HP E6386A Samsung CDMA Cellular/PCS Base Station Test Software

User's Guide

Software Revision: B.00.00 and above

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Rev D

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In this Book

Chapter 1, Product Description

This chapter provides an overview of the Software and its operation. It also includes a list of equipment (required and optional) used for operating the Software.

Chapter 2, Installation

This chapter describes how to connect the hardware that is required to run the software to the base station. Procedures for loading and running the Software are also included in this chapter.

Chapter 3, Configuring The Cell Site and Specifying the Test Configuration

This chapter describes how to configure your base station. This chapter also includes descriptions of the test configuration parameters and instructions for how to change them to meet your specific testing needs. You can also use this chapter to learn how to save and recall test procedures.

Chapter 4, Performing CDMA Tests

Each test performed by the Software is described in this chapter. This chapter also contains instructions for running each test and reviewing test results.

Chapter 5, CDMA Tests Software Reference

Use this chapter as a reference when you need to know more about the following topics:

- Acronyms
- Connections
- Demonstration Mode
- Laptop Emulator
- Test Configuration Parameter Descriptions
- Test Specifications (Pass/Fail Limits)
- Testing without BTS Control

Chapter 6, General Software Reference

Use this chapter as a reference when you need to know more about the following topics.

- Software Menu and Loading a Test Procedure
- Changing Spec Pass/Fail Limits and Saving Spec Changes
- Data Collection and Logging
- Configuring a Printer
- Using PC Cards

Chapter 7, Troubleshooting

Refer to this chapter if you have problems making measurements.

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1

Product Description

Refer to this chapter for general information on the Samsung CDMA Celluar/PCS Base Station Test Software. A flowchart (**figure 1 on page 20**) is included to give you a brief overview of how to set up and run this Software. Required and optional equipment for running this software is listed in **"Test Set Hardware" on page 21**.

Software Overview

Available Tests of the Samsung CMDA Cellular/PCS Base Station Test Software

The HP E6386A Samsung CMDA Cellular/PCS Base Station Test Software is an Instrument BASIC (IBASIC) application used to set up the HP 8935 Test Set for transceiver (TRX) measurements on cellular or personal communication services (PCS) band, CDMA base station equipment. The Software runs on the Test Set's internal IBASIC controller. Using the Software you can perform the following tests:

Transmitter Tests

- TX IF Level
- TX Frequency Coverage
- Pilot Only Tests
- TX Total Power
- TX Conducted Spurious Emissions
- Code Domain Tests
- TX RF Ripple
- HPA Linearity
- TX Frequency Tolerance

Receiver Tests

- RX Conducted Spurious Emissions
- RX Frequency Coverage
- Noise Figure
- RX IF Level
- RX IF Tilt
- RX C/N

Available Utilities

The Software provides you with the following utilities:

- RF Tools
- Laptop Emulator
- PN Offset Search
- Calibrate TX Test Port
- Check Even Second Clock Signal

Automated Testing by Controlling the BTS

By connecting the BTS control adapter (HP E6552A) between the Test Set and the base station, the Software can control the base station equipment by sending commands to the base station. This provides automated testing to reduce your time spent at the site and to greatly improve the repeatability of measurements. **See "Connect the BTS Control Adapter" on page 37** for detailed information on how to connect the adapter to the Test Set and base station.

As tests are run, the measured results are compared to specification limits that are predefined at the factory or that you have specifically defined. These test results can be printed or stored to a PC card for archival purposes.

Who should use the Samsung CDMA Cellular/PCS BS Test Software?

If you are installing, commissioning, or maintaining Samsung Electronic Company's CDMA cellular or PCS cell site equipment, this Software will assist you in performing key tests of transceiver performance.

Included with the Software

Included with the HP E6386A Software:

- ❒ Memory card (OTP) containing the program files (HP part number E6386-10001)
- ❒ Blank RAM card (HP 83231A) for saving/recalling test procedures and test results
- ❒ This manual (HP part number E6386-90001)
- ❒ Software License Agreement

Software Operation Overview

Figure 1 illustrates the basic steps for Software operation. After loading the Software, you can run a single test or a suite of tests at a time without pausing between tests.

Chapter 4, "Performing CDMA Tests" gives step-by-step instructions for each of tests. If you have questions, further details can be found in **chapter 5, "CDMA Tests Software Reference"**. If you encounter errors, **chapter 7, "Troubleshooting"** can assist you.

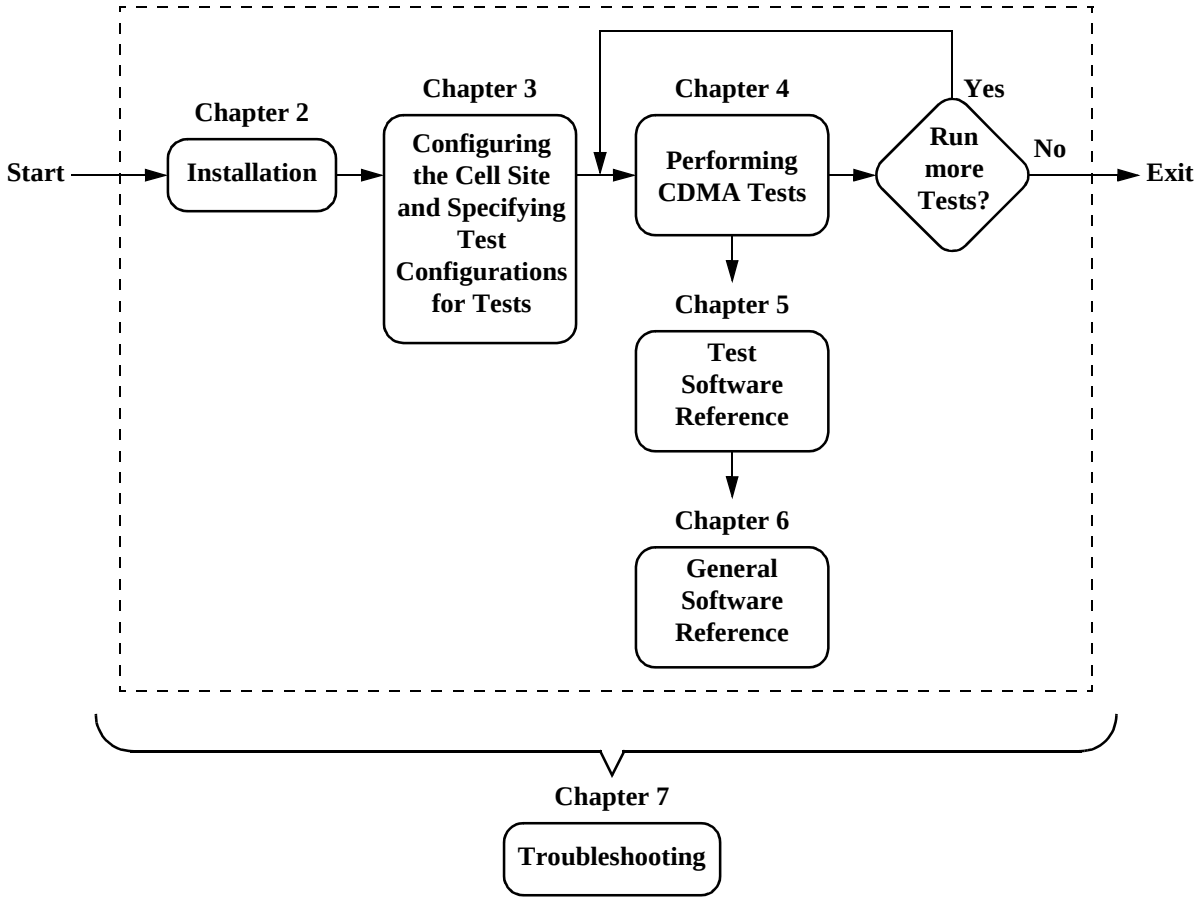


Figure 1 **Steps for the Use of the CDMA Software**

Test Set Hardware

Required Equipment

Test Equipment

The Software is written specifically to work with the HP 8935 CDMA Base Station Test Set which has the firmware revision A 02.00 and above.

If the HP 8935 Test Set has the firmware of revision A.01.00, the Software can not run the tests below:

- Pilot only tests in active cell site mode
- Absolute code domain power test
- PN offset search
- TX conducted spurious emissions test

If the HP 8935 Test Set has the firmware of revision A.01.10, the Software can not run the test below:

- TX conducted spurious emissions test

NOTE: Contact the nearest HP Sales office to upgrade the HP 8935 Test Set's firmware.

BTS Control Adapter

The Samsung base station can be controlled by sending commands using RS422 high-level data control protocol to the base station. The BTS control adapter converts RS232 commands from the HP 8935 to RS422 commands to be sent to the base station. The BTS control adapter is connected between the HP 8935 SERIAL 10 port and the MAP port on the Samsung base station. **See "Connect the BTS Control Adapter" on page 37** for detailed information.

NOTE: The Samsung BTS Control Adapter and all necessary cables and adapters are *not included* with the HP E6386A. They are bundled together with the HP E6386A if you order the HP E6550A Samsung CDMA PCS/Cellular Base Station Test Solution.

Optional Equipment

Cable Kit

See **"Connector Kit" on page 116** for information on an optional cable kit that supplies required cables and adapters for connecting Test Set to the base station.

SWR Bridge

A SWR bridge (and two pads) is used to test the antenna return loss to measure frequency return loss of transmission lines. This test helps you identify transmission line problems such as an open or shorted cable, or a damaged antenna. See **"Hardware Accessory Kit" on page 118**.

Printer

A printer can be added to the Test Set to provide a record of test results or to print control commands being sent to the base station from the Test Set. A summary of the test performed, the measured results, and a pass/fail analysis is included for tests that provide printed results.

The Test Set supports printing via the SERIAL 9, PARALLEL 15, and HP-IB ports. See **chapter 6** for detailed information.

Personal Computer (PC)

The Test Set and Software will support a PC for logging test sequences or data collection. The PC is connected to the Test Set via the SERIAL 9 port. Most PC's with an available serial port are compatible with the Test Set. This requires a terminal emulator program running on the PC (Hyper terminal in Widows 95®[1] or BTS laptop utility program supplied with the Software). See **chapter 6** for detailed information.

1. Windows is a U.S. registered trademark of Microsoft Corp.

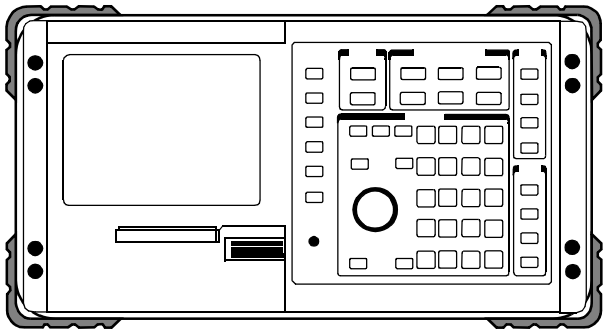
GPS Time and Frequency Reference Receiver

The Samsung CDMA Cellular/PCS Base Station Test Software supports the HP 58503A or 58503B GPS time and frequency reference receiver for supplying the timebase signal normally taken from the base station equipment.

When connecting the base station's GPSR modules as the timing reference, the Software must assume that the signals out of the modules are correctly timed to GPS time to provide the correct PN offset. If a problem exists in the base station's GPS reference, the base station's PN offset will likely be incorrect.

Using the HP 58503A or 58503B, you provide a GPS-referenced timing signal that is independent of the base station. This helps isolate problems associated with the base station's own GPS reference equipment and/or GPSR modules. An example of this is an "island cell," where the base station passes performance tests but does not properly interact with adjacent cells during handoffs.

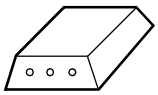
Test Equipment required:



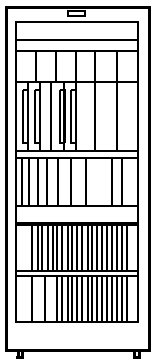
HP 8935 CDMA Cellular/PCS Base Station Test Set

You must supply:

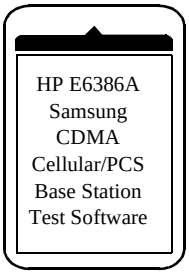
BTS Control Adapter



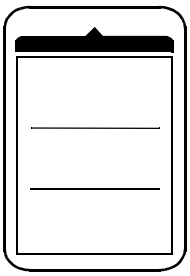
Samsung CDMA Cellular or PCS Base Station



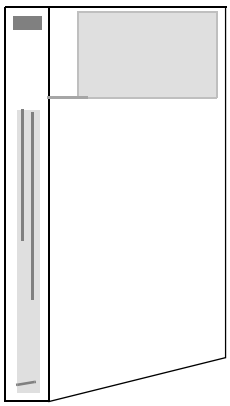
Supplied with the HP E6386A Software:



CDMA Cellular/PCS Base Station Test Software on OTP card



Blank 1 MB RAM Card with battery.



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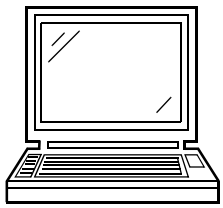
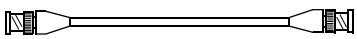
Optional Equipment:

Laptop PC for data collection or logging.





Test System to Base Station Connection Cables

Figure 2 Required Equipment.

2

Installation

Follow the steps in this chapter to connect the test equipment, to load and run the Samsung CDMA Cellular/PCS Base Station Test Software, and to check connections or make initial settings to configure your Test System. *You must complete the steps in this chapter before attempting measurements with the Software.*

Test System Installation

This chapter outlines the steps to set up the Test System for CDMA transceiver testing.

The steps in this chapter are:

1. **"Load and Run the Samsung CDMA Cellular/PCS BS Test Software" on page 27**
2. **"Connect the Test Set to the Site Equipment" on page 32**
3. **"Connect the BTS Control Adapter" on page 37**

You must use the BTS control adapter to send control commands to the base station (step 3, above). The test examples in **Chapter 4, "Performing CDMA Tests"** control the base station using the BTS control adapter.

Load and Run the Samsung CDMA Cellular/PCS BS Test Software

Locate the PC card supplied with the Software package and follow the steps outlined in **figure 3**, below, and **figure 4 on page 28**.

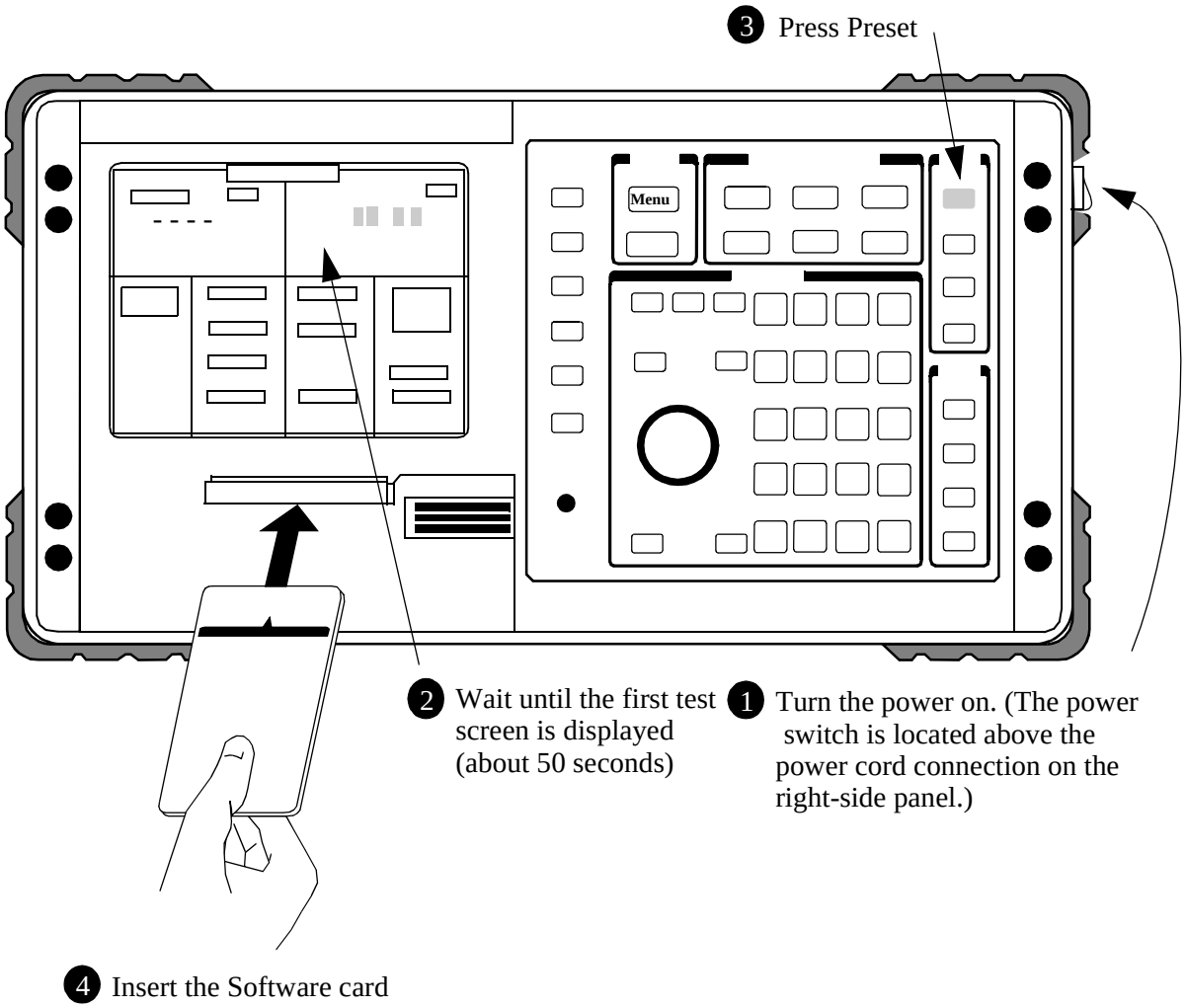
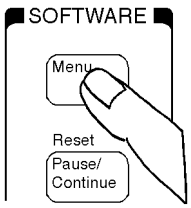
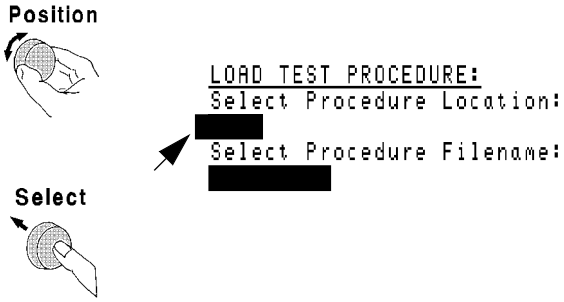


Figure 3 Loading the Software

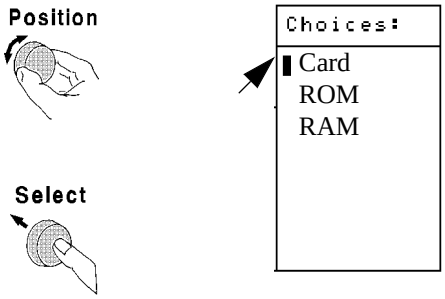
5 Press the SOFTWARE **Menu** key to display the **Software Menu** screen.



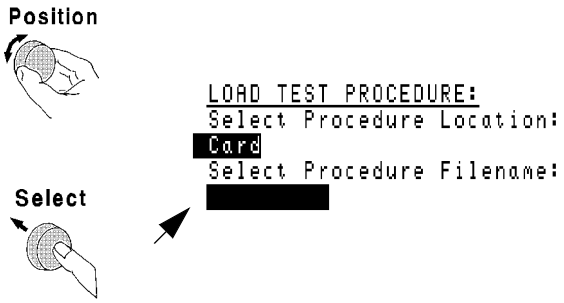
6 Position the cursor at **Select Procedure Location:** and select it.



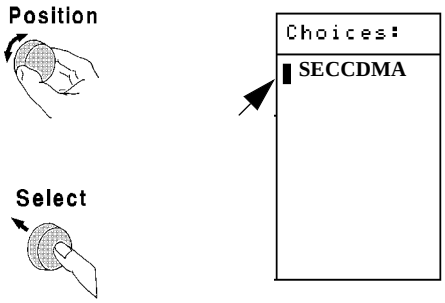
7 Position the cursor at **Card** and select it.



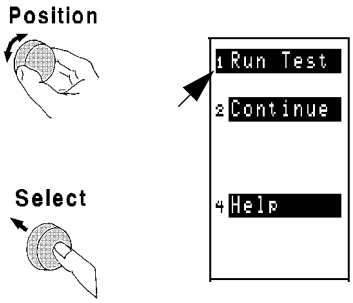
8 Position the cursor at **Select Procedure Filename:** and select it.



9 Position the cursor at **Choices:** and select the Procedure name.



10 Position the cursor at **Run Test** and select it. The Software is now loading.



Loading Time:

First time: approximately 25 seconds.

After first time: approximately 15 seconds.

Figure 4 Running the Software

Navigation of the Samsung CDMA Cellular/PCS BTS Test Software

After the Software has loaded, you will see the Software main menu screen on the Test Set's display. Turn the knob to move the cursor to the choice you desire, and press the knob to access the desired menu

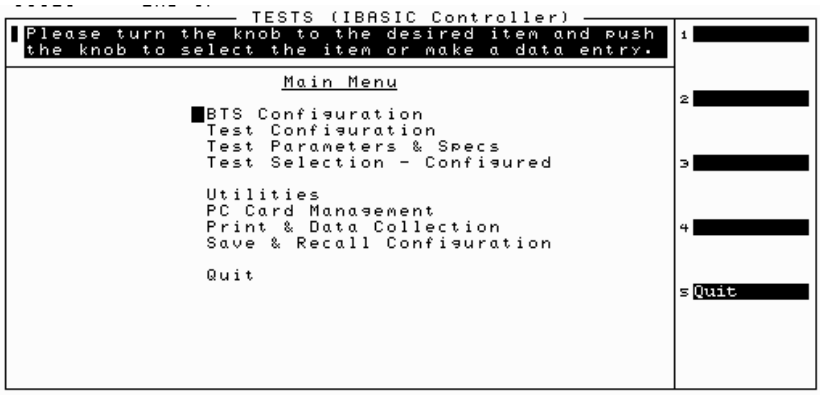


Figure 5 **Samsung CDMA Cellular/PCS BTS Test Software Menu Choice Screen**

Menu Functions

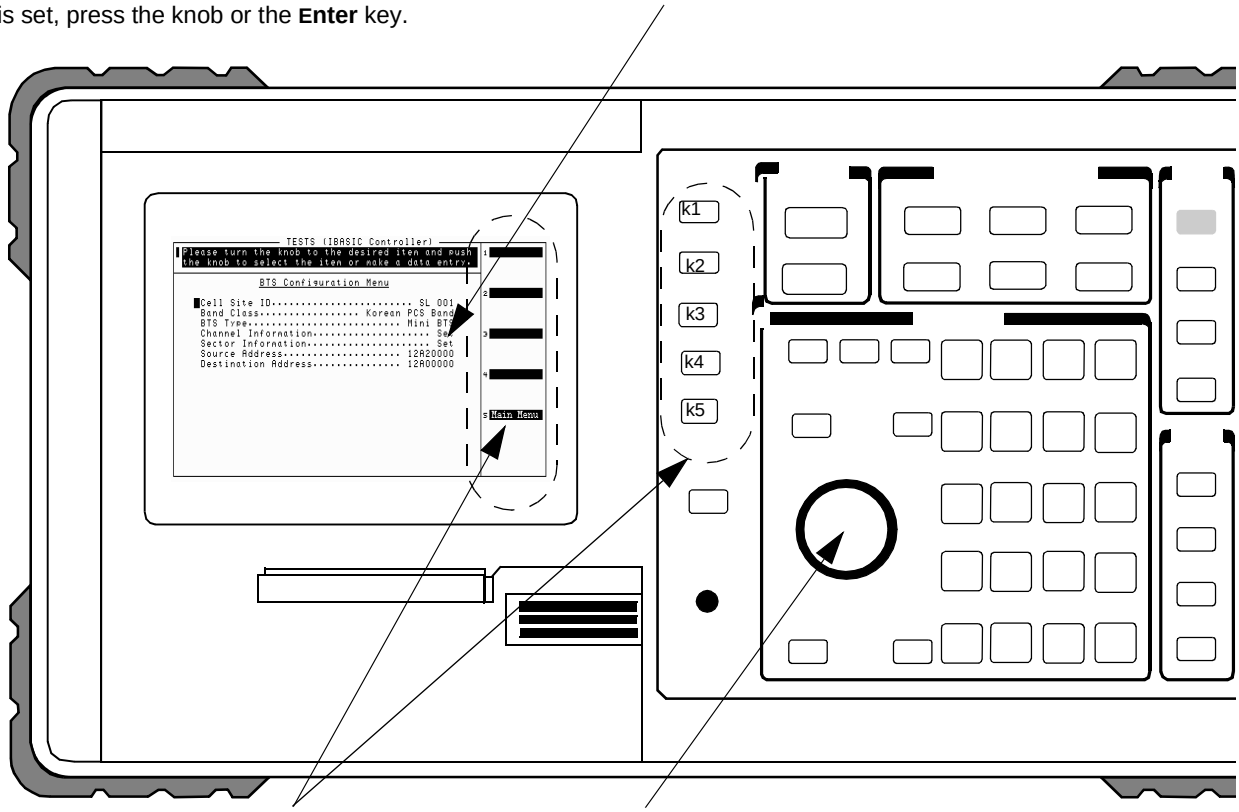
- `BTS Configuration` menu is where you enter the specific base station information that the Software needs to measure your base station. This menu includes selecting band class (channel standard) and BTS type, entering channel numbers and sector information for the channels and sectors you are testing, and entering source and destination addresses for controlling the base station using the BTS control adapter. See **chapter 3** for more detailed information.
- `Test Configuration` menu is where you create your own test conditions. You select test mode, measurement port and timing reference signal source, and you determine whether to continue testing if a test point fails during testing. In this menu you can also put the Software into the demonstration (demo) mode and enter TX attenuation level, OCNS parameter, test cable loss, and external attenuation level. See **chapter 3** for more detailed information.
- `Test Parameters & Specs` menu is where you define the test parameters and specifications (pass/fail limits) that are used during testing. The Software provides factory default settings derived from the Samsung CDMA base station test procedure. You can change the test parameters and specifications for your specific needs in this menu. See **chapter 5** for more detailed information.

- `Test Selection` menu is where you select channels, sectors, receiver path, and desired CDMA tests to be tested. You can also execute measurements for the selected CDMA tests in this screen. See **chapter 4** for more detailed information.
- `Utilities` menu is where you can use the utilities of the Software such as RF tools, laptop emulator, PN offset search, calibrate TX test port, and check even second clock signal. See **chapter 4** for more detailed information.
- `PC Card Management` menu is where you review the test results saved in the PC card. You can also catalog a PC card, purge files from the PC card, transfer a file in the PC card to the Test Set's display or to a PC, and send the files on the PC card to a printer. See **chapter 6** for more detailed information.
- `Print & Data Collection` menu is where you select how to save the test results during measurements. You can use the BTS laptop utility program or select a device to print test results or to log test sequences during testing. See **chapter 6** for more detailed information.
- `Save & Recall Configuration` menu is where you can store or recall the information that you have configured or selected in `Test Selection`, `BTS Configuration`, `Test Configuration`, `Test Parameter & Specs`, and `Print & Data Collection` menus. Normally, you can save them on a PC card. See **chapter 3** for more detailed information.

Changing Settings and Using USER Keys

Figure 6 illustrates how to make selections and settings on the Test Set's screens.

Entry Fields
Some menu selections are entry fields. When these are selected, a highlighted area appears and you may key in a value with the DATA keys, or rotate the knob to change the selection in the field. When the desired value or selection is set, press the knob or the **Enter** key.



USER Keys and their Fields
The USER Keys (**k1** - **k5**) correspond to fields 1-5 on the right side of the test screen. They are used for navigation through menus and for making selections. In a submenu, a "Previous" key is provided to take you back to the previous screen.

Knob
The knob controls the cursor position on the display and is sometimes used to make numeric entries. Pressing the knob has the same effect as pressing the **Enter** key.

Scroll or **position** means to turn the knob to move the cursor from field to field. **Select** means to scroll to the field and then press the knob.

Figure 6 **Using the Knob, USER Keys, and Screen Fields**

Connect the Test Set to the Site Equipment

Connect the system clock signal (19.6608 MHz) and even-second clock as shown in **figure 8 on page 35** for transmitter measurements and **figure 9 on page 36** for receiver measurements.

If you are using a separate GPS reference instead of the cell site's clocks, see **figure 36, "Connections to the Base Station Equipment Using an HP 58503A GPS Time and Frequency Reference Receiver," on page 114**.

NOTE: When connecting the clock signals on the base station, be sure that the base station's GPSR module is locked (**active**)

Which Test Set Port to Use - ANT IN or RF IN/OUT?

