CDMA Infrastructure Smart Module

Operating Instructions

Chapter Introduction

This chapter covers the operating instruction and procedures for using the CyberTest CDMA Smart Module instruments. It is to be used in conjunction with the information contained in the section on Common CyberTest operations and instruments. The areas that will be covered are:

- Basic instrument descriptions
- Selecting a test environment
- Making the connections required for testing
- Selecting instruments
- Selecting display methods
- Setting testing parameters

These instructions cover the basic operation of each instrument built into the CyberTest CDMA Smart Module. These instruments are covered individually, along with instructions on how to connect them in combinations. Since there are many possible combinations, the interconnect capabilities will be described but not specific combinations for specific tests. Specific test combinations will be left to the operator as the testing needs are determined.

Smart Module Connections

1. Connect the base station's "Timing Reference" to the CDMA Infrastructure's "EVEN SEC REF" BNC type connector.

2. Connect the base station's "Frequency Reference" to the CDMA Infrastructure's "19.6608 MHZ" BNC type connector.

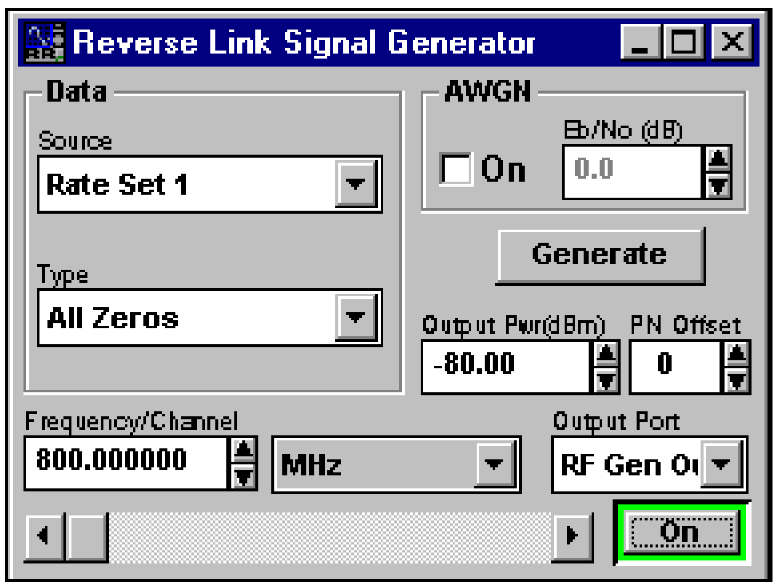
3. If desired, connect a 10 MHz frequency standard to the connector labeled "Frequency Standard IN" on the rear panel.

CDMA Smart Module Instrument Descriptions

Reverse Link Signal Generator

The Reverse Link Signal Generator (Figure 1) produces a CDMA Offset QPSK reverse-link signal that is used to test the receiver circuitry in CDMA base stations while in a test mode. The generator allows you to transmit data from pre-programmed files including random 9.6 kbps (rate set 1) data and random 14.4 kbps (rate set 2) data. Other data files can be created. An Additive White Gaussian Noise generator allows you to precisely set the Eb/No levels being transmitted to the base station under test. This is needed to conduct CDMA receiver performance testing described by industry and manufacturer's standards.

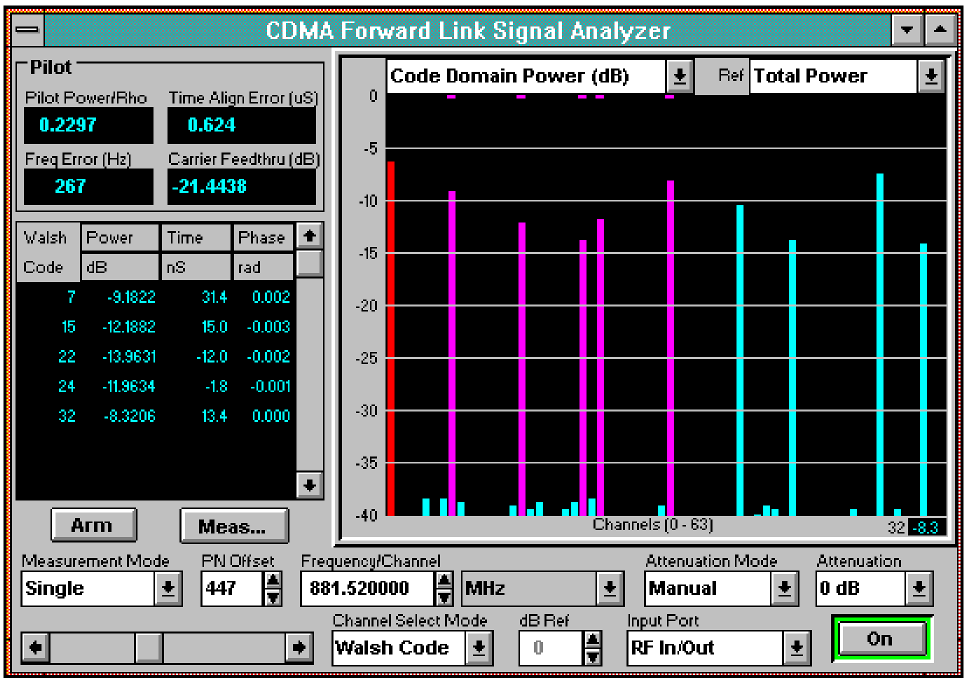
Figure 1. **Reverse Link Signal Generator**



CDMA Forward Link Signal Analyzer

In CDMA wireless systems, one RF carrier signal is used to carry several traffic and data channels that are separated from each other by unique codes. On the forward link, these codes are called Walsh codes and there are 64 of them — allowing for 64 channels. For proper system operation, it is essential that each of these codes are properly aligned with one another in time and phase or else the channels will begin to interfere with each other. The amount of power being transmitted by the base station in each of these channels is also important as the power relationships among channels also impacts system performance. The CyberTest CDMA Forward Link Signal Analyzer (Figure 2) is optimized to perform these code domain measurements easily and efficiently. Its unique graphical display is analogous to that of a spectrum analyzer with power on the y-axis and channels on the x-axis.

Figure 2. **CDMA Forward Link Signal Analyzer**



Rho Measurement

Rho is the figure of merit for a CDMA transmitter. Rho is a measure of how close the transmitted signal matches an ideal or “perfect” waveform. The rho measurement is performed on a pilot-only signal. As part of the calculation of rho, the frequency error of the RF carrier and the time alignment between the pilot signal and the CDMA system time is determined and displayed.

