

HP E6385A Lucent CDMA Base Station Test Software

User's Guide

Software Revision: A.01.00 and above

HP Part Number E6385-90001

Revision B

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In This Book

This book documents the use of the HP E6385A CDMA Base Station Test Software. The Software is used to test CDMA base station equipment manufactured by Lucent Technologies.

Chapter 1, Product Description

General information on the Software plus hardware requirements for Software operation can be found in this chapter.

Chapter 2, Installation

Start at this chapter when using the Software for the first time. This chapter shows how to make connections, load and run the Software, and configure the Software to work with an external modem connected to the Test Set or an internal modem in a PC (using the BTS Laptop Utility program).

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 utility tests.

Chapter 5, CDMA Tests Software Reference

Descriptions of the Lucent CDMA Base Station Test Software parameters and specifications, use of the Demo mode, and use of the Laptop Emulator utility are included in this chapter.

Chapter 6, General Software Reference

This chapter discusses the use of the TESTS menus, memory cards, and how to print test results.

Chapter 7, Troubleshooting

This chapter offers suggestions 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 8935 Series E6380A CDMA Base Station Test Set.
- Software - the Lucent CDMA Base Station Test Software, described in this book.
- Select - means to move the cursor (using the cursor knob) to a specific control field and press the knob to choose it.

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: `Menu`
- A selection choice or setting on the display: `Equipment Type`
- A USER Key: `κ5 (Prev Menu)`. USER keys are labeled `κ1` through `κ5` on the front panel of the Test Set. As the Software is running, it assigns various operations to these keys.

The convention used to indicate USER key operations implies that, in this case, you can either position the cursor in front of the control field labeled `Prev Menu` and press the knob to go to the previous menu, or just press the `κ5` USER key to do the same thing.

Acronyms (MSC, EVM, PCS...)

Acronyms are used throughout this manual. A list of acronyms and their definitions is provided on [page 103](#).

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1 Product Description

Review this chapter for general information on the Lucent CDMA Base Station Test Software. Included is a list of required equipment to perform the tests, plus a look at the basic Software flow.

NOTE The HP E6385A Lucent Base Station Test Software is contained on two One Time Programmable (OTP) PC cards. One card is used for CDMA testing, the other for AMPS testing. Separate manuals are included for CDMA and AMPS testing.

Overview

Description of the Lucent CDMA PCS Base Station Test Software

The Software is an Instrument BASIC (IBASIC) application used to set up the Test Set 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 and procedures:

- TX Power Meter
- Pilot Only Test
- Code Domain Tests
- Automated BBA Test
- Spectrum Analyzer
- Code Domain Analyzer
- CDMA Analyzer
- PN Offset Search
- Insertion Loss Measurement
- Return Loss Measurement
- Calibrate TX Test Port
- Test Cable Calibration
- Laptop Emulator

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 time spent at the site and to greatly improve the repeatability of measurements.

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

Who should use the Lucent CDMA Base Station Test Software?

If you are installing, commissioning, or maintaining 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 E6385A Software:

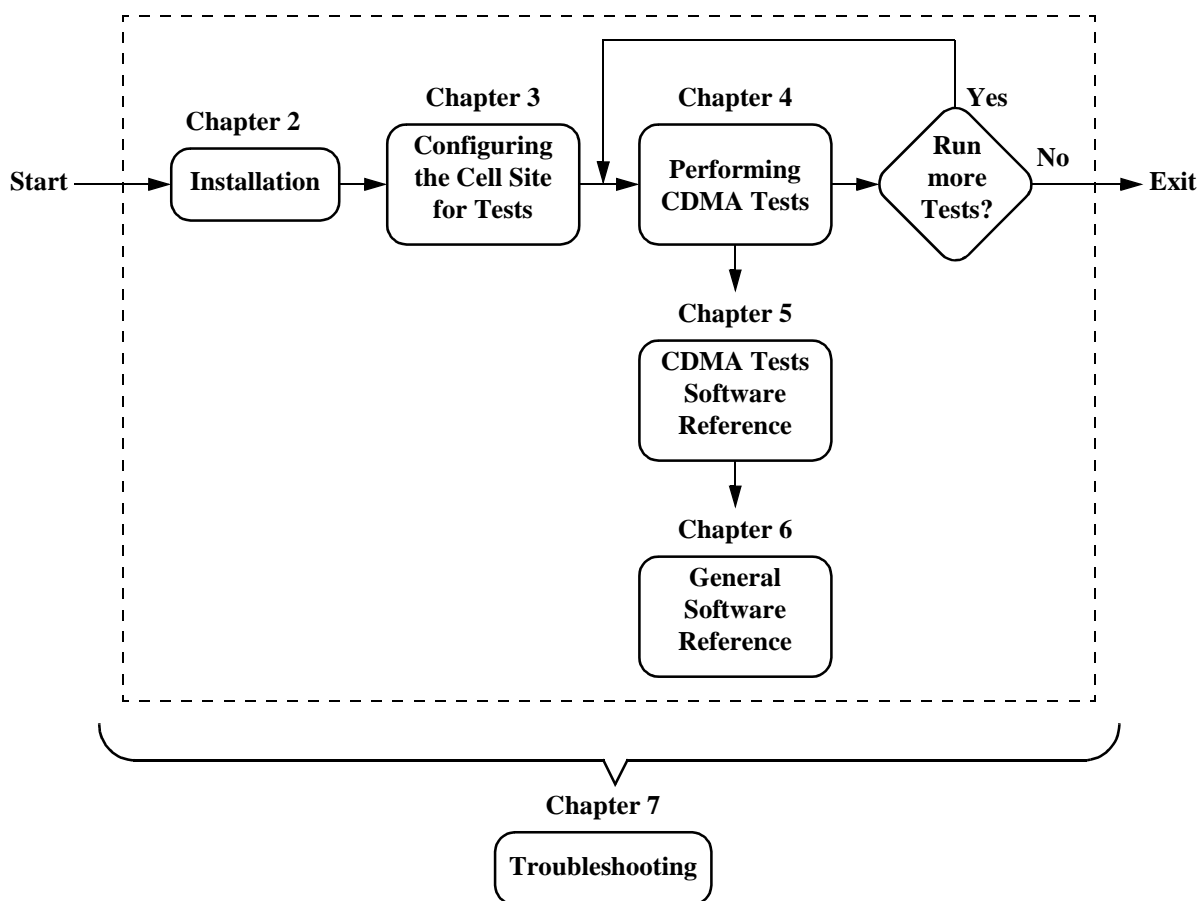
- ❑ PC Card (OTP) containing the CDMA Base Station Test program (part number E6385-10001)
- ❑ PC Card (OTP) containing the AMPS Base Station Test program (part number E6385-10002)
- ❑ Blank 1 MB SRAM PC card - to save test procedures, save/recall registers, test data, configuration settings for external modems (part number HP 83231A)
- ❑ 3.5 inch diskette containing the BTS Laptop Utilities program (part number E6385A Opt. K01)
- ❑ Lucent CDMA Base Station Test Software manual - this manual (part number E6385-90001)
- ❑ Lucent AMPS Base Station Test Software manual (part number E6385-90002)
- ❑ Software License Agreement

Software Operation Overview

Figure 1-1 illustrates the basic steps for Software operation. After running the software, a test can be repeated or you can select another test.

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

Figure 1-1 Steps for the Use of the CDMA Test Software



Test System Hardware

Required Equipment

Test Equipment

The Software is written specifically to work with the HP 8935 Series E6380A CDMA Base Station Test Set:

Modem

The best way to communicate with the MSC to control the cell site during testing is to use a laptop PC (Personal Computer) with an internal modem. This allows you to dial up and login to the MSC and enter the maintenance craft shell as you normally would for other cell site operations.

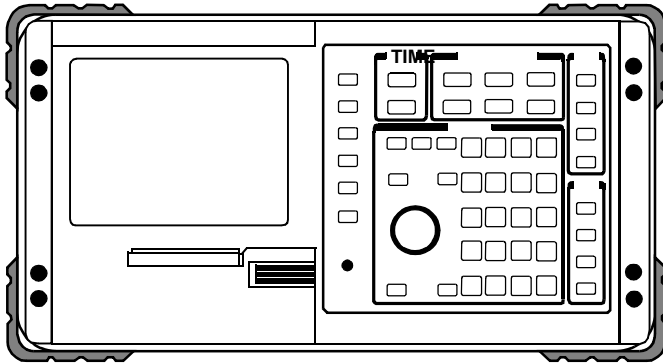
The Software also supports the use of external modems to control the cell site via the MSC. See [“Using an External Modem” on page 35](#).

Cables and Adapters

Several cables and adapters are required. See [“Connector Kits” on page 113](#) for information on an optional cable kit that supplies the necessary cables and adapters to connect the Test Set to the base station and modem.

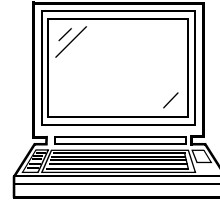
Figure 1-2 Required Equipment

Test Equipment required:

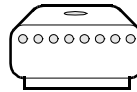


HP 8935 Series E6380A CDMA Base Station Test Set

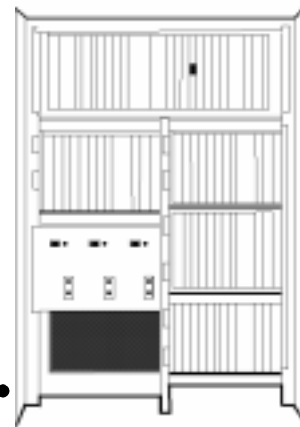
You must supply:



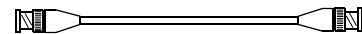
- Laptop PC to communicate with the switch.

- Modem (external or in PC). 

- Modem cable to Test Set

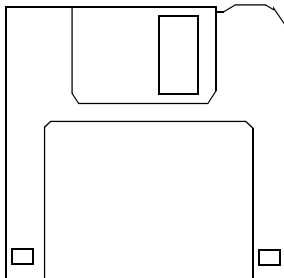
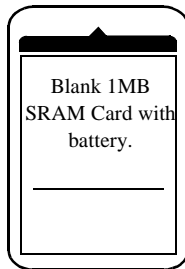
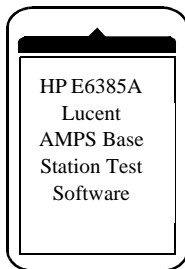
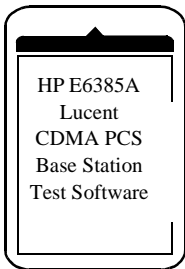


Lucent CDMA Base Station.

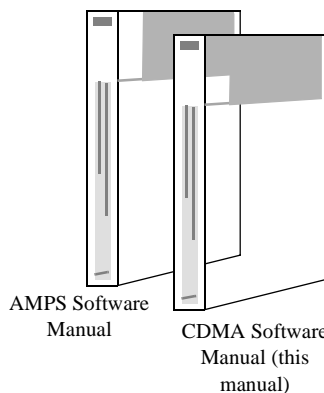


- Cables to connect the base station to the Test System.

Supplied with the HP E6385A Software:



BTS Laptop Utilities Software
(HP E6385A Opt. K01)



Optional Equipment

Printer

A printer can be used 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 15, SERIAL 9, 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 printers

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 Set and Software supports using a PC to control the site via the MSC. The PC is connected to the Test Set via the SERIAL 9 port. Most PC's with an available serial port are compatible with the Test Set.

If you install the BTS Laptop Utilities program in your PC, you can use your laptop and internal modem to relay commands to the MSC from Test Set, collect test data, log commands sent between the Test Set and the MSC, and capture screen images.

GPS Time and Frequency Reference Receiver

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

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

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

See [Figure 5-5, "HP 58503A GPS Time and Frequency Reference Receiver Connections,"](#) on [page 110](#).

Getting Help, Software Upgrades, and Training

For instrument servicing, see the *HP 8935 Series E6380A CDMA Test Set Assembly Level Repair Guide*.

For application assistance, call the HP Application Hotline (1-800-922-8920, USA and Canada only).

For information about software upgrades and hands-on HP training, contact your local HP sales engineer.

2

Installation

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

Overview

The steps in this chapter are:

1. [“Connect the Test Set to the Site Equipment” on page 21](#)
2. [“Load and Run the Lucent CDMA Base Station Test Software” on page 24](#)
3. [“Connect the Modem to the Test Set” on page 29.](#)

The last step, connecting the modem, is not a strict requirement. However, the test examples in [“Performing CDMA Tests” on page 57](#) 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 145](#) for a summary of differences when running without the modem.

Connect the Test Set to the Site Equipment

Connect the clock signals (19.6608 MHz and even-second) and transmitter output to the Test Set. See [“Test Set Connections to the Base Station” on page 105](#).

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

If you are using a separate GPS reference instead of the cell site’s clocks, see [Figure 5-5, “HP 58503A GPS Time and Frequency Reference Receiver Connections,” on page 110](#).

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

CAUTION The Test Set’s ANT IN port is only used for very low signal levels ≤ 60 mW (17.78 dBm). Therefore, to prevent damage to the Test Set, *never connect this port directly to the TX Antenna port* of the base station. This port is typically connected to the base station’s TX Test port.

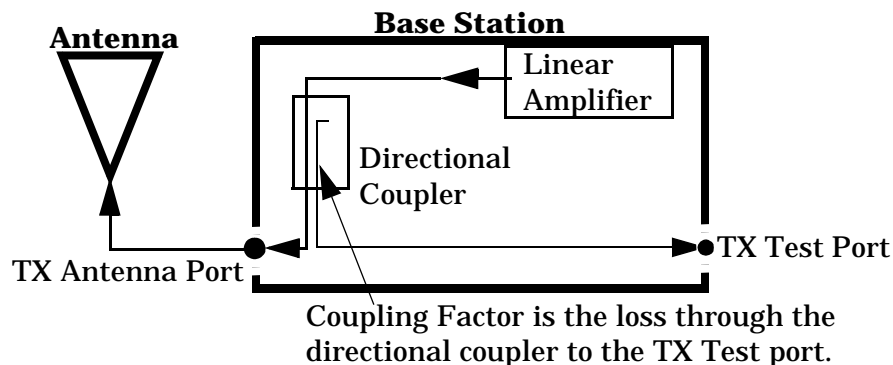
The Test Set’s RF IN/OUT port is for signals of ≤ 100 W. This is the only port on the Test Set that you should connect directly to the base station’s TX Antenna port.

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

In Service Testing Using the TX Test Port

The TX Test port gets its signal through a directional coupler connection to the TX Antenna port (see [Figure 2-1](#)). This allows you to make measurements on an active base station without disconnecting the transmit antenna and interrupting service. A “Coupling Factor” (loss) through the directional coupler is entered into the Software to compensate power measurements. Coupling factors are typically 40 to 50 dB, but can vary depending on the base station design.

Figure 2-1 Simplified Diagram of the Transmitter Output Path



If you do not know the exact coupling factor, the software contains a utility to measure the coupling factor. See [“TX Test Port Calibration” on page 90](#).

NOTE If you do not know the Specified Output Power for your transmitter at the *TX Antenna* port, the Software must measure the power to calculate the coupling factor. This requires you to take the base station out of service to connect the Test Set directly to the TX Antenna port during the calibration routine.

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

Out of Service Testing Using the TX Antenna Port

Disconnecting a TX Antenna feed line and connecting the Test Set to the TX Antenna port requires you to first take the associated base station out of service (disable call processing and turn off all transmissions to that TX Antenna port).

The base station can be taken out of service (and turned back on to make measurements) several ways:

1. Configure the Software to use an external modem connected to the Test Set to dial into the MSC (switch). After negotiating through the switch's software to arrive at a command prompt (typically in the ECP Craft Shell), the Software sends the necessary commands to control the base station.
2. Dial into the MSC using your laptop and internal modem and use an application running on your PC, such as Procomm Plus®, to control the base station through its maintenance software.
3. Call the MSC and have switch personnel control the base station for you.

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

Load and Run the Lucent CDMA Base Station Test Software

Locate the PC card labeled “HP 8935 Lucent CDMA Base Station Test Software” and follow the steps outlined in [Figure 2-2](#) and [Figure 2-3](#).

Figure 2-2 Loading the Software

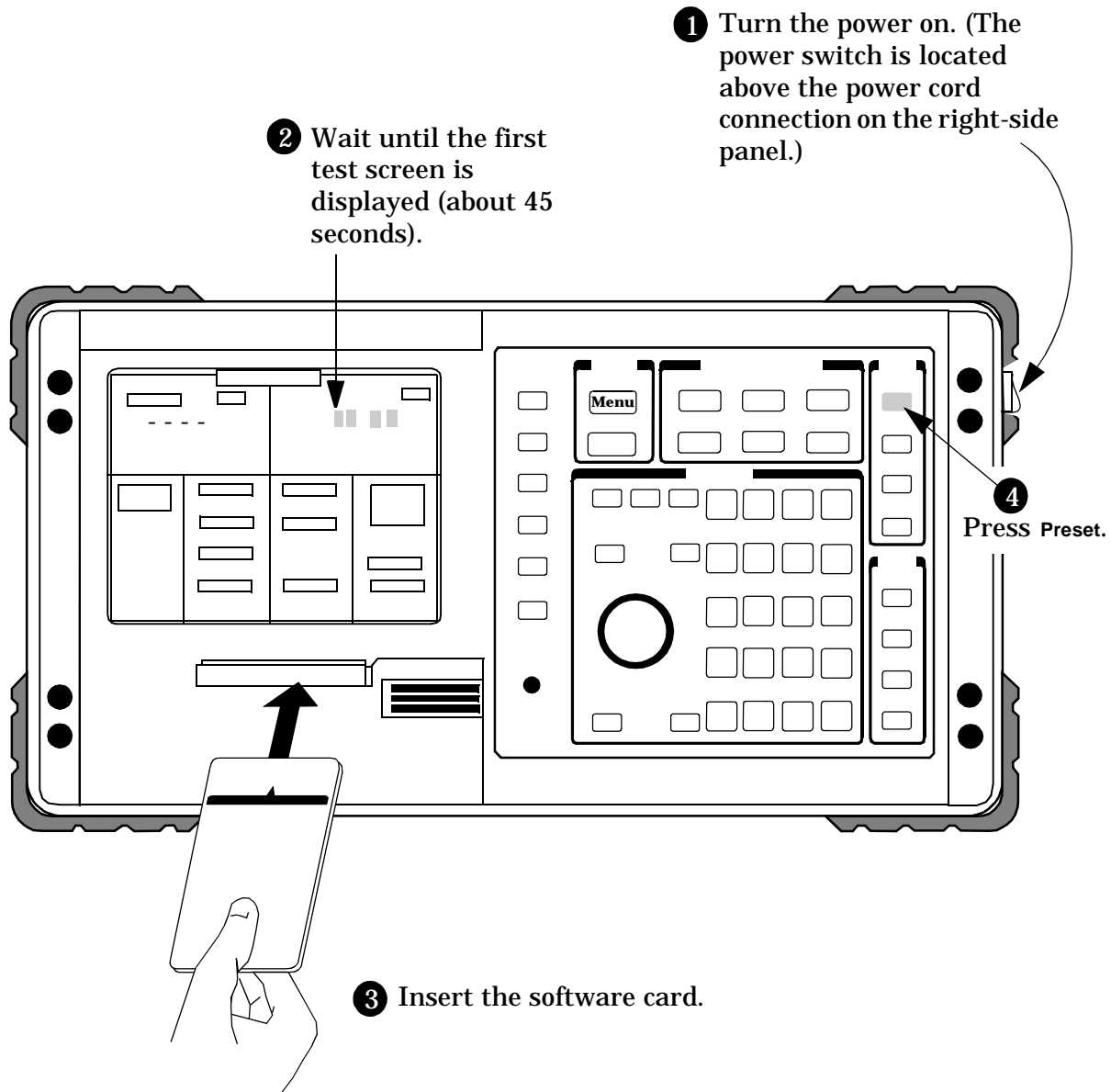
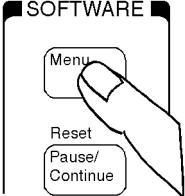













Figure 2-3 Loading the Software (continued)

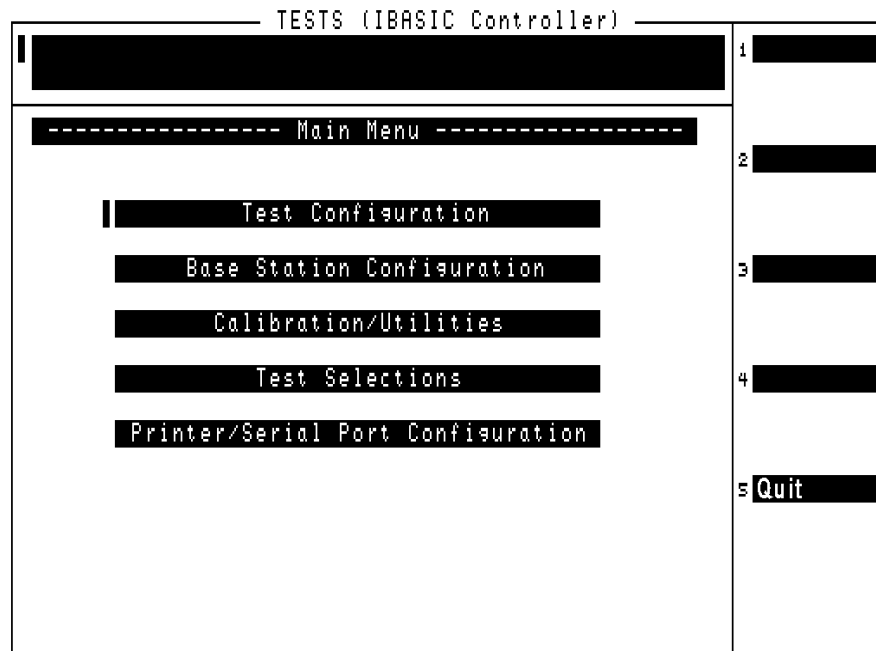
<p>5 Press the SOFTWARE Menu key to display the Software Menu screen.</p> 	<p>6 Position the cursor at Select Procedure Location: and select it.</p> <p>Position</p>  <pre>LOAD TEST PROCEDURE: Select Procedure Location: █ Select Procedure Filename: █</pre> <p>Select</p> 
<p>7 Position the cursor at Card and select it.</p> <p>Position</p>  <pre>Choices: █ Card ROM RAM</pre> <p>Position</p> 	<p>8 Position the cursor at Select Procedure Filename: and select it.</p> <p>Position</p>  <pre>LOAD TEST PROCEDURE: Select Procedure Location: Card Select Procedure Filename: █</pre> <p>Select</p> 
<p>9 Position the cursor at Choices: and select the Procedure name: LCDMA.</p> <p>Position</p>  <pre>Choices: █ LCDMA</pre> <p>Select</p> 	<p>10 Position the cursor at Run Test and select it. The Software is now loading.</p> <p>Position</p>  <pre>1 Run Test 2 Continue 4 Help</pre> <p>Select</p>  <p>  Loading Time: First time: approximately 20 seconds. After first time: approximately 8 seconds. </p>

Navigation of the Lucent CDMA Base Station Test Software

After the software has loaded, you will see the Software's Main Menu on the display of the Test Set (see [Figure 2-4](#)).

Configuration operations, test utilities, and tests are grouped into sub menus. Turn and press the knob to access the desired sub menu.

Figure 2-4 Lucent CDMA Base Station Test Software Main Menu



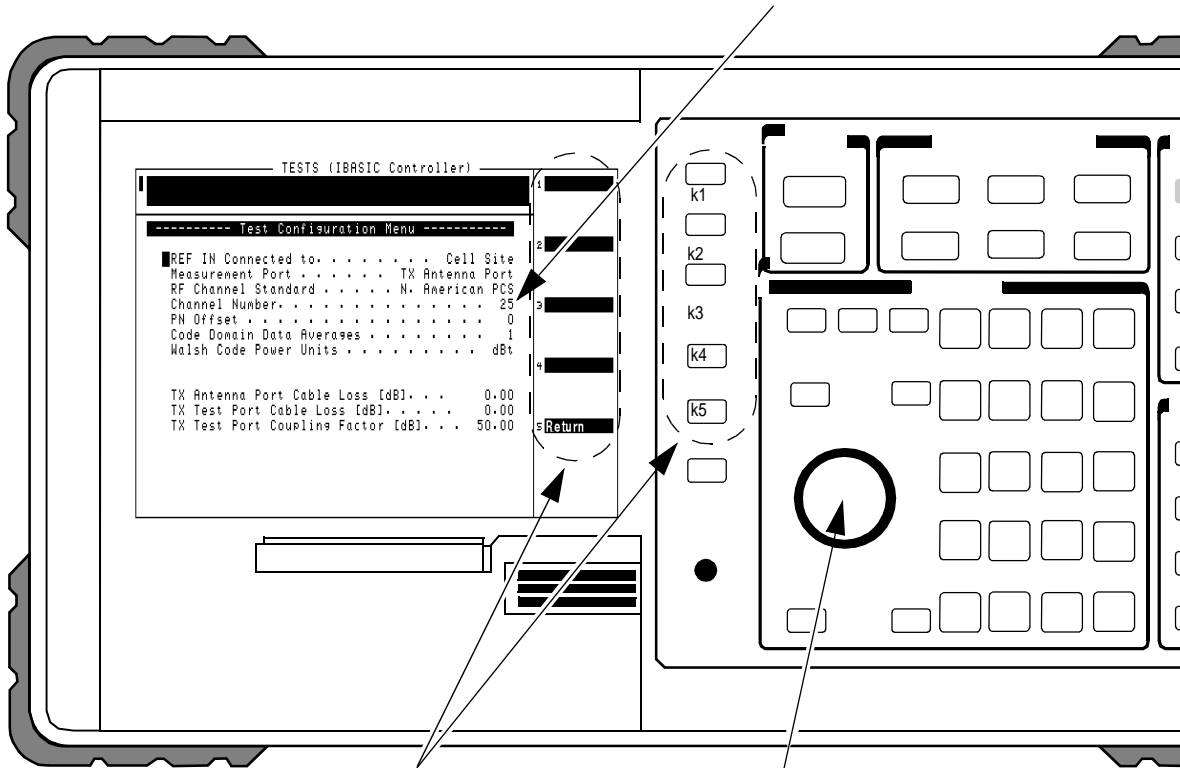
Main Menu Functions

- **Test Configuration** is where you define test information used by all tests; such as identifying the timing reference signal source, cable losses, TX test port coupling factor, and the channel number and PN offset of the BCR you are testing.
- **Base Station Configuration** is where you enter the specific cell site and base station information the Software needs to control your base station when communicating with the MSC during tests (after configuring the modem and verifying its operation).
- **Calibration/Utilities** accesses procedures used to ensure optimal calibration of the Test Set and test cables. This menu is also used to enter the laptop emulator mode to send commands directly to the MSC from a connected laptop PC.
- **Test Selections** accesses CDMA tests.

- **Printer/Serial Port Configuration** accesses routines used to enable printing of test results, enable data collection and data logging operations, configure a modem to talk to the MSC, and define the serial port communication settings.

Figure 2-5 Changing Settings and Using USER Keys**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 on the right side 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 back to the previous screen.

Knob

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

Connect the Modem to the Test Set

Using a modem, the Software can take control of the cell site to perform tests in much less time than would be required under manual control. The software can work with an internal modem in your PC (preferred method) or an external modem.

NOTE If you are *not* using control of the site via a modem to the MSC, you may skip this section. However, the procedures in [Chapter 4, “Performing CDMA Tests,”](#) use a modem for site control.

Using an Internal Modem and the BTS Laptop Utilities

The BTS Laptop Utilities are shipped with the Software on a separate 3.5 inch disk. This program sets up the internal modem and serial communications port of your laptop PC for automated testing with the Test Set. The utilities software also provides several other helpful functions.

Since you probably already use your laptop’s internal modem to connect to the MSC, using this program is the best way to establish communications between the Test Set and the MSC.

The BTS Laptop Utilities provides the following functions:

- A Switch Terminal window that works with your internal modem to dial into the switch (MSC) and monitor replies sent back from the switch.
- A Test Set terminal window to send commands to the Test Set.
- A Test Results window where automated test results are displayed and can be saved for later use.
- A Screen Capture window to capture screen images and save them as a bit mapped image. This is very helpful when using the Test Set’s spectrum analyzer or other screen you want to capture. (IBASIC operation must be paused first (by pressing the **Pause/Continue** key) to print any of the TESTS screens used for automated testing.)

Need More Information?

For additional information on using the BTS Laptop Utilities after installation, refer to the online Help topics included with that program.

System Requirements for BTS Laptop Utilities

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

- 133 MHz Pentium™¹ Processor
- 16 MBytes or RAM
- Windows 95®² or Windows NT 4.0 (Intel based)
- Available RS-232 serial port
- Internal modem

Figure 2-6 Installing the BTS Laptop Utilities Program



BTS Laptop Utilities comes compressed on an install disk for easy setup on your laptop. Simply insert the floppy into your drive and select **start** then **run** then type **A:\Setup**. The install shield will lead you through the installation process.

Configuring the Laptop's Serial Port.

After installing the BTS Laptop Utilities, you need to configure the laptop's serial port to communicate with the Test Set. If you are using the BTS Laptop Utilities to communicate and control the base station, you also need to configure the laptop's modem to match the MSC's serial communication setting. The following communications parameters should be determined before configuring the serial ports.

1. Pentium is a U.S. registered trademark of Intel Corporation.
2. Windows 95 and Windows NT are U.S. registered trademarks of Microsoft Corp.

Figure 2-7 Specifying the Serial Communication Port Settings



- **Switch Port** - This port is used to communicate with the laptop's Modem. The port number can be found in your laptop's Device Manager in the System Properties window. Simply right click the My Computer icon then select properties. Look under the properties for the modem.

If the modem's port is already in use, a message will be posted telling you a device already has control of that port. The most common culprits are programs such as Laplink or other communications programs running in the computer's background. You will need to close the other program and reselect the required Com port.

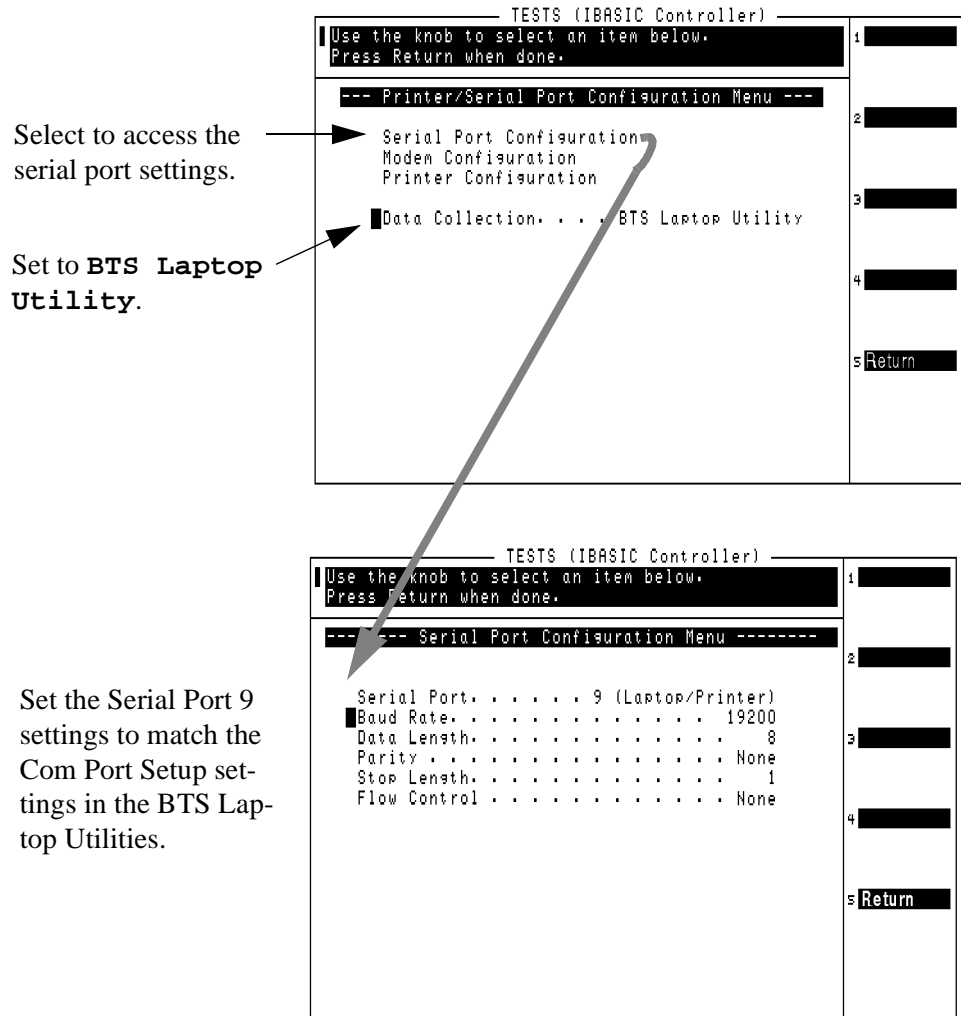
- **Switch Baud Rate** - This setting defines the speed at which the laptop communicates with the PC card or internal modem. This is not the speed at which the modem communicates with the switch (MSC). Most modems negotiate at the start of the session with the modem on the other end of the line for the best data transfer rate. This value can be set to 57600.
- **Test Set Port** - This is the port your laptop uses to communicate with the Test Set. This port setting can also be found in your laptop's Device Manager in the System Properties window. Just look under **ports** to determine the choices available.
- **Test Set Baud Rate** - This is the speed that the laptop communicates with the Test Set. This value should match the baud rate found on the HP E6385A Software's Serial Port Configuration Menu for **Serial Port 9 (Laptop/Printer)**. This value will not automatically adjust during the session. The recommended baud rate for the Test Set is 19200.