The Test Set's ANT IN port is used only for very low signal levels ≤60 mW (17.78 dBm). Therefore, to prevent damage to the Test Set, *never connect the ANT IN port to the TX Antenna port of the base station*. ANT IN is typically connected to the base station's TX Test port (EQP. CPL). **See "System Clocks and Transmitter Connections" on page 35**.

The Test Set's RF IN/OUT port is for signals of ≤15 W. Do not apply more than 15 W to the RF IN/OUT port. When you connect this port to the base station's TX Antenna port, and the signal is greater than 15 W, you should use a power attenuator.

Which Base Station Port to Use for Transmitter Test - TX Test or TX Antenna?

Testing Using the TX Test Port

The TX Test port gets its signal through a directional coupler connection to the TX Antenna port (see **figure 7 on page 33**). This allows you to make measurements without disconnecting the transmit antenna. A “Coupling Factor” (loss) through the directional coupler is entered into the Software to compensate power measurements. The coupling factor is typically 40 dB, but can vary depending on the base station design.

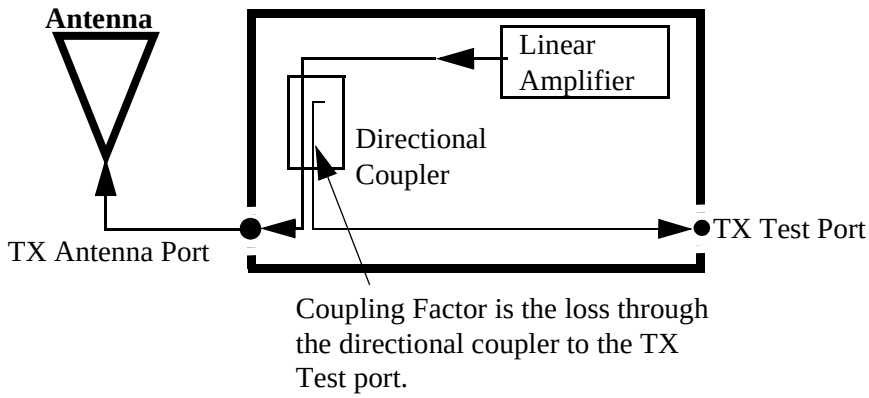


Figure 7 **Simplified Diagram of the Transmitter Output Path**

If you do not know the exact coupling factor, the Software contains a utility to measure the coupling factor. **See "TX Test Port Calibration" on page 107** for information on how to calibrate the TX Test port.

One disadvantage to using the TX Test port to make measurements is the possibility that its coupler is malfunctioning and therefore will cause erroneous measurements. If TX power measurements fail by a large amount, but you suspect that the actual *transmitted* power is correct, you should make measurements at the TX Antenna port to verify the failing reading. If the Software is correctly configured, TX power measurements at the TX Test port and TX Antenna port should not vary significantly.

Testing Using the TX Antenna Port

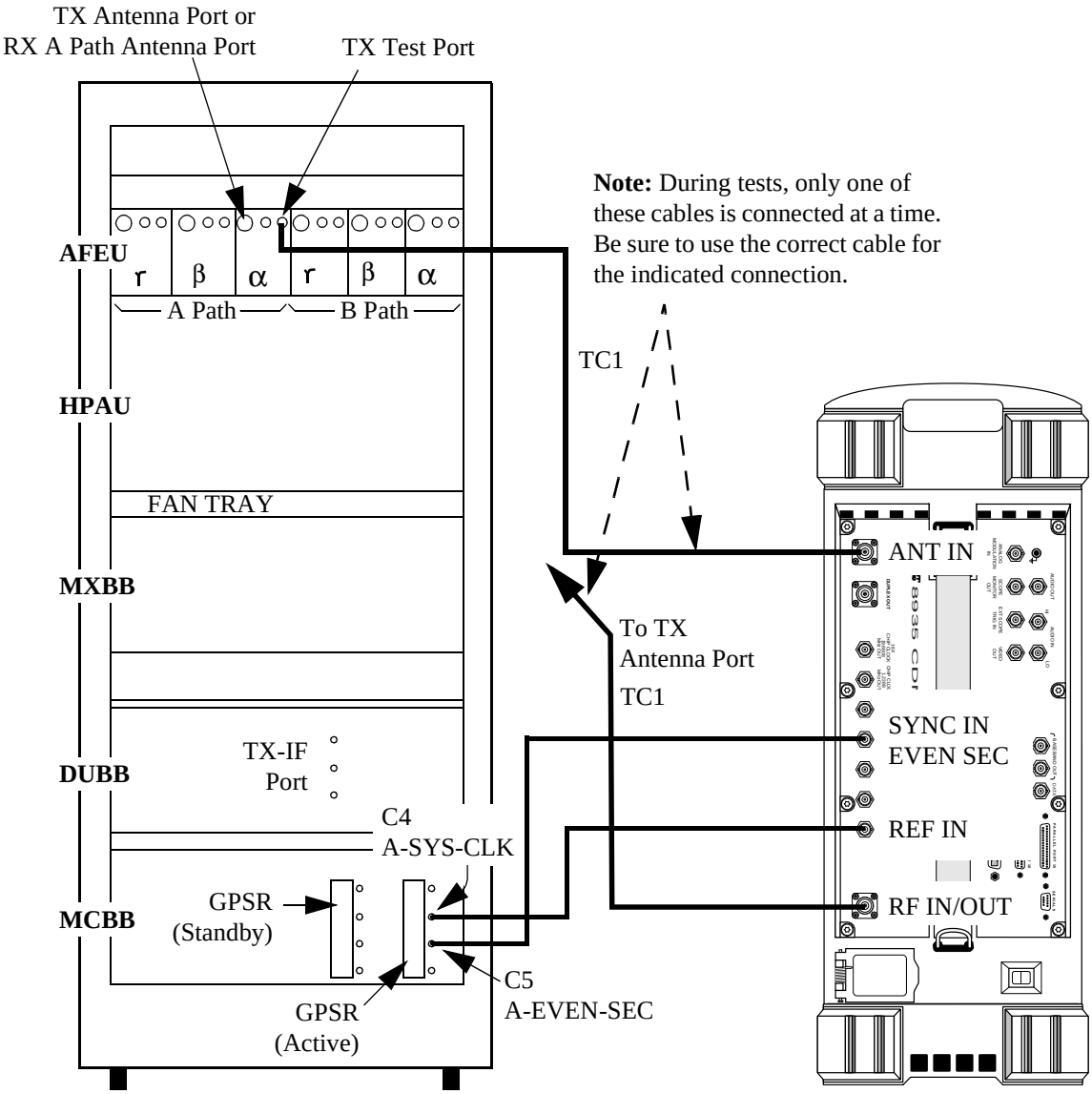
One benefit of testing at the TX Antenna port is the confidence that you are measuring the true output power of the base station at the point where the antenna feed line connects, verifying the operation of the full transmission path inside the base station. It also provides an opportunity to perform transmission line and antenna testing while the antenna is disconnected from the base station.

NOTE: Measurements for the TX IF Level test are made at the base station's TX IF port (instead of TX Test port or TX Antenna port). Connect the Test Set's ANT IN or RF IN/OUT port to the TX IF output port for the TX IF Level test. See **figure 8 on page 35**.

Which Base Station Port to Use for Receiver Test - RX IF Port and RX Antenna Port?

For all receiver measurements, disconnect the receiver (RX) antenna from the base station, then connect the Test Set's DUPLEX OUT port to the base station's antenna port (ANTENNA ports of RX A path or RX B path) so that the Test Set can transmit the CDMA signal to the base station's receiver. Also connect the Test Set's ANT IN port to the RX IF cables which come from transceiver RX IF ports to make measurements. See **figure 9 on page 36**.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test the RX A path.

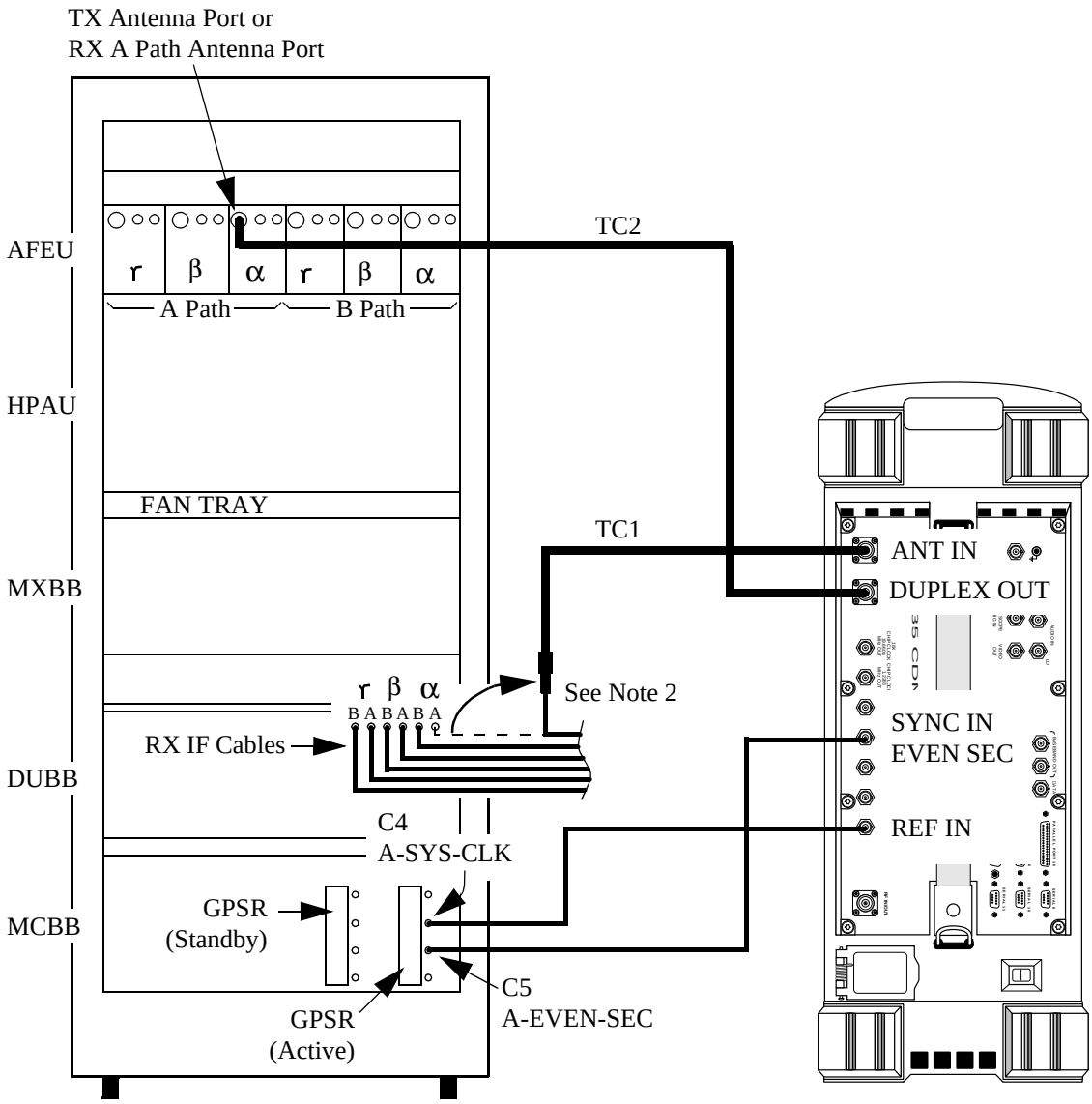


Note 1: Even Second and 19.6608 MHz clocks come from the GPSR module. Make sure that the GPSR connected to the Test Set is locked (**active**).

Note 2: Connect the Test Set's ANT IN or RF IN/OUT port to the base station's TX-IF ports for TX IF level measurements.

Note 3: Do not apply more than 15 W to the Test Set's RF IN/OUT port.

Figure 8 **System Clocks and Transmitter Connections**



Note 1: You should power off all HPA units (including redundancy unit) when testing the RX A path of the Samsung PCS base station.

Note 2: Connect the Test Set's ANT IN port to the RX IF cables.

Figure 9 System Clocks and Receiver Connections

Connect the BTS Control Adapter

The Test Set has the ability to send control commands to the base station via a BTS control adapter connected to the SERIAL 10 port of the Test Set. This enables the test system to perform tests in the shortest amount of time and with little operator intervention. This section deals with setting up the BTS control adapter. Once you have connected the adapter and set the address, the Test Set can communicate with the base station for automated testing.

The Samsung base station can be controlled by sending commands using RS422 high-level data control protocol to the base station. The Samsung BTS control adapter converts RS232 commands from the Test Set to RS422 commands to be sent to the base station. The BTS control adapter is connected between the Test Set's SERIAL 10 port and the MAP port in the Samsung base station.

A laptop PC can be connected to the Test Set's SERIAL 9 port to allow you to log test sequences or record the test results.

Figure 10 on page 38 shows the basic connection of the Test Set, BTS control adapter, and laptop PC.

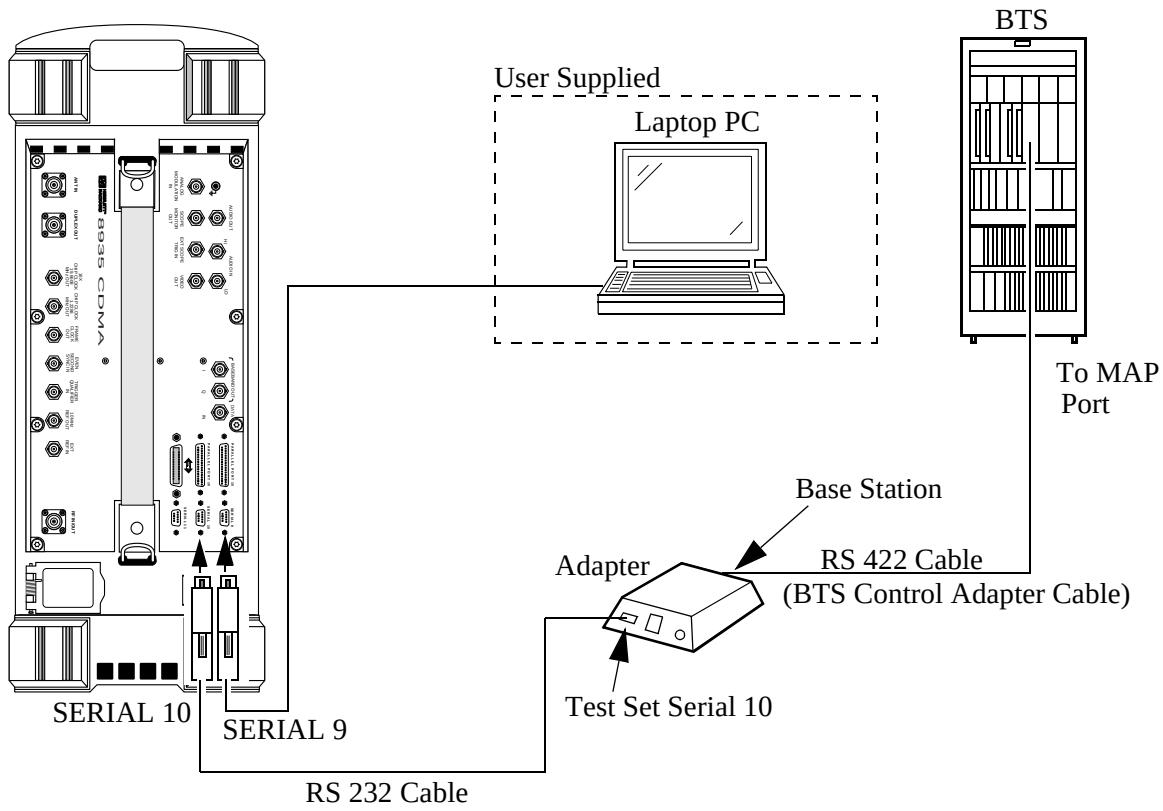


Figure 10 **Connections for the HP 8935, BTS Control Adapter and laptop PC**

Performing Adapter's Communication Test

After connecting the BTS control adapter, follow these steps to verify that the adapter is working:

1. Load and run the Software (**see "Load and Run the Samsung CDMA Cellular/PCS BS Test Software" on page 27**). The main menu is displayed.

NOTE: Make sure that you have correctly selected the BTS type you want to test in the `BTS Configuration` menu.

2. Select `Utilities` in the main menu screen. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
3. Select `Laptop Emulator` menu.
4. Scroll down to `Set Address` in the Commands Set and press the knob. Set the source and destination addresses in the `Choices:` menu.
5. Send the command by selecting `Send` in the `Choices:` menu.
6. Scroll down to `View BTS Config` in the Commands Set and press the knob. `Send` in the `Choices:` menu is selected.
7. Send the command by pressing the knob again. The configuration results will appear in the Test Set "BTS Communication" box if the BTS control adapter and cables are correctly connected.

If there is no response in the "BTS Communication" box, check the connections or your base station. Proceed the steps in **"Troubleshooting the BTS Control Adapter Installation" on page 40** to attempt to troubleshoot the problem.

NOTE: Refer to **"Laptop Emulator" on page 120** for more detailed information on how to use the Test Set's laptop emulator.

Troubleshooting the BTS Control Adapter Installation

If there is no response in the “BTS Communication” box, troubleshoot using the following procedure:

1. Disconnect the RS422 cable from the BTS control adapter’s “Base Station” port, then connect the BTS control adapter loopback test shunt (HP Part Number E6550-61002) to the BTS control adapter’s “Base Station” port.
2. Send the `Loop Test` command in the laptop emulator.
3. If `PASS` is displayed on the Test Set’s display, the BTS control adapter works. You should suspect that the RS 422 cable (HP Part Number E6550-61001) has a problem, the addresses you have set in the Command Set are wrong, or you did not connect the BTS adapter to the correct MAP port.

   If `FAIL` is displayed on the Test Set’s display, the BTS control adapter or RS 232 cable does not work.

If You Had Problems

If you were unable to load and run the software, or you encountered error messages, refer to **"Troubleshooting" on page 175** for help.

3

Configuring the Cell Site and Specifying Test Configurations for Tests

Follow the steps in this chapter to configure the cell site and to specify test configurations for testing. *You must complete the steps in this chapter before attempting CDMA measurements with the Software*. This chapter also includes a procedure for saving and recalling a test procedure.

Overview

In the last chapter, you connected the BTS control adapter to work with the Test System. The BTS control adapter is used to communicate with the base station to set up cell sites for testing. This provides the necessary physical communication link to control the base station.

Chapter 2 also showed you how to load and run the Software. If you have not connected the BTS control adapter or loaded the software, you must do so before continuing with the steps in this chapter.

This chapter discusses the following steps that must be completed before making CDMA tests:

- Configuring the cell site
- Specifying test conditions
- Saving and Recalling a Test Procedure

You can configure the cell site in the `BTS Configuration` menu and specify test conditions in the `Test Configuration` menu.

Once you configure the cell site and specified test conditions, these settings are preserved in memory, even after turning the Test Set off, unless you load another program or update the Test Set's operating system (firmware). You can also save your settings on a PC card for future use. **See "Saving and Recalling a Test Procedure" on page 51** for instructions on saving and recalling a test procedure.

Configuring the Cell Site

In the `BTS Configuration` menu, you enter the BTS configuration information that is required to run the tests. The Software uses the settings in this menu when running tests. Even though the Software comes with default settings for some configuration fields, to make valid measurements, you need to change the settings or enter the values for `Empty` fields before running tests.

This section lists the fields on the `BTS Configuration` menu and describes their use. After setting the BTS configuration, you can save the changes on a PC card for later use. **See "Saving and Recalling a Test Procedure" on page 51**.

Scroll down to `BTS Configuration` menu in the main menu and press the knob to go into this menu. **See "Changing Settings and Using USER Keys" on page 31** to learn how to use the knob and keys to change settings.

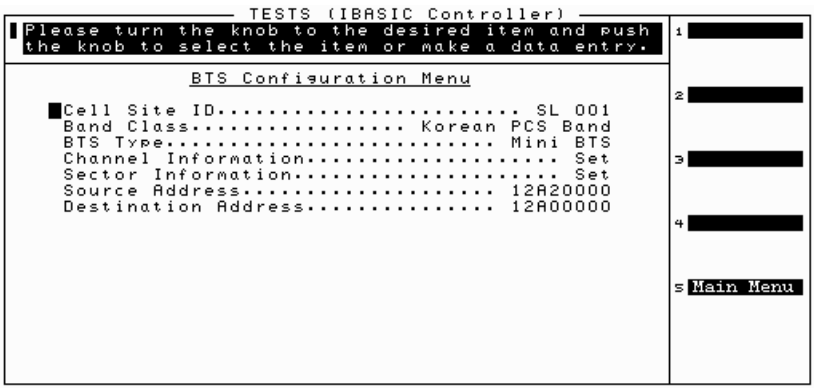


Figure 11 **BTS Configuration Menu Screen**

BTS Configuration Fields and Their Use

1. `Cell Site ID`

   You can identify the test results of each cell site with an identification (ID) tag. The cell site ID helps you manage your test results. When you print the test results, the cell site ID is also printed.

   Enter an alphanumeric cell site ID using the characters in the `Choices:` menu. Position the cursor in front of the desired characters and press the knob to enter each character. Then select `Done` (at the top of choices list) to exit this menu. Notice that you can use the backspace key ⇐ on the Test Set front panel or select `Bk Space` in the `Choices`: menu to delete a character

NOTE: It is not necessary to enter a cell site ID. It is only for your convenience to help you keep track of where the test results originated.

2. `Band Class`

   This setting tells the Software which channel standard (Korean PCS Band, 800 MHz Cellular Band, or North American PCS Band) to use when you enter a channel number.

NOTE: If you change the setting in the `Band Class` field, the entry fields of the `Channel Information` in the `BTS Configuration` menu and the `Test Cables Loss` in the `Test Configuration` menu will be *empty*. You have to enter this information again.

3. `BTS Type`

   When you select the `800 MHz Cellular Band` in the `Band Class` menu, then `Pico BTS`, `Cellular I BTS`, and `Cellular II BTS` appear on the `Choices:` menu. Otherwise, `Pico BTS` and `Mini BTS` appear on the choices menu.

   For cellular BTS testing, if you are testing the domestic cellular BTS for Korea, set it to `Cellular I BTS`. If you are testing the cellular BTS for the overseas market, set it to `Cellular II BTS`. If you are testing 800 MHz Pico BTS, set it to `Pico BTS` on the `Choices:` menu

   For PCS BTS testing, you can select `Pico BTS` or `Mini BTS` in accordance with the base station you are testing

4. `Channel Information`

   You must enter the CDMA channel numbers that your base station is transmitting on before testing begins. To properly control the base station, the channel numbers should be matched with each FA (frequency assignment) number. The valid range is 0 to 599 for the Korean PCS band, 1 to 799 or 991 to 1023 for the 800 MHz Cellular band, and 0 to 1199 for the North American PCS band.

   You can delete the channel number using k2 (`Delete`). The use of k3 (`Up`) and k4 (`Down`) can be a time-saver when moving the cursor up and down in the channel number (`Channel #`) column.

5. `Sector Information`

   The sector information includes the PN offset, the base station's output power, and the coupling factor of each sector (α, β, and γ).

   - `PN Offset`: This identifies the PN offset for your cell site. If you know these values, you can directly enter them using the DATA ENTRY keys. If you do not know these values, you can search for the PN offset values in this menu.

     To search the PN offset value, place the cursor at the column under the `PN Offset` field and press k1 (`Measure`) to search the value. The result will automatically be entered into the field.

NOTE: You have to enter or measure the PN offset value first before entering the output power or coupling factor.

The Software measures the PN offset values with the HP 8935 Test Set firmware revision A 01.10 and above.

   - `Specified Output pwr [dBm]`: This is the amount of total power that should be present at the TX antenna port. You should manually enter this value for each sector.

     These values determine the center of the power meter when the power meter display is shown in the Test Set display during TX total power measurements. See **"TX Total Power" on page 72** for more information.

   - `Coupling Factor [dB]`: This is the loss through the directional coupler used to provide the transmitter signal to the TX test port. Knowing this loss allows the Software to calculate the transmitter's true output power. If you know these values, you can directly enter them using the DATA ENTRY keys. If you do not know these values, you can measure the coupling factors in this menu.

     To measure the coupling factors, place the cursor at the column under `Coupling Factor` field and press k1 (`Measure`) to measure the value. The measurement result will automatically be entered into the field.

6. `Source Address`

   To properly control the base station, you should set the BTS control adapter's address in the `Source Address` field.

   XXX20000: The first three digits are the address of the base station and should be different for each base station. The following five digits should be always set to `20000` for the BTS control adapter.

7. `Destination Address`

   To properly control the base station, you should set the base station's address in the `Destination Address` field.

   XXX00000: The first three digits are the address of the base station and should be different for each base station. The following five digits should be always set to `00000` for the BCP module in the base station.

Specifying Test Configurations

You can specify your own test conditions in the `Test Configuration` menu. This section lists the test configuration menus and describes their use. Scroll down to `Test Configuration` in the main menu and press the knob to go into this menu.

Even though the Software comes with default settings, you may change the test conditions for your needs. After changing the test conditions, you can save the changes on a PC card for later use. See **"Saving and Recalling a Test Procedure" on page 51**

A special parameter allows you to run the Software in a demo mode. Demo mode is useful for familiarizing you with the operation of the Test Set. (See **"Demo (Demonstration) Mode" on page 119**).

See "Changing Settings and Using USER Keys" on page 31 to learn how to use the knob and keys to change settings.

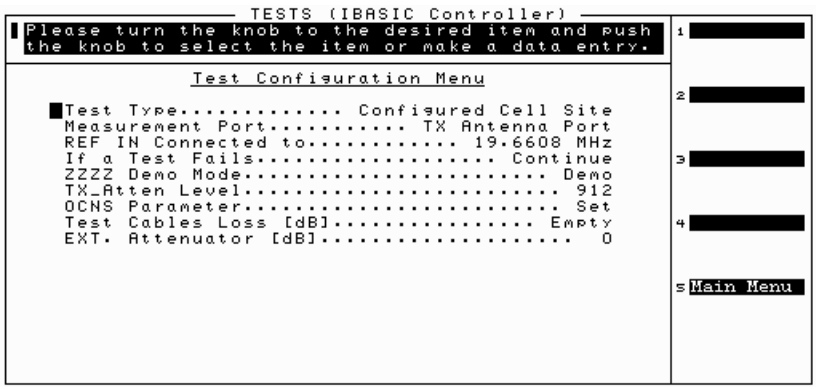


Figure 12 **Test Configure Menu Screen**

Test Configuration Menus and Their Use

1. `Test Type [Active Cell Site, Configured Cell Site]`

   You will make a choice before testing the base station; you will choose to test as a Configured Cell Site or an Active Cell Site.

   a In the **Configured Cell Site** mode, the Test Set and the Software will control the base station via the BTS control adapter to set up the site with only a pilot channel or full power condition. *This is out-of-service testing of the base station.*

   b In the **Active Cell Site mode**, the Test Set and the Software do not control the base station, and CDMA tests can be done on an in-service base station. The pilot, paging and sync channels are on. Additionally, if call processing is enabled (*in-service testing*), traffic channels can come on as well.

2. `Measurement Port [TX Test Port, TX Antenna Port]`

   You can select the test port of the base station to make transmitter measurements; TX Test Port (which comes from a directional coupler in the base station's output) or the TX Antenna Port (which supplies the base station's output directly to the antenna).

   See "Which Base Station Port to Use for Transmitter Test - TX Test or TX Antenna?" on page 33 for more information.

   Note that this field appears when you set the `Test Type` *field to* `Configured Cell Site` *mode.*

NOTE: Ensure that the power level into the Test Set's ANT IN port does not exceed 60 mW. When you make measurements at the base station's TX Antenna port, you have to connect to the Test Set's RF IN/OUT port. Do not apply more than 15 W to the RF IN/OUT port. See **"TX_Atten Level" on page 49**.

3. `REF IN Connected to [10 MHz, 19.6608 MHz]`

   This setting identifies the source of the signal connected to the Test Set's REF IN connector. This is typically 19.6608 MHz clock (SYS-CLK) or 10 MHz (10 M-CLK) which comes from the cell site. You can also use a stand-alone GPS receiver for 10 MHz.

   See **"Connect the Test Set to the Site Equipment" on page 32** when you are using the cell site's clock. See **"GPS Time and Frequency Reference Receiver" on page 23** and **"Connections to the Base Station Equipment Using an HP 58503A GPS Time and Frequency Reference Receiver" on page 114** when you are using a separate GPS reference.

4. `If a Test Fails [Continue, Go to Analyzer]`

   This parameter determines whether to continue testing if a test point fails during testing, or to go to the Test Set's analyzer screen to analyze the problem.

