HP 11807B Option 083
Lucent PCS CDMA Base Station Test Software
User's Guide

Software Version: B.01.00

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Revision A

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In this Book

This book documents the use of the HP 11807B Option 083 Software. The Software is used to test PCS CDMA base station equipment manufactured by Lucent Technologies.

Chapter 1, Product Description

This chapter describes the Software and lists the hardware requirements for Software operation.

Chapter 2, Installation

Start here when using the Software for the first time. This chapter shows how to make connections and load and run the Software. Steps for setting up the Test System's modem are also included.

Chapter 3, Configuring the Cell Site for Tests

After you have the Software loaded and running, use this chapter to see steps for controlling the site via the Mobile Switching Center using the modem.

Chapter 4, Performing CDMA Tests

Once the site has been configured for control, you can follow these steps to perform one of several CDMA transmitter tests or choose from utility tests.

Chapter 5, CDMA Tests Software Reference

This chapter contains reference information specific to the Lucent PCS CDMA Base Station Test Software.

Chapter 6, General Software Reference

This chapter offers reference information on general software use. The chapter discusses how to use the TESTS menus and memory cards, and how to print test results.

Chapter 7, Troubleshooting

This chapter offers reference material to be used if you encounter errors while using the Software. Symptoms of potential problems are described and likely solutions are provided.

Conventions Used in this Guide

The following *terms* are used throughout this guide:

- Test Set - the HP 8921A Cell Site Test Set.
- Cellular Adapter - the HP 83203B or 83205A CDMA Cellular Adapter.
- PCS Interface - the HP 83236A,B; used to translate signals into the range of the Test Set.
- Software - the Lucent PCS CDMA Base Station Test Software, described in this book.
- Test System - the combination of a Test Set, a Cellular Adapter, and a PCS Interface.

The Test Set's keys, softkeys, and selection choices in menu screens are shown as follows:

- A key on the Test Set's front panel: TESTS
- A USER Key: **`Prev Menu`** (k5)
- A selection choice or setting on the CRT display: **`Equipment Type`**

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1

Product Description

Review this chapter for general information on the Lucent PCS CDMA Base Station Test Software. Included is a list of required equipment to complete the Test System plus a look at the basic Software “flow.”

Overview

Description of the Lucent PCS CDMA Base Station Test Software

The HP 11807B Option 083 Lucent PCS CDMA BS Test Software is an Instrument BASIC (IBASIC) application used to set up the Test System for transmitter measurements on CDMA base station equipment. The Software runs on the Test Set's internal IBASIC controller to allow you to perform the following tests:

- TX Power Meter
- Pilot Only Test
- Code Domain Tests
- Spectrum Analyzer
- Code Domain Analyzer
- CDMA Analyzer
- Automated BBA Test
- PN Offset Search
- Insertion Loss Test

Using a modem in the Test System, the Software can control the base station equipment by sending commands to the Mobile Switching Center (MSC). This provides automated testing to reduce your time spent at the site and to greatly improve the repeatability of measurements.

As tests are run, the measured results are compared to specification limits that you define. These test results can be printed or stored to a memory card for archival purposes.

Who should use the Lucent PCS CDMA BS Test Software?

If you are installing, commissioning, or maintaining Personal Communication Services (PCS) sites using Lucent Technologies' CDMA cell site equipment, this Software will assist you in performing key tests of transmitter performance.

Included with the Software

Included with the HP 11807B Option 083 Software:

❒ Memory card (OTP) containing the program files (part number 11807-10042)
❒ Blank RAM card
❒ This manual (part number 11807-90146)
❒ Software License Agreement

NOTE: **See "Related Documents" on page 112** for a list of other manuals that document the operation of the Test System and its elements.

Software Operation Overview

Figure 1 shows the basic steps to follow in using the Software. In most cases, you will follow steps covered in chapters 2, 3, and 4.

Chapters 5 and 6 provide details on Software use not covered in the CDMA measurements steps.

Chapter 7 lists troubleshooting considerations and recommended fixes for common problems.

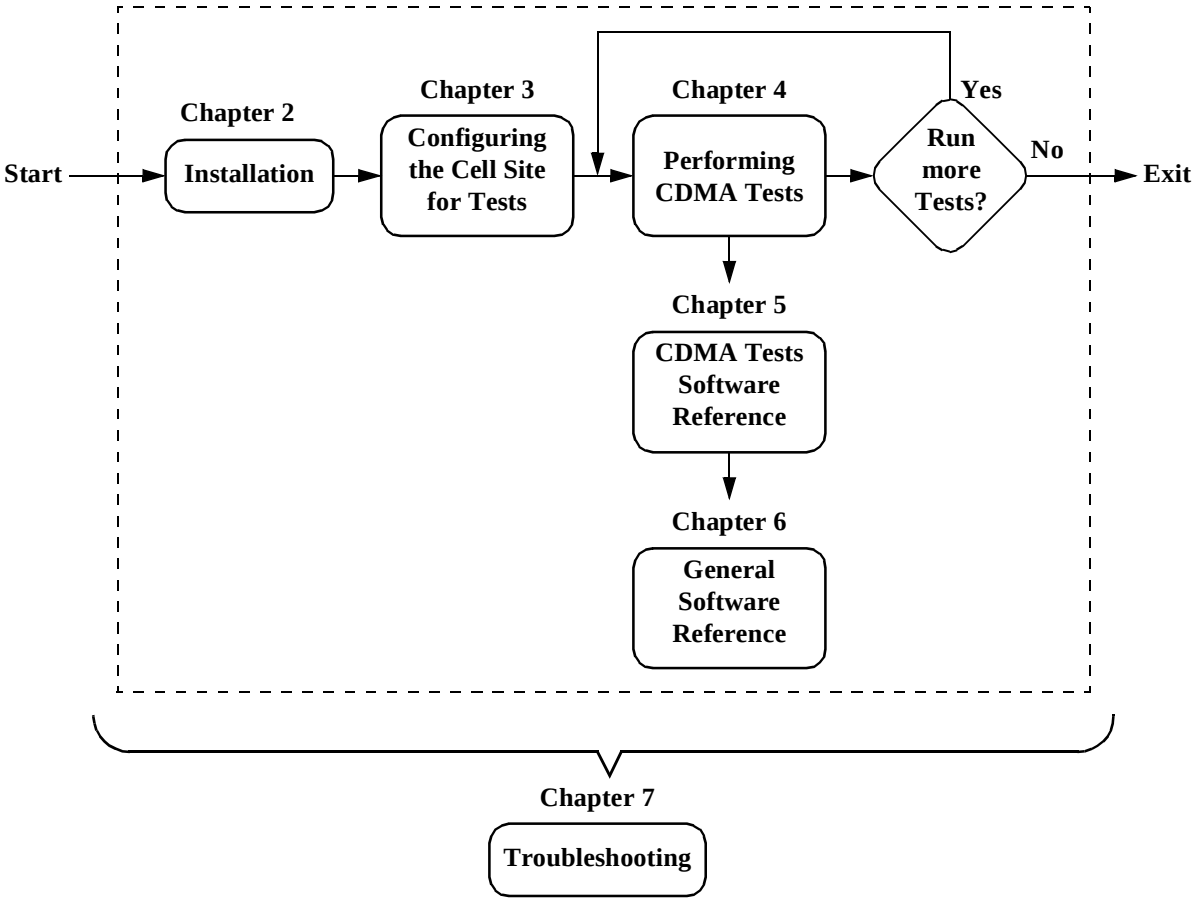


Figure 1 **Steps for the Use of the PCS CDMA Test Software.**

Test System Hardware

Required Equipment

Test System

The Lucent PCS CDMA Software supports the following Test System configurations:

- HP 8921A Option 601 (includes the HP 8921A Cell Site Test Set, HP 83205A CDMA Cellular Adapter, and HP 83236B PCS Interface).
- HP 8921A Options 600 and 603 plus the HP 83236A,B PCS Interface.
- HP 8921A plus either the HP 83203B or HP 83205A CDMA Cellular Adapter plus the HP 83236A,B PCS Interface.

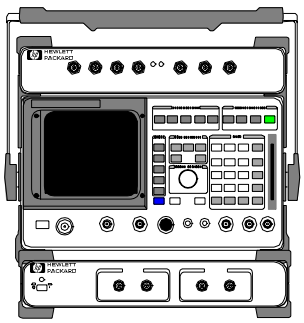
NOTE: To take full advantage of this Software, your HP 8921A Cell Site Test Set should have firmware revision A.12.04 or higher. The Software will execute on earlier revisions, but may behave differently than shown in this book. To check your Test Set's revision number, exit any software program and press and release the SHIFT key, and then press the DUPLEX key. The installed firmware revision will be displayed in the upper right of the CRT. Contact your nearest Hewlett-Packard sales office for firmware upgrade information.

Modem

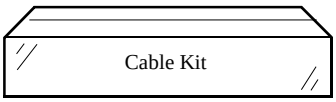
The Test System supports the use of a modem for control of the cell site via the MSC.

The Software will operate with most Hayes-compatible external modems capable of operating at up to 9600 baud. It does *not* support internal PC modems.

Test Equipment required:

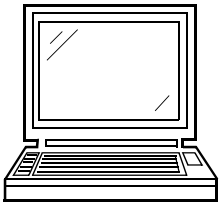


- HP 8921A Opt. 600, 601, 603 or an HP 8921A with an HP 83203B or 83205A Cellular Adapter.
- HP 83236A,B PCS Interface

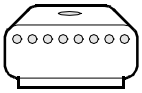


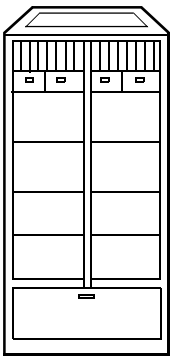
- HP 83236A,B Cable Kit (Supplied with the HP 83236A,B)

You must supply:

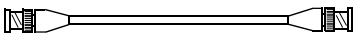


- Laptop PC to communicate with the switch.
- Modem



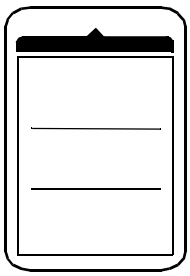


- Lucent PCS CDMA Base Station.



- Cables to connect the base station to the Test System.

Supplied with the HP 11807B Option 083 Software:



- PCS CDMA Base Station Test Software on OTP card
- RAM Card with battery.
- This Manual

HP 11807B Option 083 Lucent PCS CDMA Base Station Test Software

Figure 2 Required Equipment.

Optional Equipment

Cable Kit

See **"Connector Kit" on page 94** for information on an optional cable kit that supplies required cables and adapters for connection of the Test System to the base station and modem.

NOTE: The *required* cable kit shown in **figure 2 on page 19** is used to connect the PCS Interface to the Test Set and is supplied with the Interface. The *optional* kit described in **"Connector Kit" on page 94** is used to connect the base station to the Test System (serial connections, antenna output, timebase, and even-second clock).

Attenuator

The input to the PCS Interface is rated for a maximum of 1 Watt for CDMA base station signals. Since many base stations have output levels greater than 1 Watt, it is often necessary to add an attenuator to the Test System.

For best results, use a 30 dB attenuator rated for at least 20 Watts. The HP 8498A Option 030 is a good choice. An equivalent model can be substituted if it meets the requirements for attenuation, input power, and it covers the frequency range of the PCS base station equipment (1700 to 2000 MHz).

Printer

A printer can be added to the Test System to provide a record of test results. A summary of the test performed, the measured results, and a pass/fail analysis is included for tests that provide printed results.

The Test System supports printing via the parallel, serial, and HP-IB ports. The following printers are supported:

- ❒ HP DeskJet printers
- ❒ HP LaserJet printers
- ❒ HP ThinkJet printers
- ❒ HP QuietJet printers
- ❒ Epson FX-80 and LQ-850

You may also collect the results using a PC on the serial port. This requires a terminal emulator program running on the PC.

Personal Computer (PC):

The Test System and Software will support a PC for the purpose of controlling the site via the MSC or logging results from test sequences. The PC is connected to the Test System via the serial port.

NOTE: A PC is *required* in the system if you must log on to the MSC via an Operations Management Platform (OMP).

Most PC's with an available serial port are compatible with the Test System. You will need a software application for the PC that configures it to act as a terminal using the serial port.

2

Installation

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

Overview

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

The steps in this chapter are:

1. **"Make the Test System Connections" on page 25**
2. **"Connect the Test System to the Site Equipment" on page 27**
3. **"Load and Run the Lucent PCS CDMA BS Test Software" on page 28**
4. **"Set up the Modem for Communication to the MSC" on page 31**

NOTE: The last step, setting up the modem, is not a strict requirement. However, the test examples in **"Performing CDMA Tests" on page 47** use a modem to control the cell site via the MSC. The Software also supports testing without modem control. If you are not using a modem with your Test System, skip the last step and see **"Testing without MSC Control" on page 115** for a summary of differences when running without the modem.

Make the Test System Connections

Connect the Test Set to the PCS Interface

Make the connections between the elements of the Test System as shown in **figure 3**.

NOTE: This figure illustrates the connections between the Test Set and the PCS Interface. It does not show all rear-panel connections between the Cellular Adapter and Test Set. Refer to **"Installing the Cellular Adapter" on page 95** to verify these connections, if they are not already made.

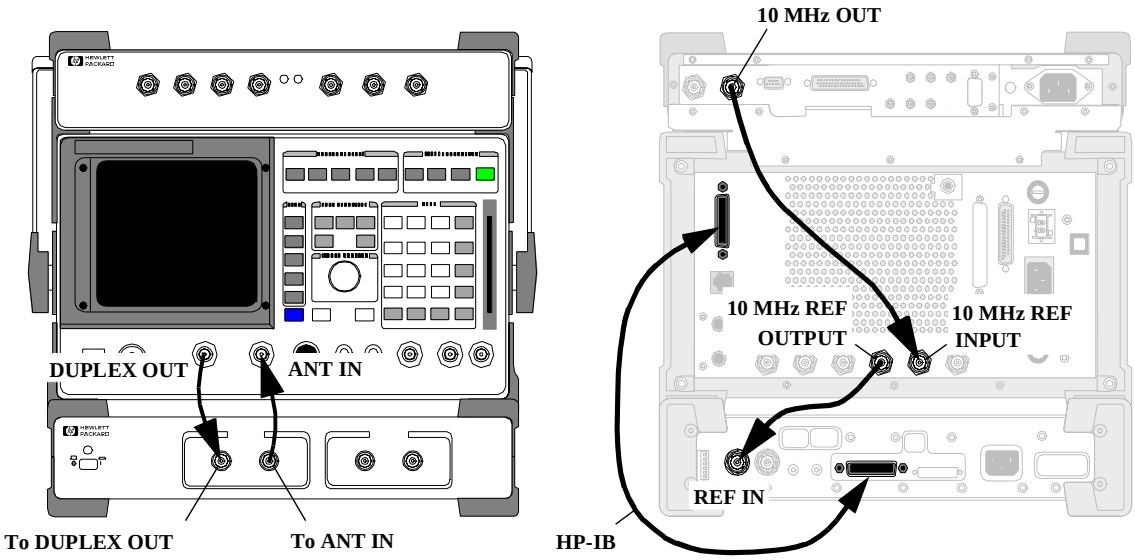


Figure 3 **Test System connections.**

Connect the Modem to the Test System

Figure 4 shows how to connect the modem to the Test System. Also shown are the serial connections to a PC, if one is used.

NOTE: If you are *not* controlling the site via a modem to the MSC, you may skip these connections. However, the steps in **chapter 4, "Performing CDMA Tests"** use a modem for site control.

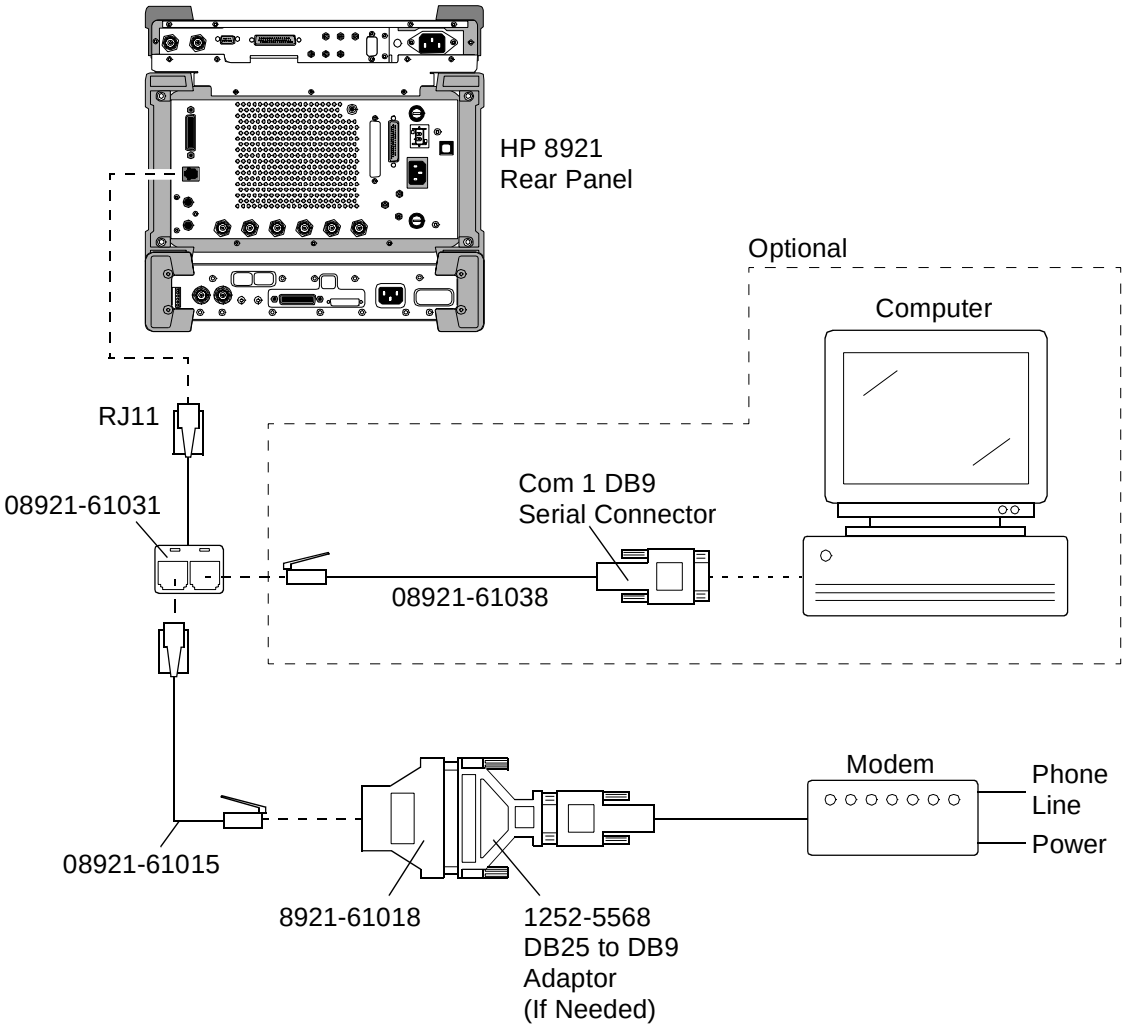


Figure 4 **Serial connections for the HP 8921A, modem and optional PC**

Connect the Test System to the Site Equipment

Connect the clock signal (19.6608 MHz) and even-second clock as shown in **figure 5**. For alternative ways of connecting these clock signals, **see "Test System Connections to the Base Station" on page 91**.

NOTE: To enable the clock signals on the base station, be sure to place the “TST CLK” switch on the SCT module to the ON position.

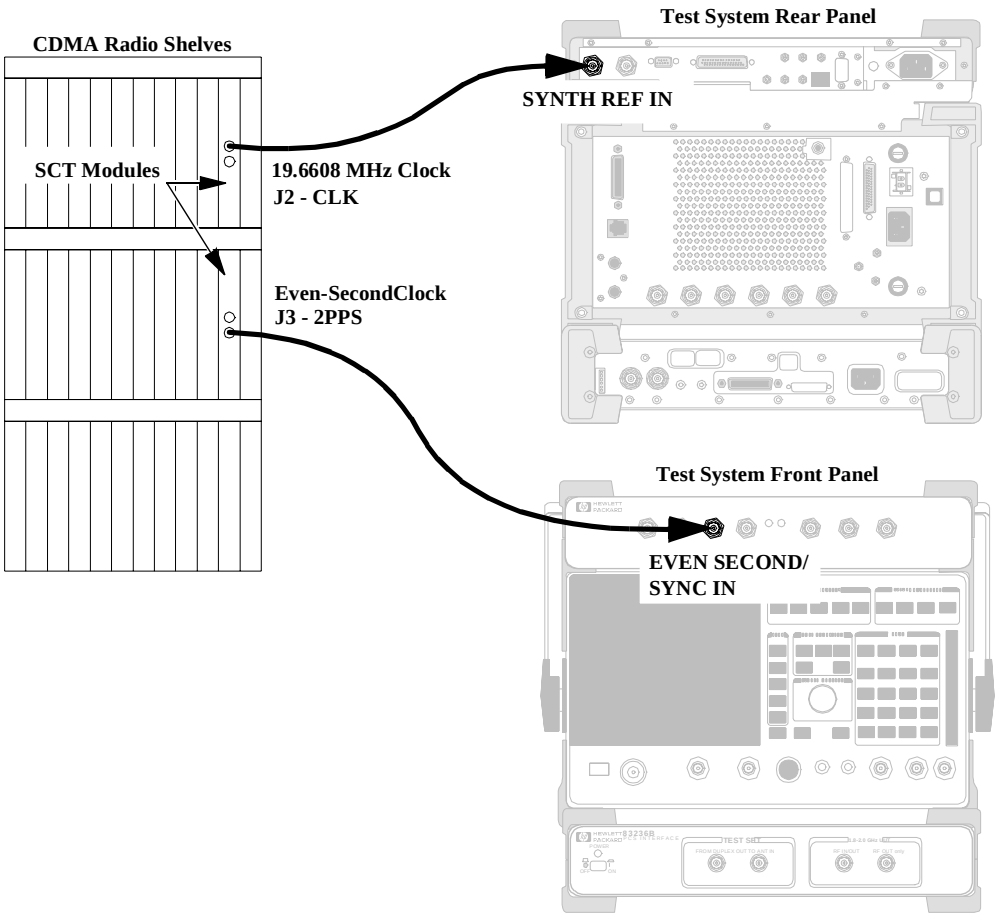


Figure 5 **Connections for the system clock and even-second clock.**

Load and Run the Lucent PCS CDMA BS Test Software

The next step is to get the Lucent PCS CDMA BS Test Software loaded into the Test Set and running on the IBASIC controller.

Locate the HP 11807B Option 083 Software card and follow the steps outlined in **figure 6** and **figure 7**.

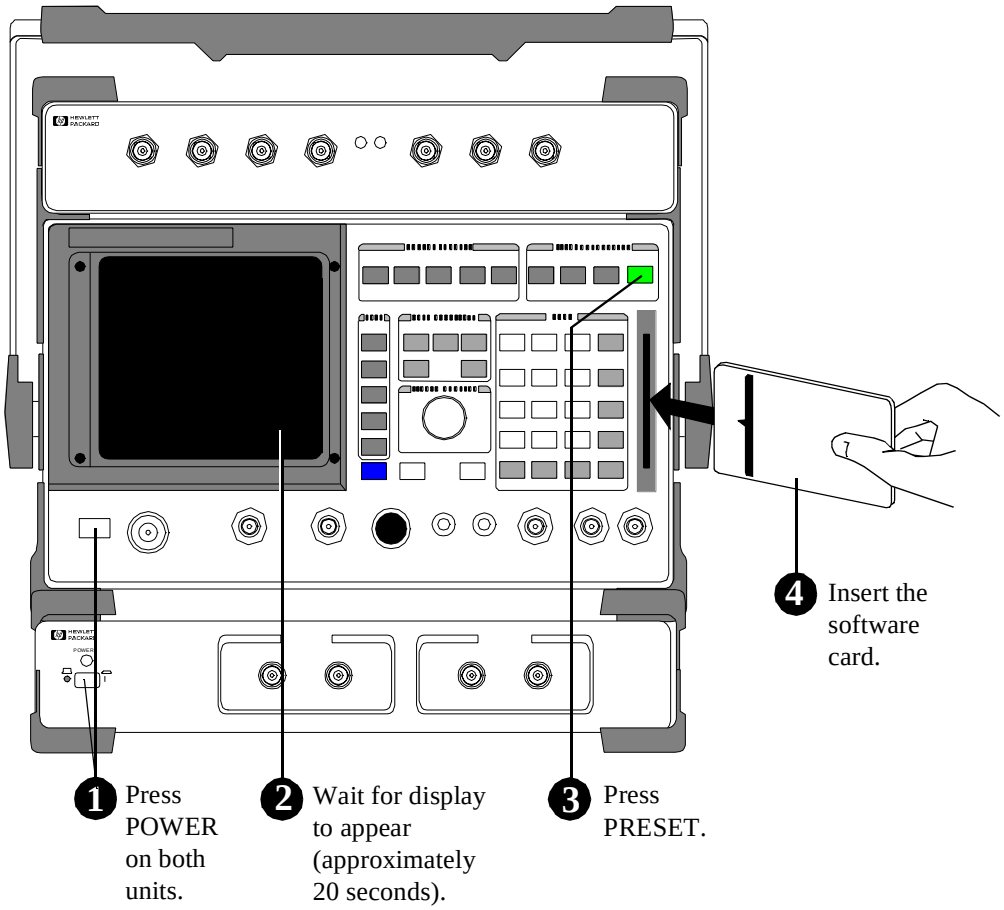
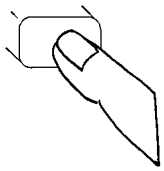
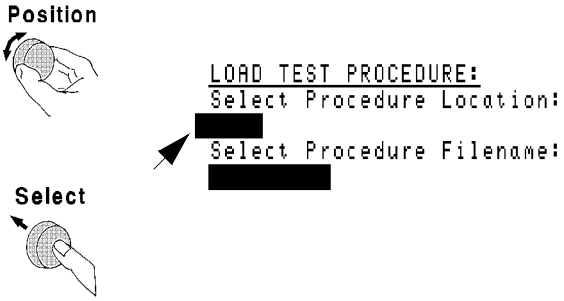


Figure 6

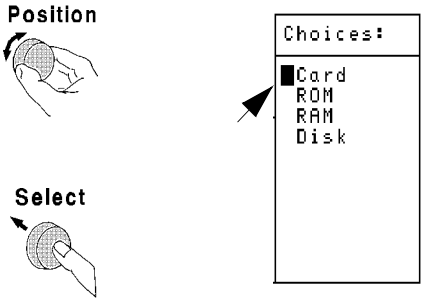
5 Press **TESTS** to display the **TESTS (Main Menu)** screen.



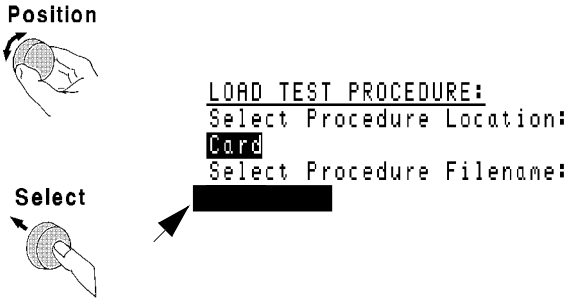
6 Position the cursor at **Select Procedure Location:** and select it.



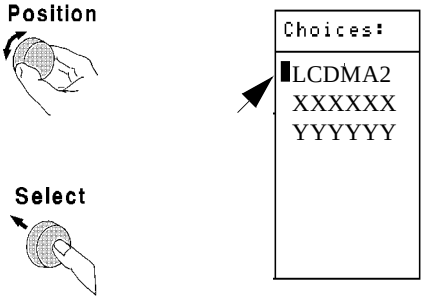
7 Position the cursor at **Card** and select it.



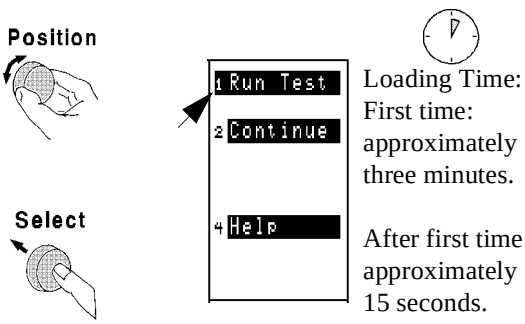
8 Position the cursor at **Select Procedure Filename:** and select it.



9 Position the cursor at **Choices:** and select LCDMA2.



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



Loading Time:
First time: approximately three minutes.

After first time: approximately 15 seconds.

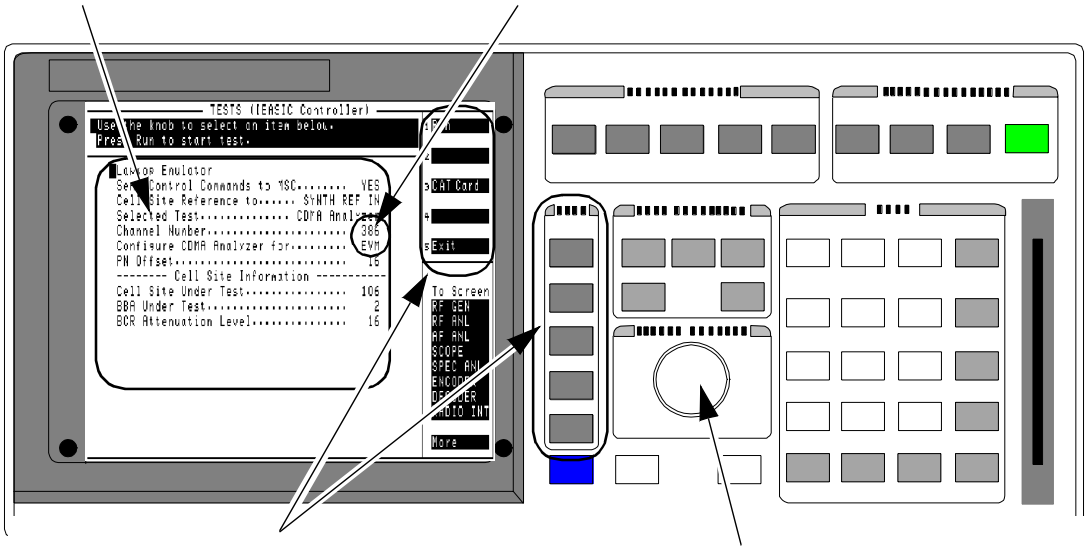
Figure 7

Navigation of the Lucent PCS CDMA BS Test Software

After the software has loaded, you will see the Software Main Menu screen on the display of the Test Set (see **figure 8**). Important features of this screen are indicated in the figure with notes on their use.

Main Selections and Cursor Control
Some menu selections open lower-level menus, others allow entry of numeric data. To select a menu item, rotate the knob until the cursor is in front of the line and press the knob.

Entry Fields
Some Main 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 value in the field. When the desired value is set, press the knob or the ENTER key.