Configuring the Test Set Software to Work with the BTS Laptop Utilities Software.

After installing BTS Laptop Utilities on your laptop, you need to configure the HP E6585A Software to send data to the laptop. This is accomplished by telling the Software to use the BTS Laptop Utilities and by setting the SERIAL 9 port communication parameters.

- To select BTS Laptop Utilities operation.
 1. Load and run the Software (see “[Load and Run the Lucent CDMA Base Station Test Software](#)” on page 24). The Software’s Main Menu is displayed.
 2. Select **Printer/Serial Port Configuration** on the Main Menu.
 3. Set the Serial Port Configuration Menu settings to work with the BTS Laptop Utilities (see [Figure 2-7 on page 31](#) and [Figure 2-8 on page 33](#)).
 - Set the **Baud Rate** field to match the Baud Rate setting on the Comm Port Setup window (19200 is recommended).
 - Set the **Data Length** to 8.
 - Set the **Parity** to None.
 - Set the **Stop Length** to 1.
 - For baud rates ≤ 19200 , set **Flow Control** to None. For baud rates >19200 , set **Flow Control** to Hardware.
 4. Set the **Data Collection** field to **BTS Laptop Utility**.

Figure 2-8 Serial Port Settings and BTS Laptop Selection

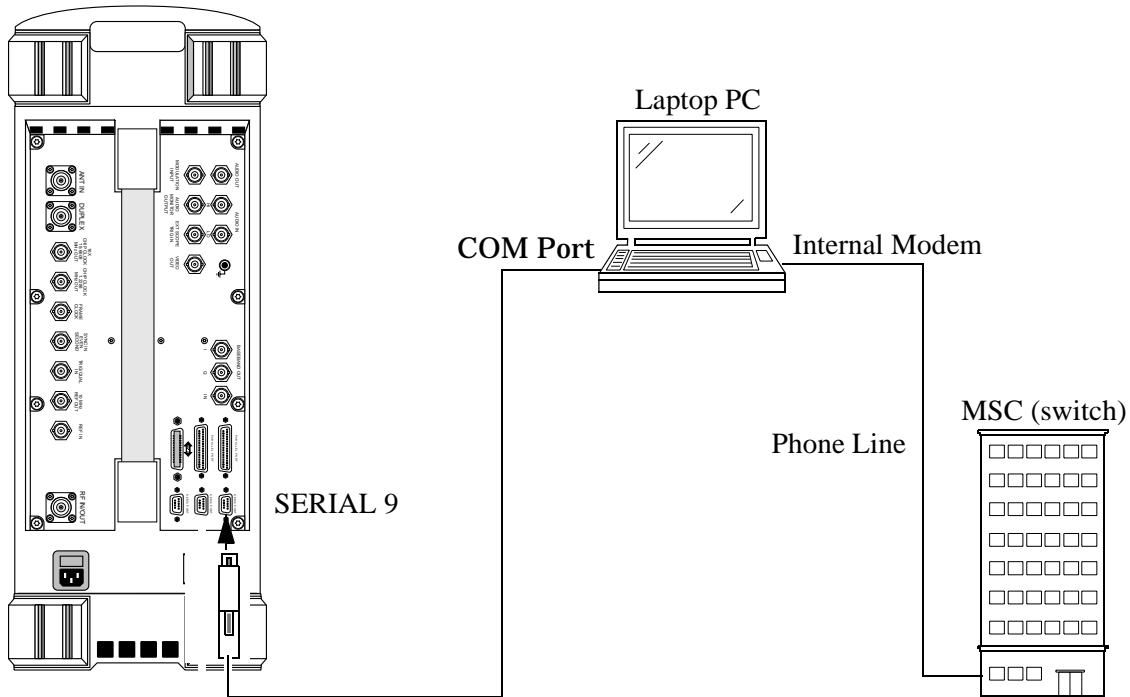


You should now be able to capture Test Set screens and, with HP's base station test software, you should be able to record test results.

Test Set to Laptop Connections

Figure 2-9 shows the Test Set to laptop connections. The laptop's modem must also be connected to a phone line capable of connecting to the MSC. If no phone line is available at the base station, a cellular phone with a properly configured cellular capable modem will work.

Figure 2-9 Test Set and PC Connections



Test Your Connections and Configuration Settings

To test the settings you have selected, you can connect a null modem cable (DB9 to DB9) from the Test Set to the Com port of your laptop and try a screen capture. With the cable connections complete, and BTS Laptop Utility running on your laptop, simply press the Test Set's **Print** key (if a program is running in the Test Set, press **Pause/Continue** to pause the program before printing). The currently-displayed screen should appear in the Test Set Screen Capture window of the BTS Utilities.

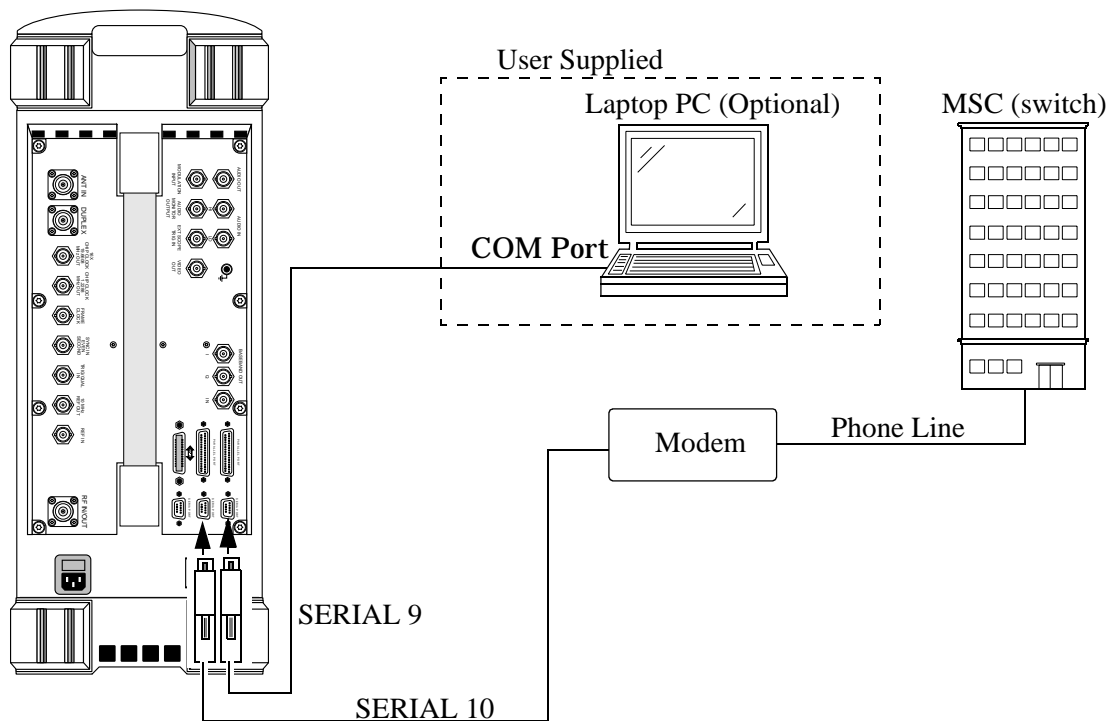
To test the modem connections you can open the Switch Terminal window in the Laptop Utilities and type **AT** followed by a carriage return. The modem should reply **OK**.

Using an External Modem

To control the radios at the cell site, the Test Set has the ability to send control commands to the switch via a modem connected to the SERIAL 10 port. This section deals with setting up the external 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 SERIAL 9 port of the Test Set to allow you to interact manually with the switch. This addition of the PC is optional. [Figure 2-10](#) shows the basic configuration of the Test Set, PC, and modem and how it is used to communicate to the switch.

Figure 2-10 Test Set, External Modem, and PC Connections



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 need to set the Test System's parameters to match the communications requirements of the MSC, including the following items:

- Baud rate
- Data length
- Parity
- Stop length
- Flow Control

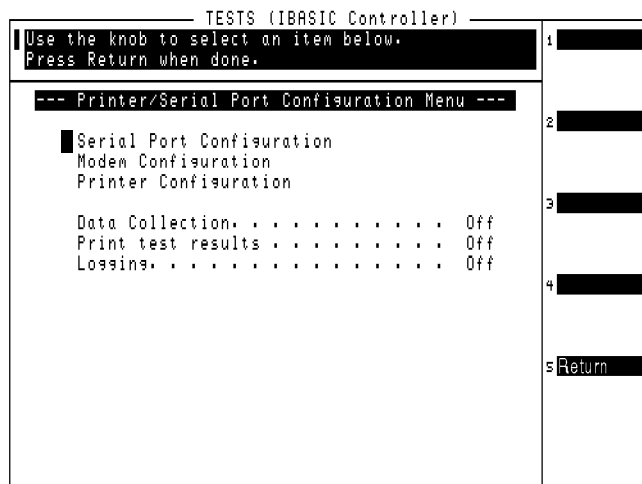
To configure the SERIAL 10 port for modem operation, perform the following steps:

Step 1. Load and run the Software (see [page 24](#)). The Software Main Menu is displayed (see [Figure 2-4 on page 26](#)).

Step 2. Select Printer/Serial Port Configuration.

Step 3. Select Serial Port Configuration.

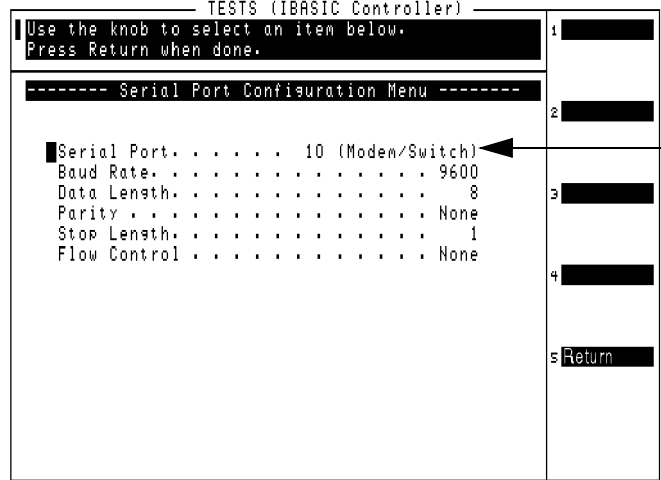
Figure 2-11 Selecting Serial Port Configuration



Step 4. Select **Serial Port** and set it to **10 (Modem/Switch)** (see [Figure 2-12](#)).

Step 5. Set the remaining communications parameters to match the serial port settings of the MSC.

Figure 2-12 Modem Communications Parameters



Select **Serial Port** and set the **SERIAL 10** port's settings to match the MSC's dial in communications settings.

If a PC is connected to the **SERIAL 9** port, change the serial port **9** settings to match the serial port **10** settings.

Step 6. If you have a computer connected to the **SERIAL 9** port (as shown in [Figure 2-10](#) on page 35), select **Serial Port** again and select **9 (Laptop/Printer)**. Change these settings to match those set in Step 5.

Turn on 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.

Step 7. Select **Return (k5)** twice to return to the Software's Main Menu screen.

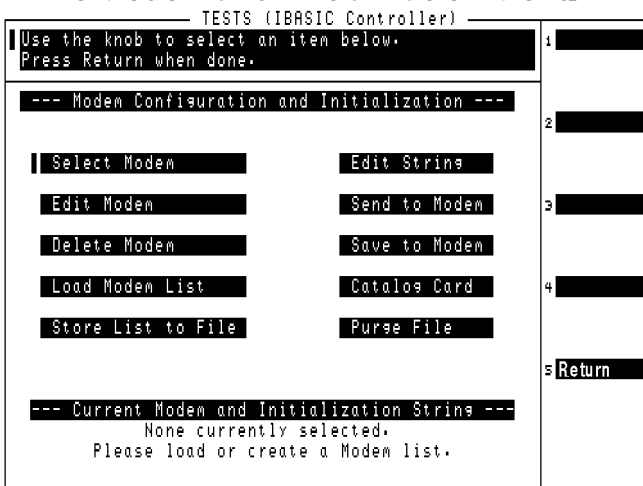
NOTE The settings you have made in the Serial Port Configuration Menu are saved in non-volatile memory and will be retained even if you turn the Test Set off. However, if you load another program or procedure, the settings will be lost. You can save your settings in a procedure file for later use after running other programs. See "[How to Save/Delete Procedures](#)" on page 160. for instructions on creating procedure files.

Configuring and Initializing the External Modem

After defining the serial port communication settings to the modem, you need to enter an identifying name for the modem you are using and its initialization string. You can then save this information to a file for later use.

See “[Modem Configuration and Initialization Menu](#)” on page 134 for more information on using this screen.

Figure 2-13 The Modem and Initialization Menu



Modem Configuration Procedure.

Use this procedure to enter the name and initialization string for the modem you are using.

- Step 1.** Load and run the Software (see [page 24](#)). The Software's Main Menu is displayed (see [Figure 2-4 on page 26](#)).
- Step 2.** Select **Printer/Serial Port Configuration**.
- Step 3.** Select **Modem Configuration** to display the Modem Configuration and Initialization menu ([Figure 2-13](#)).
- Step 4.** Select **Edit Modem**.
- Step 5.** Enter an identifying name for the modem, using the knob to scroll through and select characters from the **Choices** menu. Select **Done** when finished.
- Step 6.** Select **Edit String**.
- Step 7.** Enter the initialization string for the modem, using the knob to scroll through and select characters from the **Choices** menu. Select **Done** when finished.
- Step 8.** Insert an SRAM PC card into the Test Set, setting the card's write protect switch to allow writing to the card.

Step 9. Select **Store List to File** to save the modem configuration to a file on the PC card. The Software saves the file under the name “UMODEM”.

If you select **Load Modem List**, then **Select Modem**, you see the modem name you just entered. This is how you load and retrieve stored modem files for later use.

Modem Initialization Procedure.

Use this procedure to send the initialization string to the modem to initialize it for use with the Software. In most cases, this string is all that is required to properly initialize your modem.

If you are unsuccessful in getting your modem to communicate with the switch, you may need to re-edit the initialization string using the **Edit String** function. See “[Modem Configuration and Initialization Menu](#)” on page 134. Be sure to re-save the initialization string using **Store List to File** after getting the initialization string to work with the modem.

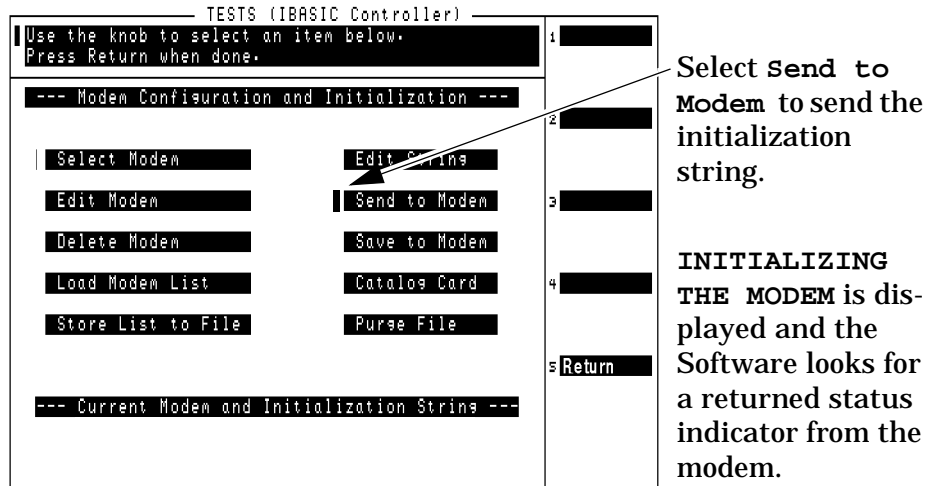
Step 1. If your modem is not already connected to the Test Set and phone line, make the connections now. If it is not turned on, turn it on now.

Step 2. Configure the Software to use your modem (as outlined on [page 38](#)).

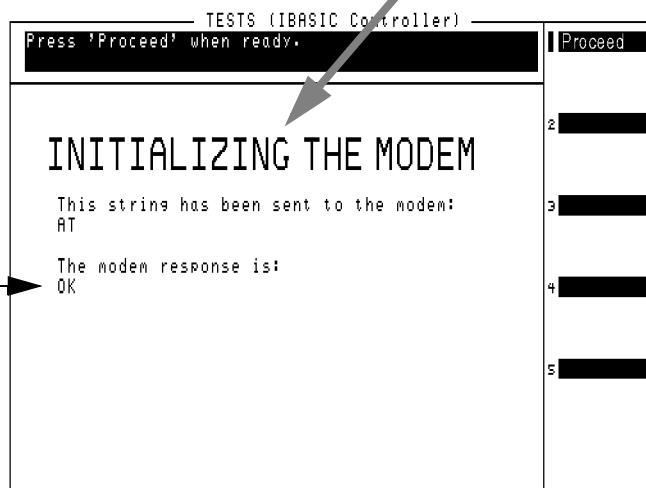
Step 3. With the Modem Configuration and Initialization screen displayed, select **Send to Modem** (see [Figure 2-14 on page 40](#)). The message “INITIALIZING THE MODEM” is displayed, along with the initialization string you entered.

If the modem initialized correctly, the response “OK” is displayed.

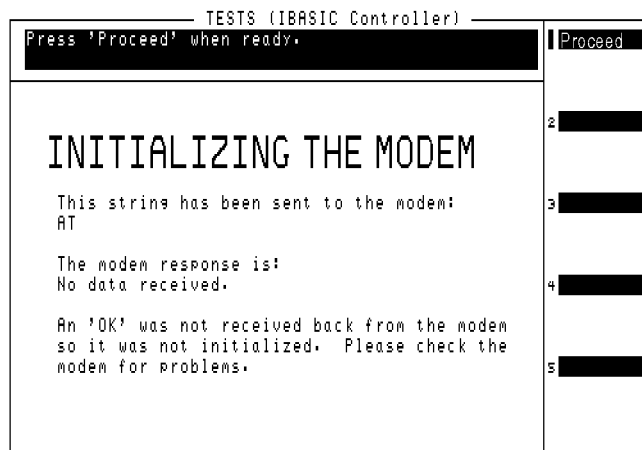
Figure 2-14 Initializing the Modem



If the modem initialized correctly, the response "OK" is



If the modem did not initialize, the response "No data received" is shown.



If the modem did *not* initialize, the message "No data received" is displayed. Verify that the modem is connected to the SERIAL 10 port on the Test Set and that the modem is turned on. You may also need to re-edit the initialization string.

- Step 4.** If the modem accepts the command string, you should save the setting in the modem by selecting **Save to Modem**. This saves the string in the non-volatile memory of the modem so you don't have to re-initialize the modem the next time you connect it to the Test Set.
- Step 5.** After successfully initializing the modem, select **Return (k5)** twice to return to the Main Menu screen.

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 193](#) for help.

3

Configuring the Software for Tests

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

If you are not using automated control of the cell site, you still need to provide some information about the base station before beginning testing (see [“Base Station Configuration Procedure” on page 45](#)).

Configuring the Software results in the following conditions:

- Several parameters about the cell site have been entered, such as the specified output power of the BCR. The cell site number, the BBA under test, BCR attenuation level, and the number of channel elements you are testing, must also be entered to provide this information to the MSC for automated testing.
- Communication has been established with the MSC (via the modem) and a command prompt is displayed on your laptop PC or on the Test Set. This indicates that the MSC is ready to receive commands from the Test Set.

Overview

For automated control of the cell site, you should have connected and configured the modem to work with the Test Set, as outlined in chapter 2. 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 setup a base station for testing.

If you are using the BTS Laptop Utility program with a PC and an internal modem, that program should be installed and the PC's serial communication ports configured ([“Configuring the Laptop's Serial Port” on page 30](#)).

NOTE This method of site control is optional, but is highly desirable when possible. If you have other means of controlling the site equipment, enter the Specified Output Power, as directed in the [“Base Station Configuration Procedure” on page 45](#), and skip the rest of this chapter and start making tests (see [“Performing CDMA Tests” on page 57](#)). See also [“Testing without MSC Control” on page 145](#).

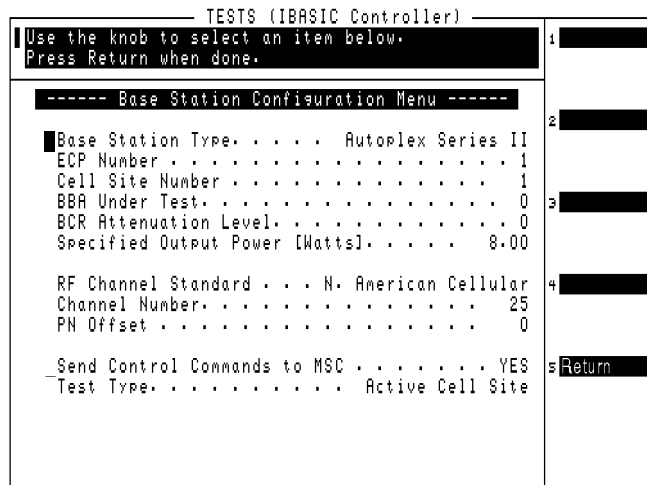
Define Which Cell Site and BBA to Test

Before the Software can control the base station, it must be able to tell the MSC which cell site and which BBA to test. The Software also needs to know how much power you expect to measure. This information is supplied on the Base Station Configuration Menu.

Base Station Configuration Procedure

- Step 1.** Load and run the Software (see [page 24](#)). The Software's Main Menu is displayed (see [Figure 2-4 on page 26](#)).
- Step 2.** Select **Base Station Configuration**. The Base Station Configuration Menu is displayed ([Figure 3-1](#)).

Figure 3-1 Specifying Base Station Configuration Information



- Step 3.** Select **Base Station Type** and choose the type of base station you are testing: PCS Minicell or Autoplex Series II
- Step 4.** Enter the **ECP Number** for the ECP that controls the cell site you are testing.
- Step 5.** Enter the **Cell Site Number** for the cell site you are testing.
- Step 6.** Enter the number of the BBA you are testing in the **BBA Under Test** field. This tells the MSC which BBA to control.
- Step 7.** Enter the **BCR Attenuation Level**. This is the value used to control base station power by the MSC, and is used when measuring transmitted power. This value varies according to the base station type (model) and geographic location. See [“TX Power Meter” on page 64](#) for more information.

Step 8. Enter the **Specified Output Power [Watts]**. This is the expected output power at the TX Antenna port (foam jumper) or at the TX Test port after subtracting the coupling factor. This value must be set for both manual and automated testing.

This setting is for a pilot channel only signal, and is affected by the number of channel elements that are active, and the BCR attenuation setting and digital gain unit (DGU) settings for the pilot, sync, paging, and traffic channels in the translation table. Use the value specified by Lucent for testing power.

Step 9. Enter the **RF Channel Standard** to use when you enter a channel number (cellular, PCS, Koren PCS).

Step 10. Enter the **Channel Number** for the CDMA channel your base station is transmitting on.

Step 11. Enter the **PN Offset** of your cell site. If you are unsure of the offset, run the PN Offset Search utility to find and automatically enter the PN offset. See [“PN Offset Search” on page 93](#).

Step 12. For automated control of the cell site:

1. Set the **Send Control Commands to MSC** field to **YES**.
2. Set the **Test Type** field to indicate a **Configured Cell Site** or an **Active Cell Site**.

When **Configured Cell Site** is selected, you also need to enter the number of **Channel Elements to Test** [0 to 55]. See [“A Note About Configured and Active Site Testing” on page 47](#).

3. Select **Return (k5)** to return to the Software's Main Menu.

Step 13. If you are going to use manual control of the cell site, set the **Send Control Commands to MSC** field to **No**, and select **Return (k5)** to return to the Software's Main Menu

A Note About Configured and Active Site Testing

- In the **configured** mode, the Test Set 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 If you chose to send commands to the MSC when testing using the **active** mode (see [step 12 on page 46](#)), the Software will temporarily remove the BBA from service to allow you to make the required antenna connections. Once made, the BBA is returned to service. You must inhibit call processing prior to running tests in the **active** mode to prevent interference 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**.

Connect to the MSC Using a Laptop PC

You can connect to the MSC three ways:.

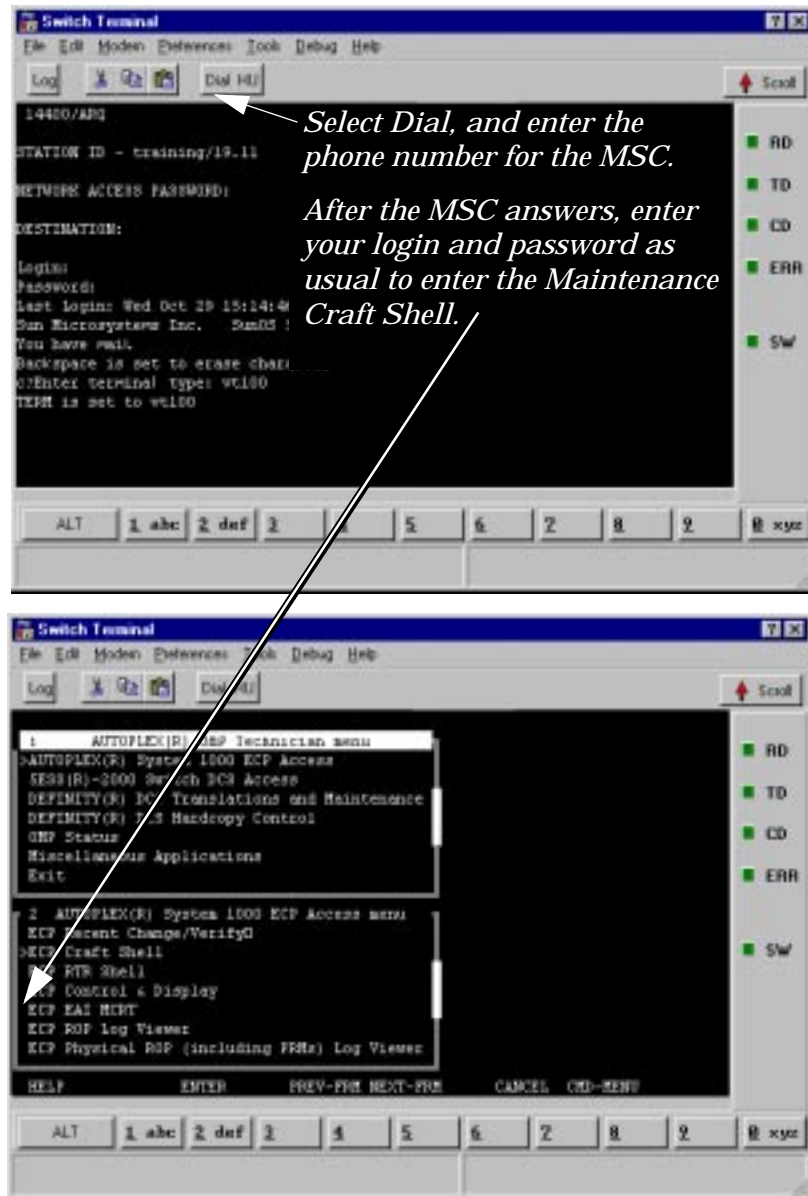
- Using a PC with an *internal modem* and the BTS Laptop Utilities connected to the Test Set. This is the preferred method, since it does not require connecting and configuring an external modem to communicate with the MSC. Connections are shown in [Figure 2-9 on page 34](#).
- Using a PC with a communications program and an *external modem* connected to the Test Set. This method uses the same communications package you normally use to dial up and login to the MSC, but requires you to use the Test Set and Laptop Emulator function in the Software as a communications link between the modem and the PC. Connections are shown in [Figure 2-10 on page 35](#).
- Using the Test Set and an *external modem* (no PC). This method requires you to send commands directly from the Test Set to the modem, using the Laptop Emulator function in the Software, to connect to the MSC. This method may not work well when negotiating through an OMP to login due to command response time requirements. Connections are shown in [Figure 2-10 on page 35](#).

MSC Dial-Up Procedure Using a PC and Internal Modem

- Step 1.** Make sure your PC is connected to the Test Set (SERIAL 9 port) and the PC's internal modem is connected to a phone line.
- Step 2.** Install and configure the BTS Laptop Utility program in your PC. Refer to [“Using an Internal Modem and the BTS Laptop Utilities” on page 29](#). Be sure to access the Preferences menu, Comm Port Setup, and define the Switch and Test Set communications settings. This specifies the ports and data rates the PC will use to communicate with the MSC and the Test Set.

Step 3. Access the BTS Laptop Utilities Switch Terminal window and enter the same commands you would use in your regular communications program to dial up and login to the ECP and enter the maintenance craft shell. A command prompt should be displayed, signaling that the MSC is waiting for the next command.

Figure 3-2 Dialing and Logging Into the MSC Using the Switch Terminal Window in the BTS Laptop Utility



Select Dial, and enter the phone number for the MSC.
After the MSC answers, enter your login and password as usual to enter the Maintenance Craft Shell.

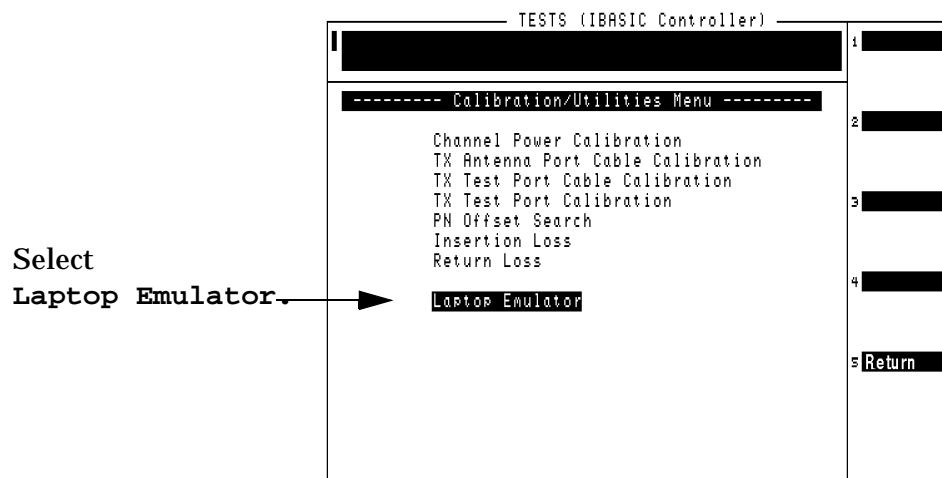
Step 4. Verify that the HP E6385A Software running in the Test Set can now communicate with the MSC. Goto [“Setup Site for Test” on page 55.](#)

MSC Dial-Up Procedure Using a PC and External Modem

The connection sequence described in this section uses a PC connected to the Test Set and an external modem. The PC must have some type of communication software running (such as Procomm Plus¹) that can communicate to the MSC through the PC's serial port (which is connected to the modem).