5. `ZZZZ Demo Mode [Demo, Normal]`

   Use this parameter to put the Software into the demonstration (demo) mode. The demo mode will let you run the tests without really testing or connecting the Test Set to the base station. This allows you to become familiar with Software operation. See **"Demo (Demonstration) Mode" on page 119** for details.

6. `TX_Atten Level`

   This parameter is used to specify the high power amplifier's (HPA) attenuation level. You can control the base station to make a full power condition by setting the attenuation level to 912 or 920.

   This field appears when you set the `Test Type` *field to* `Configured Cell Site` *mode.*

7. `OCNS Parameter`

   When you have selected the `Configured Cell Site` mode, you must set the base station to the total power condition by requesting OCNS (Other Cell Noise Simulation) for some transmitter tests.

   By selecting this parameter, you can specify the walsh codes, traffic channels and their gains to make the OCNS. You can set the base station to the total power condition by entering 6 OCNS parameters and setting their `TX Gain` to 74 for all the 6 channel elements. *Notice that you can not duplicate the Walsh codes and traffic channels.*

   - `Walsh`: Enter walsh code numbers. The valid number is 1 to 63 (except 32).
   - `TC_ID`: Enter traffic channel numbers.
   - `TX Gain`: Enter OCNS digital gains. This is typically set to 74.

     This field appears when you set the `Test Type` *field to* `Configured Cell Site` *mode.*

8. `Test Cables Loss [dB]`

   The parameter measures the signal loss through the test cables over the TX and RX frequency ranges. The `TX Cable Loss TC1` is the signal loss through the cable connected between the Test Set's ANT IN or RF IN/OUT port and the base station. **See "System Clocks and Transmitter Connections" on page 35** and **"System Clocks and Receiver Connections" on page 36**. The `RX Cable Loss TC2` is the signal loss through the cable connected between the Test Set's DUPLEX OUT port and the base station's antenna port. **See "System Clocks and Receiver Connections" on page 36**.

If you know the cable loss, you can directly enter the signal loss using the DATA ENTRY keys. If you do not know it, you can measure the signal loss in this mode. Press k1 (`Meas TC1`) or k2 (`Meas TC2`) and follow the displayed instructions and diagram to measure TX or RX cable signal loss. Note that the Cables Loss Information table shows the channel numbers you have specified in the `Channel Information` field of the `BTS Configuration Menu` screen.

The Test Set also measures the signal loss at the IF frequency (4.95 MHz). The measurement results will automatically be entered into the Cable Loss Information table. The measurement requires two 6-dB pads (attenuators).

9. `EXT. Attenuator [dB]`

This field is used to enter the external attenuation level when the external attenuator is connected. Use the DATA ENTRY keys to enter the value.

The Test Set's RF IN/OUT port is for signal of ≤15 W. Do not apply more than 15 W to the RF IN/OUT port. When you connect this port to the base station's TX antenna port that is greater than 15 W, you should use a power attenuator.

Note that this field appears when you set both the `Test Type` *field to* `Configured Cell Site` *mode and the* `Measurement Port` *field to the* `TX Antenna Port`.

Saving and Recalling a Test Procedure

Sometimes it is preferable to save a test procedure for future use or for saving time when you are required to reuse the same test procedures. The Software provides the ability to save and recall a test procedure from an external PC card.

A Test Procedure is a collection of the settings and selections in the `Test Selection`, `BTS Configuration`, `Test Configuration`, `Test Parameters & Specs`, and `Print & Data Collection` menus. After you have set up a test procedure you can save the test procedure to a PC card. The number of test procedures saved on a PC card depends on the amount of available space on the card.

NOTE: See **chapter 4** for information on how to select the test items, **chapter 5** for information on how to set the test parameters and change the specifications, and **chapter 6** for information on how to print or collect the test results.

This section contains the procedures for saving and recalling a test procedure from a PC card. The procedures covered in this section are as follows:

- Save a Test Procedure to the PC Card
- Recall a Test Procedure from the PC Card

Select `Save & Recall Configuration` from the main menu.

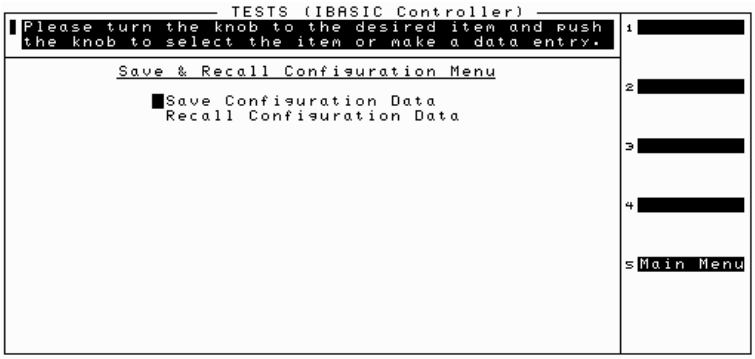


Figure 13 **Save & Recall Menu Screen**

How to Save a Test Procedure

To save a test procedure to a PC card, follow these steps:

1. Create a test procedure by entering the BTS configuration information, specifying the test configuration, customizing test parameters and specifications, selecting test items to be run, and selecting an external devices to collect the test results.

   See **"Configuring the Cell Site" on page 43**, **"Specifying Test Configurations" on page 47**, **"Customizing Test Parameters and Specifications" on page 128**, **"Selecting Tests" on page 59**, and **"Connecting to External Devices" on page 154**.

2. Insert the PC card into the Test Set's front-panel PC card slot.

NOTE: Before inserting the PC card into the Test Set's PC card slot, ensure that the PC card is formatted. For PC card formatting instructions, see **"Initializing a PC Card" on page 173**.

3. Select `Save & Recall Configuration` in the main menu.
4. Select `Save Configuration Data` in the `Save & Recall Configuration Menu` screen.
5. Enter a name for the test procedure using the characters in the `Choices:` menu. Position the cursor in front of the desired characters and press the knob to enter each character. Then select `Done` (at the top of the choices list) to save the test procedure.

NOTE: You can use the backspace key ⇐ on the Test Set's front panel or select `Bk Space` in the `Choices:` menu to delete a character.

6. You can exit this menu by pressing k5 (`Main Menu`).

   The file is saved on the PC card with a ".CNF" appended to the name.

How to Recall a Test Procedure

To recall a test procedure from a PC card, follow these steps:

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `Save & Recall Configuration` in the main menu.
3. Select `Recall Configuration` in the `Save & Recall Configuration Menu` screen.
4. Scroll to and select the file you desire to recall. Then the test procedure is recalled.
5. You can exit this menu by pressing k5 (`Main Menu`).

NOTE: If there is no test procedure file (.CNF) in the PC card, the `Choices:` menu will not appear on the Test Set's screen.

If You Had Problems

If you encountered error messages when performing the procedures in this chapter, refer to **"Troubleshooting" on page 175** for help.

4

Performing CDMA Tests

This chapter shows detailed steps used in running each of the Software's tests and utilities.

Overview

This chapter provides details about each test in the `Test Selection` menu and is intended to be used after your Test System has been installed. This chapter also describes details on how to use the `Utilities` menu.

The following test procedures are intended to take you from setting up a test to getting test results.

Overall Procedure for Making Measurements

Before making CDMA measurements, verify that you have performed the following steps in order.

Getting Ready to Test

1. The Software has been loaded and run. See **"Load and Run the Samsung CDMA Cellular/PCS BS Test Software" on page 27**.
2. You have connected the Test Set to the base station using the BTS control adapter. See **"Connect the Test Set to the Site Equipment" on page 32** for detailed information. Notice that you do not have to connect the adapter when you run the tests in **Active Cell Site** mode.
3. You have configured the base station to be tested in the `BTS Configuration` menu and specified test conditions in the `Test Configuration` menu. See **"Configuring the Cell Site" on page 43** and **"Specifying Test Configurations" on page 47**.

NOTE: For valid CDMA measurements, you must configure your base station correctly by changing the settings or entering the values for `Empty` fields in the `BTS Configuration` and `Test Configuration` menus before making measurements.

4. You have customized test parameters and specifications (pass/fail limits) in the `Test Parameters & Specs` menu. See **"Customizing Test Parameters and Specifications" on page 128**.

   When testing begins, the Software uses the test parameters associated with each test to alter test system settings. The parameter entries affect how the test runs and how test results appear.

   The parameters used by each test are listed with the test descriptions in this chapter. You should review the parameters for each test to make sure that their settings match your testing conditions.

   Default values of the specifications (pass/fail limits) are set in the Software in accordance with Samsung Base Station Test Procedures. These default values may be changed to suit your particular requirements.

   The values entered into the specifications fields are used to determine if a test passes or fails. The specifications used by each test are listed with the test descriptions in this chapter.

Selecting Print & Data Collection

Sometimes, it is preferable to record the test results for future reference or evaluation. The Software provides the capability to save test results to a memory card, personal computer, or an external printer. See **"Sending Test Results to a Printer" on page 161** and **"Sending Test Results to a PC or PC Card" on page 163** for detailed information on how to save or print test results during measurements.

Selecting Test Channels

Even though you have entered up to 8 channels in the `BTS Configuration` menu, whenever you make measurements, you have to select which of these channels to test in the `Test Selection` menu. The `Test Channel` field will show `No Selection` until you select the channels to test. Notice that the `Test Channel` field is set to `Empty` if you have not entered any channels in the `BTS Configuration` menu. To select the test channels, proceed as follows:

1. Select `Test Selection` in the main menu.

NOTE: According to selection of the `Test Type` field in the `Test Configuration Menu`, the Software shows either `Test Selection - Configured` (configured cell site mode) or `Test Selection - Active` (active cell site mode) for test selection in the main menu screen.

When you run the tests in the **configured cell site** mode, check the source and destination addresses using the laptop emulator before proceeding to next step. Select `Laptop Emulator` in the `Test Selection` menu screen to go to the laptop emulator. See **"Laptop Emulator" on page 120** for more detailed information.

2. Scroll to and choose `Test Channel`.
3. Select (set to `Yes`) a channel or a suite of channels you want to test in the `Choices:` menu. Note that the numbers of frequency assignment (FA) appears in the choices list instead of the channel numbers you have entered into the Channel Information table in the `BTS Configuration` menu.
4. Select `Done` to exit channel selection mode. The FA numbers you have selected are shown in the `Test Channel` field. See **figure 14 on page 58**.

Note that, when making measurement, the Software and Test Set will test only the channels of the frequency assignments (FA) you have selected.

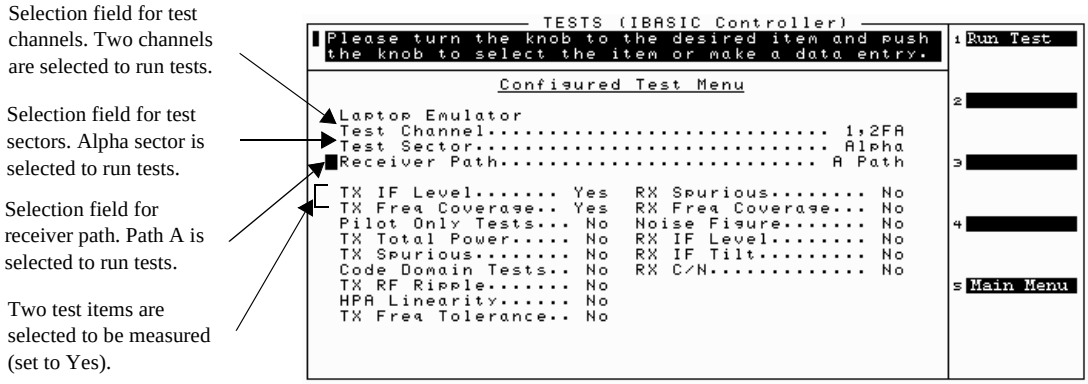


Figure 14 **Test Selection Menu Screen**

Selecting Test Sectors

Even though you enter up to 3 sectors in the `BTS Configuration` menu, whenever you make measurements, you have to select which of these sectors to test in the `Test Selection` menu. The test sectors will show `No Selection` until you select one. Notice that the entry field of test sectors will show `Empty` if you have not entered any sector information in the `BTS Configuration` menu. To select the test sectors, proceed as follows:

1. Select `Test Selection` in the main menu.
2. Scroll to and choose `Test Sector`.
3. Select (set to `Yes`) the test sectors you want to test in the `Choices:` menu. Note that the sectors you have selected in the `BTS Configuration` menu appear in the choices list.
4. Select `Done` to exit sector selection mode.

Note that the Software and Test Set will test only the sectors you have set to `Yes` when running tests. See **figure 14**.

Selecting Receiver Path

You can choose a receiver path for receiver tests in the `Test Selection` menu. To select the receiver path to test, proceed as follows:

1. Select `Test Selection` in the main menu.
2. Scroll to and choose `Receiver Path`.
3. Select the receiver path (`A Path`, `B Path` or `Both`) you want to test in the `Choices:` menu.

The Software and Test Set will test the receiver path you have selected when running tests. See **figure 14 on page 58**.

NOTE: If you have selected the PCS band in the `BTS Configuration` menu in **Active Cell Site** mode, you can test RX B path only.

Selecting Tests

Tests are selected in the `Test Selection` menu. Position the cursor in front of the test item you want to run and press the knob to select the test (set to `Yes`). Notice that the Software can perform a suite of transceiver tests on the selected channels and sectors at one time. See **figure 14 on page 58**.

Use the following list to locate the procedure for running each test.

- **"TX IF Level" on page 64**
- **"TX Frequency Coverage" on page 67**
- **"Pilot Only Tests" on page 69**
- **"TX Total Power" on page 72**
- **"TX Conducted Spurious Emissions" on page 76**
- **"Code Domain Tests" on page 78**
- **"TX RF Ripple" on page 81**
- **"HPA Linearity" on page 83**
- **"TX Frequency Tolerance" on page 85**
- **"RX Conducted Spurious Emissions" on page 88**
- **"RX Frequency Coverage" on page 91**
- **"Noise Figure" on page 93**
- **"RX IF Level" on page 95**
- **"RX IF Tilt" on page 97**
- **"RX C/N Test" on page 100**

NOTE: If you select `Mini BTS` in the `BTS Configuration` menu, all the tests listed above are available. But, if you select `Pico BTS`, some tests are not available.

Start Testing

After selecting the tests you desire to make measurements, you are now ready to run CDMA tests. You can start testing by pressing k1 (`Run Test`).

You can monitor commands being sent between the Test Set and the base station on the Test Set's display when you run the tests. **See "Data Logging" on page 168** for information.

If you need to stop testing before the test sequence is complete, press k5 (`Abort`). Depending on the state of the system, it can take up to 60 seconds for the test to stop. Because the site configuration may not have been reset before testing was aborted, you will be instructed to return the site to its original configuration.

CAUTION: The Test Set's ANT IN port is only used for very low signal levels ≤60 mW (17.78 dBm). Therefore, to prevent damage to the Test Set, never connect this port to the base station's TX Antenna port during tests in this chapter. This port is typically connected to the base station's TX Test port (EQP. CPL). The Test Set's RF IN/OUT port is for signals of ≤15 W. To connect this port to the base station's TX Antenna port of which signal is greater than 15 W, use a power attenuator.

NOTE: If you have set the `If a Test fails` field to `Go to Analyzer` in the `Test Configuration` menu, the Test Set enters into an appropriate analyzer screen if a test fails during measurements. The analyzer helps you to verify or diagnose what the problem is in the base station.

Reviewing Test Results

When testing is complete for all the selected test items, the Test Set will show a test results table on the display. If a measurement's results fall outside the specified limits, the measurement will fail. A failure is indicated by an `F` in the `P/F` column (see **figure 15 on page 61**). The following list explains how to use the USER keys on this screen.

- Press k1 (`Proceed`) to continue to make measurements for remaining tests or exit running test mode.
- Press k3 (`Page Up`) or k4 (`Page Down`) to review the test result table.
- Press k5 (`Save`) and enter a file name to save the test result to a PC card. To enter the file name, use the characters in the `Choices:` list. Position the cursor in front of the desired characters and press the knob to enter each character. Then select `Done` (at the top of the choices list).

NOTE: If you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results. See **"Sending Test Results to a PC or PC Card" on page 163** for more detailed information.

After saving the file of test results to the PC card, you can transfer the file to a PC or printer or view it on the Test Set's display. See **"PC Card Management" on page 149** for detailed information.

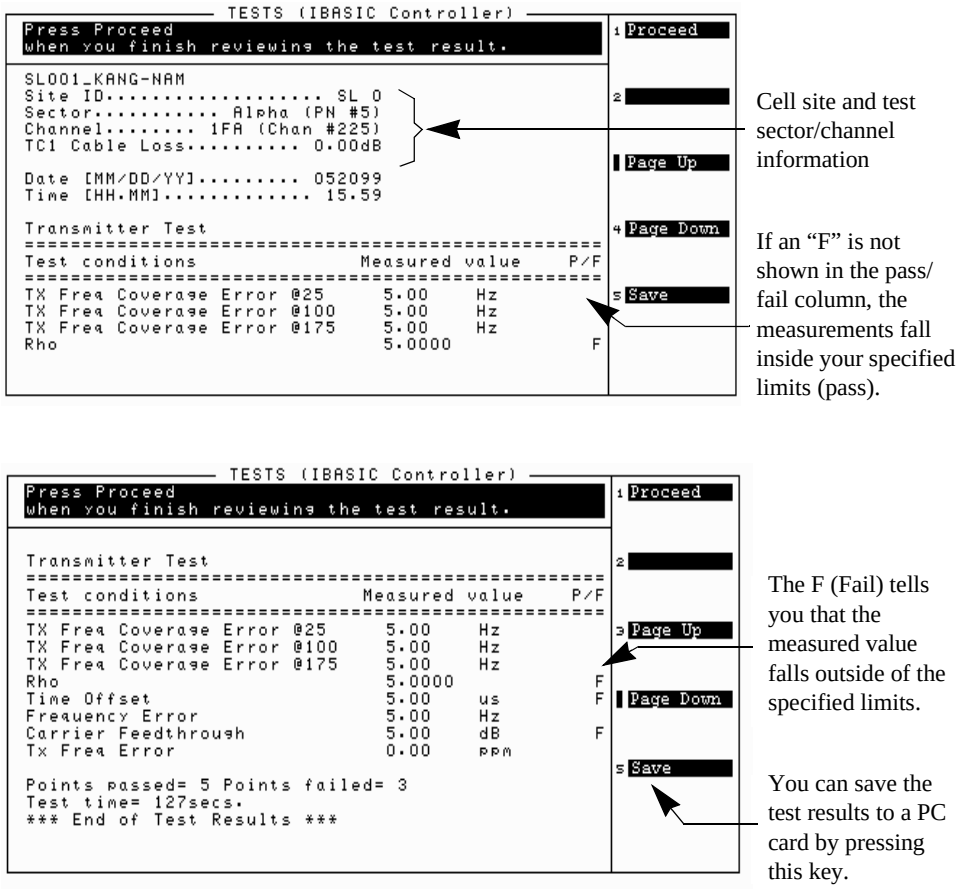


Figure 15 An Example of Test Results

Saving a Test Procedure

After successfully running the tests, it is recommended that you save all of the configurations and settings as a test procedure file for later retrieval. This eliminates the need to re-enter the information if you run a different program, if you change the configurations and test parameters when testing another cell site, or if you install new operating system firmware in your Test Set. **See "Saving and Recalling a Test Procedure" on page 51**.

Available Tests in Configured Cell Site Mode

In the **Configured Cell Site** mode, the Test Set and the Software will control the base station via the BTS control adapter to set up the site with only a pilot channel or full power condition. This is out-of-service testing of the base station. All tests listed on **"Selecting Tests" on page 59** are available in the configured cell site mode.

Transmitter Test Requirements

For some transmitter tests, the Software will make a choice before testing; the Software will set the base station to *pilot only control* mode or *total power control* mode.

Pilot Only Control Mode Only the pilot channel is transmitted in this control mode. The Test Set sets the digital gain of the pilot channel to 127 and the gains of other channels to 0.

The tests performed in this mode are:

- TX IF Level
- TX Frequency Coverage
- Pilot Only Tests
  - Rho
  - Time Offset
  - Frequency Error
  - Carrier Feedthrough

Total Power Control Mode This mode controls the transmitter to output a specified total power. It is the composite power of all the code channels on one frequency. The Test Set sets the digital gains for each channel as shown below.

- Pilot Channel - 108
- Sync Channel - 52
- Paging Channel - 105
- Traffic Channel - 74 (X6)
- TX Attenuation Level - 910 or 912

The tests performed in this mode are:

- TX RF Ripple
- TX Conducted Spurious Emission
- TX Total Power
- Code Domain Tests
  - Active walsh code power
  - Walsh code timing
  - Walsh code phase
  - Pilot walsh code power
- HPA Linearity

Receiver Test Requirements

The base station's antenna ports must be disconnected from the receive antennas for all receiver tests. The Test Set's ANT IN port should be connected to the base station's RX IF cables and the DUPLEX OUT port should be connected to the RX Antenna ports. See **"System Clocks and Receiver Connections" on page 36** for information on how to make connections for receiver tests.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HP A units when you test RX A path.

Available Tests in Active Cell Site Mode

In the **Active Cell Site** mode, the Test Set and the Software do not control the base station and CDMA tests can be done on an in-service base station. The pilot, paging and sync channels are on. Additionally, if call processing is enabled (in-service testing), traffic channels come on as well. The tests listed below are available in the active cell site mode.

- Pilot Only Tests
- TX Total Power
- TX Spurious Emissions
- Code Domain Tests
- TX RF Ripple
- Noise Figure
- RX IF Level
- RX IF Tilt
- RX C/N

TX IF Level

The TX IF Level test measures the level of a CDMA IF signal, modulated to 4.95 MHz.

NOTE: For the TX IF level test, connect the Test Set's ANT IN or RF IN/OUT port to the base station's TX IF output port. See **figure 8 on page 35** for more information.

This test simulates a power meter with an analog display. This mode is useful when you are making adjustments to power levels on a CDMA transmitter.

Features of the power meter display include:

- Tick marks on the meter to indicate when a power level setting is within the desired limits.
- Audible tones to indicate whether the power reading falls within specified limits.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min TX IF Level - Pilot Only Condition`
- `Max TX IF Level - Pilot Only Condition`
- `Min TX IF Level - Total Power Condition`
- `Max TX IF Level - Total Power Condition`

Parameters:

- `Adjust Power Level`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX IF Level` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make the measurement.

NOTE: This procedure includes steps that prompt you to set **SIC_A** board to **active** mode and SIC_B board to **standby** mode to make measurements at the SIC_A board. When measuring TX IF level at the SIC_B board, you need to set the **SIC_B** board to **active** mode and the SIC_A board to **standby** mode. After finishing measurements, you should *return* the SIC boards to their original setup.

Review the Results

1. When the testing is complete for the first channel, the Test Set will display the power meter screen (see **figure 16**) if you set the `Adjust Power Level` parameter to `Always` or `On fail` in the `Test Parameters & Specs Menu` screen.

NOTE: Even though you set the `Adjust Power Level` parameter to `Off`, the Test Set will go to power meter display mode if you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu.

The power meter display defaults to units of dBm. To view the power level in Watts, press k3 (`Watts`). A beeping tone accompanies the measurement to assist in adjusting your transmitter's power without looking at the display. Adjust the tone's volume by pressing k4 (`Tns off/Tns quiet/Tns loud`).

The longer tick marks indicate the high and low limit specification.

This prompt indicates if power is low, within specifications (OK), or high.

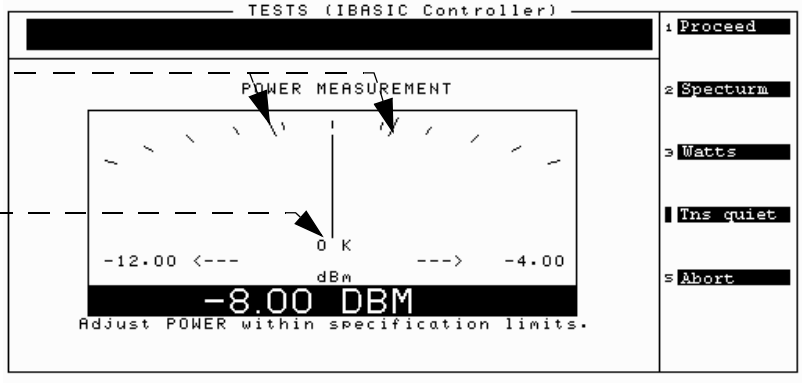


Figure 16 **TX IF Power Meter Display**

NOTE: If power measurements do not meet specifications, adjust the power level of the base station until the power meter's pointer is between the longer tick marks. After adjusting the power level, press k1 (`Proceed`). The Software instructs you to remeasure and record the adjusted power level in the test results table. We recommend that you remeasure the TX IF level after adjustment. Press k1 (`Yes`) to remeasure the TX IF level.

2. After remeasuring the TX IF level and when the test results meet the specifications, press k1 (`Proceed`) and follow the displayed instructions and diagram to continue to make the measurement.
3. Test results will begin showing on the display with a failure indication (F) if a measurement falls outside your specified limits.

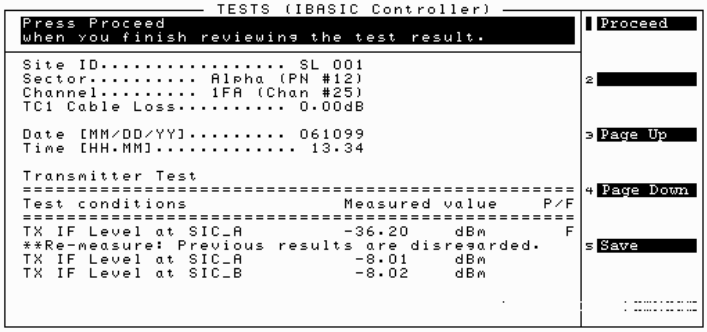


Figure 17 TX IF Level Test Results

4. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

5. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

TX Frequency Coverage

The base station's transmitter CDMA frequency assignments are associated on a one-to-one basis with the transmit CDMA frequency assignments. Each CDMA frequency assignment is centered at one of the specific frequencies. The base station transmitter is fixed-tuned to a specific CDMA frequency assignment. This test measures how well the transmitter is tuned to a specific CDMA frequency assignment.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max Freq Coverage`

Parameters:

- `Tuning to Min Channel`
- `Tuning to Mid Channel`
- `Tuning to Max Channel`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX Freq Coverage` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete for the first channel, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

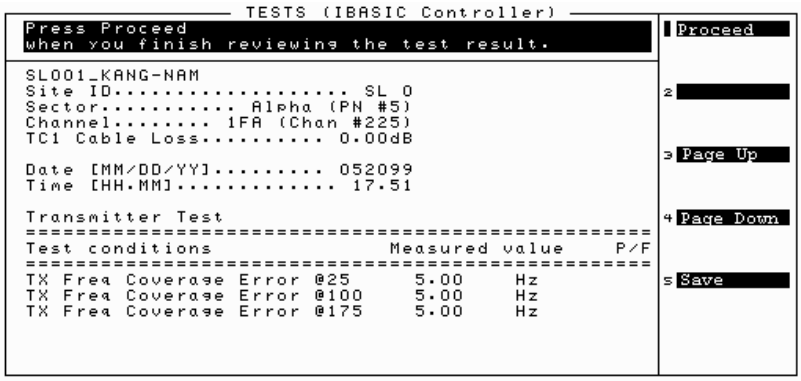


Figure 18 **TX Frequency Coverage Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name in this step if you want to save the test results to a PC card. But if you have activated `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

Pilot Only Tests

NOTE: For Test Sets with firmware revision A.01.10 and above, you must run this test in **Active Cell Site** mode. For Test Sets with firmware revision A.01.00, you must run this test in **Configured Cell Site** mode.

The Pilot Only Test performs a suite of CDMA tests on a carrier with only the pilot channel active (no active traffic or paging channels). The tests performed are:

- Rho (modulation quality)

  Rho is a measure of CDMA waveform quality. In this measurement, the modulated CDMA signal is compared to an ideal reference waveform to determine the performance of the transmitter's modulation circuitry.

- Time offset

  Time offset test measures how well the transmitter's signal is time-aligned to system time (GPSR time).

- Frequency error

  Carrier frequency error measures the difference between the transmitter's actual center frequency and the specified CDMA transmit frequency assignment.