Code Domain Power/Phase/ Time Measurement

With the CyberTest platform’s CDMA Forward Link Analyzer instrument, each Walsh code can be measured for:

- Signal power
- Phase
- Time alignment

Measurements for all 64 codes are displayed graphically. This allows you to see all of the activity on a particular CDMA RF frequency and if the Walsh traffic channels are interfering with each other. Color coding makes it easy for you to identify the pilot, sync, and traffic channels. Channels can be selected for more precise measurement in two different ways:

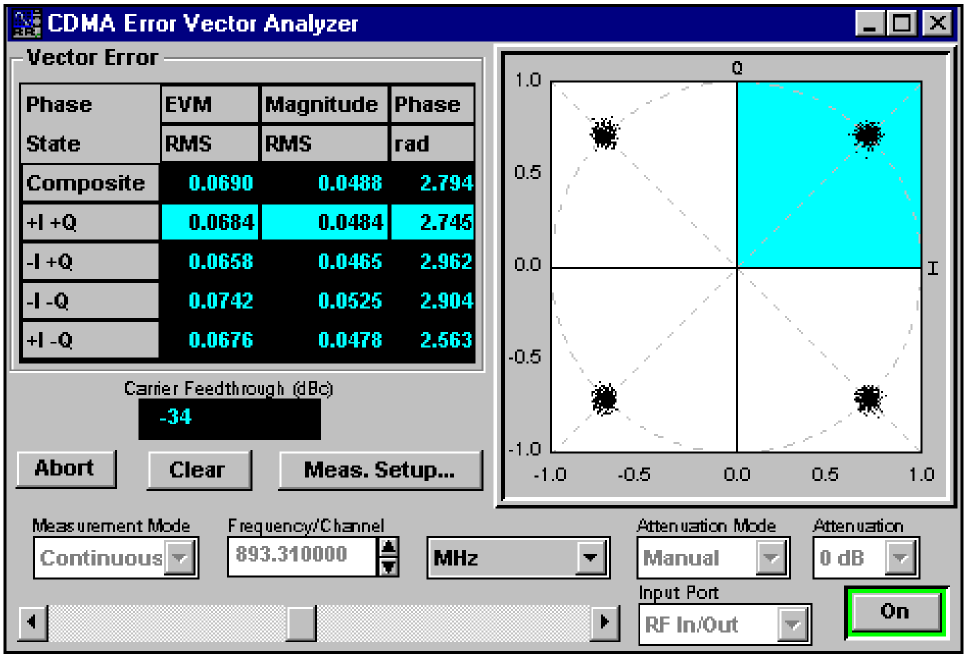
- Clicking on the graphic display screen.
- Entering a threshold value whereby any channel who’s power exceeds the threshold is automatically selected for measurement.

Performing precise code domain measurements requires a certain amount of processing time. As additional channels are selected for measurement, the computation time increases. With this instrument, you can trade-off test speed for additional channel measurements.

CDMA Error Vector Analyzer

Error Vector Magnitude (or EVM) is becoming an industry-accepted measurement of modulator performance in digital communication systems. The error vector is an indication of how close the modulator in the transmitter being tested is performing as compared to the ideal case. Another important measure of modulator performance is Carrier CDMA. Error Vector Analyzer provides unprecedented test capability in an easy to read display. The controls are shown in Figure 3.

Figure 3. **CDMA Error Vector Analyzer Controls**



Constellation Display

The signal constellation of the CDMA forward link waveform is displayed in the I-Q signal space. Every bit of information transmitted is represented by a dot on the screen. By looking at how closely clustered the patterns of dots are and how far they are from ideal you can identify and diagnose modulator problems. Convenient gridlines make it easy to see the specified locations for the modulated points.

Numerical Display

The CyberTest Error Vector instrument displays the EVM, magnitude and phase numerically for each quadrant of the I-Q diagram as well as the values for the composite signal. Color coding makes it easy to tie the results data to a particular quadrant.

CyberTAME Software Operations Review

Overview

The CyberTAME software is the main display component of the CyberTest system. It provides the interface between the CyberTest Analyzer and the operator. This software sets up the operating environment and provides displays for all of the instrumentation built into the system. This section covers the basic operation of the CyberTAME Software. It details:

- Starting software.
- Selection and setup of the test environment.
- Saving the test environment.
- Using CyberTest instruments.

Also covered is the instrument display method setup that the operator desires.

Starting the CyberTAME Software

Review the CyberTAME software section in the section on Common CyberTest operations and instruments.

Starting the CyberTAME Software

The CyberTAME software starts from the Program Manager in Windows.

1. Open Program Manager if not already open.
2. Locate the CyberTAME icon in the appropriate Program Group.
3. Double-click the CyberTAME icon to start the software.

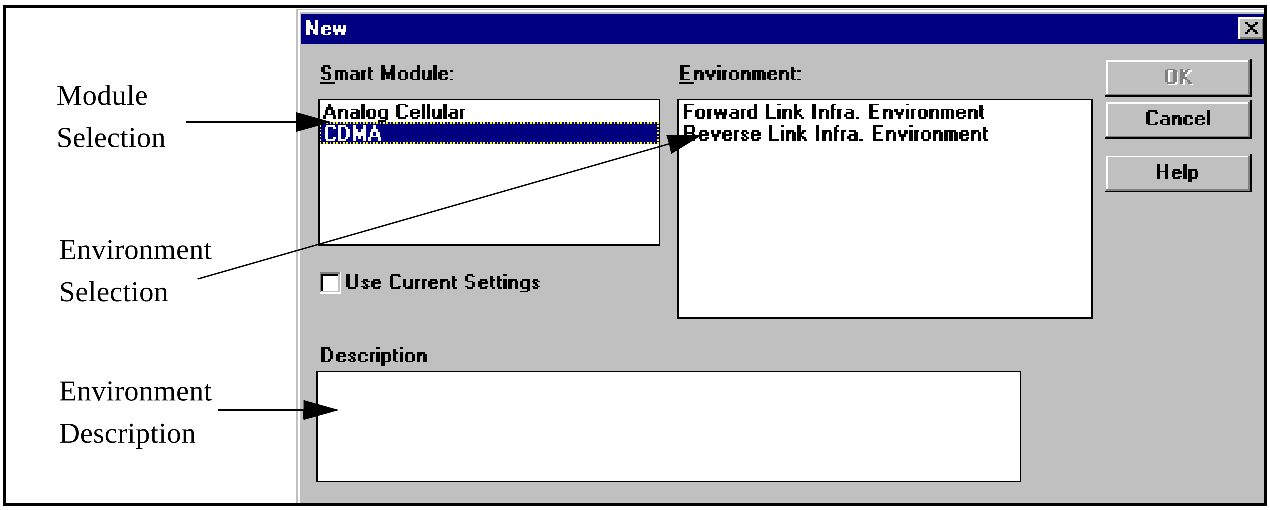
New File Command

The New File Command provides access to the operating environment and instrument selection and setup in the CyberTest system. It is used to define a new operating environment, including the instruments that will be used and the selected connections between the instruments and the equipment under test. Selection of the New command accomplishes the following operations in the start of the CyberTAME software.

- Allows you to select the Smart Module.
- Allows you to select and setup desired testing operating environment to perform a particular test.

Figure 4 shows the screen that appears when the New command is selected.

Figure 4. **New File Command Screen**



The Smart Module window in the New File screen lists the Smart Modules installed in the CyberTest system. The Environment window of this screen lists the environments associated with the Smart Module that is highlighted on the left as shown in Figure 4.

To choose an environment:

1. Highlight desired selections in the windows.
2. Click OK button.

The screen also provides a description of the currently highlighted environment. With different selections in the environment window, the description changes to briefly describe the purpose of the selected environment.

Operating Environment Selected

Once a Smart Module and operating environment is chosen, the CyberTAME software main program window changes to add an additional menu choice on the

Menu Bar. The newly added Instrument menu appears to the left of the Special menu.