- Step 1.** Make sure that your modem is connected to the Test Set and a phone line, and both instruments are turned on.
- Step 2.** Start the communications program in your PC.
- Step 3.** Load and run the HP E6385A Software (see [page 24](#)). The Software's Main Menu is displayed (see [Figure 2-4 on page 26](#)).
- Step 4.** Select **Calibration/Utilities**. The Calibration/Utilities Menu is displayed. (See [Figure 3-3](#)).
- Step 5.** Select **Laptop Emulator**.

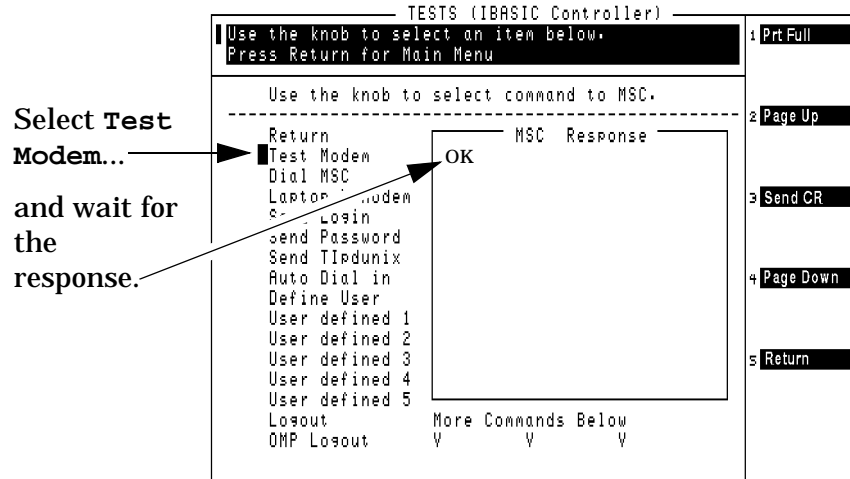
Figure 3-3 Accessing the Laptop Emulator Screen



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

Step 6. Scroll down to **Test Modem** and press the knob to verify basic modem operation (see [Figure 3-6 on page 53](#)). The response “OK” should appear in the box.

Figure 3-4 Connecting to the MSC



Step 7. Select **Dial MSC** and enter the phone number for the MSC using the keypad and pressing **Enter**. The modem then calls the switch.

Step 8. Select the **Laptop > Modem** mode. This causes characters typed on the connected PC to be passed on to the modem (and subsequently to the MSC). Likewise, communications from the MSC will be passed back to the PC.

Step 9. Login to the MSC using the PC. This typically involves:

1. Accessing the “AUTOPLEX®¹ OMP Administrator menu”.
2. Selecting “AUTOPLEX Set 1000 ECP Access” from the list of menu items.
3. Selecting “ECP Craft Shell” from the next list of menu items.

Step 10. Once you have accessed the Craft Shell, and a command prompt is displayed indicating it is ready to receive commands, select **EXIT L>M** to exit the Laptop > Modem mode.

Step 11. Go to “[Setup Site for Test](#)” on [page 55](#) and verify site control before proceeding to run tests.

1. Autoplex is a registered trademark of Lucent Technologies.

Connect to the MSC Without a Laptop PC

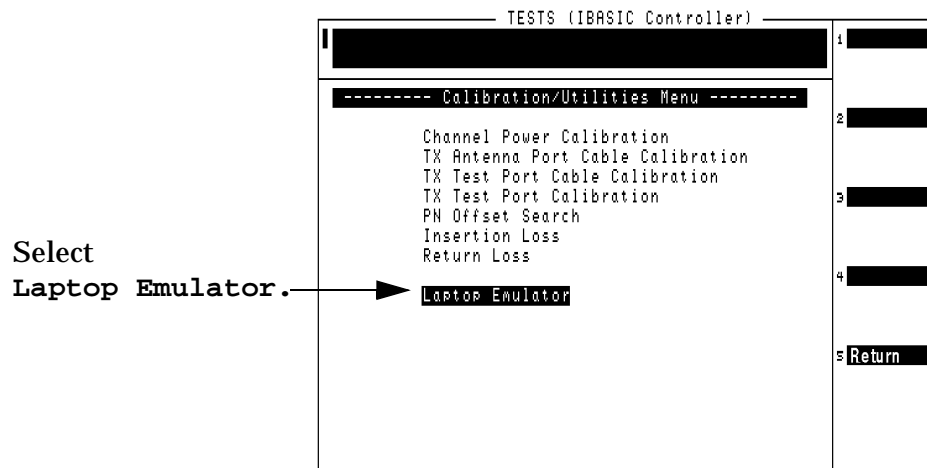
If a laptop PC is not connected to your Test Set, use the Test Set's laptop emulator function to send the commands necessary to access the ECP. Rather than using a PC keyboard, you will use the Test Set's knob to select from lists of characters to login to the MSC and access the Craft Shell.

NOTE In some cases, you may need to use a PC with the modem to make the connection when negotiating through an OMP to access the Craft Shell. See [“Connect to the MSC Using a Laptop PC” on page 48](#). For more information specific to the laptop emulator utility, see [“Laptop Emulator” on page 118](#).

MSC Dial-Up Procedure Without a Laptop PC

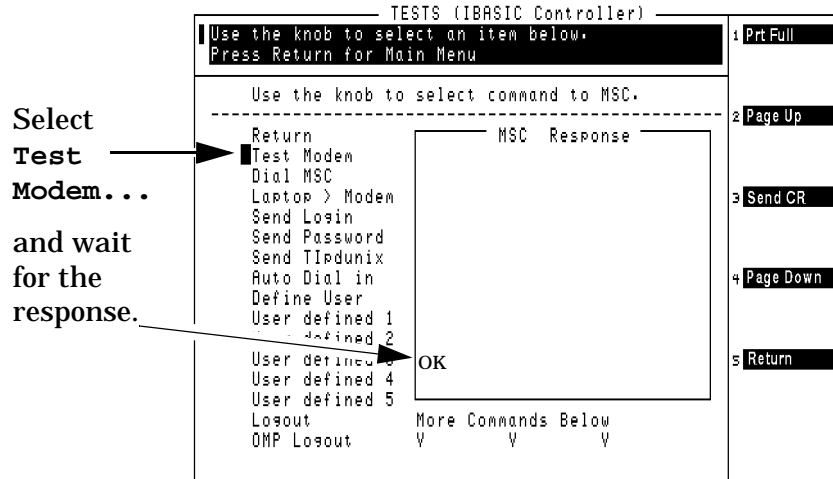
- Step 1.** Load and run the Software (see [page 24](#)). The Software's Main Menu is displayed (see [Figure 2-4 on page 26](#)).
- Step 2.** Make sure that your modem is connected to the Test Set and a phone line, and that both instruments are turned on.
- Step 3.** Select **Calibration/Utilities**. The Calibration/Utilities Menu is displayed. (See [Figure 3-5](#)).
- Step 4.** Select **Laptop Emulator**.

Figure 3-5 Accessing the Laptop Emulator Screen



Step 5. Scroll down to **Test Modem** and press the knob to verify basic modem operation (see [Figure 3-6](#)). The response “OK” should appear in the box.

Figure 3-6 Connecting to the MSC



Step 6. Scroll down to **Dial MSC** and press the knob. When you are prompted to enter the phone number for the switch:

- If you have entered the number before, it will appear at the top of the screen and you can select **Done**.
- If you have not entered the number before, use the Test Set’s keypad to enter the number and press **Enter** to begin dialing.

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.” See [“Laptop Emulator” on page 118](#) for details on dialing options.

Step 7. If a login prompt does not appear in the **MSC Response** box, select **Send CR** (k3) once or twice to get the login prompt to appear.

Step 8. When prompted by the MSC for a login, select **Send Login**.

- If you have entered your login previously, it will appear at the top of the screen and you can select **Done**.
- If you have not entered your login before, use the knob to enter your login from the characters in the **Choices** menu, then select **Done**.

Step 9. When prompted by the MSC for a password, select **Send Password**.

- If you have entered your password previously, it will appear at the top of the screen and you can select **Done**
- If you have not entered your password before, use the knob to enter your password from the characters in the **Choices** menu and select **Done**.

Step 10. 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 3-7](#) shows the typical appearance of the **MSC Response** box after a connection sequence.

Figure 3-7 Typical MSC Response Box Display After Connection to the MSC

```
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
```

Step 11. Go to [“Setup Site for Test” on page 55](#) and verify site control before proceeding to run tests.

Setup Site for Test

You can now verify that you can control the site via the MSC. This is done by accessing the Laptop Emulator and sending a command from the Test Set to the MSC and looking for a response.

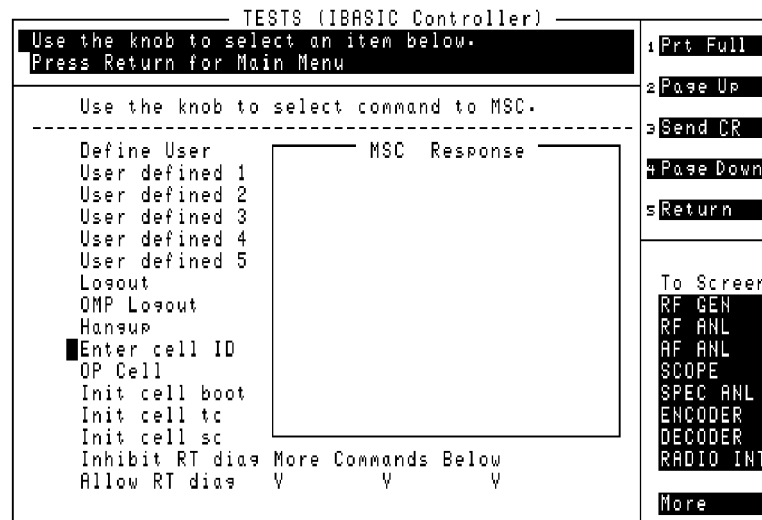
Step 1. If the Laptop Emulator screen is *not* already displayed -

1. Load and run the Software.
2. Select **Calibration/Utilities**.
3. Select **Laptop Emulator**.

Step 2. Press **k4** (**Page Down**), then select **Enter cell ID** (see [Figure 3-8](#)) and enter the number for the cell site to be tested.

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

Figure 3-8 Verifying Site Control



Step 3. Select **OP Cell**. You should see a response to the Op Cell command in the **MSC Response** box on the display.

Step 4. The base station is now ready to receive the commands from the Test Set that are sent during testing. Exit the laptop emulator mode by selecting **Return** (**k5**).

If You Had Problems

If you were unable to load and run the software, make the required entries, or encountered error messages, refer to [“Troubleshooting” on page 193](#) for help.

4 Performing CDMA Tests

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

NOTE Testing may be interrupted if cell site diagnostics are initiated by the MSC while tests are being run. To prevent this, use your PC, or the `Inhibit RT diag` command in the Software's Terminal Emulator, to send a command to inhibit diagnostics from the switch before testing.

Overview

These test procedures are intended to take you from setting up a test to getting test results. To simplify the procedures, all procedures are written to use a modem to communicate with the MSC (where applicable) and the Software will be set to send control commands.

Making Measurements

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

Getting Ready to Test

Step 1. The Software is installed and cell site is configured. Make sure you have performed all steps in the previous two chapters, including:

- [“Installation” on page 19.](#)
- [“Configuring the Software for Tests” on page 43.](#)

The Software will allow you to control the cell site equipment manually, but these steps are not covered specifically in these procedures. See [“Testing without MSC Control” on page 145](#) for instructions on manual control of the site equipment.

Step 2. You have specified the required test parameters on the Test Configuration Menu. See [“Specifying General Test Configuration Parameters” on page 59.](#)

Step 3. You have calibrated the test setup to compensate for losses and other variables. See [“Calibrating the Test Setup” on page 60.](#)

Step 4. You have entered the test specifications to use during automated tests. These values are compared to the measured values to alert you to a failing test point. See [“How to Change Pass/Fail Limits” on page 157.](#)

Start Testing

You are now ready to select and run CDMA tests. After successfully running the tests, it is recommended that you save all of the configuration information as a procedure file for later retrieval. This eliminates the need to re-enter the information if you run a different program, change parameters when testing another cell site, or install new operating system firmware in your Test Set. See [“How to Save a Test Procedure” on page 161.](#)

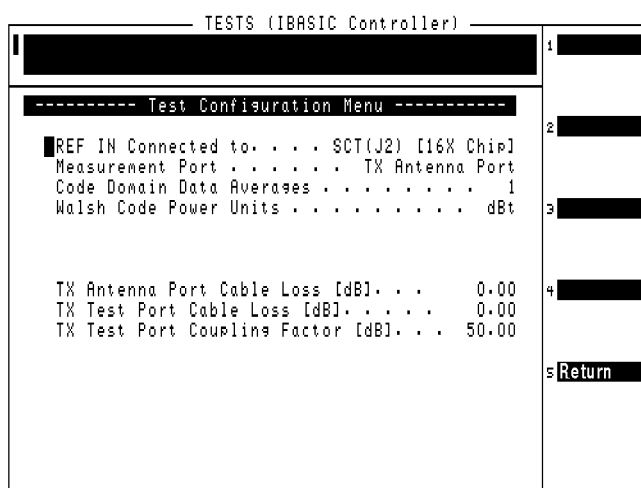
Specifying General Test Configuration Parameters

The Software uses several settings when running almost every test and utility. These parameters determine such things as the connection diagram used for each test and how much to offset measurement values because of test cable losses. *These values must be entered before you can make CDMA measurements.*

These parameters are entered on the Test Configuration Menu. This menu is accessed by selecting **Test Configuration** from the Software's Main Menu.

Once configured, these values are preserved in memory, even after turning off the Test Set, unless you load another program or update the Test Set's operating system (firmware).

Figure 4-1 Entering Values on the Test Configuration Menu



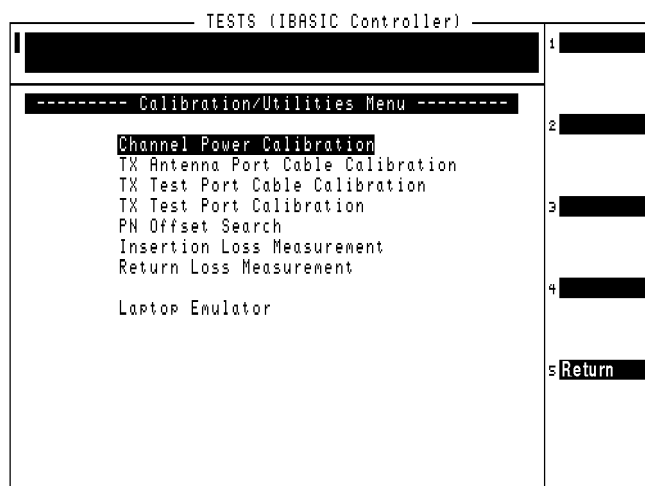
Test Configuration Menu Settings

- **REF IN Connected to** specifies the source of the signal connected to the REF IN connector. This is typically the 19.6608 MHz clock, and comes either from one of the cell site's SCT modules or from a GPS receiver.
- **Measurement Port** selects the base station port to make the transmitter measurements on; the TX Test port (which comes from a directional coupler in the transmitter's output) or the TX Antenna port (which supplies the transmitter power directly to the antenna).
- **Code Domain Data Averages** specifies how many data samples to use when averaging measurements during the code domain tests. Larger values reduce the effects of small changes in level during the test to produce more consistent results, but also increase test times.

- **Walsh Code Power Units** specifies the units to use when displaying the power in each Walsh Code when running the code domain tests. The unit “dBt” refers to the power of a Walsh code relative to the total measured channel power. Watts and dBm are measurements of the absolute power for a Walsh code.
- **TX Antenna Port Cable Loss [dB]** specifies the loss through the cable you connect from the Test Set’s RF IN/OUT port to the base station’s TX Antenna port. This value can be measured and automatically entered into this field using the TX Antenna Port Cable Calibration routine. See “[TX Antenna Port Cable Calibration](#)” on page 86.
- **TX Test Port Cable Loss [dB]** specifies the loss through the cable you connect from the Test Set’s ANT IN port to the base station’s TX Test port. This value can be measured and automatically entered into this field using the TX Test Port Cable Calibration routine. See “[TX Test Port Cable Calibration](#)” on page 88.
- **TX Test Port Coupling Factor [dB]** specifies the loss through the directional coupler used to provide the transmitter signal to the TX Test port. The Software uses this value to calculate the transmitter’s true power output without the need to disconnect the transmit antenna from the TX Antenna port. This value can be measured and automatically entered into this field using the TX Test Port Calibration routine. See “[TX Test Port Calibration](#)” on page 90.

Calibrating the Test Setup

Figure 4-2 The Calibration/Utilities Menu



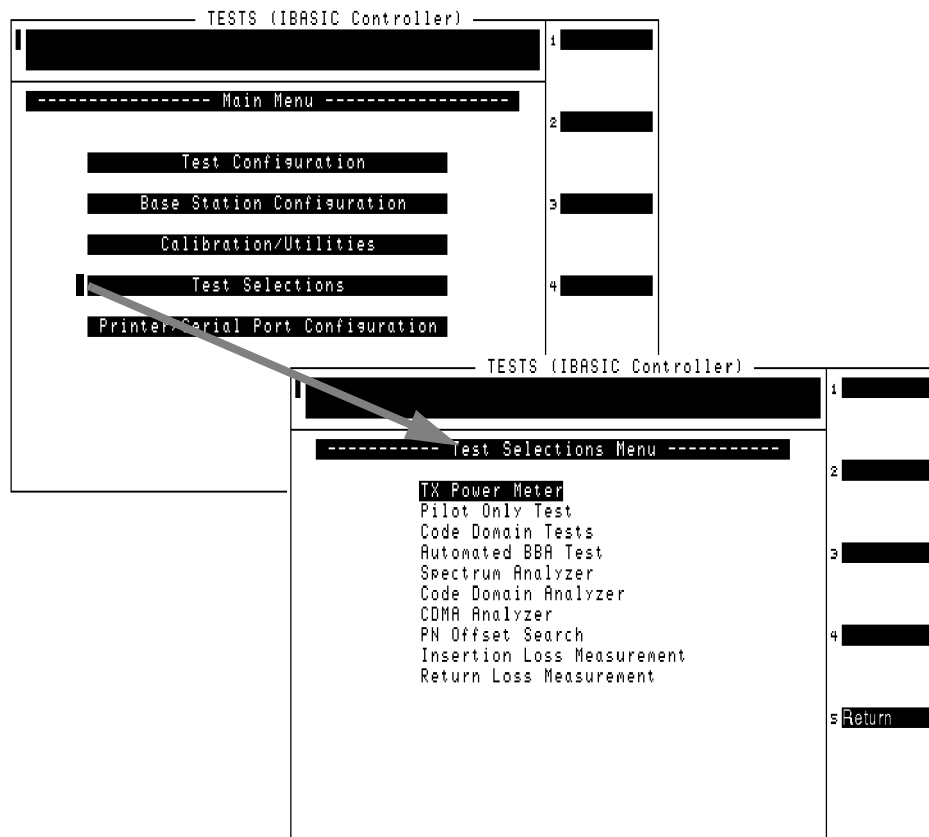
Before making CDMA measurements, you must first run a few simple calibration and utility routines to improve measurement accuracy. These routines are accessed by loading and running the Software (see [page 24](#)) and selecting **Calibration/Utilities** from the Software's Main Menu. After these values are measured, they are automatically entered into the Software for future testing, without having to rerun the routines every time you test. However, if you run a different program in the Test Set after making these measurements, the values must be re-measured (or re-entered) the next time you use the Software.

Calibration and Utility Procedures

- [“Channel Power Calibration” on page 85](#). Run after the Test Set has reached operating temperature (about 15 minutes) and you are ready to start performing CDMA tests. Once the Software is running, it will automatically run this utility before performing some tests.
- [“TX Antenna Port Cable Calibration” on page 86](#) and [“TX Test Port Cable Calibration” on page 88](#). Run these utilities to determine cable losses at the frequency and power level you will be testing at.
- [“TX Test Port Calibration” on page 90](#). Run this utility to determine the exact coupling factor (loss) of the TX Test port.
- [“PN Offset Search” on page 93](#). Use this utility to find the PN offset of the base station you are testing.
- [“Insertion Loss Measurement” on page 95](#). Use this routine to measure losses through cables, attenuators, power splitters, or other RF devices.
- [“Return Loss Measurement” on page 98](#). Use this routine to measure the return loss of a transmission line and/or an antenna.
- [“Laptop Emulator” on page 118](#). Use this utility any time you need to send commands from the Test Set to the MSC via an *external* modem.

Selecting Tests

Tests are selected by loading and running the software (explained on [page 24](#)) and choosing **Test Selections** on the Main Menu.



Once you have decided on the test you want to run, use the list below to locate the start page for the steps for that test. The PN Offset Search, Insertion Loss Test, and Return Loss Test utilities are also available on this screen.

- [“TX Power Meter” on page 64.](#)
- [“Pilot Only Test” on page 68.](#)
- [“Code Domain Tests” on page 71.](#)
- [“Automated BBA Test” on page 74.](#)
- [“Spectrum Analyzer” on page 77.](#)
- [“Code Domain Analyzer” on page 79.](#)
- [“CDMA Analyzer” on page 82.](#)
- [“PN Offset Search” on page 93.](#)
- [“Insertion Loss Measurement” on page 95.](#)
- [“Return Loss Measurement” on page 98.](#)

For More Information

For more details on the tests in this chapter:

- “Parameters List and Descriptions” on page 137
- “Specifications (Pass/Fail Limits) List and Descriptions” on page 143
- “Laptop Emulator” on page 118

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

See “Troubleshooting” on page 193.

TX Power Meter

The TX Power Meter test provides an analog display of power measurements. This mode is useful when making adjustments to power levels on a CDMA transmitter.

This test can be performed in-service using the TX Test port, or performed out-of-service using the TX Antenna port. See [“Which Base Station Port to Use - TX Test or TX Antenna?”](#) on page 22.

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.

Be sure to use the correct Test Set input port for the power level you are measuring. See [“Which Test Set Port to Use - ANT IN or RF IN/OUT?”](#) on page 21.

For Automated Base Station Control

If you have configured the Software to automatically control the base station, the Software will send a command to the MSC to set the BCR attenuation to the level specified on the Base Station Configuration Menu.

However, the Software cannot override a minimum BCR attenuation level that has been set in the translation tables of the MSC's CEQFACE form. If the measured power is out of specifications, make sure that the **BCR Attenuation** setting on the Software's Base Station Configuration Menu is not set to a lower value than the minimum BCR attenuation level listed in the translation tables of the CEQFACE form.

For Manual Base Station Control

If you have configured the Software to require manual control of the base station, you need to make sure that the **BCR Attenuation** setting on the Base Station Configuration Menu matches the BCR attenuation setting on the MSC's CEQFACE control form. If these values are different, the TX Power Meter measurement may be incorrect.

NOTE Transmitter power is partly controlled by the MSC using the BCR attenuation setting. The value for this setting, and the corresponding TX power of the base station, varies between models of base station and individual base station location.

It is very important that you correctly set the **BCR Attenuation Level** and **Specified Output Power** on the Software's Base Station Configuration Menu. See [“Base Station Configuration Procedure”](#) on page 45.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to [Chapter 5, “CDMA Tests Software Reference”](#), for descriptions of the specifications and parameters.

Specifications (Pass/Fail Limits):

- [6. Output Power Adjustment Error](#). This specification determines where the low and high tick marks appear on the measurement's graphic scale.

Parameters:

- None used for this test

Select and Run the Test

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

- Step 1.** From the Main Menu, scroll to **Test Selections** and press the knob.
- Step 2.** Scroll to **TX Power Meter** and press the knob.
- Step 3.** Follow the displayed instructions and diagram to make the measurement.

NOTE

This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

Review the Results

1. The Test Set will display the power meter screen (see [Figure 4-3](#)).

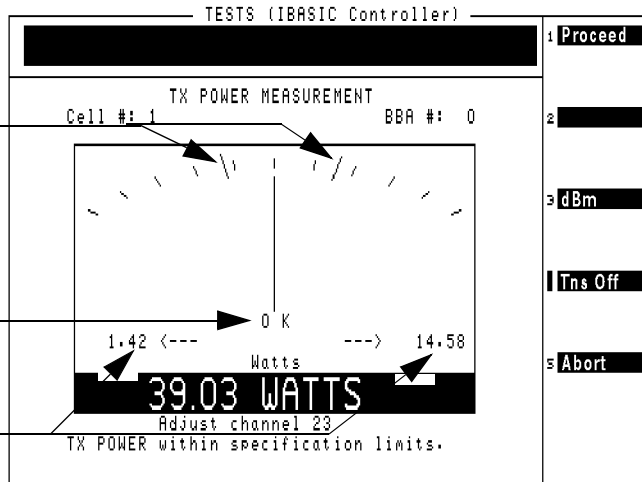
The power meter display defaults to units of Watts. To view the power level in dBm, select **dBm (k3)**. A beeping tone accompanies the measurement to assist in adjusting your transmitter's power without looking at the display. Adjust the tone's volume by selecting **Tns off**, **Tns quiet**, **Tns loud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

Figure 4-3 Power Meter Display

The longer tick marks are the high and low specification limits.

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

These values indicate the meter's high and low display limits.



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). Therefore, this test can only be performed with the base station out-of-service.

The tests performed are:

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

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to “[Parameters List and Descriptions](#)” on page 137 and “[Specifications \(Pass/Fail Limits\) List and Descriptions](#)” on page 143 for descriptions of these parameters and specifications.

Specifications (Pass/Fail Limits):

- [1. Carrier Feedthrough](#)
- [5. Frequency Error](#)
- [7. Output Power Error](#)
- [8. Rho](#)
- [9. Time Offset](#)

Parameters:

- [1. Adjust Power \[0=no 1=on fail 2=always\]](#)

Select and Run the Test

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

- Step 1.** From the Main Menu, scroll to **Test Selections** and press the knob.
- Step 2.** Scroll to **Pilot Only Test** and press the knob.
- Step 3.** Follow the displayed instructions and diagram to make the measurement.

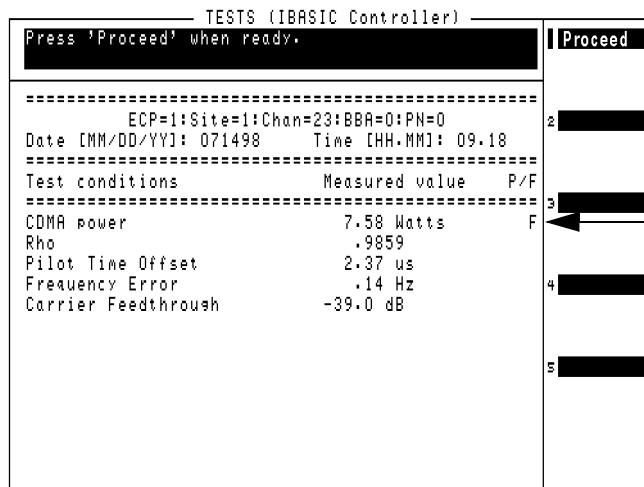
NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

Review the Results

The Software begins running pilot channel tests on the selected BBA. During the test, results are displayed with a failure indication if a measurement falls outside your specified limits (see [Figure 4-4](#)).

To see the pass/fail limits for each data point as it is measured, use the data collection function. See [“Data Collection”](#) on page 167.

Figure 4-4 Results from the Pilot Only Test Sequence



The “F” (Fail) tells you that the measured value is outside of the specified limits. To change limits, see [“How to Change Pass/Fail Limits”](#) on page 157.

When the testing is complete, the Software pauses to allow you to review the on-screen test results. Select **Proceed** (κ) to return to the Test Selections menu.

Code Domain Tests

The Code Domain Tests 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.

This test can be performed in-service by setting the **Test** field on the Base Station Configuration Menu to **Active**. Measurements are then made on the existing active channel elements.

When the **Test** field is set to **Configured** to perform out-of-service testing, you must enter the number of channel elements (CEs) to test on the Base Station Configuration Menu. See [“A Note About Configured and Active Site Testing” on page 47](#). In this case, call processing must be deactivated, either by selecting the **Inhibit cp** command in the Software’s Laptop Emulator or by some other means, before testing begins. For information on enabling automated control, see [“Base Station Configuration Procedure” on page 45](#).

The following measurements are performed:

- Time offset
- Frequency error
- Carrier feedthrough
- Code domain tests on traffic channels (if CEs are configured)

TX Walsh code power

Estimated rho

Walsh code timing

Walsh code phase

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to the “[CDMA Tests Software Reference](#)” on page 101 for descriptions of these specifications and parameters.

Specifications (Pass/Fail Limits):

- 1. Carrier Feedthrough
- 2. Code Domain Floor
- 3. Code Domain Phase
- 4. Code Domain Timing
- 5. Frequency Error
- 9. Time Offset

Parameters:

- 5. GN Code Domain Power Threshold
- 6. GN Print Inactive Walsh Codes [0=no 1=yes]

Select and Run the Test

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

Step 1. From the Main Menu, position the cursor next to **Test Selections** and press the knob.

Step 2. Scroll down to **Code Domain Tests** and press the knob.

Step 3. Follow the displayed instructions and diagram to make the measurement.

NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

Review the Results

1. The Software begins running code domain tests on the selected BBA. After tests are performed, test results will begin showing on the display. See [Figure 4-5](#). Failures are indicated in the P/F column if a measurement falls outside your specified limits.

If you need to stop testing before the sequence is complete, select **Abort (k5)**. Depending on the state of the system, it can take up to 60 seconds for the test to stop.

Figure 4-5 Final Results from the Code Domain Tests

TESTS (IBASIC Controller)			Proceed
Press 'Proceed' when ready.			
=====			
ECP=1:Site=1:Chan=23:BBA=0:PN=0			2
Date [MM/DD/YY]: 071498 Time [HH.MM]: 09.49			
=====			
Test conditions	Measured value	P/F	3
=====			
Pilot Time Offset	2.37 us		
Frequency Error	-.88 Hz		
Carrier Feedthrough	-36.18 dB		
Active Walsh code set:			4
TX Walsh Code # 0 Power	-.06 dBt		
Estimated Rho	.9870		5

Automated BBA Test

The Automated BBA Test performs a suite of CDMA transmitter tests on the selected BBA. *This test requires that the Test Set 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). See “[A Note About Configured and Active Site Testing](#)” on [page 47](#).

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
 - Estimated Rho
- 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.

Specifications and Parameters Used

The following specifications and parameters are used when running this test. Refer to the “[CDMA Tests Software Reference](#)” on page 101 for descriptions of these specifications and parameters.

Specifications (Pass/Fail Limits):

- 1. Carrier Feedthrough
- 2. Code Domain Floor
- 3. Code Domain Phase
- 4. Code Domain Timing
- 5. Frequency Error
- 7. Output Power Error
- 8. Rho
- 9. Time Offset

Parameters:

- 1. Adjust Power [0=no 1=on fail 2=always]
- 5. GN Code Domain Power Threshold
- 6. GN Print Inactive Walsh Codes [0=no 1=yes]

Select and Run the Test

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

- Step 1.** From the Main Menu, scroll to **Test Selections** and press the knob.
- Step 2.** Scroll to **Automated BBA Test** and press the knob.
- Step 3.** Follow the displayed instructions and diagram as prompted to make the measurement.