- Carrier feedthrough

  Carrier feedthrough is a result of the RF carrier signal feeding through the I/Q modulator and getting on the transmitter's output circuitry without getting modulated. It is an important parameter that has a direct bearing on CDMA modulator performance. If the rho measurement is bad, this could be caused by poor carrier feedthrough. The most common cause of high carrier feedthrough is I/Q modulator dc offsets.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min Rho`
- `Max Time Offset`
- `Max Frequency Error`
- `Max Carrier Feedthrough`

Parameters:

- *None used for this parameter*

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `Pilot Only Tests` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete for the first channel, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

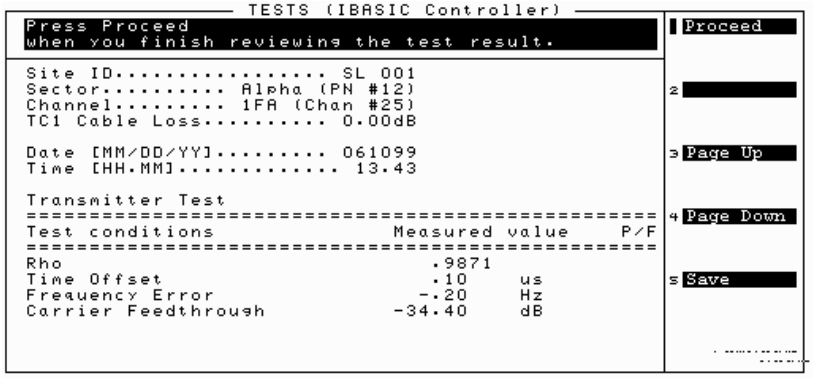


Figure 19 **Pilot Only Tests Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

TX Total Power

The TX Total Power test measures the composite power of all the code channels on a CDMA transmitter.

This test simulates a power meter with an analog display. This mode is useful when you are making adjustments to power levels on a CDMA transmitter.

Features of the power meter display include:

- Tick marks on the meter to indicate when a power level setting is within the desired limits.
- Audible tones to indicate whether the power reading falls within specified limits.

If you measure the TX Total Power at the Test Set's RF IN/OUT port, the **average power** is measured. If you measure the TX Total Power at the Test Set's ANT IN port, the **channel power** is measured.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min Power Error`
- `Max Power Error`

NOTE: These limits determine how the power meter is displayed during TX total power measurements together with the `Specified Output Power` parameter of the `Sector Information` field in the `BTS Configuration` menu. When the power meter display is shown, it has major tick marks that indicate the adjustment range for power settings. If you enter ±1 dB as the limits, the power meter will be drawn from the setting of the `Specified Output Power` in the center and major tick marks 1 dB up and 1 dB down from the center.

Parameters:

- `Adjust Power Level`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX Total Power` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: This procedure may include steps that prompt you to power off HPA units of other CDMA channels when you test at the **TX antenna port**.

Review the Results

1. When the testing is complete for the first channel, the Test Set will display the power meter screen (see **figure 20**) if you set the `Adjust Power Level` parameter to `Always` or `On fail` in the `Test Parameters & Specs Menu` screen.

NOTE: Even though you set the `Adjust Power Level` parameter to `Off`, the Test Set will go to power meter display mode if you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu.

The power meter display defaults to units of dBm. To view the power level in Watts, press k3 (`Watts`). A beeping tone accompanies the measurement to assist in adjusting your transmitter's power without looking at the display. Adjust the tone's volume by pressing k4 (`Tns off/Tns quiet/Tns loud`).

NOTE: When you run this test in the **TX test port**, the coupling factor you entered in the `Sector Information` field will be compensated for when the Test Set displays the power meter or when the test results are displayed.

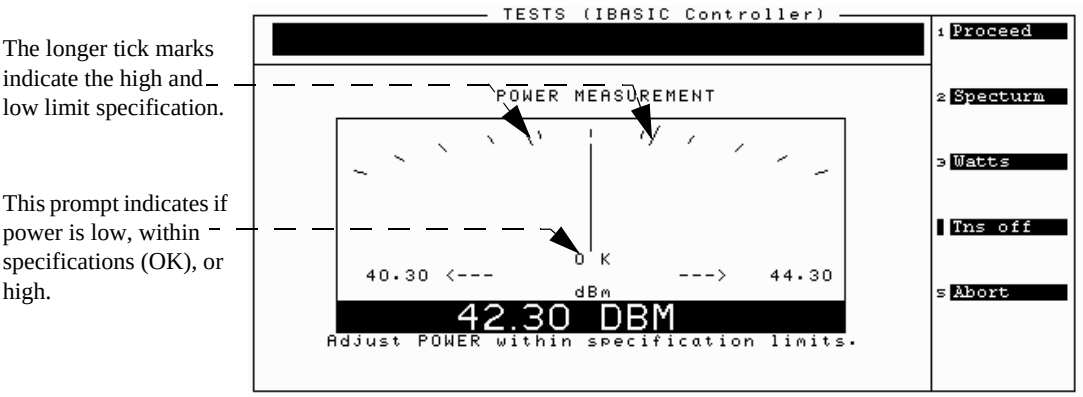


Figure 20 TX Total Power Meter Display

NOTE: If power measurements do not meet specifications, adjust the power level of the base station until the power meter's pointer is within the longer tick marks. After adjusting the power level, press k1 (`Proceed`). The Software instructs you to remeasure and record the adjusted power level in the test results table. We recommend that you remeasure the TX total power after adjustment. Press k1 (`Yes`) to remeasure the TX total power.

2. After remeasuring the TX total power, press k1 (`Proceed`) and follow the displayed instructions and diagram to continue to make the measurement. The Software inquires whether or not you want to measure the TX IF level, if you have selected the `Mini BTS` type in the `BTS Configuration` menu. We recommend that you test the TX IF level after adjusting the TX total power.
3. After testing the TX IF level, test results will begin showing on the display with a failure indication (F) if a measurement falls outside your specified limits.

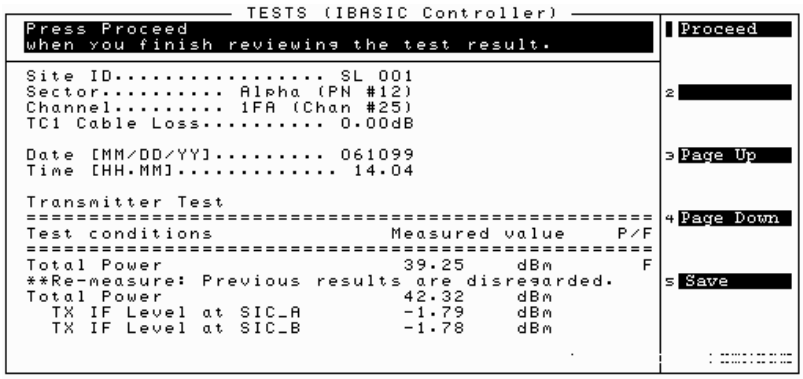


Figure 21 **TX Total Power Test Results**

4. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

5. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

TX Conducted Spurious Emissions

The TX Conducted Spurious Emissions test measures emissions at frequencies that are outside the specified CDMA channel, measured at the base station's antenna ports.

NOTE: This test is available with the HP 8935 Test Set firmware revision A.02.00 and above.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min Level @ Fc +/- 885 kHz - PCS Band`
- `Min Level @ Fc +/- 1.25 MHz - PCS Band`
- `Min Level @ Fc +/- 2.25 MHz - PCS Band`
- `Min Level @ Fc +/- 750 kHz - Cellular Band`
- `Min Level @ Fc +/- 1.98 MHz - Cellular Band`

Parameters:

- *None used for this parameter*

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX Spurious` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete for the first channel, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

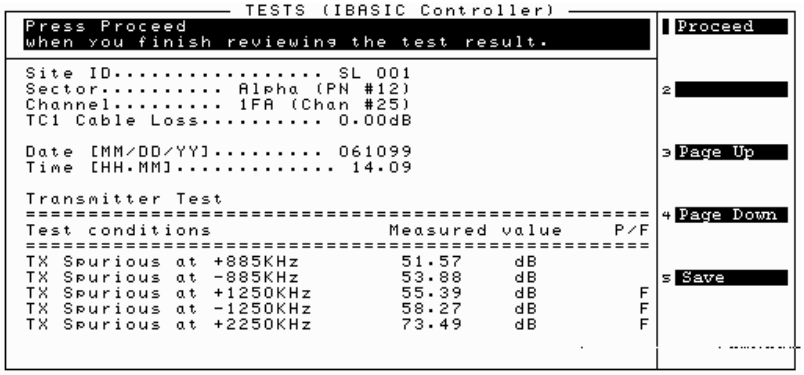


Figure 22 **TX Conducted Emission Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

Code Domain Tests

The Code Domain Tests perform a suite of CDMA transmitter tests on the selected channels and sectors. Unlike the Pilot Only test, this test is performed in the total power condition.

The tests performed are:

- Walsh Code Power
- Walsh Code Timing
- Walsh Code Phase
- Maximum Inactive Walsh Code Power
- Pilot Power

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min Pilot Power`
- `Max Pilot Power`
- `Max Inactive Walsh Power`
- `Max Code Domain Timing`
- `Max Code Domain Phase`

Parameters:

- `Code Domain Data Averages`
- `Code Domain Power Threshold`
- `Measure Code Domain Phase`
- `Print Inactive Walsh Code Power`
- `Walsh Code Power Units`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `Code Domain Tests` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete for the first channel, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

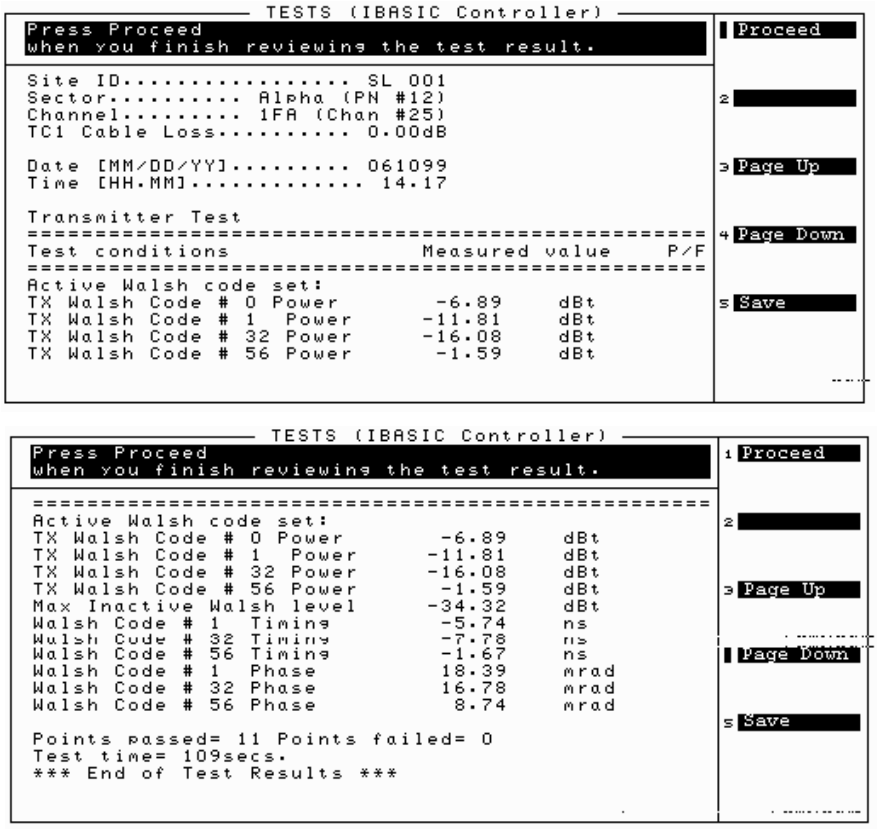


Figure 23 **Code Domain Tests Results**

TX RF Ripple

The TX RF Ripple test measures the ripple of the CDMA transmit signals on the assigned frequency assignments.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max TX RF Ripple`

Parameters:

- *None used for this parameter*

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX RF Ripple` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

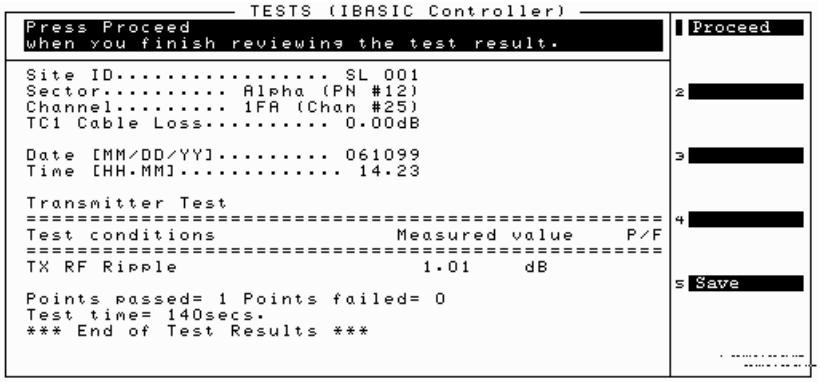


Figure 24 **TX RF Ripple Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

HPA Linearity

This test measures the HPA linearity by changing TX attenuation level values.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- *None used for these specifications*

Parameters:

- `Min TX Gain`
- `Max TX Gain`
- `TX Gain Incremental Step`
- `Min TX Atten`
- `Max TX Atten`
- `TX Atten Incremental Step`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `HPA Linearity` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

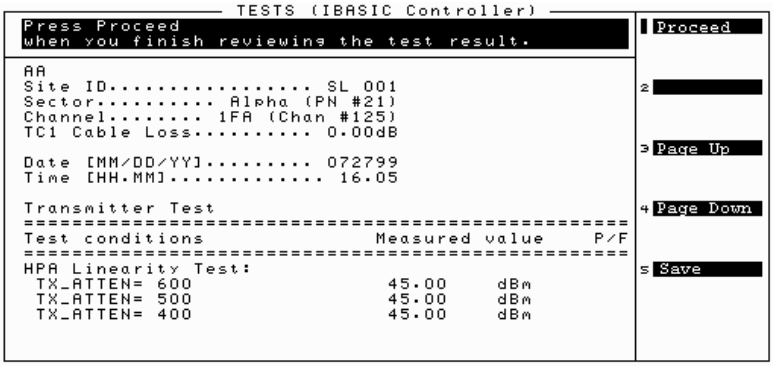


Figure 25 **HPA Linearity Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

TX Frequency Tolerance

The TX Frequency Tolerance test measures the maximum allowed difference between the actual CDMA transmit frequency and the specified CMDA transmit frequency assignment by making a single-toned RF frequency.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max TX Freq Tolerance`

Parameters:

- *None used for this test*

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `TX Freq Tolerance` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: This procedure includes steps that prompt you to remove the CIP board from the base station to make a single-toned RF frequency. Connect an RS232 cable between the Test Set's SERIAL 10 port and the **active** BCP board in order for the Test Set to send the key on command to the transmitter. For *manual* base station control, you need to send the key on command to the transmitter.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

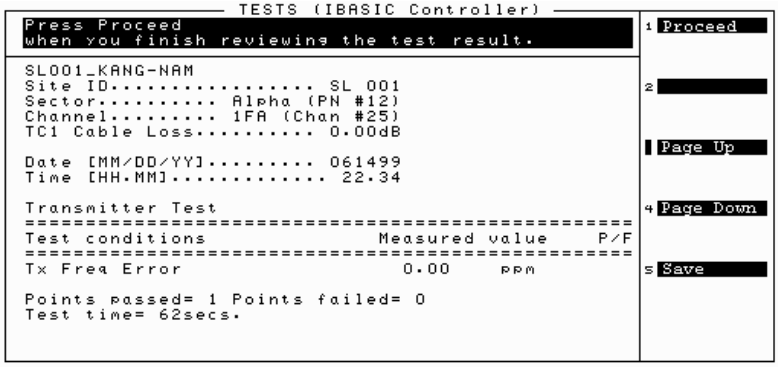


Figure 26 **TX Frequency Tolerance Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

RX Conducted Spurious Emissions

The RX Conducted Spurious Emissions test measures spurious emissions which are generated or amplified in the base station and then appear at the base station's Antenna ports.

NOTE: Before proceeding with this test, set all TX attenuation gains to 600 (maximum value) and remove the SIC board from the base station, or disconnect the RX IF cables from the base station to disable the TX Antenna outputs.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max at Out Band`
- `Max at RX Band`
- `Max at TX Band`

Parameters:

- *None used for this test*

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `RX Spurious` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the Pause/Continue key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column. You can use k2 (`View Plot`) to view the test results.

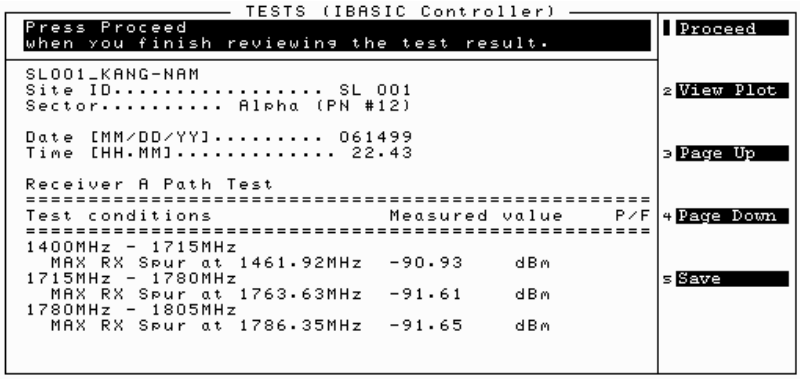


Figure 27 **RX Conducted Spurious Emissions Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. Press k2 (`View Plot`) to see the measurement results on a graphical plot. Press k1 (`Proceed`) to exit the graphical plot mode.

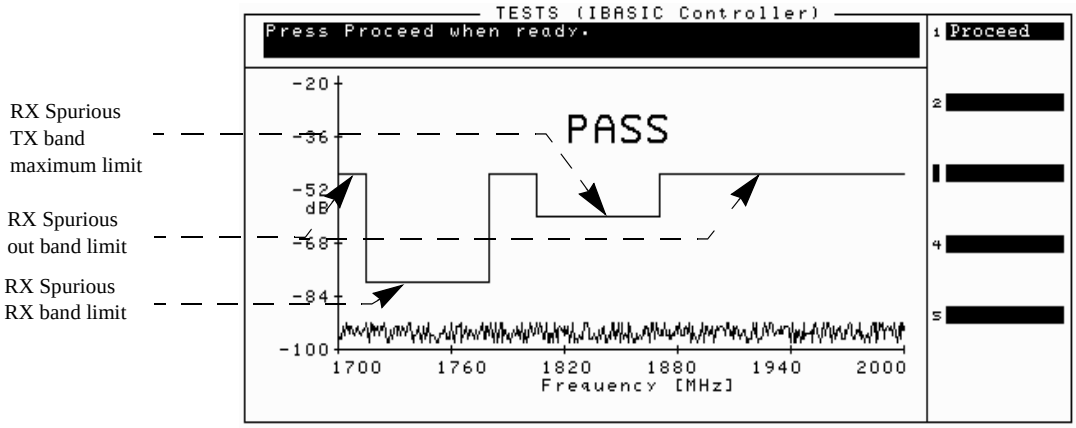


Figure 28 **Plot of RX Conducted Spurious Emissions Test Results**

3. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

RX Frequency Coverage

The base station's receive CDMA frequency assignments are associated on a one-to-one basis with the transmit CDMA frequency assignments. Each CDMA frequency assignment is centered at one of the specific frequencies. The base station's receiver is fixed-tuned to a specific CDMA frequency assignment. This test measures how well the receiver is tuned to a specific CDMA frequency assignment.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max Freq Coverage`

Parameters:

- `Tuning to Min Channel`
- `Tuning to Mid Channel`
- `Tuning to Max Channel`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `RX Freq Coverage` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

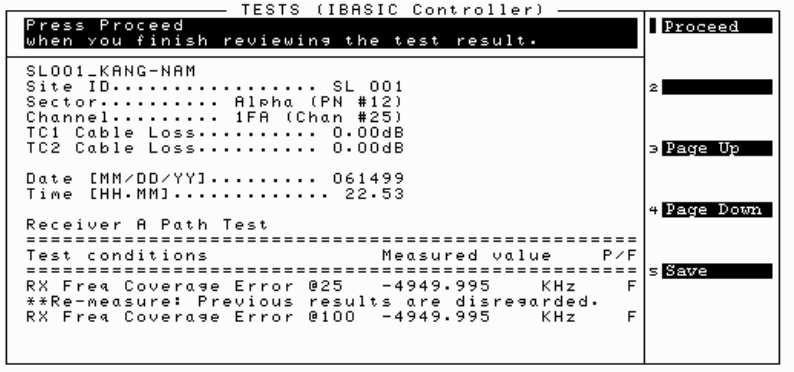


Figure 29 RX Frequency Coverage Test Results

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

Noise Figure

The sensitivity of the receiver is set by the noise presented to the receiver with the desired CDMA signal. Noise figure is defined as the ratio of the input signal-to-noise to the output signal-to-noise of the receiver.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max Noise Figure`

Parameters:

- *None used for this test*

NOTE: The test results of this test are greatly affected by the values of cable loss measurements. Make sure to measure the cable loss again before running this test. See **"Test Cables Loss [dB]" on page 49** for more information.

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `Noise Figure` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

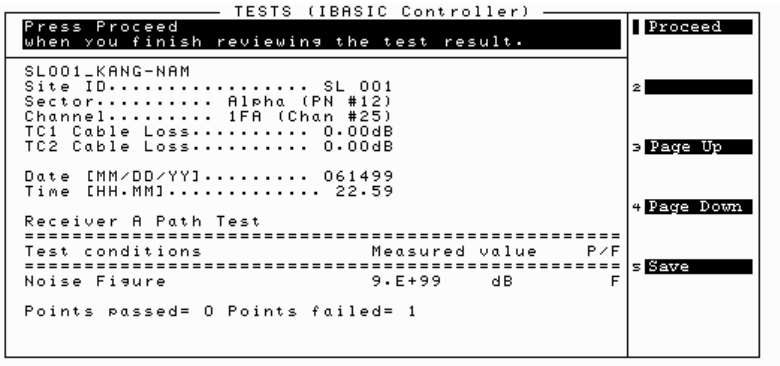


Figure 30 **Noise Figure Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

RX IF Level

The RX IF Level test measures the level of the single-toned 4.95 MHz RX IF signal after it is received from the antenna.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min RX IF Level`
- `Max RX IF Level`

Parameters:

- `Min CW Generator Level`
- `Max CW Generator Level`
- `CW Generator Incremental Step`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `RX IF Level` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: This procedure includes steps that prompt you to connect a short cable between the Test Set's ANT IN port and DUPLEX OUT port to calibrate the Test Set's spectrum analyzer.

The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

NOTE: If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

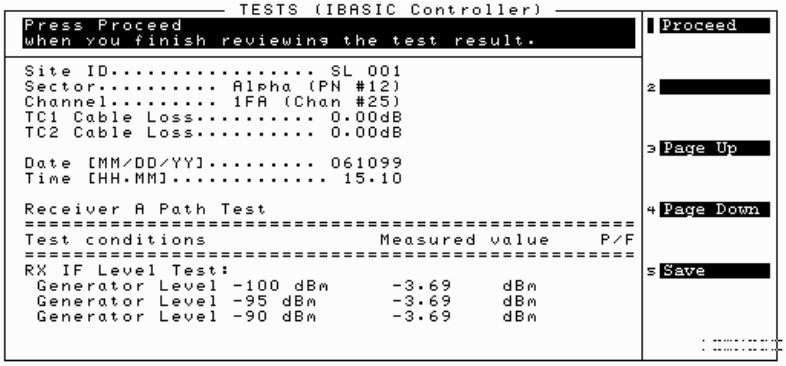


Figure 31 **RX IF Level Test Results**

1. When measuring RX IF level, the Test Set changes the CDMA generator's incremental step by 2, 5, or 10 dB resolution which is set by the `CW Generator Incremental Step` parameter. You can also change the generator's minimum or maximum level using the `Min CW Generator Level` or `Max CW Generator Level` parameters.
2. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

3. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

RX IF Tilt

The RX IF Tilt test measures the tilt of the RX IF signal (4.95 MHz) after it is received from the antenna.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Max RX IF Tilt`

Parameters:

- `CDMA Generator Level`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `RX IF Tilt` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

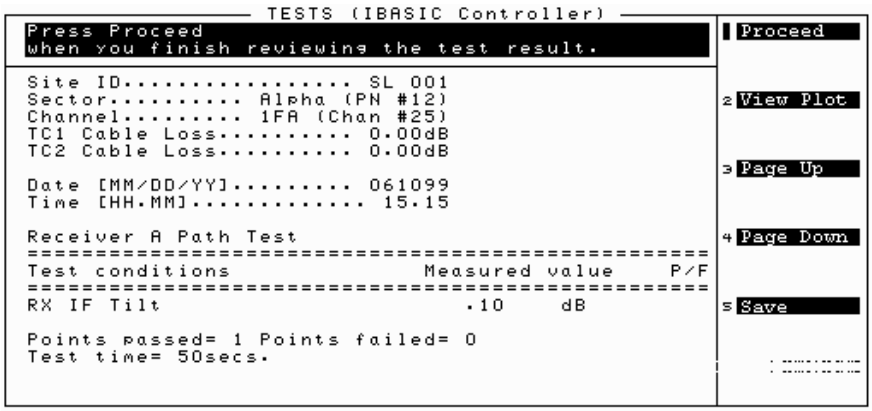


Figure 32 **RX IF Tilt Test Results**

1. Press k2 (`View Plot`) to see the measurement results on a graphical plot.

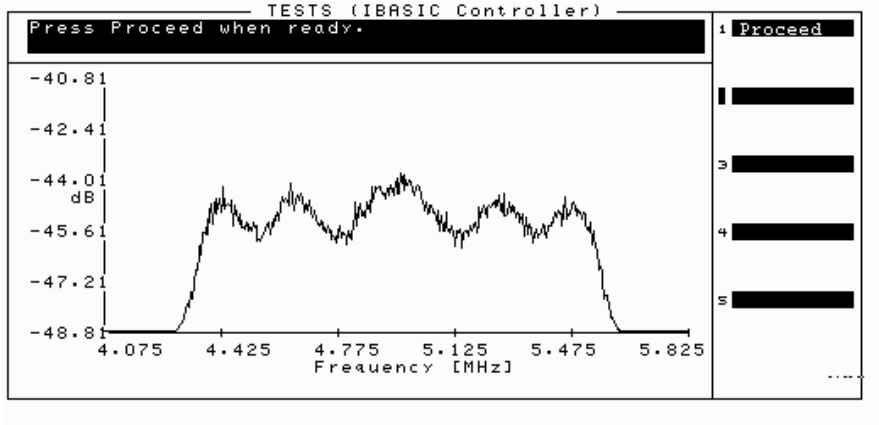


Figure 33 **Plot of RX IF Tilt Test Results**

2. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

3. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

RX C/N Test

The RX C/N Test measures the carrier to noise (C/N) ratio of the receiver path. This test is useful for maximizing system diversity by maintaining a constant C/N ratio.

Specifications and Parameters Used

The following specifications and parameters are used when running this test.

Specifications (Pass/Fail Limits):

- `Min RX C/N`

Parameters:

- `CW Generator Level`

Select and Run the Test

1. Select `Test Selection` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select the test channels and sectors that you desire to test.
3. Select `RX C/N` (press the knob to set to `Yes`).
4. Press k1 (`Run Test`) to start testing.
5. Follow the displayed instructions and diagram as prompted to make measurement.

NOTE: The receiver (RX) A path's antenna of the Samsung PCS band CDMA base station uses the same antenna port as the transmitter. Power off all HPA units when you test RX A path.

If you have selected `Go to Analyzer` in the `If a Test Fails` selection field of the `Test Configuration` menu, the The Test Set enters into the CDMA analyzer screen when the measurement's results fall outside the specified limits during measurements. After verifying the problem using the analyzer, and adjusting the BTS, press the **Pause/Continue** key on the Test Set's front panel to return to the Software. Press k1 (`Yes`) to make measurements again or k2 (`No`) to exit analyzer mode. If you select Yes, the test result table shows the new measurement results.

Review the Results

When the testing is complete, you can review the on-screen test results. If the measurement's results fall outside the specified limits, the measurement will fail. Failures are indicated by an `F` in the `P/F` column.

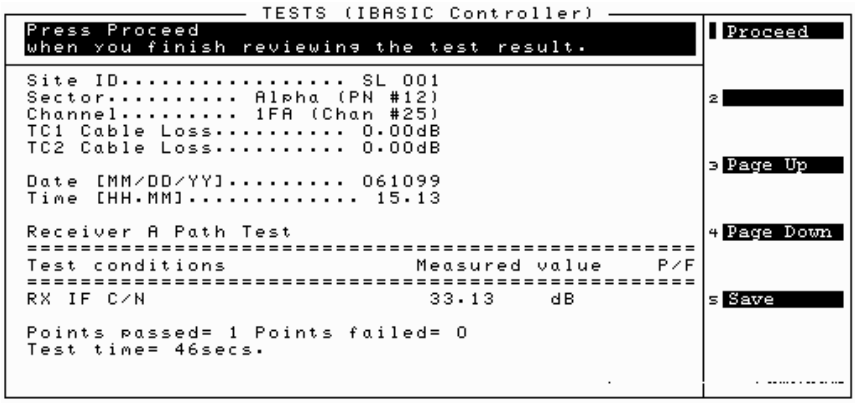


Figure 34 **RX C/N Test Results**

1. Press k1 (`Proceed`) to test other channels or sectors and follow the displayed instructions and diagram to make the measurement.