USER Keys and their Fields
The USER Keys (k1 - k5) correspond to fields 1-5 at the top right corner of the test screen. They are used for navigation through menus and for making selections. In many lower-level menus, a “Return” key is provided to take you up one menu level.

Knob
The knob controls the cursor position on the display and is sometimes used to make numeric entries.

Figure 8 **Lucent PCS CDMA BS Test Software Main Menu features.**

Set up the Modem for Communication to the MSC

The Test Set has the ability to send control commands to the switch, via a modem, to control the radios at the cell site. 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 modem. Once you have set up and initialized the modem, you should not have to repeat these steps again unless the settings are cleared (or the modem is used for other purposes and is reconfigured).

A laptop PC can be connected to the second serial port of the Test Set to allow you to interact manually with the switch (this addition of a PC is optional). It also allows you to do data collection directly to your PC for archival or later printing. **Figure 9** shows the basic configuration of the Test System and modem and how it is used to communicate to the switch.

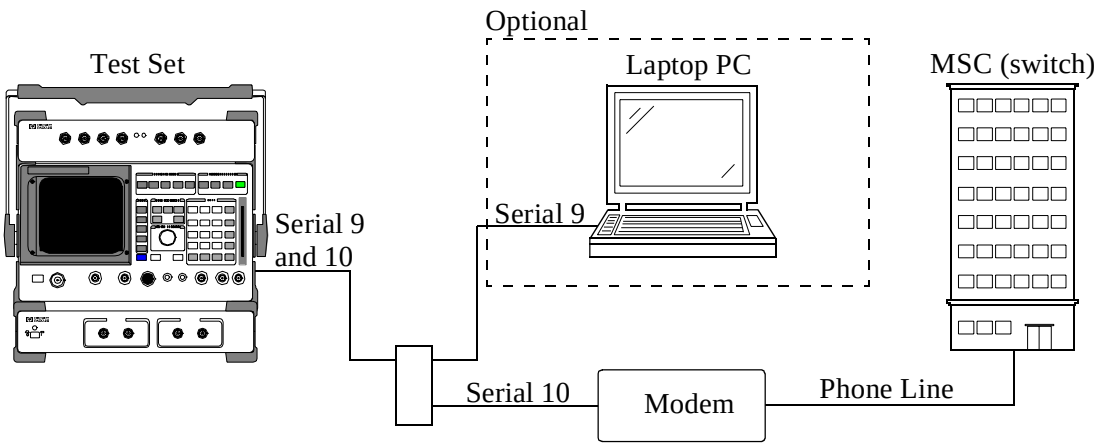


Figure 9 **Test Set communication to the MSC.**

NOTE: This method of site control is optional. If you have other means of controlling the site equipment, you may skip this section covering modem setup and go right to making tests (**see "Performing CDMA Tests" in chapter 4**).

Configure the Serial Port

The serial port information must be properly set for data communications between the Test Set, modem, MSC, and computer (if used). You will want to set the Test System parameters to match the communications requirements of the MSC. You will need to know the following MSC communication link items to set the serial parameters:

- ❒ Baud rate
- ❒ Data length
- ❒ Parity
- ❒ Stop length

To configure the serial ports, you will have to temporarily exit the software environment. These steps will show you how to exit the software, make the settings, then return to Software control:

1. From the Main Menu, select **Exit** (k5). The software will be paused.
2. Press the TESTS key.
3. Scroll to and select **Parm:Test Parameters** near the bottom of the screen.
4. Using the cursor to select the **Parm #** and modifying the **Value** fields, change *parameters 1, 2, 3, and 4* to match the serial port settings of the MSC (see **figure 10**).

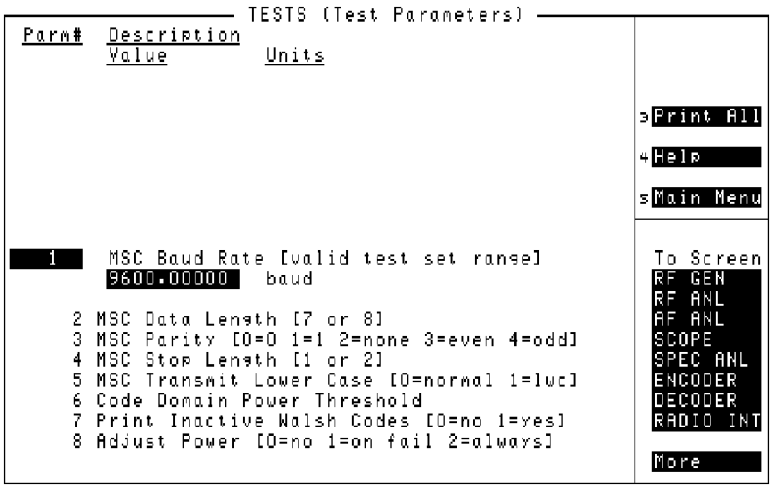


Figure 10 **Parameter screen, showing modem setup parameters.**

5. To return to Software control, press the TESTS key then select **Run Test** (k1).
6. If you have connected a computer as shown in **figure 9**, set up your PC terminal program for a serial port connection with the same settings made above. Set the XON/XOFF pacing control on your computer's serial port (this may appear in your PC software as an item marked "Software Flow Control"; you will want to set this to "yes" or "on"). Consult the documentation for the communications software package that is installed on your PC if you have questions on these, or other, settings.

NOTE: The settings you have made in the Test Parameters screen are saved in non-volatile memory and will be retained even if you turn the Test Set off. However, if you load another program or procedure, the settings will be lost. You can save your settings in a "procedure file" for later use after running other programs. **See "How to "Save/Delete Procedure"" on page 130** for instructions on creating procedure files.

Initialize the Modem

In these steps, you will send pre-defined strings to the modem that will initialize it for use with the Software. In most cases, these pre-defined strings will properly initialize your modem. If you are unsuccessful in getting your modem to communicate with the switch, you may need to customize the strings. The steps for creating custom strings and a summary of the pre-defined strings are given in **"Creating User-Defined Commands" on page 106**.

1. From the Main Menu, scroll to and select **`Laptop Emulator`** (see **figure 11**).

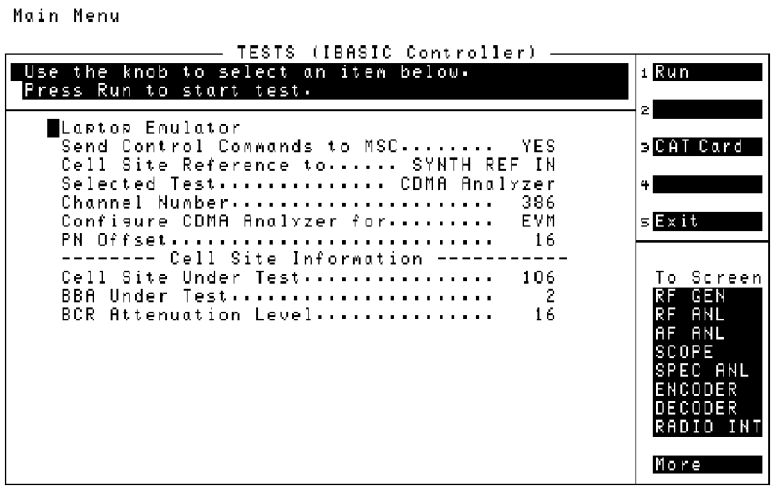


Figure 11 **Selecting the Laptop Emulator screen.**

2. If your modem is not already connected to the test system and phone line, make the connections now. If it is not turned on, turn it on now.

3. Position the cursor at **`Test Modem`** and press the knob. In the **`MSC Response`** window the modem should respond “OK”. This confirms that the Test Set can communicate with the modem via the serial port.

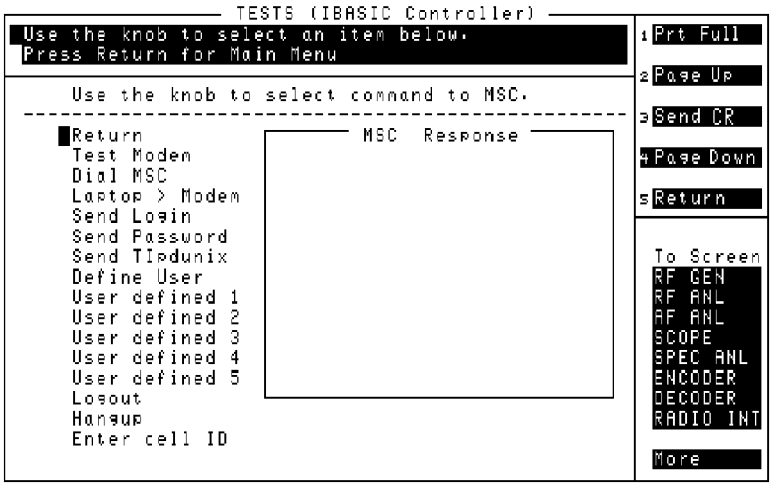


Figure 12 **The Laptop Emulator screen.**

4. Scroll down to **`Define User`** and select it by pressing the knob.
5. To load a set of available modem commands, select the **`File Name`** (k1) USER key.

6. You will use the pre-defined set for modem use, so press the **Modem** (k5) USER key. You should see modem setup strings appear in the menu under the lines marked **User Action x to MSC** (not shown).
7. Press the **Return** (k5) USER key. You should now have choices of **Modem Init 1**, **Modem Init 2**, and **Modem Save** in the Laptop Emulator menu (see **figure 13**).

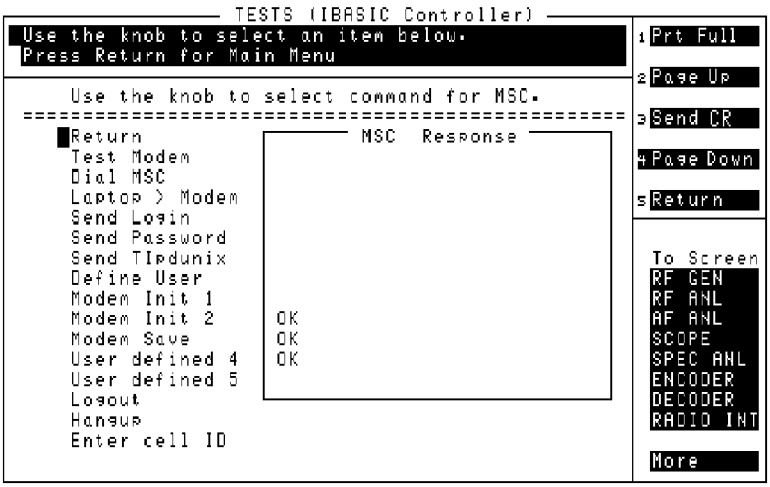


Figure 13 **Laptop Emulator screen after selecting the Modem user definition.**

8. The modem for MSC communication can now be initialized.
   a. Position the cursor on **Modem Init 1**. The top of the display will show the command string that will be sent to the modem. Press the knob to send the command and wait for the "OK" response in the MSC Response window.
   b. Position the cursor on **Modem Init 2** and select it. This sends the second command string.
   c. If the modem accepted the two command strings, you'll probably want to save the settings in the modem. Scroll to **Modem Save** and press the knob. This will save the settings in the non-volatile memory of the modem so you can skip these initialization steps in the future.
9. To exit the Laptop Emulator mode, press **Return** (k5).

If You Had Problems

If you were unable to load and run the software, make the required entries, or you encountered error messages refer to **"Troubleshooting" on page 173** for help.

3

Configuring the Cell Site for Tests

Follow the steps in this chapter to connect to the MSC and configure the site for testing. *You must complete the steps in this chapter before attempting CDMA measurements with the Software.*

Overview

In the last chapter, you connected and configured the modem to work with the Test System. The modem is used to communicate with the MSC to set up cell sites for testing. In this chapter, you will use the modem to connect to the MSC and set a site up for tests.

NOTE: This method of site control is optional. If you have other means of controlling the site equipment, you may skip this section covering modem setup and go right to making tests (**see "Performing CDMA Tests" in chapter 4**). See also **"Testing without MSC Control" on page 115**.

Connect to the MSC

You will now use the Test System to dial up the MSC controlling the site you are planning to test. You will log on and enter the maintenance craft shell (TIpdunix). From there, the Test System will send commands to the site when an action is required during testing.

NOTE: The steps in this section describe the use of the Test Set and the Software screens to communicate to the MSC via the modem. In some cases, you may need to use a PC with the modem to make the connection (such as when negotiating through an OMP). This process is described at the end of this section (**"Use of a PC to accomplish the connection to the MSC (Laptop>Modem)" on page 45**) and in more detail in **"Using the Laptop > Modem Mode" on page 105**.

a. In the Main Menu, verify that the **`Send Control Commands to MSC`** field indicates **YES**. If not, scroll to that field and press the knob to change the entry to **YES**.

b. From the Main Menu, scroll to **`Laptop Emulator`** and press the knob (see **figure 14**).

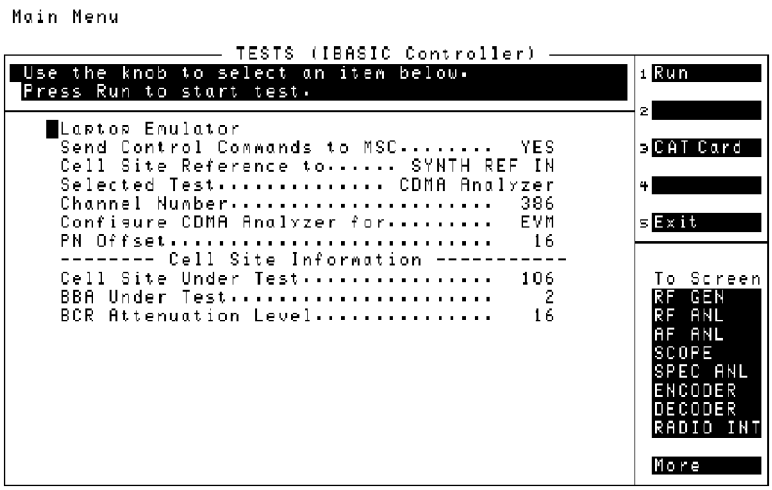


Figure 14 **Selecting the Laptop Emulator.**

c. Make sure that your modem is connected to the Test System and a phone line and is turned on.

d. Scroll down to **`Test Modem`** and press the knob to verify basic modem operation (see **figure 15**). The response "OK" should appear in the **`MSC Response`** box.

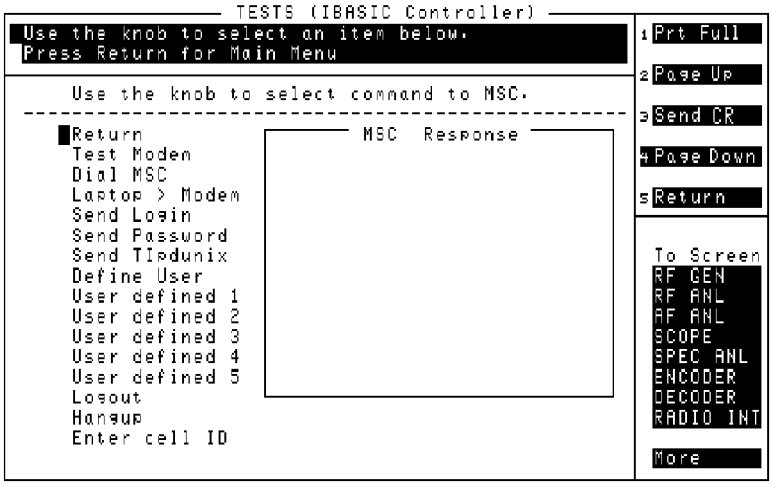


Figure 15 **Connecting to the MSC.**

e. Now, dial up the MSC: Scroll down to **`Dial MSC`** and press the knob. You will be prompted to enter the phone number for the switch; enter it using the DATA keys and press the knob (**`Done`**). If you have entered the number before, it will appear at the top of the screen and you can select **`Done`**. You should hear the modem activate and send the DTMF tones. You should then hear the ring at the MSC end, followed by the "connect sound."

NOTE: In some cases you may need to dial extra digits or insert commas to provide pauses in the dialling sequence. If you use any non-numeric characters, you will have to enclose the entire dialling sequence in double-quotes ("). For example, to dial a 9 and pause before the actual number is dialled, you would enter "9,5551234".

f. If a login prompt does not appear in the **`MSC Response`** box, press the **`Send CR`** (k3) USER key once or twice to get the login prompt to appear.

g. When prompted by the MSC for a login, select **`Send Login`**. Use the knob to enter your login from the characters in the **`Choices`** menu, then select **`Done`**. If you have entered your login previously, it will appear at the top of the screen and you can select **`Done`**.

h. When prompted by the MSC for a password, select **`Send Password`**. Use the knob to enter your password from the characters in the **`Choices`** menu and select **`Done`** If you have entered your password previously, it will appear at the top of the screen and you can select **`Done`**.

i. Wait for the prompt from the MSC (typically a "$" or "#" or a few characters of text) then select **`Send TIpdunix`** to enter the maintenance mode. You should receive a response of TERMINAL IN SERVICE. **Figure 16** shows the typical appearance of the **`MSC Response`** box after a connection sequence.

```
login: tech23
Password:

Welcome to the LUCENT Autoplex System 1000

Current ECP Generic: APX-1000 L8.0
Current IMS Generic: Release 4.1.3.D
Current 5E-DCS Generic: DCS 1 - 5E10
Current Definity DCS Generic: DCS 2 - 8.0

Current OMP Generic 8.0

Current Series I Cell Site Generic:  APXC04.12
Current Series II Cell Site Generic: APXB05.32
Current Series II/CDMA Cell Site Generic: b03Y07.10


You are logged into ECP-1

Good afternoon


Spokane, Wa.   APX-1000 APX8.0      ttyx     TTY 21
```

Figure 16 **Typical MSC Response box display after the connection to the MSC.**

Set Up the Site for Test

a. You can now verify that you can control the site via the MSC. Scroll to **`Enter cell ID`**. Select it and enter the number for the cell site you plan to test.

NOTE: In the **`Laptop Emulator`** menu, using the **`Page Up`** (k2) and **`Page Down`** (k4) USER keys can save time.

b. Scroll to and select **`OP Cell`** (see **figure 17**). You should see a response to the OP Cell command in the **`MSC Response`** box on the display.

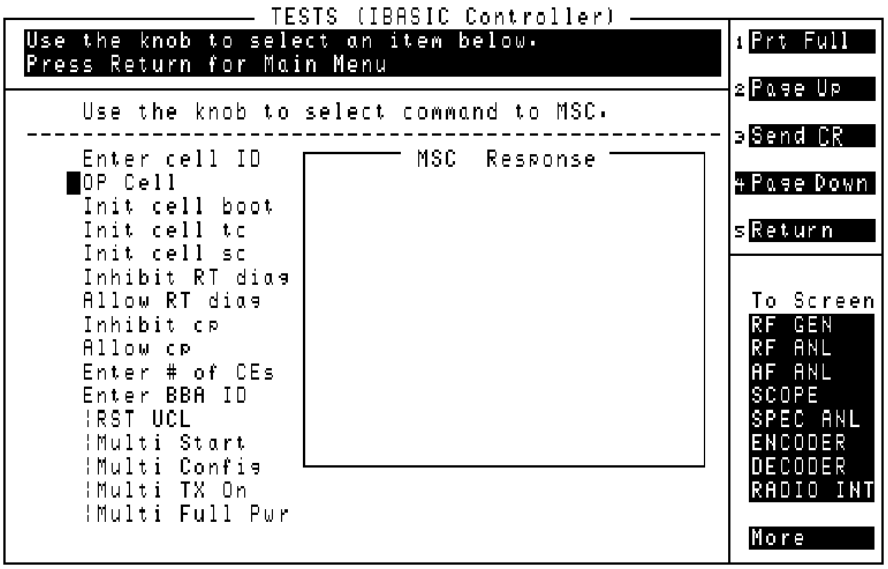


Figure 17 **Verifying site control.**

c. The radio is now ready to receive the commands from the Test System that will be sent during testing. Exit the Laptop Emulator mode by pressing **`Return`** (k5).

Use of a PC to accomplish the connection to the MSC (Laptop>Modem)

You may also perform the connection sequence described in this section using a PC connected to the Test System rather than the Laptop Emulator menu. This may be necessary when negotiating an OMP or when passcodes are used. The basic steps are:

1. Go to the Laptop Emulator menu.
2. Select the Laptop > Modem mode.
3. Perform connection to MSC using the PC via the modem.
4. Once connected, exit the Laptop > Modem mode and the Laptop Emulator menu.

For more information, **see "Laptop Emulator" on page 101**.

If You Had Problems

If you were unable to dial the MSC, log on to the system, or you encountered error messages when performing the previous steps, refer to **"Troubleshooting" on page 173** for help.

4

Performing CDMA Tests

This chapter shows detailed steps used in running each of the Software's test modes. Highlights are given for each step and cover setting up through getting test results. *You should have completed the steps in* **Chapter 2, "Installation"** *and* **Chapter 3, "Configuring the Cell Site for Tests"** *before continuing on with the tests in this chapter.*

Overview

This chapter is intended to be used once your Test System has been installed and configured and you are ready to begin the real work of performing CDMA transmitter measurements.

The chapter is divided into sections that match the test modes of the Software. Once you have decided on the test you want to run, use **table 1** to locate the start page for the steps for that test.

Table 1

Test Modes	Start of Test
"TX Power Meter"	**page 50**
"Pilot Only Test"	**page 54**
"Code Domain Tests"	**page 58**
"Spectrum Analyzer Test"	**page 62**
"Code Domain Analyzer Test"	**page 66**
"CDMA Analyzer Test"	**page 70**
"Automated BBA Test"	**page 74**
"PN Offset Search"	**page 78**
"Insertion Loss Test"	**page 82**

For More Information

For more details on the tests in this chapter:

"Parameters List and Descriptions" on page 110
"Specifications (Pass/Fail Limits) List and Descriptions" on page 113
"Laptop Emulator" on page 101

If you had problems or received error messages when running a test:

See **"Troubleshooting" on page 173**

Important: About the Test Procedures

These test procedures are intended to take you from setting up a test to getting test results. To simplify the procedures, certain settings for the Software menu entries have been assumed (for example, it is assumed that you will be using a modem to communicate with the MSC and that the Software will be set to send control commands). Also, the procedures are written based on setup steps that were performed in previous chapters.

Be aware of the following before starting tests:

- *You should have completed the installation and configuration of the Test System*. The test procedures of this chapter start where those chapters left off. Make sure you have performed all steps in the following chapters:

  ❒ **"Installation" on page 23**
  ❒ **"Configuring the Cell Site for Tests" on page 39**

- *These steps are performed by controlling the site equipment via the MSC using a modem*. The Software allows you to control the cell site equipment manually, but the steps to do so are not covered specifically in these procedures.

  See "Testing without MSC Control" on page 115 for instructions on manual control of the site equipment.

A Note About “Configured” and “Active” Site Testing

In many of the test modes in this chapter, you will make a choice before testing a Bus Interface Unit (BIU) / Baseband Combiner and Radio (BCR) / Analog Conversion Unit (ACU) combination (BBA): you will choose to test as a **Configured Cell Site** or an **Active Cell Site**.

- In the **configured** mode, the Test System will set up (via the MSC) the site with only a pilot channel and your requested number of channel elements (or as many channel elements as are available to that BBA). The sync channel and paging channels are turned off. *This is out-of-service testing of the BBA.*
- In the **active** mode, the pilot, paging, and sync channels are on. Additionally, if call processing is enabled (*in-service testing*), traffic channels can come on as well. Therefore, you must inhibit call processing if you wish to look at only paging and sync channel performance.

NOTE: When testing using the **active** mode, the Software will temporarily remove the BBA from service to allow you to make the required antenna connections. Once the connections are made, the BBA is returned to service. You must inhibit call processing prior to running tests in the **active** mode so testing will not interfere with service to mobile users. To test in a truly active mode (the BBA not removed from service even temporarily), set the **`Send Control Commands to MSC`** setting to **`NO`**.

TX Power Meter

The TX Power Meter test simulates a power meter with an analog display. This mode is useful when 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.
- A USER key to access the Laptop Emulator for cell site control.

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The specified output power of the transmitter (in Watts).
❒ The loss between the Test System and the antenna port (in dB).
❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level
  - The number of channel elements (CEs) to be configured for the test.

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to **"CDMA Tests Software Reference" on page 87** for descriptions of the specifications and parameters.

Specifications (Pass/Fail Limits):

- Output Power Adjustment Error

Parameters:

None used for this test

Select and Run the Test

Use these steps to select and run the TX Power Meter test:

a. From the Main Menu, scroll the cursor to **Selected Test** and press the knob.
b. Position the cursor in front of the label **TX Power Meter** and press the knob.
c. Update the following fields (if necessary):
- ❒ **Channel Number**
- ❒ **Specified Output Power [Watts]**
- ❒ **Loss to Test Set [dB]**

d. Enter the following cell site information, if not already applicable:
- ❒ **Cell Site Under Test**
- ❒ **BBA Under Test** (Alpha (2), Beta (4), or Gamma (6))
- ❒ **BCR Attenuation Level**

e. Scroll to **Test** and press the knob until it displays your choice of one of the following:
  a. **Active Cell Site** -
  b. **Configured Cell Site**
  - If using the **Configured Cell Site** setting, scroll to **Number of CEs to Configure**, press the knob, and enter a value using the DATA keys.

f. This completes the entries for the test. Press **Run** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

a. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.

b. The Test System will display the power meter screen (see **figure 18**).

NOTE: The meter will display power in units of Watts, unless your entry for **`Specified Output Power`** is less than 100 mW (– 20 dBm). In that case, only units of dBm are available. You may change from Watts to units of dBm by pressing **`dBm`** (k3).

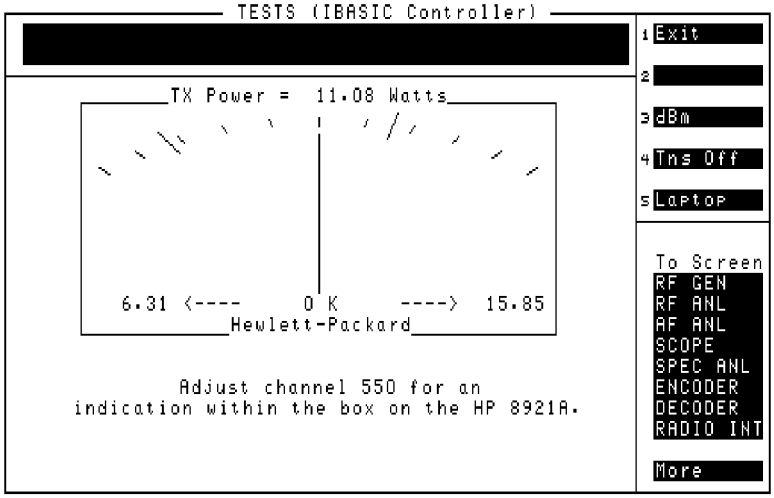


Figure 18 **Power meter display.**

Pilot Only Test

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:

- CDMA power
- Rho (modulation quality)
- Time offset
- Frequency error
- Carrier feedthrough

Prerequisites

You will need to know the following before you can test:

- ❒ The CDMA channel number of the transmitter to be tested.
- ❒ The PN offset for the BBA to be tested.
- ❒ The specified output power of the transmitter (in Watts).
- ❒ The loss between the Test System and the antenna port (in dB).
- ❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to **"Parameters List and Descriptions" on page 110** and **"Specifications (Pass/Fail Limits) List and Descriptions" on page 113** for descriptions of these parameters and specifications.

Specifications (Pass/Fail Limits):

- Output Power Error
- Rho
- Time Offset
- Frequency Error
- Carrier Feedthrough

Parameters:

- Adjust Power

Select and Run the Test

Use these steps to select and run the Pilot Only Test:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Pilot Only Test`** and press the knob.
3. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`PN Offset`**

NOTE: The Software has a utility that can help you find the PN offset if it is not known. **See "PN Offset Search" on page 78**.

   - ❒ **`Specified Output Power [Watts]`**
   - ❒ **`Loss to Test Set [dB]`**

4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. This completes the entries for the test. Press **`Run`** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

a. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **Continue** (k2) when the connection has been made.

b. The Test System will begin running pilot channel tests on the selected BBA. Test results will be shown on the display, and a failure will be indicated if a measurement falls outside your specified limits (see **figure 19**).

```
Date [MM/DD/YY] 032097     Time [HH.MM] 12.20
================================================================================
Test conditions              Measured value       Lower limit  Upper limit  P/F
================================================================================
_____________________________Site=8:Chan=550:BBA=2:PN=80_____________________________
CDMA power                       1.73 Watts           1.89         4.75      FAIL
Rho                               .9714               .9120
Time Offset                     2.88 us            -10.00        10.00
Frequency Error                  9.07 Hz            -44.00         44.00
Carrier Feedthrough            -43.4 dB                           -25.0
```

Figure 19 **Results from the Pilot Only Test sequence.**

c. When the testing is complete, the testing will pause to allow you to review the on-screen test results. Press **Continue** (k2) to go on.

d. You will see a prompt to reconnect the foam jumper to the antenna port (be sure that the transmitter is off). Press **Continue** (k2) after making the connections and the Software will return to the Main Menu.

Code Domain Tests

The Code Domain Tests mode performs a suite of CDMA transmitter tests on the selected BBA. Unlike the Pilot Only test, in this test one or more traffic channels (channel elements) are turned on.

The tests performed are:

- Time offset
- Frequency error
- Carrier feedthrough
- Code domain tests on traffic channels (if CEs are configured)
  - TX Walsh code power
  - Walsh code timing
  - Walsh code phase
  - Inactive channel Walsh code power (optional)

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The PN offset for the BBA to be tested.
❒ The following site information:
- Cell Site Under Test number
- BBA Under Test (alpha, beta, or gamma)
- BCR Attenuation Level
- The number of CEs to be configured for the test (if testing a configured site)

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. The values entered into the specifications fields are used to determine if a test passes or fails. The parameter entries affect how the test runs and how results appear Refer to the **"CDMA Tests Software Reference" on page 87** for descriptions of these specifications and parameters.

Specifications (Pass/Fail Limits):

- Time Offset
- Frequency Error
- Carrier Feedthrough
- Code Domain Timing
- Code Domain Phase
- Code Domain Floor

Parameters:

- Code Domain Power Threshold
- Print Inactive Walsh Codes

Select and Run the Test

Use these steps to select and run the Code Domain Tests:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Code Domain Tests`** and press the knob.
3. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`PN Offset`**

NOTE: The Software has a utility that can help you find the PN offset if it is not known. **See "PN Offset Search" on page 78**.

4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. Scroll to **`Test`** and press the knob until it displays your choice of one of the following:
   a. **`Active Cell Site`** -
   b. **`Configured Cell Site`**
      - If using the **`Configured Cell Site`** setting, scroll to **`Number of CEs to Configure`**, press the knob, and enter a value using the DATA keys.
6. This completes the entries for the test. Press **`Run`** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will begin running code domain tests on the selected BBA. Test results will be shown on the display, and a failure indication will be displayed if a measurement falls outside your specified limits. See **figure 20**.