Instrument Menu

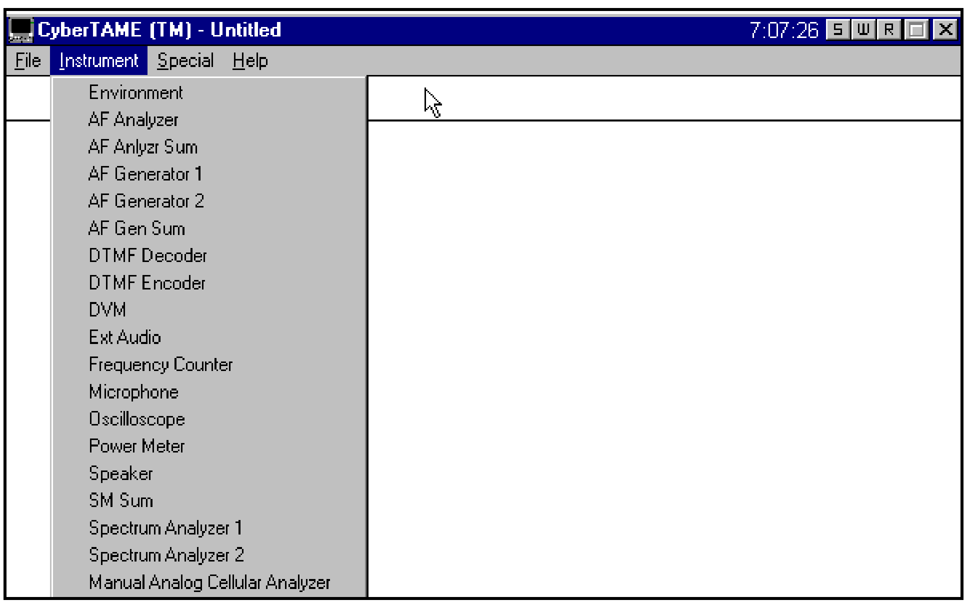
The Instrument menu lists all available instruments for use with the selected environment. In addition, there are two more commands that appear on the Special menu. These are:

Special Menu

- Reset
- IEEE-488

The CyberTAME main window with the Instrument menu chosen is shown in Figure 5.

Figure 5. **Instrument Menu Displayed**



Some of the instruments listed in the Instrument menu are dependent on the Smart Module and the selected operating environment. The following instruments are common and appear regardless of the Smart Module or environment chosen:

- AF Analyzer
- AF Generators

- DTMF Encoder
- DTMF Decoder
- Volt Meter (DVM)
- Frequency Counter
- Oscilloscope
- Power Meter
- Spectrum Analyzers

In Figure 5, the Manual Analog Cellular Analyzer is specific to this Smart Module and environment.

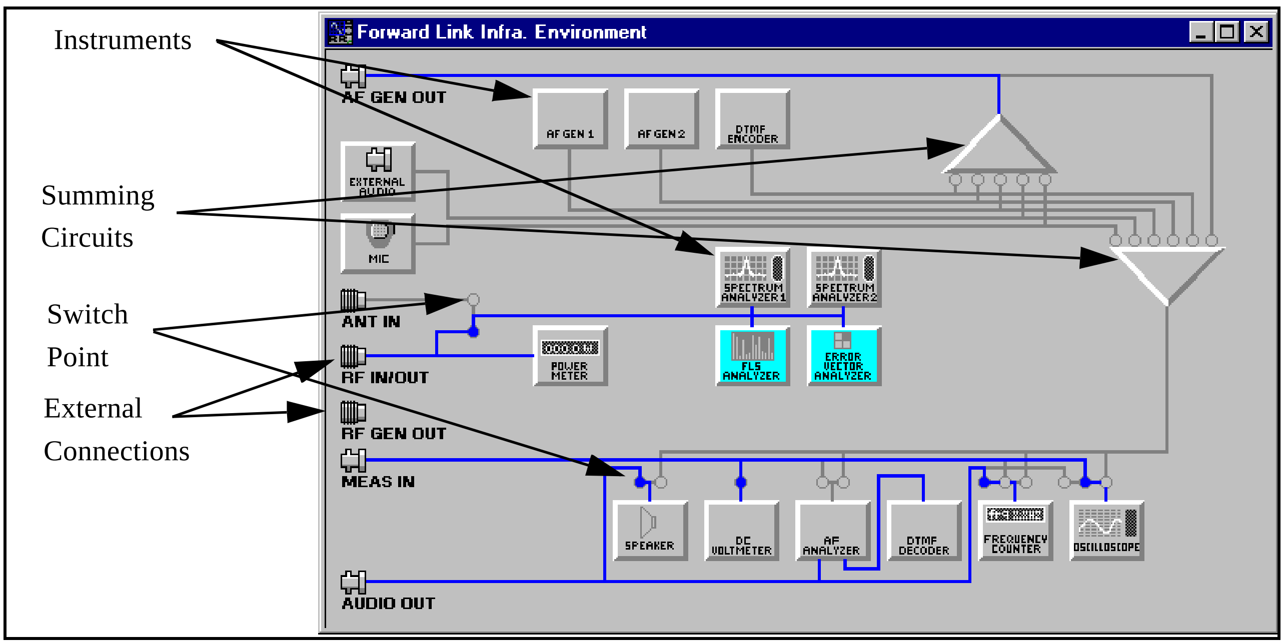
Other items listed on the Instrument menu are not really instruments, but are controllers or displays that provide for interconnections between the various instruments and the equipment under test. Each of these listed items are covered in the following sections.

Operating Environment

CDMA Environment Selected

With the selection of the CDMA Smart Module through the use of the New File Command or the retrieval of a saved CDMA environment, the following Environment Screen will be available (Figure 6).

Figure 6. **CDMA Environment Screen**



Choosing Instruments from the Environment

The instrument or instruments that you desire to use for a particular test can be chosen using two different methods:

- Use Environment menu to choose from a list of instruments.
- Use Environment screen to doubleclick on an instrument icon.

If you choose from the Environment menu list, the instrument is displayed on the computer screen. If you choose from the Environment screen, the instrument is displayed by double-clicking on the icon representing the desired instrument. Again, the instrument will be displayed on the computer screen. Using either method, the displayed instrument can be moved to any location on the computer screen. This instrument display contains all of the controls necessary for its operation and the typical display for that instrument. When an instrument is displayed on the computer screen, turning the instrument on changes the instrument color from grey to yellow.

NOTE

Instruments shown on the environment screen that are provided by the installed Smart Module are identified by their icon's cyan (light blue) color.

Signal Paths and Connections

The signal path lines on the Environment screen are color coded grey, blue or yellow to represent three states.

- Grey lines represent unused or disconnected signal paths.
- Blue lines represent potential signal paths.
- Yellow lines represent paths where is signal is actually flowing.

By default when the Environment screen is first opened, most of these signal path lines are grey. When an instrument is selected and turned on, the signal path line can turn either blue or yellow. These lines change state with the activation of an instrument and the connections chosen for that instrument.

Connections are made and broken through the use of the switch points on the Environment screen represented by the small circles. The Environment screen (Figure 6) shows some connections are hardwired into the system or are default connections and the appropriate signal paths are already coded in a blue color. Additional connections are made as needed by the tests being performed.

Saving a Test Environment

Once you set up a test environment that you want to use again, you can save this environment to disk using the File menu Save command in the CyberTAME main window. The environment can be named and described so that it can be easily retrieved. The saved environment saves:

- Displayed Instruments.
- Connections in the Environment screen.
- Individual instrument settings for all of the set up instruments.