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

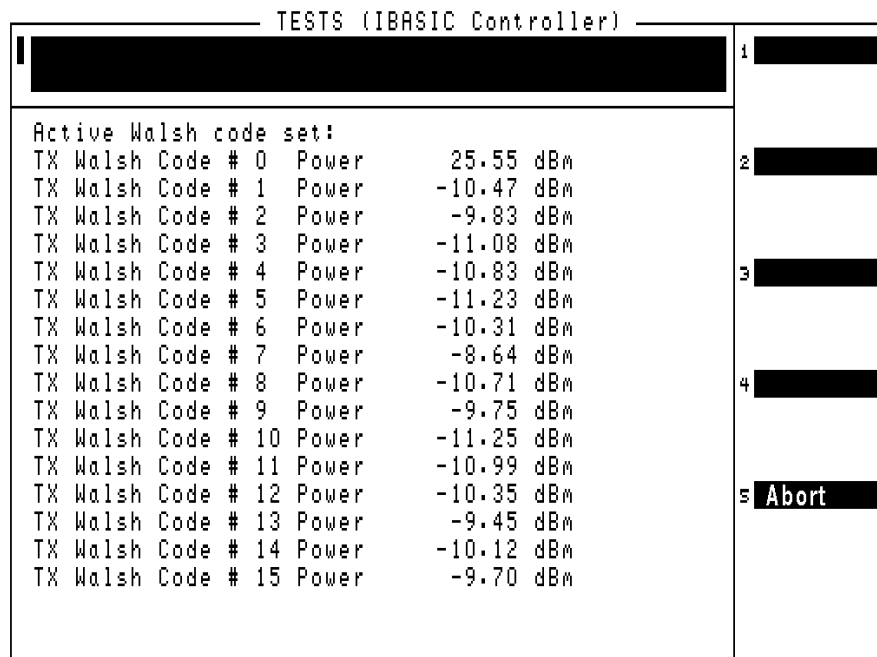
Review the Results

1. The Software begins running tests on the active BBA. See [Figure 4-6](#). As tests are performed, test results begin showing on the display with a failure indication if a measurement falls outside your specified limits.

If you need to stop testing before the sequence is complete, select **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.

Figure 4-6 Partial Code Domain Tests Sequence Results



Spectrum Analyzer

The spectrum analyzer mode configures the Test Set to display spectrum sweeps. This mode is useful when you would like to verify the presence of a CDMA signal or look for sources of interference.

This test does not send commands to the MSC, and can be performed in-service or out-of-service. See [“Which Base Station Port to Use - TX Test or TX Antenna?”](#) on page 22.

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:

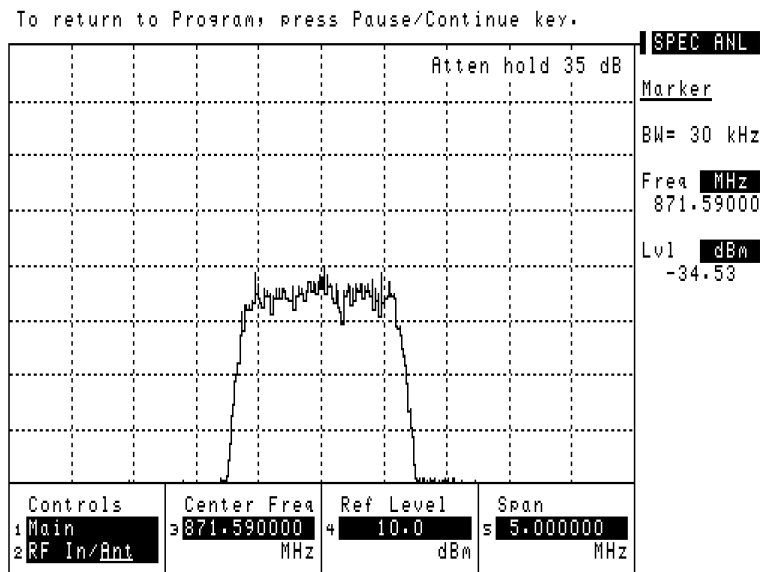
- Step 1.** From the Main Menu, scroll to **Test** selections and press the knob.
- Step 2.** Scroll to **Spectrum Analyzer** and press the knob.
- Step 3.** Follow the displayed instructions and diagram to make the measurement.

NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

Review the Results

1. The Test Set sets up and displays the spectrum analyzer. See [Figure 4-7](#).

Figure 4-7 The Spectrum Analyzer Display



2. Use 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 and select **Test Configuration** (to access the Test Configuration Menu) and change the **Channel Number**, then re-run the test.

3. When you are finished using the spectrum analyzer, press the **Pause/Continue** key and follow the instructions on the Test Set's display. The Software will return to the Test Selections menu.

Code Domain Analyzer

The Code Domain Analyzer Test is used to set up the Test Set to make manual measurements on a CDMA transmitter. This test is useful if you would like to switch between Code Domain Power, Code Domain Timing, and Code Domain 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: “[Code Domain Tests](#)” on page 71 and “[Automated BBA Test](#)” on page 74.

This test can be made with the base station either in-service or out-of-service. In either case, no commands are sent to the MSC. To perform out-of-service testing, you must disable call processing and turn off any transmitters prior to connecting the Test Set to the TX Antenna port.

Available measurements in the Code Domain Analyzer screen are:

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

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 mode:

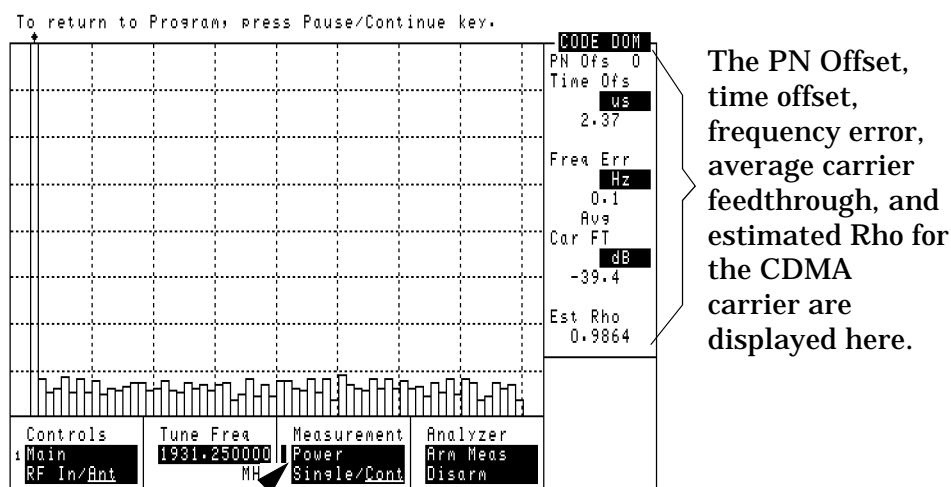
- Step 1.** From the Main Menu, scroll to **Test Selections** and press the knob.
- Step 2.** Scroll to **Code Domain Analyzer** and press the knob.
- Step 3.** Follow the displayed instructions and diagram to make the measurement.

NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

Review the Results

1. The Test Set displays the Code Dom Analyzer (see [Figure 4-8](#)). 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.

Figure 4-8 Making Code Domain Analyzer Measurements

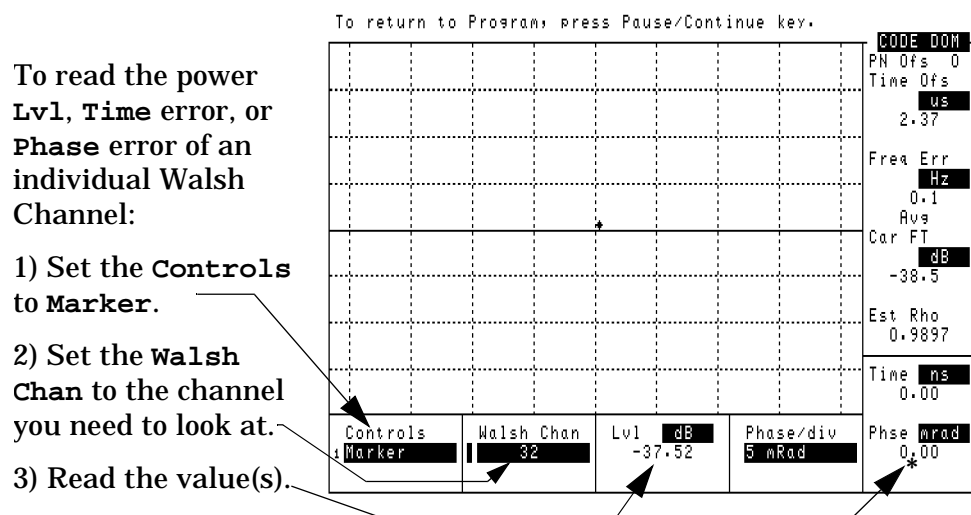


Select the **Measurement** field to change the measurement type to **Fast Pwr**, **Phase**, or **Timing**. For fast power measurements, you must access **FP Setup** in the **Controls** menu and manually set the **Time Offset**.

NOTE Do not make changes to the **Tune Freq** field. It has been preset by the Software. Changes to other fields can also cause measurements to fail.

2. Changing the **Controls** field from **Main** to **Marker** lets you move the marker to any **Walsh Chan** (0-63), with the resulting **Lvl** (level), **Time**, or **Phse** (phase) indicated for the current marker position (depending on the **Measurement** field setting shown in [Figure 4-8](#)). See [Figure 4-9](#).

Figure 4-9 Reading Individual Walsh Channel Measurements



* The **Time** and **Phase** measurements are only displayed if the **Measurement** field is set to **Phase** or **Timing**. (See [Figure 4-8](#)).

3. When you are finished using the code domain analyzer screen, press the **Pause/Continue** key, and follow the directions on the screen. The Software returns to the **Test Selections** menu.

CDMA Analyzer

The CDMA Analyzer sets up the Test Set to manually make several measurements.

This test can be made with the base station either in-service or out-of-service. In either case, no commands are sent to the MSC. To perform out-of-service testing, you must disable call processing and turn off any transmitters prior to connecting the Test Set to the TX Antenna port.

The following measurements can be performed:

- Channel Power
- Rho (modulation quality). The following measurements are also displayed when Rho is selected:
 - Time offset
 - Frequency error
 - Carrier feedthrough
- EVM
 - The following measurements are also displayed when EVM is selected:
 - Phase error
 - Magnitude error
- Average Power

NOTE The Rho and EVM measurements should be made with all traffic, paging, and sync channels off; only the pilot channel should be transmitting.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- None used for this test

Parameters:

- [23. TX Antenna Port Cable Loss](#)
- [25. TX Test Port Cable Loss](#)

Select and Run the Test

Use these steps to select and run the CDMA Analyzer:

- Step 1.** From the Main Menu, scroll to **Test Selections** and press the knob.
- Step 2.** Scroll to **CDMA Analyzer** and press the knob.
- Step 3.** Follow the displayed instructions and diagram to select and make the measurement.

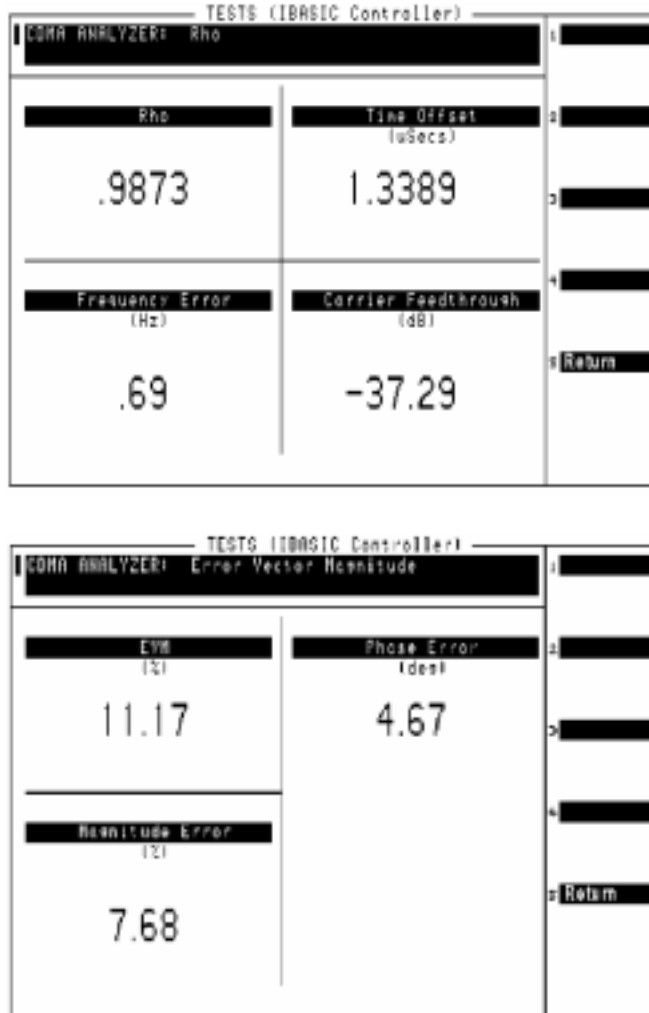
NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. Before removing or re-installing the antenna cables, make sure that the transmitter has been turned off by the MSC (or by switch personnel if not using a modem). The green ACT LEDs on the ACU and BCR modules indicate the transmitter is active, and therefore should be off before disconnecting cables.

- Step 4.** Select the desired measurement from the displayed list. The Test Set configures itself and makes the measurement. It may take several seconds before the measurement results are displayed.

Review the Results

Channel power and average power are displayed as individual measurements. Additional measurements are displayed if Rho or EVM is selected. See [Figure 4-10](#).

Figure 4-10 CDMA Analyzer Rho and EVM Test Results



1. When you are finished using the CDMA analyzer, select **Return** (k5) to return to the CDMA Analyzer Choices menu. Select **Return** (k5) again and follow the displayed instructions to return to the Test Selections menu.

Channel Power Calibration

The channel power measurement must be calibrated to ensure maximum accuracy. Channel Power Calibration compensates for offsets in the channel power measurement. The Average Power measurement is also zeroed in the process. No external timing signals or other connections are required.

The calibration procedure compensates for temperature changes and other Test Set variables (such as measurement frequency) and should be run immediately before running tests on your base station, and any time you change the channel number. The Software automatically performs this calibration at the start of the first test when the Software is first loaded and run.

There are no prerequisites to running this test, and no specifications or parameters are used. No commands are sent to the MSC.

Select and Run the Test

Use these steps to select and run the Channel Power Calibration routine:

- Step 1.** From the Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 2.** Scroll to **Channel Power Calibration** and press the knob.
- Step 3.** Follow the displayed instructions to disconnect any signals to the Test Set.
- Step 4.** Select **Proceed (K1)** to continue the test.

The Software returns to the Calibration/Utilities menu when the calibration is done.

TX Antenna Port Cable Calibration

This utility measures the signal loss through the cable used to connect the Test Set to the base station's TX Antenna port. This loss must be known when making power measurements. Once this value is measured, you should label the cable indicating the loss through it for future use.

This routine requires the use of two external 6 dB attenuators (pads) and a short calibration cable. These parts are not standard equipment with the Test Set, but are included in the optional connector kit (see [“Connector Kits” on page 113](#)).

This test sends no control commands to the MSC.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

None used for this test.

Parameters:

- [23. TX Antenna Port Cable Loss](#)

Select and Run the Utility

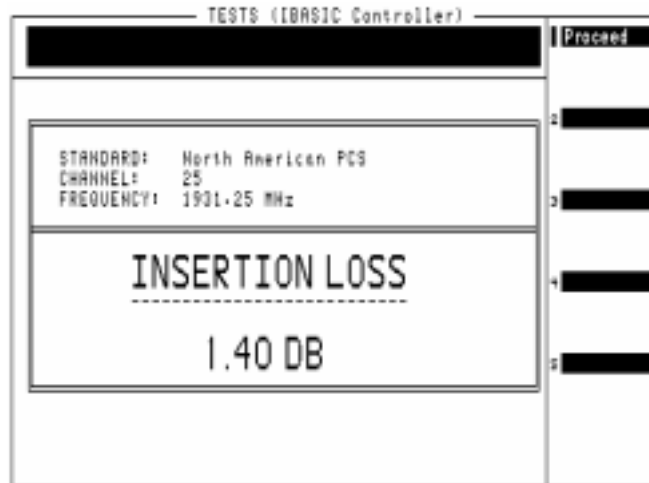
Use these steps to select and run the TX Antenna Port Cable Calibration procedure:

- Step 1.** From the Main Menu, scroll the cursor to **Calibration/Utilities** and press the knob.
- Step 2.** Scroll to **TX Antenna Port Cable Calibration** and press the knob.
- Step 3.** Follow the displayed instructions to connect the 6 dB pads and calibration cable. Select **Proceed (k1)** to continue.
- Step 4.** Follow the displayed instructions to connect the test cable in series with the calibration cable and pads. Select **Proceed (k1)** to continue making the measurement.

Review the Results

1. The measured insertion loss and test frequency are displayed. Select **Proceed** (k1) to continue.

Figure 4-11 TX Antenna Port Cable Loss display.



2. You are asked if you want to store the insertion loss as the TX Antenna Port Cable Loss. Use the knob to select **Yes** or **No**.
 - If you select **Yes**, the Software automatically enters the value in the Test Configuration Menu. Unless you believe that the indicated loss is incorrect, you should select **Yes**.
 - If you select **No**, you are asked if you want to **Remeasure** the loss or **Return** to the Calibration/Utilities Menu.

TX Test Port Cable Calibration

This utility measures the signal loss through the cable used to connect the Test Set to the base station's TX Test port. This is the base station port that samples the BCR's transmitter output through a directional coupler. This loss must be known when making power measurements. Once this value is measured, you should label the cable indicating the loss through it for future use.

This routine requires the use of two external 6 dB attenuators (pads) and a short calibration cable. These parts are not standard equipment with the Test Set, but are included in the optional connector kit (see [“Connector Kits” on page 113](#)).

This test sends no control commands to the MSC.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

None used for this test.

Parameters:

- [25. TX Test Port Cable Loss](#)

Select and Run the Utility

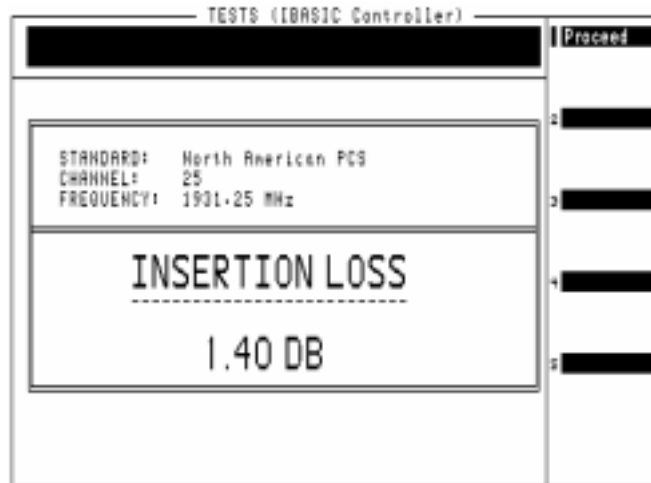
Use these steps to select and run the TX Test Port Cable Calibration routine:

- Step 1.** From the Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 2.** Scroll to **TX Test Port Cable Calibration** and press the knob.
- Step 3.** Follow the displayed instructions to connect the 6 dB pads and calibration cable. Select **Proceed (k1)** to continue.
- Step 4.** Follow the displayed instructions to connect the test cable in series with the calibration cable and pads. Select **Proceed (k1)** to continue making the measurement.

Review the Results

1. The measured insertion loss and test frequency are displayed. Select **Proceed** (k1) to continue.

Figure 4-12 TX Test Port Cable Loss Display



2. You are asked if you want to store the insertion loss as the TX Test Port Cable Loss. Use the knob to select **Yes** or **No**.
 - If you select **Yes**, the Software automatically enters the value in the Test Configuration Menu. Unless you believe that the indicated loss is incorrect, you should select **Yes**.
 - If you select **No**, you are asked if you want to **Remeasure** the loss or **Return** to the Calibration/Utilities Menu.

TX Test Port Calibration

The Calibrate TX Test Port utility measures the loss associated with testing from the TX Test port. This gives the Test Set a coupling factor to use with measurements from the TX Test port.

At the start of the test, you are prompted to choose either full or specified calibration.

- Full calibration first measures the level at the TX Antenna port, then measures the level at the TX Test port. The difference in these levels is used to determine the loss through the TX Test port.

If automated control of the base station is enabled, the Software sends commands to the MSC during the test. See “[Base Station Configuration Procedure](#)” on page 45. If manual base station control is used, you must disable call processing and turn off any transmitters prior to connecting the Test Set to the TX Antenna port.

NOTE During full calibration, you are prompted to connect the Test Set’s RF IN/OUT port to the base station’s TX Antenna port using the TX Antenna Port cable. After proceeding, you are then prompted to connect the Test Set’s ANT IN port to the base station’s TX Test port using the TX Test Port cable.

For accurate TX Test port calibration, you must use the correct cables when prompted.

- Specified calibration uses the Specified Output Power level from the Base Station Configuration menu to determine the coupling factor. If the correct output level is specified, the level at the TX Test port is measured and the difference in these levels is used to determine the loss through the TX Test port.

Unless you are certain that the Specified Output Power level is correct (± 0.5 dB), you should use the full calibration for the most accurate results.

Specifications and Parameters Used

Specifications (Pass/Fail Limits):

- None used for this test

Parameters:

- [23. TX Antenna Port Cable Loss](#)
- [25. TX Test Port Cable Loss](#)

Select and Run the Test

Use these steps to select and run the TX Test Port Calibration utility:

NOTE This procedure may include steps that prompt you to disconnect cables from the Test Set's antenna port and RF IN/OUT port. 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).

Step 1. From the Main Menu, scroll to **Calibration/Utilities** and press the knob.

Step 2. Scroll to **TX Test Port Calibration** and press the knob.

Step 3. Select full or specified calibration (see the description of full and specified calibration on [page 90](#)).

Step 4. Follow the directions on the screen.

Step 5. Connect the Test Set to the base station as indicated and select **Proceed** (↵) to continue after each setup.

- Full calibration requires two separate measurement setups. Be sure to use the correct test cables for each setup.

- Specified calibration uses one measurement setup. Be sure to use the TX Test Port cable when making the measurement.

Review the Results

1. The TX Test Port coupling factor is calculated and displayed. You should write this value next to the TX Test port for future reference.

Select **Proceed** (k1) to return to the Calibration/Utilities Menu.
Then select **Return** (k5) to return to the Main Menu.

If you select **Test Configuration** (from the Main Menu) you see that the **TX Test Port Coupling Factor [dB]** field now contains the value determined by the test.

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 Set tune to the CDMA channel and search to find the valid PN offset. The resulting PN offset value is then entered into the **PN Offset** field of the Main Menu.

This utility can be performed with the base station in or out of service. No commands are sent to the MSC during this test.

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:

Step 1. From the Main Menu, scroll to **Calibration/Utilities** and press the knob.

Step 2. Scroll to **PN Offset Search** and press the knob.

Step 3. Select **Proceed (k1)** to start the search.

Review the Results

NOTE The displayed setup diagram may prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. 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. The setup diagram prompts you to make connections between the Test Set and the base station. Press **Proceed** (κ1) when the connections have been made.
2. The Test Set begins searching for the BBAs 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 also enters the value into the **PN Offset** field on the Test Configuration Menu.

3. Once the PN offset value is displayed, select **Proceed** (κ1) and follow the displayed instructions to return to the Calibration/Utilities Menu.

Insertion Loss Measurement

The Insertion Loss Measurement is used to measure the loss associated with RF cables, filters, and other passive devices in the measurement path. This test uses the Test Set's internal source and measures the relative loss through the cable or device.

To optimize measurement accuracy, the measurement setup diagram indicates the use of two external 6 dB attenuators (pads) and a short calibration cable. The pads are optional, but should be used if available. These parts are not standard equipment with the Test Set, but are included in the optional connector kit (see [“Connector Kits” on page 113](#)).

This test sends no control commands to the MSC.

Select and Run the Test

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

Step 1. From the Main Menu, scroll to **Calibration/Utilities** and press the knob.

Step 2. Scroll to **Insertion Loss Test** and press the knob.

Step 3. If prompted to do so, remove the RF connections from the Test Set and select **κ₁ (Proceed)** to perform a channel power calibration. If channel power was recently calibrated, you may not be prompted to recalibrate before starting the Insertion Loss test.

Step 4. Select the **Loss Measurement Type**:

- **Swept** measures the loss over the frequency range you specify in the **Start Frequency** and **Stop Frequency** settings.
 - The **Maximum Expected Loss** for the device you are testing is used to adjust the scale on the results plot. Use a value slightly greater than expected for the best display resolution.
 - The **Duplex Out Level** into the device being tested may be adjusted if necessary.
- **Discrete** measures the loss at the frequency you specify by entering the **Channel Number** you are testing.

Step 5. Select **κ₁ (Proceed)** to start the measurement.

Step 6. Connect the short calibration cable as directed, and then select **κ₁ (Proceed)**.

Step 7. The Test Set turns on the source and makes a reference measurement. You are then prompted to add in the cable or device to be tested. Leave the calibration cable and pads connected to the ANT IN port and insert the cable or device you want to measure as shown in the diagram. Select **Proceed (k1)** to make the insertion loss measurement.

Review the Results

1. **When making a discrete measurement**, the insertion loss is displayed as a single numeric value (in units of dB).

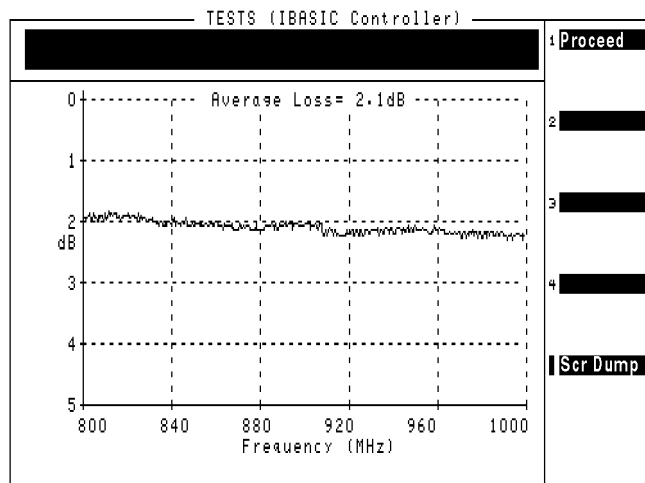
When making a swept measurement, the loss is displayed on the screen (in units of dB) and as a plot of loss versus frequency. (See [Figure 4-13](#).)

- Selecting **Scr Dump** (k5) causes the Test Set to pause automated operation. Press the **Print** key to send the plot to a printer connected to the Test Set. After the plot has printed, select **Continue** (k2).

Printer selection and settings are accessed by selecting **Configure Printer** from the list of tests at the Software's Main Menu.

- Selecting **Proceed** (k1) displays the frequency range settings and average insertion loss for the test. From this point you can select **Repeat** (k1) to test another cable or device, select **Return** (k5) once to go to the Insertion Loss Test setup menu, or select **Return** (k5) twice to return to the Calibration/Utilities Menu.

Figure 4-13 Insertion Loss Test Results



Return Loss Measurement

The Return Loss Measurement is used to measure the return loss of a cable, antenna, or other device in the swept mode. A SWR bridge and a 6 dB pad are connected to the Test Set. The Software uses the pad to improve the mismatch between the SWR bridge and the ANT IN port on the test set. A reference level is measured with an open or short on the bridge and then the return loss is measured with the cable or antenna-under-test. Measured values for minimum and maximum return loss are printed at the top of the screen.

This measurement requires the use of two external 6 dB attenuators (pads), two type-N cables, and an SWR bridge. These parts are not standard equipment with the Test Set, but are included in the optional HP E6554A 8935 RF Tools Hardware Accessory Kit. See [“Hardware Accessory Kit” on page 115](#).

This test sends no control commands to the MSC.

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 Return Loss Measurement:

Step 1. From the Main Menu, scroll to **Calibration/Utilities** and press the knob.

Step 2. Scroll to **Return Loss Test** and press the knob.

Step 3. If prompted to do so, remove the RF connections from the Test Set and select κ_1 (**Proceed**) to perform a channel power calibration. If channel power was recently calibrated, you may not be prompted to recalibrate before starting the Return Loss test.

Step 4. Select the loss **Measurement Type**:

- **Swept** measures the loss over the frequency range you specify in the **Start Frequency** and **Stop Frequency** settings.
 - The **Maximum Expected Loss** for the device you are testing is used to adjust the scale on the results plot. Use a value slightly greater than expected for the best display resolution.
 - The **Duplex Out Level** into the device being tested may be adjusted if necessary.
- **Discrete** measures the loss at the frequency you specify by entering the **Channel Number** you are testing.

Step 5. Select **Run (κ_1)** to start the test.

NOTE This procedure may include steps that prompt you to disconnect cables from the site's antenna ports and make connections to the Test Set. 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).

Step 6. At the start of the test sequence, you see a connection diagram. You are prompted to make a connection between the **DUPLEX OUT** port, **ANT IN** port of the Test Set, and the **SWR** bridge indicated on the on-screen diagram. Select **Proceed (κ_1)** when the connections have been made.

Step 7. The Test Set will turn on the source and make a reference measurement. You will then see a prompt to add in the DUT (Device-Under-Test). Connect the DUT you want to measure, as shown in the diagram, and select **Proceed (κ_1)**.

Review the Results

- **When making a discrete measurement**, the return loss and VSWR are displayed as single numeric values.

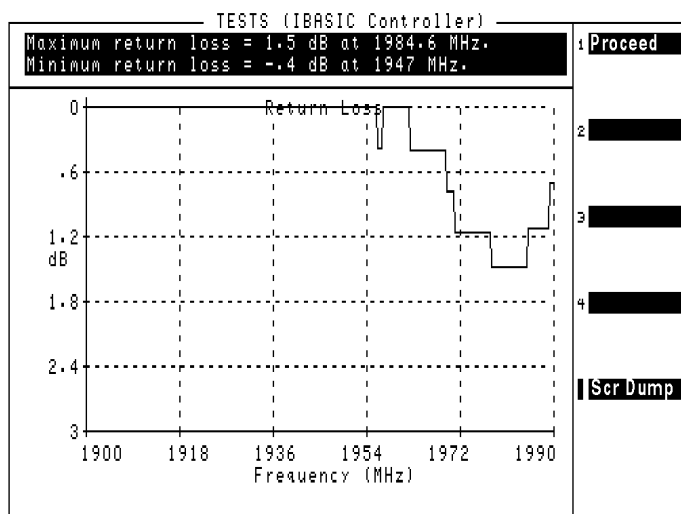
When making a swept measurement, the loss is displayed on the screen (in units of dB) and as a plot of loss versus frequency. (See [Figure 4-14](#).)

- Selecting `Scr Dump` (k5) causes the Test Set to pause automated operation to print a copy of the plot. Press the `Print` key to send the plot to a printer connected to the Test Set. After the plot has printed, press `Continue` (k2).

Printer selection and settings are accessed by selecting `Configure Printer` from the list of tests at the Software main menu.

- Selecting `Proceed` (k1) displays the minimum and maximum return loss and VSWR measured during the test. From this point you can select `Repeat` (k1) to test another device, select `Return` (k5) once to go to the Return Loss Test setup menu, or select `Return` (k5) twice to return to the Calibration/Utilities Menu.

Figure 4-14 Return Loss Test Results



5 CDMA Tests Software Reference

This chapter describes detailed operation of the Software that was not covered in [Chapter 4, “Performing CDMA Tests,” on page 57](#). The information in this chapter is organized by key topics, listed alphabetically. Use this chapter as a supplement when you have questions about using the CDMA tests.