   If you need to stop testing before the sequence is complete, press **`Abort`** (k5). 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 given a choice to send a "multistop" command to reset the BBAs.

```
Date [MM/DD/YY] 032097     Time [HH.MM] 12.20
================================================================================
Test conditions              Measured value       Lower limit  Upper limit  P/F
================================================================================
_____________________________Site=8:Chan=550:BBA=2:PN=80_____________________________
Time Offset                    2.88 us            -10.00        10.00
Frequency Error                 9.07 Hz            -44.00         44.00
Carrier Feedthrough           -43.4 dB                           -25.0
Active Walsh code set (10 Averages):
TX Walsh Code # 0 Power        -6.94 dB                            0.00
TX Walsh Code # 38 Power       -9.61 dB                            0.00
TX Walsh Code # 39 Power       -9.57 dB                            0.00
TX Walsh Code # 40 Power       -9.61 dB                            0.00
Walsh Code # 38 Timing         -8.27 ns            -50.00         50.00
Walsh Code # 39 Timing          5.04 ns            -50.00         50.00
Walsh Code # 40 Timing          6.58 ns            -50.00         50.00
Walsh Code # 38 Phase          -4.61 mrad          -50.00         50.00
Walsh Code # 39 Phase            .73 mrad          -50.00         50.00
Walsh Code # 40 Phase           4.69 mrad          -50.00         50.00
```

Figure 20 **Results from the Code Domain Tests sequence.**

3. When the testing is complete, you will see a prompt to reconnect the foam jumper to the antenna port (be sure that the transmitter is off). Press **`Continue`** (k2) after making the connections and the Software will return to the Main Menu.

Spectrum Analyzer Test

The Spectrum Analyzer mode configures the Test System to display spectrum sweeps in the PCS band. This mode is useful when you would like to verify the presence of a CDMA signal or to look for sources of interference.

Prerequisites

You will need to know the following before you can test:

- ❒ The CDMA channel number of the transmitter to be tested.
- ❒ The loss between the Test System and the antenna port (in dB).
- ❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level
  - The number of CEs to be configured for the test (if testing a configured site).

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

Use these steps to select and run the Spectrum Analyzer mode:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Spectrum Analyzer`** and press the knob.
3. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`Loss to Test Set [dB]`**
4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. Scroll to **`Test`** and press the knob until it displays your choice of one of the following:
   a. **`Active Cell Site`** -
   b. **`Configured Cell Site`**
      - If using the **`Configured Cell Site`** setting, scroll to **`Number of CEs to Configure`**, press the knob, and enter a value using the DATA keys.
6. This completes the entries for the test. Press **`Run`** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will set up and display the spectrum analyzer screen. See **figure 21**.

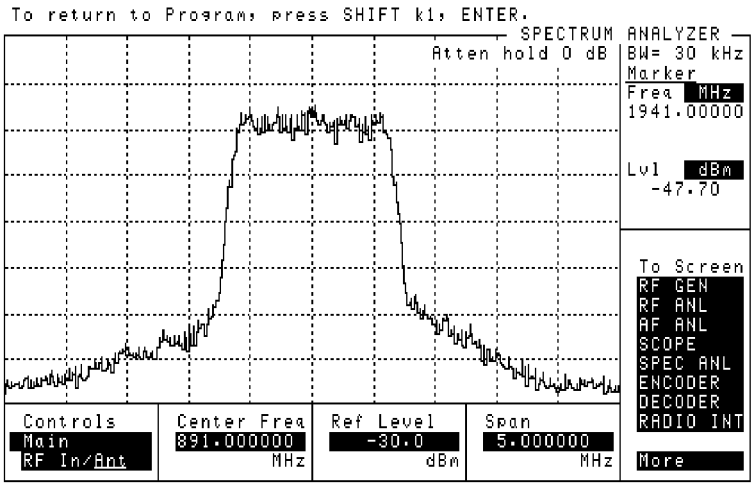


Figure 21 **The Spectrum Analyzer display.**

3. Adjust the **`Ref Level`** and **`Span`** fields to give you the best view of the transmitted signal.

   You can read the marker frequency and level in the upper right of the display. If you would like to change the marker position, use the **`Controls`** field to select **`Marker`**, then use the **`Position`** field.

NOTE: Do not make changes to the **`Center Freq`** field. If you would like to view another channel/frequency return to the Main Menu, change the channel number, and re-run the test.

4. When you are finished using the spectrum display, press and release the SHIFT key, the k1 USER key, then the ENTER key. The Software will return to the Main Menu.

Code Domain Analyzer Test

The Code Domain Analyzer Test is used to set up the Test System to make manual code domain measurements on a CDMA transmitter. This test is useful if you would like to switch between Code Domain Power, Timing, and Phase measurement screens. It is also useful for looking at changes in Code Domain readings over time. Otherwise, you would probably want to use the automated tests, referenced below.

Available measurements in the Code Domain Analyzer screen are:

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

You may also make these measurements using automated tests. **See "Code Domain Tests" on page 58** and **"Automated BBA Test" on page 74**

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The PN offset for the BBA to be tested.
❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level
  - The number of CEs to be configured for the test (if testing a configured site).

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

Use these steps to select and run the Code Domain Analyzer Test:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Code Domain Analyzer`** and press the knob.
3. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`PN Offset`**

NOTE: The Software has a utility that can help you find the PN offset if it is not known. **See "PN Offset Search" on page 78**.

4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. Scroll to **`Test`** and press the knob until it displays your choice of one of the following:
   a. **`Active Cell Site`** -
   b. **`Configured Cell Site`**
      - If using the **`Configured Cell Site`** setting, scroll to **`Number of CEs to Configure`**, press the knob, and enter a value using the DATA keys.
6. This completes the entries for the test. Press **`Run`** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will then display the Code Domain Analyzer screen (see **figure 22**). You can now make changes to the setup fields and view the code domain response for your transmitter's signal. Use the **`Measurement`** field to choose between measurements of power, phase, and timing.

NOTE: Do not make changes to the **`Tune Freq`** field, as this has been preset by the Software. Changes to other fields can also cause measurements to fail. If failures are encountered exit and re-run the test.

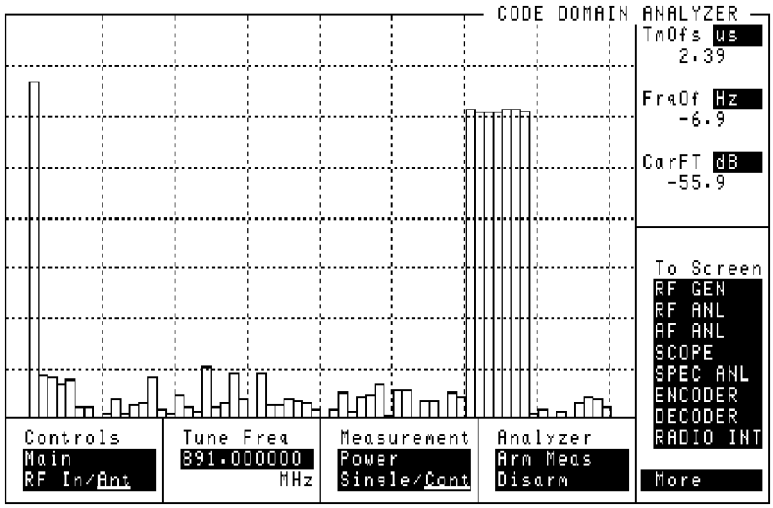


Figure 22 **The Code Domain Analyzer display.**

3. When you are finished using the Code Domain Analyzer screen, press and release the SHIFT key, then the k1 USER key, then the ENTER key. The Software will prompt you to reconnect the foam jumper to the antenna port (be sure that the transmitter is off). Make the connection and press **`Continue`** (k2) and the Software will return to the Main Menu.

CDMA Analyzer Test

The CDMA Analyzer Test sets up the Test System for manual use of the CDMA Analyzer screen. This screen can be used for manual measurements of:

- Rho (modulation quality)
- EVM
- Time offset
- Frequency error
- Carrier feedthrough

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The PN offset for the BBA to be tested.
❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level.

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

Use these steps to select and run the CDMA Analyzer Test:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`CDMA Analyzer`** and press the knob.
3. You may choose to measure EVM or rho when in the CDMA Analyzer display. If the **`Configure CDMA Analyzer for`** field does not indicate the measurement type you would like, scroll down to the field and press the knob. This will change the entry to the alternate choice.
4. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`PN Offset`**

NOTE: The Software has a utility that can help you find the PN offset if it is not known. **See "PN Offset Search" on page 78**.

5. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
6. This completes the entries for the test. Press **`Run`** (k1) to start the test.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will then display the CDMA Analyzer screen (see **figure 23**). You can now make changes to the setup fields and view the CDMA performance for your transmitter's signal.

NOTE: Do not make changes to the **`Tune Freq`** field, as this has been preset by the Software. Changes to other fields can also cause measurements to fail. If failures are encountered exit and re-run the test.

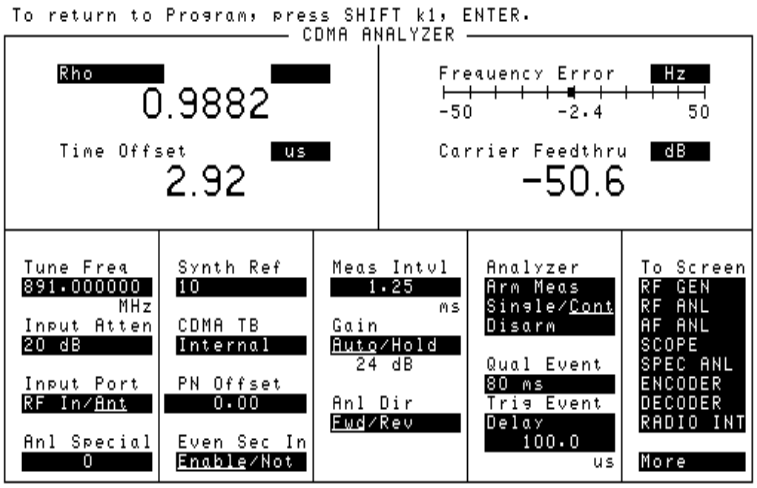


Figure 23 **The CDMA Analyzer display.**

3. When you are finished using the CDMA Analyzer screen, press and release the SHIFT key, then the k1 USER key, then the ENTER key. The Software will prompt you to reconnect the foam jumper to the antenna port (be sure that the transmitter is off). Make the connection and press **`Continue`** (k2) and the Software will return to the Main Menu.

Automated BBA Test

The Automated BBA Test performs a suite of CDMA transmitter tests on the selected BBA. *This test requires that the Test System send control commands to the MSC*. The Automated BBA Test is done first in the configured mode and then in the active mode (to test pilot and paging channels).

The test sequence includes the following tests:

- CDMA Power (pilot only)
- Pilot Channel Tests
  - Rho
  - Time Offset
  - Frequency Error
  - Carrier Feedthrough
- Code Domain Tests on traffic channels (if CEs are configured)
  - TX Walsh Code Power
  - Walsh Code Timing
  - Walsh Code Phase
  - Inactive Channel Walsh Code Power (optional)
- Code Domain Tests on pilot and paging channels (active mode)

NOTE: Because the last tests are done in the **active** mode, traffic channels may come up if you have not first inhibited call processing before running the test.

Prerequisites

You will need to know the following before you can test:

- ❒ The CDMA channel number of the transmitter to be tested.
- ❒ The PN offset for the BBA to be tested.
- ❒ The specified output power of the transmitter (in Watts).
- ❒ The loss between the Test System and the antenna port (in dB).
- ❒ The following site information:
  - Cell Site Under Test number
  - BBA Under Test (alpha, beta, or gamma)
  - BCR Attenuation Level
  - The number of CEs to be configured for the test.

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. The values entered into the specifications fields are used to determine if a test passes or fails. The parameter entries affect how the test runs and how results appear Refer to the **"CDMA Tests Software Reference" on page 87** for descriptions of these specifications and parameters.

Specifications (Pass/Fail Limits):

- Output Power Error
- Rho
- Time Offset
- Frequency Error
- Carrier Feedthrough
- Code Domain Timing
- Code Domain Phase
- Code Domain Floor

Parameters:

- Adjust Power
- Code Domain Power Threshold
- Print Inactive Walsh Codes

Select and Run the Test

Use these steps to select and run the Automated BBA Test:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Automated BBA Test`** and press the knob.
3. For the BBA being tested, update the following fields (if necessary):
   - ❒ **`Channel Number`**
   - ❒ **`PN Offset`**

NOTE: The Software has a utility that can help you find the PN offset if it is not known. **See "PN Offset Search" on page 78**.

   - ❒ **`Specified Output Power [Watts]`**
   - ❒ **`Loss to Test Set [dB]`**

4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. Scroll to **`Number of CEs to Configure`** and press the knob. Use the DATA keys to enter the number of channel elements to be tested in the current BBA.

NOTE: If desired, you can enter a number greater than the actual number of channel elements in the BBA. The site will set all available channel elements on for the test.

6. This completes the entries for the test. Press **`Run`** (k1) to start the test sequence.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will begin running tests on the active BBA. Test results will be shown on the display, and a failure indication will be displayed if a measurement falls outside your specified limits. See **figure 24**.

   If you need to stop testing before the sequence is complete, press **`Abort`** (k5). 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 given a choice to send a "multistop" command to reset the BBAs.

```
Date [MM/DD/YY] 032097     Time [HH.MM] 12.20
================================================================================
Test conditions              Measured value       Lower limit  Upper limit  P/F
================================================================================
_____________________________Site=8:Chan=550:BBA=2:PN=80_____________________________
CDMA power                        2.73 Watts           1.89         4.75
Rho                                .9714               .9120
Time Offset                      2.88 us            -10.00        10.00
Frequency Error                   9.07 Hz            -44.00        44.00
Carrier Feedthrough             -43.4 dB                           -25.0
Active Walsh code set (10 Averages):
TX Walsh Code # 0 Power         -6.94 dB                             0.00
TX Walsh Code # 38 Power        -9.61 dB                             0.00
TX Walsh Code # 39 Power        -9.57 dB                             0.00
TX Walsh Code # 40 Power        -9.61 dB                             0.00
Walsh Code # 38 Timing          -8.27 ns             -50.00         50.00
Walsh Code # 39 Timing           5.04 ns             -50.00         50.00
Walsh Code # 40 Timing           6.58 ns             -50.00         50.00
Walsh Code # 38 Phase           -4.61 mrad           -50.00         50.00
Walsh Code # 39 Phase             .73 mrad           -50.00         50.00
Walsh Code # 40 Phase            4.69 mrad           -50.00         50.00
```

Figure 24 **Results from the Automated BBA Test sequence.**

3. When the testing is complete, you will see a prompt to reconnect the foam jumper to the antenna port (be sure that the transmitter is off). Press **`Continue`** (k2) after making the connections and the Software will return to the Main Menu.

PN Offset Search

The PN Offset Search is a utility that can be used when you are testing a BBA and do not know the PN Offset value. The utility has the Test System tune to the CDMA channel and "search" to find the valid PN Offset. The resulting PN offset value is then automatically entered into the **`PN Offset`** field of the Main Menu.

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The following site information:
- Cell Site Under Test number
- BBA Under Test (alpha, beta, or gamma)
- BCR Attenuation Level.

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

Use these steps to select and run the PN Offset Search:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`PN Offset Search`** and press the knob.
3. For the BBA being tested, update the following field (if necessary):
   - ❒ **`Channel Number`**
4. Enter the following cell site information, if not already applicable:
   - ❒ **`Cell Site Under Test`**
   - ❒ **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - ❒ **`BCR Attenuation Level`**
5. This completes the entries for the test. Press **`Run`** (k1) to start the search.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will begin searching for the BBA'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.

   The PN offset returned by the search will be automatically entered into the **`PN Offset`** field for use in subsequent testing.

   If you need to stop testing before the sequence is complete, press **`Abort`** (k5). 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 given a choice to send a "multistop" command to reset the BBAs.

NOTE: There may be a delay of up to 60 seconds after pressing the Abort key before you will be returned to the Main Menu.

3. Once the PN offset value is displayed, you will see a prompt to continue. Press the **`Continue`** (k2) USER key.
4. You will see a prompt to reconnect the foam jumper to the antenna port. Make the connection (be sure that the transmitter is off) and press **`Continue`** (k2) and the Software will return to the Main Menu.

Insertion Loss Test

The Insertion Loss Test is a utility that can be used to measure the loss in RF cables. This test uses a site CDMA channel as a source and the Test System as an analyzer to measure relative loss through the cable.

Prerequisites

You will need to know the following before you can test:

❒ The CDMA channel number of the transmitter to be tested.
❒ The following site information:
- Cell Site Under Test number
- BBA Under Test (alpha, beta, or gamma)
- BCR Attenuation Level.

CAUTION: Before proceeding with tests, ensure that the power level into the RF IN/OUT port of the PCS Interface does not exceed 1 Watt (+30 dBm). You may need external attenuators to reduce the level below this maximum input limit. Exceeding this power level may cause permanent damage to the PCS Interface.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- *None used for this test*

Parameters:

- *None used for this test*

Select and Run the Test

Use these steps to select and run the Insertion Loss Test:

1. From the Main Menu, position the cursor next to **`Selected Test`** and press the knob.
2. Scroll down to **`Insertion Loss Test`** and press the knob.
3. Update the following field (if necessary):
   - **`Channel Number`**
4. Enter the following cell site information, if not already applicable:
   - **`Cell Site Under Test`**
   - **`BBA Under Test`** (Alpha (2), Beta (4), or Gamma (6))
   - **`BCR Attenuation Level`**
5. This completes the entries for the test. Press **`Run`** (k1) to start the search.

Review the Results

NOTE: This procedure includes steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test System. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off (check the green ACT LEDs on the ACU and BCR modules; *they should be off*) by the MSC (or by switch personnel if not using a modem).

1. At the start of the test sequence, you will see a connection diagram. You will be prompted to make a connection between the RF IN/OUT port of the PCS Interface and the antenna indicated on the on-screen diagram (alpha, beta, or gamma). Press **`Continue`** (k2) when the connection has been made.
2. The Test System will turn on the transmitter and make a reference measurement. You will then see a prompt to add in the cable to be tested. Add the cable you want to measure, as shown in the diagram, and press **`Continue`** (k2).

   If you need to stop testing before the sequence is complete, press **`Abort`** (k5). 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 given a choice to send a "multistop" command to reset the BBAs.
3. After taking the measurement, the loss will be displayed on the screen (in units of dB). You can then choose to repeat the measurement (press **`Yes`** (k1)) or exit the insertion loss test (press **`No`** (k2)).
4. On exiting the test, you will see a prompt to reconnect the foam jumper to the antenna port. Make the connection (be sure that the transmitter is off) and press **`Continue`** (k2) and the Software will return to the Main Menu.

5

CDMA Tests Software Reference

This chapter describes detailed operation of the Software that was not covered in the **"Performing CDMA Tests" chapter**. 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.

ACU – Analog Conversion Unit
AIF – Antenna Interface Frame
AWGN – Added White Gaussian Noise
BBA – BIU/BCR/ACU combination
BCR – Baseband Combiner and Radio
BIU – Bus Interface Unit
CAT – CATalog
CCC – CDMA Cluster Controller
CCU – CDMA Channel Unit
CDMA – Code Division Multiple Access
CE – Channel Element
CS – Cell Site
CR – Carriage Return
CRT – Cathode Ray Tube
CRTU – CDMA Radio Test Unit
dB – deciBel
dBm – deciBels with respect to a milliwatt
Eb/No – ratio of energy-per-bit to noise spectral density
ERP – Effective Radiated Power
EVM – Error Vector Magnitude
MSC – Mobile Switching Center (also, MTSO)
OMP – Operations Management Platform
OOS – Out-Of-Service
OP – Output Process
PC – Personal Computer
PCS – Personal Communications Services
PN – pseudonoise
RF – Radio Frequency
TX – transmitter
UCL – UnConditionaL

Connections

Refer to the following sections for details on making connections:

Test System Connections to the Base Station

Figure 25 shows the most typical configuration for connecting the reference timebase and even-second clock between the base station and the Test System.

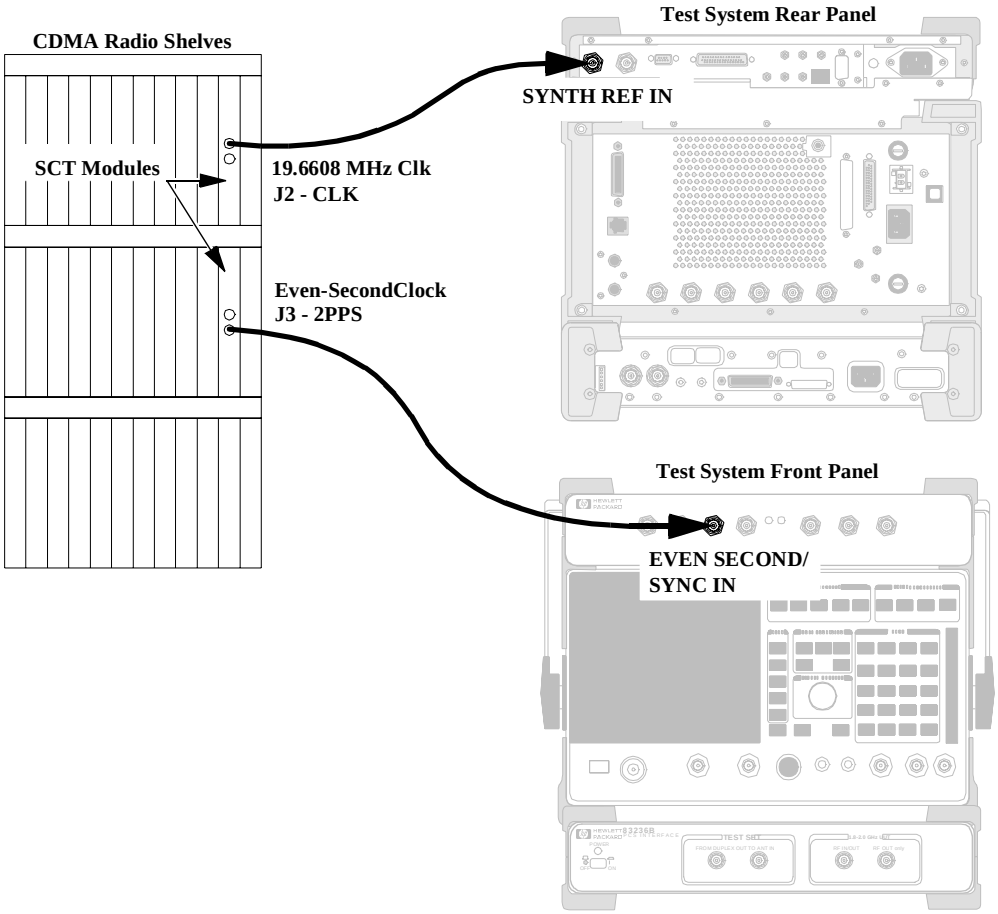


Figure 25 **Standard connections to base station equipment.**

Figure 26 shows an alternative way of connecting the reference timebase and even-second clock between the base station and the Test System.

NOTE: Because this configuration uses the internal timebase of the Cell Site Test Set as the primary reference for measurements, you may experience inaccuracies when measuring frequency error on your transmitter.

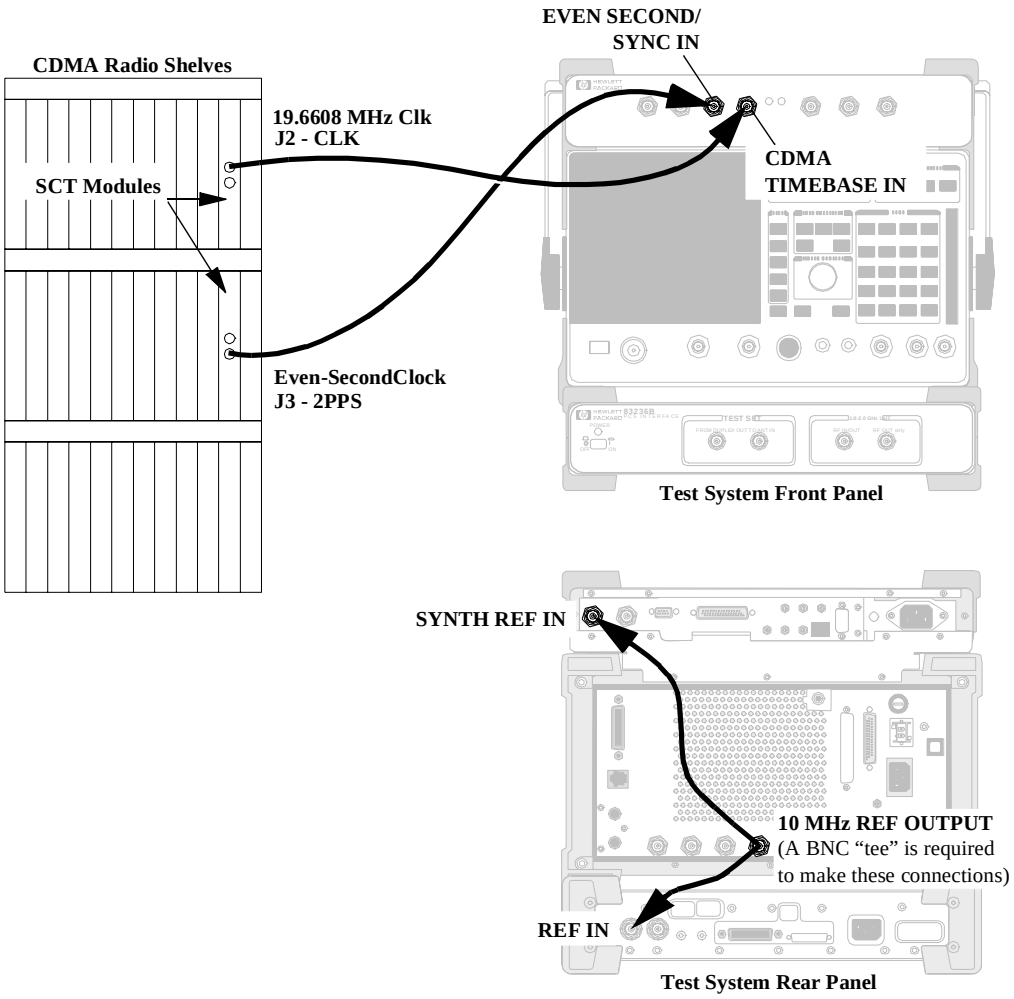


Figure 26 **An alternative using the CDMA TIMEBASE IN port.**

Modem Connections

Figure 27 illustrates the connections used when adding a modem to the Test System and (optionally) how to add a personal computer to the second serial port using a splitter.

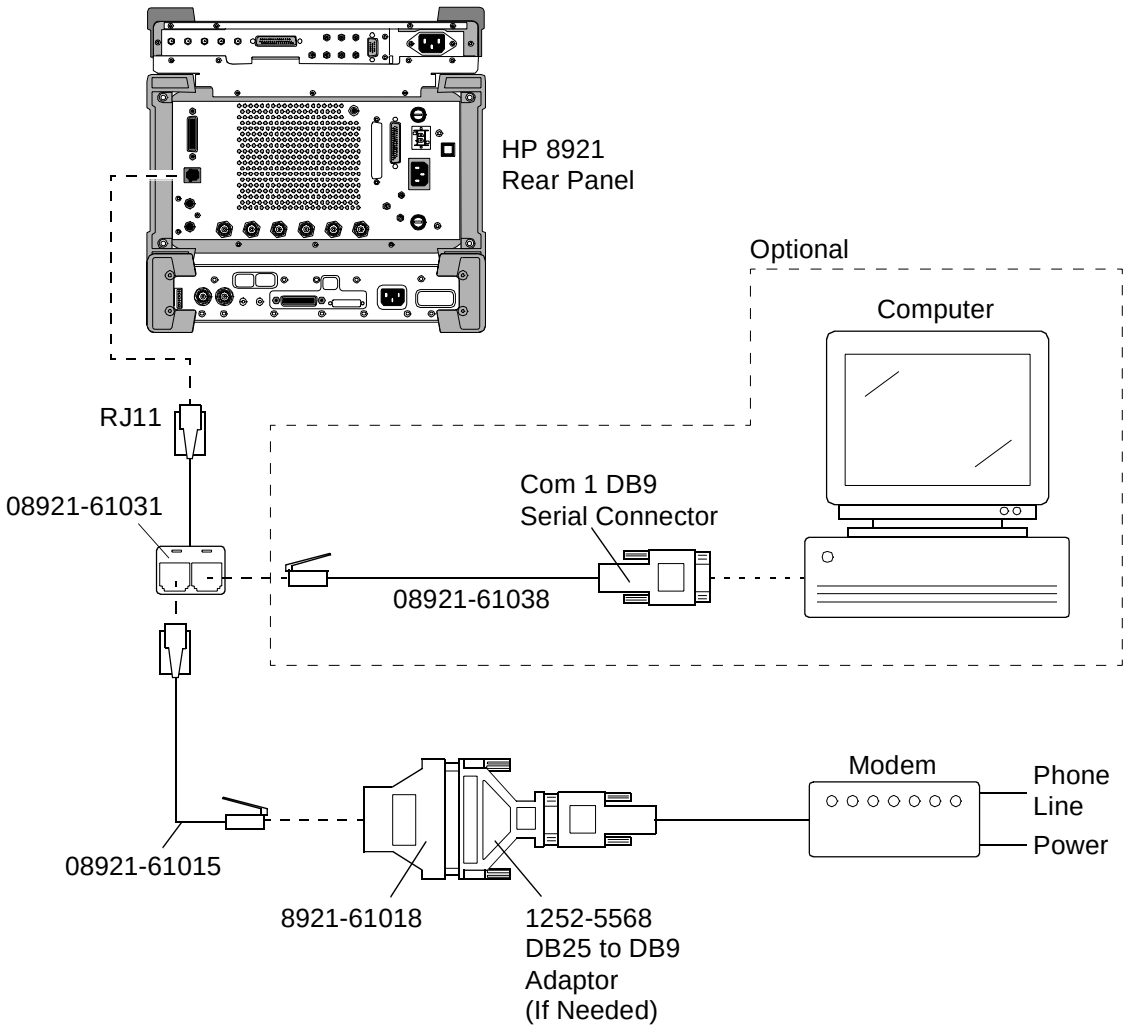


Figure 27 **Connections for the HP 8921A, Modem, and PC**

Connector Kit

A cable kit for use with the Software can be used to supply the required parts to connect the Test System to the base station equipment and modem. The HP 83202A Option 083 Cable Accessory Kit supplies serial cables, RF cables and adapters needed to connect the Test System for testing. Refer to **table 2** for a list of parts included with the HP 83202A Option 083 Cable Accessory Kit.

NOTE: The HP 83202A Option 083 Cable Accessory Kit is *optional*, and is *not included* with the HP 8921A, the HP 83236A, or the HP 11807B Option 083 Software. *It must be ordered separately*.

Table 2 HP 83202A Option 083 Cable Accessory Kit Contents.