CyberTAME Instruments - CDMA Smart Module

Introduction

The instruments contained in the CyberTest Analyzer are designed to provide testing capability for Cellular Infrastructure and Cellular Subscriber equipment. This section covers the operation of the controls for all CDMA instruments. These controls are covered in general. The specific procedures to accomplish a particular test are left to the technician

Common Instruments

The instruments installed in the basic CyberTest Analyzer package that are available in the CDMA environment include:

- Audio Frequency Analyzer
- Two Audio Frequency Generators
- DTMF Decoder
- DTMF Encoder, DC Voltmeter
- Frequency Counter, Oscilloscope
- Power Meter
- Two Spectrum Analyzers

Smart Module Instruments

In addition to the basic instruments contained in the basic CyberTest Analyzer package, the digital environment includes the following instruments:

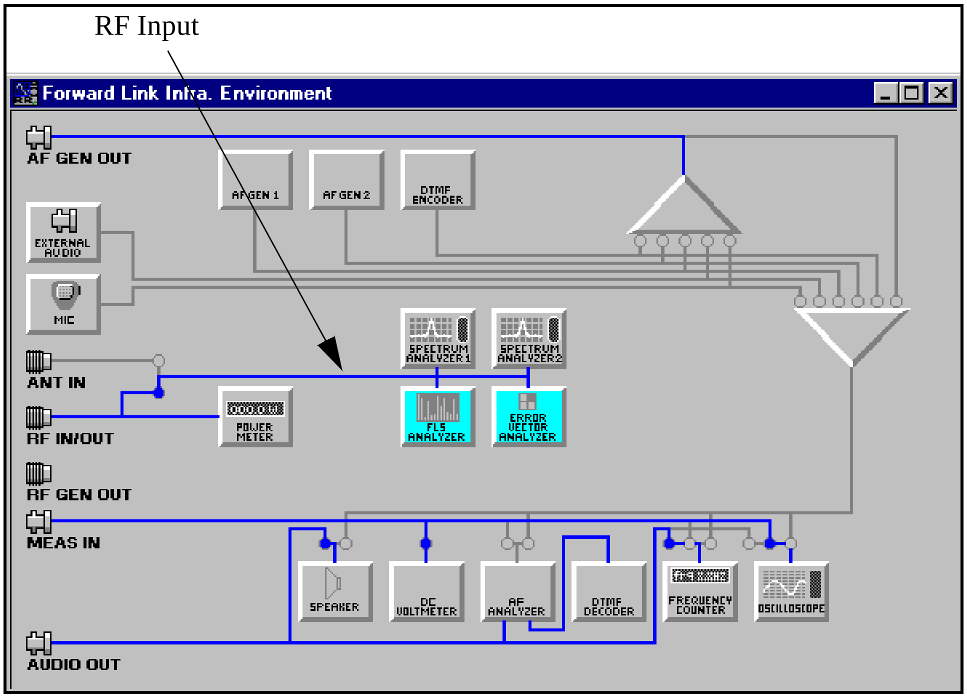
- Reverse Link Signal Generator
- CDMA Forward Link Signal Analyzer
- CDMA Error Vector Analyzer

The operation of each of these instruments is covered individually.

Forward Link Infrastructure Environment

Figure 1 shows the Forward Link Infrastructure Environment. It shows all of the virtual instruments that are available to use in addition to the Forward Link Signal Analyzer and CDMA Error Vector Analyzer instruments. It also shows the various interconnection paths that exist between these instruments. You can use this test environment for testing the transmit circuitry in CDMA cellular base stations.

Figure 1. **Forward Link Infrastructure Environment**



This test environment is nearly identical to most of the other test environments. The difference is the CDMA Forward Link Signal Analyzer and CDMA Vector Analyzer Instruments. These instruments are available when the CDMA Smart Module is inserted into the CyberTest Analyzer and is identified by the icon's cyan (light blue) color (as are all smart module instruments). The top of the environment shows the various sources for audio signals, (i.e., microphone jack, external audio, Audio Frequency Generators 1 & 2, and the DTMF Encoder)

These audio sources can be summed together in various combinations and 1) routed directly out of the analyzer, or 2) routed to the various internal measurement instruments.

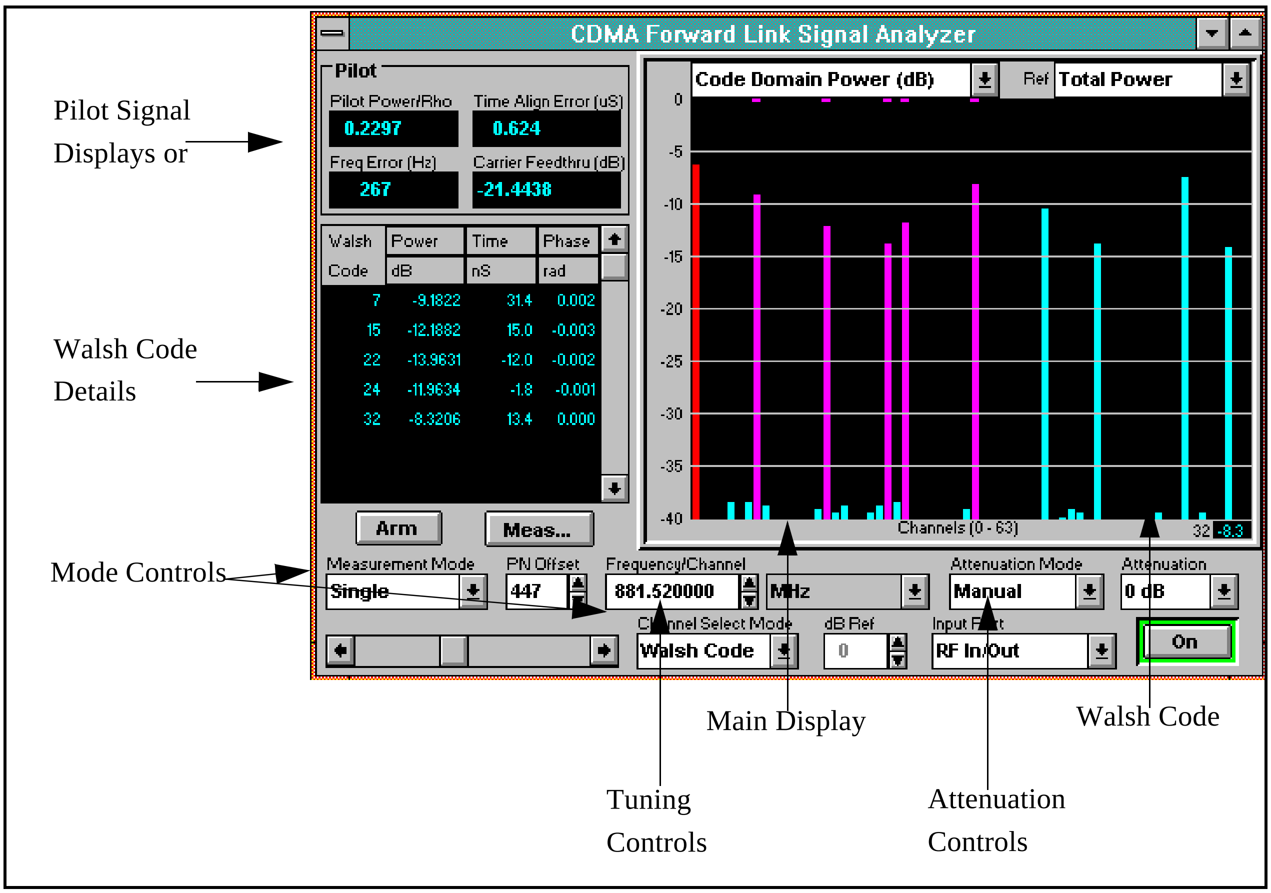
NOTE

Because CDMA is a ***digital*** *wireless system, there is no received audio which can be routed to the various platform instruments (AF Analyzer, Frequency Counter, Oscilloscope, etc.). For this reason, there are no audio signal paths shown on the environment display.*