Overview

Reference Information Topics

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

[“Acronyms List” on page 103](#)

[“Connections” on page 105](#)

[“Demo \(Demonstration\) Mode” on page 116](#)

[“Laptop Emulator” on page 118](#)

[“Parameters List and Descriptions” on page 137](#)

[“Specifications \(Pass/Fail Limits\) List and Descriptions” on page 143](#)

[“Testing without MSC Control” on page 145](#)

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
CP – Call Processing
CS – Cell Site
CR – Carriage Return
CRT – Cathode Ray Tube
CRTU – CDMA Radio Test Unit
dB – deciBel
dBm – decibels with Respect to a milliwatt
dBt – decibels with Respect to Total Channel Power
DTMF – Dual Tone Multi Frequency
DUT – Device Under Test
Eb/No – Ratio of Energy-Per-Bit to Noise Spectral Density
ECP – Executive Cellular Processor
ERP – Effective Radiated Power
EVM – Error Vector Magnitude
GPS – Global Positioning System
LED – Light Emitting Diode
MHz – Megahertz
MSC – Mobile Switching Center (also, MTSO)
OMP – Operations Management Platform
OOS – Out-Of-Service
OP – Output Process
OTP – One Time Programmable
PC – Personal Computer

PCS – Personal Communications Services

PN – Pseudonoise

RAM – Random Access Memory

RF – Radio Frequency

RX – Receiver

SCT – Synchronized Clock and Tone

TX – Transmitter

VSWR – Voltage Standing Wave Ratio

UCL – UnConditional

Connections

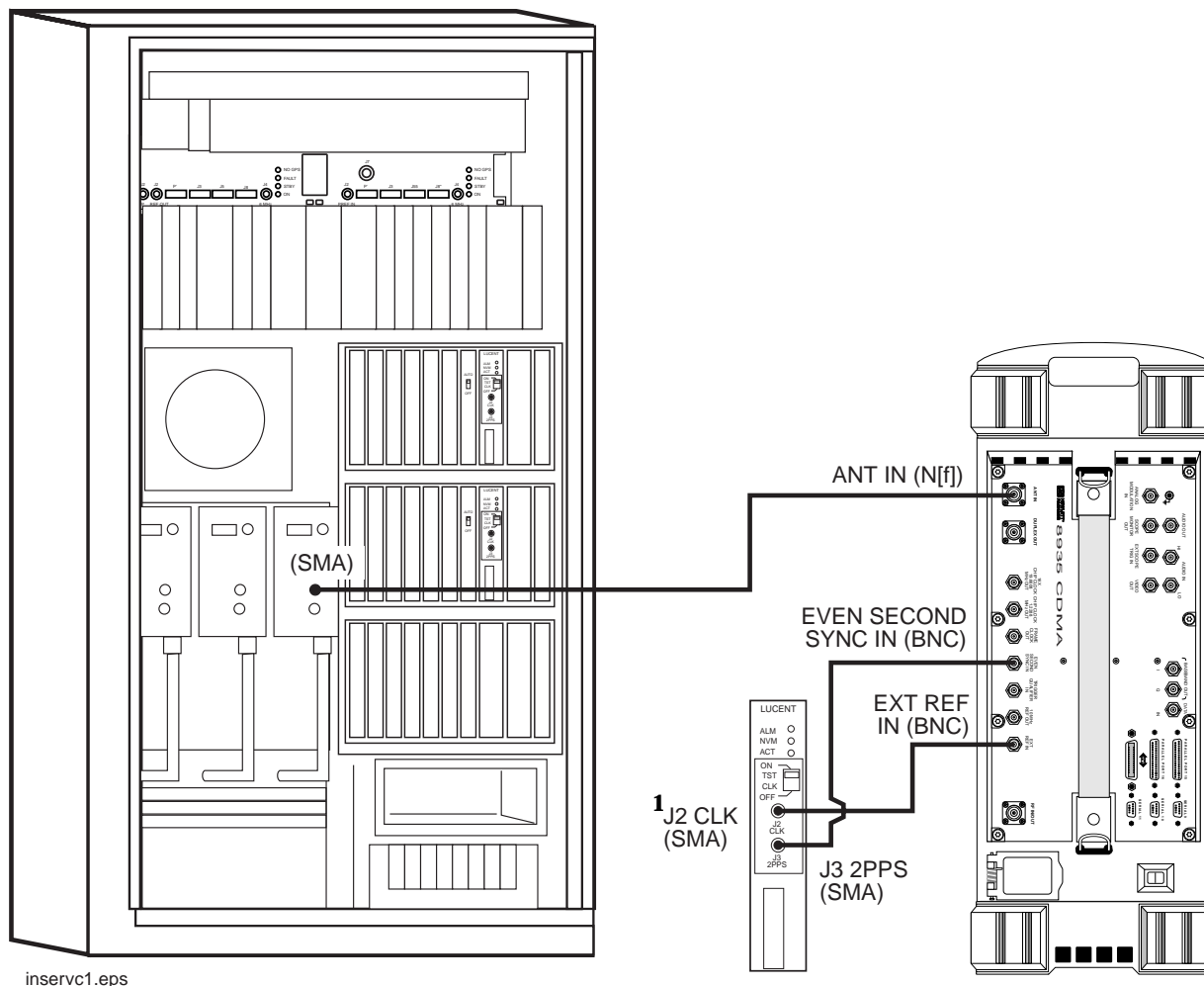
Refer to the following sections for details on making connections:

- [“Test Set Connections to the Base Station” on page 105](#)
- [“External Modem Connections” on page 111](#)
- [“Printer Connections” on page 112](#)
- [“Connector Kits” on page 113](#)

Test Set Connections to the Base Station

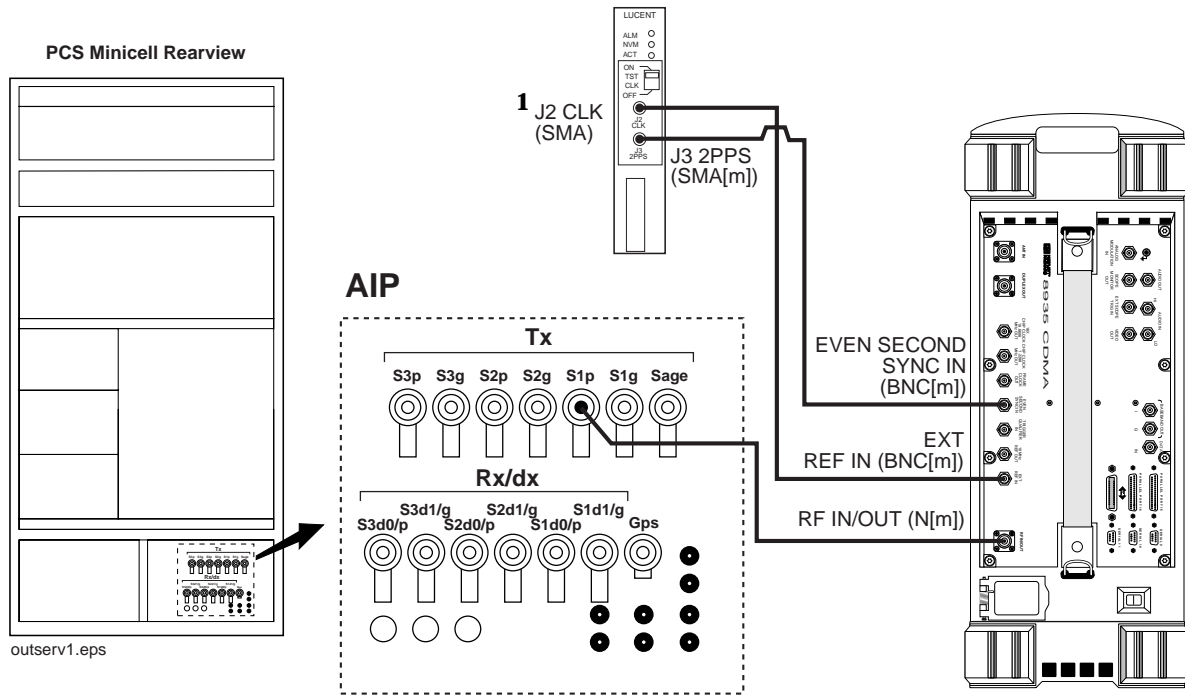
[Figure 5-1 on page 106](#) and [Figure 5-2 on page 107](#) show connections between a PCS Mini-cell base station and the Test Set. [Figure 5-3 on page 108](#) and [Figure 5-4 on page 109](#) show connections between the Series II base station and the Test Set. All of these setups utilize the SCT module's clocks for the Test Set reference.

Figure 5-1 Mini-Cell TX Test Port (In Service) Connections



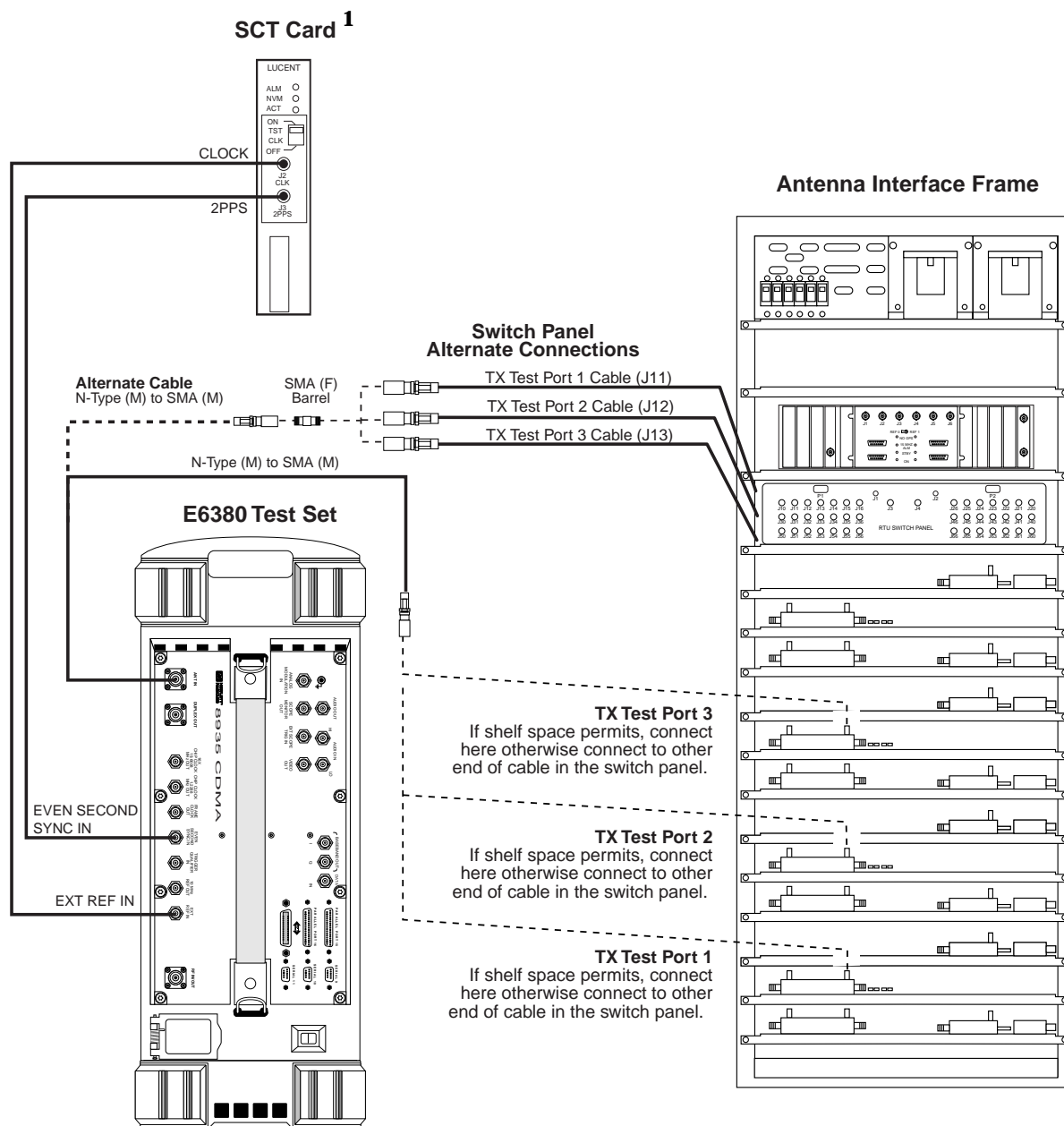
¹The TST CLK switch on the SCT module must be set to ON.

Figure 5-2 Mini-Cell TX Antenna Port (Out of Service) Connections



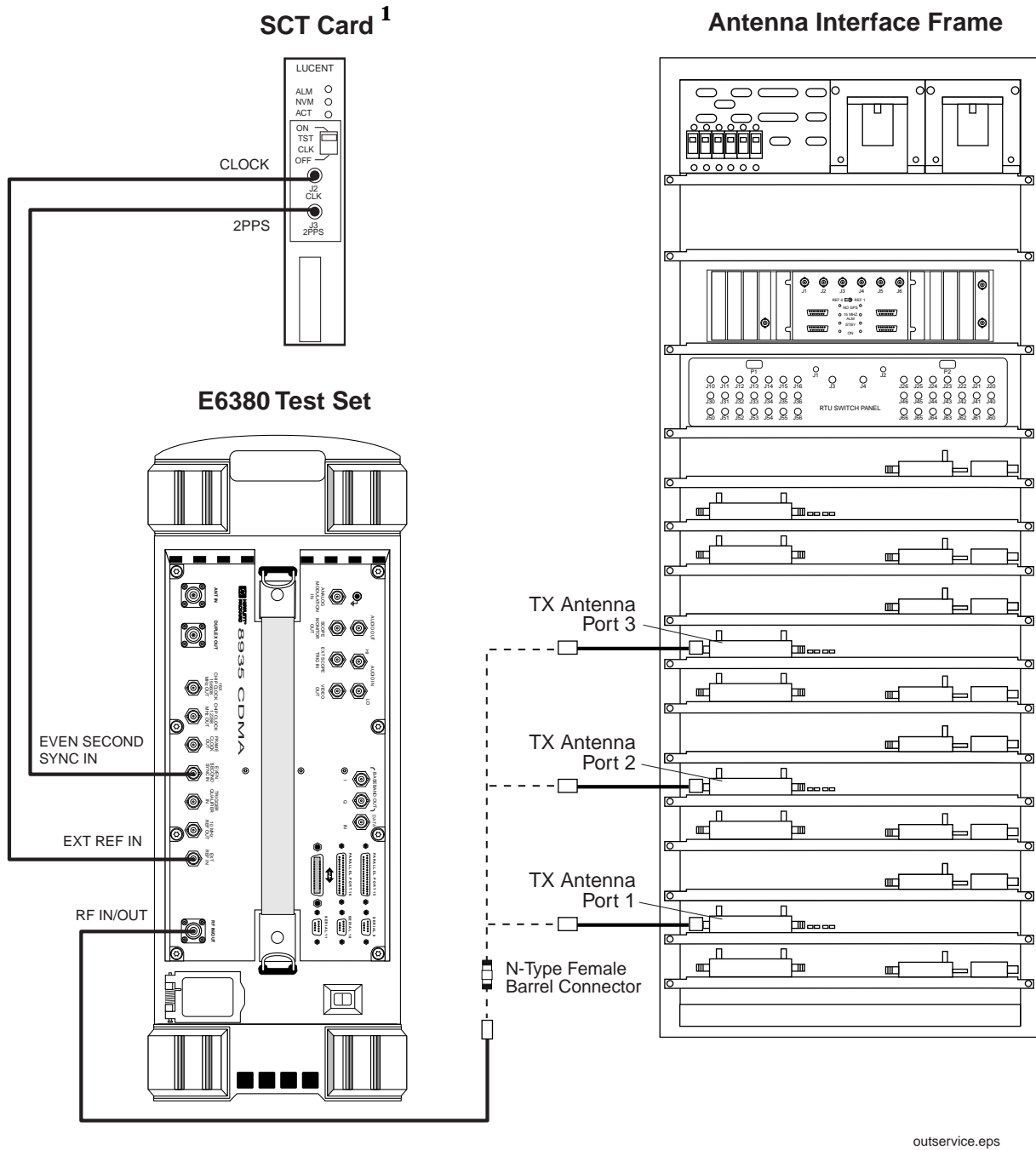
¹The TST CLK switch on the SCT module must be set to ON.

Figure 5-3 Series II Test Port (In Service) Connections



¹The TST CLK switch on the SCT module must be set to ON.

Figure 5-4 Series II TX Antenna Port (Out of Service) Connections

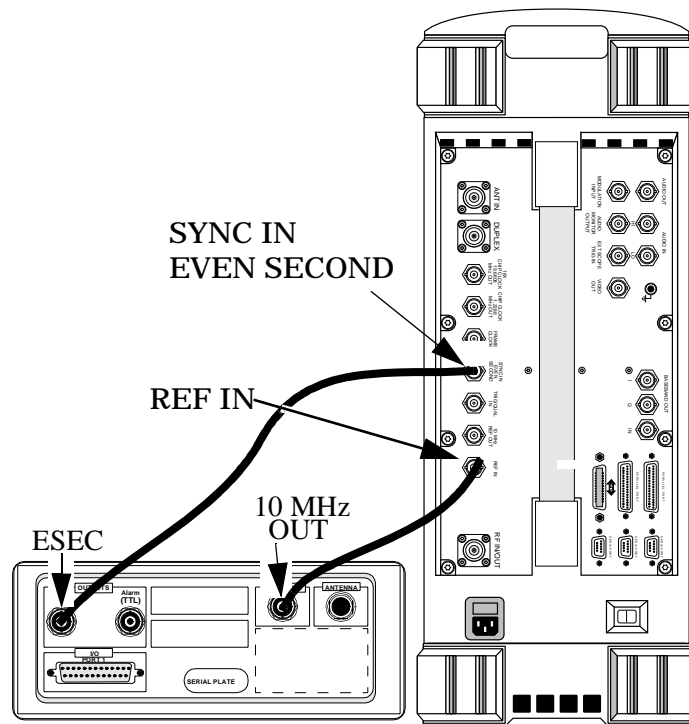


¹The TST CLK switch on the SCT module must be set to ON.

Figure 5-5 shows the connections to the Test Set when using an HP 58503A GPS time and frequency reference receiver to establish a time base. This configuration utilizes a GPS signal for the Test Set timebase instead of connecting to the cell site's SCT modules. See “GPS Time and Frequency Reference Receiver” on page 16 for information on why you would use the HP 58503A.

When using the HP 58503A, be sure to set the REF IN Connected to field on the Test Configuration Menu to GPS Receiver (see “Test Configuration Menu Settings” on page 59).

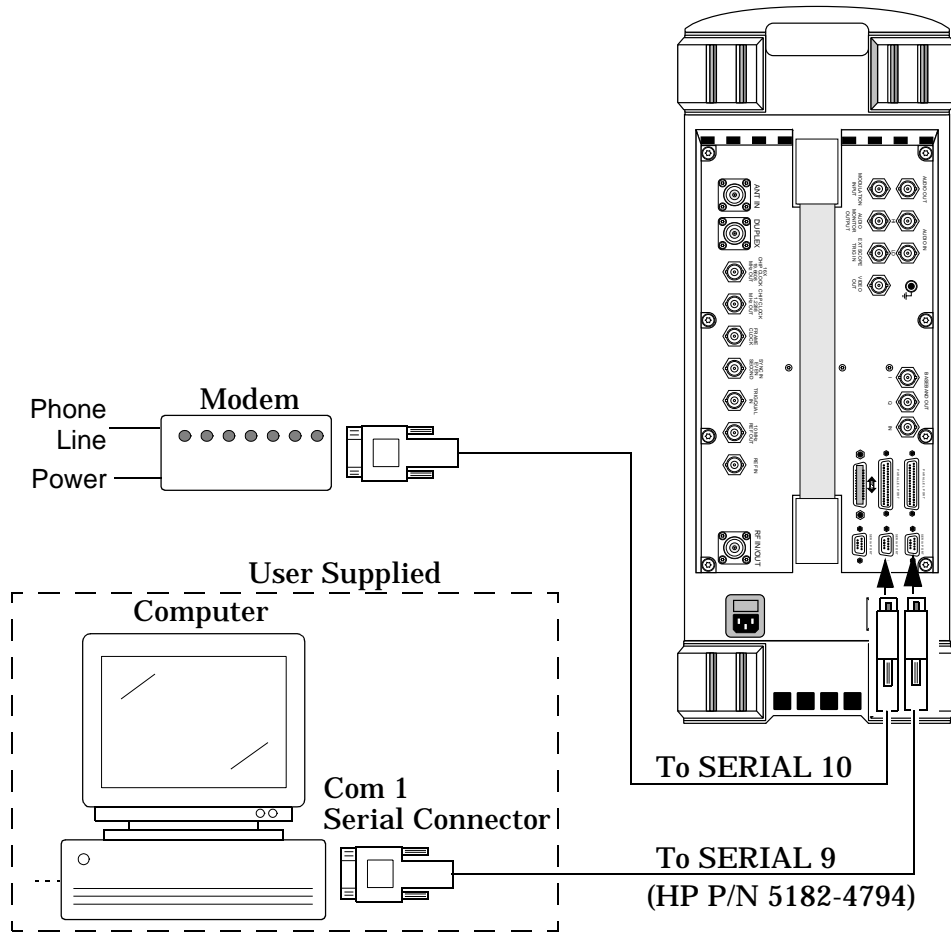
Figure 5-5 HP 58503A GPS Time and Frequency Reference Receiver Connections



External Modem Connections

Figure 5-6 illustrates the connections used when adding an external modem to the Test Set and (optionally) how to add a personal computer to the second serial port.

Figure 5-6 Connections for the HP 8935, Modem, and PC



Printer Connections

Screen images, test data, and communications between the MSC and Test Set can all be printed to a hard copy (paper). You can print using the SERIAL 9, PARALLEL 15, or the HP-IB port. When using SERIAL 9, you cannot have your laptop PC connected at the same time.

- Screen images of any screen can be printed. Certain tests, such as the Insertion Loss Test and Return Loss Test provide a `scr Dump (k5)` feature to allow you to send the test's result plot to a connected printer.
- Using the data collection function, you can print test results as tests are run. See ["Data Collection" on page 167](#).
- Using data logging, you can print commands and responses between the MSC and Test Set. See ["Logging" on page 183](#).

Connector Kits

A connector and cable kit is available to supply the required parts to connect the Test Set to the base station equipment. The HP E8300A 8935 Base Station Connection Kit supplies serial cable, RF cables and adapters needed to connect the Test Set for testing. Refer to [Table 5-1](#) for a list of parts included with the HP E8300 Base Station Connection Kit. See [page 114](#) for information on Option 001.

Table 5-1 HP E8300A Base Station Connection Kit Contents

Part	Part Number	Quantity	Use
Cable Assy N(M) to N(M) 10 ft	08921-61010	1	Connects the base station's TX Antenna Port to the Test Set's RF IN/OUT port.
Cable Assy SMA(M) to BNC(M) 10ft	08921-61021	2	Connects base station's Even Second clock and 19.6608 MHz clock to Test Set.
Cable assembly SMA(M) to N(M) 12 ft	E8300-61002	1	Connects the base station's TX Test Port to the Test Set's ANT IN port.
Cable assembly N(M) to N(M) 2 ft	E8300-61005	1	Used as the calibration cable for Insertion Loss test.
Cable assembly DB9(F) to DB9(F) 10 ft Null Modem.	5182-4794	1	Connects the PC's serial port to the Test Set's SERIAL9 port.
Attenuator 6 dB N(M) to N(F)	0955-0819	2	Used for cable loss calibration routines.
Adapter SMA(F) TO N(M)	1250-1250	1	TX Test Port Cable calibration adapts to a Type N attenuator.
Velcro Cable Wrap	1400-2157	10	Used for securing and organizing cables for transporting and during testing.
Verification Guide	E8300-90001	1	Used as a checklist for connector kit contents.
Transit Case	E8300-61006	1	Organizes and transports cables and connectors. Includes spaces for Option 001 parts.
Adapter N(F) to N(F)	1250-0777	1	Joining Type N cables
Adapter TNC(M) to N(F)	1250-2361	1	Used for TNC connections on some base stations.
Strain Relief Assembly	E8300-61004	2	Reduces strain on connectors from hanging cables.
Strain Relief Application Guide	E8300-90005	1	Instructions for using the strain relief assemblies.

E8300A Connection Kit Option 001

By ordering Option 001 for the E8300A Connector Kit, the additional parts are included that are needed to run all of the Test Set's built-in RF Tools routines. The RF Tools routines are automated measurements used in cell site maintenance (such as antenna sweeps).

If you do not purchase the HP E8300A connector kit, you can order the HP E6554A RF Tools Hardware Accessory Kit to provide all of the needed connectors, cables, and accessories to run the RF Tools tests. See ["Hardware Accessory Kit" on page 115](#).

Table 5-2 HP E8300A Connection Kit; Option 001 Contents

Part	Part Number	Quantity	Use
Cable Assy N(M) to N(M) 2 ft	8120-8687	2	Used to connect the Test Set to the VSWR bridge.
VSWR bridge	0955-0829	1	Used to measure return loss
50Ω N(M) termination	1250-2656	1	Used to terminate transmission lines.
Short N(M)	1250-2655	1	Used to terminate the DUT port of the VSWR bridge during return loss tests.
Resistive power splitter, 2-way	0955-0827	1	Divide a signal in two.

Hardware Accessory Kit

The HP E6554A 8935 RF Tools Hardware Accessory Kit contains the equipment necessary to run the “Return Loss Measurement” on page 98 and to run the RF Tools ROM programs that reside in the Test Set. Refer to the *HP 8935 CDMA Cellular/PCS Base Station Test Set Reference Guide* for more information about the RF Tools program.

Table 5-3 HP E6554A 8935 RF Tools Hardware Accessory Kit

Part	Part Number	Quantity	Use
Cable Assy N(M) to N(M) 2 ft.	8120-8687	2	Used to connect the Test Set to the VSWR bridge.
VSWR bridge	0955-0829	1	Used to measure return loss
50Ω N(M) termination	1250-2656	1	Used to terminate transmission lines.
Short N(M)	1250-2655	1	Used to terminate the DUT port of the VSWR bridge during return loss tests.
Resistive power splitter, 2-way	0955-0827	1	Divide one signal into two signals.
Adapter BNC(M) to N(F)	1250-0077	2	Connect BNC cables to type N connections.
Attenuator 6 dB N(M) to N(F)	0955-0826	2	Used during cable loss, insertion loss, and return loss tests.
Transit case	E6554-61004	1	Organizes and safely transports kit contents.
Verification Guide	E6554-9001	1	Used as a checklist for accessory kit contents.

Demo (Demonstration) Mode

A good way to get started with the Software is to run it in the demo mode. The demo mode allows you to step through the menus and simulate testing without 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, but it will perform very much the same as if actually testing a base station. When measurements are displayed, it provides sample numbers in order to show what the printout format will look like.

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

Entering the Demo Mode

The switch used to turn the demo mode on and off is a parameter in the test parameters menu. To turn on the demo mode:

- Step 1.** If the Software is running, press **Shift** then **Pause/Continue** to stop program operation.
- Step 2.** Press the **Menu** key to display the SOFTWARE MENU screen.
- Step 3.** Scroll to **Parm Test Parameters** and press the knob.
- Step 4.** When the **TESTS (Test Parameters)** menu is displayed, press the knob again to allow scrolling.
- Step 5.** Scroll to **zzzz Test Demo Mode** (usually the last parameter in the list) and press the knob again (this stops the scrolling function).
- Step 6.** Turn the knob to place the cursor in front of the field's value (0.000000) below the parameter name.
- Step 7.** Using the DATA ENTRY keys, press **1** then **Enter**.
- Step 8.** That is all it takes to set up demo mode. The demo mode begins the next time the Software is run. If you want to re-run the Software now, press the **Menu** key and then select **Run Test (k1)**. You will return to the Software's Main Menu in the demo mode.

Exiting the Demo Mode

To turn off the demo mode, enter a value of 0 for the demo mode setting:

- Step 1.** If the Software is running, press **Shift** then **Pause/Continue** to stop program operation.
- Step 2.** Press the **Menu** key to display the **SOFTWARE MENU** screen.
- Step 3.** Scroll to **Parm Test Parameters** and press the knob.
- Step 4.** Once in the **TESTS (Test Parameters)** menu, press the knob again to (allow scrolling).
- Step 5.** Scroll to **ZZZZ Test Demo Mode** and press the knob again (to stop the scrolling function).
- Step 6.** Turn the knob to place the cursor in front of the field's value (**1.000000**) below the parameter name.
- Step 7.** Using the **DATA ENTRY** keys, press **0** (zero) then **Enter**.
- Step 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 **Menu** key and then select **Run Test (k1)**. You will return to the Software's Main Menu in the test mode.

Laptop Emulator

Overview

The Test Set has the ability to send control commands to the MSC (switch), via an external modem, to control the radios at the cell site. This significantly reduces test time over manual operation. The Software function used for site control via the MSC is called the Laptop Emulator.

The Laptop Emulator uses the Test Set's internal IBASIC controller and serial I/O capabilities to emulate a terminal device for communications to the MSC. The Laptop Emulator can be used instead of (or in conjunction with) a separate laptop PC.

NOTE The Laptop Emulator function cannot be used if you are using the BTS Laptop Utility program running on a connected PC with an internal modem. See [“Connect to the MSC Using a Laptop PC” on page 48.](#)

Setting Up and Using the Laptop Emulator

These are the steps used in Laptop Emulator use. (Only steps 2 and 3 are covered in this chapter. See [“Installation” on page 19](#) for modem setup steps 1a to 1c:)

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 the MSC.
3. Send commands to the MSC.

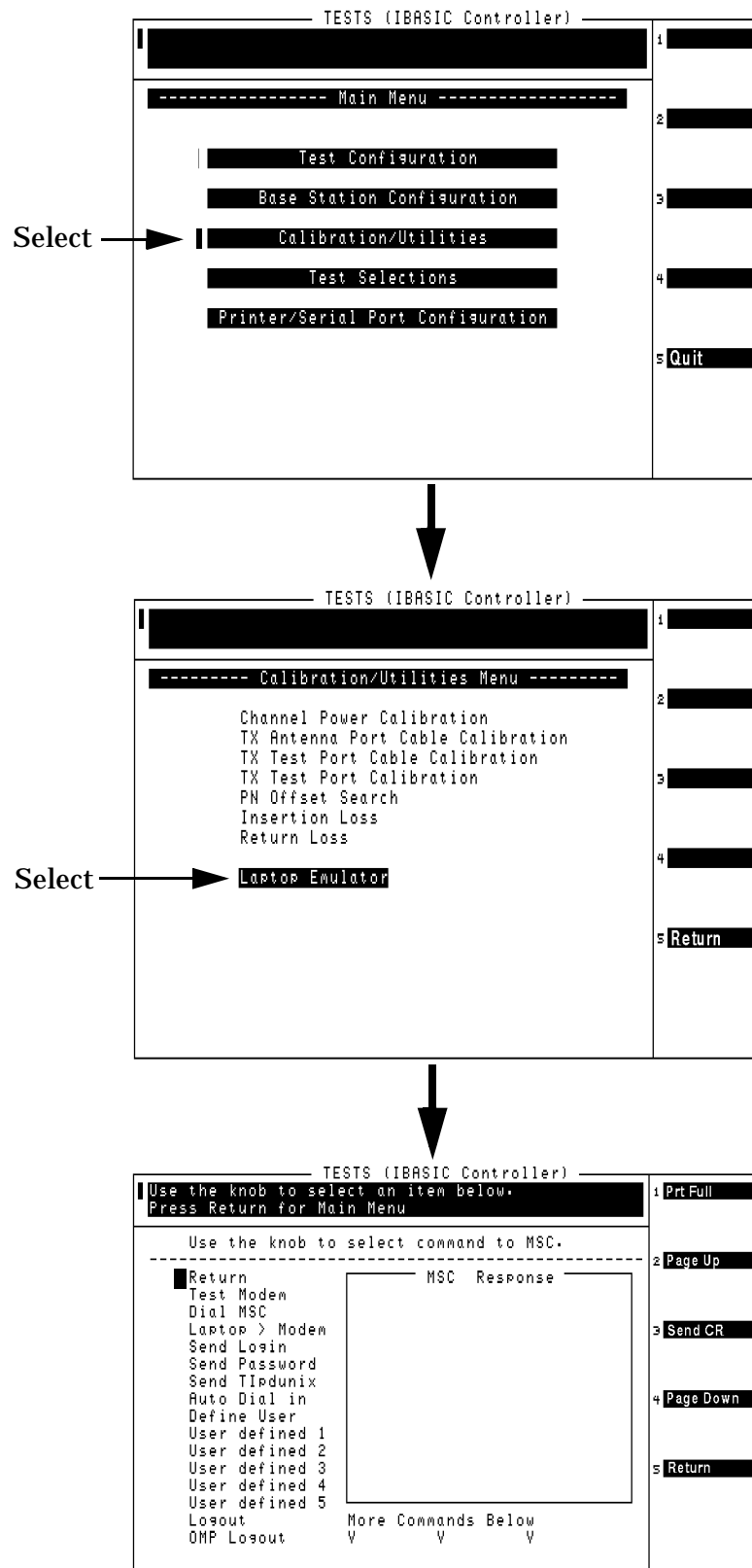
Dialing and Logging on to the MSC

Once the modem is connected and configured, you should be able to dial up the MSC and log on to perform maintenance. See [Figure 5-7 on page 119.](#)

Step 1. From the Software's Main Menu, scroll to **Calibration/Utilities** and press the knob.