Part	Part Number	Quantity	Use
Adapter, N(m) to BNC(f)	1250-0780	1	Adapts PCS Interface RF IN/OUT to BNC.
Adapter, SMA(m) to BNC(f)	1250-1200	2	Connects to the base station's TX Test Port.
Adapter, DB25(f) to DB9(m)	1252-5568	1	Serial cable (modem) adapter.
Cable assembly, N(m) to N(m), 10 ft.	08921-61010	1	Connects the base station's TX Antenna Ports to the Test System's RF IN/OUT port.
Cable assembly, BNC(m) to BNC(m), 10 ft.	08921-61011	2	Connects the base station's TX Test Port to the Test System's RF IN/OUT port.
Cable assembly, RJ11(m) to RJ11(m), 25 ft.	08921-61015	2	Serial (modem) cable.
Adapter, RJ11(f) to DB25(m)	08921-61018	1	Serial (modem) adapter.
Cable assembly, RJ11(m) to dual RJ11(f)	08921-61031	1	Splits the serial path to allow connection to modem and PC.
Cable assembly, RJ11(m) to DB9(f), 7 ft.	08921-61038	1	Connects the Test System's serial path to a PC or printer.

Installing the Cellular Adapter

If your Cellular Adapter is not attached to your Cell Site Test Set:

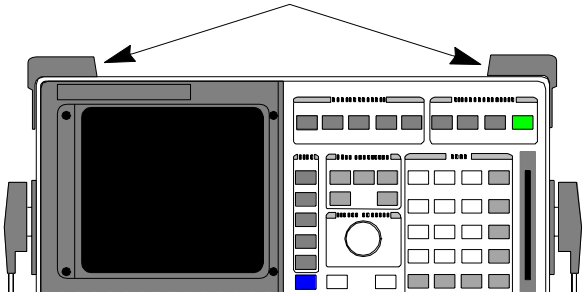
Many HP 8921A Cell Site Test Sets are ordered and shipped with the Cellular Adapter already attached and connected. It is possible, however, to add the adapter at a later time.

This section of the manual explains how to physically attach and then configure a Cellular Adapter onto a Cell Site Test Set when the adapter is added at a later time.

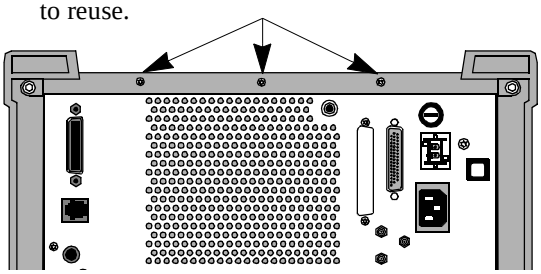
Step 1: Attach the Cellular Adapter.

Follow the steps on the following page to attach the Cellular Adapter to the Cell Site Test Set.

a Use a T-10 Torx Screwdriver to remove the top front bumpers from the Test Set. Keep the screws for attaching the top instrument.

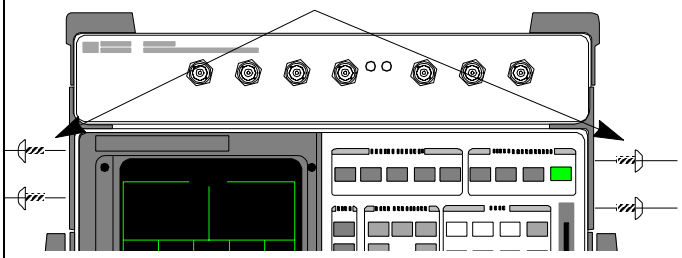


b Use a T-10 Torx Screwdriver to remove the three screws along the top of the rear panel. Discard these screws; they are not long enough to reuse.

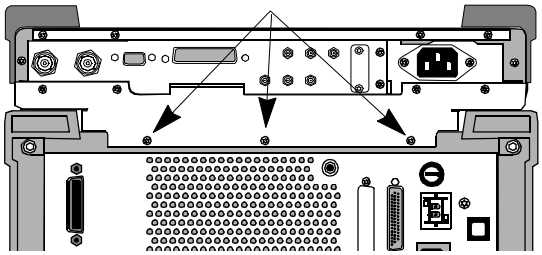


c Place the instrument on top of the Test Set as shown below. Use the screws you removed in step 1 to attach the instruments together at the front. Use the three new screws (T10, 15 cm) to attach the instruments at the rear.

Attach at the Front

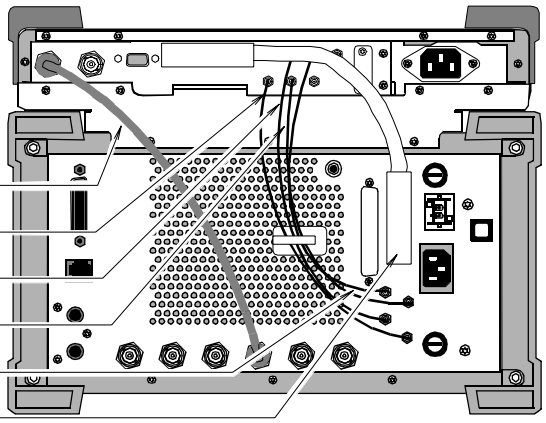


Attach at the Rear



d Peel and stick the cable tie, then connect the cables in the following order...

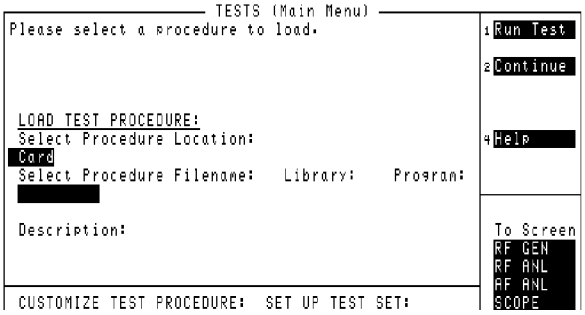
	Cellular Adapter	Cable	Test Set
1	SYNTH REF IN	BNC to BNC	10 MHz OUT
2	CW RF IN	SMC to SMC	CW RF OUT
3	114.3 MHz IF IN	SMC to SMC	114.3 MHz OUT
4	IQ RF OUT	SMC to SMC	IQ RF IN
5	AUX DSP In	SMC to SMC	DET OUT
6	CONTROL I/O	45 pin bus	CONTROL I/O



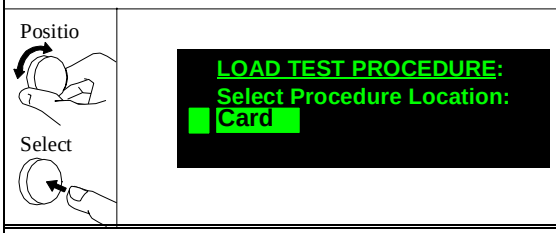
Step 2: Perform a calibration on the Cellular Adapter

Follow the steps on the next page to run a program that will perform a calibration on the Cellular Adapter.

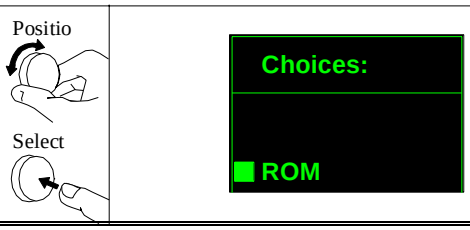
a Press the TESTS key to display the TESTS (Main Menu) screen.



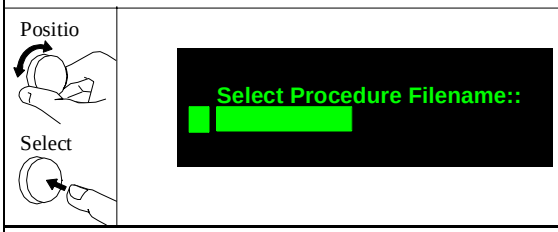
b Position cursor at **Select Procedure Location:** and select it.



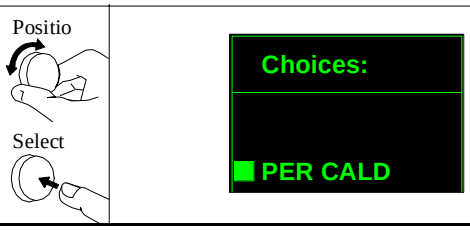
c Position cursor at **ROM** and select it.



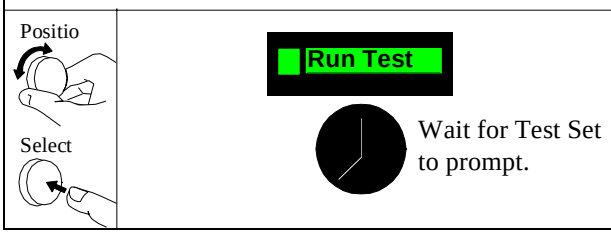
d Position cursor at **Select Procedure Filename:** and select it.



e Position cursor at **PER_CALD** and select it.



f Position cursor at **Run Test** and select it.



Wait for Test Set to prompt.

g Follow the on-screen instructions to complete & exit the calibration process.

Demo (Demonstration) Mode

A good way to get started with the 11807B Option 083 Software is to run it in the "demo mode". The demo mode allows you to step through the menus and simulate testing without the need for a modem, a connection to the switch, or even a base station to test.

In the demo mode, the system will not send commands to the MSC. Other than that, it will perform very much the same as if actually testing a base station. In the demo mode, the Software will still expect frequency plan (for full cell site test) and calibration files. When it gets to the point that 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.

Entering the Demo Mode

The "switch" used to turn the demo mode on and off is a parameter in the Test Parameters menu. These are the steps to set the demo mode to "on":

1. If the Software is running (displaying an asterisk (*) in the upper right of the display), use the **`Exit`** (k5) key of the Main Menu to stop it.
2. Press the TESTS key to get to the TESTS (Main Menu) screen.
3. Scroll to **`Parm:Test Parameters`** and press the knob.
4. Once in the **`TESTS (Test Parameters)`** menu, press the knob again to allow scrolling.
5. Scroll down to the parameter on the list titled **`ZZZZ Test Demo Mode`** and press the knob again to leave the scrolling function.
6. Turn the knob to place the cursor on the field below the parameter name.
7. Using the DATA keys, press 1 (one) and ENTER.
8. That is all it takes to set it up. The demo mode will be on the next time the Software is run. If you want to re-run the Software now, press the TESTS key and then **`Run Test`** (k1). You will return to the Software's Main Menu in the demo mode.

Exiting 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 enter a value of 0 for the demo mode setting:

1. If the Software is running (displaying an asterisk (*) in the upper right of the display), use the **Exit** (k5) key of the Main Menu to stop it.
2. Press the TESTS key to get to the TESTS (Main Menu) screen.
3. Scroll to **Parm:Test Parameters** and press the knob.
4. Once in the **TESTS (Test Parameters)** menu, press the knob again to allow scrolling.
5. Scroll down to the last parameter on the list, titled **ZZZZ Test Demo Mode** and press the knob again to leave the scrolling function.
6. Turn the knob to place the cursor on the field below the parameter name.
7. Using the DATA keys, press 0 (zero) and ENTER.
8. The demo mode is now off and *will not be in effect the next time the Software is run.* If you want to re-run the Software now, press the TESTS key and then **Run Test** (k1). You will return to the Main Menu in the normal operating mode.

Laptop Emulator

Overview

The Test Set has the ability to send control commands to the switch, via a modem, to control the radios at the cell site. This enables the Test System to perform tests in the shortest amount of time and with little operator intervention. The menu used for site control via the MSC is called the Laptop Emulator. This section deals with detailed use of the Laptop Emulator menu.

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 MSC. The Laptop Emulator mode can be used instead of (or in conjunction with) a separate laptop PC.

Setup and Basic Use of the Laptop Emulator

This section outlines the steps required to configure the Test System for use of the Laptop Emulator menu. These are the steps used in Laptop Emulator use (only steps 2 and 3 are covered in this chapter; **see "Installation" on page 23** for modem setup steps):

1. Set up the modem for communication to the MSC.
   a. Make the serial communications connections.
   b. Configure the serial ports.
   c. Initialize the modem.
2. Dial and log on to MSC.
3. Send commands to the MSC.

Dialling and Logging on to the MSC

Once the modem is connected and configured, you should be able to dial up the MSC and log on to perform maintenance.

a. From the Main Menu, scroll to **`Laptop Emulator`** and press the knob (see the resulting menu in **figure 28**).

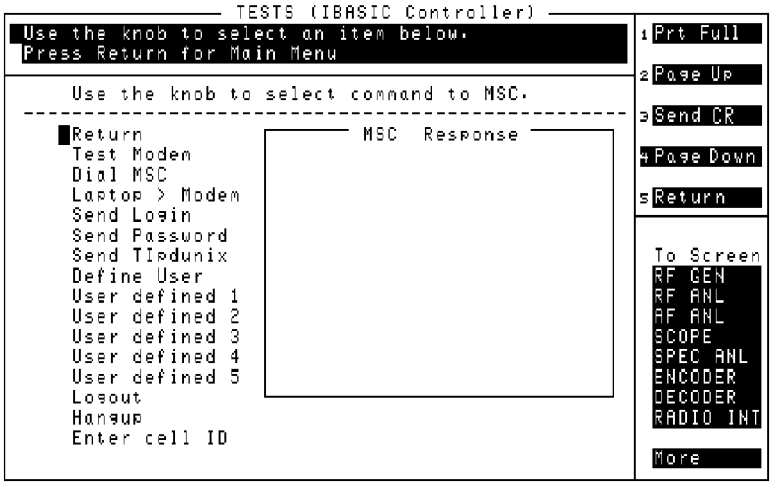


Figure 28 **Selecting the Laptop Emulator.**

b. Make sure that your modem is connected and turned on. You should have already performed steps to set the modem up for use with the Test Set. If not, return to **"Installation" on page 23** and follow the steps outlined in that chapter.

c. Scroll down to **`Test Modem`** and press the knob to check basic modem operation. The response “OK” should appear in the MSC Response box.

d. Now, dial up the Mobile Switching Center (MSC): Scroll down to **`Dial MSC`** and press the knob. You will be prompted to enter the phone number for the switch; enter it using the DATA keys and press the knob (**`Done`**) (if you have entered the number before, it will appear at the top of the screen and you can simply select **`Done`**). You should hear the modem activate and send the DTMF tones. You should then hear the ring at the MSC end, followed by the “connect sound.”

e. You now need to get to the login prompt. This may require that you send a few carriage returns (CR). Press the **Send CR** (k3) user key once or twice to get the login prompt to appear in the **MSC Response** box.

NOTE: If you use passcodes to access the MSC or must negotiate an OMP, you may have to use the Laptop > Modem mode to log on. **See "Using the Laptop > Modem Mode" on page 105**

f. When prompted by the MSC for a login, select **Send Login**. Use the knob to enter your Login from the characters in the **Choices** menu, then select **Done**. If you have entered your Login previously, it will appear at the top of the screen and you can simply select **Done**.

g. When prompted by the MSC for a password, select **Send Password**. Use the knob to enter your Password from the characters in the **Choices** menu and select **Done** (if you have entered your Password previously, it will appear at the top of the screen and you can simply select **Done**).

h. Wait for the prompt from the MSC (typically a "$" or "#" or a few characters of text) then select **Send TIpdunix** to enter the maintenance mode. You should receive a response of TERMINAL IN SERVICE. **Figure 29** shows the typical appearance of the **MSC Response** box after a connection sequence.

```
login: tech23
Password:

Welcome to the LUCENT Autoplex System 1000

Current ECP Generic: APX-1000 L8.0
Current IMS Generic: Release 4.1.3.D
Current 5E-DCS Generic: DCS 1 - 5E10
Current Definity DCS Generic: DCS 2 - 8.0

Current OMP Generic 8.0

Current Series I Cell Site Generic:  APXC04.12
Current Series II Cell Site Generic: APXB05.32
Current Series II/CDMA Cell Site Generic: b03Y07.10


You are logged into ECP-1

Good afternoon


Spokane, Wa.   APX-1000 APX8.0      ttyx     TTY 21
```

Figure 29 **Typical Laptop Emulator display after the connection to the MSC.**

i. You can now verify that you can control the site via the MSC. Scroll to **`Enter cell ID`**. Select it and enter the number for the cell site to be tested.

NOTE: In the **`Laptop Emulator`** menu, the use of the **`Page Up`** (k2) and **`Page Down`** (k4) user keys can be a time-saver.

j. Scroll to and select **`OP Cell`** (see **figure 30**). You should see a response to the OP Cell command in the MSC Response box on the display.

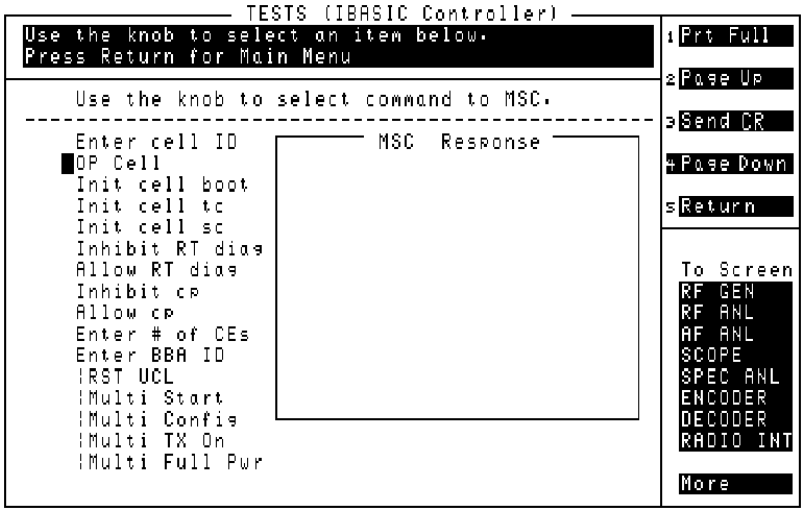


Figure 30 **Verifying site control.**

k. The site should now be ready to receive the commands from the Test System that will be sent during testing. Scroll to the command you wish to use next and press the knob to select it. Commands that require entry will present the Choices menu for you to spell out the entries. Exit the Laptop Emulator mode by pressing **`Return`** (k5).

Using the Laptop > Modem Mode

If you have connected a PC to the serial port of the Test System (**see "Connections for the HP 8921A, Modem, and PC" on page 93**) you can use the Laptop > Modem mode to bypass Test System communications to the MSC.

This may be necessary when you are negotiating an OMP in logging on to the switch. It also gives you more freedom in sending site control commands; you can send any “type-in” command from the keyboard. You are not limited to the built-in commands of the Laptop Emulator menu.

These are the steps to accessing and using the Laptop > Modem mode:

1. First, make sure that you have connected the modem and PC to the serial ports as shown in **figure 27 on page 93**.
2. Prepare your PC for use by starting a communications software application.
3. From the Software’s Main Menu, scroll to **`Laptop Emulator`** and press the knob.
4. Scroll to **`Laptop > Modem`** and press the knob.
5. You can now type commands on the PC. The commands are passed, via the Test System, to the modem and then the MSC. Responses from the modem and MSC will appear on your PC monitor, not the Test System display.

NOTE: While using the Laptop > Modem mode, you can no longer choose and send commands from the Laptop Emulator menu. You must first exit the Laptop > Modem mode by pressing **`EXIT L>M`** (k3).

6. When finished using the PC to communicate, press **`EXIT L > M`** (k3) to return to the Laptop Emulator menu.
7. If you would like to return to the Main Menu, press **`Return`** (k5).

Creating User-Defined Commands

Why use the user-defined commands?

The Laptop Emulator provides most common commands needed to control the site and the radios. In some cases, however, you may want to use commands that are not available in the Laptop Emulator screen.

For one-time use, you can use the **Enter Command** selection in the menu and type in the command directly. If you need to use the command more than once, 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.

Defining your command set:

1. Insert an initialized SRAM card into the Test Set's front-panel MEMORY CARD slot. Make sure that the switch on the card is *not* in the "SAFE" position.
2. From the Main Menu, scroll to and select **Laptop Emulator**.
3. Scroll down to **Define User** and select it by pressing the knob.
4. Press the **File Name** (k1) user key. There are five file areas available for storage of commands. One of them, **Modem**, is predefined and cannot be changed. You may create your own commands and save them to the remaining files (**uKEYS**, **uKEYS2**, **uKEYS3**, and **uKEYS4**).
5. Select from one of the uKEYS files by pressing USER key k1 through k4.
6. Scroll to **User Title 1** and press the knob.
7. The title you enter will show up on the Laptop Emulator menu as one of the choices. Use the knob to select from the characters in the **Choices** menu to create a recognizable title for your command. When done spelling the name, scroll up to **Done** and press the knob.
8. Scroll to **User Action 1 to MSC** and press the knob.
9. Now enter the corresponding command string to be sent to the MSC exactly as it would appear if you were using your PC to type and send the command. Again, you will use the **Choices** menu to select the characters. 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** and press the knob. Your text will appear next to **User Action 1 to MSC**.
10. If you have other commands to define, repeat step 6. through step 9. for User Actions 2 through 5.
11. Once the commands have been entered, store the entries by scrolling to **Store Information to Card** and pressing the knob.
12. Return to the Laptop Emulator menu by pressing **Return** (k5). Command strings that you entered will appear immediately after the **Define User** selection.
13. To exit the Laptop Emulator mode, press **Return** (k5).

Loading and Using your User-Defined Commands:

1. Insert the SRAM card you stored the file on into the Test Set's front-panel MEMORY CARD slot.
2. From the Main Menu, scroll to **`Laptop Emulator`** and press the knob.
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. Press **`File Name`** (k1).
   c. Press a USER key (k1 through k4) corresponding to the file name to load.
   d. Scroll to **`Load Information from Card`** and press the knob.
   e. The definitions for your user-defined commands should appear in the list on the display. Press **`Return`** (k5) to go back to the Laptop Emulator.
4. Scroll down to the user-defined command area (below the **`Define User`** choice in the Laptop Emulator) to the command you wish to use. With the cursor in front of the command, and *before* pressing the knob, you can see the command characters to be sent at the top of the display.
5. Press the knob to send the command to the MSC.
6. Select and send other commands, as needed, in the Laptop Emulator.
7. To exit the Laptop Emulator, press **`Return`** (k5).

Purging User-Defined Command Files:

If you find that you have user-defined command files on a memory card that you no longer use and would like to remove them, follow these steps:

1. Insert the SRAM card you stored the files on into the Test Set's front-panel MEMORY CARD slot.
2. From the Main Menu, scroll to **`Laptop Emulator`** and press the knob.
3. Scroll to **`Define User`** and press the knob.
4. Press **`File Name`** (k1).
5. Press a USER key (k1 through k4) corresponding to the file that you plan to delete. The name will appear under the **`Purge file:`** heading.
6. Scroll to the **`Purge file:`** line and press the knob. The file will be deleted from the memory card.
7. Press **`Return`** (k5) to leave the user-defined command screen.
8. To exit the Laptop Emulator, press **`Return`** (k5).

Command Summary

Table 3 lists the commands available in the Laptop Emulator menu and the command syntax that is sent to the MSC. The commands to the MSC are the same as those sent if you are using a laptop PC to control the site.

NOTE: In the table, CELL *x* indicates the current Cell Site number and BBA *y* the current BBA number.

Table 3 Laptop Emulator Commands

Command	Command Syntax Sent to MSC
Return	*exits the Laptop Emulator menu*
Test Modem	AT
Dial MSC	ATDT *phone number entered*
Laptop>Modem	*permits communication with the MSC through the test set* (**see "Using the Laptop > Modem Mode" on page 105***)*
Send Login	sends *login*
Send Password	sends *password*
Send TIpdunix	TIpdunix
Define User	*allows user to customize command* (**see "Creating User-Defined Commands" on page 106**)
User Defined 1	*sends user defined customized command 1*
User Defined 2	*sends user defined customized command 2*
User Defined 3	*sends user defined customized command 3*
User Defined 4	*sends user defined customized command 4*
User Defined 5	*sends user defined customized command 5*
Logout	Two Control - D's
Hangup	+ + +
Enter Cell ID	*stores cell ID info for recall later*
Op Cell	OP:CELL *x*
Init Cell Boot	INIT:CELL *x*:BOOT

Table 3 Laptop Emulator Commands

Command	Command Syntax Sent to MSC
Init cell tc	INIT:CELL *x*:TC
Init cell sc	INIT:CELL *x*:SC
Inhibit RT diag	INH:CELL *x*,RTDIAG
Allow RT diag	ALW:CELL *x*,RTDIAG
Inhibit cp	INH:CELL *x*,CP
Allow cp	ALW:CELL *x*,CP
Enter # of CEs	*displays the number of CEs to test at the top of the display*
Enter BBA ID	*stores radio ID info for recall later*
|RST UCL	RST:CELL *x*,BBA *y*;UCL
|Multi Start	CFR:CELL *x*,MULTI;START
|Multi Config	CFR:CELL *x*, MULTI BBA *y*;CONFIG 150
|Multi TX On	CFR:CELL *x*, MULTI BBA *y*;XMITC 300
|Multi Full Pwr	CFR:CELL *x*, MULTI BBA *y*;CDMAPC 715
||Multi Add CEs	CFR:CELL *x*, MULTI BBA *y*;ADDCE
||Multi Del CEs	CFR:CELL *x*, MULTI BBA *y*;DELCE
|Multi TX Off	CFR:CELL *x*, MULTI BBA *y*;XMITC 301
|Multi Stop	CFR:CELL *x*,MULTI;MSTOP
Enter Command	*allows user to enter command (use quotes if comma is used)*

Parameters List and Descriptions

The Software uses your entries in the Test Parameters screen to customize testing and configure the modem. An additional parameter allows you to run the Software in a demo mode, which is useful for familiarization with the operation of the Test Set (**see "Demo (Demonstration) Mode" on page 99**). This section lists the parameters and describes their use; for instructions on changing the parameters and saving your changes on a memory card, **see "How to "Save/Delete Procedure"" on page 130**.

Parameter Names and Use

1. **`MSC Baud Rate [valid test set range]`**

   Enter the baud rate used by your switch when communicating via a modem. Typical entries for this parameter are 2400 or 9600 baud. This number can be entered directly using the DATA keys.

2. **`MSC Data Length [7 or 8]`**

   Select either 7 or 8 bits for your serial communication data link. This number can be entered directly using the DATA keys.

3. **`MSC Parity [0=0 1=1 2=none 3=even 4=odd]`**

   Set to match your communication link to the MSC. Enter the number value to indicate your desired setting as indicated below:

MSC Parity Parameter Entry	Parity Setting
Zero (0)	zero parity
One (1)	ones parity
Two (2)	parity equals "none"
Three (3)	even parity
Four (4)	odd parity

4. **`MSC Stop Length [1 or 2]`**

   Enter the number of stop bits that matches your communication link with the MSC. You can choose 1 or 2 stop bits. Enter these values directly, using the DATA keys.

5. **`Code Domain Power Threshold`**

   This 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**.

NOTE: The useful range for entries into the **`Code Domain Power Threshold`** parameter is 0 to –30 dB. If you enter a value outside of this range, the Software will use the nearest value within the range.

   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

6. **`Print Inactive Walsh Codes [0=no 1=yes]`**

   This 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 **`0=no`**, the inactive Walsh values are not measured or reported. If the parameter is set to **`1=yes`**, the Software will measure and report the code domain power for each of the inactive Walsh channels.

7. **`Adjust Power [0=no 1=on fail 2=always]`**

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

   - If set to **`0=no`**, power measurements will be displayed whether they meet the specified pass/fail limits or not.
   - If set to **`1=on fail`**, the adjustment power meter will be displayed if the measured power is outside the specified pass/fail limits. You can then adjust power to within the limits and continue with testing.
   - If set to **`2=always`**,the adjustment power meter will be displayed any time power measurements are made, whether the values are within the specified pass/fail limits or not.

   See "`Output Power Adjustment Error`" on page 114 and **"`Output Power Error`" on page 114**.

8. **`ZZZZ Test Demo Mode [0=normal 1=demo]`**

   Use this parameter to put the Software into the “demo mode”. The demo mode will let you run the tests without really testing or connecting to a base station. This allows you to become familiar with Software operation. For details, **see "Demo (Demonstration) Mode" on page 99**.

Related Documents

Refer to the manuals in **table 4** for more information on the elements (Test Set, Cellular Adapter, and PCS Interface) of the Test System:

Table 4

Manual	Description	Part Number
HP 8921A User's Guide	Describes general operation of the HP 8921A Cell Site Test Set	08921-90022
HP 83203B User's Guide	Describes CDMA measurements with the HP 83203B CDMA Cellular Adapter	83203-90028
HP 83205A User's Guide	Describes TDMA measurements with the HP 83205A CDMA Cellular Adapter	83205-90008
HP 83236A,B Operating Manual	Describes the setup, programming, and general use of the PCS Interface	83236-90101

Specifications (Pass/Fail Limits) List and Descriptions

The Software uses the entries in the **`TESTS (Pass/Fail Limits)`** screen to determine if a measurement meets your test requirements. If not, a “fail” indication is generated on the printout (and in some cases you are able to make adjustments and re-test).

This section lists the specification limit names and explains how they are used. For instructions on changing the pass/fail limits and saving your changes to a memory card, **see "How to “Save/Delete Procedure”" on page 130**.

1. **`Carrier Feedthrough`**

   These pass/fail limits are for the test that measures the performance of the I/Q modulator of the CDMA transmitter.

   Units are dBc.

2. **`Code Domain Floor`**

   These pass/fail limits are used when performing code domain tests and will only be used if the **`Print Inactive Walsh Codes`** parameter is set to **`1=yes`**. The **inactive** Walsh channel levels are measured and compared to this value (typically, they should fall *below* some upper limit).

   Units are dB.

   See "`Print Inactive Walsh Codes [0=no 1=yes]`" on page 111.

3. **`Code Domain Phase`**

   These pass fail limits are used when performing code domain tests. The Test System measures the phase of a Walsh channel compared to the pilot (Walsh 0) and compares it to these limits.

   Units are mrad (milliradians).

4. **`Code Domain Timing`**

   These pass fail limits are used when performing code domain tests. The Test System measures the time offset of a Walsh channel compared to the pilot (Walsh 0) and compares it to these limits.

   Units are ns (nanoseconds).

5. **`Frequency Error`**

   The Test System measures the transmitter's center frequency and compares it to the ideal frequency, based on your entry for channel number. 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.

   Units are Hz (hertz).

6. **`Output Power Adjustment Error`**

   These limits determine how the power meter is displayed. 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 meter will be drawn with the ideal setting in the center and major tick marks one dB up and one dB down from center.

   Units are dB.

7. **`Output Power Error`**

   The previous limit setting (**`Output Power Adjustment Error`**) controlled the adjustment diagram in power meter use. These values determine whether or not the power measurement made in automated testing meets specifications. If you set **`Output Power Error`** limits of ± 2 dB, these will be used when a power reading is made. If the power measured is more than 2 dB from the desired setting, a "fail" indication will result.

NOTE: In general, it is best to have the **`Output Power Adjustment Error`** limits set narrower (smaller) than the **`Output Power Error`** limits.

   Units are dB.

8. **`Rho`**

   These limits are used when measuring rho, a measure of the modulation quality of a CDMA transmitter. Typically, only the lower limit is checked.