CDMA Forward Link Signal Analyzer

The CDMA Forward Link Signal Analyzer is designed to analyze and test the power and time and phase alignment of the Walsh code channels of an RF carrier. It displays the Walsh code information on the main display screen with power shown on the Y-axis and channels on the X-axis. The controls are shown in Figure 2.

Figure 2. **CDMA Forward Link Signal Analyzer**



Tuning Controls

The Tuning Controls consist of:

- Frequency/Channel - settable in frequency from 800 MHz to 1000 MHz or from 1700 MHz to 2000 MHz depending on the model number of the analyzer.

– There is no CDMA channel plan at this time. In the USA, the CDMA Cellular system uses channel numbers from the EAMPS system.

- Units drop-down box - units selectable as Hz, kHz, MHz, GHz or a preset cellular channel.

Mode Controls

These controls set and select the mode of operation of the analyzer. They consist of:

- Measurement Mode - selectable as Single or Continuous.
- PN Offset - settable from 0 to 511.
- Channel Select Mode - selectable as Threshold or Walsh Code.
- dB Ref - if Threshold is selected in the Channel Select Mode, this setting is used to change the threshold level for the Walsh Code detail displays. - Settable from -30 to 0 dB.
- Arm button - If the measurement mode is set to single, clicking “ARM” will return a single measurement. If the mode is set to continuous, then the instrument will continuously make measurements. Continuous mode can be stopped by clicking the “ABORT” button. (Note that “ARM” becomes “ABORT” in continuous mode.)

Input Signal Strength

The two input ports on the Cybertest platform can accept differing amounts of input power. If the output power of the base station exceeds the rating of the input port, then another port or external attenuators must be used.

The antenna port (ANT IN) can accept up to 0 dBm of power. If the base stations output power is higher than 0 dBm permanent damage to the Cybertest platform can occur. If the output power is too high, then attenuators can be used to adjust the power level, or (in most cases) the transceiver port can be used.

NOTE

*You **must** have the CDMA base station synchronization signals connected to the CDMA Infrastructure Smart Module. Both the even second reference and the 19.6608 MHz CDMA timebase signals must be connected in order for the forward Link Signal Analyzer instrument to operate. Without these signals present, the analyzer cannot function.*

CDMA Forward Link Signal Analyzer (Cont)

The transceiver port (RF IN/OUT) can accept up to 4 watts (36 dBm) in the low power version (50 watts (47 dBm) in the high power version).

Attenuation Controls

These two controls prevent overdriving the analyzer. They consist of:

- Attenuation Mode - a drop-down box that selects either Manual or Automatic attenuation.
- Attenuation - if Manual is selected for Attenuation Mode, this selects the amount of attenuation. Selectable in 10 dB increments from 0 to 50 dB.

Main Display Screen

This screen displays the overall analyzer readings in several modes. These are:

- Code Domain Power - displays each of the 64 channels across the display with power shown on the vertical axis. Power is shown in relationship to the Pilot Power or Total Power. This is selectable with the Ref drop-down box. If the Channel Select Mode is selected as Threshold, the threshold level is changed using the dB Ref drop-down box or by dragging the Red Threshold level down from the top of the Main Display screen. As this level changes, those channels that exceed the threshold change color on the Main Display. If the Channel Select Mode is selected as Walsh code, individual channels are selectable by clicking on the particular channel display on the Main Display screen. Again, the selected channels change color.
- Relative Time Offset - display mode that shows the time offset errors on the Main Display screen as positive or negative errors in nanoseconds for the previously selected channels.
- Relative Phase Error (rad) -display mode that shows the Phase errors of the selected channels as positive or negative values in radians.
- Relative Phase Error (deg) - display mode that shows the Phase errors of the selected channels as positive or negative values in degrees.

CDMA Forward Link Signal Analyzer (Cont)

Pilot Signal Displays

These displays give readouts of the Pilot Channel power and alignment errors. The displays are:

- Pilot Power/Rho - If only the Pilot (channel 0) is active, the Pilot Power/Rho measurement is Rho. If other channels are active (channel power greater than -30 dB from the pilot) then the measurement is the Pilot Power to Total power ratio.
- Time Align Error - displays the Pilot Channel Time align error in nanoseconds.
- Freq Error - displays the Pilot Channel Frequency Error in Hz.
- Meas... button - allows these displays to portray as Analog Meters with ranges, limits and averaging.

Walsh Code Details

This display region of the CDMA Forward Link Signal Analyzer shows the detailed power measurements, time errors and phase errors of the selected Walsh Code channels. The displays are ordered numerically for the selected channels. The displays are:

- Power - displayed for the selected channels in dB or as a ratio to Pilot Power.
- Time - displayed for the selected channels in nanoseconds.
- Phase - displayed for the selected channels in degrees or radians.

Channels that are selected for display are determined by either those channels that exceed the selected threshold with Threshold selected in the Channel Select Mode or those channels that are manually selected by clicking with the mouse on the Main Display screen with Walsh Code selected in the Channel Select Mode.

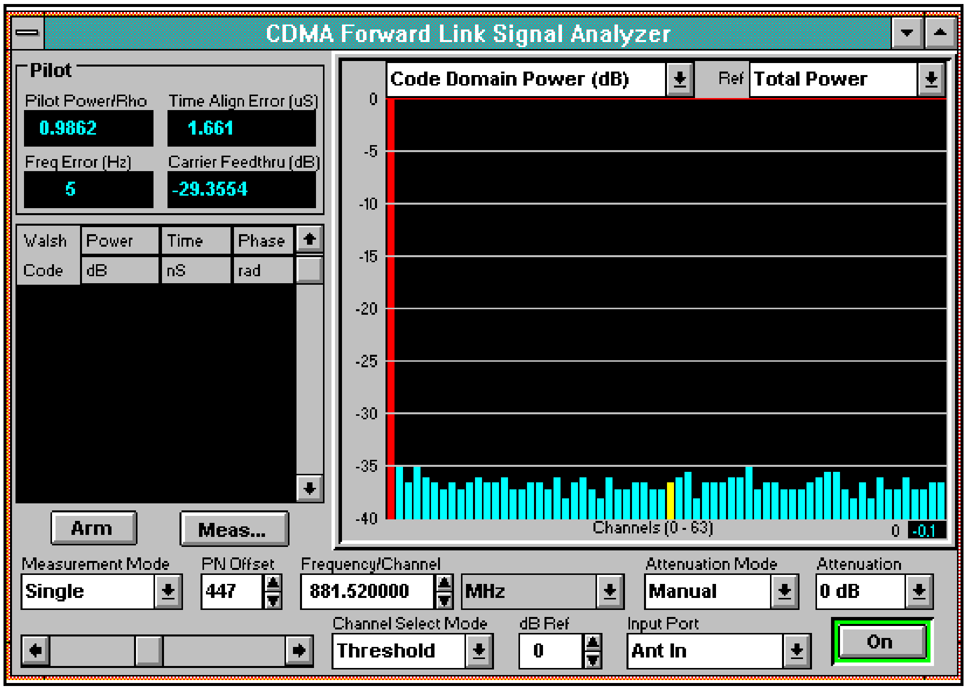
CDMA Forward Link Signal Analyzer (Cont)