Step 2. Scroll to **Laptop Emulator** and press the knob.

Figure 5-7 Selecting the Laptop Emulator



Step 3. Make sure that your modem is connected and turned on. You should have already performed the steps to set the modem up for use with the Test Set. If not, return to [“Installation” on page 19](#) and follow the steps outlined in that chapter.

Step 4. Scroll to **Test Modem** and press the knob to check basic modem operation. The response OK should appear in the MSC Response box.

Step 5. To dial up the MSC, scroll to **Dial MSC** and press the knob.

- If you have entered the number before, it will appear at the top of the screen and you can simply select **Done**.
- If you have not previously entered the number, you are prompted to enter the phone number for the switch. Enter the number using the DATA ENTRY keys and press the knob (**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.

Step 6. You now need to get to the login prompt. This may require that you send a few carriage returns (CR). Select the **Send CR (k3)** 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 126](#).

Step 7. When prompted by the MSC for a login, select **Send Login**.

- If you have entered your login previously, it will appear at the top of the screen and you can simply select **Done**.
- If you have not previously entered your login, use the knob to enter your login from the characters in the **Choices** menu, then select **Done**.

Step 8. When prompted by the MSC for a password, select **Send Password**.

- If you have entered your password previously, it will appear at the top of the screen and you can simply select **Done**.
- If you have not previously entered your password, use the knob to enter your password from the characters in the **Choices** menu and select **Done**.

Step 9. 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 5-8 shows the typical appearance of the MSC Response box after a connection sequence.

Figure 5-8 Typical Laptop Emulator Display After the Connection to the MSC Has Been Established

```
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

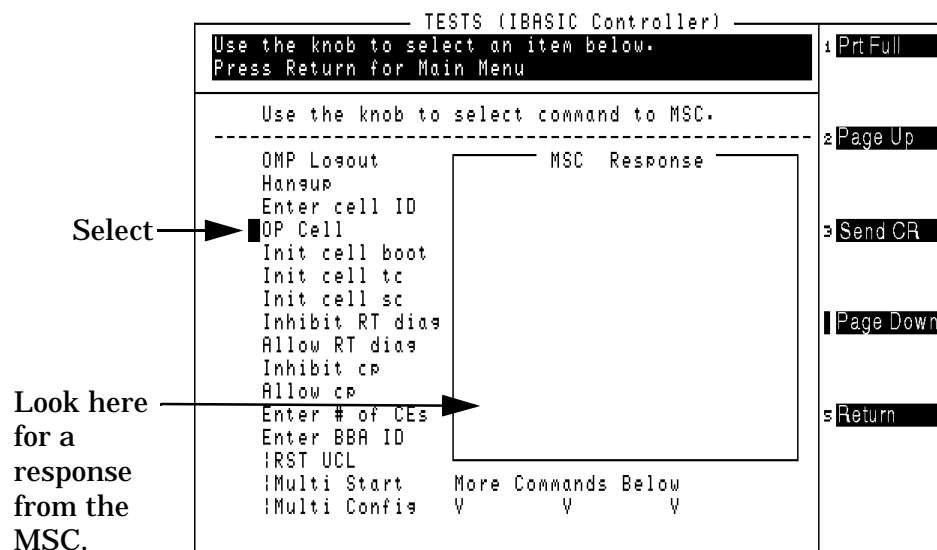
Spokane, Wa.   APX-1000 APX8.0      ttyx      TTY 21
```

Step 10. You can now verify that you can control the site via the MSC. Select **k2** (**Page Down**) and scroll down 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.

Step 11. Scroll to and select **OP Cell** (see [Figure 5-9](#)). You should see a response to the Op Cell command in the MSC Response box on the display.

Figure 5-9 Verifying Site Control



Step 12. The site should now be ready to receive the commands from the Test Set that will be sent during testing. Scroll to the command you wish to use next and press the knob to select. 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 Automated Dial In

Once you have become familiar with the steps to dial the MSC and log on, you can use the dial in mode to save time on subsequent connections.

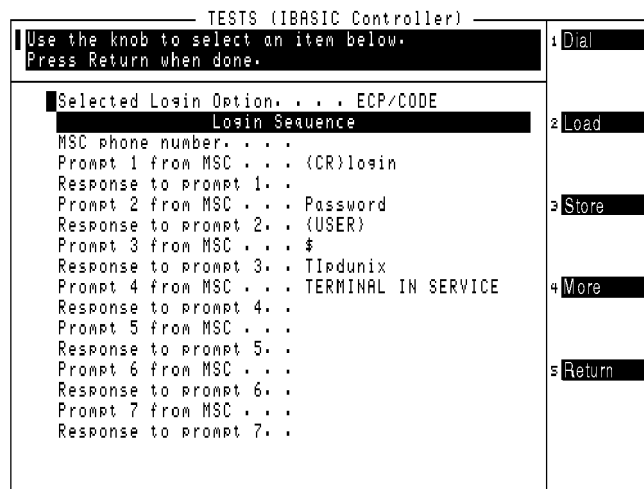
Dial in is set up by entering the commands to be sent to the MSC during the logon sequence. You will also enter the responses that should come back from the MSC so the Test Set knows when to send the next commands.

Defining and Storing the Dial In File:

Use these steps to make the entries needed to use the dial-in feature to connect to the MSC and prepare a cell site for maintenance:

1. From the Software's main menu, select **Calibration/Utilities**.
2. Select **Laptop Emulator**.
3. Select **Auto Dial in**.

Figure 5-10 Entering the Dial in Information for Automated Dial In



4. To specify the method to use when logging in, choose **Selected Login Option**.
 - ECP - enter through the Executive Cellular Processor.
 - ECP/CODE - enter through the Executive Cellular Processor and prepare to create and send a coded response.
 - OMP - enter through the Operations Maintenance Platform
 - OMP/CODE - enter through the Operations Maintenance Platform and prepare to create and send a coded response.
 - DK/OMP - use Data Kit to enter through the OMP
 - DK/ECP - use Data Kit to enter through the ECP
5. Scroll to **MSC phone number** and press the knob. Using the **DATA ENTRY** keys, enter the phone number for the MSC to be dialed. Press **Enter** when the complete number has been entered.
6. Scroll to **Prompt 1 from MSC** and press the knob. This defines the initial response text that will be looked for from the MSC. In many cases this will be "login." Use the **Choices** menu to enter the response from your MSC. Scroll up and select **Done** when the entry has been made.
7. Scroll to **Response to prompt 1** and press the knob. Now enter the response that you would send to the MSC prompt defined in the previous step. In most cases, this would be your login name.
8. Repeat these steps to enter the MSC responses and commands to send from the Test Set. Typically, you can include the commands up to and including sending the **TIpunix** command to put the site into the maintenance mode.
9. When finished with the command-response entries, press **k5 (Return)**.
10. If you made changes, you will be asked if you would like to save them to the SRAM PC card. Press **k1 (Yes)**. After the file is saved, you will be returned to the main menu.

NOTE The dial-in information is automatically saved to a file named a **SIGN**. You cannot use another file name, nor can you have more than one dial-in file on an SRAM card.

Running the Dial In Sequence:

Use the following steps to initiate the dial-in sequence (after it has been defined) in order to connect to the MSC and set up for maintenance:

1. Make sure that the serial connections to the modem have been made, that the modem is powered on, and that it is connected to the phone line. If you have already used the Laptop Emulator to connect to the MSC manually, you should not need to make any changes to the equipment setup.
2. From the Software's Main Menu, select **Calibration/Utilities**.
3. Select **Laptop Emulator**.
4. Select **Auto Dial in**.
5. Send the dial-in sequence to the MSC.
 - If the currently displayed entries are correct for dialing in to the MSC, press **k1 (Dial)** to dial in and login.
 - To use Dial in settings saved on an SRAM PC card, insert the card and press **k2 (Load)**. Press **k1 (Dial)** to dial in and login.

Once logged on to the MSC and in the maintenance mode, you can use the Laptop Emulator to send further commands to the MSC or exit the Laptop Emulator and begin automated testing using the Test Set.

To Logout Using the Terminal Emulator

After using the Terminal Emulator to dial in and login to the MSC to test, you should use the Terminal Emulator again to logout after testing.

1. Make sure that the serial connections to the modem have been made, that the modem is powered on, and that it is connected to the phone line.
2. From the Software's Main Menu, select **Calibration/Utilities**.
3. Select **Laptop Emulator**.
4. Select **Logout** or **OMP Logout** (if logged in through the OMP).
5. Press **k5 (Return)** to return to the Calibration/Utilities Menu.

Using the Laptop > Modem Mode

If you have connected a PC to the serial port of the Test Set (see “Connections for the HP 8935, Modem, and PC” on page 111) you can use the **Laptop > Modem** mode to bypass Test Set communications to the MSC. The Test Set merely routes the commands back and forth between the MSC and the laptop PC without sending any commands of its own.

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:

- Step 1.** First, make sure that you have connected the modem and PC to the serial ports as shown in [Figure 5-6 on page 111](#).
- Step 2.** Prepare your PC for use by starting a communications software application.
- Step 3.** From the Software’s Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 4.** Scroll to **Laptop Emulator** and press the knob.
- Step 5.** Scroll to **Laptop > Modem** and press the knob.
- Step 6.** You can now type commands on the PC using your terminal/communications program. The commands are passed, via the Test Set, to the modem and then the MSC. Responses from the modem and MSC will appear on your PC’s display, not the Test Set’s 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)**.

- Step 7.** When finished using the PC to communicate, select **EXIT L > M (k3)** to return to the Laptop Emulator menu.
- Step 8.** To return to the Calibration/Utilities Menu, select **Return (k5)**. Selecting **Return (k5)** a second time returns the Software to the Main Menu.

Creating User-Defined Commands

Why use the user-defined commands?

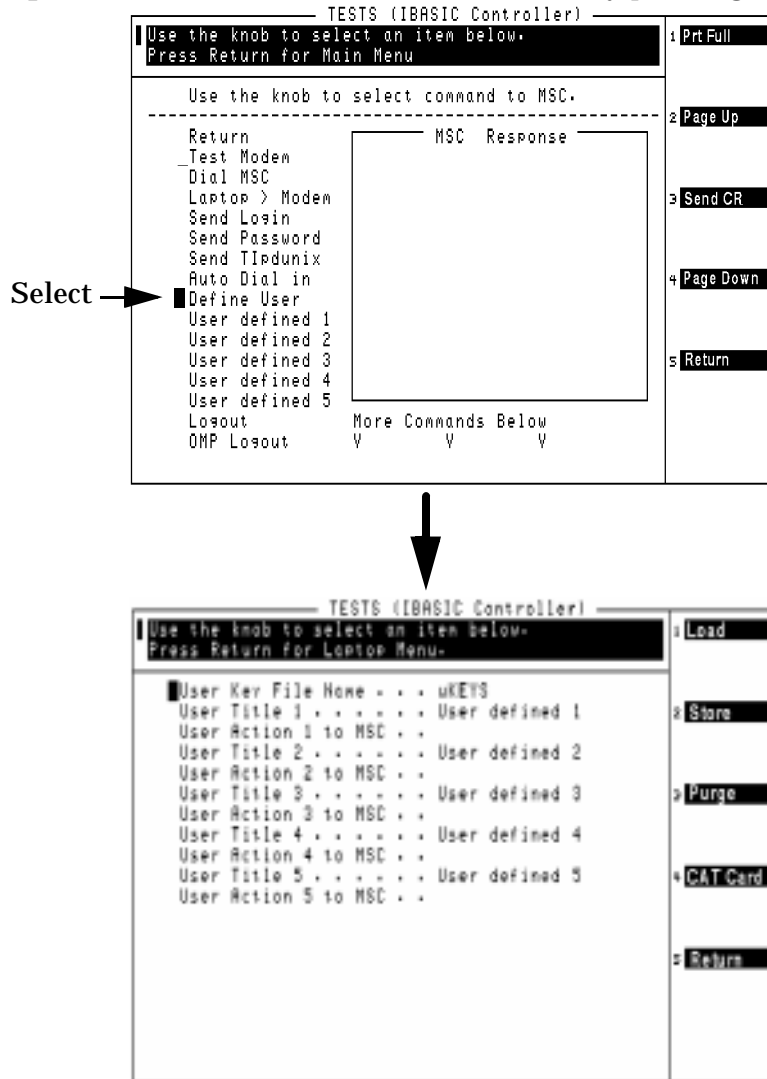
The Laptop Emulator provides most common commands needed to control the site and the radios. In some cases, however, you may want to use commands that are not available in the Laptop Emulator menu.

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:

- Step 1.** Insert an SRAM PC card into the Test Set's front-panel PC card slot. Make sure that the card is *not* write-protected.
- Step 2.** From the Software's Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 3.** Scroll to **Laptop Emulator** and press the knob.

Step 4. Scroll to **Define User** and select it by pressing the knob.



Step 5. Select **User Key File Name** (k_1). There are five file names available for storage of commands: **uKEYS**, **uKEYS2**, **uKEYS3**, **uKEYS4** and **uKEYS5**.

Step 6. Select the file name by pressing a **USER** key (k_1 through k_5).

Step 7. Scroll to **User Title 1** and press the knob.

Step 8. The title you enter will be displayed 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 title for your command. When done spelling the name, scroll to **Done** and press the knob.

Step 9. Scroll to **User Action 1 to MSC** and press the knob.

- Step 10.** Now enter the corresponding command string to be sent to the MSC exactly as it would appear if you were using your PC to 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**.
- Step 11.** If you have other commands to define, repeat [step 7](#) through [step 10](#) for User Actions and User Titles 2 through 5.
- Step 12.** Once the commands have been entered, store the entries by selecting **store (k2)**.
- Step 13.** Return to the Laptop Emulator menu by selecting **Return (k5)**. User titles that you entered will appear immediately after the **Define User** selection. Position the cursor in front of the title to display the associated user defined action at the top of the screen.
- Step 14.** To exit the Laptop Emulator mode, select **Return (k5)**.

Loading and Using your User-Defined Commands:

- Step 1.** Insert the SRAM card you stored your commands on into the Test Set's front-panel PC card slot.
- Step 2.** From the Software's Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 3.** Scroll to **Laptop Emulator** and press the knob.
- Step 4.** If your commands do not appear on the list available in the Laptop Emulator screen:
 - a.** Scroll to **Define User** and press the knob.
 - b.** Position the cursor in front of **User Key File Name** and press the knob.
 - c.** Press the USER key (κ_1 through κ_5) associated with the file name you saved your user-defined commands under.
 - d.** Select **Load** (κ_1).
 - e.** The definitions for your user-defined commands should appear in the list on the display. Select **Return** (κ_5) to go back to the Laptop Emulator.
- Step 5.** Scroll to the user-defined command area (follows 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.
- Step 6.** Press the knob to send the command to the MSC.
- Step 7.** Select and send other commands, as needed, in the Laptop Emulator.
- Step 8.** To exit the Laptop Emulator, select **Return** (κ_5).

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:

- Step 1.** Insert the SRAM card you stored your commands on into the Test Set's front-panel PC card slot.
- Step 2.** From the Software's Main Menu, scroll to **Calibration/Utilities** and press the knob.
- Step 3.** Scroll to **Laptop Emulator** and press the knob.
- Step 4.** Scroll to **Define User** and press the knob.
- Step 5.** Scroll to **User Key Filename** and press the knob.
- Step 6.** Press the **USER** key (k_1 through k_5) corresponding to the file that you plan to delete.
- Step 7.** Select **Purge**(k_3). A prompt appears asking if you are sure you want to purge the selected file.
 - Select **Yes** (k_1) to remove the file.
 - Select **No** (k_2) to keep the file on the card.
- Step 8.** Select **Return** (k_5) to leave the user-defined command screen.
- Step 9.** Select **Return** (k_5) again to return to the Calibration/Utilities Menu.

Command Summary

Table 5-4 lists the commands available in the laptop emulator mode 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 5-4 Laptop Emulator Commands

Command	Command Syntax Sent to MSC
Return	<i>exits the Laptop Emulator menu</i>
Test Modem	AT
Dial MSC	ATDT <i>phone number entered</i>
Laptop>Modem	permits communication with the MSC through the Test Set (See “Using the Laptop > Modem Mode” on page 126.)
Send Login	sends <i>login</i>
Send Password	sends <i>password</i>
Send TIpunix	TIpunix
Auto Dial in	sends user defined login information and responses to prompts
Define User	<i>allows user to customize command</i> (See “Creating User-Defined Commands” on page 127.)
User Defined 1	<i>sends user defined command 1</i>
User Defined 2	<i>sends user defined command 2</i>
User Defined 3	<i>sends user defined command 3</i>
User Defined 4	<i>sends user defined command 4</i>
User Defined 5	<i>sends user defined command 5</i>
Logout	Two Control - D's
OMP Logout	forces OMP to close connection (This command is dependent on the base station's code revision number.)
Hangup	+ + +
Enter Cell ID	<i>stores cell ID information for recall later</i>
Op Cell	OP:CELL <i>x</i>

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

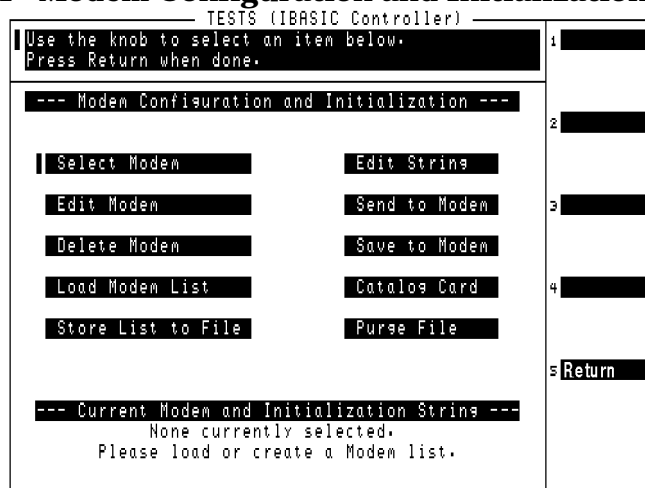
Modem Configuration and Initialization Menu

The Modem Configuration and Initialization menu is where you load, store, edit, delete, or create modem initialization files. This menu is accessed from the Main Menu by selecting **Printer/Serial Port Configuration**, and then selecting **Modem Configuration**.

After the modem initialization string is entered, it is sent to the modem to initialize it for communication with the MSC. Once the modem is initialized, you use the Laptop Emulator utility to send commands to the MSC to enter the OMP Craft Shell. After a command prompt is displayed for the Craft Shell, you can exit the laptop emulator and start automated testing.

Once the initialization string has proven to work correctly with your modem, you should store the initialization string to a file on an SRAM PC card (supplied with the Software) for later use. The **Store List to File** feature stores the modem in a file called "UMODEM".

Figure 5-11 Modem Configuration and Initialization Screen



Getting Started With a New Modem

When you first start using the Software with a modem, you need to get the modem working and then save the modem's information for later use. This procedure is discussed in [“Configuring and Initializing the External Modem” on page 38](#). The general steps are as follows:

1. Connect your modem to the Test Set. See [“Connect the Modem to the Test Set” on page 29](#).
2. Access the Modem Configuration and Initialization menu.
3. Enter a modem name using the `Edit Modem` function.
4. Enter the modem's initialization string using the `Edit String` function.
5. Verify that the initialization string works correctly with the modem using the `Send to Modem` function. If no message is displayed after attempting initialization, the modem initialized properly.
 - If the modem initialized correctly, save the name and string to a file using the `Store List to File` function.
 - If the message `“Problem, modem not initialized”` is displayed, use the `Edit Modem` function to modify the initialization string. Select `Send to Modem` to test the new string. After getting the modem to accept the initialization string (the error message is not displayed after sending the string), save the name and string to a file using the `Store List to File` function.
6. Save the initialization string in the *modem* using the `Save to Modem` function. This eliminates the need to re-initialize the modem later.

Modem Configuration and Initialization Menu Functions

- **Select Modem** is used to select the modem you are using from a list of modems that you have stored. The modem name and initialization string are then listed at the bottom of the screen.
- **Edit Modem** is used to edit the name of the selected modem. Use this function whenever you need to create a new modem configuration.

When you create a new modem configuration, save the configuration to a PC card using the **Store List to File** function. If not saved, the new configuration will be lost if a new program is loaded into the Test Set.

- **Delete Modem** is used to remove the current modem's settings from the Test Set's memory. Subsequent use of the **Select Modem** function shows that the modem you deleted is no longer shown on the modem list. A modem may be deleted from the list if you need to enter a name and initialization settings for an unlisted modem.

If you removed a modem from the list in error, reload the modem list using the **Load Modem List** function.

- **Load Modem List** is used to load a list of modems from a PC card. You must first create the modem list and store it on an SRAM PC card (using the **Store List to File** function).
- **Store List to File** is used to store the list of modems currently loaded into the Test Set's memory onto a RAM PC card. The software automatically assigns the name "UMODEM" to the list.

After a list has been created, the message "Duplicate file name" is displayed any time you try to re-save information to an existing modem configuration. The message warns you that you will overwrite the previous information. If you are editing the initialization string, select **Yes (Y)** to save the new information.

- **Edit String** is used to alter the initialization string for the currently selected modem.
- **Send to Modem** sends the initialization string to the modem. Serial communication settings to the modem must have already been configured (see "[Configure the Serial Port](#)" on page 36).
- **Save to Modem** stores the initialization string in the modem for future use.
- **Catalog Card** lists all of the files contained on the inserted PC card.
- **Purge File** removes the currently selected modem list from the inserted PC card (if the card is not write-protected).

Parameters List and Descriptions

The Software uses your entries in the Test Parameters screen to customize testing and configure the modem.

A special parameter allows you to run the Software in a demo mode, which is useful for familiarization with the operation of the Test Set without connecting to any external equipment. See [“Demo \(Demonstration\) Mode”](#) on page 116.

Most parameters can be entered two ways:

- By loading and running the software and entering all of the information in the Test Configuration, Base Station Configuration, and Printer/Serial Port Configuration menus, the software automatically changes the test parameter settings to match your configuration settings.

Parameters that can **not** be set while the Software is running include:

- 1. Adjust Power [0=no 1=on fail 2=always]
- 5. GN Code Domain Power Threshold
- 6. GN Print Inactive Walsh Codes [0=no 1=yes]
- 7. GN Stop Test if results fail [0=no 1=yes]
- 27. ZZZZ Test Demo Mode [0=normal 1=demo]
- By loading the Software and selecting **Parm Test Parameters** on the main SOFTWARE MENU screen, you can change the settings or any or all parameters from the factory defaults.

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 Change the Test Parameters and Conditions”](#) on page 155 and [“How to Save/Delete Procedures”](#) on page 160.

Parameter Names and Use

1. 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, power measurements are displayed whether they meet the specified pass/fail limits or not, but the power meter is not displayed.
- If set to 1, 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, 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 144](#) and [“Output Power Error” on page 144](#).

2. BBA Chan Stand [1=NAC 1=NAP 2=KP4]

The entry in this parameter field determines which channel or frequency assignment to use.

- NAC = North American Cellular
- NAP = North American PCS
- KP4 = Korean PCS P4

3. BBA Channel Number

This parameter identifies the channel number for the BBA you are testing.

4. BBA PN Offset

This parameter identifies the PN offset for the BBA you are testing. If you don't know this value, run the PN offset search to find it (see [“PN Offset Search” on page 93](#)).

5. GN 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. GN 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. GN Stop Test if results fail [0=no 1=yes]

An **F** appears in the P/F column of the test results to indicate a failure of that data point.

- Setting this value to 0 causes the Software to continue running if a measured value is not within specifications.
- Setting this value to 1 causes the Software to stop testing if a measured value is not within specifications.

8. LAP Baud Rate [valid test set range]

Enter the baud rate to use for communications between the laptop PC and the Test Set's SERIAL 9 port. Valid rates (bps) are: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, and 57600. This setting must match the setting used by your laptop's communication software.

9. **LAP Data Length** [7 or 8]

Select either 7 or 8 bits for your serial communication data link between the laptop PC and the Test Set's SERIAL 9 port. This number can be entered using the DATA ENTRY keys. This setting must match the setting used by your laptop's communication software.

10. **LAP Flow Control** [1=None 2=Xon 3=Hw]

Enter the type of data flow control for your serial communication data link between the laptop PC and the Test Set's SERIAL 9 port. This setting must match the setting used by your laptop's communication software.

- 1 provides no flow control.
- 2 uses Xon/Xoff flow control.
- 3 uses hardware flow control. This setting must be used for baud rates of 38400 and above.

11. **LAP Parity** [0=0 1=1 2=none 3=even 4=odd]

Set to match your laptop's communication program settings for communication between the laptop PC and the Test Set's SERIAL 9 port. Enter the number value to indicate your desired setting as indicated below:

Table 5-5 Parity Settings for Laptop to Test Set Communication

MSC Parity Parameter Entry	Parity Setting
0	zero parity
1	ones parity
2	parity equals "none"
3	even parity
4	odd parity

12. **LAP Stop Length** [1 or 2]

Enter 1 or 2 to match your laptop's communication program settings for the number of stop bits to use for communications between the laptop PC and the Test Set's SERIAL 9 port.

13. **MDM Baud Rate** [valid test set range]

Enter the baud rate used by your switch when communicating via a modem connected to the Test Set's Serial 10 port. Typical entries for this parameter are 2400 and 9600 baud. This number can be entered using the DATA ENTRY keys.

14. MDM Data Length [7 or 8]

Select either 7 or 8 bits for your serial communication data link to the MSC via a modem from the Test Set's SERIAL 10 port. This number can be entered using the DATA ENTRY keys.

15. MDM Flow Control [1=None 2=Xon 3=Hw]

Enter the type of data flow control for your serial communication data link between the modem and the Test Set's Serial 10 port. This setting must match the setting used by your laptop's communication software.

- 1 provides no flow control.
- 2 uses Xon/Xoff flow control.
- 3 uses hardware flow control. This setting must be used for baud rates of 38400 and above.

16. MDM Parity [0=0 1=1 2=none 3=even 4=odd]

Set to match your communication link to the MSC from the Test Set's Serial 10 port. Enter the number value to indicate your desired setting as indicated below:

Table 5-6 Parity Settings for Modem to MSC Communication

MSC Parity Parameter Entry	Parity Setting
0	zero parity
1	ones parity
2	parity equals "none"
3	even parity
4	odd parity

17. MDM Stop Length [1 or 2]

Enter the number of stop bits that matches your communication link with the MSC from the Test Set's Serial 10 port. You can choose 1 or 2 stop bits. Enter these values using the DATA ENTRY keys.

18. MSC BBA Number [50 Max]

Enter the number for the BBA you are testing.

19. MSC BCR Attenuation [30 dB Max]

Enter the BCR attenuation setting for the BBA you are testing.

20. MSC Cell Site Number [222 Max]

Enter the cell site number where you are testing.

21. MSC ECP Number

Enter the number of the ECP that controls the cell site you are testing.

22. REF 8935 REF IN [1=CS 2=GPS]

Define the source for the timebase reference signal to use when testing:

- 1 is used when using the cell site's clock signals from the SCT modules.
- 2 is used when you are using an HP 58503A GPS time and frequency reference receiver.

23. TX Antenna Port Cable Loss

This parameter is used to account for the cable loss when testing from the TX Antenna port. If you do not know this value, you can have the Software measure it for you, (See [“TX Antenna Port Cable Calibration” on page 86.](#))

24. TX Output Power

Enter the power level (in Watts) that the BCR should be transmitting (at the TX Antenna port) when BCR Attenuation is set to 0 (zero).

25. TX Test Port Cable Loss

This parameter is used to account for the cable loss when testing from the TX Test port. If you do not know this value, you can have the Software measure it for you, (See [“TX Test Port Cable Calibration” on page 88.](#))

26. TX Test Port Coupling Factor

Enter the amount of isolation between the BCR's transmitter output and the TX Test port. If you do not know this value, you can have the Software measure it for you. (See [“TX Test Port Calibration” on page 90.](#))

27. 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 116.](#)

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 Change Pass/Fail Limits” on page 157](#) and [“How to Save/Delete Procedures” on page 160](#).

1. Carrier Feedthrough

These are the pass/fail limits 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 are 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 fail some upper limit).

Units are dB.

See [“GN Print Inactive Walsh Codes \[0=no 1=yes\]” on page 139](#).

3. Code Domain Phase

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

Units are mrad (milliradians).

4. Code Domain Timing

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

Units are ns (nanoseconds).

5. Frequency Error

The Test Set 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 1 dB up and 1 dB down from center.

Units are dB.

7. Output Power Error

The previous limit setting (**Output Power Adjustment Error**) controls the adjustment diagram in power meter use. These (**Output Power Error**) 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 limits 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 (F) 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

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

Units are μs (microseconds).

Testing without MSC Control

Chapter 4, “Performing CDMA Tests,” on page 57, lists the steps for fully automated testing, using the Software to control the base station. The steps of that chapter use a modem to control the cell site via the MSC.

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

- Be sure to set the **Send Control Commands to MSC** field on the Base Station Configuration Menu to **NO**. The Test Set 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.

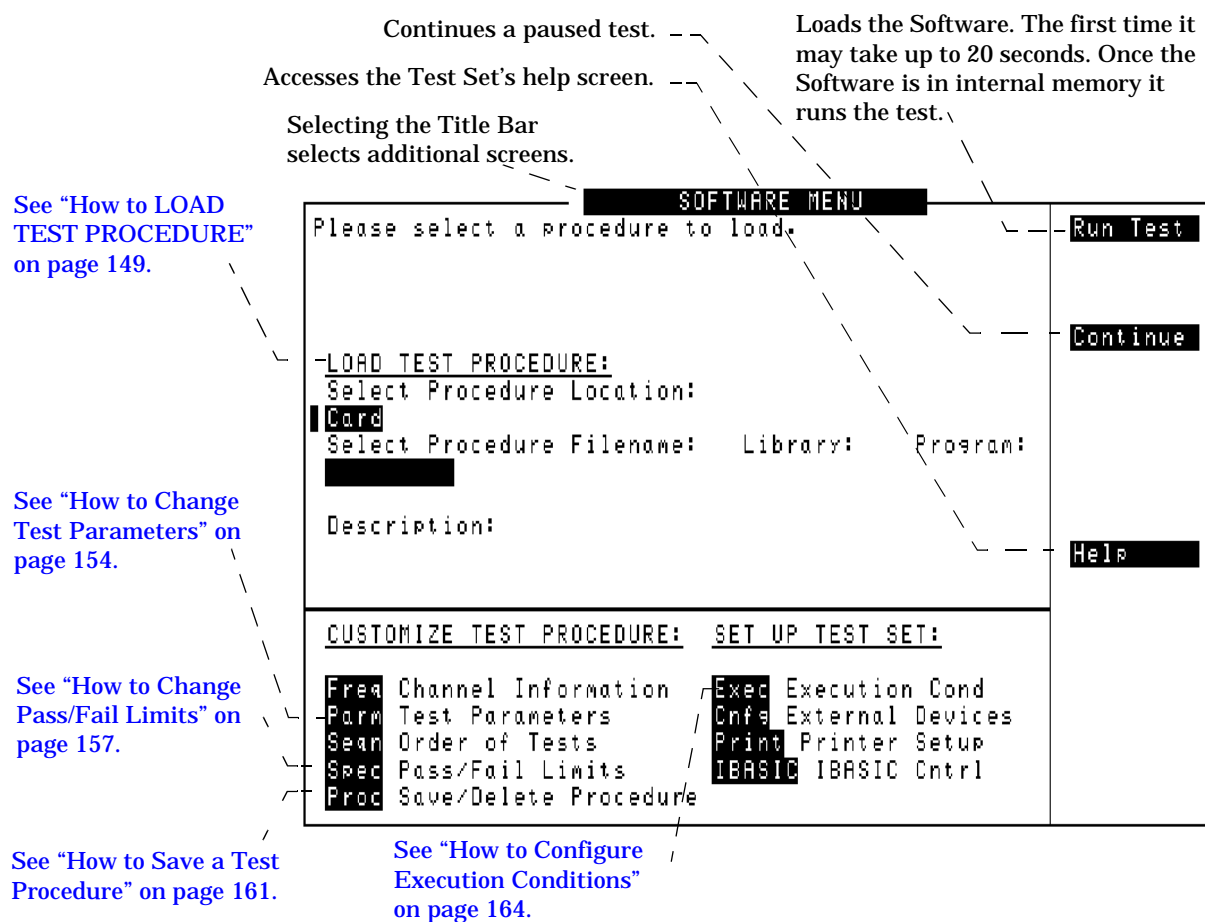
-
- You will probably need an assistant at the MSC to control the site and remove the radios from service.