   This measurement has no "units".

9. **`Time Offset`**

   Pass/fail limits used when measuring the transmitter's time-alignment to system time.

   Units are µs (microseconds).

Testing without MSC Control

"Performing CDMA Tests" in chapter 4 lists the steps for each of the Software's test modes. The steps of that chapter assume that you are using a modem to control the cell site via the MSC.

If you *are using a Test System setup with no modem and connection to the MSC* , the following considerations apply:

- Be sure to set the **`Send Control Commands to MSC`** field to indicate **`NO`**. The Test System will no longer send control commands to the MSC using the modem.
- The connection diagrams at the start of each test sequence will include prompts to apply or remove power for the BBA being tested. You must control the transmitter signal (on and off) manually at the site.

NOTE: In addition to turning the transmitter signal on and off, you will also need to ensure that the proper configuration of the BBA is done for each test. For example, when running the Pilot Only Test, you will need to make sure that the pilot channel is the only active channel for that BBA (no paging or traffic channels should be active). For Code Domain tests, you will want to enable traffic, paging, and sync channels in most cases.

- You will probably need an assistant at the MSC to control the site and remove the radios for service.

6

General Software Reference

This chapter contains general Software operating instructions. These include how to load the Software, customize the test procedure, and set up the Test Set for use with automated tests.

TESTS Screen Overview

TESTS Main Menu

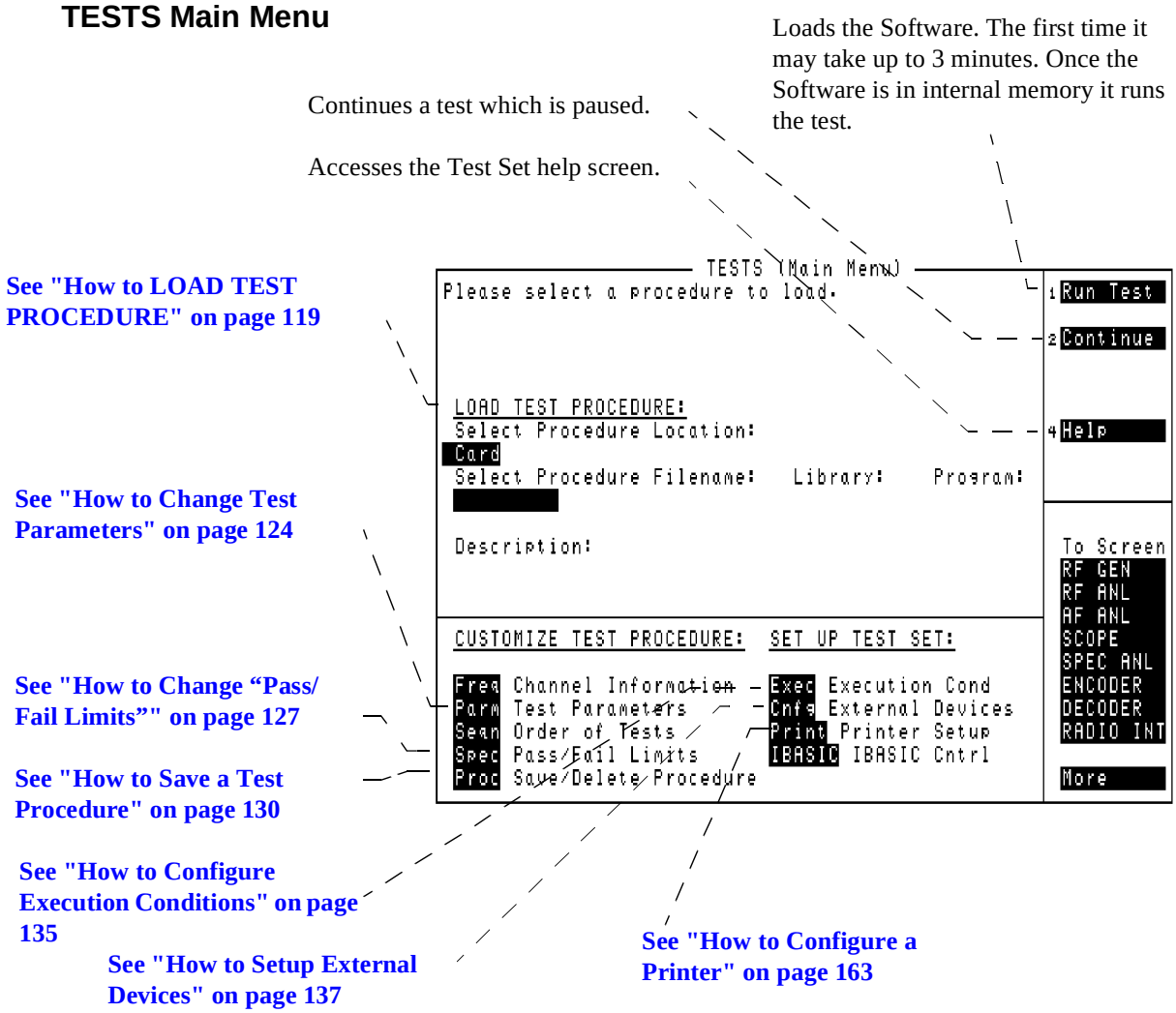


Figure 31 Test Subsystem

Pressing the TESTS key will display the TESTS (Main Menu) screen. This screen allows the user to configure and run custom Software, access help, continue with a paused procedure, or access additional test screens through the To Screen menu.

How to LOAD TEST PROCEDURE

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

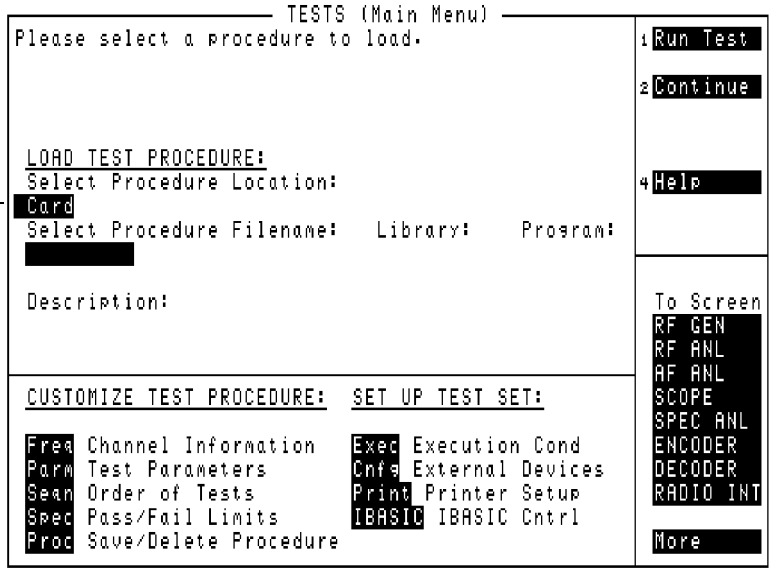


Figure 32 **LOAD TEST PROCEDURE**

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 **`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 select **`k1`** (**`Run Test`**) from the USER keys on the Test Set. It will take approximately three minutes 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

HOW TO TROUBLESHOOT THE INSTALLATION

See **"Troubleshooting the Software Installation" on page 122** for some hints to help debug any problems you may have during the installation of the Software.

Loading The Software Card

Follow the instructions in **Figure 33** *to set up the Software for use:*

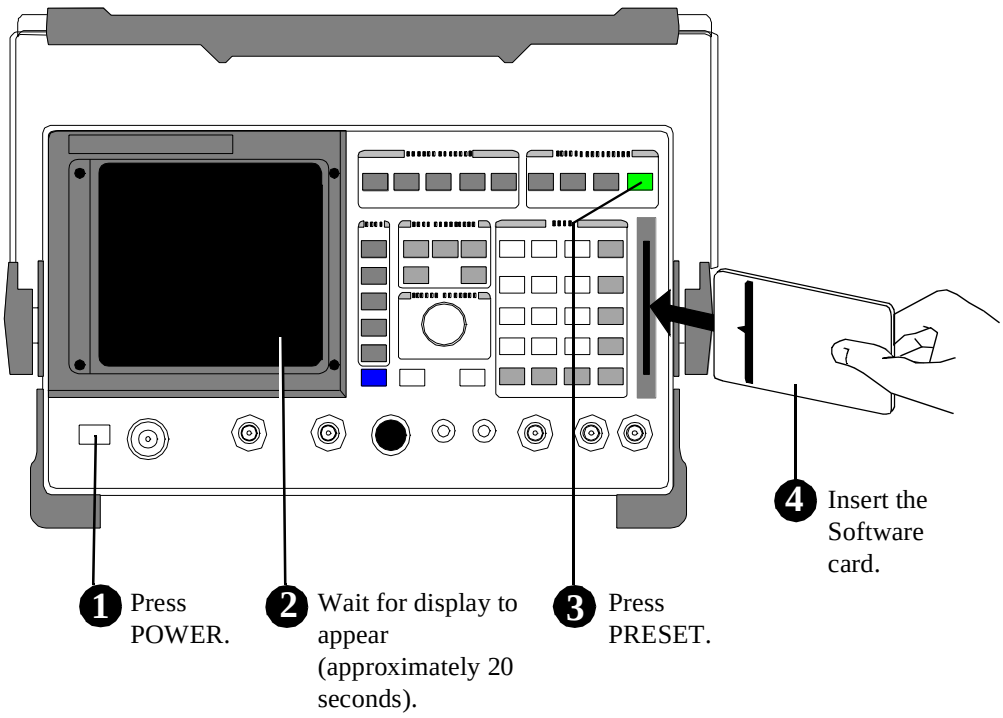
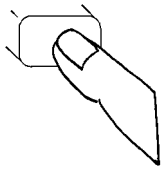


Figure 33 **Loading the Software Card**

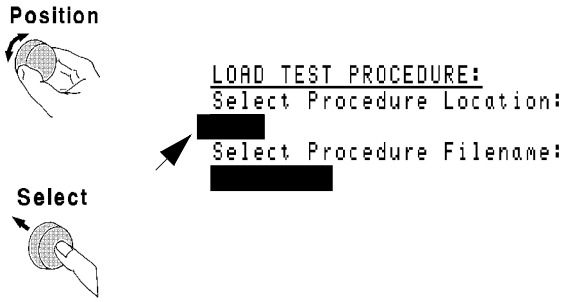
Selecting a Procedure Location and Name

Follow the instructions in **Figure 34** *to select your desired procedure.*

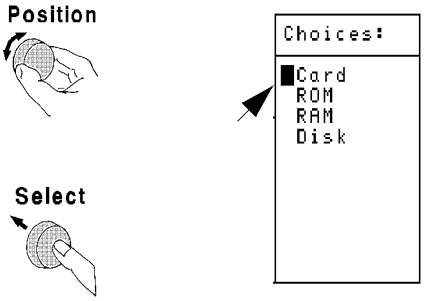
5 Press **TESTS** to display the **TESTS (Main Menu)** screen.



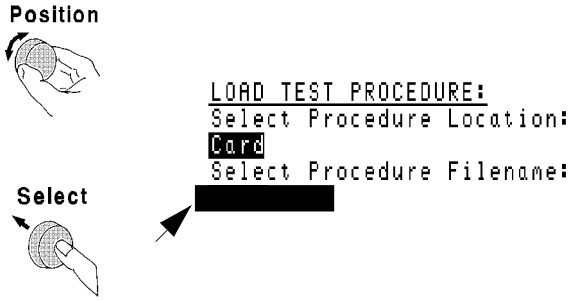
6 Position the cursor at **Select Procedure Location:** and select it.



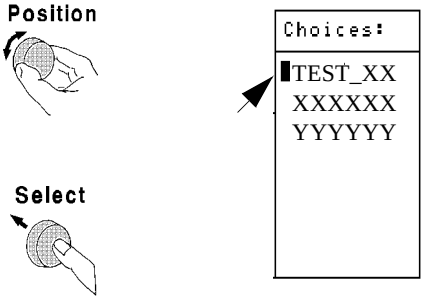
7 Position the cursor at **Card** and select it.



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.

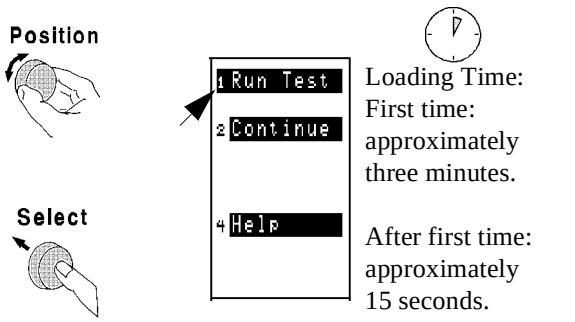


Figure 34 **Selecting a Procedure Location and Name**

Troubleshooting the Software Installation

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

- Is power on? Do you see text on the display?
- Check the AC or DC power connection and the setting of the AC/DC switch on the rear panel. See the Test Set's *User's Guide.*
- Is the card inserted in the right direction? The arrow on the card must line up with the arrow on the Test Set.
- Is the 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 TESTS screen? Pressing PRESET should take you to the RX TEST screen, and pressing TESTS should take you to the TESTS (Main 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* manual.

IF A PROBLEM PERSISTS Call the HP Factory Hotline from anywhere in the USA or Canada (1-800-922-8920, 8:30 am - 5:00 pm Pacific time).

How to CUSTOMIZE TEST PROCEDURES

The fields listed under CUSTOMIZE TEST PROCEDURE: are used to customizes the Software for various testing needs.

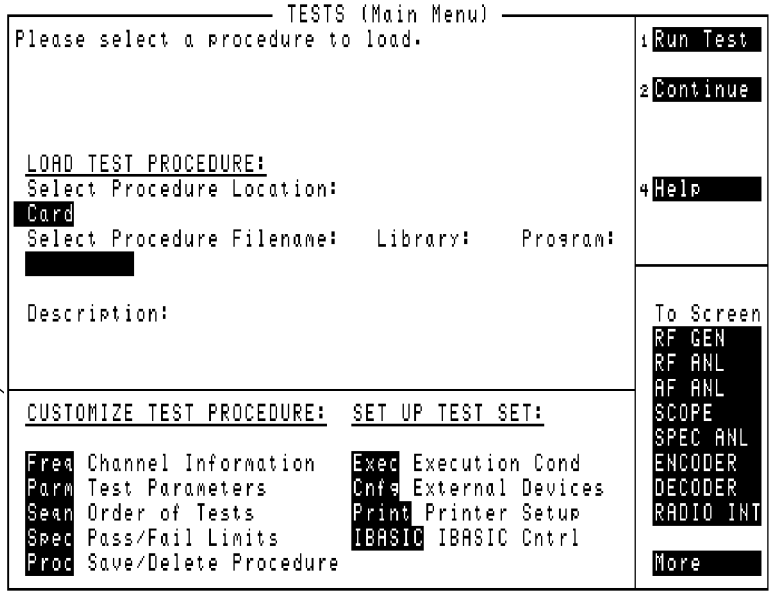


Figure 35 **CUSTOMIZE TEST PROCEDURES**

NOTE: Your Software package may not allow customization of testing procedures. If you try to enter a customization screen which is not supported with your package the message “Access to secure test information denied” will be displayed.

Software packages have been designed so that changes may be easily made from the Test Set’s front panel. For example, tests may be inserted or deleted, and later after running the tests you can change the pass/fail limits or decide to test different channels.You may store your customized test procedure on a memory card so that you may skip these steps in the future. See **"How to “Save/Delete Procedure”" on page 130**.

How to Change Test Parameters

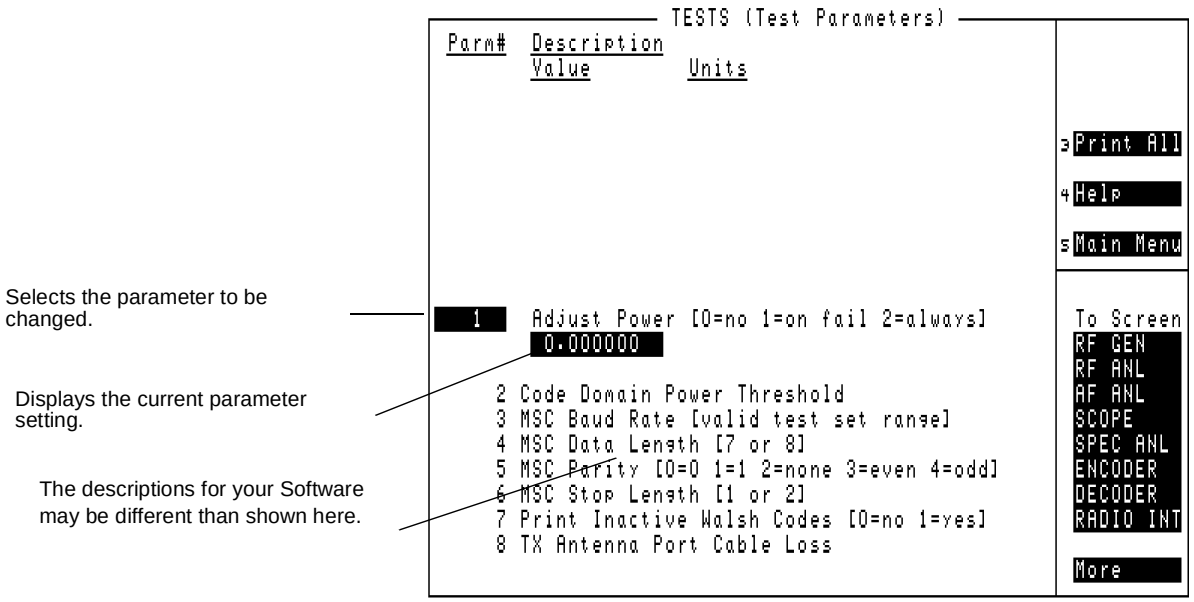


Figure 36 **TESTS (Test Parameters) screen**

NOTE: The TESTS (Test Parameters) screen may not be used in your particular Software package or some fields may not be present depending on the Software application. The message “Access to screen is denied” will appear if this screen is not supported in your current Software package.

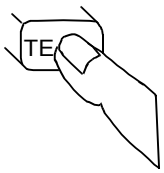
The Software uses parameters to optimize the test environment and conditions for your testing situation. Many of the test parameters are determined by examining your testing needs. The Software comes with default settings for all test parameters.

The following procedure describes how you can change test parameters through the Test Parameter screen to optimize your testing conditions. For information on saving customized test parameters, see **"How to “Save/Delete Procedure”" on page 130**.

How to Change the Test Parameters and Conditions

1 *Press* **TESTS** *to display the* **TESTS (Main Menu)** *screen.*

IF you're in **IBASIC,** *press* **SHIFT, CANCEL** before pressing **TESTS.**



2 *Position cursor at* **Parm** **Test Parameters..** *and select it.*

Position

Select

Freq	Channel Information
Parm	Test Parameters
Seqn	Order of Tests
Spec	Pass Fail Limits
Proc	Save/Delete Procedure

The Test Parameters screen is now present on your CRT.

3 *Position cursor at* **Parm #** *field and select it.*

Position

Select

(Entries on your display may be different)

1 RT audio test to

0.00000

4 *Scroll to* **Parm #** *to be changed and select it.*

Scroll

Select

(This parameter number and description are examples)

15 TX cable loss

5 *Position cursor at* **Value** *field and select it.*

Position

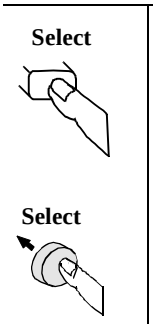
Select

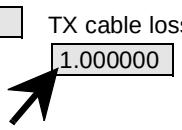
15 TX cable loss

0.000000

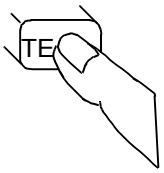
Continue on next page

6 *Use* **DATA** *keys to enter new value, than select it.*





7 *Press* **TESTS** *to return to the* **TESTS (Main Menu)** *screen.*



How to Change “Pass/Fail Limits”

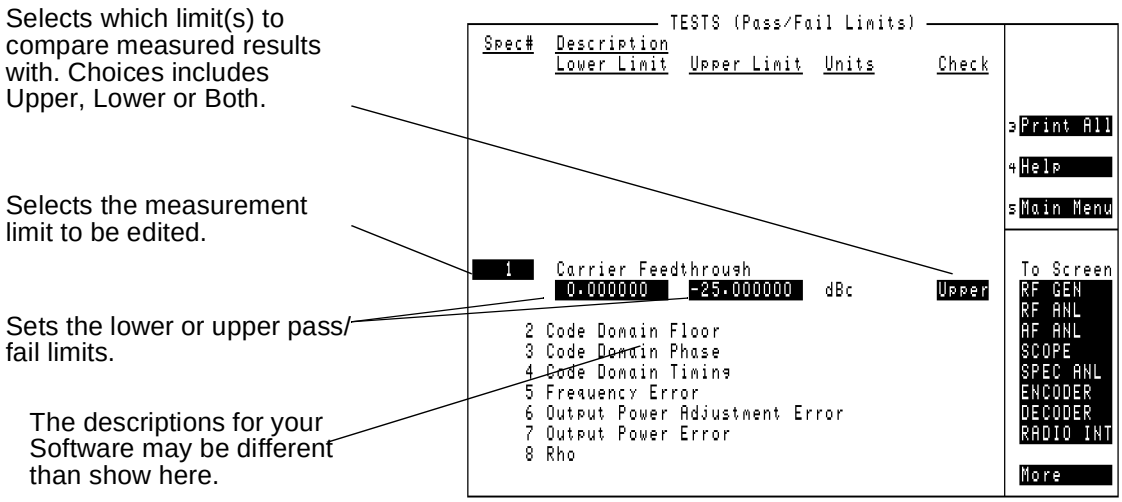


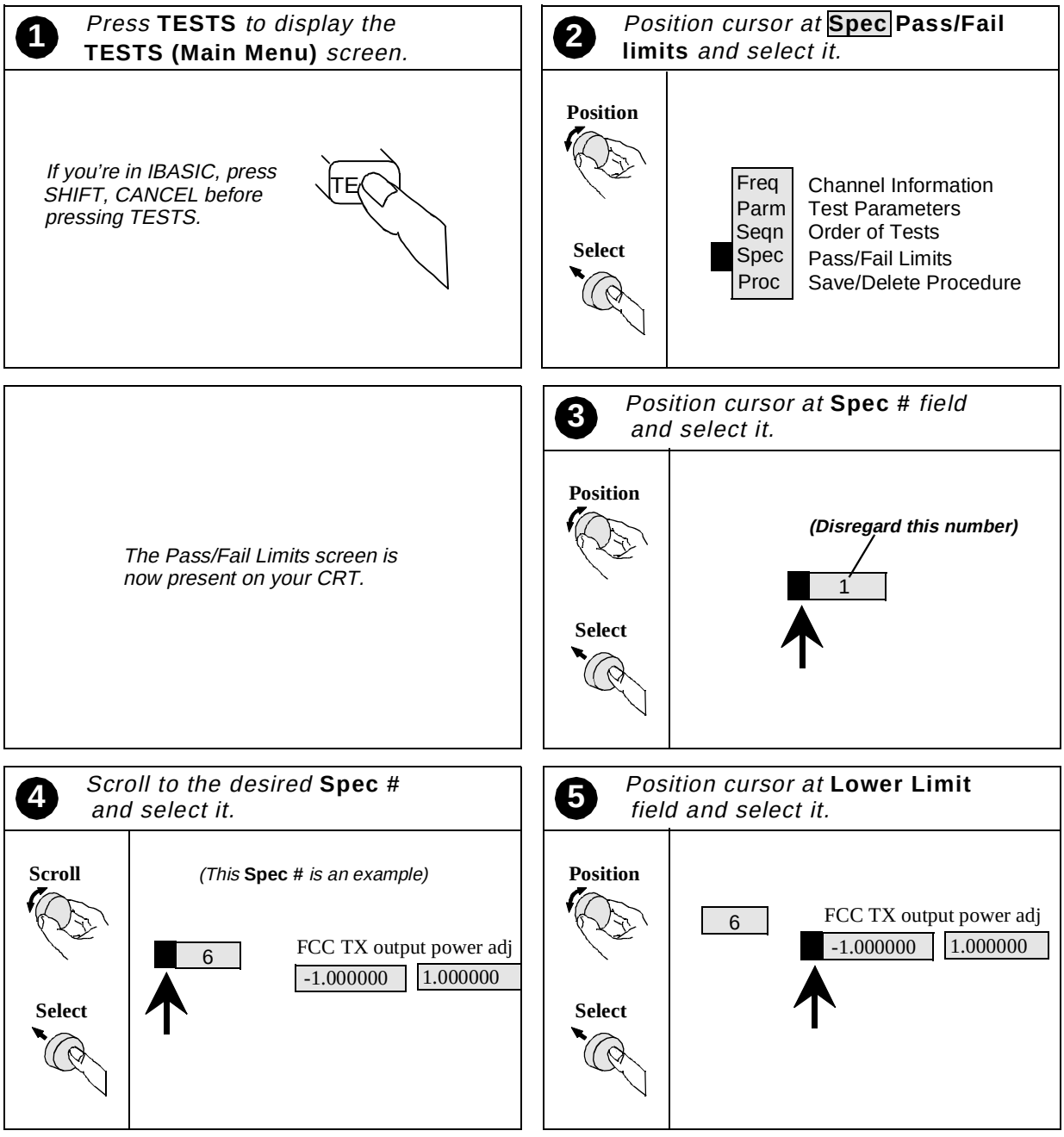
Figure 37 TESTS (Pass/Fail Limits)

NOTE: The TESTS (Pass/Fail Limits) screen may not be used in your particular Software package or some fields may not be present depending on the Software application. The message “Access to secure test information denied” will appear if this screen is not supported in your current Software package.

Pass/Fail limits define the values a measurement result is compared against to determine if the UUT meets its specified standards. Default values are set in the test Software. These default values may be changed to suit your particular requirements.

The following steps describe how to change the pass/fail (upper and lower) limits. For information on saving customized pass/fail limits, see **"How to “Save/Delete Procedure”" on page 130**.

How to Change Spec Pass/Fail Limits



Continue on next page

Figure 38 Procedure for setting pass/fail limits

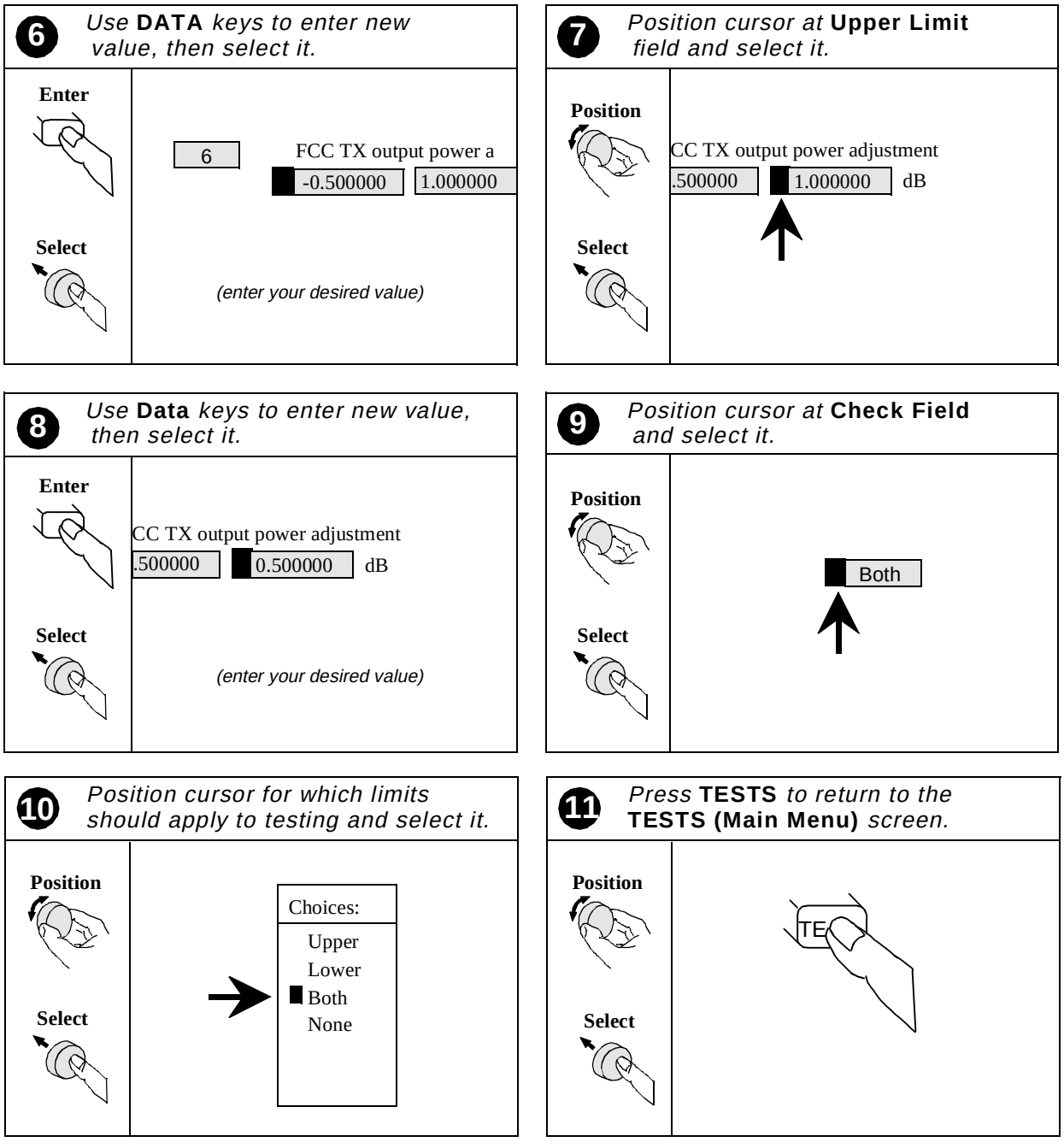


Figure 39 **Procedure for setting pass/fail limits**

How to “Save/Delete Procedure”

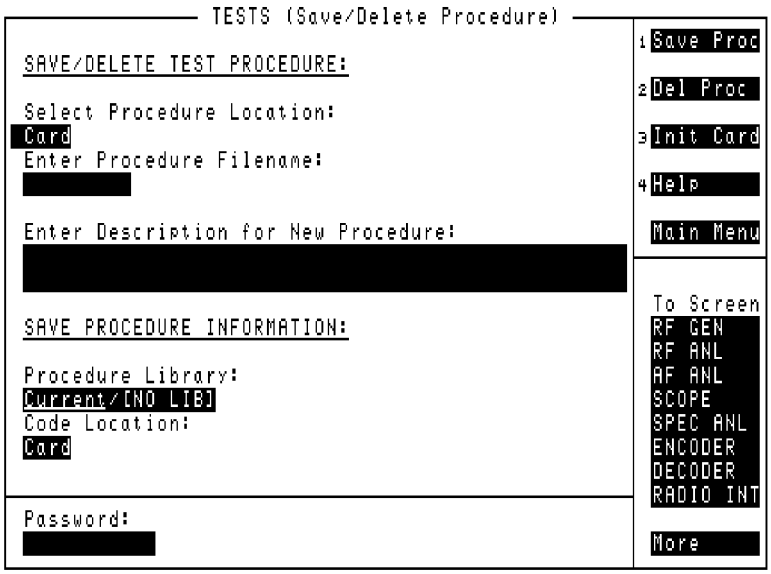


Figure 40 **TESTS (Save/Delete Procedure) screen**

A Test Procedure is a collection of channel information, test parameters, testing order, and pass/fail limits saved in a file that customizes the test Software to a specific application. Normally, procedures are saved on a SRAM card.