Display Examples

Rho Example

A typical “Pilot Only” measurement on a base station is shown in Figure 3:

Figure 3. **Rho Example**



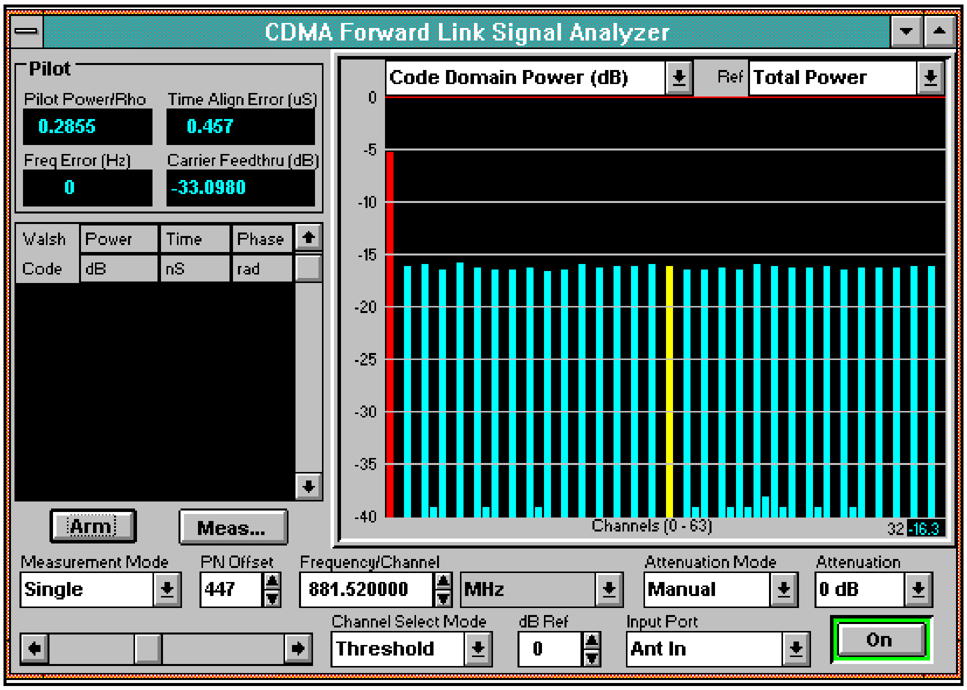
The Rho, Time Alignment Error and Frequency Error measurements are displayed. A quick look at the Code Domain Power graph shows that only the Pilot channel is active.

CDMA Forward Link Signal Analyzer (Cont)

Pilot Power Example

Figure 4 is an example of a base station measurement in which every other channel is active:

Figure 4. **Pilot Power Example**



Pilot Power to Total Power ratio is indicated in the Pilot Power/Rho indicator.

Detailed Channel Information

If channels other than the pilot are active, then detailed information about the channel power, relative time, and relative phase errors can be measured. To get the detailed measurement, the channels of interest need to be selected. Channel selection can be done in one of two ways.

- “Channel Select Mode”
- “Single” measurement mode

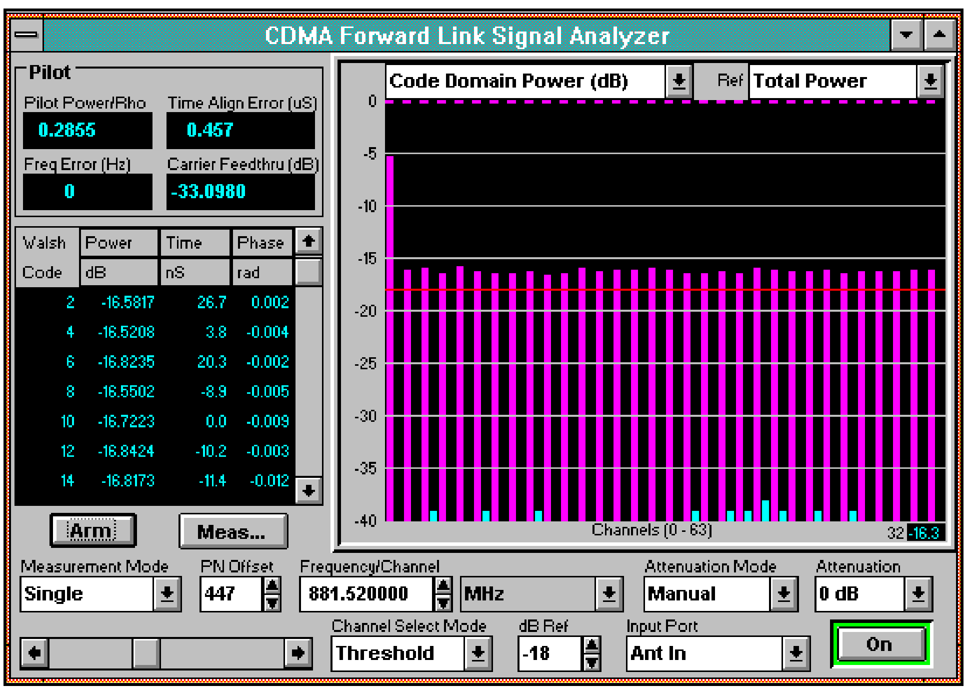
CDMA Forward Link Signal Analyzer (Cont)

With the “Channel Select Mode” set to “Threshold” a reference value can be defined. Channels with power above the threshold are automatically selected. In “Walsh Code” mode, individual channels of interest can be selected by clicking on their respective Code Domain Power graphs. Selected channel numbers are displayed in the “Detailed Channel Information” area on the left side of the instrument.

In “Single” measurement mode, the user must click “ARM” to retrieve the detailed channel information. In “Continuous” mode, the user needs only to wait for the next measurement update.

Figure 5 is an example of a base station measurement in which every other channel is active and the threshold has been set to -18 dB from the pilot.

Figure 5. **Detailed Channel Example**



Purple dashes at the top of the screen indicate which channels are selected. The red line on the screen indicates the current selected threshold level. Detailed measurement data is displayed for the selected channels to the left of the main screen in a scrollable box. Pilot Power to Total Power ratio is indicated in the Pilot Power/Rho indicator.