NOTE: Before proceeding to test other channels or sectors, press k5 (`Save`) and enter a file name if you want to save the test results to a PC card. But if you have activated the `Send Test Results to` parameter in the `Print & Data Collection` menu, the Software will automatically save the test results.

2. The Software will return to the test selection menu when you are finished testing all specified channels and sectors.

Using the Utilities

The following sections describe the utilities which are available in the Software. The following utilities are included in the Software's `Utilities` menu.

- RF Tools
- Laptop Emulator
- PN Offset Search
- Calibrate TX Test Port
- Check Even Second Clock Signal

See "Laptop Emulator," in chapter 5, on page 120 for detailed information on how to use the laptop emulator.

NOTE: The measurements for `PN Offset Search` and `Calibrate TX Test Port` are also available through the `Sector Information` menu in the `BTS Configuration` menu. The measurement results in the `Utilities Menu` are ***not*** automatically entered into the Sector Information table.

RF Tools

The RF Tools program resides in two places: in the Test Set's ROM, and in the Software.

- Running the RF Tools program from the Test Set's ROM purges the Software from the Test Set's memory. You must reload the Software and reconfigure all previous settings when you exit the RF Tools ROM program.
- Loading the RF Tools program from the `Utilities Menu` in the Software will temporarily remove the Software from Test Set's memory, then restore both the Software and all settings you made in the Software when you exit the RF Tools program.

NOTE: Before running the RF tools program from the Software, insert the PC card containing the Software's *procedure* and *code* files into the Test Set's front-panel PC card slot. When you load the RF Tools program in the Software, the Test Set will check your card to make sure the correct files are on the PC card. To correctly restore the Software when exiting the RF tools, you must have the PC card which contains the Software procedure and code files inserted in the PC card slot.

The following tests and utility programs are available in the RF Tools.

- Swept Gain
- Discrete Frequency Insertion Loss
- Swept Insertion Loss
- Swept Return Loss
- Cable Fault
- Replot Data Files
- Transfer Stored Data
- SA (Spectrum Analyzer) Self Calibration ON/OFF
- Catalog PC (Memory) Card
- Setup Printer/Data Collection

Select and Run the Test

1. Select `Utilities` menu in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select `RF Tools`.

NOTE: This procedure includes steps that prompt you to save any changes before running the RF Tools program and insert the PC card which contains the Software procedure and code files into the Test Set's front-panel PC card slot.

3. Press k1 (`Yes`) to load the RF tools and k1 (`CDMA`).
4. Select a test or utility in the `Choices:` by pressing the knob or k1 (`Sel Test`).
5. Press k1 to start the utility. (The label for k1 varies depending on the utility.)
6. Follow the displayed instructions and diagrams.

Refer to the HP 8935 manuals supplied with the Test Set for details on how to set the parameters for the specific measurements and review the test results of each test or utility.

PN Offset Search

NOTE: This test is available for HP 8935 Test Sets with firmware revision A01.10 and above.

The PN Offset Search is a utility that can be used when you are testing a sector and do not know the PN Offset value. The utility has the Test Set tune to the CDMA channel and search to find the valid PN offset value. The resulting PN offset value is *not* automatically entered into the `PN Offset` field of the Sector Information table in the `BTS Configuration` menu.

This test can be performed with base station either in-service (at TX Test port) or out-of-service (at TX Antenna port).

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

1. Select the `Utilities` menu in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select `PN Offset Search`.
3. Select or set the following cell site information, if not already applicable:
   - `Sector` (`Alpha`, `Beta`, or `Gamma`)
   - `Channel Number`
   - `Measurement Port` (`TX Test Port` or `TX Antenna Port`)

NOTE: If you select the TX Antenna port, the instructions on the display prompt you to power-off all HPA units before connecting the cable at TX Antenna port, and to power the HPA units on again after the connection has been made.

4. Press k1 (`Proceed`) key to start the search.
5. Follow the displayed instructions and diagram, as prompted, to search the PN offset value.

Review the Results

The Test Set will begin searching for the sector's PN offset. This is an iterative process and it may take several minutes before returning the PN offset. Once the value has been found, it will be displayed on the screen.

1. When the PN offset value is displayed, press k1 (`Proceed`) and k5 (`Previous`) to return to `Utilities` menu screen.

TX Test Port Calibration

The Calibrate TX Test Port utility measures the loss associated with testing from the TX Test port. The resulting value of the coupling factor is not automatically entered into the `Coupling Factor` field of the Sector Information table in the `BTS Configuration` menu.

This calibration first measures the level at the TX Antenna port, then measures the level at the TX Test port. The difference in these levels, plus factors such as test cable losses, is used to determine the loss through the TX Test port

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

1. Select `Utilities` menu in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select `Calibrate TX Test Port`.
3. Select or set the following cell site information, if not already applicable:
   - `Sector` (`Alpha`, `Beta`, or `Gamma`)
   - `Channel Number`
   - `EXT. Attenuator`

   For accurate calibration, you need to enter an accurate attenuation value of the external attenuator.
4. Follow the displayed instructions and diagram as prompted to make measurements.

Review the Results

1. The TX Test Port coupling factor is calculated and displayed. Record this value on a label next to the TX Test port for future reference.
2. Press k1 (`Proceed`) to return to the Calibrate TX Test Port screen and press k5 (`Previous`) to return to `Utilities` menu screen.

Even Second Clock Signal Check

The Check Even Second Clock Signal test is a utility that can check if the even second clock is found in the base station.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

1. Select `Utilities` menu in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select `Check Even Second Clock Signal`.
3. Press k1(`Proceed`) to start checking and follow the displayed instruction and diagram as prompted.

NOTE: This procedure includes steps that prompt you to disconnect the base station's even second clock signal from the Test Set's SYNC IN EVEN SECOND port, then temporarily connect it to the Test Set's TRIG/QUAL IN port.

Review the Results

1. When test results are displayed, press k1 (`Proceed`).
2. After testing, you will be prompted to reconnect the base station's even second clock signal to the Test Set's SYNC IN EVEN SECOND port. Press k1 (`Proceed`) to go to the Check Even Second Clock Signal setup menu after reconnection.

5

CDMA Tests Software Reference

This chapter describes detailed operation of the Software that was not covered in the **Chapter 4, "Performing CDMA Tests"**. The information in this chapter is organized by key topics, listed alphabetically. Use this chapter as a supplement when you have questions using the CDMA tests.

Overview

Reference Information Topics

Refer to the following topic areas for detailed instructions on Software use:

Acronyms List

The following acronyms appear throughout this book. Use this as a reference when you have questions about the meaning of a particular acronym.

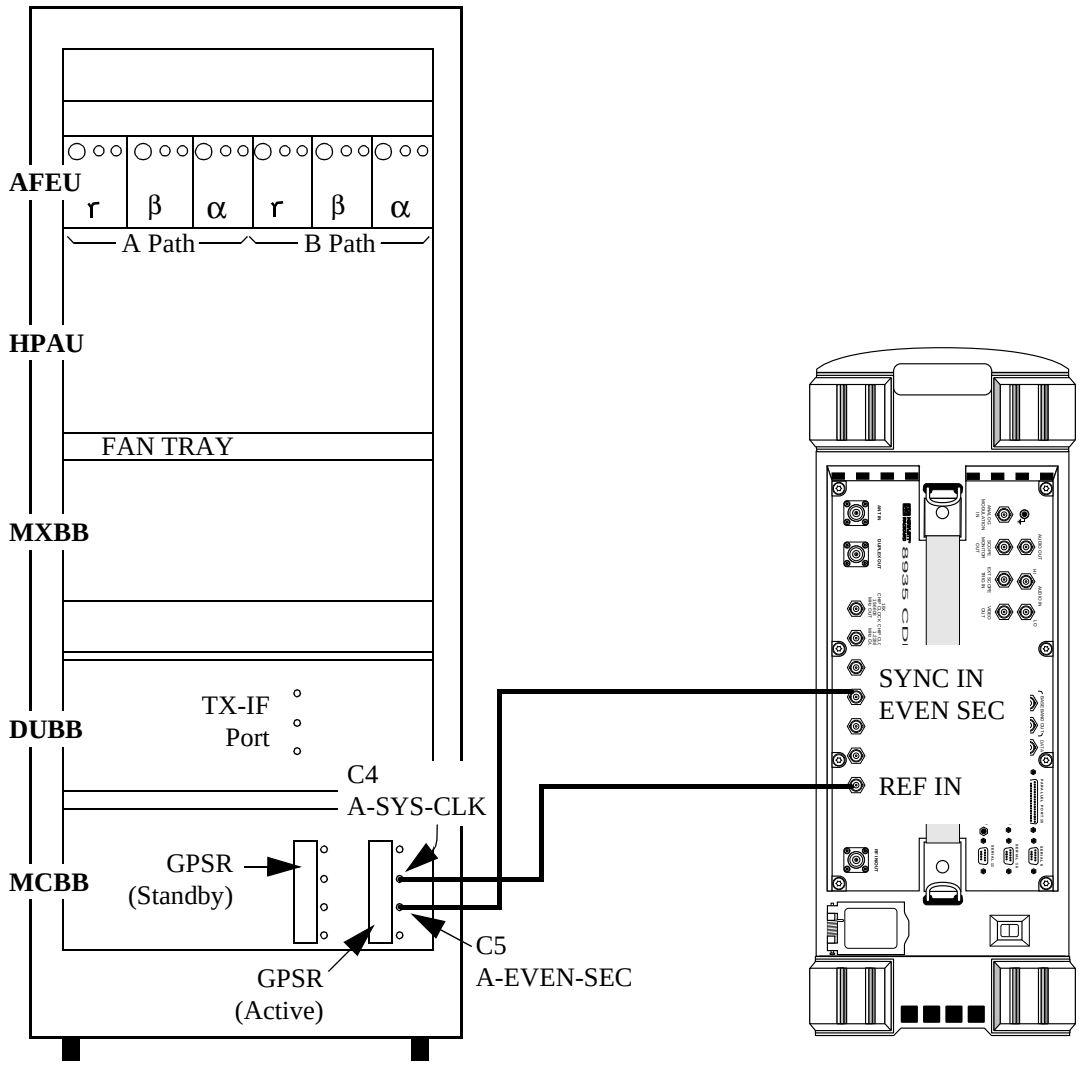
BSC – Base Station Controller
BTS – Base Station Transceiver Subsystem
CDMA – Code Division Multiple Access
CE – Channel Element
CR – Carriage Return
C/N – Carrier to Noise
CRT – Cathode Ray Tube
dB – deciBel
dBm – deciBels with respect to a milliwatt
dBc – deciBels with respect to the power level of the carrier
dBt – deciBels with respect to the total measured channel power
DUT – Device Under Test
FA – Frequency Assignment
GPS – Global Positioning System
GPSR – Global Positioning System Receiver
HIB – High speed Intercommunication Board
HPA – High Power Amplifier
IF – Intermediate Frequency
MAP – Maintenance & Administration PC (operation manual)
OCNS – Other Cell Noise Simulation
PC – Personal Computer
PCS – Personal Communications Services
PN – pseudonoise
RF – Radio Frequency
RX – Receiver
TC – Test Cable
TRX – Transmitter and Receiver
TX – Transmitter

Connections

Refer to the following sections for details on making connections:

Test Set Connections to the Base Station

Figure 35 shows the most typical configuration for connecting the reference timebase and even-second clock between the base station and the Test Set. This configuration utilizes the base station's clocks for the Test Set's reference.



Even Second and 19.6608 MHz clocks should come from the GPSR module. Make sure that the GPSR is being locked (active).

Figure 35 **Standard Connections to Base Station Equipment for Transmitter Test**

Figure 36 shows the connections to the Test Set when using an HP 58503A GPS time and frequency reference receiver to establish a time base. This configuration utilizes a GPS signal for the Test Set's timebase. **See "GPS Time and Frequency Reference Receiver" on page 23** for information on why you use the HP 58503A.

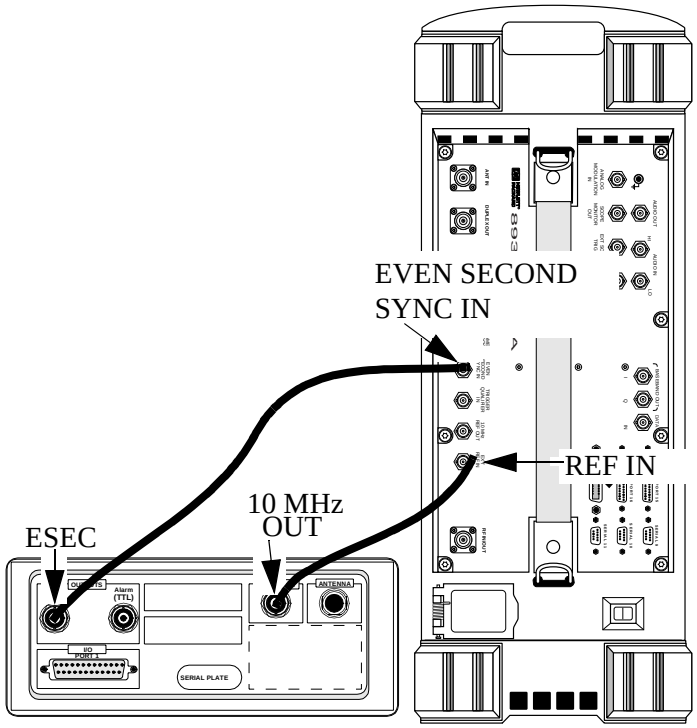


Figure 36 **Connections to the Base Station Equipment Using an HP 58503A GPS Time and Frequency Reference Receiver**

Connections for Site Control

Figure 37 illustrates the connections used when connecting the Samsung BTS control adapter to the Test System for sending site control commands and (optionally) how to add a personal computer to the SERIAL 9 port for logging and data collection.

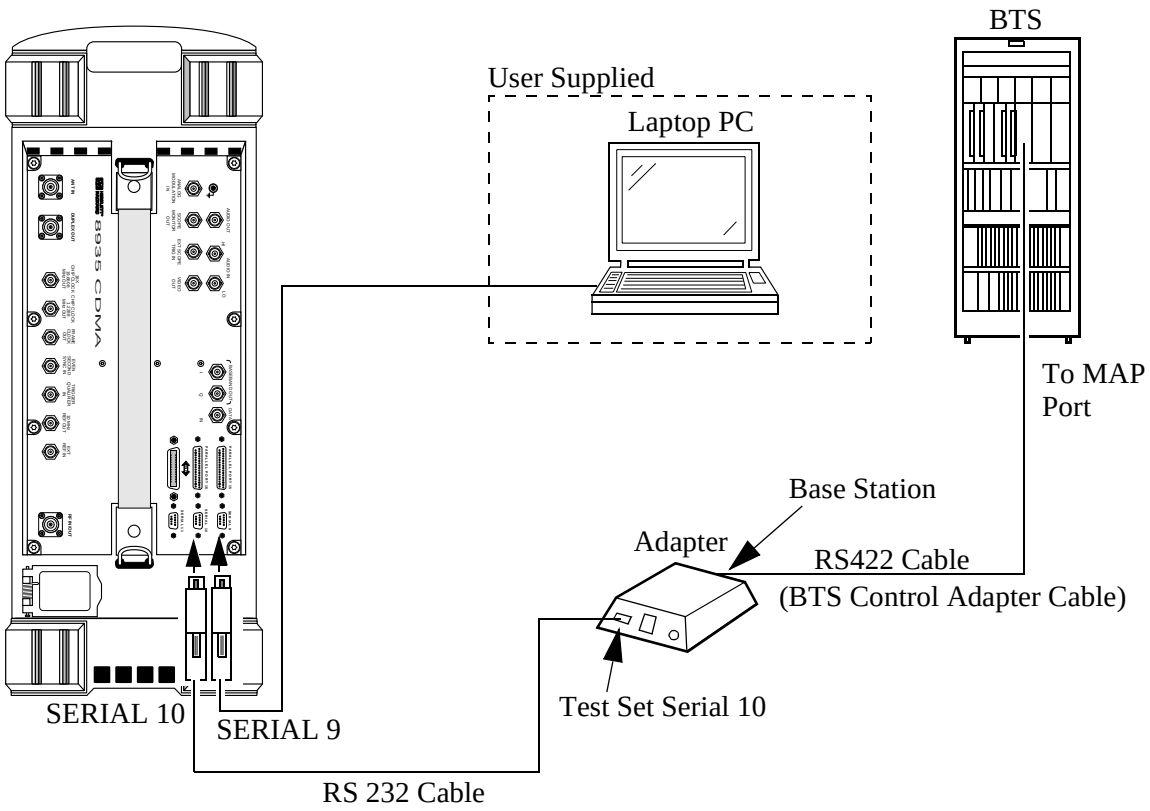


Figure 37 **Connections for the HP 8935, BTS Control Adapter, and Laptop PC**

Printer Connection

Test results and communication commands between the base station and Test Set can all be printed to a hard copy (paper). You can print using the SERIAL 9 port, the PARALLEL 15 port, or the HP-IB port. When using SERIAL 9 port, you cannot have your laptop PC connected at the same time.

For information on connecting and configuring a printer, **see "Connecting to External Devices" on page 154**.

- Using the data collection function, you can print test results as tests are run. **See "Sending Test Results to a Printer" on page 161**.
- Using data logging function, you can print control commands and responses between the base station and Test Set. **See "Data Logging" on page 168**.

Connector Kit

A special cable kit supplies serial cables, RF cables and adapters needed to connect the Test Set for testing while running the Software. Refer to **table 1 on page 117** for a list of parts included with the cable accessory kit.

NOTE: The cable accessory kit is *optional*, and is *not included* with the HP 8935, or HP E6386A Software. They are bundled together with the HP E6386A if you order the HP E6550A Samsung CDMA PCS/Cellular Base Station Test Solution.

Table 1 Samsung Base Station Connection Kit Contents

Part	Part Number	Quantity	Use
RF Coaxial Cable N(m) to N(m) 3 m (10 ft)	08921-61010	2	Connects the base station's TX Antenna port to the Test Set's RF IN/OUT port or DUPLEX OUT port.
RF Coaxial Cable SMA(m) to BNC(m) 3 m (10 ft)	08921-61021	2	Connects base station's even second clock and 19.6608 MHz clock to Test Set.
RF Coaxial Cable SMA(m) to N(m) 3.7 m (12 ft)	E8300-61002	1	Connects the base station's TX Test port to the Test Set's ANT IN port.
Null Modem Cable DB9(f) to DB9(f) 3 m (10 ft)	5182-4794	1	Connects the PC's serial port to the Test Set's SERIAL 9 or SERIAL 10 port.
RF Coaxial Fixed Attenuator 6 dB N(m) to N(f)	0955-0819	2	Used for cable insertion loss calibration routines.
RF Adapter, SMA(f) to N(m)	1250-1250	1	Needed for test cable calibration to adapt to a Type N connector.
Velcro Cable Wrap	1400-2157	10	Used for securing and organizing cables for transporting and during testing.
RF Cable Strain Relief Assembly	E8300-61004	2	Used to provide strain relief on RF coaxial cables connected to the base station.
Verification Guide	E6550-90001	1	Used as a checklist for connector kit contents.
Connection Kit Case	E6550-61004	1	Organizes and transports connectors and cables.
BTS Control Adapter Cable DB9(f) to Quarter Plug	E6550-61001	1	Connects the BTS control adapter to the base station.
BTS Control Adapter Loopback Test Shunt	E6550-61002	1	Needed to perform the loopback test for the BTS control adapter.
Gender Changer DB9(m) to DB9(m)	N/A	1	Needed to measure TX frequency tolerance for BCP RS232 female port.
RF Adapter SMA(f) to SMA(f)	1250-1753	1	Needed to connect the RX-IF cables.
RF Adapter N(f) to N(f)	1250-0777	2	Needed for test cable calibration.

Table 1 Samsung Base Station Connection Kit Contents

Part	Part Number	Quantity	Use
RF Coaxial Cable N(m) to N(m) 0.6 m (2 ft)	E8300-61005	1	Needed for test cable calibration.
Attenuator 25 W N(m) to N(f)	N/A	1	Connect the base station's TX Antenna port to the Test Set's RF IN/OUT port.
BTS Control Adapter	E6552A	1	Convert RS232 commands to RS422 commands.
AC/DC Adapter	F1044B	1	Connect the BTS control adapter to the AC inlet.
Map Cable for Pico BTS	N/A	1	Connect the BTS control adapter to the Pico base station.
RF Adapter BNC(m) to SMA(f)	N/A	2	Needed to connect even second clock or 19.6608 MHz clock for Pico base station.

Hardware Accessory Kit

The HP 8935 RF Tools Hardware Accessory Kit contains the equipment necessary to run the RF Tools ROM programs that reside in the Test Set. Refer to the *HP 8935 CDMA Cellular/PCS Base Station Test Set Reference Guide* for more information about the RF Tools program.

NOTE: The RF Tools hardware accessory kit is *optional*, and is *not included* with the HP 8935, or HP E6386A Software. *It must be ordered at the same time as Option 001 when the HP E6550A is ordered.*

Table 2 HP 8935 RF Tools Hardware Accessory Kit

Part	Part Number	Quantity	Use
RF Coaxial Cable N(m) to N(m) 0.6 m (2 ft)	8120-8687	2	Used to connect the Test Set to the VSWR bridge.
RF VSWR Bridge N(f)	E6554-61002	1	Used during return loss test.
Coaxial 50 Ω Termination N(m)	1250-2656	1	Used to terminate transmission lines.
Short Circuit N(m)	1250-2655	1	Used to terminate the DUT port of the VSWR bridge during return loss test.
2-Way Resistive Power Splitter N(f)	E6554-61003	1	Used during cable fault test.

Demo (Demonstration) Mode

A good way to get started with the Software is to run it in the demo mode. The demo mode allows you to step through the menus and simulate testing without really testing and connecting to a base station control.

In the demo mode, the Test System will not actually send control commands to a base station, but it will perform very much the same as if actually testing a base station. When measurements are displayed, it provides sample numbers in order to show what the printout format will look like.

NOTE: Once the demo mode is enabled, *it will stay on until you turn it off*. Even if you power off the Test Set and run the Software later, the demo mode setting is stored in non-volatile RAM and will still be set.

The switch used to turn the demo mode on and off is a parameter in the `Test Configuration` menu. To turn on the demo mode:

1. Select `Test Configuration` in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.).
2. Select `ZZZZ Demo Mode`.
3. Select `Demo` in the `Choices:` menu.
4. That is all it takes to set it up. The demo mode begins the next time when you run the CDMA tests in the `Test Selection` or `Utilities` menu. Ignore the displayed instructions and diagrams to run the Sofware in the demo mode. Just press k1 (`Proceed`) or the other USER keys when you are running the Software in the demo mode.

The steps to turn the demo mode off are the same as those used to turn it on, except that you will select `Normal` in the demo mode `Choices:` menu. After selecting `Normal`, the demo mode will turn off and not be in effect the next time the Software is run.

Laptop Emulator

NOTE: Before sending the commands using the Test Set's laptop emulator, you should set the address for the BTS control adapter. See **table 3, "Laptop Emulator Commands" on page 122** for the command syntax.

Overview

The Test Set has the ability to send control commands to the base station using the laptop emulator, via a BTS control adapter, to control the radios at the cell site. **See "Installation" on page 25** for setup steps. This enables the Test System to perform tests in the shortest amount of time and with little operator intervention.

The Laptop Emulator mode uses the IBASIC controller and serial I/O capabilities of the Test Set to emulate a terminal device for communications to the base station. The laptop emulator mode can be used instead of a separate laptop PC. After sending the commands in the laptop emulator, you can verify that the base station is properly configured on the laptop emulator's BTS Communication screen.

Site Control Using the Laptop Emulator

Once the Test Set and BTS control adapter are connected to the base station, you should be able to perform basic communication tests using the commands in the laptop emulator. **See "Performing Adapter's Communication Test" on page 39**.

After verifying that the Test System sends control commands to the base station, you can perform base station maintenance by sending the control commands using the laptop emulator. Use these steps to send control commands:

1. Select `Utilities` menu in the main menu. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.)
2. Select `Laptop Emulator`.
3. Select the command you wish to use in the `Commands Set`.

   Some command parameters will present a `Choices:` menu for you to change values.
4. Change the parameter values using the DATA ENTRY keys or the knob.
5. Select `Send` in the `Choices:` menu.

Now, The base station's state will be shown on the Test Set's display.

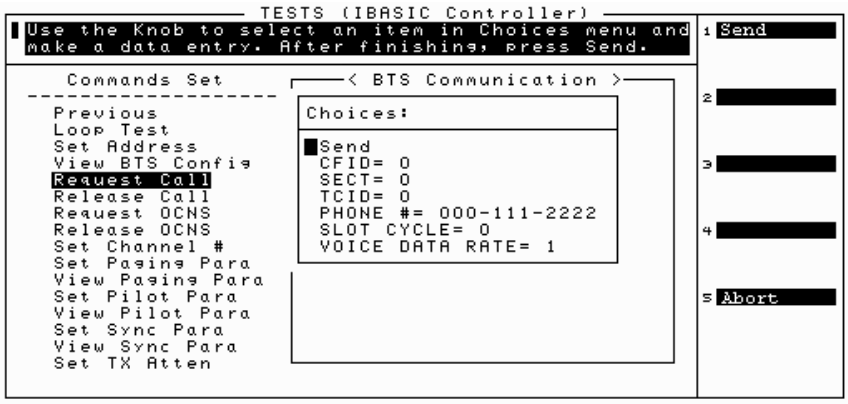


Figure 38 Laptop Emulator Screen

NOTE: In the laptop emulator menu screen, the use of k3 (`Page Up`) and k4 (`Page Down`) can be a time-saver. You can also see the full command syntax which is sent to the base station using k1 (`Full SCR`). Use k2 (`Clear SCR`) to clear the commands in the BTS Communication screen.

Command Summary

This section lists the commands available in the `Laptop Emulator` menu and the command syntax that is sent to the base station. The commands to the base station are the same as those sent if you are using a laptop PC to control the site. This section also lists the description of parameters which are used with the commands.

NOTE: In the table, *x* indicates the parameters being entered together with the commands. See **table 4, "Command Parameters" on page 123** for the valid range of the parameters.

Table 3 Laptop Emulator Commands

Command	Command Syntax Sent to Base Station
Previous	*exits the Laptop Emulator menu*
Loop Test	LOOP-TEST;
Set Address	CHG-ADDR:*yyy*00000,*yyy*20000,*z*; *yyy* is the base station address and *z* is K for **Cellular I** type BTS, D for **Pico Cellula**r or **Cellular II** type BTS, and P for **PCS Pico**, or **PCS Mini** type BTS.
View BTS Config	DIS-BTS-CONF;
Request Call	1. For **Cellular I** and **Pico Cellular** type BTS's: TST-CALL:CFID #,SECT #, phone #, slot cycle index #,32770 (service option #),voice data rate #,TCID #,ESN; (ex, TST-CALL:0,0,000-111-2222,0,32770,1,0,12345678;) 2. For **Cellular II** type BTS: TST-CALL:CFID #,SECT #, phone #,slot cycle index #,32770 (service option #),voice data rate #,TCID #; (ex, TST-CALL:0,0,000-111-2222,0,32770,1,0;) 3. For **PSC** type BTS: TST-CALL:CFID #,SECT #,phone #, slot cycle index #,2 *or* 9 (service option #),voice data rate #,TCID #; (ex, TST-CALL:0,0,000-111-2222,0,9,1,0;)
Release Call	TST-CALL-REL;

Table 3 Laptop Emulator Commands

Command	Command Syntax Sent to Base Station
Request OCNS	TST-OCNS-REQ:CFID #,SECT #,TCID #,traffic channel gain #,lower range #,upper range #,walsh code #,gain control #; (for example, TST-OCNS-REQ:0,0,0,0,1,2,0,0;)
Release OCNS	TST-OCNS-REL:CFID #,SECT#,TCID#; (for example, TST-OCNS-REL:0,0,0;)
Set Channel #	CHG-CDMA-MAP:CFID=*x*,CDMA_CH_NUM=*x*;
Set Paging Para	CHG-PC-PARA:CFID=*x*,SECT=*x*,PC=*x*,GAIN=*x*;
View Paging Para	DIS-PC-PARA:CFID=*x*,SECT=*x*,PC=*x*;
Set Pilot Para	CHG-PLT-PARA:CFID=*x*,SECT=*x*,GAIN=*x*;
View Pilot Para	DIS-PLT-PARA:CFID=*x*,SECT=*x*;
Set Sync Para	CHG-SYN-PARA:CFID=*x*,SECT=*x*,GAIN=*x*;
View Sync Para	DIS-SYN-PARA:CFID=*x*,SECT=*x*;
Set TX Atten	CHG-XCVR-INFO:CFID=*x*,SECT=*x*,TX_ATTEN=*x*;
View TX Atten	DIS-XCVR-INFO:CFID=*x*,SECT=*x*;
View CE Config	DIS-CE-CONF:CIP=*x*,CE=*x*;
View CH Config	DIS-CDMA-CONF:CFID=*x*;
View CIP Config	DIS-CIP-CONF:CIP=*x*;
View Neighbor	DIS-NEBR-INFO:SECT=*x*;
View Sector Info	DIS-SECT-INFO:SECT=*x*;
View Subcell Info	DIS-SCEL-INFO:CFID=*x*,SECT=*x*;

Table 4 Command Parameters

Parameter	Description and Valid Values
CDMA_CH_NUM=*x*	CDMA channel number
CE=*x*	Channel element
CFID=*x*	CDMA frequency assignment identification (0 to 7)

Table 4 Command Parameters

Parameter	Description and Valid Values
CIP=*x*	Channel card interface process (0 to 2)
GAIN=*x*	Traffic channel digital gain (0 to 127)
PC=*x*	Paging channel number (0 to 6)
SECT=*x*	Sector identification (0 to 2)
TCID=*x*	Traffic channel identification (0 to 99)
TX_ATTEN=*x*	Transmitter attenuation (0 to 600 and 900 to 950)

Creating User-Defined Commands

The laptop emulator provides most common commands needed to control the site. In some cases, however, you may want to use commands that are not available in the laptop emulator commands set.