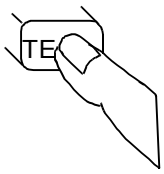
When you save a procedure you will be saving channel information, test parameters, pass/fail limits, and testing order, plus a library that contains the names of all test parameters, pass/fail limits, and tests that are resident in the Software. The library file comes from the Software and cannot be modified. The library file will be automatically saved on the card or disk that is being used to store the new test procedure.

How to Save a Test Procedure

Figure 41 , **Figure 42** , and **Figure 43** show how to save a new procedure to a memory card.

1 *Press* **TESTS** *to display the* **TESTS (Main Menu)** *screen.*

If you are in **IBASIC,** *press* **SHIFT, CANCEL** *before pressing* **TESTS.**



2 *Position cursor at* **Prog Save/Delete Procedure** *and select it.*

Position

Select

Freq	Channel Information
Parm	Test Parameters
Seqn	Order of Tests
Spec	Pass Fall Limits
■ Proc	Save/Delete Procedure

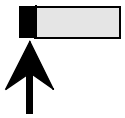
The Save/Delete Procedure screen is now on your CRT

3 *Position cursor at* **Select Procedure Location** *and select it.*

Position

Select

Select Procedure Location:



4 *Position cursor at* **Card** *and select it.*

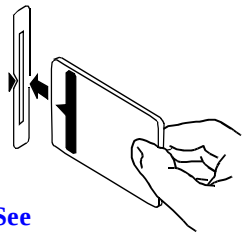
Position

Select

Choices:
■ Card
RAM
Disk

(You can also save procedures to an internal RAM disk or external disk drive.)

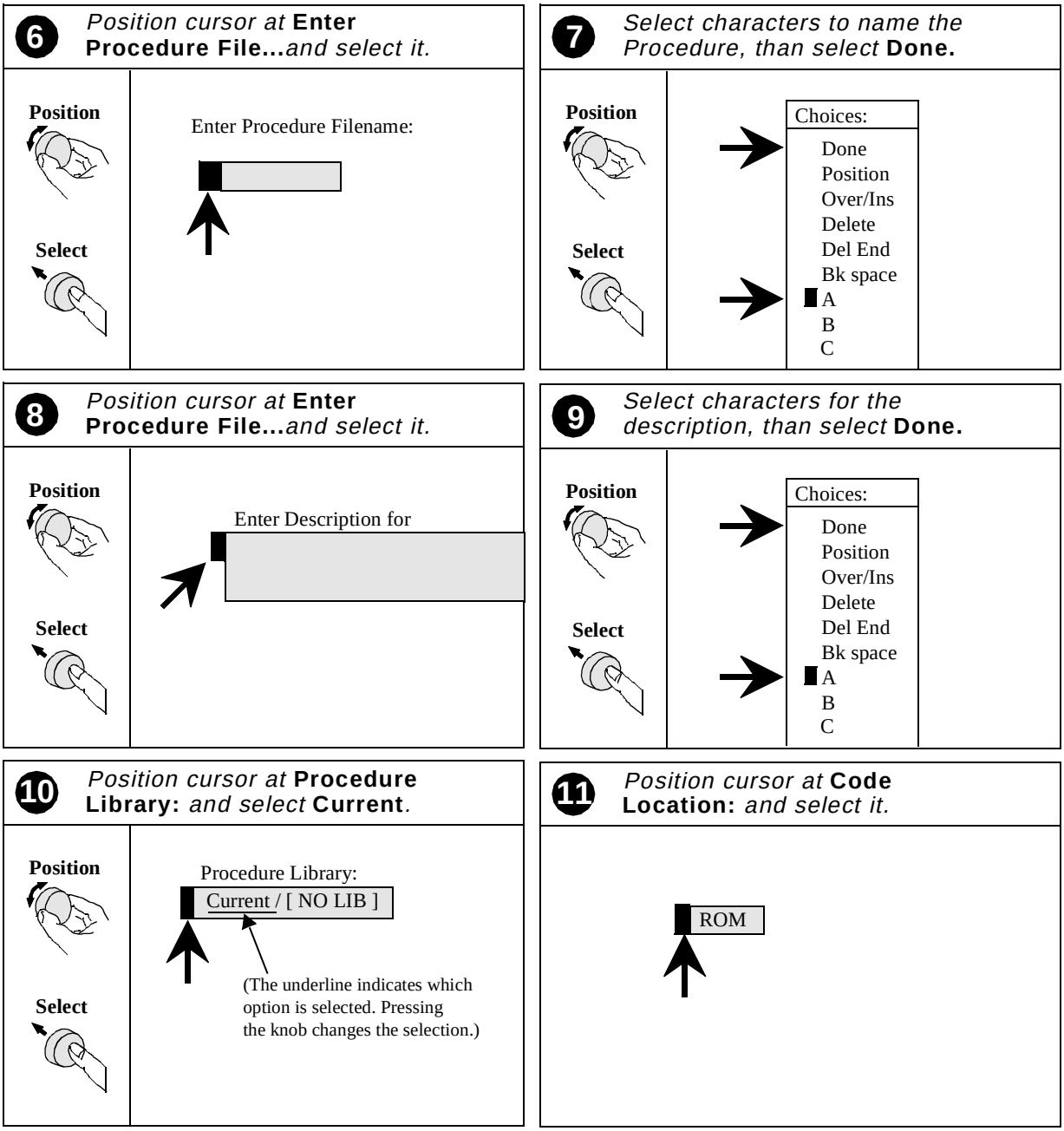
5 *Position an initialized memory* ***SRAM*** *memory card.*



For detailed memory card initialization instructions **See "Initializing an SRAM card" on page 171**

Continue on next page

Figure 41 How to Save a Procedure



Continue on next page

Figure 42 How to Save a Procedure

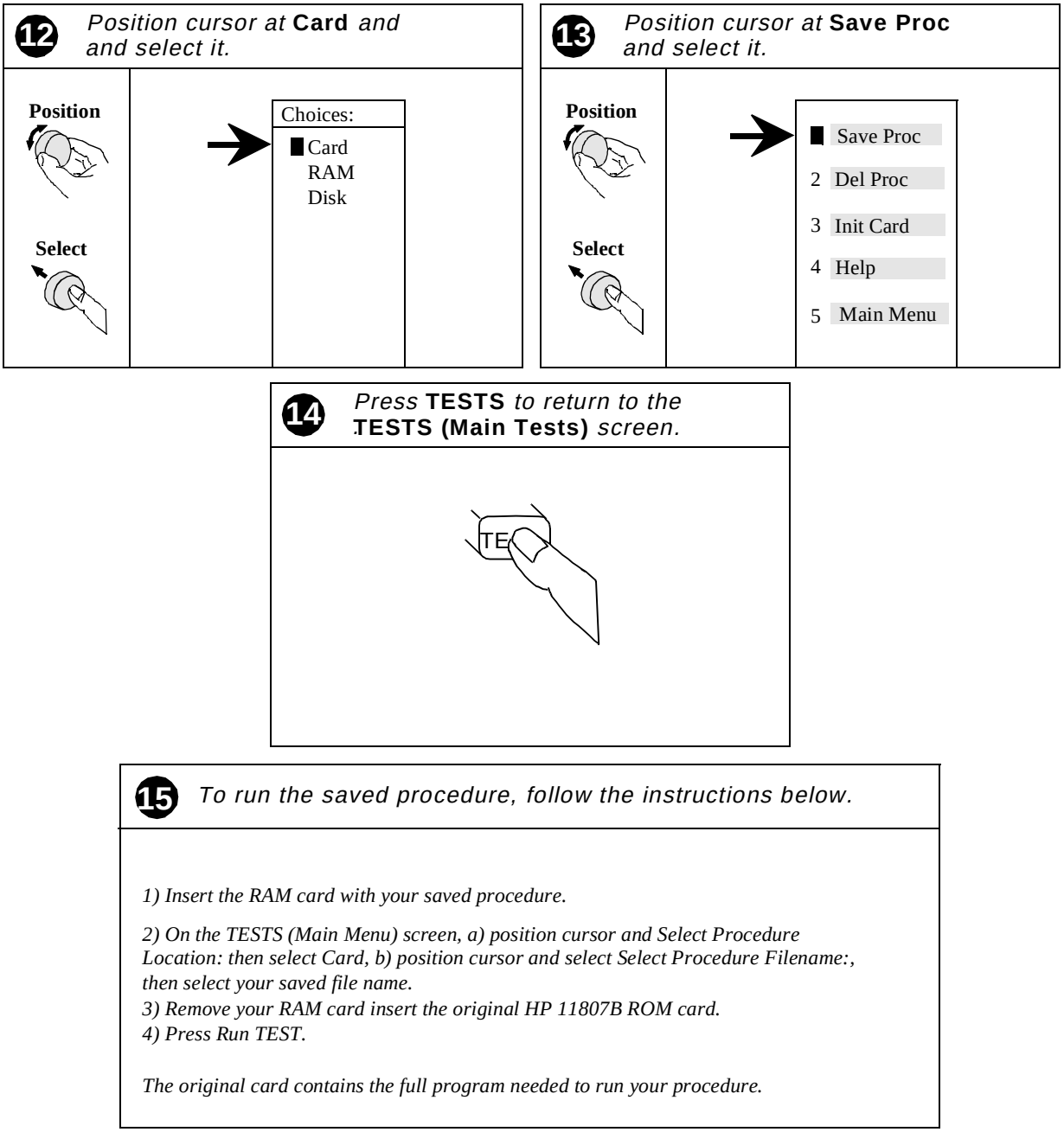


Figure 43 How to Save a Procedure

SET UP TEST SET

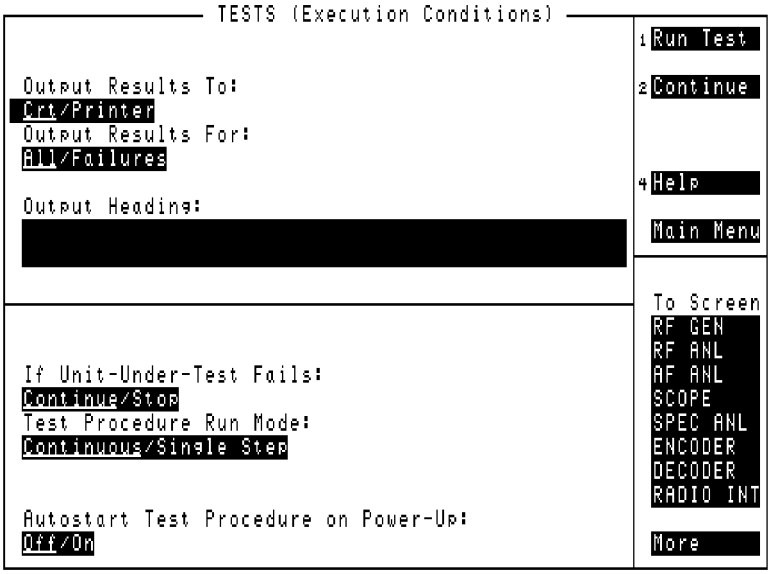


Figure 44 **SET UP TEST SET**

The list of fields, found under SET UP TEST SET on the TESTS (Main Menu) screen, allows the user to define when and where test output occurs, and to which devices the output is sent. The user has the option to output all test results to the CRT or printer or to output data only when a test fails. Output can be sent to several types of printers or to a PC for later review.

The Test Set also allows for continuous testing or for pausing the Test Set when a test fails.

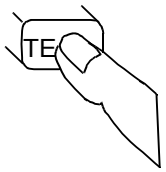
How to Configure Execution Conditions

TESTS (Execution Conditions) are accessed from the **SET UP TEST SET** list on the TESTS (Main Menu) screen. Press the TESTS key, then select **Exec Execution Cond** to display the testing execution conditions.

NOTE: TESTS (Executions Conditions) are not retained after a Test System power cycle. To save execution conditions **See "How to “Save/Delete Procedure”" on page 130**.

1 *Press* **TESTS** *to display the* **TESTS (Main Tests)** *screen.*

If you are in IBASIC, press SHIFT, CANCEL before pressing TESTS.



2 *Position cursor at* **Exec** *and select it.*

Position

Select

Exec	Execution Cond
Cnfg	External Devices
Print	Printer Set up
IBASIC	IBASIC Cntrl

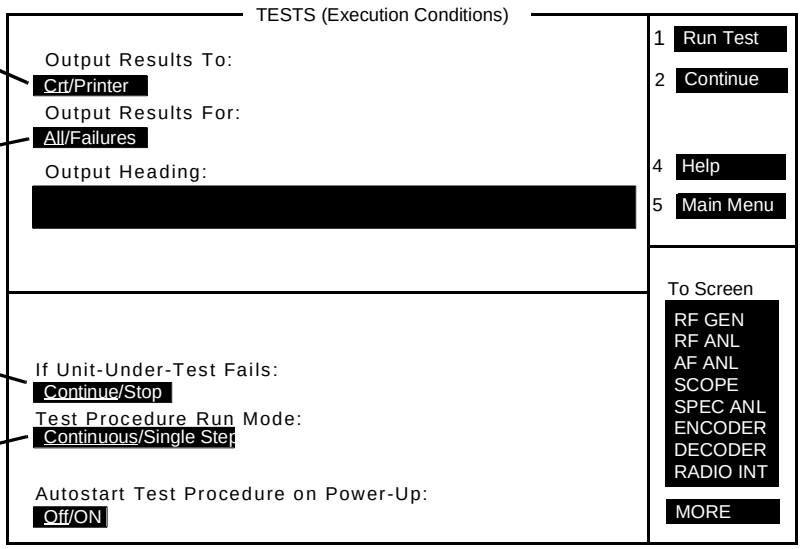
3

Select Printer to output test procedure results to the CRT and a printer.

Select Failures to display only the measurements that fail to the CRT or printer.

Select Stop to halt a Test Procedure when a failure occurs.

Select Single Step to stop a Test Procedure after each measurement



How to Setup External Devices

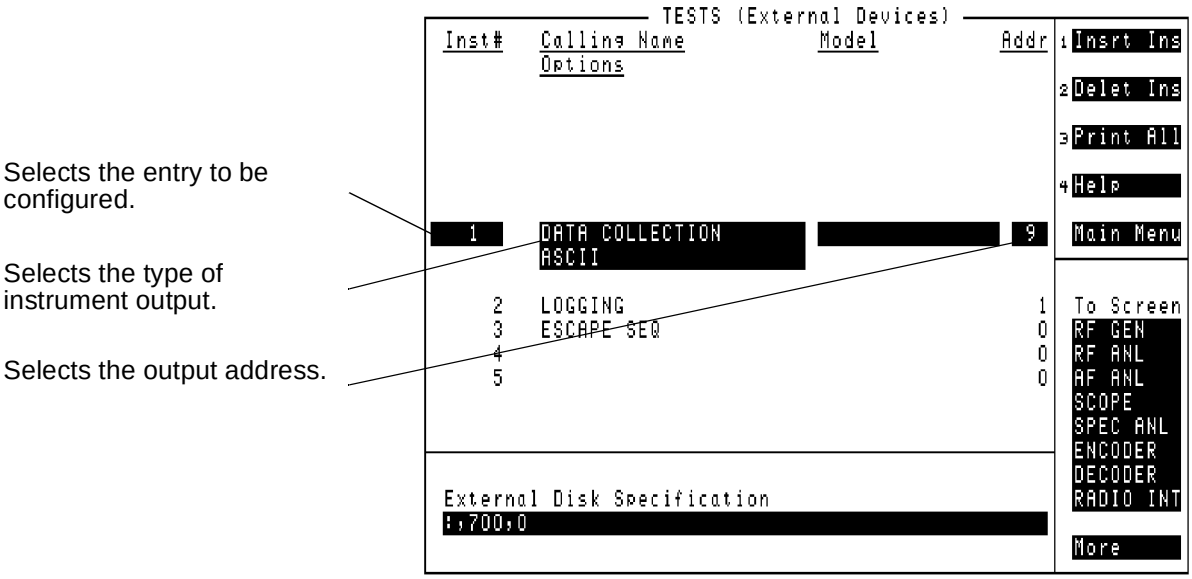


Figure 45 **Example of TESTS (External Devices) Screen configured for data collection to a PC**

The TESTS (External Devices) screen defines the equipment arrangement you use for data collection including:

- **"Data Collection to a Memory Card" on page 139**
- **"Data Collection to a PC" on page 145**
- **"Connections for Logging to a PC" on page 152**
- **"Set up the Test Set for Logging to a PC" on page 156**

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 external disk drive.

Table 5 Data Collection (Saving/Retrieving Tests) Configuration Summary

Inst#	Calling Name Options	Model	Addr	Description
x (first unused #)	DATA Collection	don't care	1	To memory card
x (first unused #)	DATA Collection	don't care	9	Serial to external computer or printer
Options field:[1]	File types of ASCII, or BDAT, or (EXT),[2] or blank,[3] REC=200, (number of records)	don't care	7xx	LIF format LIF format DOS file type DOS or HP-UX file type Number of records

1. These options apply to disk drive and memory card data collection. They do not apply when collecting data with Addr=9.
2. A DOS file name extension. For example, the file name may be CELL1.EXT.
3. DOS is used if the disk format is DOS. HP-UX is used if the disk format is LIF.

Data Collection to a Memory Card

To capture the test results on a memory card you will need to configure the **TESTS (External Devices)** screen to activate data collection and specify the address and file type of the memory card. If you are using a new memory card see **"Initializing an SRAM card" on page 171** for initialization information and instructions.

The test Software supports data storage on Logical Interchange Format (LIF) and Disk Operating System (DOS) disk formats. Storage can be to any of the following file types:

- ASCII files under LIF
- BDAT files under LIF
- HP-UX files under LIF
- DOS files under DOS

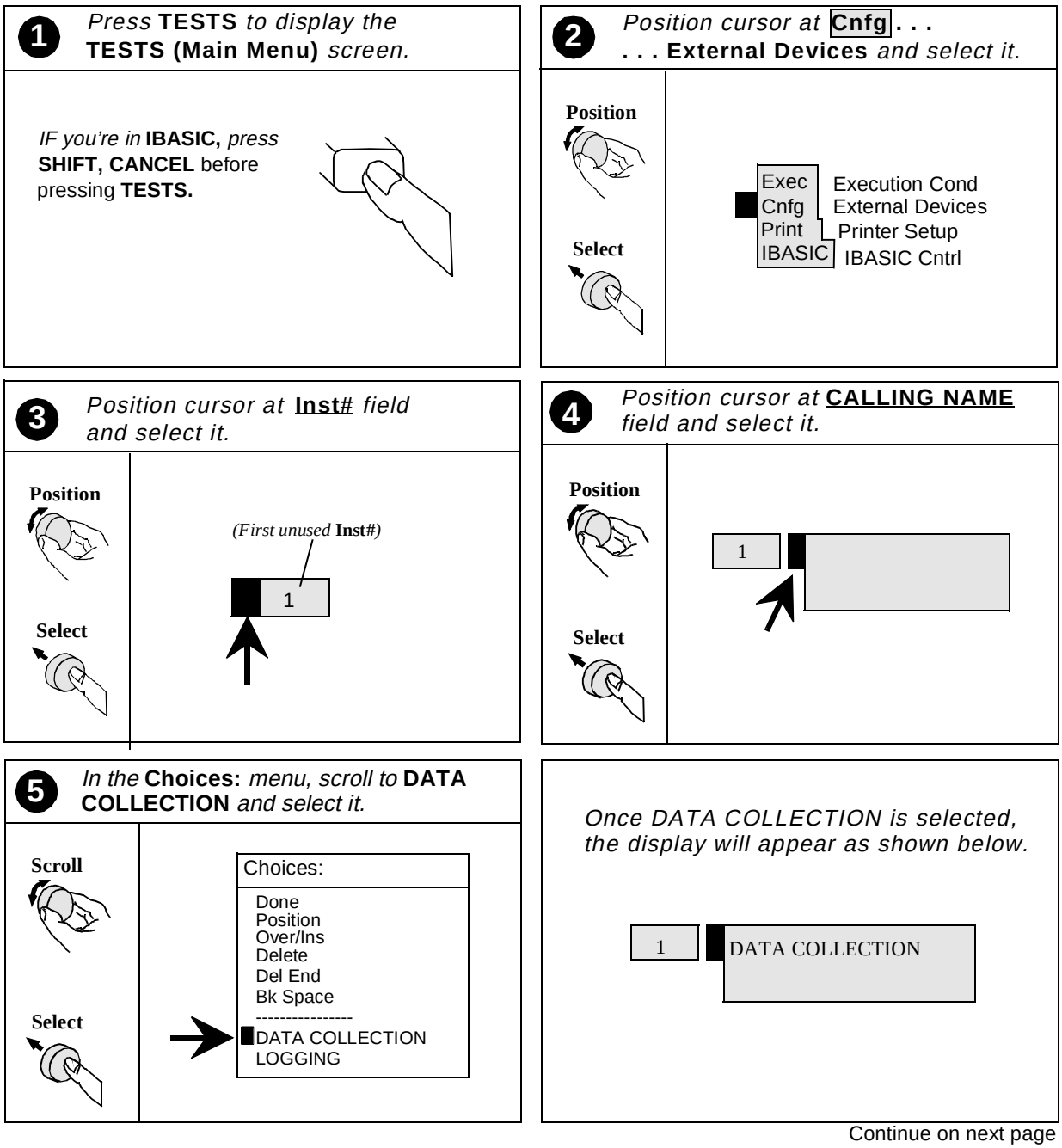
The file types under LIF can be used by the Test Set's IBASIC controller and some HP workstations. The DOS format is required if you wish to use the disk with a PC.

If you are using an ASCII, BDAT or HP-UX file, you can specify the number of records allocated to the file. The DOS file is automatically updated as data is stored, so record allocation is not required. If you are using HP-UX files, you will have to enter **REC=** to establish a usable number of records. **REC=20480** sets the size to be the same as the default number of 256 byte records used for ASCII files (80×256). You can enter the **REC=** after the file type. For example, to use an ASCII file with 200 records of 256 bytes each, you will enter **ASCII REC=200** into the **Options** field.

The default number of records, used when no **REC=** entry is made, is 80.

Items in the **Options** field can be separated by a comma or a space.

Configuring Data Collection to a Memory Card



Continue on next page

Figure 46 **Test Set configuration for data collection to a memory card**

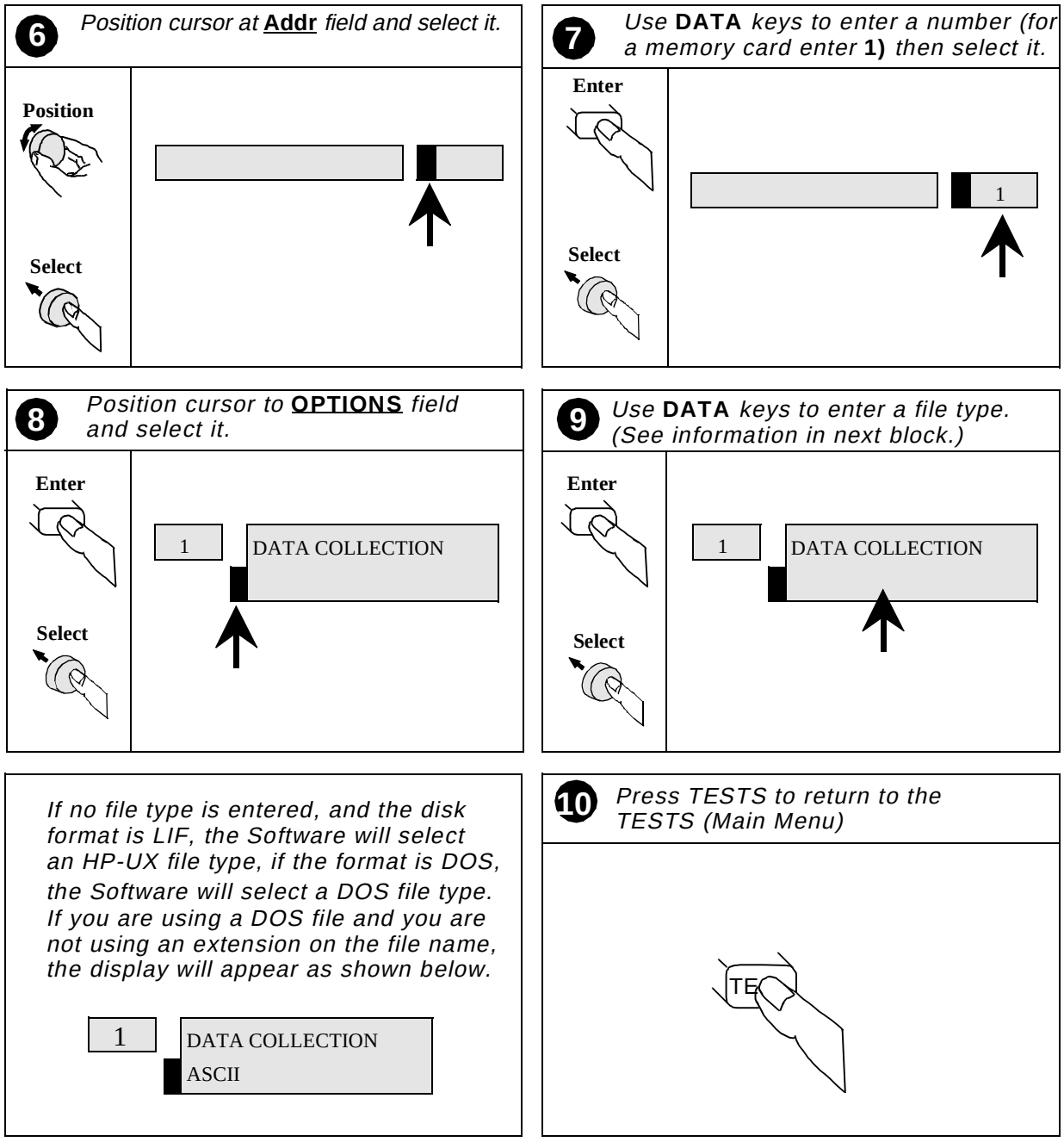


Figure 47 **Test Set configuration for data collection to a memory card**

Retrieving Data from a Memory Card

A Software utility (FILE_XFER) included in every HP 8921A Cell Site Test Set is used to transfer data files from the memory card to a serial printer, an HP-IB printer, or a PC via the serial port.

NOTE: Loading and running the Software utility will replace any Software in the memory space of the Test Set. This means that you will have to reload the test Software when you are done with file transfer. For this reason, it is best to complete all testing at the cell site first then do data transfers when you are done testing.

Transferring Data to a Printer via the Serial Port:

1. Check to make sure that your serial printer is on and set up to print when the serial data is sent.
2. Press the TESTS key.
3. Position the cursor at **`Select Procedure Location:`** and select it.
4. In the **`Choices:`** menu, scroll to **`ROM`** and press the knob. This allows the loading of various utility programs resident in the Test Set.
5. Position the cursor at **`Select Procedure Filename:`** and select it.
6. In the **`Choices:`** menu, select **`FILE_XFER`**.
7. Run the utility Software by pressing **`Run Test`** (k1).
8. You will be prompted to insert the SRAM card that contains the data collection files. Insert your card and press **`Continue`** (k1).
9. The file transfer menu will be shown. Position the cursor at **`Output Port`** and push the knob until it shows **`Serial Port, 9600 baud`**. This configures the Software to send the data out the serial port (serial 9).
10. Next, scroll down the list of file names to the file you want to transfer and press the knob. An asterisk (*) will appear next to the name. You can send more than one file at a time. Scroll to any other files you would like to transfer and press the knob to get the asterisk.

NOTE: All files on the SRAM card are displayed, not just the data collection files. If you attempt to transfer files that are not data collection data, unexpected results at the printer can occur. Also, transferring code files can result in many pages of code being printed. Look for files with "_d" appended to the name, indicating that they are true data collection files.

11. When all files to be transferred have been selected, scroll up to **`Start Transfer`** and press the knob. The data will be sent out the serial port to the printer.
12. When finished printing, you can select other files and transfer them or exit the Software utility by scrolling to **`Exit Data-Collection-File-Transfer`** and pressing the knob.
13. To use the Software again, rerun it by following the steps in **"How to LOAD TEST PROCEDURE" on page 119**.

Transferring Data to a Printer via the HP-IB Port:

1. If the Software is running, exit it by pressing the **Exit** (k5) USER key from the Software's main menu.
2. Check to make sure that your HP-IB printer is on and set up to print when the data is sent.
3. Press the TESTS key.
4. Position the cursor at **Select Procedure Location:** and select it.
5. In the **Choices:** menu, position the cursor at **ROM** and select it. This allows the loading of various utility programs resident in the Test Set.
6. Position the cursor at **Select Procedure Filename:** and select it.
7. In the **Choices:** menu, position the cursor at **FILE_XFER** and select it.
8. Run the utility Software by pressing **Run Test** (k1).
9. You will be prompted to insert the SRAM card that contains the data collection files. Insert your card and press **Continue** (k1).
10. The file transfer menu will be shown. Position the cursor at **Output Port** and press the knob until it shows **HPIB, Addr 701**. This configures the Software to send the data to an HP-IB printer at an address of 701.
11. Next, scroll down the list of file names to the file you want to transfer and press the knob. An asterisk (*) will appear next to the name. You can send more than one file at a time. Scroll to any other files you would like to transfer and press the knob to get the asterisk.

NOTE: All files on the SRAM card are displayed, not just the data collection files. If you attempt to transfer files that are not data collection data, unexpected results at the printer can occur. Also, transferring code files can result in many pages of code being printed. Look for files with an "_d" appended to the name, indicating that they are true data collection files.

12. When all files to be transferred have been selected, scroll up to **Start Transfer** and press the knob. The data will be sent out the HP-IB printer.
13. When finished printing, you can select other files and transfer them or exit the Software utility by scrolling to **Exit Data-Collection-File-Transfer** and pressing the knob.
14. To use the Software again, re-run it by following the steps in **"How to LOAD TEST PROCEDURE" on page 119**.