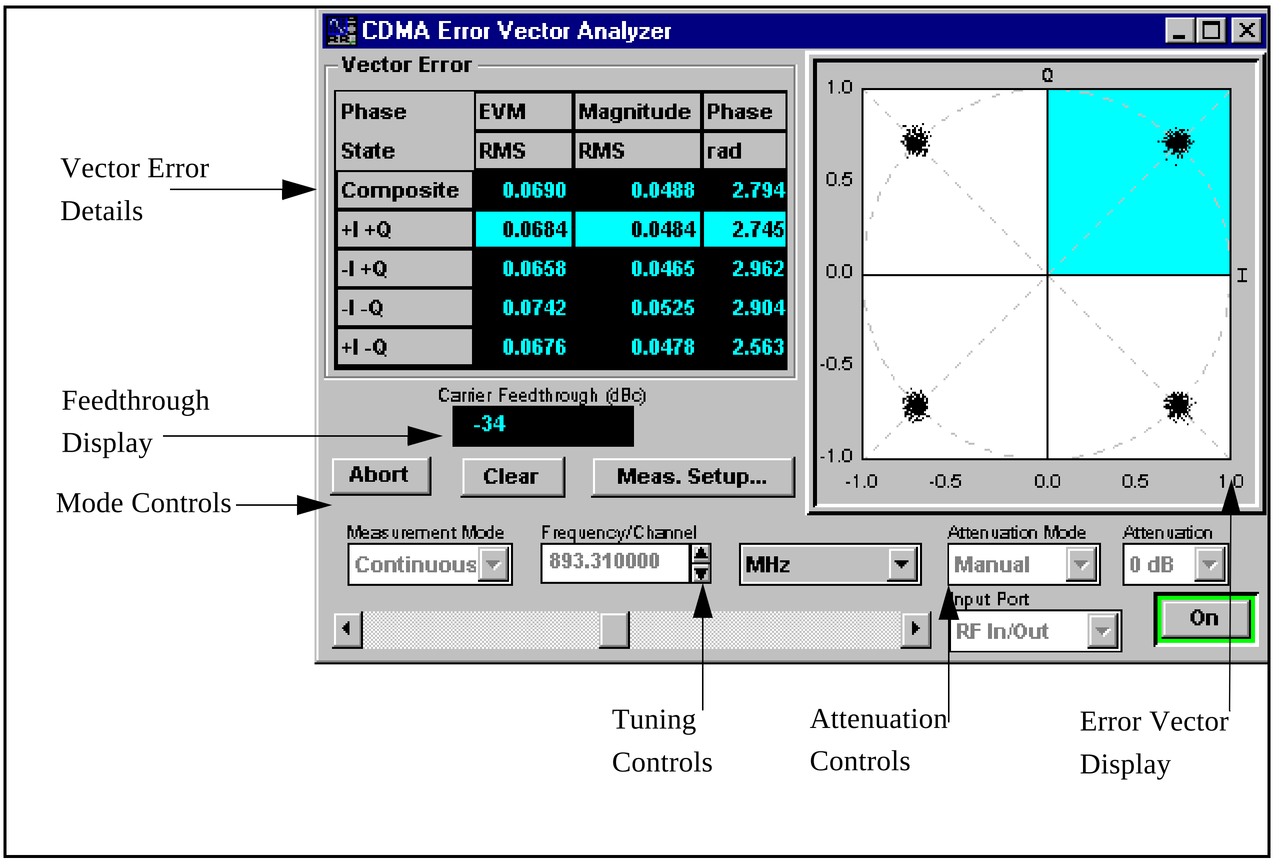
CDMA Forward Link Signal Analyzer Operating Procedure

1. Ensure that the CDMA base station synchronization signals are connected to the front of the CDMA Infrastructure Smart Module (even second reference and the 19.6608 MHz CDMA timebase).
2. Set the test Frequency or preset channel.
3. Select the Attenuation Mode and value desired.
4. Select the Measurement Mode.
5. Set the PN Offset.
6. Select the Input Port.
7. Select the Main Display Screen Mode.
8. Click the **On** button.
9. Click the **Arm** button.
10. Set the Threshold level or Select the desired channels for detail readouts.

CDMA Error Vector Analyzer

The CDMA Error Vector Analyzer indicates how close the modulator in the transmitter is performing as compared to the ideal case. It also provides a measure of how much carrier energy leaks through without being modulated. The displays provided give both a graphical representation and numerical indication of the errors. The controls are shown in Figure 6.

Figure 6. **CDMA Error Vector Analyzer Controls**



Tuning Controls

The Tuning Controls helps you select the Frequency or Channel to be tested. They are:

- Frequency/Channel - settable in Frequency from 800 MHz to 1000 MHz.

CDMA Error Vector Analyzer (Cont)

- Units drop-down box - selectable in Frequency for Hz, kHz, MHz, GHz or cellular present channel.

Attenuation Controls

There are two controls that affect attenuation. These are:

- Attenuation Mode - selectable as Manual or Automatic.
- Attenuation - if Manual attenuation is selected, values are selectable in 10 dB increments from 0 to 50 dB.

Mode Controls

This section contains three controls that determine the analyzer operation. They are:

- Measurement Mode - selectable as Continuous or Single.
- Arm button - starts the operation of the analyzer in continuous or single mode.
- Clear button - if Single Measurement Mode is selected, clicking on this button clears the displays for another measurement prior to use of the Arm button.

Error Vector Display

This is a graphical display of error vector information. The screen shows all four I-Q quadrants. The dotted lines radiating from the center cross a dotted circle in each of the I-Q quadrants. These crossing points represent the ideal points for perfect modulator operation. Every bit of information transmitted is represented by a dot on the screen. These should cluster around the four ideal points. Any difference in dot location from the ideal points represent Error Vector Magnitude values.

Error Details

This section of the analyzer displays the numerical error information. The displays give the readouts for the Composite errors and the readouts for each of the individual I-Q quadrants. The readouts consist of:

- EVM - error Vector Magnitude displays in RMS values.
- Magnitude - displays in RMS values.
- Phase errors - displays in degrees or radians selectable by clicking on the rad or deg box under Phase.

CDMA Error Vector Analyzer (Cont)

For correlation of the numeric display to the graphical display, click on the individual quadrant readouts. The readouts are highlighted as well as the selected quadrant. Alternatively, click on the display quadrant on the Error Vector Display and the readouts are highlighted.

Feedthrough Display

The feedthrough display indicates the amount of signal leaking through the unmodulated carrier. It is displayed in dB.

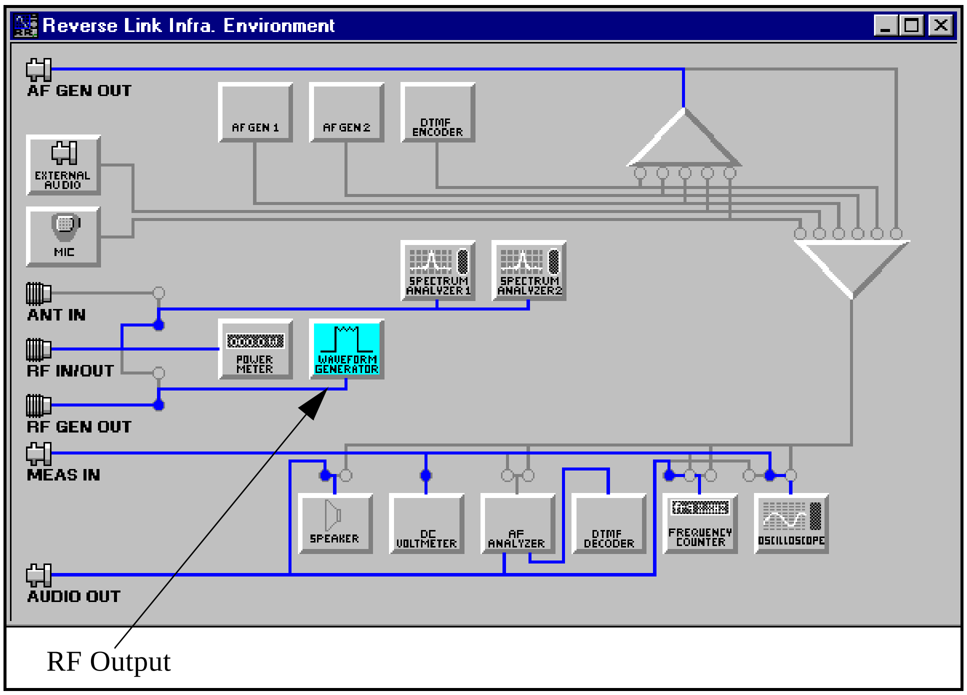
CDMA Error Vector Analyzer Operating Procedure