If you need to use the command frequently, it is probably best to define a user command file and add it to the laptop emulator list. Use the steps in this section to create, store, and use custom commands.

Connections to Send User-Defined Commands

To send user-defined commands to the BTS, you need to *disconnect* the BTS control adapter and *connect* the Test Set's SERIAL 10 port directly to the RS232 port of the BTS.

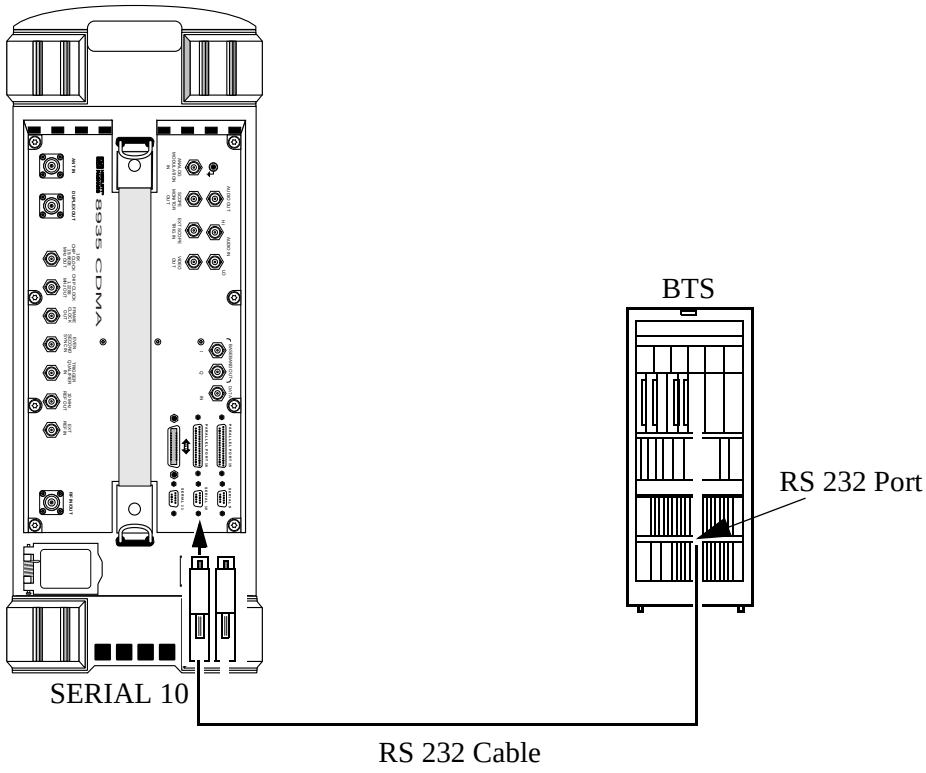


Figure 39 **Connections for Sending the User-Defined Commands**

Defining the User Commands Set

1. In the `Utilities` menu, select `Laptop Emulator`. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.).
2. Scroll down to `Define User` and select it.
3. Scroll down to `User Title 1` and select it.
4. Use the knob to select the characters in the `Choices:` menu to create a recognizable title for your command. When done spelling the name, scroll up to `Done` (at the top of the choices list) and press the knob.The title you have entered will show up on the laptop emulator menu as one of the choices.

NOTE: You can use the backspace key ← or select `Bk Space` in the `Choices:` menu to delete a character.

5. Scroll down to `User Defined Command 1` and select it.
6. Now enter the corresponding command string to be sent to the BTS exactly. Again, you will use the `Choices:` menu to enter the command string. You will need to scroll to the end of the list if you need characters such as colons, commas, and semicolons. When finished with the entry, scroll to `Done` (at the top of the choices list) and press the knob.

NOTE: If the command contains a comma (,), you have to enclose the command in double quotation marks (" ").

7. If you have other commands to define, repeat step 3 through step 6.
8. Once the commands have been entered, you can store the command entries in the PC card.
   a. Scroll to `Save User Defined Command` and press the knob.
   b. Enter a file name of the user-defined commands using the characters in the `Choices:` menu. The file of the user-defined commands will be saved in the PC card with .CMD appended (filename.CMD).
9. Return to the laptop emulator menu by pressing k5 (`Previous`). Command strings that you entered will appear immediately after the `Define User` selection.
10. To exit the laptop emulator mode, press k5 (`Previous`).

    The user-defined commands remain in the Test Set's laptop emulator until you run a different program, change the commands, or install new operating system firmware in your Test Set.

Loading and Using the User-Defined Commands

1. Insert the PC card you stored the file on into the Test Set's front panel memory card slot.
2. Select `Utilities` in the main menu screen, then select `Laptop Emulator`. (To "select," turn the knob to move the cursor to your choice, press the knob to activate your choice.).
3. If you have not yet loaded your user-defined commands (your commands do not appear on the list available in the laptop emulator screen):
   - **a** Scroll to `Define User` and press the knob.
   - **b** Scroll to `Recall User Defined Command` and press the knob.
   - **c** Scroll to the file name in the `Choices:` menu screen you want to recall and press the knob. Press k5 (`Previous`) to go back to the laptop emulator.
   - **d** The definitions for your user-defined commands should appear in the list on the command set.
4. Scroll down to the user-defined command (below the `Define User` choice in the commands set) you wish to use and press the knob. You can see the command string to be sent and BTS states response in the "BTS Communication" screen.
5. Select and send other commands, as needed, in the commands set.

NOTE: If the response from BTS is greater than 50 characters, press the k 2 (`Move -->`) or k5 (`Move <--`) to see the full command syntax in the full screen mode. Press k1 (`Proceed`) to return to the laptop emulator screen.

6. To exit the laptop emulator, press k5 (`Previous`).

NOTE: If you find that you have user-defined command files on a PC card that you no longer use and would like to remove them, follow the steps in **"How to Purge a File from a PC Card" on page 150**.

Customizing Test Parameters and Specifications

The Software uses the entries in the `Test Parameters & Specs` to customize testing and determine if a measurement meets your test requirements. When testing begins, the Software uses the test parameters associated with each test item to alter test system settings. The values entered into the specifications fields are used to determine if a test passes or fails. If measurement results do not meet the specifications, a “fail” indication is generated on the printout.

This section lists the test parameters and specifications (pass/fail limits) and explains how they are used; for instructions on saving your changes in the test parameters and specifications to a memory card, see **"Saving and Recalling a Test Procedure" on page 51**.

The Software provides the default values of the specifications (pass/fail limits) in accordance with Samsung Base Station Test Procedures. These default values may be changed to suit your particular requirements.

To change the test parameters and specifications, scroll down to `Test Parameters & Specs` in the main menu screen and press the knob to go to this menu. In this menu, select the test item for which you want to change the test parameters and specifications.

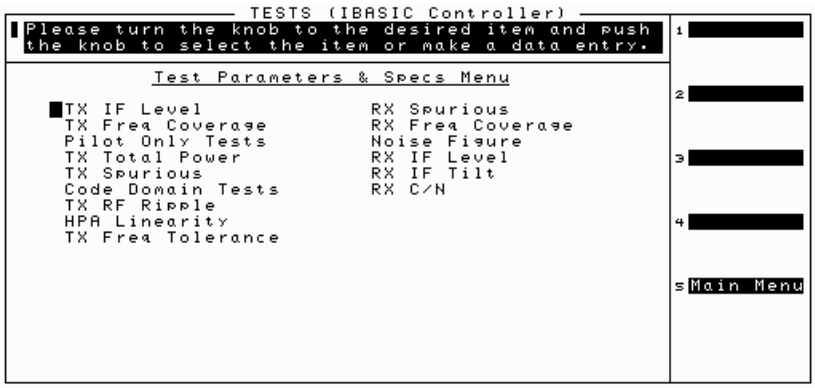


Figure 40 **Test Parameters and Specifications Menu Screen**

Test Parameters and Specifications and Their Use

When you select a test item in the `Test Parameters & Specs Menu` screen, the individual test parameters and specifications for each CDMA test are shown on the screen. The test parameters appear in the upper screen and the specifications appear in the lower screen. Because most of the test parameters and specifications fields contain valid default settings and values derived from the Samsung Base Station Test Procedures, usually, it is *not* necessary to change these values.

Even though the Software comes with default settings and values, you may want to change them for your specific needs.

TX IF Level

The following test parameters and pass/fail limits are used when running the TX IF level test.

1. `Adjust Power Level [No, Always, On Fail]`

   The entry in this test parameter field determines how power measurements are made during TX IF level test. The settings have the following effects:

   - If set to `No`, the adjustment power meter will not be displayed.
   - If set to `Always`, the adjustment power meter will be displayed any time power measurements are made, regardless of the measurement's pass/fail status.
   - If set to `On Fail`, the adjustment power meter will be displayed only if the measured power is outside the specified pass/fail limits (fails). You can then adjust power to within the limits and continue with testing.

2. `Min TX IF Level [dBm]` - Pilot Only condition

   This pass/fail limit determines whether or not the TX IF level measurements meet the minimum specification in the pilot only condition (TX IF level test). The default limit is –9 dBm.

3. `Max TX IF Level [dBm]` - Pilot Only condition

   This pass/fail limit determines whether or not the TX IF level measurements meet the maximum specification in the pilot only condition (TX IF level test). The default limit is –7 dBm.

4. `Min TX IF Level [dBm]` - Total Power condition

   Whenever adjusting the TX Total Power of Mini or Cellular I and Cellular II BTS, you have to perform the TX IF level test. This pass/fail limit determines whether or not the TX IF level measurements made in total power condition meet the minimum specification. The default limit is –4.4 dBm.

5. `Max TX IF Level [dBm]` - Total Power condition

   Whenever adjusting the TX Total Power of Mini or Cellular I and II BTS, you have to perform the TX IF level test. This pass/fail limit determines whether or not the TX IF level measurements made in total power condition meet the maximum specification. The default limit is –0.4 dBm.

TX Frequency Coverage

The following test parameters and pass/fail limits are used when running the TX frequency coverage test.

NOTE: If you change the values of test parameters for TX frequency coverage, the corresponding values of RX frequency coverage will be automatically changed to the same values.

1. `Tuning to Min Channel`

   This test parameter is used to specify the desired minimum tuning frequency for the TX frequency coverage test. The default value is 25.

   The valid range is 0 to 599 for Korean PCS band, 1 to 1023 for 800 MHz Cellular band, and 0 to 1199 for North American PCS band.

2. `Tuning to Mid Channel`

   This test parameter is used to specify the desired middle tuning frequency for the TX frequency coverage test. The default value is 100

   The valid range is 0 to 599 for Korean PCS band, 1 to 1023 for 800 MHz Cellular band, and 0 to 1199 for North American PCS band.

3. `Tuning to Max Channel`

   This test parameter is used to specify the desired maximum tuning frequency for the TX frequency coverage test. The default value is 175.

   The valid range is 0 to 599 for Korean PCS band, 1 to 1023 for 800 MHz Cellular band, and 0 to 1199 for North American PCS band.

4. `Max Frequency Coverage [+/- Hz]`

   This pass/fail limit determines whether or not the TX frequency coverage measurement meets specifications. If you set the specifications to ±90 Hz, these will be used when a frequency coverage measurement is made. If the frequency coverage measured is more than 90 Hz, a “fail” indication will result. The defaults for the upper and lower limits are +90 Hz and –90 Hz, respectively.

Pilot Only Tests

The following pass/fail limits are used when running the pilot only tests.

1. `Min Rho`

   This pass/fail limit is used when measuring rho, a measure of the modulation quality of a CDMA transmitter. Typically, only the lower limit is checked. The default for the lower limit is 0.912.

2. `Max Time Offset [+/- µs]`

   This pass/fail limit is used when measuring the transmitter's time-alignment to system time. The defaults for the upper and lower limits are +3 µs and –3 µs, respectively.

3. `Max Frequency Error [+/- Hz]`

   The Test Set measures the transmitter's center frequency and compares it to the ideal frequency, based on your entry for channel number during the pilot only test. The difference between the two is the frequency error. The calculated frequency error is then compared to these pass/fail limits to determine if the test passes or fails. The defaults for the upper and lower limits are +90 Hz and –90 Hz, respectively.

4. `Max Carrier Feedthrough [dB]`

   This is the pass/fail limit for the test that measures the performance of the I/Q modulator of the CDMA transmitter. The default value is –20 dB.

TX Total Power

The following test parameters and pass/fail limits are used when running the TX total power test.

1. `Adjust Power Level [No, Always, On Fail]`

   The entry in this test parameter field determines how power measurements are made during TX total power test. The settings have the following effects:

   - If set to `No`, the adjustment power meter will not be displayed.
   - If set to `Always`, the adjustment power meter will be displayed any time power measurements are made, regardless of the measurement's pass/fail status.
   - If set to `On Fail`, the adjustment power meter will be displayed only if the measured power is outside the specified pass/fail limits (fails). You can then adjust power to within the limits and continue with testing.

2. `Min Power Error [dB]`

   This pass/fail limit determines how the power meter is displayed during measurements. When the power meter display is shown, it has major tick marks that indicate the adjustment range for power settings. If you enter –0.5 dB as the limit, the power meter will be drawn with the setting of the `Specified Output Pwr` in the center and a major tick mark 0.5 dB down from the center. See **"Sector Information" on page 45** for more information on the `Specified Output Pwr` settings. The default value is –0.5 dB.

3. `Max Power Error [dB]`

   This pass/fail limit determines how the power meter is displayed during measurements. When the power meter display is shown, it has major tick marks that indicate the adjustment range for power settings. If you enter +0.5 dB as the limit, the power meter will be drawn with the setting of the `Specified Output Pwr` in the center and a major tick mark 0.5 dB up from the center. See **"Sector Information" on page 45** for more information on the `Specified Output Pwr` settings. The default value is +0.5 dB.

TX Spurious

The following pass/fail limits are used when running the TX spurious emission test.

1. `Min Level @ Fc +/-885 kHz [dBc]` - PCS Band

   This pass/fail limit specifies the minimum allowable difference between the level at the center frequency of the PCS band and the level of spurious emission at ±885 kHz from the center frequency. The default limit is 47 dBc.

2. `Min Level @ Fc +/-1.25 MHz [dBc]` - PCS Band

   This pass/fail limit specifies the minimum allowable difference between the level at the center frequency of the PCS band and the level of spurious emission at ±1.25 MHz from the center frequency. The default limit is 60 dBc.

3. `Min Level @ Fc +/-2.25 MHz [dBc]` - PCS Band

   This pass/fail limit specifies the minimum allowable difference between the level at the center frequency of the PCS band and the level of spurious emission at ±2.25 MHz from the center frequency. The default limit is 80 dBc.

4. `Min Level @ Fc +/-750 kHz [dBc]`- Cellular Band

   This pass/fail limit specifies the minimum allowable difference between the level at the center frequency of the cellular band and the level of spurious emission at ±750 kHz from the center frequency. The default limit is 40 dBc.

5. `Min Level @ Fc +/-1.98 MHz [dBc]`- Cellular Band

   This pass/fail limit specifies the minimum allowable difference between the level at the center frequency of the cellular band and the level of spurious emission at ±1.98 MHz from the center frequency. The default limit is 60 dBc.

Code Domain Tests

The following test parameters and pass/fail limits are used when the Test Set performs the code domain tests.

1. `Code Domain Data Averages`

   This test parameter tells the Software how many data samples to use when averaging measurements during the code domain tests. Larger values reduce the effects of small changes in level during the test and produce more consistent results, but also increase test times. The default value is 1.

2. `Code Domain Power Threshold [dBt]`

   This test parameter is used to set a level for code domain power measurements. The level of each Walsh channel is compared to this threshold level; if it exceeds the threshold value, the channel is considered **active**. If it falls below the threshold, the Walsh channel is considered **inactive**. The default value is –20 dBt.

   On **active** Walsh channels (when running code domain test sequences), the Software will measure and report:

   - Code Domain Power
   - Code Domain Timing
   - Code Domain Phase

3. `Measure Code Domain Phase [No, Yes]`

   This test parameter is used when performing the code domain phase measurement. If this parameter is set to `No`, the code domain phase for each of the **active** Walsh channels is not measured or reported. If the parameter is set to `Yes`, the Software will measure and report the code domain phase for each of the **active** Walsh channels.

4. `Print Inactive Walsh Code Power [No, Yes]`

   This test parameter is used with the `Code Domain Power Threshold` parameter. Walsh channels with levels below the `Code Domain Power Threshold` parameter entry are considered **inactive**. If this parameter is set to `No`, the inactive Walsh channels are not measured or reported. If the parameter is set to `Yes`, the Software will measure and report the code domain power for each of the inactive Walsh channels.

5. `Walsh Code Power Units [dBt, dBm, Watts]`

   You can specify the units to use when displaying the power in each Walsh Code when running the Code Domain Tests. The unit dBt refers to the power of a Walsh code relative to the total measured channel power. Watts and dBm are measurements of the absolute power for a Walsh code. The default setting is dBt.

NOTE: The absolute code domain power can be measured with HP 8935 Test Sets with firmware revision A 01.10 and above.

6. `Min Pilot Power [dBt]`

   This pass/fail limit is used to display the power of the pilot channel (Walsh 0), relative to the total power of the 64 walsh channels in the code domain tests. The code domain tests show the comparison result. The defaults limit is −7.5 dBt.

7. `Max Pilot Power [dBt]`

   This pass/fail limit is used to display the power of the pilot channel (Walsh 0), relative to the total power of the 64 walsh channels in the code domain tests. The code domain tests show the comparison result. The defaults limit is –6.5 dBt.

8. `Max Inactive Walsh Power [dBt]`

   This pass/fail limit is used when performing inactive walsh code power in code domain tests. The levels of all **inactive** Walsh channels are measured and compared to this value (typically, they should fall *below* this limit). The default for the upper limit is –27 dBt.

9. `Max Code Domain Timing [+/- nsec]`

   This pass/fail limit is used when performing code domain tests. The Test Set measures the time offset of a Walsh channel compared to the pilot (Walsh 0) and compares the results to this limit.The default limit is +50 ns.

10. `Max Code Domain Phase [+/- mrad]`

    This pass/fail limit is used when performing code domain tests. The Test Set measures the phase of a Walsh channel compared to the pilot (Walsh 0) and compares the results to these limits. The default limit is +50 mrad.

TX RF Ripple

The following pass/fail limit is used when running the TX RF ripple test.

1. `Max TX RF Ripple`

   This pass/fail limit determines whether or not the TX RF ripple measurements meet specifications.The default for the upper limit is 4 dB.

HPA Linearity

The following test parameters are used when running the HPA linearity test.

1. `Min TX Gain`

   This test parameter is used to specify the desired minimum gain of the transmitter for the HPA (High Power Amplifier) linearity test. The default value is 900.

2. `Max TX Gain`

   This test parameter is used to specify the desired maximum gain of the transmitter for the HPA (High Power Amplifier) linearity test. The default value is 950.

3. `TX Gain Incremental Step`

   This test parameter is used to specify the incremental step of the transmitter gain. You can set the step resolution to either 5 or 10.

4. `Min TX Atten`

   This test parameter is used to specify the minimum attenuation level of the transmitter. The default value is 0.

5. `Max TX Atten`

   This test parameter is used to specify the maximum attenuation level of the transmitter. The default value is 600.

6. `TX Atten Incremental Step`

   This test parameter specifies the incremental step of the transmitter attenuation. You can choose 50 or 100 for the incremental step.

TX Frequency Tolerance

The following pass/fail limit is used when running the TX frequency tolerance test.

1. `Max TX Freq Tolerance [+/- ppm]`

   This pass/fail limit determines whether or not the TX frequency tolerance measurements meet specifications. The default limit is +0.05 ppm.

RX Spurious

The following pass/fail limits are used when running the RX spurious emissions test.

1. `Max at Out Band [dBm]`

   This pass/fail limit specifies the maximum allowable level of spurious emission outside of TX and RX frequency bands. The default for the upper limit is –47 dBm.

2. `Max at RX Band [dBm]`

   This pass/fail limit specifies the maximum allowable level of spurious emission at the RX frequency band. The default for the upper limit is –80 dBm.

3. `Max at TX Band [dBm]`

   This pass/fail limit specifies the maximum allowable level of spurious emission at the TX frequency band. The default for the upper limit is –60 dBm.

RX Frequency Coverage

The following test parameters and pass/fail limit are used when running the RX frequency coverage test.

NOTE: If you change the values of test parameters for RX frequency coverage, the corresponding values of TX frequency coverage will be automatically changed to the same values.

1. `Tuning to Min Channel`

   This test parameter is used to specify the desired minimum tuning frequency for the RX frequency coverage test. The default value is 25.

   The valid range is 0 to 599 for the Korean PCS band, 1 to 799 or 991 to 1023 for the 800 MHz Cellular band, and 0 to 1199 for the North American PCS band.

2. `Tuning to Mid Channel`

   This test parameter is used to specify the desired middle tuning frequency for the RX frequency coverage test. The default value is 100

   The valid range is 0 to 599 for the Korean PCS band, 1 to 799 or 991 to 1023 for the 800 MHz Cellular band, and 0 to 1199 for the North American PCS band.

3. `Tuning to Max Channel`

   This test parameter is used to specify the desired maximum tuning frequency for the RX frequency coverage test. The default value is 175.

   The valid range is 0 to 599 for the Korean PCS band, 1 to 799 or 991 to 1023 for the 800 MHz Cellular band, and 0 to 1199 for the North American PCS band.

4. `Max Freq Coverage [+/- KHz]`

   This pass/fail limit determines whether or not the RX frequency coverage measurement meets specifications. If you set the specifications to ±10 kHz, these will be used when a frequency coverage measurement is made. If the frequency coverage measured is more than 10 kHz, a “fail” indication will result. The defaults for the upper and lower limits are +10 kHz and –10 kHz, respectively.

Noise Figure

The following pass/fail limit is used when running the noise figure test.

1. `Max Noise Figure [dB]`

   This pass/fail limit determines whether or not the noise figure measurements meet specifications. The default limit is 7 dB.

RX IF Level

The following test parameters and pass/fail limits is used when running the RX IF level test.

1. `Min CW Generator Level [dBm]`

   This test parameter is used to specify the desired minimum level of the CW signal to be tested for the RX IF level test. The default is –100.

2. `Max CW Generator Level [dBm]`

   This test parameter is used to specify the desired maximum level of the CW signal to be tested for the RX IF level test. The default is –80.

   The valid range for entries is –137 to 0.

3. `CW Generator Incremental Step [2dB, 5dB, 10dB]`

   This test parameter is used to set the CW generator's incremental step for the RX IF level test. You can set the step to either 2 dB, 5 dB, or 10 dB resolution.

4. `Min RX IF Level [dBm]`

   This pass/fail limit determines whether or not the RX IF level measurements meet specifications for lower limit. The default limit is –6 dBm.

5. `Max RX IF Level [dBm]`

   This pass/fail limit determines whether or not the RX IF level measurements meet specifications for upper limit. The default is 0 dBm.

RX IF Tilt

The following test parameter and pass/fail limit are used when running the RX IF tilt test.

1. `CDMA Generator Level [dBm]`

   This test parameter is used to specify the desired level of the CDMA signal to be tested for the RX IF tilt test. The default level is –90 dBm.

2. `Max RX IF Tilt [dB]`

   This pass/fail limit determines whether or not the RX IF tilt measurements meet specifications. The default for the limit is +2 dB.

RX C/N

The following test parameter and pass/fail limit are used when running the RX C/N test.

1. `CW Generator Level [dBm]`

   This test parameter is used to specify the desired level of the CW signal to be tested for the RX C/N test. The default level is –90 dBm.

2. `Min RX C/N [dB]`

   This pass/fail limit determines whether or not the RX C/N measurements meet specifications. The default for the limit is +20 dB.

6

General Software Reference

This chapter contains general Software operating instructions for use with the Test Set. These include how to load the Software, manage a PC card, and set up the Test Set for data collection and logging.

Software Menu Screen Overview

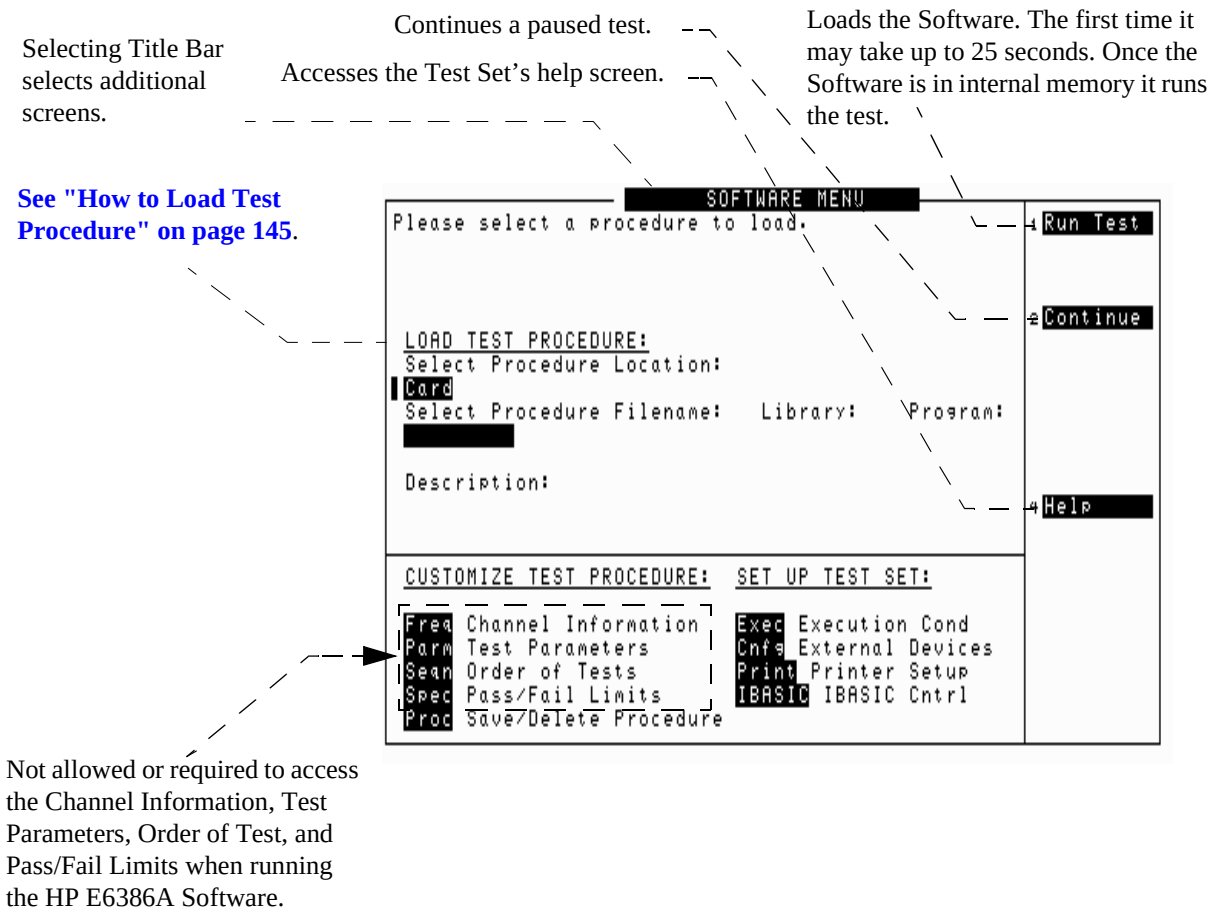


Figure 41 **Tests Subsystem**

Pressing the front-panel Menu key in the Software will display the `SOFTWARE MENU` screen. This screen allows the user to configure and run custom Software, access help, proceed with a paused procedure, or access additional test screens.