Transferring Data to a PC via the Serial Port:

1. If the Software is running, exit it by pressing the **Exit** (k5) USER key from the Software's Main Menu.
2. Connect the Test System to your PC using the serial port.
3. Load a PC Software utility for communicating on the serial port such as Microsoft®[1] Windows®[2] Terminal.
4. Configure the PC Software to prepare the PC to receive a text file via the serial port.
5. Press the TESTS key.
6. Position the cursor at **Select Procedure Location:** and select it.
7. In the **Choices:** menu, position the cursor at **ROM** and select it. This allows the loading of various utility programs resident in the Test Set.
8. Position the cursor at **Select Procedure Filename:** and select it.
9. In the **Choices:** menu, position the cursor at **FILE_XFER** and select it.
10. Run the utility Software by pressing **Run Test** (k1).
11. You will be prompted to insert the SRAM card that contains the data collection files. Insert your card and press **Continue** (k1).
12. The file transfer menu will be shown. Position the cursor at **Output Port** and press the knob until it shows **Serial Port, 9600 baud**. This configures the Software to send the data out the serial port (serial 9).
13. Next, position the cursor at the name of the file you want to transfer and select it. An asterisk (*) will appear next to the name. You can send more than one file at a time. Position the cursor next to another file you would like to transfer and select it to get the asterisk.
14. When all files to be transferred have been selected, position the cursor at **Start Transfer** and select it. The data will be sent out the serial port.
15. When finished sending data to the PC, you can select other files and transfer them or exit the Software utility by scrolling to **Exit Data-Collection-File-Transfer** and pressing the knob.
16. Re-run the Software by following the steps in **"How to LOAD TEST PROCEDURE" on page 119**.

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

Data Collection to a PC

Test results can be output directly to a PC communications program through the serial 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 to a file. Examples of terminal emulator programs are Microsoft Windows Terminal, or ProComm.[1]

Figure 48 details the cable connections between the Test Set and a PC for Data Collection.

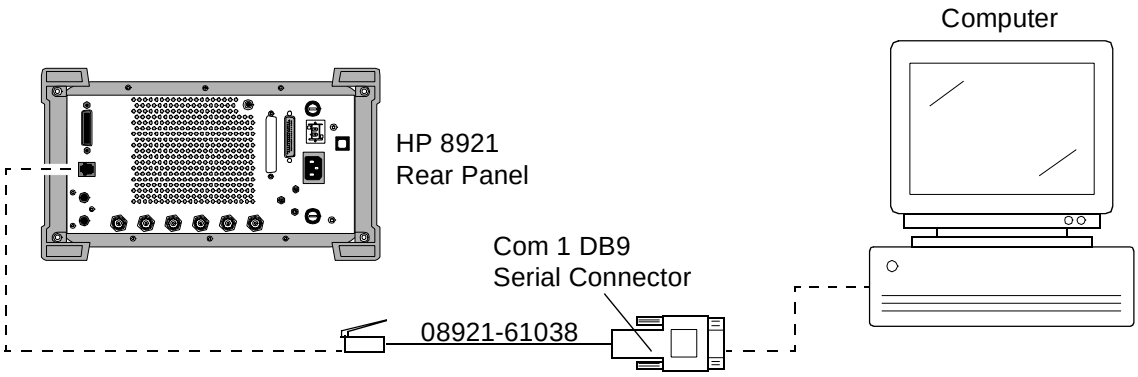


Figure 48 Serial Connections for the HP 8921A and PC

Data collection to a PC requires a terminal emulator be configured and running while data collection is enabled. **Figure 49** and **Figure 50** detail the steps to configure a terminal program for data collection.

1. Procomm is a product of DataStorm Technologies, Inc.

Configuring a Terminal program for DATA COLLECTION

1 *Start the* **Terminal** *program in* **Windows**.

2 *From the* **Terminal** *menu, select* **Settings**.

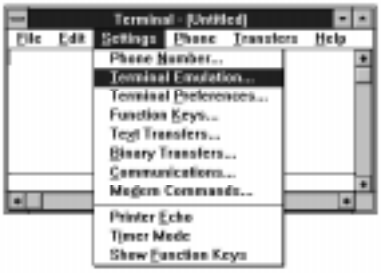
Position

Select

3 *Scroll to* **Terminal Emulation** *and and select it.*

Position

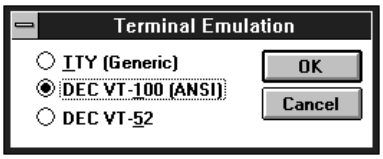
Select



4 *Select* **DEC VT-100 (ANSI)**, *then press* **OK.**

Position

Select



5 *From the* **Terminal** *menu, select* **Settings**.

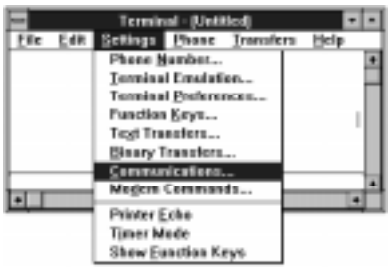
Scroll

Select

6 *Scroll to* **Communications** *and select it.*

Position

Select



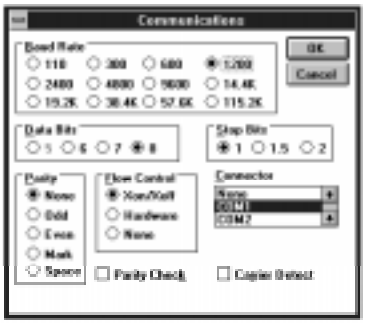
Continue on next page

Figure 49 **Communications program setup for data collection to a PC**

7 *Edit menu to match the Test Set's settings on the* **IO CONFIG** *screen.*

Enter

Select



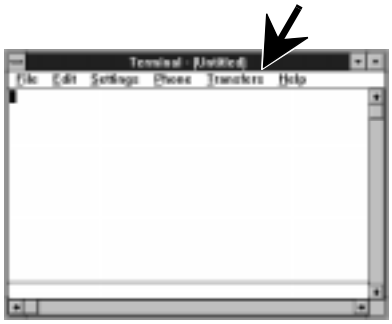
Example Communications Setup:

Connector: COM1 (remember to use your own settings!)
Baud Rate: 9600
Data Bits: 8
Parity: None
Flow Control: Xon/Xoff
Stop Bits: 1
Parity Check and Carrier Detect: both unchecked

8 *From the Terminal menu, select* **Transfers**.

Enter

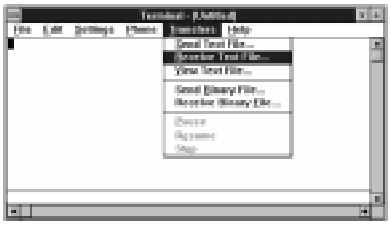
Select



9 *Scroll to* **Receive text file...** *and select it.*

Enter

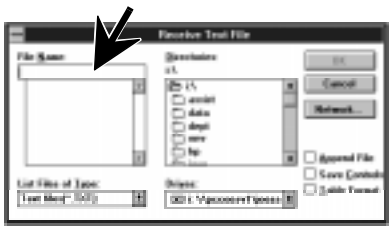
Select



10 *Enter the path and filename of the file you are saving.*

Enter

Select



After configuring the personal computer to receive the measured data, you must turn on data collection in the Test Set and verify that the I/O Configuration screen's communications parameters match those of the Windows terminal.

Figure 50 Communications program setup for data collection to a PC

Configuring the Test Set for DATA COLLECTION to a PC

Data collection to a PC requires the Test Set be configured to send data to the serial port. **Figure 51** and **Figure 52** detail the steps to configure the Test Set for data collection to a PC.

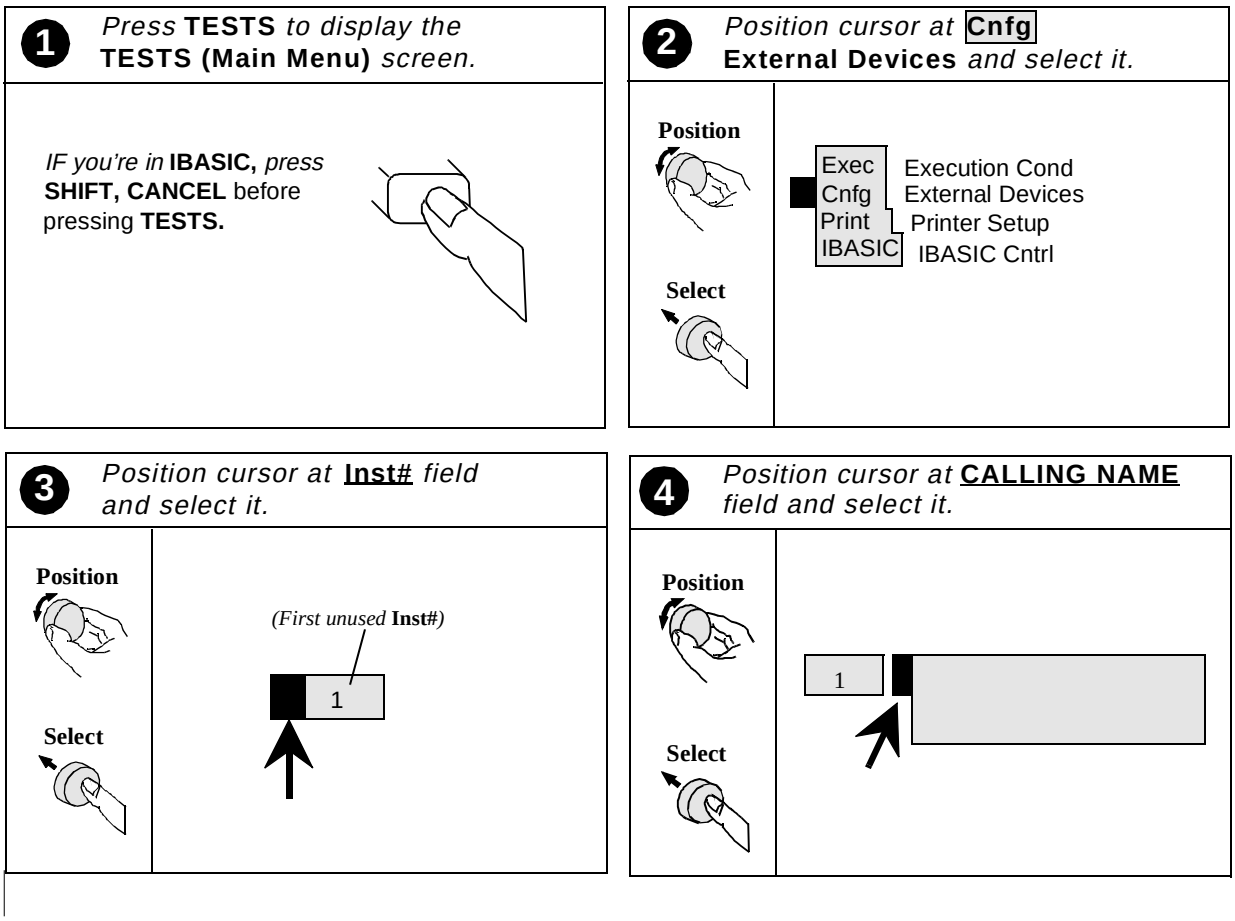


Figure 51 **Test Set configuration for data collection to a PC**

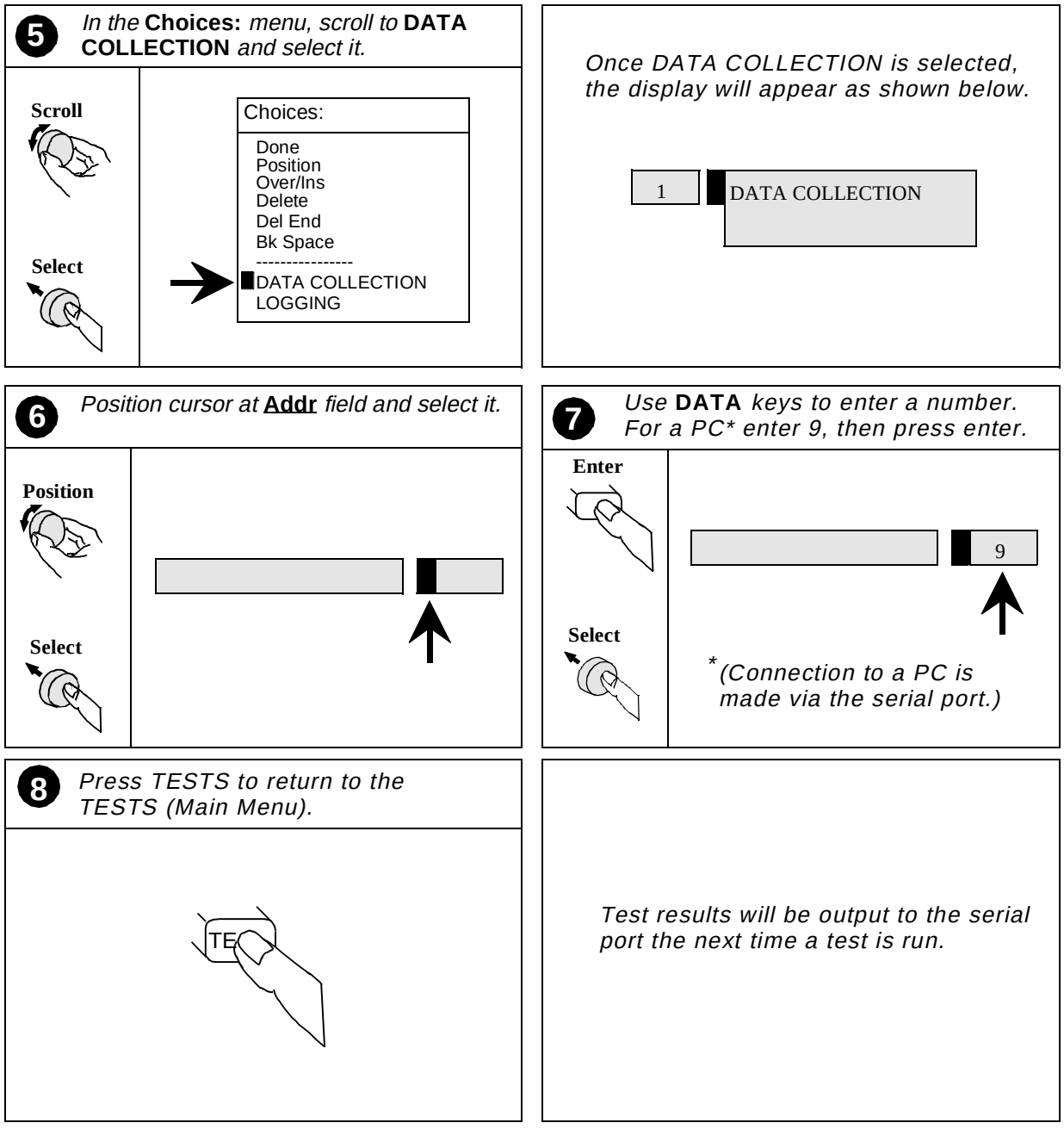


Figure 52 **Test Set configuration for data collection to a PC**

Using Data Collection when Running Tests

The data collection feature stays “on” once you have performed the steps in **"Data Collection to a Memory Card" on page 139** or **"Data Collection to a PC" on page 145**.

The Test Set automatically creates data collection files on the memory card based on the name you enter at the start of testing. The Software appends “_d” to your file name so that the files are easily recognized on the memory card.

Once you have finished with your testing and have the test results in files on the memory card, follow the steps in **"Retrieving Data from a Memory Card" on page 142** to transfer the data to a PC or printer.

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 to save the data to. The Test Set ***will not*** issue an error message if the PC communications application is not configured properly or running.

Turning Data Collection Off

Follow the steps in **"Configuring Data Collection to a Memory Card" on page 140**, except set the **`Addr`** field entry to zero (0). This will allow you to leave the other information in the **`Cnfg External Devices`** screen. You can then turn data collection back on by changing the **`Addr`** field entry back to 1 or 9 depending on your data collection needs.

Logging

The Software has a logging mode that will display the commands being sent between the Test System and the base station or MSC. This mode can be useful if you suspect communications problems between the Test System and the base station. Once enabled, the logging mode will display commands from the Test System along with the corresponding responses from the base station.

You may choose to display the commands on the display (CRT), PC, or on a hard copy using a printer.

Your test set has up to three connectors available for logging:

- serial connector at ports 9.
- parallel connector port 15 (only on Test Sets with serial numbers that begin with 3501 or greater.)
- HP-IB connector (address 7xx).

Table 6 LOGGING Configuration Summary

Inst#	Calling Name Options	Model	Addr	Description
x (first unused #)	LOGGING	don't care	0	Logging off
x (first unused #)	LOGGING	don't care	1	Log to CRT
x (first unused #)	LOGGING	don't care	7xx	HP-IB printer
x (first unused #)	LOGGING	don't care	9	Serial Printer or PC

Connections for Logging to a PC

Command logging can be output directly to a PC communications program through the serial 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 to a file. Examples of terminal emulator programs are Microsoft Windows Terminal, or ProComm.

Figure 53 displays the connection between the PC and the Test Set using a serial cable.

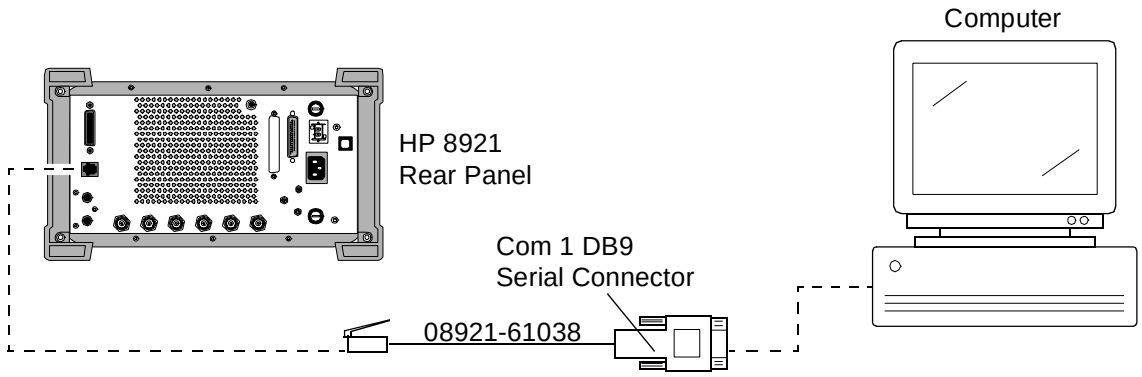
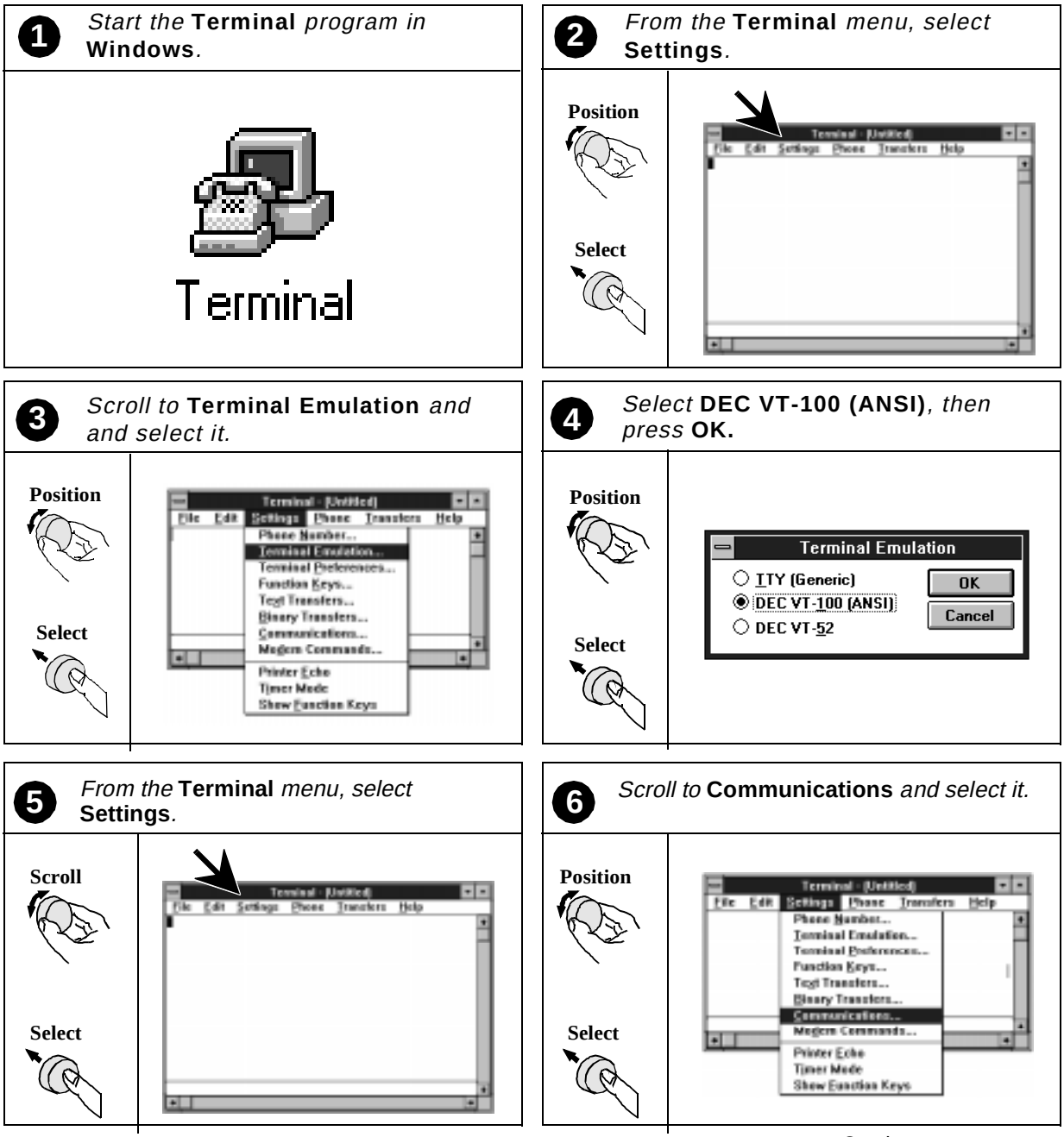


Figure 53 Serial Connections between the Test Set and PC

Setting up your PC for Logging

Figure 54 and **Figure 55** describe how to set up PC terminal Software for logging. You may need to refer to your Software manuals to perform this task with other terminal/communications programs.



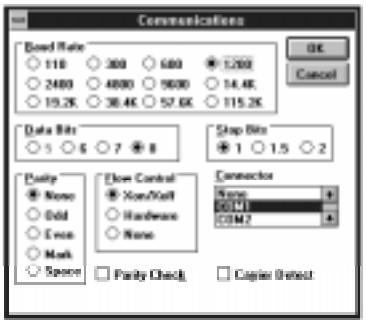
Continue on next page

Figure 54 **Communications program setup for Logging to a PC**

7 *Edit menu to match the Test Set's settings on the* **IO CONFIG** *screen.*

Enter

Select



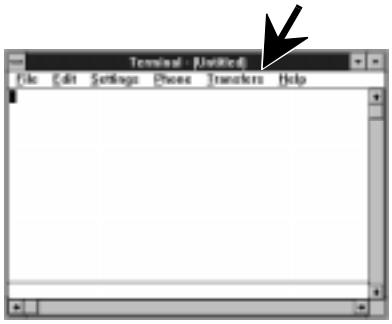
Example Communications Setup:

Connector: COM1 (remember to use your own settings!)
Baud Rate: 9600
Data Bits: 8
Parity: None
Flow Control: Xon/Xoff
Stop Bits: 1
Parity Check and Carrier Detect: both unchecked

8 *From the Terminal menu, select* **Transfers**.

Enter

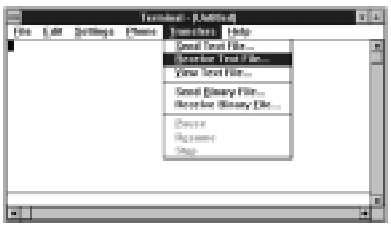
Select



9 *Scroll to* **Receive text file...** *and select it.*

Enter

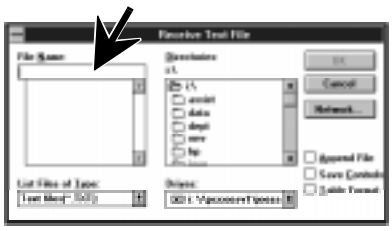
Select



10 *Enter the path and filename of the file you are saving.*

Enter

Select



After configuring the personal computer to receive the logging data, you must turn on logging in the Test Set and verify that the I/O Configuration screen's communications parameters match those of the Windows terminal.

Figure 55 Communications program setup for logging to a PC

Set up the Test Set for Logging to a PC **Figure 56** and **Figure 57** describe how to set up the Test Set for logging.

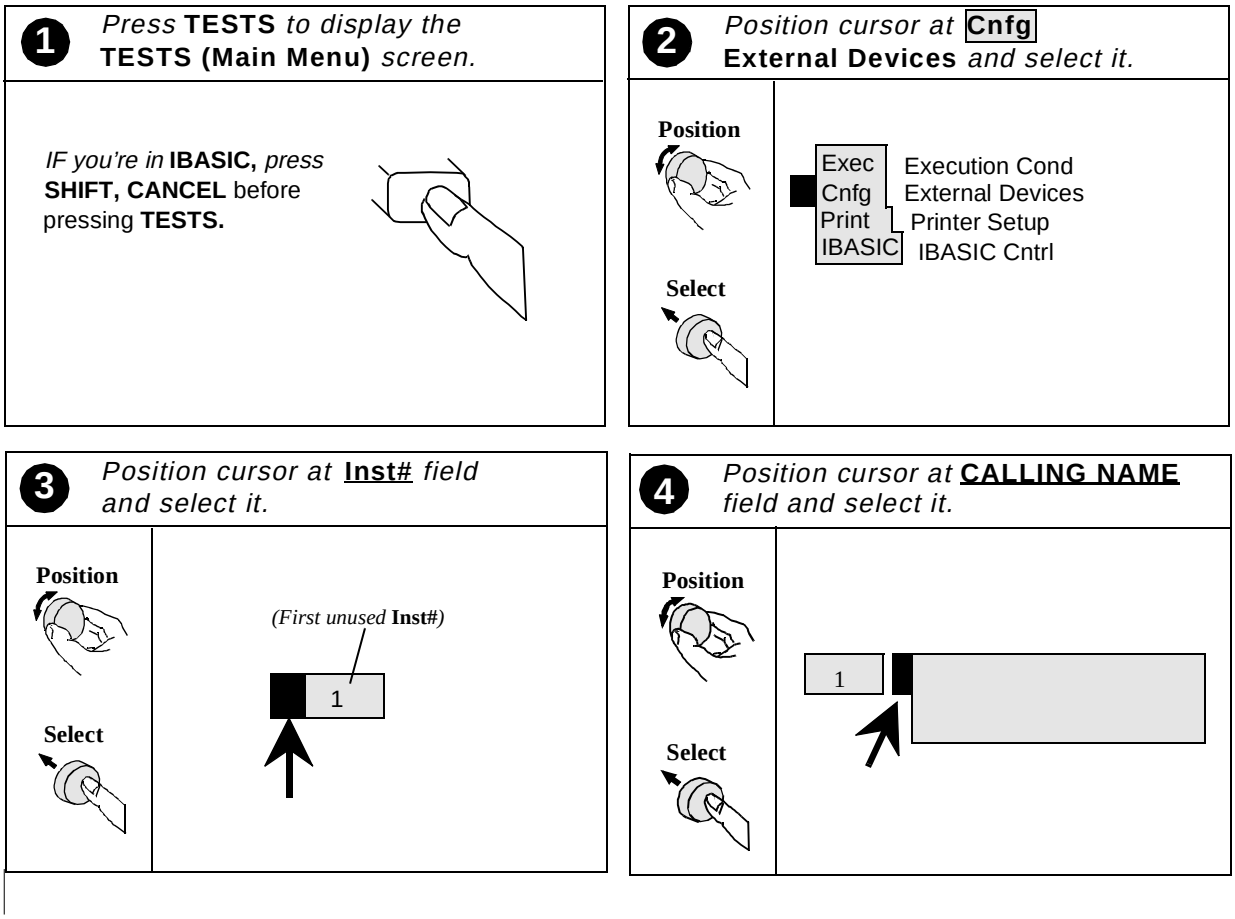


Figure 56 **Test Set configuration for logging to a PC**

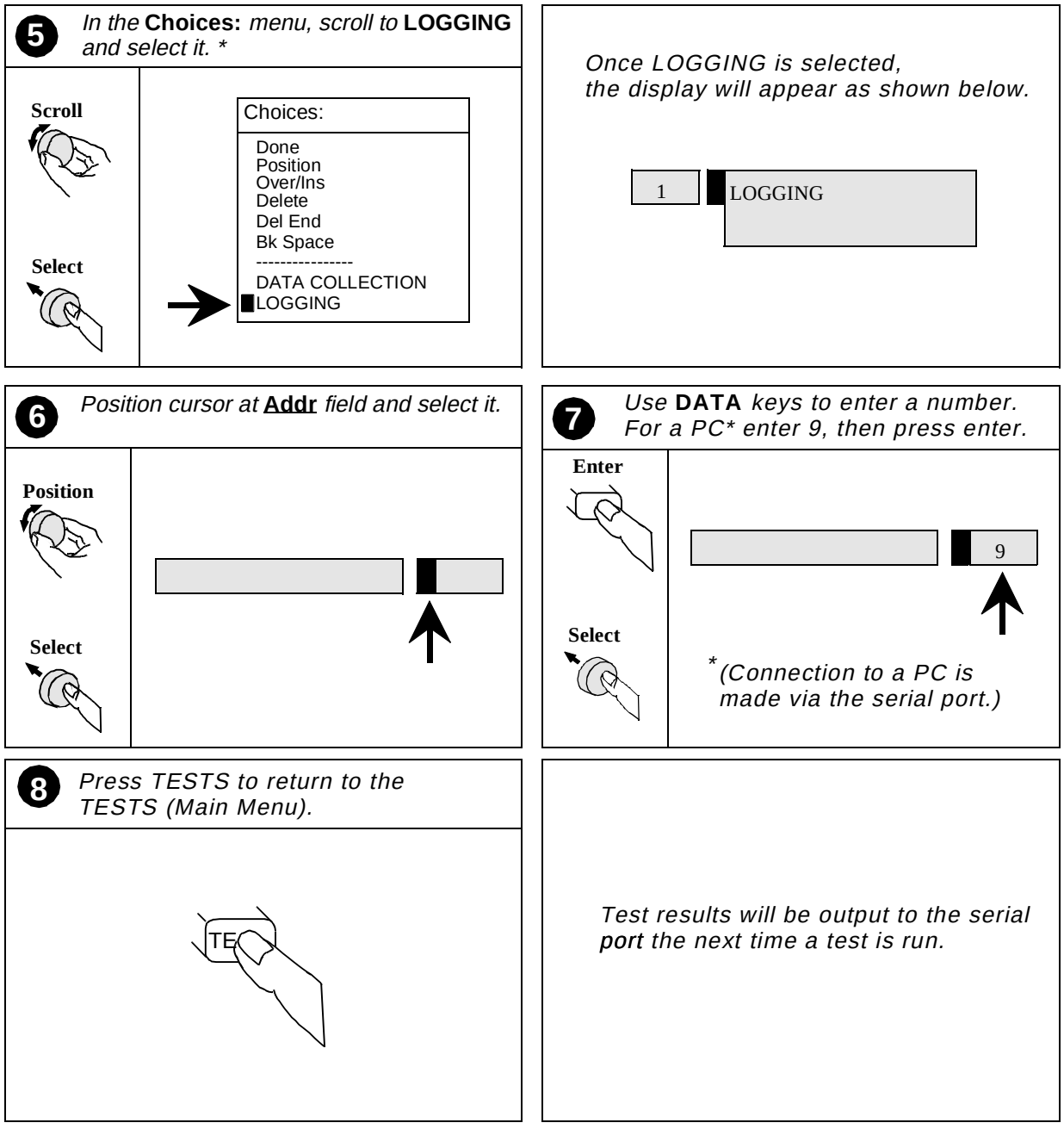


Figure 57 **Test Set configuration for logging to a PC**

Logging to a Serial Printer

A printer which has a serial port (usually a DB25 connector) can be quickly connected and used to log a hard-copy of the commands being sent between the Test System and the base station. The serial cable with HP part number 08921-61039 is an RJ-11 to DB25 cable.