6 General Software Reference

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

SOFTWARE MENU Screen Overview

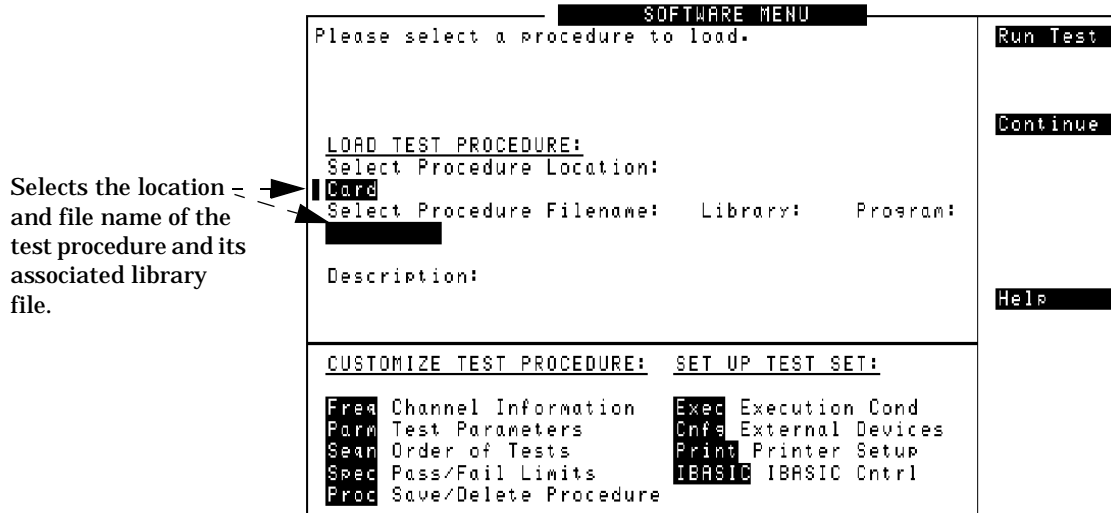
Figure 6-1 Test Subsystem



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

How to LOAD TEST PROCEDURE

Figure 6-2 LOAD TEST PROCEDURE



NOTE **How to Troubleshoot the Installation**

See [“Troubleshooting the Software Installation”](#) on page 152 for some hints to help debug any problems you may have during the installation of the Software.

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

The first time you select a procedure the actual Software program does not get loaded into the Test Set’s memory until you select **Run Test** (k1) on the Test Set. It will take approximately 20 seconds for the Software program to be loaded. The program will remain in memory after a power-down/power-up cycle, unless it is manually deleted or a new program is loaded.

Loading the Software Card

Figure 6-3 Loading the Software Card

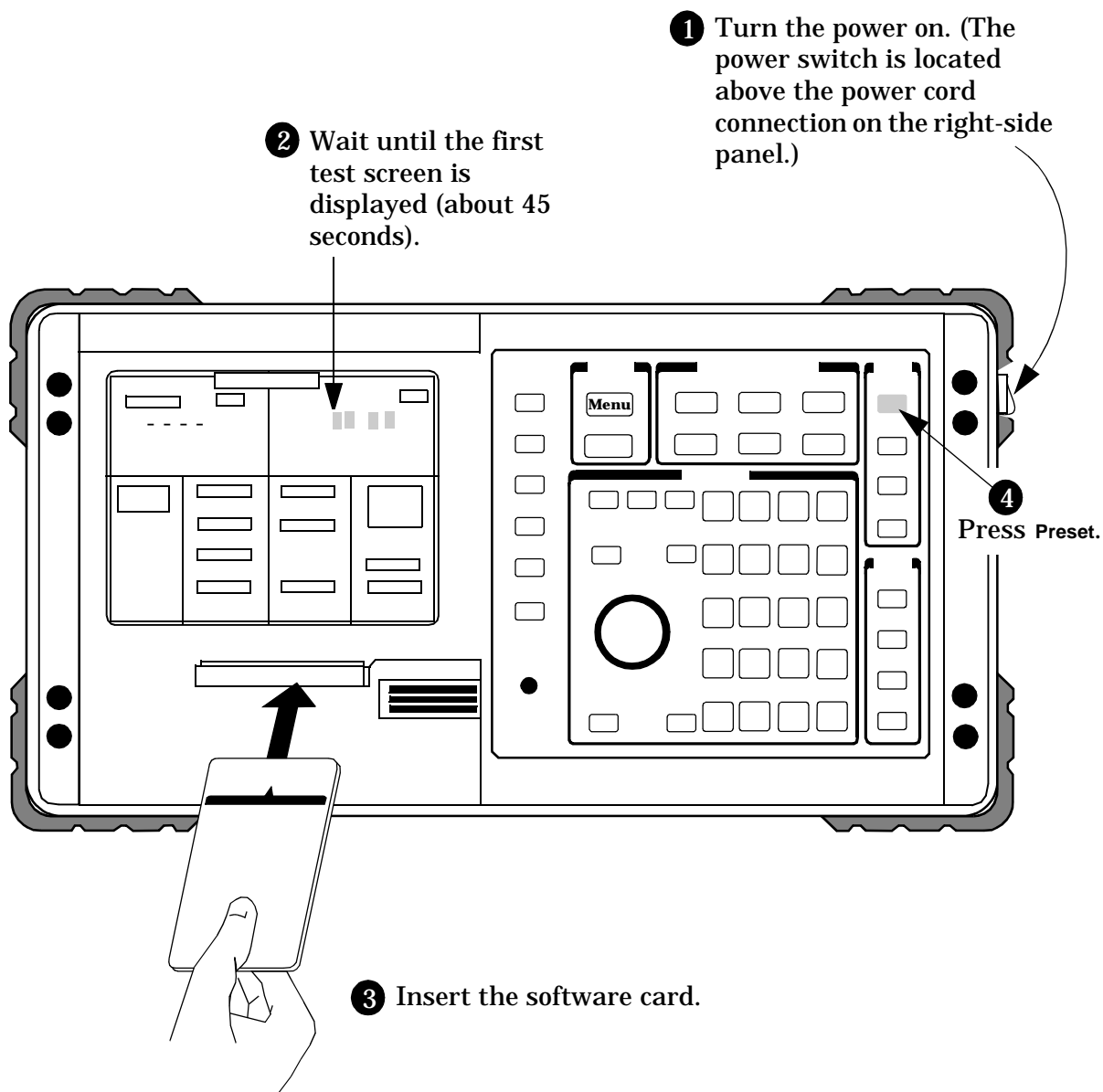
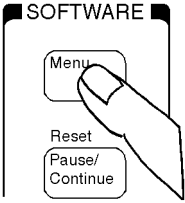













Figure 6-4 Selecting a Procedure

<p>5 Press the SOFTWARE Menu key to display the Software Menu screen.</p> 	<p>6 Position the cursor at Select Procedure Location: and select it.</p> <p>Position</p>  <pre>LOAD TEST PROCEDURE: Select Procedure Location: Select Procedure Filename:</pre> <p>Select</p> 
<p>7 Position the cursor at Card and select it.</p> <p>Position</p>  <pre>Choices: Card ROM RAM</pre> <p>Position</p> 	<p>8 Position the cursor at Select Procedure Filename: and select it.</p> <p>Position</p>  <pre>LOAD TEST PROCEDURE: Select Procedure Location: Card Select Procedure Filename:</pre> <p>Select</p> 
<p>9 Position the cursor at Choices: and select the Procedure name: OUT_SVC.</p> <p>Position</p>  <pre>Choices: TEST_XX</pre> <p>Select</p> 	<p>10 Position the cursor at Run Test and select it. The Software is now loading.</p> <p>Position</p>  <pre>1 Run Test 2 Continue 4 Help</pre> <p>Select</p>  <p>  Loading Time: First time: approximately 20 seconds. After first time: approximately 8 seconds. </p>

Troubleshooting the Software Installation

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

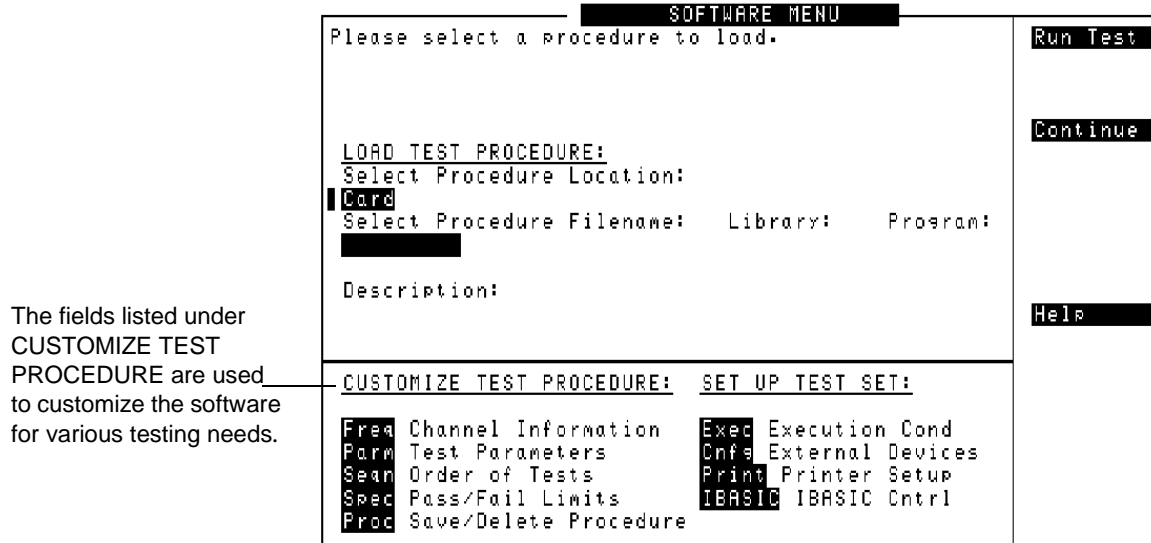
- Is the power on?
- Is the PC card inserted in the right direction?
- Is the PC card firmly seated in the slot? It should slide in loosely, then must be firmly pushed in to make proper contact.
- Did you get to the SOFTWARE MENU screen? Pressing **Preset** should take you to the CDMA ANALYZER screen,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

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

- Do you see TESTS (IBASIC Controller) at the top of the display after selecting **Run Test (κ1)**? If not, make sure you have specified the correct **Procedure Location** and **Procedure Filename**.

How to CUSTOMIZE TEST PROCEDURES

Figure 6-5 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” is 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 Procedures” on page 160](#).

How to Change Test Parameters

Figure 6-6 TESTS (Test Parameters) screen

TESTS (Test Parameters)		
Parm#	Description	Units
	Value	
1	Adjust Power [0=no 1=on fail 2=always]	
	0.000000	
2	BBA Chan Stand [1=NAC 2=NAP 3=KP4]	
3	BBA Channel Number	
4	BBA PN Offset	
5	GN Code Domain Power Threshold	
6	GN Print Inactive Codes [0=no 1=yes]	
7	GN Stop test if results fail [0=no 1=yes]	
8	LAP Baud Rate [valid test set range]	

Parameter description.
 The descriptions for your Software may be different than shown here.

Selects the parameter to be changed.

Displays the current parameter setting.

3 Print All
 4 Help
 5 Main Menu

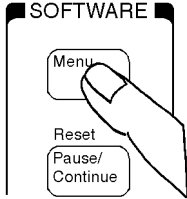
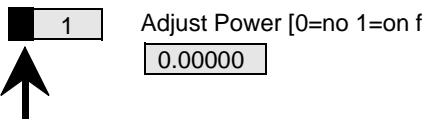
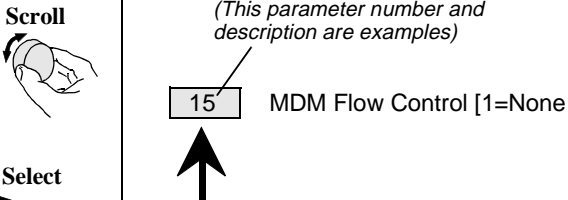
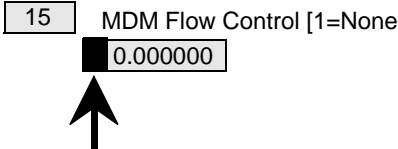
NOTE The TESTS (Test Parameters) screen may not be used in your particular Software package or some fields may not be present depending on the Software application. The message “Access to secure test information denied” is displayed if the screen is not supported in your current Software package.

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

The following procedure describes how you can change test parameters through the TESTS (Test Parameters) screen to optimize your testing conditions. For information on saving customized test parameters, see [“How to Save/Delete Procedures” on page 160.](#)

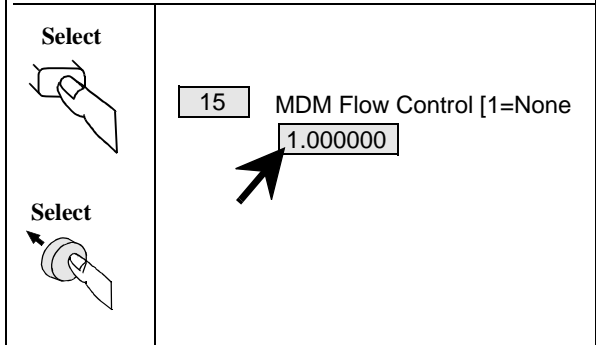
How to Change the Test Parameters and Conditions

Figure 6-7 Procedure for Changing Parameters

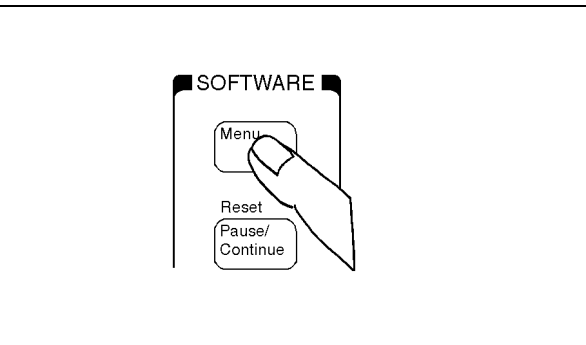
<p>1 Press the Menu key to display the SOFTWARE MENU screen.</p> <p>If the Software is running, press Shift, Pause/Continue before pressing Menu.</p> 	<p>2 Position the cursor at Parm Test Parameters... and select it.</p> <table border="1"> <tr> <td>Freq</td> <td>Channel Information</td> </tr> <tr> <td>Parm</td> <td>Test Parameters</td> </tr> <tr> <td>Seqn</td> <td>Order of Tests</td> </tr> <tr> <td>Spec</td> <td>Pass Fail Limits</td> </tr> <tr> <td>Proc</td> <td>Save/Delete Procedure</td> </tr> </table>	Freq	Channel Information	Parm	Test Parameters	Seqn	Order of Tests	Spec	Pass Fail Limits	Proc	Save/Delete Procedure
Freq	Channel Information										
Parm	Test Parameters										
Seqn	Order of Tests										
Spec	Pass Fail Limits										
Proc	Save/Delete Procedure										
<p>The TESTS (Test Parameters) screen is now present on your CRT.</p>	<p>3 Position the cursor at Parm # field and select it.</p> <p>(Entries on your display may be different.)</p> 										
<p>4 Scroll to the Parm # to be changed and select it.</p> <p>Scroll</p>  <p>(This parameter number and description are examples)</p>	<p>5 Position the cursor at Value field and select it.</p> 										

Continue on next page

6 Use the **DATA ENTRY** keys to enter a new value, then select it.



7 Press **Menu** to return to the **SOFTWARE MENU** screen.



How to Change Pass/Fail Limits

Figure 6-8 TESTS (Pass/Fail Limits)

Annotations for Figure 6-8:

- Selects which limit(s) to compare measured results with. Choices includes Upper, Lower, or Both.
- The descriptions for your Software may be different than shown here.
- Selects the pass/fail limit to be edited.
- Sets the lower or upper pass/fail limits.

Spec#	Description	Lower Limit	Upper Limit	Units	Check
1	Carrier Feedthrough	0.000000	0.000000		Upper

Menu options: Print All, Help, Main Menu

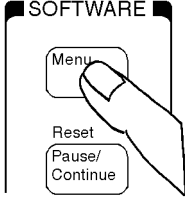
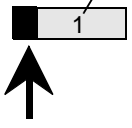
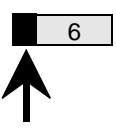

NOTE The TESTS (Pass/Fail Limits) screen may not be used in your particular Software package or some fields may not be present depending on the Software application. The message “Access to secure test information denied” will appear if this screen is not supported in your current Software package.

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 limits, see [“How to Save/Delete Procedures” on page 160](#) to save your new pass/fail limits.

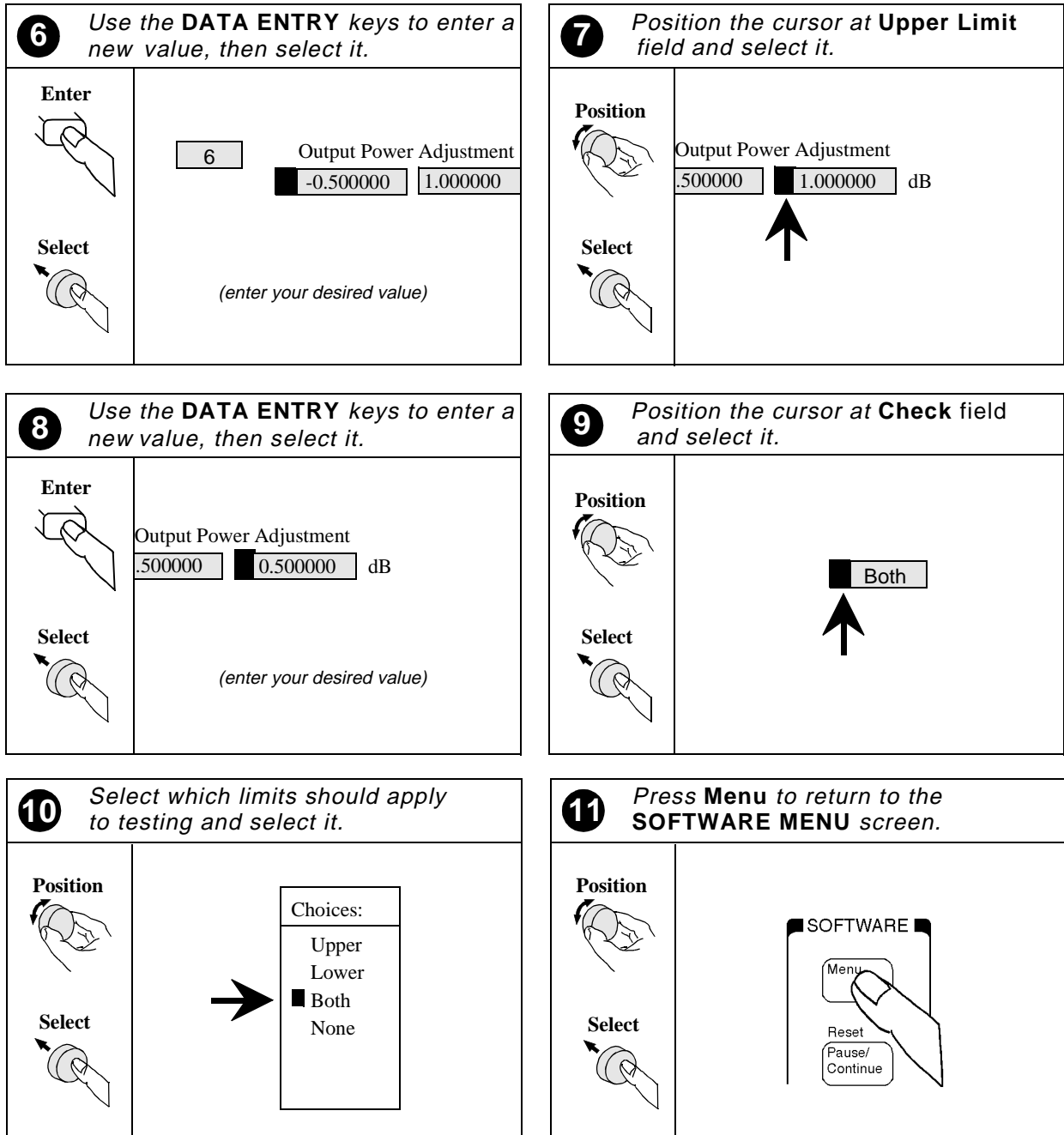
How to Change Spec Pass/Fail Limits

Figure 6-9 Procedure for Setting Pass/Fail Limits

<p>1 Press the Menu key to display the SOFTWARE MENU screen.</p> <p>If the Software is running, press Shift, Pause/Continue before pressing Menu.</p> 	<p>2 Position the cursor at Spec Pass/Fail limits and select it.</p> <table border="1"> <tr> <td>Position</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Select</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <table border="1"> <tr> <td>Freq</td> <td>Channel Information</td> </tr> <tr> <td>Parm</td> <td>Test Parameters</td> </tr> <tr> <td>Seqn</td> <td>Order of Tests</td> </tr> <tr> <td>Spec</td> <td>Pass/Fail Limits</td> </tr> <tr> <td>Proc</td> <td>Save/Delete Procedure</td> </tr> </table>	Position				Select				Freq	Channel Information	Parm	Test Parameters	Seqn	Order of Tests	Spec	Pass/Fail Limits	Proc	Save/Delete Procedure		
Position																					
Select																					
Freq	Channel Information																				
Parm	Test Parameters																				
Seqn	Order of Tests																				
Spec	Pass/Fail Limits																				
Proc	Save/Delete Procedure																				
<p>The TESTS (Pass/Fail Limits) screen is now present on your CRT.</p>	<p>3 Position the cursor at Spec # field and select it.</p> <table border="1"> <tr> <td>Position</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Select</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>(Disregard this number)</p> 	Position				Select															
Position																					
Select																					
<p>4 Scroll to the desired Spec # and select it.</p> <table border="1"> <tr> <td>Scroll</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Select</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>(This Spec # is an example)</p>  <table border="1"> <tr> <td>Output Power Adjustment</td> </tr> <tr> <td>--1.000000 1.000000</td> </tr> </table>	Scroll				Select				Output Power Adjustment	--1.000000 1.000000	<p>5 Position the cursor at Lower Limit field and select it.</p> <table border="1"> <tr> <td>Position</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Select</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table> <p>6</p> <table border="1"> <tr> <td>Output Power Adjustment</td> </tr> <tr> <td>--1.000000 1.000000</td> </tr> </table> 	Position				Select				Output Power Adjustment	--1.000000 1.000000
Scroll																					
Select																					
Output Power Adjustment																					
--1.000000 1.000000																					
Position																					
Select																					
Output Power Adjustment																					
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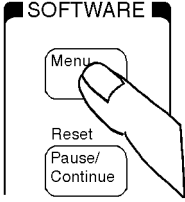
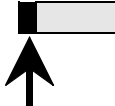
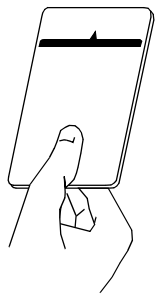
Figure 6-10 Procedure for setting pass/fail limits



How to Save a Test Procedure







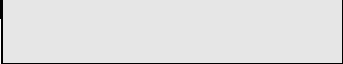






Figure 6-12, Figure 6-13, and Figure 6-14 show how to save a new procedure to a memory card.

Figure 6-12 How to Save a Test Procedure

<p>1 Press the Menu key to display the SOFTWARE MENU screen.</p> <p><i>If the Software is running, press Shift, Pause/Continue before pressing Menu.</i></p> 	<p>2 Position cursor at Proc Save/Delete Procedure and select it.</p> <table border="1"> <tr> <td>Freq</td> <td>Channel Information</td> </tr> <tr> <td>Parm</td> <td>Test Parameters</td> </tr> <tr> <td>Seqn</td> <td>Order of Tests</td> </tr> <tr> <td>Spec</td> <td>Pass/Fall Limits</td> </tr> <tr> <td>Proc</td> <td>Save/Delete Procedure</td> </tr> </table>	Freq	Channel Information	Parm	Test Parameters	Seqn	Order of Tests	Spec	Pass/Fall Limits	Proc	Save/Delete Procedure
Freq	Channel Information										
Parm	Test Parameters										
Seqn	Order of Tests										
Spec	Pass/Fall Limits										
Proc	Save/Delete Procedure										
<p>The TESTS (Save/Delete Procedure) screen is now on your Test Set display.</p>	<p>3 Position cursor at Select Procedure Location and select it.</p> <p>Select Procedure Location:</p> 										
<p>4 Position the cursor at Card and select it.</p> <table border="1"> <tr> <td>Choices:</td> </tr> <tr> <td>■ Card</td> </tr> <tr> <td>RAM</td> </tr> <tr> <td>Disk</td> </tr> </table> <p><i>(You can also save procedures to an internal RAM disk or external disk drive.)</i></p>	Choices:	■ Card	RAM	Disk	<p>5 Put an initialized PC card in the front-panel slot.</p> <p>For detailed memory card initialization instructions See "Initializing a PC Card" on page 190.</p> 						
Choices:											
■ Card											
RAM											
Disk											



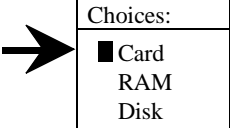


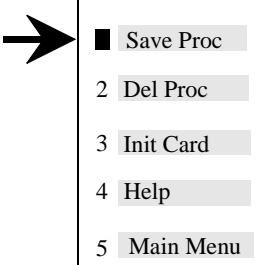
Continue on next page

Figure 6-13 How to Save a Test Procedure

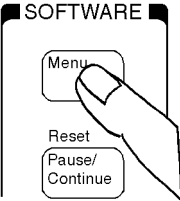
<p>6 Position the cursor at Enter Procedure File... and select it.</p> <p>Position </p> <p>Enter Procedure Filename: </p> <p>Select </p>	<p>7 Select characters to name the Procedure, then select Done.</p> <p>Position </p> <p>Select </p> <p>Choices: Done Position Over/Ins Delete Del End Bk space <input checked="" type="checkbox"/> A B C</p>
<p>8 Position the cursor at Enter Description for New ... and select it.</p> <p>Position </p> <p>Enter Description for New Procedure </p> <p>Select </p>	<p>9 Select characters for the description, then select Done.</p> <p>Position </p> <p>Select </p> <p>Choices: Done Position Over/Ins Delete Del End Bk space <input checked="" type="checkbox"/> A B C</p>
<p>10 Position the cursor at Procedure Library: and select Current.</p> <p>Position </p> <p>Procedure Library: <input checked="" type="checkbox"/> <u>C</u>urrent / [NO LIB]</p> <p>Select </p> <p>(The underline indicates which option is selected. Pressing the knob changes the selection.)</p>	<p>11 Position the cursor at Code Location: and select it.</p> <p></p>

Continue on next page

Figure 6-14 How to Save a Test Procedure

<p>12 Position the cursor at Card and select it.</p>	<p>13 Position the cursor at Save Proc and select it or press k1.</p>
<p>Position</p>  <p>Select</p> 	
 <p>Select</p> 	

14 Press the **Menu** key to return to the **SOFTWARE MENU** screen.



15 To run the saved procedure, follow the instructions below.

- 1) Insert the PC card with your saved procedure.
- 2) On the **SOFTWARE MENU** screen, a) position cursor at **Select Procedure Location**: then select **Card**, b) select **Select Procedure Filename**:, then select your saved file name.
- 3) Remove your PC card then insert the original HP E6385 ROM card¹.
- 4) Select **Run Test (k1)**.

¹The original Software card contains the full program needed to run your procedure. The procedure cannot run without using the original IBASIC program code on the factory card.

How to Set Test Execution Conditions

Figure 6-15 Configuring Test Execution Conditions

TESTS (Execution Conditions)	
Output Results To: Crt/Printer	1 Run Test
Output Results For: All/Failures	2 Continue
Output Heading: [REDACTED]	
If Unit-Under-Test Fails: Continue/Stop	4 Help
Test Procedure Run Mode: Continuous/Single Step	5 Main Menu
Autostart Test Procedure on Power-Up: Off/On	

The list of fields found under **Execution Cond** on the SOFTWARE 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

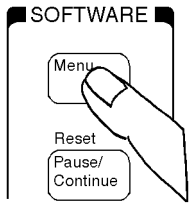
Press the **Menu** key, then select **Execution Cond** to display the TESTS (Execution Conditions) settings.

NOTE Except for the Autostart setting, TESTS (Execution Conditions) are not retained after a Test System power cycle. To save execution conditions see [“How to Save/Delete Procedures”](#) on page 160.

Figure 6-16 Setting the Tests Execution Conditions


1 Press the **Menu** key to display the **SOFTWARE MENU** screen.

*If the Software is running, press **Shift, Pause/Continue** before pressing **Menu**.*




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

Position



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

Select



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*

*Select **On** to have the Software automatically run and access the Main Menu whenever the Test Set is turned on.*

TESTS (Execution Conditions)

Output Results To:	1 Run Test
Crt/Printer	
Output Results For:	2 Continue
All/Failures	
Output Heading:	
If Unit-Under-Test Fails:	4 Help
Continue/Stop	
Test Procedure Run Mode:	5 Main Menu
Continuous/Single Step	
Autostart Test Procedure on Power-Up:	
Off/On	

Connecting to External Devices

The Test Set and Software offer the ability to connect to external devices such as a PC, printer, or PC card for data collection and logging.

To find out more on this subject see:

- Data Collection
 - See “Data Collection to a PC (Not Using the BTS Laptop Utilities)” on page 169.
 - See “Configuring Data Collection to a PC Card” on page 174.
 - See “Transferring Data to a Printer via the Serial Port:” on page 175.
 - See “Transferring Data to a PC via the Serial Port:” on page 177.
 - See “Data Collection to a Printer” on page 180.
- Logging
 - See “Logging to a PC” on page 183.
 - See “Logging to a Printer” on page 188.

Data Collection

Sometimes it is preferable to record the test results for future reference or evaluation. The HP Software provides the capability to save test results to a PC card installed in the Test Set's front-panel card slot or to an external device such as a printer or PC.

The data collection feature stays "on" once you have performed the steps in ["Data Collection to a PC \(Not Using the BTS Laptop Utilities\)" on page 169](#) or ["Configuring Data Collection to a PC Card" on page 174](#).

NOTE

BTS Laptop Utilities and Data Collection

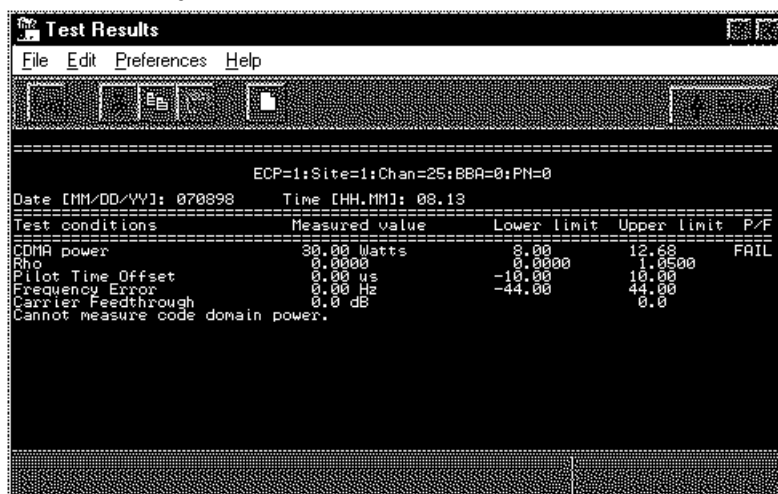
If you enable the use of the BTS Laptop Utilities on the Printer/Serial Port Configuration Menu, data collection and printing from the Test Set are disabled. To collect test data, use the Test Results window in the laptop utilities. To print the collected data, connect a serial printer to your PC, open the data file in a text editor, and then send the text to the printer.