NOTE: Your Software package may not allow to access some menus under `CUSTOMIZE TEST PROCEDURE:` field. If you try to enter a menu which is not supported with your package, the message "Access to secure test information denied" will be displayed.

How to Load Test Procedure

Selects the location and file name of the test procedure and its associated library file.

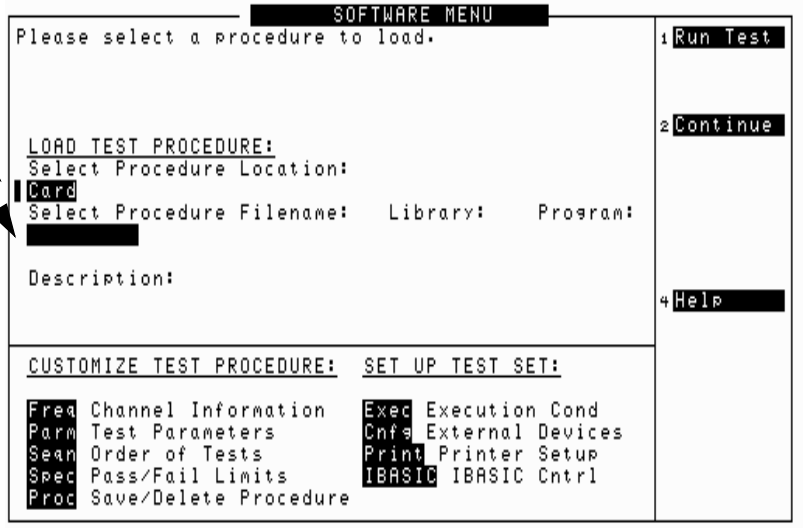


Figure 42 **LOAD TEST PROCEDURE**

HOW TO TROUBLESHOOT THE INSTALLATION

See **"Troubleshooting the Software Installation" on page 148** for some hints to help debug any problems you may have during the installation of the Software.

Before you begin testing, you must load the Software into the Test Set's memory. To load the Software, select the location where the procedure currently resides (in this case, it will be a PC card) and a procedure file name to download into the Test Set's memory. Your card comes pre-programmed with at least one procedure.

The first time you select a procedure the actual Software program does not get loaded into the Test Set's memory until you press the k1 (`Run Test`) from the USER keys on the Test Set. It will take approximately 25 seconds for the Software program to be loaded at that time. The program will remain in memory after a power-down/power-up cycle, unless it is manually deleted or a new program is loaded.

Loading the Software Card

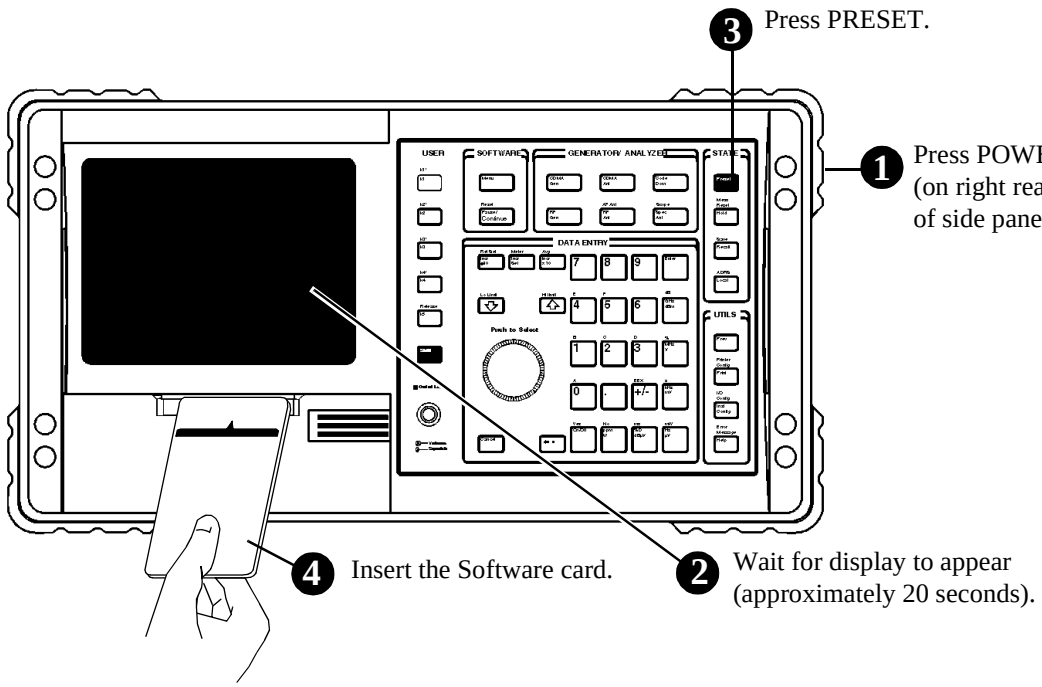
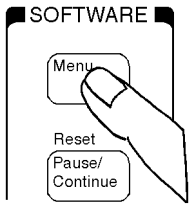
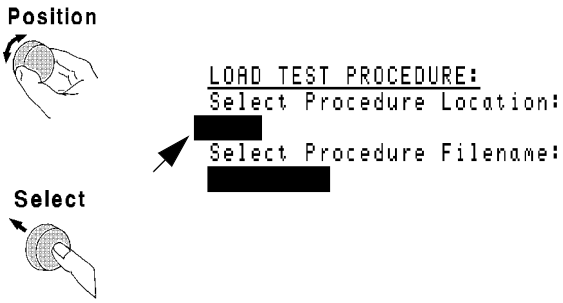


Figure 43 Loading the Software Card

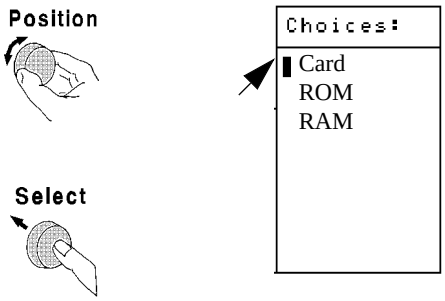
5 Press the SOFTWARE **Menu** key to display the **Software Menu** screen.



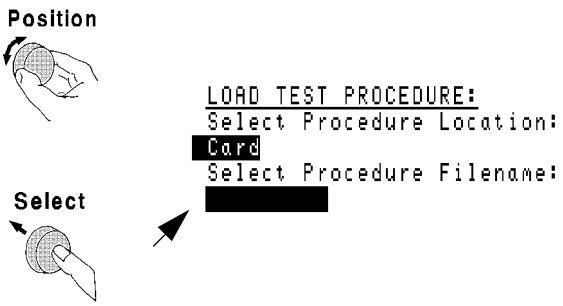
6 Position the cursor at **Select Procedure Location:** and select it.



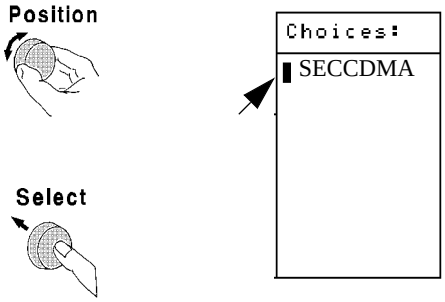
7 Position the cursor at **Card** and select it.



8 Position the cursor at **Select Procedure Filename:** and select it.



9 Position the cursor at **Choices:** and select the Procedure name.



10 Position the cursor at **Run Test** and select it. The Software is now loading.

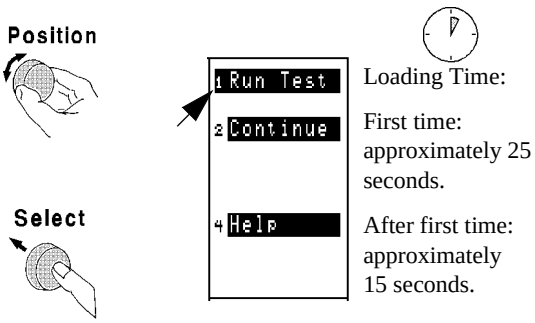


Figure 44 **Selecting a Procedure**

Troubleshooting the Software Installation

If your Software did not install properly, check the following:

- Is power on?
- Is the PC card inserted in the right direction?
- Is the PC card firmly seated in the slot? It should slide in loosely, then must be firmly pushed in to make proper contact.
- Did you get to the SOFTWARE MENU screen? Pressing the Preset key should take you to the CDMA ANALYZER screen, and pressing the Menu key on the front panel should take you to the SOFTWARE MENU screen

NOTE: If the Test Set displays an error that states "One or more self-tests failed," you have a hardware problem. In this case, refer to the Test Set's *Assembly Level Repair Guide*. If a problem persists, call the HP Factory Hotline from anywhere in the USA or Canada (1-800-922-8920), 8:30 am to 5:00 pm Pacific time or in Korea (02-3770-0400), 8:30 am to 5:30 pm.

- Do you see TESTS (IBASIC Controller) at the top of the display after pressing k1 (Run Test)? If not, make sure you have specified the correct procedure location and procedure filename.

PC Card Management

This section includes information about file management operations on the PC card such as cataloging, purging, and viewing a file.

The procedures covered in this section are as follows:

- Catalog PC card
- Purge a file from the PC card
- Transfer a data collection file to the Test Set display or a PC via SERIAL 9 port
- Print a data collection file to a printer via SERIAL 9, HP-IB, or PARALLEL port.
- Configure the printer format and the Test Set's SERIAL 9 port settings

Select `PC Card Management` in the main menu screen.

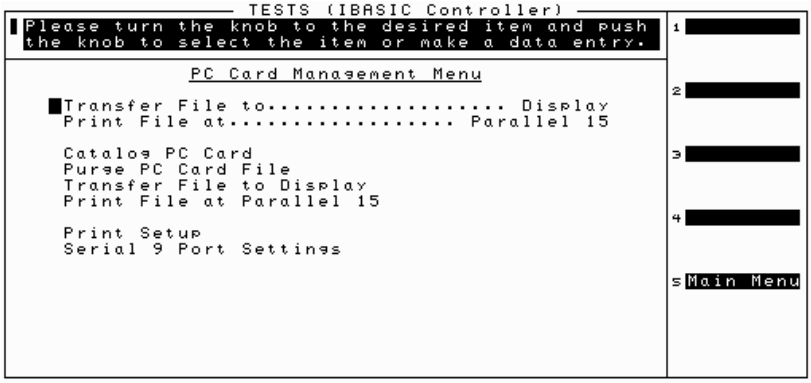


Figure 45 **PC Card Management Menu Screen**

How to Catalog a PC Card

You can list all the files contained on the PC card. To display the files, follow these steps:

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `PC Card Management` menu in the main menu.
3. Select `Catalog PC Card`. A list of file names is shown on the display.
4. Press k5 (`Abort`) or knob to go back to the previous menu screen.

How to Purge a File from a PC Card

The files can be deleted from a PC card by doing the following.

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `PC Card Management` in the main menu.
3. Select `Purge PC Card File`.
4. Scroll to and select the file you desire to purge.
5. Press k1 `(Yes)` to purge the file you have selected.

NOTE: Program code (.PGM suffix), library file (.LIB suffix) and procedure file (.PRC suffix) are not shown to prevent you from to deleting them inadvertently.

How to Transfer a File in PC Card to the Test Set Display

Test results files (appended with a ".TXT") saved in the PC card can be reviewed by transferring them directly to the Test Set's display. To review the test results on the Test Set's display, follow these steps.

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `PC Card Management` in the main menu.
3. Select `Transfer File to` at the top of the `PC Card Management Menu` screen.
4. Scroll to and select `Display` in the `Choices:` menu.
5. Select `Transfer File to Display`.
6. Scroll to and select the file you desire to transfer in the `Choices:` menu. The test result will appear on the Test Set's display. You can use k3 (`Page Up`) or k4 (`Page Down`) when you review the test results.
7. Press k1 `(Proceed)` to exit the test result screen.

How to Transfer a File in PC Card to a PC

Test results files (appended with a ".TXT" or ".PLT") can be transferred a PC communications program through the Test Set SERIAL 9 port. A variety of devices can receive the data. An HP Palmtop computer, PC, laptop, or terminal can be used. A terminal emulator can write the test results directly to a file. An example of terminal emulator programs is the Hyper terminal[1] in Windows 95®[2] or BTS laptop utility program supplied with the Software. See **"BTS Laptop Utility Program" on page 155** for more detailed information.

To transfer a file of test results to a PC, you must meet the requirements listed below:

- Test Set's SERIAL 9 port must be connected to a PC.
- Test Set's SERIAL 9 port communications parameters settings must match those of the PC.
- Configured terminal program must be running on a PC.

Test Set Connection to a PC

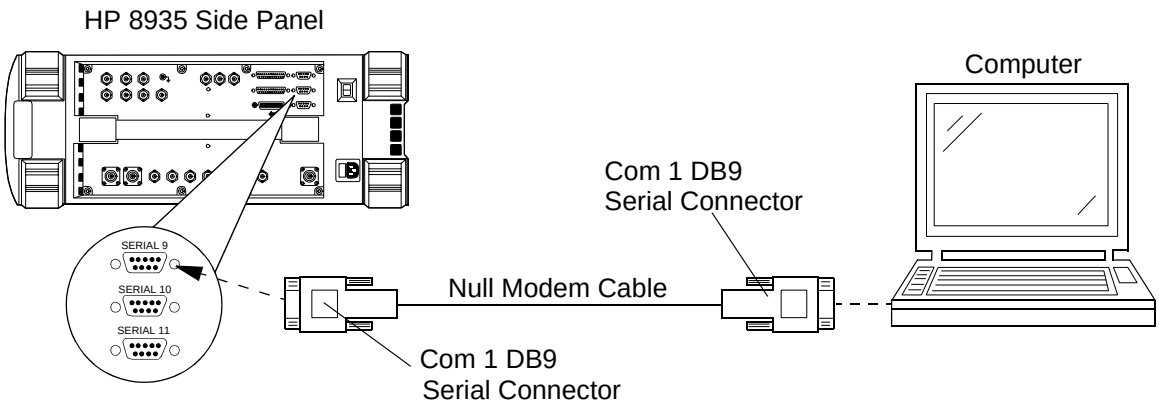


Figure 46 Serial Connections for the HP 8935 and PC

1. Hyper terminal is a U.S registered trademark of Microsoft Corp.
2. Windows is a U.S. registered trademark of Microsoft Corp.

Configuring a PC Terminal Program

Transferring test results to a PC requires a configured terminal emulator while sending test results is enabled. The following steps describe how to set up an Hyper Terminal program in Windows 95 for saving test results. You may need to refer to the documentation of the Windows 95 to configure the Hyper terminal program.

1. Start `Hyper Terminal` program in `Accessories` group in Windows 95.
2. Select `Hypertrm` icon.
3. Enter a name and choose an icon for your new connection. Select `Ok`.
4. Choose the serial port you have connected in `Connecting Using` field and select `Ok`.
5. Set the following port settings to match the Test Set's Serial 9 port Settings and press `Ok`.
   - Baud rate
   - Data length
   - Parity
   - Stop length

Now, the test results are displayed on the terminal emulator when you run tests. After receiving the test results, you should save the test results in the terminal emulator for later use. When you access the Hyper Terminal program next time, select the icon you made previously in the Hyper Terminal screen.

NOTE: You can use the BTS laptop utility program shipped with the Test Software on a separate 3.5-inch disk. This program provides the capability to use a PC terminal program for displaying the test results. See **"BTS Laptop Utility Program" on page 155** for detailed information.

Transferring a File to a PC

After connecting a PC to the Test Set's SERIAL 9 port and configuring a terminal program, proceed these steps to transfer a file of test results.

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `PC Card Management` in the main menu.
3. Select `Transfer File to` at the top of this menu screen.
4. Scroll to and select `Serial 9` in the `Choices:` menu.
5. Select `Serial 9 Port Settings` in the `PC Card Management Menu` screen and change the communication settings to match your PC settings. Press k5 (`Previous`) to return to the previous menu screen.
6. Scroll to and select `Transfer File to Serial 9`. Select the file you desire to transfer in the `Choices:` menu. The test results will appear on the PC terminal program.

How to Print a File from a PC Card

Test result files (appended with a ".TXT") can be sent directly to a printer through the Test Set's SERIAL 9, PARALLEL 15, or HP-IB port. See **"Making Printer Connections" on page 172** for information on how to connect the printer.

After connecting a printer to a Test Set's port, follow these steps:

1. Insert the PC card into the Test Set's front-panel PC card slot.
2. Select `PC Card Management` in the main menu.
3. Select `Print File at` in this menu screen.
4. Select the port you have connected to the printer.
   - If you have selected the HP-IB port, you need to match the Test Set's HP-IB address with your printer's address. Turn the knob or use the DATA keys to change the address when the HP-IB field is highlighted in the Choice: menu.
   - If you have selected the SERIAL 9 port, you have to check that the Test Set's communication settings match those of the printer you are connecting. To change the serial port settings, follow these steps:
     a Select `Serial Port 9 Settings` in the `PC Card Management Menu` screen.
     b Set the Test Set's communication settings to match your printer's settings.
     c Press k5 (`Previous`) to return to the previous menu screen.
5. Select `Print Setup` field. Set the following parameters if required:
   - `Lines/Page`: This field is used to specify how many lines are printed per page.
   - `Form Feed at Start of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the start of printing.
   - `Form Feed at End of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the end of printing.

   After setting the parameters, press k5 (`Previous`) to return to the previous menu screen.
6. Select `Print File at Serial 9` (`HP-IB 705`, or `Parallel`). Select the file you desire to print in the `Choices:` menu. The test results will be printed to the printer you have selected.

Connecting to External Devices

During measurements, the Test Set and the Software offer the ability to save test results to an external devices such as a PC, printer, or PC card. Sending test results to a PC requires a configured terminal emulator. The Software also provides the capability to monitor commands being sent between the Test Set and base station (logging). You can use the BTS laptop utility program supplied with the Software as one of the PC terminal emulator.

To find out more on this subject see:

- See **"BTS Laptop Utility Program" on page 155**
- See **"Sending Test Results to a Printer" on page 161**
- See **"Sending Test Results to a PC or PC Card" on page 163**.
- See **"Data Logging" on page 168**.

Select `Print & Data Collection` menu in the Software main menu screen to choose a device to collect the test results during measurements.

BTS Laptop Utility Program

The BTS laptop utility program is shipped with the Test Software on a separate 3.5” disk. This program provides the capability to use a PC terminal program for displaying the test results from the Software and capturing the current screen the Test Set is displaying.

The BTS laptop utility provides the following functions:

- **Test Set Terminal** window to receive the data file from a PC card.
- **Test Results** window where automated test results are displayed and can be saved for later use.
- **Test Set Screen Capture** window to capture screen images and save them as bit mapped images. This is very helpful when using the Test Set’s spectrum analyzer or other screens where you want to capture the contents of the screen. (IBASIC operation must be paused first to print any of the TESTS screens used for automated testing.)

For additional information on using the BTS laptop utility program after installation, refer to the on-line Help information for that program.

System Requirements for BTS Laptop Utility

If your laptop PC does not meet the following minimum system requirements, you *could* encounter erratic operation and longer test times.

- 133 MHz Pentium Processor
- 16 MB or RAM
- Windows 95 or Windows NT®[1] 4.01 (Intel based)
- Available RS-232 serial port

1. Windows NT is a U.S. registered trademarks of Microsoft Corp.

Test Set to PC Connections

You need to connect the Test Set and PC through serial ports to use the BTS laptop utility program. **Figure 47 on page 156** shows the Test Set to laptop PC connections using a null modem cable.

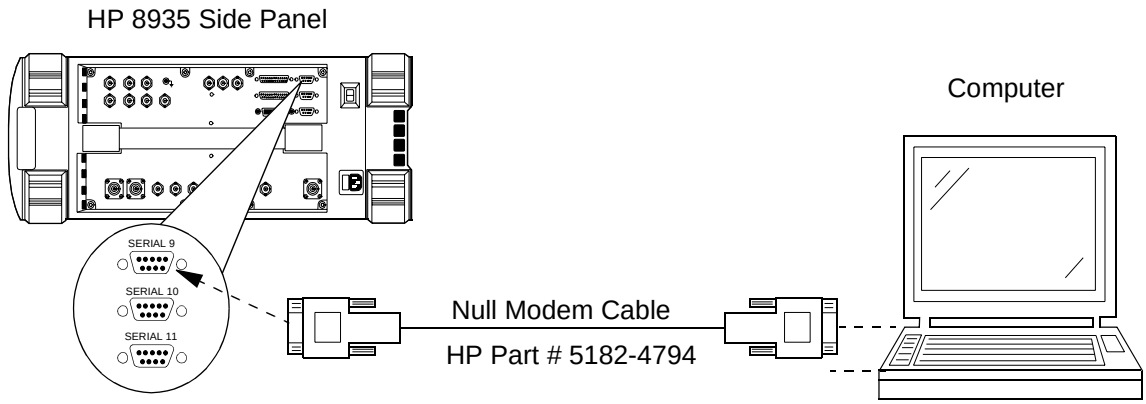
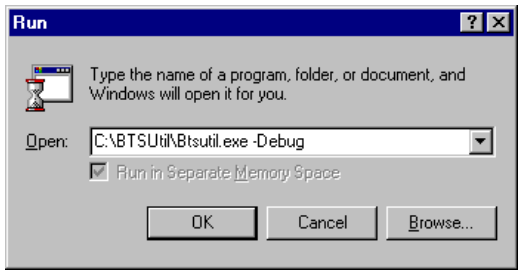


Figure 47 Serial Connections for the Test Set and PC

Installing and Configuring the BTS Laptop Utility Program



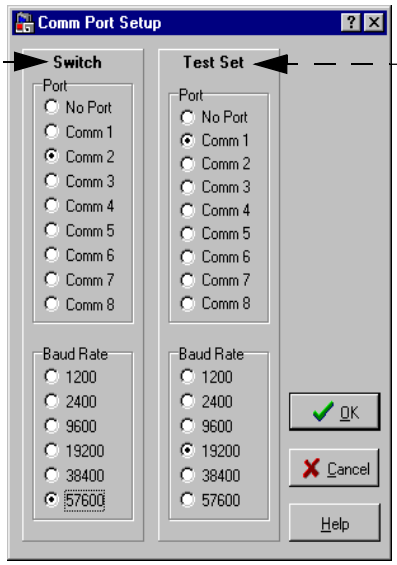
The BTS laptop utility program comes compressed on an install disk for easy setup on your laptop. Simply insert the floppy into your drive and select `Start`, then `Run`, then type A:\Setup. The install shield will lead you through the installation process.

After installing the BTS laptop utility program, you need to configure the laptop PC's serial port to communicate with the Test Set.

To configure the laptop's serial port, follow these steps.

1. Load and Run the BTS laptop utility program in your laptop PC.
2. Click the `TR(Test Results)` button.
3. Select `Preferences` and `Comm Port Setup`. The screen in **figure 48 on page 157** will be displayed. Set the serial port configuration settings to work with the Test Set.

You do not need to configure the parameters under the **Switch** field to communicate with the Test Set.



The parameters under the **Test Set** field should be configured before communicating with the Test Set.

Figure 48 **Serial Communication Port Settings**

- **Test Set Port** - This is the port your laptop uses to communicate with the Test Set. Choose the port you have connected the cable.
- **Test Set Baud Rate** - This is the speed that the laptop PC communicates with the Test Set. This value should match the baud rate found on the Software's `Print & Data Collection Menu` screen. See **"Configuring the Test Set's Serial 9 Port" on page 171** to configure the Test Set's SERIAL 9 port. This value will not automatically adjust during the session. The recommended baud rate is 19200.

NOTE: Only two communication parameters under the ''Test Set'' field should be determined before communicating with the Test Set. Note that you do not need to configure the communication parameters under the ''Switch'' field for recording the test results and capturing screen images with HP E6386A Software.

Descriptions of BTS Laptop Utility Program's Main Window

The following three functions can be used together with the Software.

- **TS** (Test Set Terminal): This screen is used to view the data files transferred from the PC card in this screen. See also **"PC Card Management" on page 149**.
- **TR** (Test Results): This screen displays the measurement results from the Software. Before results can be displayed, you must activate `Use BTS Laptop Utility` in the `Print & Data Collection` menu screen (see below section).
- **SC** (Test Set Screen Capture): This screen captures the current screen that the Test Set is displaying when the **Print** UTILS key is pressed. If the Software is running, the **Pause/Continue** SOFTWARE key must be pressed first to pause the Software.

Activating the Test Set Software to Work with the BTS Laptop Utility Program

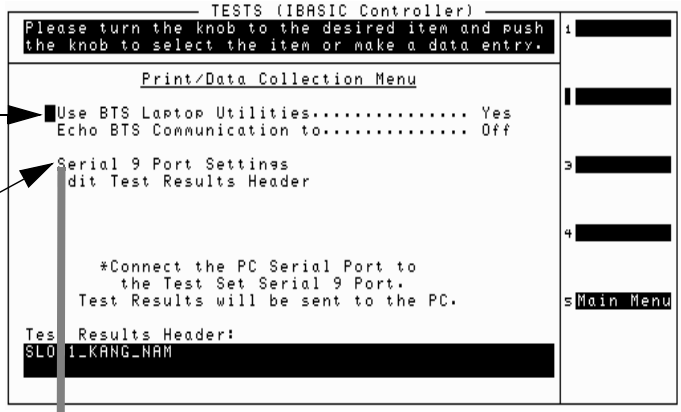
After installing and configuring the BTS Laptop Utility program on your laptop, you need to configure the Software to send data to the laptop PC. This is accomplished both by telling the Software to use the BTS Laptop Utility and by setting the SERIAL 9 port communication parameters.

To select BTS laptop utility operation in the Software, follow these steps:

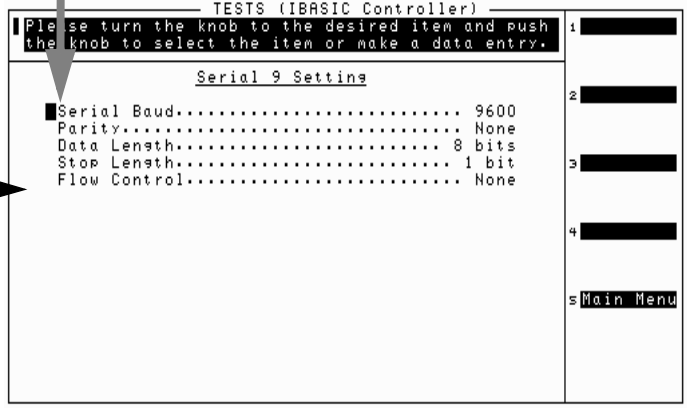
1. Load and run the Software (see **"Load and Run the Samsung CDMA Cellular/PCS BS Test Software" on page 27**). The Software's main menu is displayed.
2. Select `Print & Data Collection` in the main menu. (To ''select'', turn the knob to move the cursor to your choice, and press the knob to activate your choice.)
3. Set `Use BTS Laptop Utilities` field to `Yes`.
4. Select `Serial Port 9 Settings` and set the Test Set's SERIAL 9 port settings to work with the BTS laptop utility program.
   - Set `Serial Baud` field to match the baud rate setting on the ''Comm Port Setup'' window of the BTS laptop utility program (19200 is recommended).
   - Set `Parity` to `None`.
   - Set `Data Length` to `8`.
   - Set `Stop Length` to `1`.
   - For baud rates ≤19200, set `Flow Control` to `Xon/Xoff`. For baud rates >19200, set `Flow Control` to `Hardware`.

Set to “Yes” to use the BTS laptop utility program.

Select this parameter to access the SERIAL 9 port settings menu.



Set the SERIAL 9 port settings to match those under “Test Set” of “Com Port Setup” window in the BTS laptop utility



You should now be able to record test results with the Software, transfer the data from a PC card to view on the laptop PC, and capture Test Set screens through the BTS laptop utility program screens.