Below is a diagram of the connection between the printer and the Test Set using a serial cable.

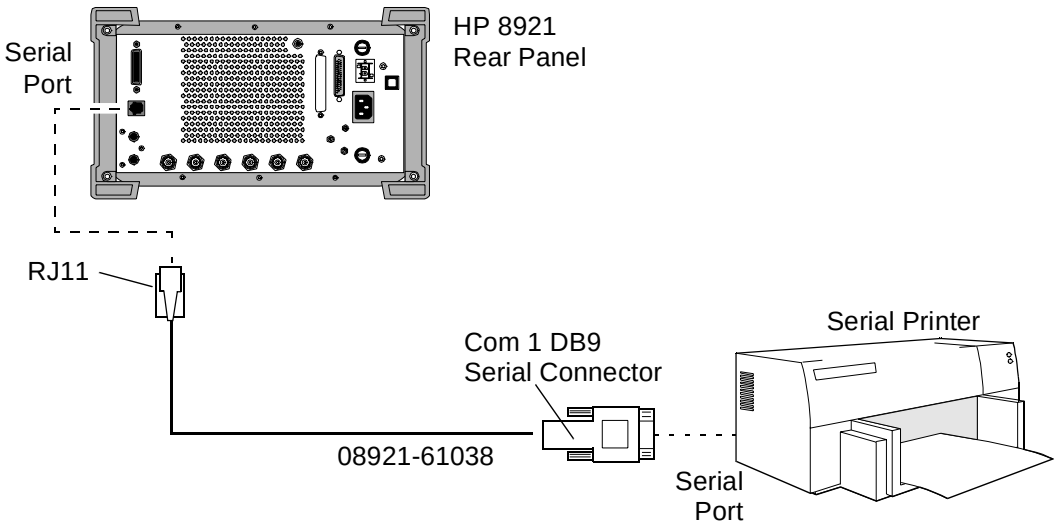


Figure 58 **Serial Connections for a serial printer.**

Procedure to set up the Test Set for Logging to a serial printer

1. Press the TESTS key.
2. Select the **`Print Printer Setup`** field. The TESTS (Printer Setup) screen will be displayed.
3. Select the **`Model:`** field. A list of compatible printers will be displayed.
4. Select your printer from the **`Choices:`** list.
5. Select the **`Printer Port:`** field. A list of output ports will be displayed.
6. Select Serial from the **`Choices:`** list.
7. Select Main Menu or K5 to return to the TESTS (Main Menu) screen.
8. Position the cursor at the **`Cnfg External Devices`** field and select it. The TESTS (External Devices) screen will be displayed.
9. Select the **`Inst#`** field and scroll to the first available number.
10. Position the cursor at the **`Calling Name`** field and Select it.
11. Select **`LOGGING`** from the Choices menu. The entry should look as follows:

```
Inst#    Calling Name          Model       Addr

1        LOGGING
```

12. Position the cursor at the **`Addr`** field and Select it.
13. Using the DATA keypad, enter a number into **`Addr`** field, for a serial port enter 9, then press ENTER.

```
Inst#      Calling Name          Model       Addr

1           LOGGING                            9
```

14. The LOGGING mode is now enabled. To rerun the Software, press the TESTS key then press **`Run Test`** (k1).

Logging to a Parallel Printer

Below is a diagram of the connection between the printer and the Test Set using the parallel cable.

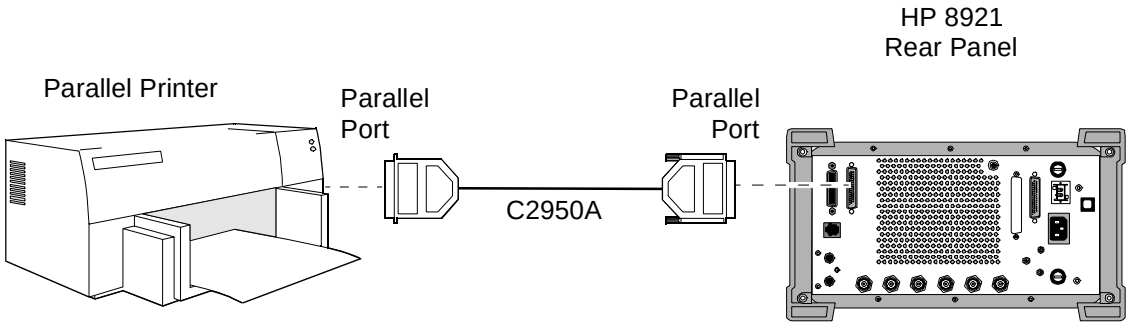


Figure 59 **Connections for a parallel printer.**

Procedure to set up the Test Set for Logging to a parallel printer

1. Press the TESTS key.
2. Select the **Print Printer Setup** field. The TESTS (Printer Setup) screen will be displayed.
3. Select the **Model:** field. A list of compatible printers will be displayed.
4. Select your printer from the **Choices:** list.
5. Select the **Printer Port:** field. A list of output ports will be displayed.
6. Select Parallel from the **Choices:** list.
7. Position the cursor at Main Menu and select it or K5 to return to the TESTS (Main Menu) screen.
8. Position the cursor at the **Cnfg External Devices** field and select it. The TESTS (External Devices) screen will be displayed.
9. Select the **Inst#** field and scroll to the first available number.
10. Position the cursor at the **Calling Name** field and Select it.
11. Select **LOGGING** from the Choices menu. The entry should look as follows:

```
Inst#    Calling Name          Model       Addr

1        LOGGING
```

12. Position the cursor at the **Addr** field and Select it.
13. Using the DATA keypad, enter a number into **Addr** field, for a parallel port enter 15, then press ENTER.

```
Inst#      Calling Name          Model       Addr

1           LOGGING                            15
```

14. The LOGGING mode is now enabled. To rerun the Software, press the TESTS key then press **Run Test** (k1).

Turning the Logging Mode Off

Follow the steps in **"Set up the Test Set for Logging to a PC" on page 156**, except set the **Addr** field entry to zero (0). This will allow you to leave the other information in the **Cnfg:External Devices** screen. You can then turn the logging mode back on by changing the **Addr** field entry back to your previously-used setting (1, 9, or 15).

How to Configure a Printer

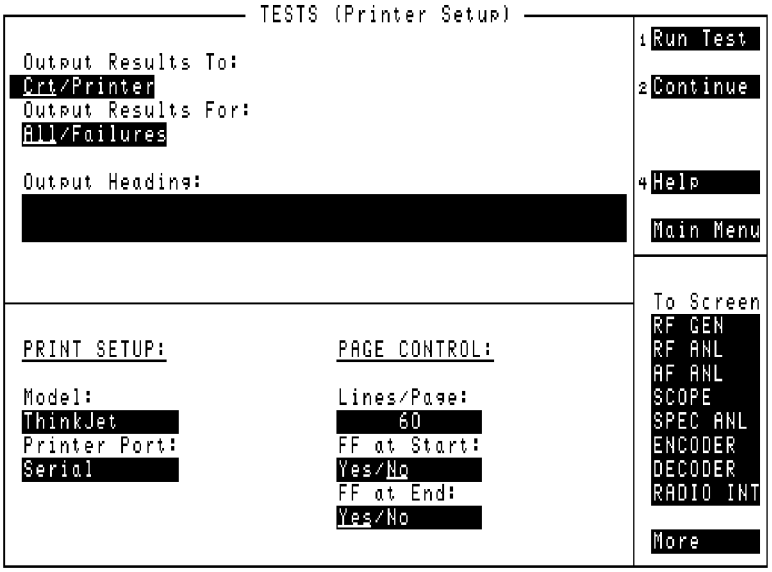


Figure 60 **TESTS (Printer Setup) screen**

The TESTS (Printer Setup) screen allows the user to configure the Test Set to print test results to a supported printer.

Printer Setup

Follow the step below to configure the Test Set for printing.

1. Verify that your printer is one of the supported models, **see "Supported Printers"** below.
2. Connect the printer to the Test System using the serial, parallel, or HP-IB port, **see "Making Printer Connections" on page 165**.
3. Generate the printout. You can print:
   - Test results: **see "Configuring the Test System for Printouts" on page 167**
   - Parameters (Test Parameters) and their entries - **see "How to Change the Test Parameters and Conditions" on page 125**
   - Specifications (Pass/Fail Limits) and their entries - **see "How to Change Spec Pass/Fail Limits" on page 128**

Supported Printers

The Test System supports the following printers:

- HP ThinkJet printer
- HP QuietJet printer
- HP PaintJet printer
- HP DeskJet printer
- HP LaserJet printer
- Epson FX-80
- Epson LQ-850

Making Printer Connections

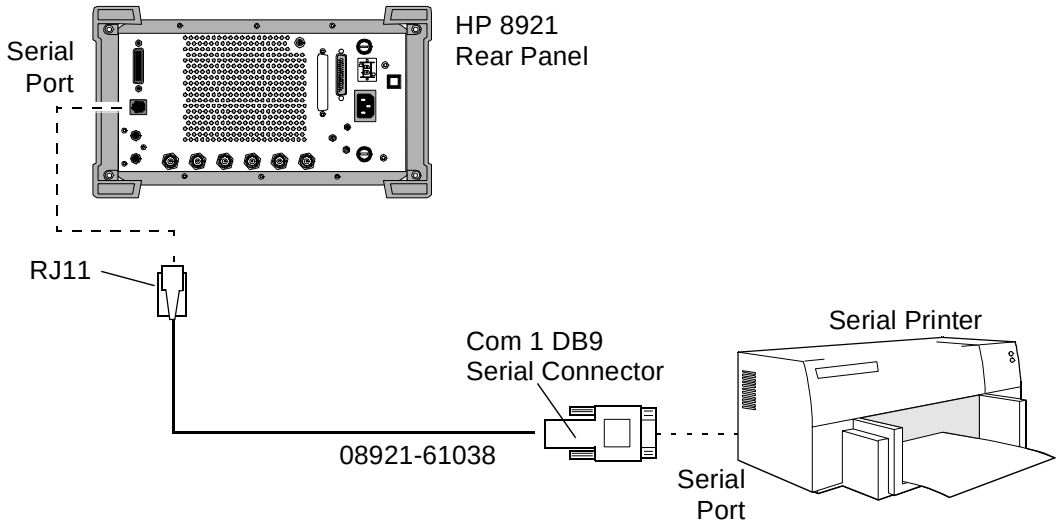


Figure 61 **Connections for the Test System and serial printer.**

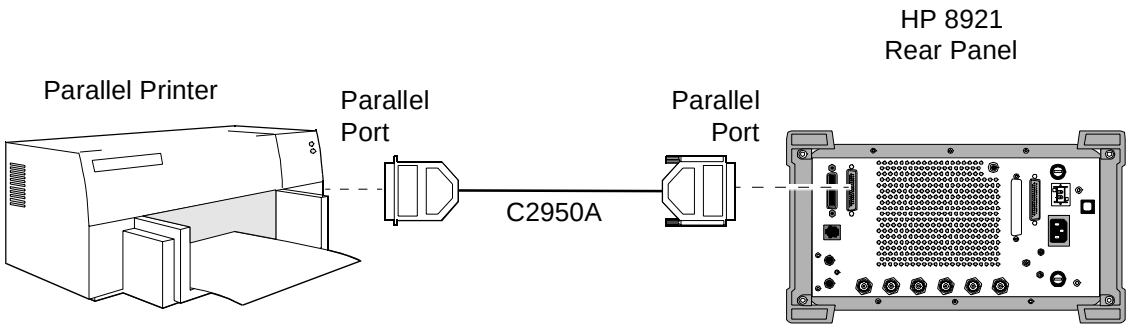


Figure 62 **Connections for the printer (parallel).**

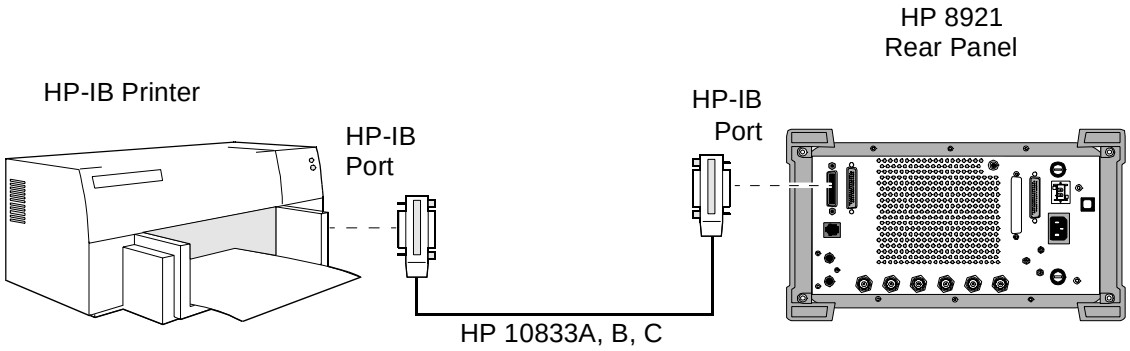


Figure 63 **Connections for the printer (HP-IB).**

Configuring the Test System for Printouts

To set the Test System up for printouts, follow these steps:

1. Press the TESTS key.
2. Select **Print Printer Setup**. The TESTS (Printer Setup) screen will be displayed.
3. Select the **Model:** field. From the **Choices** menu, select your printer model from the list.
4. Select **the Printer Port:** field. From the **Choices** menu, select the interface you have connected the printer to (**Parallel**, **HPIB**, or **Serial**).

NOTE: *If you have selected HP-IB as the printer port*, you also need to enter the address of the printer. Select the **Printer Adrs** field and use the DATA keys to enter the HP-IB address. Often printers with HP-IB interfaces default to an address of one (1).

5. Optional:
   a. Update the entries in the following fields to customize printouts and form feeds: **Lines/Page:**, **FF at Start:** and **FF at End:**.
   b. If you do not want to see all the test results, but only want to see the measurement values when a test fails, scroll to **Output Results For:** and press the knob until **Failure** is underlined.
   c. If you would like to add comments to the beginning of the test results printout, enter your comments in the **Output Heading:** field. 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.
6. Enable printing of the test results by scrolling to **Output Results To:** and pressing the knob until **Printer** is underlined.

NOTE: If you want to disable printing at a later time, all you need to do is change the **Output Results To:** setting back to **Crt**. You do not have to change any of the other settings in this screen.

7. To resume running the Software, press the TESTS key followed by the **Run Test** (k1) USER key.

Sending Printer Escape Sequences:

Printer setup commands are often handled by sending escape sequences to define printer configuration settings such as text pitch, margin size, and number of lines per page.

Escape sequences are sent at the time the Software is first run. Use these steps to define the escape character sequence to send:

1. If the Software is running, press the **Exit** (k5) USER key to stop it.
2. Press the TESTS key.
3. Scroll to **Cnfg:External Devices** and press the knob.
4. Scroll to the **Inst#** field, press the knob, and scroll to the first blank line in the screen (no entry under the **Calling Name** field). This would be the first line if you have not used the External Devices menu for other purposes. Press the knob again to de-activate the **Inst#** field.
5. Scroll to the **Calling Name** field and press the knob.
6. Scroll to **ESCAPE SEQUENCE** from the **Choices** menu and press the knob (you can also spell out the phrase using individual characters in the **Choices** menu).
7. Scroll up to **Done** in the **Choices** menu and press the knob.
8. Scroll to the **Addr** field and press the knob. Use the DATA keys to enter the address of the printer you are using:
   - Serial printers - enter 9
   - Parallel printers - enter 15
   - HP-IB printers - enter 7xx, where xx is the printer address (typically 701).
9. Scroll to the **Options** field (under the **Calling Name** field) and press the knob.
10. You can now choose from pre-defined escape sequences (see **table 7**) or build your own. Use the selection in the **Choices** menu to enter your escape sequence.

NOTE: If your sequence exceeds the length of the **Options** field, you can put in more than one escape sequence string. Use the next **Calling Name** field to continue the escape sequence definition.

11. When you are done inputting the escape sequence, scroll up to **Done** and press the knob. This completes the entry. This sequence will be sent each time you press the **Run Test** (k1) USER key in the TESTS screen.
12. To re-run the Software and send the escape sequence, press the TESTS key followed by the **Run Test** (k1) USER key.

Table 7 Pre-defined escape sequences and their functions.

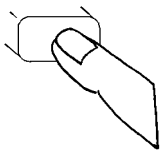
Escape Sequence	Printer Functions
&l66P	Sets the page length to 66 lines per page
&l72P	Sets page length to 72 lines
&l6D	Sets lines per inch to 6 lines
&l8D	Sets lines to inch to 8 lines
(s12h12v6T	Selects 12 characters per inch 12/72 inch character height gothic typeface
&a9L~&l6E	Sets left margin to 9 characters top margin to 6 lines
(s12h12v6T~&a9L~&l6E	Selects 12 characters per inch 12/72 inch character height gothic typeface left margin to 9 characters top margin to 6 lines
&l8d88P	Selects 8 lines per inch 88 lines per page
&l8d96P	Selects 8 lines per inch 96 lines per page
(s16.67h12V~&a17L~&l6E	Selects 16.67 characters per inch 12/72 inch character height left margin to 17 characters top margin to 6 lines

Using an SRAM Card

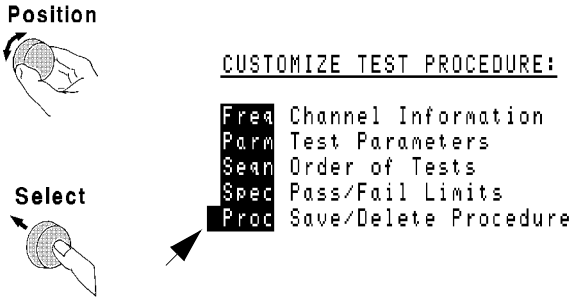
Initializing an SRAM card

1 Press [**TESTS**] to display the **TESTS (main menu)** screen.

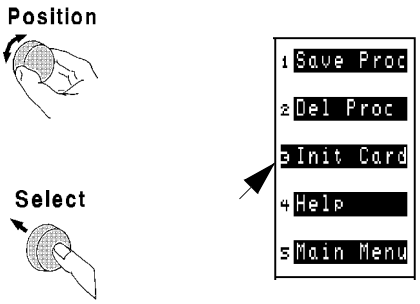
If you are using the IBASIC TESTS screen, press [**PRESET**] before pressing [**TESTS**].



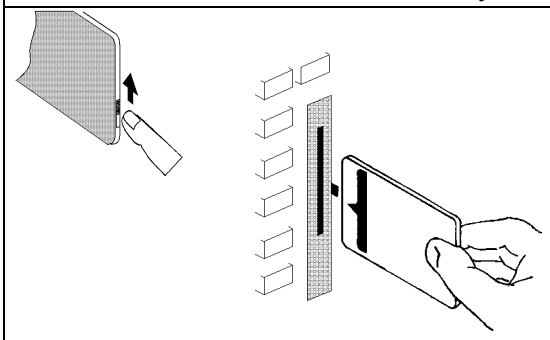
2 Position cursor at **Proc Save/Delete Procedure** and select it.



3 Position cursor at **Init Card** and select it.

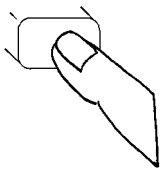


4 Slide write protect tab to the up position, then insert card into the test set memory slot.

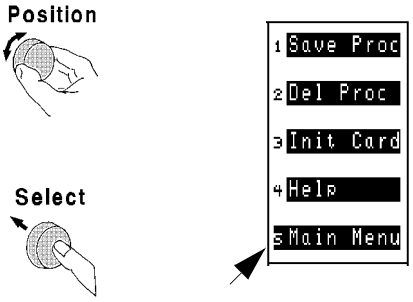


5 Press **YES** key on test set front panel to begin card initialization.

Initialization takes approx. 5 sec.



6 Position cursor at **Main Menu** and select it to return to the main menu.



Troubleshooting RAM Card usage

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

`Directory Overflow.`

- The memory 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 SRAM 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 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 or measurement errors or if you are questioning measurement results.

Error Summary

Overview

This chapter lists errors that might be encountered when using the Software. The errors are listed roughly in the order that one might encounter them when getting started using the Software:

"Errors When Loading and Running the Software" on page 175
"Errors When First Setting Up or Connecting to MSC" on page 177
"Communications Errors During Testing" on page 178
"Errors While Attempting Measurements" on page 181

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 MSC:

"Troubleshooting Checks for Communications Problems" on page 179
"Troubleshooting Tools for Communications Problems" on page 180

Errors When Loading and Running the Software

This group of 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 23**. The errors are presented with the error text, a description of the cause, followed by possible solutions.

- **Message: The HP 8921A must be configured in Control Mode. No other controllers may be on the HP-IB bus. Do you want to put the HP 8921A in Control Mode?**

  When the Software is first run, it checks to see that the IBASIC controller of the Cell Site Test Set is the "system controller." If not, it needs to be so that it can issue commands to the PCS Interface.

  Selecting **Yes** is your only choice if you want to continue with Software operation. Make sure that no other controllers are connected to the HP-IB and press **Yes** (k1) to continue on with Software use.

  Otherwise, choose **No** (k2) and the Software will be stopped.

- **Message: To run this program, a CDMA top box must be attached to your HP 8921A. Make sure the top box is plugged in and (and) operating properly and try again. Program terminated.**

  A required element of the Test System is a Dual Mode Cellular Adapter, which is used to make the CDMA measurements. Your Test System can use the HP 83203B or the HP 83205A Cellular Adapters.

  If the Cellular Adapter is present and you still encounter this error, check the following:

  - ❒ Verify that you have supplied the Cellular Adapter with AC power. The front-panel PWR light should be illuminated if the Cell Site Test Set is on.
  - ❒ If the unit is powered on and you still get this message, you will need to check the rear-panel connections between the Test Set and Cellular Adapter, especially the CONTROL I/O cable between the two units. Refer to the Installation chapter of the Cellular Adapter's *User's Guide* for connections.

- **Message: Verify PCS Interface is connected and on. Retry?**

  This error message occurs when the Test Set is unable to communicate with the PCS Interface via the HP-IB bus. Check the following:

  - ❒ Make sure that the PCS Interface is plugged in and the power switch is set to the "on" position. The front-panel POWER indicator should be lit.
  - ❒ Check that there is an HP-IB cable connected between the Test Set and the PCS Interface. Other devices on the HP-IB bus may interfere with bus communications. Remove any other devices (printers and so forth) until this error message is eliminated.
  - ❒ The PCS Interface has a serial communications setting that is not used in this application. Make sure that the rear-panel HP-IB Address Selector is set to "HP-IB" and not "Ser". If set to "Ser", set the switch to "HP-IB", then cycle the power to the PCS Interface.

- **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 all storage registers at once (globally).

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 8921 User's Guide* for instructions on this procedure.

To delete a single register:

1. Press the RECALL key.
2. Scroll the cursor to the register to be deleted.
3. Press the ON/OFF key.
4. Press the YES key (same key) to confirm and the register is cleared.

To delete *all* saved registers:

1. Press the RECALL key.
2. Scroll down to **`*Clr All*`** and press the knob.
3. Press the YES key to confirm and all save registers will be cleared.

Communications Errors

Errors When First Setting Up or Connecting to MSC

- **Messages:**

  MSC, TEST SET, AND LAPTOP BAUD RATES MUST BE SET TO THE SAME VALUE.
  CHECK TEST PARAMETERS FOR MSC DATA LENGTH AND PARITY FOR ERRORS.

  These messages may be displayed if the configuration of the Test Set and modem do not match the communication requirements of the MSC. To correct this, follow the steps to set up the Test Set parameters for serial communication via the modem. **See "Set up the Modem for Communication to the MSC" on page 31**.

- **Message: Base station did not answer command: <command name> with a response of: <command response> in three tries. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  This command indicates that basic communication with the MSC is taking place, but that the control commands to set the site up for service are not being responded to. Refer to **"Troubleshooting Checks for Communications Problems" on page 179** for a list of items to check when you have received this error.

- **Message: Improper communication with MSC. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  If commands are misunderstood at the MSC end, this error message can occur. Use the laptop emulator to send commands and view responses to identify the problem command. You may also use the logging capability of the Software to display the commands between the MSC and the Test System to help you locate the problem area. **See "Logging" on page 151**.

- **The unit under test is unavailable. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  If the MSC is unable to free up the requested BBA at the site, it will send a command indicating that the equipment is unavailable. You may have to try testing that BBA at a later time or contact switch personnel for assistance.

Communications Errors During Testing

Message: Lost the modem carrier. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to the main menu.

This error indicates that communication with the MSC was taking place, but the link was lost sometime during the testing process.

As indicated in the message, you can go to the Laptop Emulator menu to try to re-establish the link with the MSC. If the link was lost, you will have to repeat the steps of **"Configuring the Cell Site for Tests" in chapter 3**.

Troubleshooting Checks for Communications Problems

The following list provides items to check when you are having communication difficulties using the modem to connect to the MSC.

- **Cable connections between the Test System, modem, and phone line:**

  Make sure that you have made the proper connections between the Test System's serial port, the modem, the phone line, and the PC (if used). See the connection diagram in **"Connections for the HP 8921A, Modem, and PC" on page 93**.

  A list of cables and their part numbers is provided in **"Connector Kit" on page 94**.

- **Modem operation:**

  Verify that you have supplied power to the modem and that the power indicator light (if it has one) is on. Most modems also have indicators to show when they have gone "off hook" and TX/RX lights to show data transfers.

  Make sure that you have followed the steps to configure the modem. These steps make all required modem settings to match the communication setup of the modem to the Test System and MSC. See **"Set up the Modem for Communication to the MSC" on page 31**.

- **Dialling difficulties:**

  In some cases, you may have to customize the dialling information in the Laptop Emulator to properly dial and connect to the MSC. For example, if you need a "9" in your dialling sequence to get an outside phone line there may be a short delay before the dial tone is heard. Therefore, you may need a delay after the "9" before the rest of the digits in the sequence are sent. This can be done in the Laptop Emulator screen and then stored in a custom file in the Define Auto menu (**see "Creating User-Defined Commands" on page 106**).

- **Modem autobaud being set to "on":**

  If you have made changes to the system baud rate since applying power to the modem, you made need to turn it off and back on in order to clear the "autobaud" setting. Some modems autobaud to the incoming data rate and will not change thereafter until the power is removed.

- **MSC is not configured to send responses to commands:**

  After sending a control command to the MSC, the Software looks for response commands from the MSC before going on. It may be that the MSC you are communicating with has been configured to not send responses to remote computers. You may need to check with a switch technician to see if this is the case for the MSC that you use.

Troubleshooting Tools for Communications Problems

The following tools can be used to troubleshoot communications problems between the Test System and the MSC:

❒ **Laptop Emulator:**

The Laptop Emulator can be a useful tool when checking communications between the Test System and the MSC.

Use the **`Test Modem`** command to check basic communication between the Test System and the modem. If the modem does not respond with "OK" you need to check:

- Serial connections between the Test System and modem. Make sure that you are using a Test System cable that connects the modem to the serial 10 port. See the cable accessories table for part numbers (**"HP 83202A Option 083 Cable Accessory Kit Contents." on page 94**).
- Power connections to the modem and that the power switch is "on."
- Settings in the TESTS (Edit Parameters) menu for serial communications (baud rate, parity, stop bits, and so forth). **See "Parameters List and Descriptions" on page 110**.
- Verify modem configuration. Follow the steps in **"Set up the Modem for Communication to the MSC" on page 31**.

Use the Laptop > Modem mode and a PC to perform the connection and to send custom commands once connected. **See "Using the Laptop > Modem Mode" on page 105**.

❒ **Logging Data Communications:**

The Software provides a "logging" feature that prints the commands between the Test System and the MSC. This allows you to view the outgoing command and the MSC's response (if any).

If no responses are being received, you may need to verify with a switch technician that the MSC is set to send responses to a remote computer.

See "Logging" on page 151 for more information.

Errors While Attempting Measurements

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

- **Code domain power test failed. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  If the Test System 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 main menu - this could be a problem *if you are not using a modem to control the base station via the MSC*. If you enter the wrong channel number, the Test System will be tuned to the wrong frequency. You can use the Spectrum Analyzer mode to verify the presence of a signal.
  - Entry for **`PN Offset`** in the main menu - if you have entered an incorrect value for PN offset, the Test System will not be able to correlate CDMA measurements. You may use the PN Offset Search test from the main menu to find the valid PN offset value (**see "PN Offset Search" on page 78**).
  - **Even-second clock** connection - check your connection from the source of the even-second clock (at the base station). You may have to set the TST CLK switch to the ON position to enable the clock signal. The even-second clock signal should be connected from the base station to the EVEN SECOND/SYNC IN port on the Cellular Adapter.
  - **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 set the TST CLK switch to ON to enable the reference signal. The timebase reference should be connected to the SYNTH REF IN port on the rear of the Cellular Adapter (there are alternative connections; **see "Connections" on page 90**). If a valid clock signal is present during testing, the REF UNLOCK (yellow) LED on the Cellular Adapter will be off.
  - **Transmitter** turned on at time of testing - if you are using a modem connected to the MSC for base station control, the Test System will turn on the transmitter when needed for testing. You may verify that the transmitter is on by checking the green ACT LEDs on the front of the ACU and BCR modules. If you are *not* using the modem, you will have to enable the transmitter yourself as prompted by the Software.

- **Input power must be greater than -25 dBm (3μW) to conduct this test. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  To improve the accuracy of power measurements, the Software checks the signal level into the RF IN/OUT port of the PCS Interface prior to performing power measurements. If the signal level at the RF IN/OUT port is less than –25 dBm, this message will be posted and testing will be halted.

  To correct this condition, remove attenuation from the signal path. This may require using an external attenuator with less loss, using shorter RF test cables, or connecting to a different tap point on the base station equipment (an antenna output rather than a coupled connection). Make the necessary changes and re-run the test.**Warning; A test was aborted while sending control commands to the MSC. Use the Laptop Emulator to correct problem and to return all configured BBAs back to active status. Press 'Abort' to return to main menu.**

  If you press the **Abort** (k5) key to stop testing, the base station equipment can be left in an indeterminate state. The Software will prompt you to ask if you would like to send the "multistop" command to abort all the BBA configurations. Press **Yes** (k1) to abort or **No** (k2) to continue without sending additional commands to the MSC.

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