1. Ensure that the CDMA base station synchronization signals are connected to the front of the CDMA Infrastructure Smart Module (even second reference and the 19.6608 MHz CDMA timebase).
2. Set the test Frequency or cellular preset channel.
3. Select the Attenuation Mode and set the attenuation values as necessary.
4. Select the Measurement Mode.
5. Click the **On** button.
6. Click the **Arm** button to start the analyzer operation.

Reverse Link Infrastructure Environment

Figure 1 shows the Reverse Link Infrastructure Environment. It shows all of the virtual instruments that are available to use in addition to the Reverse Link Signal Generator instrument. It also shows the various interconnection paths that exist between these instruments. You can use this test environment for testing the receive circuitry in CDMA cellular base stations.

Figure 1. **Reverse Link Infrastructure Environment**



This test environment is nearly identical to most of the other test environments. The difference is the Reverse Link Signal Generator Instrument. This instrument is available when the CDMA Smart Module is inserted into the CyberTest Analyzer and is identified by the icon's cyan (light blue) color (as are all smart module instruments). The top of the environment shows the various sources for audio signals, (i.e., microphone jack, external audio, Audio Frequency Generators 1 & 2, and the DTMF Encoder). These audio sources can be summed together in various combinations and 1) routed directly out of the analyzer, or 2) routed to the various internal measurement instruments.

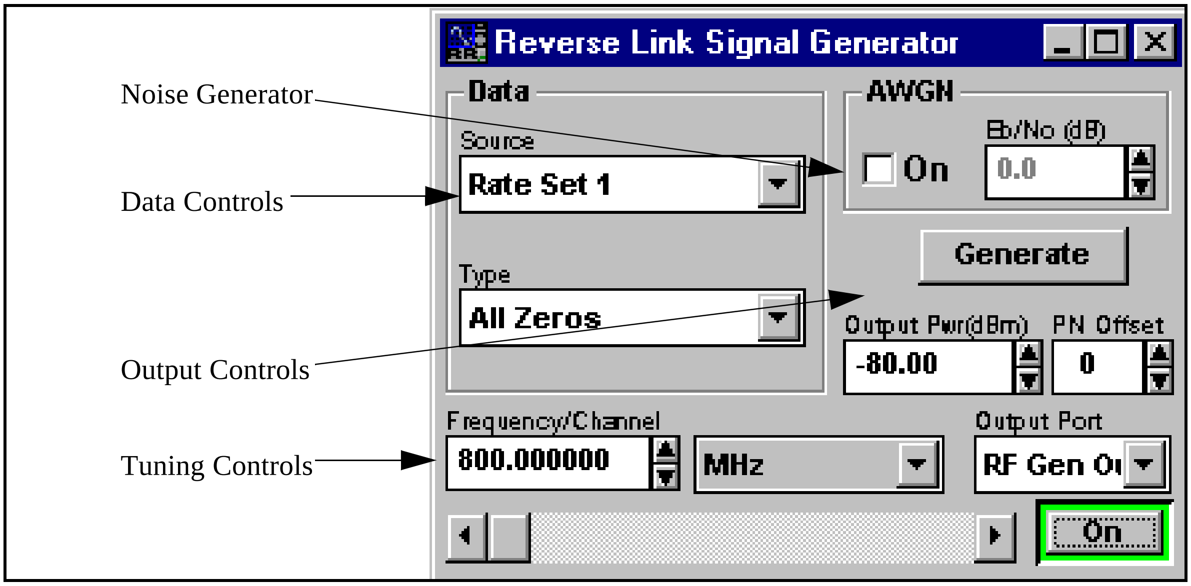
NOTE

Because CDMA is a ***digital*** *wireless system, audio cannot be used to modulate the CDMA Reverse Link Generator. For that reason, there is no signal path shown on the Reverse Link Infrastructure environment display which can be used to route audio signals to the Reverse Link Generator.*

Reverse Link Signal Generator

The Reverse Link Signal Generator produces a CDMA Offset QPSK reverse-signal that is used to test the receiver circuitry in CDMA base stations while in a test mode. The signal generated is either a continuous or a bust signal. The controls are shown in Figure 2.

Figure 2. **Reverse Link Signal Generator Controls**



Tuning Controls

The Tuning controls consist of:

- Frequency/Channel - sets the frequency of the generated signal from 800 to 1000 MHz or sets the frequency to a preset cellular channel.
- Units drop-down box - selects the desired frequency units or the desired cellular present channel.

Data Controls

This section is the primary area to set up the transmission of information. It consists of:

Reverse Link Signal Generator (Cont)

- Source - allows you to choose from Rate Set 1 (9.6 kbs data) or Rate Set 2 (14.4 kbps data).
- Type - allows you to choose between “All Zero” data and “Random” data. Base Stations typically cannot perform FER measurements with the data type set to “All Zeros”. So set the data type to “Random”.

Output Controls

This section consists of three controls:

- Output Pwr - settable from -130 dBm to 0 dBm.
- PN Offset - settable from 0 to 511.
- Output Port - selects the external connection desired. Selectable as Gen Out or XCVR.

Noise Generator

An Additive White Noise Generator allows you to precisely set the Eb/No levels being transmitted to the base station under test. The controls are:

- On Check box - checking this box turns the noise generator on.
- Eb/No - sets the ratio between the energy of each information bit (E_b) and the noise spectral density (n_o). Settable from 0 to 15 dB.

Generate Control

Click on this button to begin generating the reverse link waveform. While generating, this button’s label changes to “Stop” to allow you to stop transmitting.

NOTE

*You **must** have the CDMA base station synchronization signals connected to the CDMA Infrastructure Smart Module in order for the Reverse Link Generator to be able to generate. Both the even second reference and the 19.6608 MHz CDMA timebase must be connected.*

Reverse Link Signal Generator Operating Procedure

1. Ensure that the CDMA base station synchronization signals are connected to the front of the CDMA Infrastructure Smart Module (even second reference and 19.6608 MHz CDMA timebase).
2. Set the Frequency or preset channel.
3. Select the transmission mode.
4. Select the data type from the Source selections.
5. Set the output power.
6. Set the PN Offset.
7. If desired, set and turn on the Noise Generator.
8. Click the **On** button.
9. Click the Generate button to start Signal Generation.