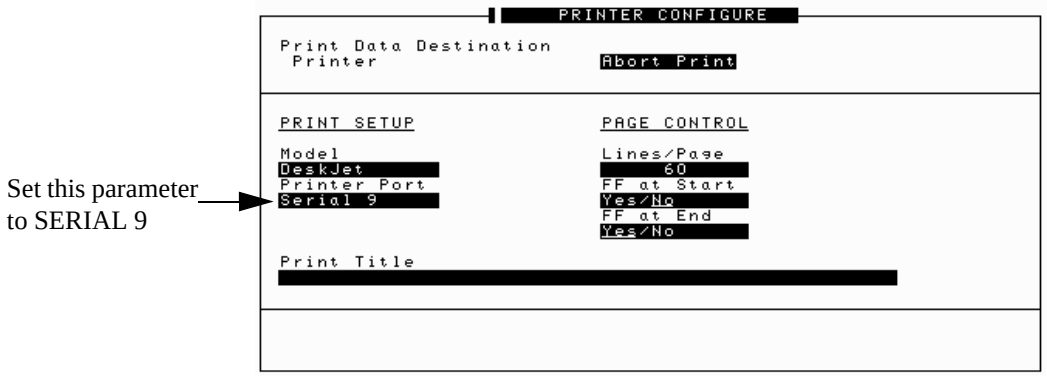
Test Set Screen Capture with the Laptop Utility Program

The BTS Laptop Utility program provides the capability to capture the Test Set's screen images. You can save them as a bit mapped files for your illustrations. Follow these steps to capture screen images.

Test Set Configuration

To capture the screen images, you need to set the Test Set's printer port to serial 9.

1. If the Software is running in the Test Set, press **Pause/Continue** key on the Test Set front panel.
2. Press **Shift** and **Print** keys on the Test Set front panel.
3. Select `Serial 9` in the `Printer Port` field in the Printer Configure screen.



4. Press **Pause/Continue** key again to return to Software running mode.

Capturing Screen Images Using the Laptop Utility Program

To send the screen images to the laptop utility program, follow the steps below.

1. Connect the Test Set serial 9 port to the PC.
2. Configure the Test Set serial 9 port settings in the Software to match those under "Test Set" field of the "Com Port Setup" in the BTS laptop utility program.
3. Load the BTS laptop utility program in the PC and press the "SC" button to open the Test Set screen capture.
4. If the Software is running in the Test Set, press **Pause/Continue** SOFTWARE key on the Test Set's front panel to pause the Software before sending.
5. Press the Test Set's **Print** UTILS key to send the screen images to the PC. The screen image will be printed on the ''Test Set Screen Capture'' screen of the BTS laptop utility program. Now, you can save the captured image in your PC.

Sending Test Results to a Printer

The test results can be directly sent to a printer through the Test Set's SERIAL 9, PARALLEL 15, or HP-IB port.

To send test results to a printer, you will need to activate `Send Test Results to Printer at` parameter within the Software after connecting a printer. See **"Making Printer Connections" on page 172** on how to connect printers to the Test Set.

NOTE: You have to set `Use BTS Laptop Utilities` parameter to `No` in the `Print & Data Collection` menu before activating `Send Test Results to Printer at` parameter.

After connecting a printer to a Test Set's port, follow these steps:

1. Select `Print & Data Collection` in the main menu. (To ''select'', turn the knob to move the cursor to your choice, and press the knob to activate your choice.)
2. Select `Send Test Results to Printer at` field, then select the port you have connected the printer in the `Choices:` menu.

   If you select the HP-IB port, you need to match the Test Set's HP-IB address with your printer's address. Turn the knob or use the DATA keys to change the address when the HP-IB field is highlighted in the `Choices:` *menu.*

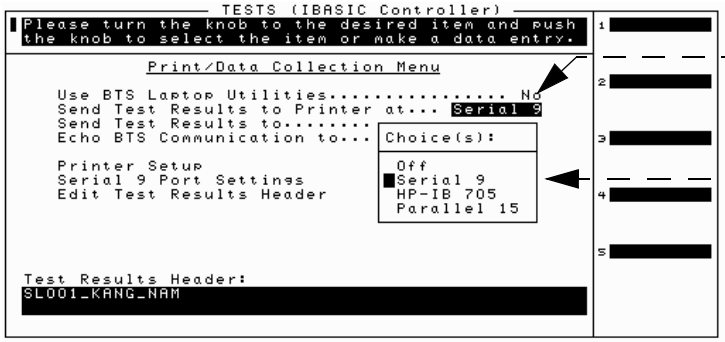


Figure 49 **Sending Test Results to a Printer**

3. If you have selected the `Serial 9` in step 2, you have to check that the Test Set's communication settings match those of the printer you are connecting. *If you have selected the* `Parallel 15` *or* `HP-IB`*, skip to the next step.*

   To change the serial port settings, follow these steps:

   a Select `Serial 9 Port Settings` in the `Print/Data Collection Menu` screen.

   b Set the Test Set's communication settings to match your printer's settings.

   c Press k5 (`Previous`) to return to the previous menu.

4. Select `Printer Setup` field. Set the following parameters if required:

   - `Lines/Page`: This field is used to specify how many lines are printed per page.
   - `Form Feed at Start of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the start of printing.
   - `Form Feed at End of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the end of printing.

5. If you would like to add a title to be printed at the top of the printout, follow these steps:

   a Select `Edit Test Results Header` in the `Print/Data Collection Menu` screen.

   b Enter the title for the test result header using the characters in the `Choices:` menu. Position the cursor in front of the desired characters and press the knob to enter each character. Then select `Done` (at the top of the choices list) to finish entering.

The Test Set is now ready to send test results to the printer you have selected. Results will be printed until you set the `Send Test Results to Printer at` to `Off`.

Sending Test Results to a PC or PC Card

Sometimes it is preferable to record (save) the test results for future reference or evaluation. The Software provides the capability to save test results to a PC card installed in the Test Set's front-panel card slot or to an external PC connected to the Test Set's SERIAL 9 port.

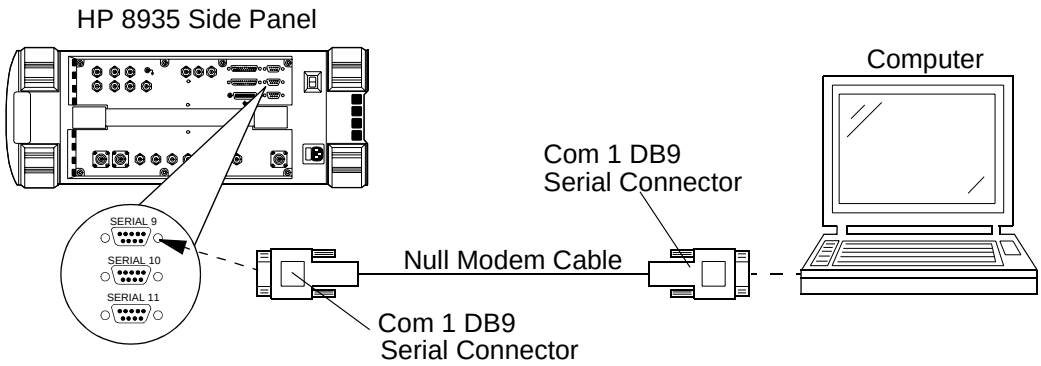
Sending Test Results to a PC

Test results can be sent to a PC communication program through the Test Set's SERIAL 9 port. A variety of devices can receive the data. An HP Palmtop computer, PC, laptop, or terminal can be used. A terminal emulator can write the test results directly to a file. An example of terminal emulator programs is the Hyper Terminal in Windows 95.

To save test results to a PC, you must meet the requirements listed below.

- Connect the Test Set's SERIAL 9 to a PC.
- Activate and configure the Software for sending test results to a PC.
- Configure a terminal program to run on a PC.

Test Set Connection to a PC



Activating the Software for Sending Test Results to a PC

To save test results to a PC, you will need to activate `Send Test Results to` parameter within the Software.

NOTE: You have to set `Use BTS Laptop Utilities` parameter to `No` in the `Print & Data Collection` menu before activating `Send Test Results to` parameter.

After connecting a PC to the Test Set's SERIAL 9 port, follow these steps:

1. Select `Print & Data Collection` in the main menu. (To ''select'', turn the knob to move the cursor to your choice, and press the knob to activate your choice.)
2. Select `Send Test Results to`, then select `Serial 9` in the `Choices:` menu.

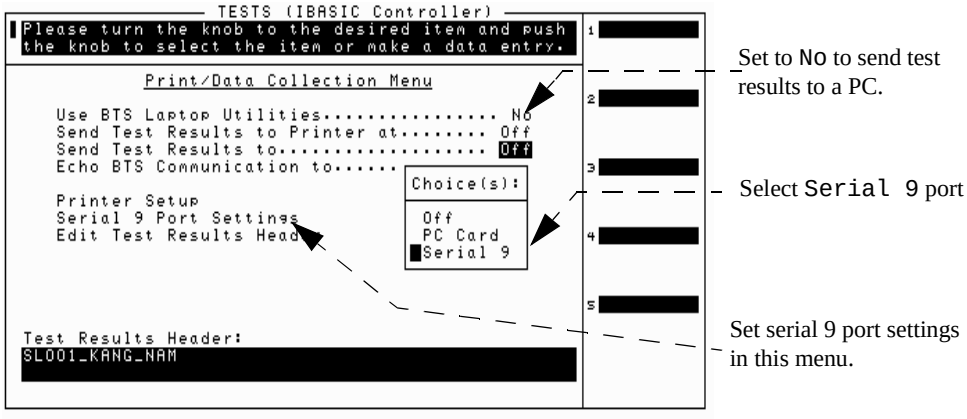


Figure 50 **Sending Test Results to a PC**

3. Select `Serial Port 9 Settings` in the `Print/Data Collection Menu` screen.
4. Set the Test Set's serial 9 communication settings to match your PC's settings.
5. Press k5 (`Previous`) to return to the previous menu.

The Test Set is now ready to send the test results to a PC terminal program.

Set `Send Test Results to` to `Off` in the `Print/Data Collection Menu` screen to stop sending test results to a PC.

NOTE: When you have configured the Test Set to send the data to a PC, you must remember to activate the communication package and specify a file in which to save the data. The Test Set will not issue an error message if the PC communications application is not running or configured properly.

Configuring PC Terminal Programs

Saving test results to a PC requires a configured terminal emulator. The following steps describe how to set up the Hyper Terminal program in Windows 95. You may need to refer to the documentation of the Windows 95 to configure the Hyper terminal program.

1. Start the `Hyper Terminal` program in the `Accessories` group in Windows 95.
2. Select the `Hypertrm` icon.
3. Enter a name and choose an icon for your new connection. Select `Ok`.
4. Choose the serial port you have connected in the `Connecting Using` field and select `Ok`.
5. Set the following port settings to match those of Test Set's SERIAL 9 port and press `Ok`.
   - Baud rate
   - Data length
   - Parity
   - Stop length

Now, the test results can be displayed on the Hyper terminal emulator when you run tests. After receiving the test results, you should save the test results in the terminal emulator for later use. When you access the Hyper terminal program next time, select your icon which has been made before in the Hyper terminal screen.

NOTE: See **"BTS Laptop Utility Program" on page 155** if you want to use the BTS laptop utility program as a terminal emulator.

Sending Test Results to a PC Card

To send test results to a PC card you will need to set `Send Test Results to` to `PC Card` within the Software. The Test Set automatically creates data files on the PC card based on the name you enter at the start of testing. The Software appends ".TXT" to your file name so that the files are easily recognized on the PC card.

NOTE: Once you have finished with your testing and have the test results in files on the PC card, follow the steps in **"How to Transfer a File in PC Card to a PC" on page 151** or **"How to Print a File from a PC Card" on page 153** to transfer the data file to a PC or printer.

NOTE: You have to set `Use BTS Laptop Utilities` parameter to `No` on the `Print & Data Collection` menu before activating `Send Test Results to` parameter.

To send test results to a PC card, follow these steps:

1. Insert a PC card into the Test Set's front panel card slot. If the card is uninitialized, see **"Initializing a PC Card" on page 173**
2. Select `Print & Data Collection` in the main menu. (To ''select'', turn the knob to move the cursor to your choice, and press the knob to activate your choice.)
3. Select `Send Test Results to`, then select `PC Card` in the `Choices:` menu.

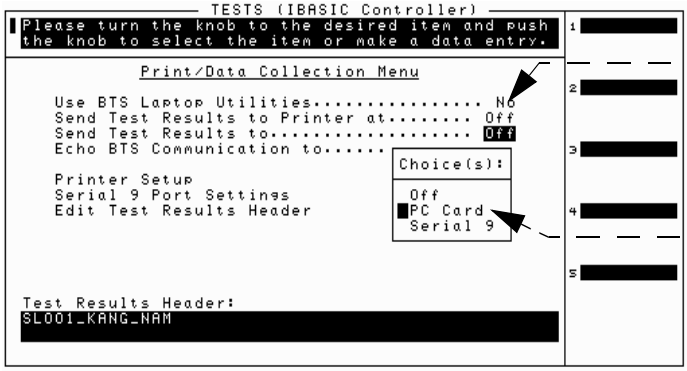


Figure 51 **Sending Test Results to a PC Card**

4. The Test Set will display a message asking for a file name to store the test results. Enter the file name using the characters in the `Choices:` menu. Position the cursor in front of the desired characters and press the knob to enter each character. Then select `Done` (at the top of the choices list) to finish entering.

The Test Set is now ready to send the test results to a PC card when you run tests.

NOTE: When saving test results to a PC card after running a test, `Send Test Results to` parameter will be automatically turned off. To send more test results to the PC card, you should reactivate the `Send Test Results to` parameter.

Data Logging

The data logging mode is for use by the technician for monitoring commands being sent between the Test Set and the base station. This mode can be useful if you suspect communications problems between the Test Set and the base station. Once enabled, the communication commands will be sent to the device along with the corresponding responses from the base station.

You may choose to send communication commands to the Test Set's display, a PC, or a printer (serial, parallel, or HP-IB.).

To log communication data, follow these steps:

1. Select `Print & Data Collection` in the main menu. (To ''select'', turn the knob to move the cursor to your choice, and press the knob to activate your choice.)
2. Select `Echo BTS Communication to` field, then select the device you want to view the communication data in the `Choices:` menu.

   If you select the HP-IB port, you need to match the Test Set's HP-IB address with your printer's address. Turn the knob or use the DATA keys to change the address when the HP-IB field is highlighted in the `Choices:` *menu.*

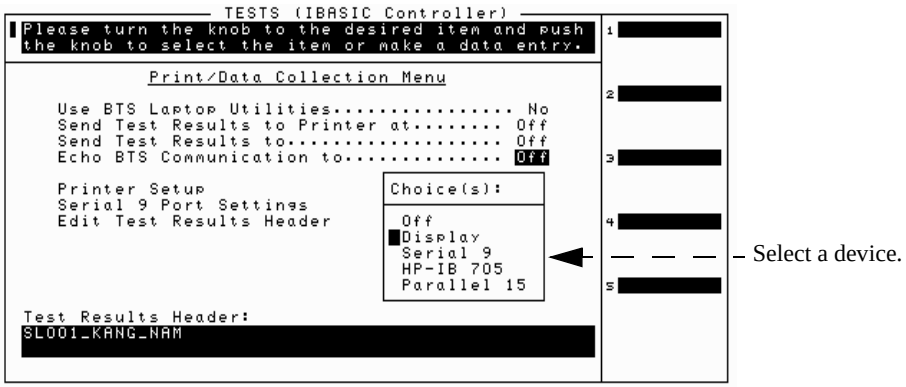


Figure 52 **Data Logging**

3. If you have selected `Serial 9` in step 2, you have to check that the Test Set's communication settings match those of the device you are connecting. *If you have selected the* `Parallel 15` *or* `HP-IB`*, skip to the next step.*

To change the serial port settings, follow these steps:

a Select `Serial 9 Port Settings` in `Print/Data Collection Menu` screen.

b Set the Test Set's communication settings to match your printer's settings.

c Press k5 (`Previous`) to return to the previous menu.

The Test Set is now ready to log communication data to the device you have selected. Communication data will be displayed or printed until you set the `Echo BTS Communication to` to `Off` on the `Print/Data Collection Menu` screen.

How to Configure a Printer

Printer Setup

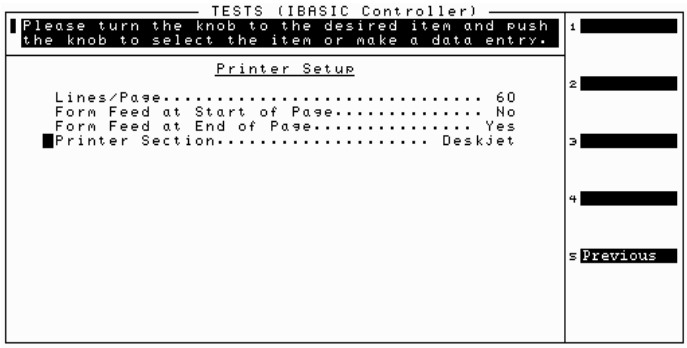


Figure 53 **Printer Setup Screen**

The `Printer Setup` menu screen allows the user to configure the Test Set printer format and select the printer you have connected. The user can select the number of lines to a page and the form feed location.

1. Connect the printer to the Test System using the serial 9, parallel, or HP-IB port, **see "Making Printer Connections" on page 172**
2. Select `Print & Data Collection` menu in the main menu.
3. Select `Printer Setup`.
4. Update the entries in the following fields to customize printouts and form feeds:
   - `Lines/Page`: This field is used to specify how may lines are printed per page.
   - `Form Feed at Start of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the start of printing.
   - `Form Feed at End of Page`: This field is used to specify if you want the printer to make a form feed (blank page) at the end of printing.
   - `Printer Selection`: This field is used to specify the printer you have connected.

If you would like to add comments to the beginning of the test results printout, enter your comments after pressing the `Edit Test Results Header` parameter in the `Print/Data Collection Menu` screen. Do this by scrolling to the field, pressing the knob, and selecting the characters from the `Choices:` menu. Scroll to `Done` when finished and press the knob.

Configuring the Test Set's Serial 9 Port

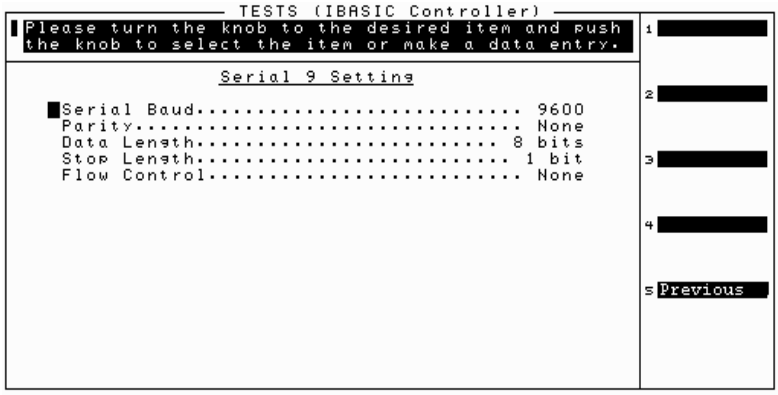


Figure 54 **Serial 9 Setting Screen**

Follow the steps below to configure the Test Set's serial 9 port.

1. Select `Print & Data Collection` menu in the main menu.
2. Select `Serial 9 Port Settings`. Change the serial 9 port settings to match your PC or serial printer's port settings.
3. Press the k5 (`Previous`) key.

Making Printer Connections

To connect the Test Set to a printer, follow the connection diagram for the type of printer your are using.

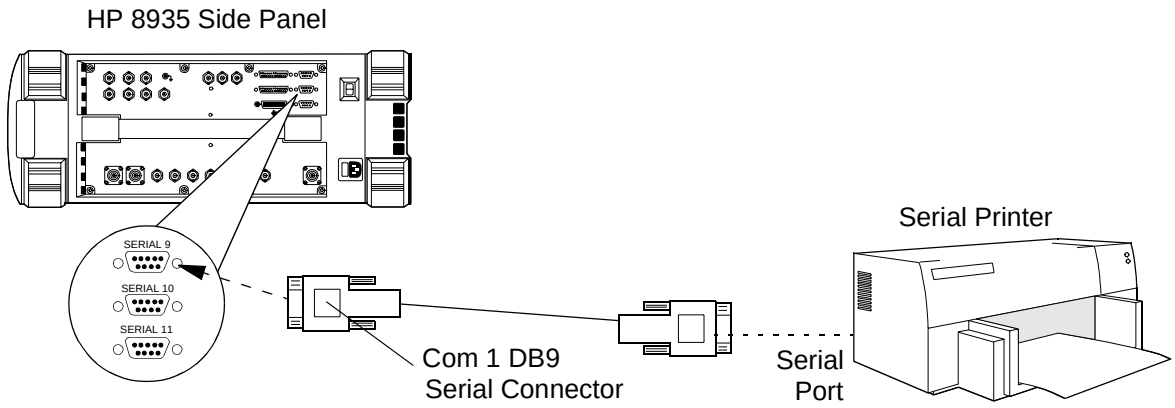


Figure 55 **Connections for the Test Set and Serial Printer**

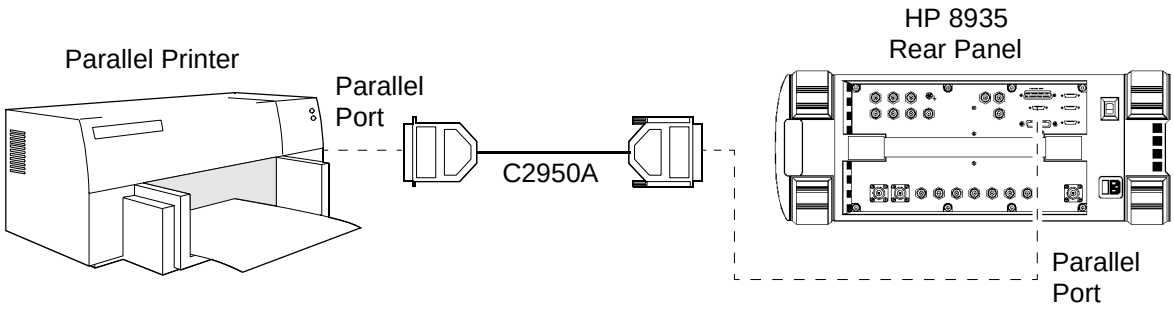


Figure 56 **Connections for the Test Set and Parallel Printer**

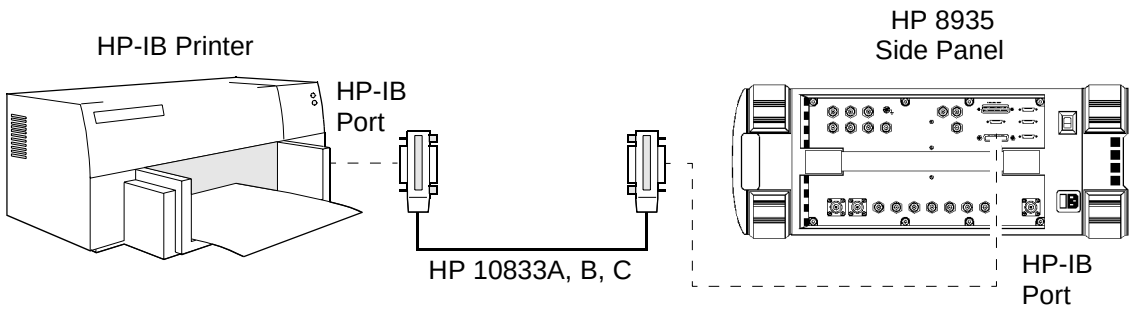


Figure 57 **Connections for the Test Set and HP-IB Printer**

Using a PC Card

Initializing a PC Card

When a PC card is new or the battery has been removed, then the card must be initialized to store data. To initialize a PC card, follow these steps:

1. Insert PC card into the front panel card slot.
2. From the `SOFTWARE MENU` screen, press the **SHIFT** and **Inst Config** keys in the Test Set front panel. The I/O CONFIGURE screen should be displayed.
3. Scroll to and select `Format Card`.

   The Test Set will display a message asking “Erase and format the PCMCIA Card?” (YES/NO)
4. Press **Yes On/Off** key, located below the knob, to format the card.

The card is formatted when the cursor stops blinking.

Troubleshooting PC Card usage

Each of the messages listed below is followed by an explanation of the probable cause.

`Directory Overflow.`

- The PC card is probably full and cannot store new files. You may have to delete some files on the card to free up memory space or use a new PC card.

`Medium uninitialized. Do you want to initialize?`

- This is a card which has either not been initialized or has other information stored on it. Initializing will overwrite any data which may already be on the card. Press the Yes On/Off key to initialize the installed card.

`Write protected.`

- This card has been write protected (the switch in the “SAFE” position). Slide the write protect switch into the up position before writing.

`Medium changed or not in drive. No information was loaded.`

- This card has possibly not been inserted properly. Re-insert and try again.

`File name is undefined. No information was loaded.`

- There may be no information (files) stored on the card.
- You may not have the correct card in the MEMORY CARD slot. Try again with a different card.

7

Troubleshooting

Use this chapter if you have encountered Software, communication, or measurement errors.

Error Summary

Overview

This chapter lists errors that might be encountered when loading or running the Software, communicating to the base station, and testing CDMA measurements. The errors are listed roughly in the order that you might encounter them when getting started using the Software:

"Errors When Loading and Running the Software" on page 177

"Errors When Connecting the BTS Control Adapter to Base Station" on page 178

"Errors While Attempting Measurements" on page 179

Help for Communications Errors:

The following sections have checks and tools that can be used to troubleshoot communication errors between the Test System and the base station:

"Troubleshooting the BTS Control Adapter Installation" on page 40

Errors When Loading and Running the Software

These errors would most often be encountered before you get to the Software's Main Menu. They would be most likely to appear the first time you load and run the Software, as outlined in **"Installation" on page 25**.

- Symptom: Memory Overflow Errors

  The random access memory (RAM) space of the Test Set is shared by IBASIC programs and save/recall registers. If you have saved a large number of registers in your Test Set, you may encounter a memory overflow error when you first attempt to load the Software.

  To correct this, you will need to clear up some RAM space by deleting some or all of your saved registers. You can do this selectively (one register at a time) or you can clear globally (all storage registers at once).

NOTE: Clearing the registers, whether selectively or globally, is *permanent*. *You cannot retrieve the registers once they are deleted*. You have an option to save registers to a RAM memory card, as well. Consult the *HP 8935 Reference Guide* for instructions on this procedure.

To delete a single register:

1. Press the Recall key from the CDMA ANALYZER screen.
2. Scroll the cursor to the register to be deleted.
3. Press the **Yes On/Off** key to indicate you want to clear the register.
4. Press the **Yes On/Off** key again to confirm.
5. The register is cleared.

To delete all saved registers:

1. Press the Recall key.
2. Scroll to **`*Clr All*`** and press the knob.
3. Press the **Yes On/Off** key to confirm.
4. All save registers are now cleared.

Errors When Connecting the BTS Control Adapter to Base Station

- Message:

  Base Station did not set up the OCNS release.

This message may be displayed if you send a second OCNS release command after one OCNS release command has already been sent. To correct this, send the OCNS request command to the base station. **See "Laptop Emulator" on page 120** for information how to send the command. You can verify the base station's configuration or conditions using the Test Set's Code Domain Analyzer.

- Message:

  Base Station did not set up the OCNS request.

This message may be displayed if you send a second OCNS request command again after one OCNS request has already been sent. To correct this, send the OCNS release command to the base station. **See "Laptop Emulator" on page 120** for information on how to send the command. You can verify the base station's configuration or condition using the Test Set's Code Domain Analyzer.

- Message:

  Base Station did not response the following command : <command name>

This message indicates that basic communication with the base station is taking place, but that the control commands to set the base station up are not being responded to. To correct this, follow the steps in the **"Troubleshooting the BTS Control Adapter Installation" on page 40**

Errors While Attempting Measurements

The following error message can be posted once a test mode has begun making CDMA measurements:

- Can not measure code domain tests.

  If the Test Set is unable to correlate the code domain power measurements, this error will result. Check the following items and re-run the test:

  - Entry for **`Channel Number`** in the Channel Information of the BTS Configuration Menu. If you enter the wrong channel number, the Test Set will be tuned to the wrong frequency. You can use the Test Set's spectrum analyzer to verify the presence of a signal.
  - Entry for **`PN Offset`** in the Sector Information of BTS Configuration Menu. If you have entered an incorrect value for PN offset, the Test Set will not be able to correlate CDMA measurements. You may use the PN Offset Search test from the Utilities Menu to find the valid PN offset value. **See "PN Offset Search" on page 105**.
  - Even-second clock connection. Check your connection from the source of the even-second clock (at the base station). You may have to check that the GPSR being connected to the base station is **active** mode to enable the clock signal. The even-second clock signal should be connected from the base station to the SYNC IN EVEN SECOND port on the Test Set. **See "Even Second Clock Signal Check" on page 108**.
  - Timebase reference clock connection. Check your connection from the source of the timebase reference signal (typically 19.6608 MHz) at the base station. You may have to check that the GPSR being connected to the base station is **active** mode to enable the reference signal. The timebase reference should be connected to the REF IN port on the Test Set (there are alternative connections; see **figure 36, "Connections to the Base Station Equipment Using an HP 58503A GPS Time and Frequency Reference Receiver," on page 114**). If a valid clock signal is present during testing, the front-panel UNLOCK (yellow) LED on the Test Set will be off.

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