agilent 8924C Assembly Level Repair Manual* for diagnostic information.

Error –1300 **Order attempted while not in Connect state.**

Indicates that an attempt was made to send an order type Mobile Station Control Message (that is - order a change in power level, put the mobile station in maintenance mode, or send an alert message to the mobile station) when the Call Processing Subsystem was not in the Connect state.

Error –1301 **Handoff attempted while not in Connect state.**

Indicates that an attempt was made to handoff a mobile station to a new voice channel when the Call Processing Subsystem was not in the Connect state.

Error –1302 **Release attempted while not in Connect state.**

Indicates that an attempt was made to send a Release message to a mobile station when the Call Processing Subsystem was not in the Connect state.

Error –1303 **Page attempted while not in Active state.**

Indicates that an attempt was made to Page a mobile station when the Call Processing Subsystem was not in the Active state.

Error –1304 **Origination attempted while not in Active state.**

Indicates that a mobile station attempted to originate a call to the simulated Base Station when the Call Processing Subsystem was not in the Active state.

Error –1305 **Registration attempted while not in Active state.**

Indicates that an attempt was made to send a Registration message to a mobile station when the Call Processing Subsystem was not in the Active state.

Error –1306 **Origination in progress.**

Indicates that an attempt was made to; register, page, handoff, release, order a change in power level, put the mobile station in maintenance mode, or send an alert message to the mobile station while an origination was in progress.

Error –1307 **Timeout occurred while attempting to register Mobile.**

Indicates that the simulated Base Station's internal timer expired before receiving a response from the mobile station during a registration attempt. The internal timer is set to 20 seconds when the **`Register`** state is entered.

Error –1308 **Timeout occurred while attempting to page Mobile.**

Indicates that the simulated Base Station's internal timer expired before receiving a response from the mobile station during a page attempt. The internal timer is set to 20 seconds when the **`Page`** state is entered.

Error –1309 **Timeout occurred while attempting to access Mobile.**

Indicates that the simulated Base Station's internal timer expired before receiving a response from the mobile station during an access attempt. The internal timer is set to 20 seconds when the **`Access`** state is entered.

Error –1310 **Timeout occurred while attempting to alert Mobile.**

Indicates that the simulated Base Station's internal timer expired before receiving a response from the mobile station during an alert attempt. The internal timer is set to 20 seconds when the alert order is sent to the mobile station.

Error –1311 **RF power loss indicates loss of Voice Channel.**

When the **`CALL CONTROL`** screen is displayed and the Call Processing Subsystem is in the **`Connect`** state, the host firmware constantly monitors the mobile station's transmitted carrier power. If the power falls below 0.0005Watts the simulated Base Station will terminate the call and return to the **`Active`** state. This error message is displayed if the host firmware has detected that the mobile station's carrier power has fallen below the 0.0005Watts threshold. The call is dropped and the Call Processing Subsystem returns to the **`Active`** state.

NOTE: In order to ensure that the host firmware makes the correct decisions regarding the presence of the mobile stations's RF carrier, the Test Set's RF power meter should be zeroed when first entering the Call Processing Subsystem (that is - the first time the CALL CONTROL screen is selected during a measurement session). Failure to zero the power meter can result in erroneous RF power measurements. See "Using the Analog Call Processing Subsystem" chapter in the *Agilent 8924C Application Guide* for information on zeroing the RF Power meter.

Error –1312 **Data from RVC contains invalid bits in word [1,2,3].**

Indicates that the decoded data received on the reverse voice channel contains invalid bits in word 1 and/or word 2 and/or word 3. The raw decoded data is displayed in hexadecimal format in the top right-hand portion of the **`CALL CONTROL`** screen. Raw decoded data is only displayed when the **`CALL CONTROL`** screen **`Display`** field is set to **`Data.`**

Error –1313 **Timeout occurred while in Maintenance state.**

Indicates that the simulated Base Station's internal timer expired before the mobile station was taken out of the maintenance state. The internal timer is set to 20 seconds when the maintenance order is sent to the mobile station.

Error –1314 **Alert attempted while not in Maintenance or Connect state.**

Indicates that an attempt was made to send an Alert order to the mobile station when the Call Processing Subsystem was not in the Maintenance state or Active state.

Error –1315 **Data from RECC contains invalid bits in word [1,2,3].**

Indicates that the decoded data received on the reverse control channel contains invalid bits in word 1 and/or word 2 and/or word 3. The raw decoded data is displayed in hexadecimal format in the top right-hand portion of the **`CALL CONTROL`** screen. Raw decoded data is only displayed when the **`CALL CONTROL`** screen **`Display`** field is set to **`Data.`**

Error –1316 **Incomplete data received on RECC for word [1,2,3].**

Indicates that the decoded data received on the reverse control channel did not contain the proper number of bits in word 1 and/or word 2 and/or word 3. The raw decoded data is displayed in hexadecimal format in the top right-hand portion of the **`CALL CONTROL`** screen. Raw decoded data is only displayed when the **`CALL CONTROL`** screen **`Display`** field is set to **`Data.`**

Error –1317 **Incomplete data received on RVC for word [1,2,3].**

Indicates that the decoded data received on the reverse voice channel did not contain the proper number of bits in word 1 and/or word 2 and/or word 3. The raw decoded data is displayed in hexadecimal format in the top right-hand portion of the **`CALL CONTROL`** screen. Raw decoded data is only displayed when the **`CALL CONTROL`** screen **`Display`** field is set to **`Data.`**

List of Text Only Error Messages

Operation errors generally occur when you try to do something the Test Set was not designed to do. Most messages tell you what to do to correct the problem, (turn something off, reduce a field's value, press a certain key, and so forth).

Some common messages are listed here:

All self tests passed.

The Test Set did not detect any hardware or firmware failures during its initial self-diagnostics. This message should always be displayed immediately after instrument turn on.

Cal file checksum incorrect - initializing file.

This error usually occurs after changing the Test Set's firmware ROM's. It is not a problem in that instance, but should not re-appear during subsequent operation of the Test Set.

Cannot make call at this time.

This error message appears when a call is attempted while the Test Set is performing another call processing function, such as registration. Press the END CALL key and attempt the call again.

Change Ref Level, Input Port or Attenuator (if using "Hold").

The RF signal level is either too great or too small for the current input port, attenuator setting, or both. This error often occurs when trying to make a low-level measurement using the RF IN/OUT port with the Spectrum Analyzer. Make the indicated changes until this message is no longer displayed.

Change RF Gen Amplitude, Output Port or Atten Hold (if on).

This message appears when the RF Generator’s **`Amplitude`** field is set too high when using the RF IN/OUT port or when adjusting the amplitude with the **`Atten Hold`** field set to **<u>`On`</u>**.

The RF IN/OUT port has a lower maximum output level than the DUPLEX OUT port. Use the DUPLEX OUT port, or reduce the RF Generator’s level.

If **`Atten Hold`** is **<u>`On`</u>**, you may be adjusting the amplitude outside of the allowed range. Change the amplitude

Decoder buffer full. Decrease gate time.

Too many decoder samples were sent to the decoder’s buffer during a measurement gate time causing a data overflow. Reducing the gate time decreases the amount of data sent during each measurement.

Delta between RF Power and a channel level greater than 30 dB

A code channel level (pilot, sync, paging, or traffic) is set to a value outside of the 30 dB range relative to the RF Power level.

To find out which code channel is causing this error message, calculate the delta between RF Power and Sector A power. Add to this value the delta between Sector A power and the code channel that is set to the lowest value. If this total exceeds 30 dB, decrease the delta by adjusting the code channel level or the Sector A Power level closer to the displayed RF Power. Repeat for Sector B if necessary.

Direct latch write occurred. Cycle power when done servicing.

The SERVICE screen was accessed and one or more internal latch settings were changed. Turn the instrument off and back on to reset the latches. (This condition can occur during periodic calibration.)

Input value out of range.

A number was entered that was too large or small for the selected field, for example, trying to set **`AFG1 Freq`** to 125 kHz.

Invalid channel setting with paging rate set to ‘half’.

It is invalid to set the Sector A **`Paging`** field or the Sector B **`Pilot`** field to a level between –3.01 and 0 dB with the **`Page Rate`** field (on the CELL SITE CONFIGURATION screen) set to **`Half`**.

Readjust the Sector A **`Paging`** field and/or the Sector B **`Pilot`** field (on the CDMA GENERATOR CONTROL screen) so that neither is at a value between –3.01 and 0 dB. Or, set the **`Page Rate`** field to **`Full`** to allow levels up to 0 dB.

Invalid keystroke.

You used a key that has no function relating to the selected field, for example, pressing the [ON/OFF] key while the **Filter 1** field is selected.

One or more self tests failed. Error code: XXXX

An instrument failure was detected when the Test Set was turned on. (For example, having a stuck front-panel key during turn on.) The numbered error message corresponds to a binary-weighted group of errors listed in the *TST Common Command description in GP-IB Common Commands chapter of the *Agilent 8924C Condensed Programming Reference Guide*.

Option not installed.

You selected a function that requires optional hardware that is not present.

Squelch interrupt overflow. Press MEAS RESET.

The Test Set temporarily interrupts audio measurements when squelch is first broken to prevent internal switching transients from influencing measurements (except when using the OSCILLOSCOPE, SPECTRUM ANALYZER, DECODER, or SERVICE screens). If squelch is repetitively broken in a period of a few seconds, the duration of measurement interruption becomes too great, and the Test Set stops interrupting the signal. Following measurements may be influenced by transient signals.

Pressing [MEAS RESET] clears the data buffer used to generate interrupts, resetting the normal squelch operation to eliminate transients.

This condition may occur when monitoring low-level off-the-air signals.

Turn off either AM or FM settings.

You tried to create simultaneous AM and FM (using any combination of AFGen1, AFGen2, and the **`Mod In To`** field). The Test Set does not provide simultaneous AM and FM.

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