Data Collection Using the BTS Laptop Utilities

The BTS Laptop Utilities shipped with the Software contains a Test Results window for displaying and logging (saving) test results (see [Figure 6-17](#)). After enabling data collection using the BTS Laptop Utilities and configuring the serial ports of the laptop and Test Set to the same values, test result data is automatically sent to the laptop and displayed in the Test Results window. By selecting File, Logging Enabled, you can enter a file name to save the test results to a file that can be retrieved into a text editor and printed out.

For information on installing the BTS Laptop Utility software and configuring your laptop PC and Test Set to work together, see [“Using an Internal Modem and the BTS Laptop Utilities”](#) on page 29.

Figure 6-17 Capturing Test Results Using the BTS Laptop Utility



Data Collection to a PC (Not Using the BTS Laptop Utilities)

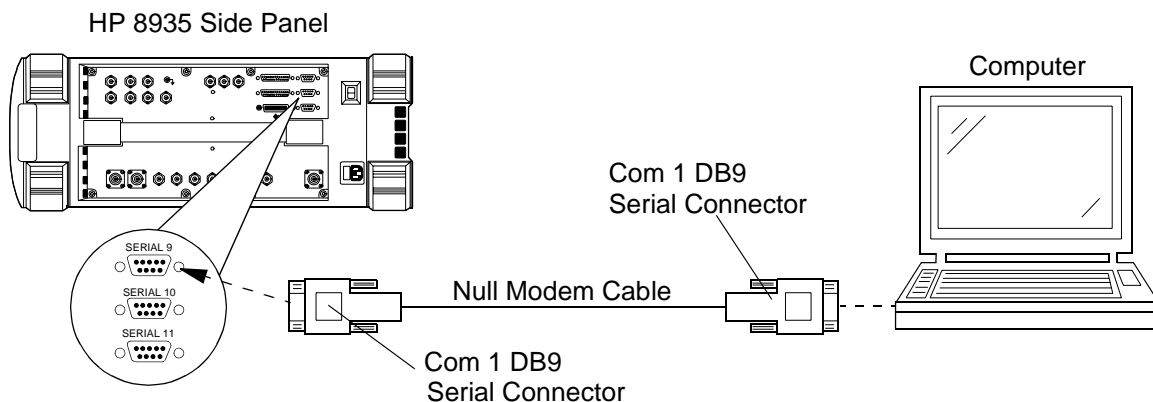
Test results can be output directly to a PC communications program through the Test Set's serial port 9. A variety of devices can receive the data. An HP Palmtop computer, PC, laptop, or terminal can be used. A terminal emulator can write the test results directly to a file. Examples of terminal emulator programs are Microsoft¹ Windows² Terminal, or ProComm.³

To collect data to a PC you must meet the requirements listed below.

- Test Set's SERIAL 9 port connected to a PC.
- Configured terminal program running on a PC.
- Data Collection to Serial 9 port activated in the Software.
- Test Set's SERIAL 9 port communications parameters configured to match communications parameters of the PC.

Test Set Connection to a PC

Figure 6-18 Serial Connections for the HP 8935 and PC



1. Microsoft is a U.S. registered trademark of Microsoft Corp.
2. Windows is a U.S. registered trademark of Microsoft Corp.
3. Procomm is a product of DataStorm Technologies, Inc.

Turning on Data Collection to a PC

To collect the test results to a PC, you will need to turn on data collection within the Software. To activate data collection, follow these steps:

Step 1. Press the Test Set's Menu key. The SOFTWARE MENU is displayed.

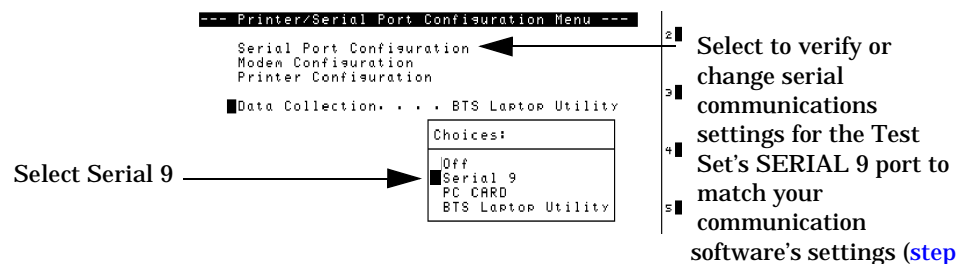
Step 2. Press $\kappa 1$ (Run Test) to start the Software.

The Software Main Menu is displayed. If the Software is not loaded in the Test Set, see [“How to LOAD TEST PROCEDURE” on page 149](#) for details.

Step 3. Select the Printer/Serial Port Configuration field. The Printer/Serial Port Configuration screen is displayed.

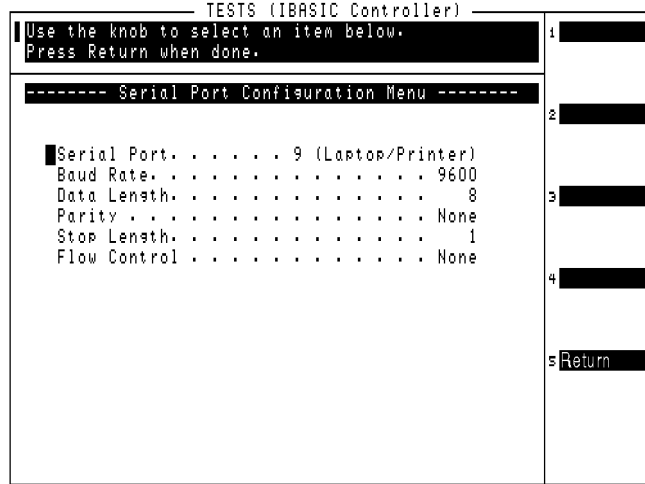
Step 4. Select Data Collection, then select Serial 9 from the Choices: displayed.

Figure 6-19 Data Collection to a PC



Step 5. Start your terminal program. See [“Configuring a Terminal Program for Data Collection” on page 172](#).

Step 6. Select Serial Port Configuration.



Verify that the communications parameters match those of the terminal program you are running.



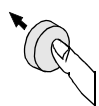


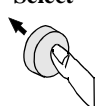
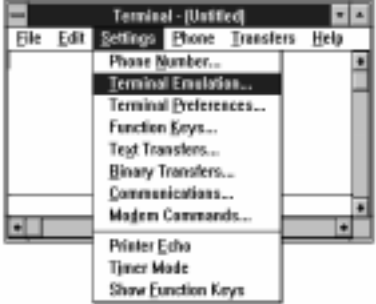


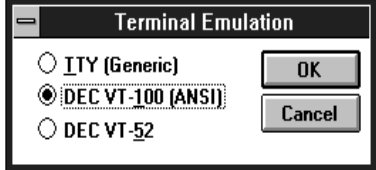





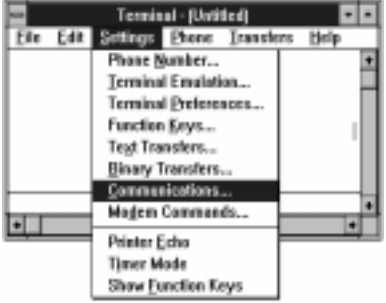
NOTE When you have configured the Test Set to send the data to a PC, you must remember to activate the communication package and specify a file in which to save the data. The Test Set will not issue an error message if the PC's communications application is not running or configured properly.

The Test Set will now record your test results to a PC until you turn off data collection.

Configuring a PC Terminal Program

Data collection to a PC requires a terminal emulator be configured and running while data collection is enabled. [Figure 6-20](#) and [Figure 6-21](#) detail the steps to configure a terminal program for data collection.

Figure 6-20 Configuring a Terminal Program for Data Collection


<p>1 Start the Terminal program in Windows.</p>	<p>2 From the Terminal menu, select Settings.</p>
 <p>Terminal</p>	<p>Scroll</p>  <p>Select</p>  
<p>3 Scroll to Terminal Emulation... and select it.</p>	<p>4 Select DEC VT-100 (ANSI), then press OK.</p>
<p>Scroll</p>  <p>Select</p>  	<p>Scroll</p>  <p>Select</p>  
<p>5 From the Terminal menu, select Settings.</p>	<p>6 Scroll to Communications... and select it.</p>
<p>Scroll</p>  <p>Select</p>  	<p>Scroll</p>  <p>Select</p>  

Continue on next page

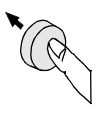
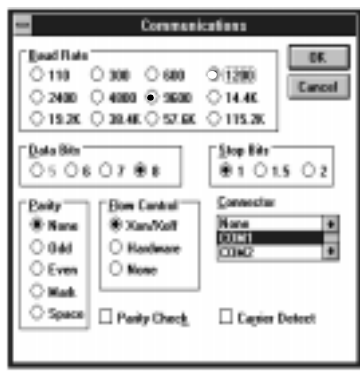
Figure 6-21 Configuring a Terminal Program for Data Collection

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

Scroll



Select





Example Communications Setup:
(remember to use your own settings!)



Connector: COM1
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**.*

Scroll




Select

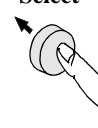




9 *Scroll to **Receive Text File...** and select it.*

Scroll




Select

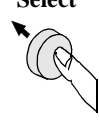
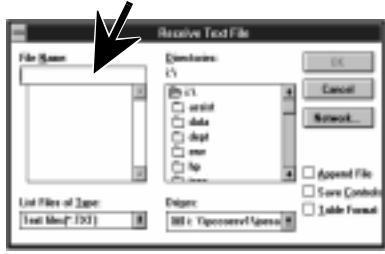



10 *Enter the path and filename of the file you are saving.*

Scroll



Select

Your terminal program should now be ready to receive the test data as tests are run.

Configuring Data Collection to a PC Card

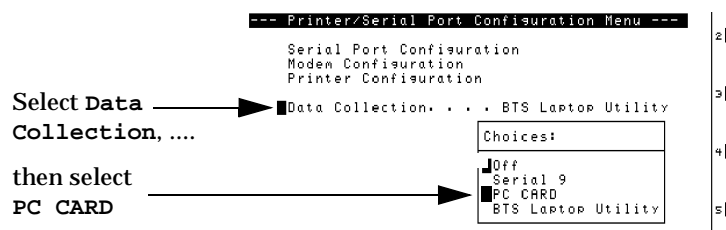
To collect the test results to a PC card, you need to turn on data collection within the Software. The Test Set automatically creates data collection files on the PC card based on the name you enter at the start of testing. The Software appends `_d` to your file name so that the files are easily recognized on the PC card.

Once you have finished with your testing and have the test results in files on the PC card, follow the steps in [“Retrieving Data from a PC Card” on page 175](#) to transfer the data to a PC or printer.

To activate data collection to a PC card, follow these steps:

- Step 1.** Press the Test Set’s Menu key. The SOFTWARE MENU is displayed.
- Step 2.** Select `κ1` (Run Test) to start the Software.
The Software’s Main Menu is displayed. If the Software is not loaded in the Test Set, see [“How to LOAD TEST PROCEDURE” on page 149](#) for details.
- Step 3.** Select `Printer/Serial Port Configuration`. The Printer/Serial Port Configuration menu is displayed.
- Step 4.** Insert a PC card into the front-panel card slot. If the card is uninitialized see [“Initializing a PC Card” on page 190](#)
- Step 5.** Select `Data Collection`, then select `PC CARD` from the `Choices:` displayed.

Figure 6-22 Selecting Data Collection



- Step 6.** The Test Set will display a message asking for a data collection file name. Use the cursor to enter a file name then select `Done`.

The Test Set will now record your test results to a PC card until you turn off data collection.

Retrieving Data from a PC Card

A Software utility (FILE_XFER) is used to transfer data files from the PC 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.

Transferring Data to a Printer via the Serial Port:

- Step 1.** Check to make sure your serial printer is turned on and set up to print when the data is sent to the Test Set's SERIAL 9 port.
- Step 2.** Press the Menu key.
- Step 3.** Position the cursor at **Selected Procedure Location:** and select it.
- Step 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.
- Step 5.** Position the cursor at **Select Procedure Filename:** and select it.
- Step 6.** In the **Choices:** menu, select **IB_UTIL**.
- Step 7.** Run the utility Software by selecting **RUN TEST (k1)**.
- Step 8.** A list of utility procedures is displayed. Select **FILE_XFER**.
- Step 9.** You will be prompted to insert the PC card containing the data collection files. Insert your card and press the knob to **(Continue)**.
- Step 10.** 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).

Step 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.

NOTE All files on the PC 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 they are true data collection files.

Step 12. When all files to be transferred have been selected, scroll to `Start Transfer` and press the knob. The data will be sent out the serial port to the printer.

Step 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.

Step 14. To use the Software again, rerun it by following the steps in [“How to LOAD TEST PROCEDURE” on page 149](#)

Transferring Data to a PC via the Serial Port:

- Step 1.** If the Software is running, stop the Software by pressing **Shift**, then press **Pause/Continue**.
- Step 2.** Connect the Test Set to your PC using the SERIAL 9 port and a null modem cable.
- Step 3.** Load a PC software utility for communicating on the PC's serial port such as Microsoft Windows Terminal.
- Step 4.** Configure the PC software to prepare the PC to receive a text file via the serial port.
- Step 5.** Press the **Menu** key to access the SOFTWARE MENU.
- Step 6.** Position the cursor at **Select Procedure Location:** and select it.
- Step 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.
- Step 8.** Position the cursor at **Select Procedure Filename:** and select it.
- Step 9.** In the **Choices:** menu, select **IB_UTIL**.
- Step 10.** Run the utility software by selecting **Run Test (k1)**.
- Step 11.** A list of utility procedures is displayed. Select **FILE_XFER**.
- Step 12.** You will be prompted to insert the PC card that contains the data collection files. Insert your card and select **Continue**.
- Step 13.** 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 to SERIAL 9 port.
- Step 14.** 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.

NOTE All files on the PC 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.

- Step 15.** When all files to be transferred have been selected, scroll to **Start Transfer** and press the knob. The data will be sent to the serial port.
- Step 16.** 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.
- Step 17.** To use the Software again, re-run it by following the steps in [“How to LOAD TEST PROCEDURE” on page 149.](#)

Turning Data Collection Off

To turn data collection off, follow these steps:

- Step 1.** Press the Test Set's **Menu** key. The **SOFTWARE MENU** is displayed.
- Step 2.** Select **κ1 (Run Test)** to start the Software. The **Main Menu** is displayed.
- Step 3.** Select the **Printer/Serial Port Configuration** field. The **Printer/Serial Port Configuration** menu is displayed.
- Step 4.** Scroll to and select the **Data Collection** field, then select **Off** from the **Choices:** displayed.

Data collection is now off.

Data Collection to a Printer

Test results can be output directly to a printer connected to either the Test Set's SERIAL 9 port, PARALLEL 15 port, or the HP-IB port.

Turning on Data Collection to a Printer.

To collect the test results to a printer, you will need to turn on test result printing in the software.

Step 1. Press the Test Set's Menu key. The SOFTWARE MENU is displayed.

Step 2. Press $\kappa 1$ (Run Test) to start the Software.

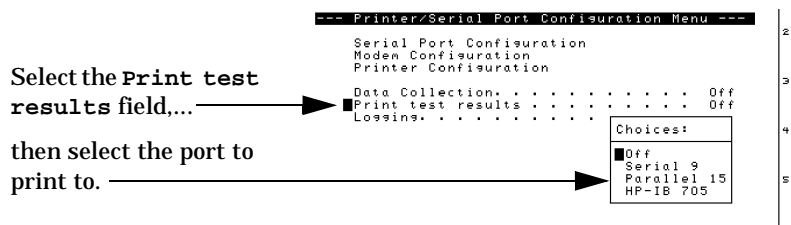
The software's Main Menu is displayed. If the Software is not loaded in the Test Set, see ["How to LOAD TEST PROCEDURE"](#) on page 149 for details.

Step 3. Select the Printer/Serial Port Configuration field. The Printer/Serial Port Configuration menu is displayed.

Step 4. Scroll to and select the Print test results field.

NOTE If the Print test results and Logging fields are not displayed (as shown in [Figure 6-23](#)) it is because the Data Collection field is set to BTS Laptop Utility. Either change the Data Collection field setting or use the BTS Laptop Utility to collect test data and print the results from your laptop PC using a text editor program.

Figure 6-23 Data Collection to a Printer



Step 5. Select the port to print to from the Choices: displayed.

Step 6. Scroll to and select the **Printer Configuration Menu** field. Set the following parameters:

- Lines/page
- Form Feed
- Printer Selection (model)
- HP-IB Print Address (for HP-IB printers only)
- Output Headings

Step 7. Connect the printer to the appropriate connector on the Test Set's side panel.

The Test Set will now send test results to the printer connected to the port you selected until you set the **Print test results** field to **Off**.

Figure 6-24 Serial Printer Connections

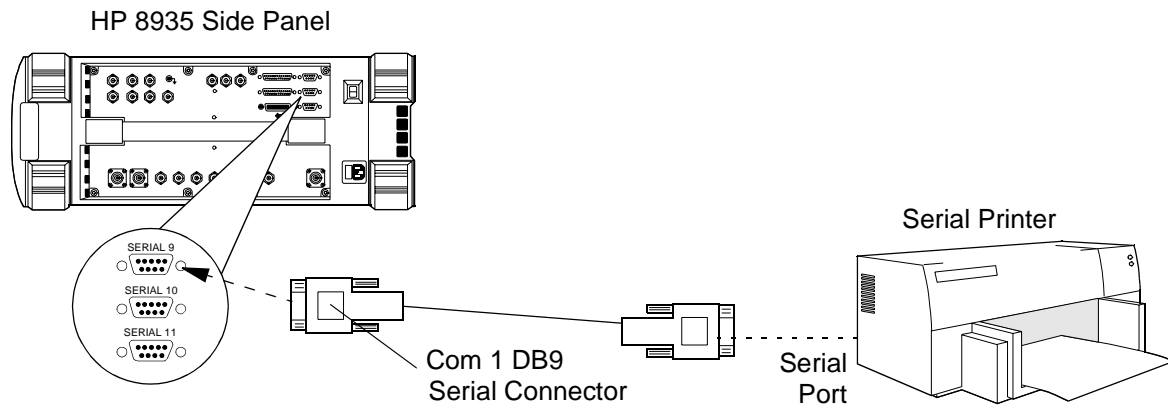


Figure 6-25 Parallel Printer Connections

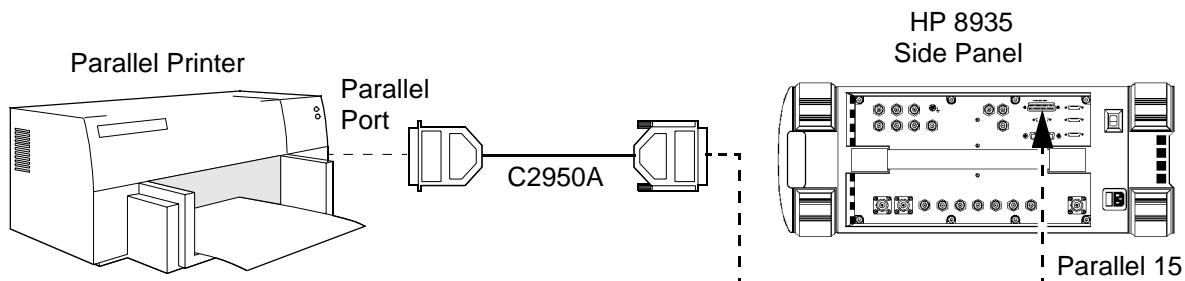
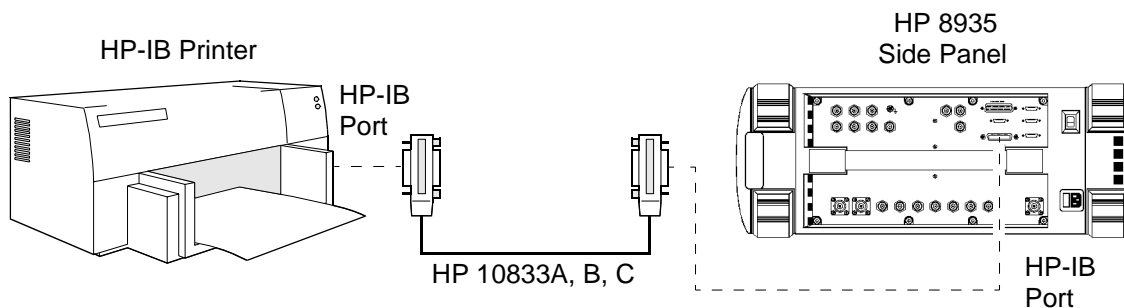


Figure 6-26 HP-IB Printer Connections



Turning Data Collection to a Printer Off

To turn data collection off, follow these steps:

- Step 1.** Press the Test Set's Menu key. The SOFTWARE MENU is displayed.
- Step 2.** Scroll to and select Run Test or press the $\kappa 1$ user key to start the Software. The Main Menu is displayed.
- Step 3.** Scroll to and select the Printer/Serial Port Configuration field, the Printer/Serial Port Configuration menu is displayed.
- Step 4.** Scroll to and select the Print test results field, then select Off from the Choices: displayed.

Data collection has now been turned off.

Logging

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

Commands can be printed on a serial, parallel, or HP-IB printer, or sent to the Test Set's SERIAL 9 port and recorded on a PC using a communications software package. You can also use the BTS Laptop Utilities to display and save the commands in a file using the Switch Terminal window.

NOTE To use the BTS Laptop Utilities to log commands between the MSC and the Test Set, the **Data Collection** field on the Printer/Serial Port Configuration Menu must be set to **BTS Laptop Utility**.

Doing this disables printing directly from the Test Set for logging or data collection.

Logging to a PC

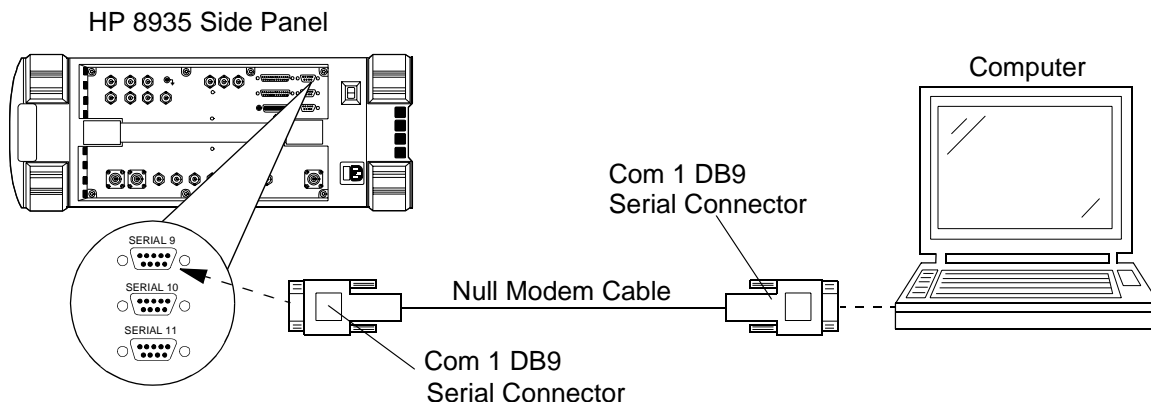
A variety of devices can log commands directly to a PC communications program through the Test Set's SERIAL 9 port. A terminal emulator can display the commands or they can be written directly to a file. An HP Palmtop computer, PC, laptop, or terminal can be used. Examples of terminal emulator programs are Microsoft Windows Terminal, or ProComm.

To log to a PC you must meet the requirements listed:

- Test Set's SERIAL 9 connected to a PC.
- Configured terminal program running on a PC.
- Logging to Serial 9 activated in the Software.
- Test Set's SERIAL 9 communications parameters configured to match those of the PC.

Test Set Connections to a PC

Figure 6-27 SERIAL 9 Connection from the Test Set to a PC



Set up the Test Set for Logging to a PC

To log communications to a PC, you will need to turn on logging within the software.

Step 1. Press the Test Set's Menu key. The SOFTWARE MENU is displayed.

Step 2. Press $\kappa 1$ (Run Test) to start the Software.

The Software's Main Menu is displayed. If the Software is not loaded in the Test Set, see ["How to LOAD TEST PROCEDURE"](#) on page 149 for details.

Step 3. Scroll to and select the Printer/Serial Port Configuration field. The Printer/Serial Port Configuration menu is displayed.

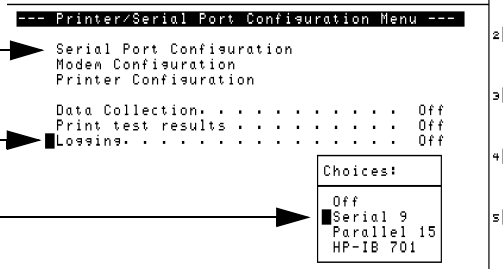
Step 4. Scroll to and select the Logging field, then select Serial 9 from the Choices: displayed.

Figure 6-28 Logging to a PC

Select and verify that the communication settings for the Serial 9 port match those used by your communications program on your PC.

Select Logging.

Then select Serial 9 to log to a PC.



Step 5. Start your PC terminal program. See [“Setting Up Your PC for Logging” on page 185](#).

Step 6. Scroll to and select **Serial Port Configuration**.

Check that the communications parameters match those of the terminal program you are running.

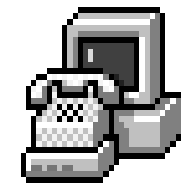

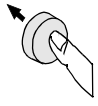
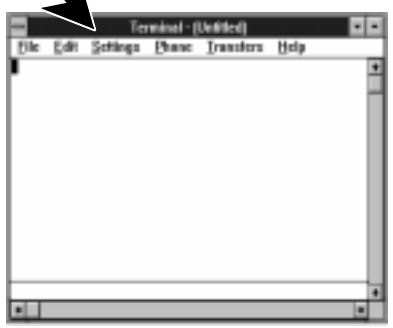

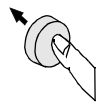
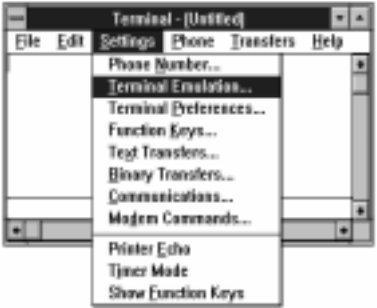

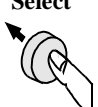
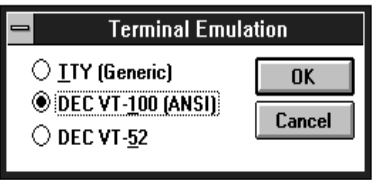




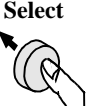
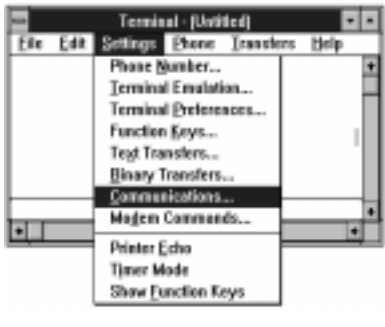
NOTE When you have configured the Test Set to send the data to a PC, you must remember to activate the communication package and specify a file to save the data in. The Test Set will not issue an error message if the PC’s communications application is not running or configured properly.

The Test Set will now log communications between the MSC and the Test Set to a PC until you turn off logging.

Setting Up Your PC for Logging

[Figure 6-29](#) and [Figure 6-30](#) describe how to set up a PC terminal software for logging. You may need to refer to your software manuals to perform this task with other terminal/communications programs.


Figure 6-29 Configuring a Terminal Program for Logging

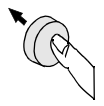
<p>1 Start the Terminal program in Windows.</p>	<p>2 From the Terminal menu, select Settings.</p>
 <p>Terminal</p>	<p>Scroll</p>  <p>Select</p>  
<p>3 Scroll to Terminal Emulation... and select it.</p>	<p>4 Select DEC VT-100 (ANSI), then press OK.</p>
<p>Scroll</p>  <p>Select</p>  	<p>Scroll</p>  <p>Select</p>  
<p>5 From the Terminal menu, select Settings.</p>	<p>6 Scroll to Communications... and select it.</p>
<p>Scroll</p>  <p>Select</p>  	<p>Scroll</p>  <p>Select</p>  


Continue on next page

Figure 6-30 Configuring a Terminal program for Logging

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

Scroll



Select


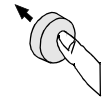



Example Communications Setup:
(remember to use your own settings!)

Connector: COM1
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.*

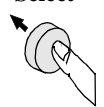
Scroll



Select





9 *Scroll to Receive Text File... and select it.*

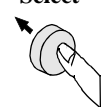
Scroll


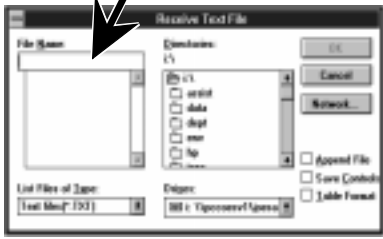
Select




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

Scroll


Select




Your terminal program should now be ready to receive the commands sent between the Test Set the and MSC.

Logging to a Printer

A printer can be used to create a hard copy of the commands being sent between the Test Set and the MSC.

Step 1. Press the Test Set's Menu key. The SOFTWARE MENU is displayed.

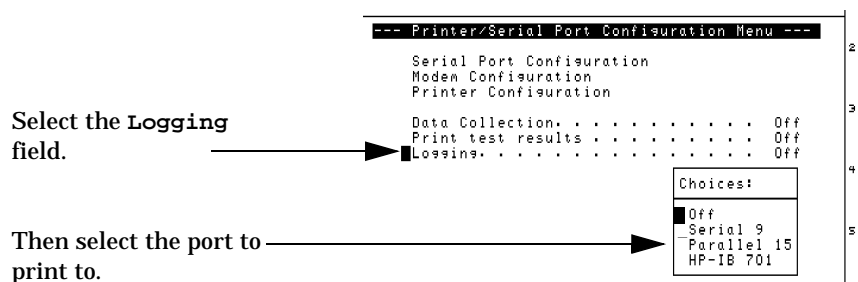
Step 2. select $\kappa 1$ (Run Test) to start the Software.

The Software Main Menu is displayed. If the Software is not loaded in the Test Set, see "How to LOAD TEST PROCEDURE" on page 149 for details.

Step 3. Select Printer/Serial Port Configuration. The Printer/Serial Port Configuration menu is displayed.

Step 4. Select the Logging field, then select the desired printer port from the Choices: displayed.

Figure 6-31 Logging to a Printer



Step 5. Connect the printer to the Test Set. See [Figure 6-24 on page 181](#), [Figure 6-25 on page 182](#), and [Figure 6-26 on page 182](#).

Step 6. Select the Printer Configuration field. Set the following parameters:

- Lines/page
- Form Feed
- Printer Selection (model)
- HP-IB Print Address (for HP-IB printers only)
- Output Heading

You are now ready to log to a printer.

Turning the Logging Mode Off

To turn the Logging mode off, follow these steps:

- Step 1.** Press the Test Set's **Menu** key. The **SOFTWARE MENU** is displayed.
- Step 2.** Scroll to and select **Run Test** or press the **κ1** user key to start the Software. The Software Main Menu is displayed.
- Step 3.** Scroll to and select the **Printer/Serial Port Configuration** field. The Printer/Serial Port Configuration screen is displayed.
- Step 4.** Scroll to and select the **Logging** field, then select **Off** from the **Choices:** displayed.

The logging mode is now off.

Using a PC Card

Initializing a PC Card

When a card is new, or the battery has been removed when the card is not inserted into the Test Set, then the card must be initialized to store data. To initialize a PC card follow these steps:

- Step 1.** Insert the PC card into the front-panel card slot
- Step 2.** If a software package is running, press **Shift** then **Pause/Continue** to stop program operation.
- Step 3.** Press the **shift** key then **Inst Config** key. The **I/O CONFIGURE** screen should be displayed.
- Step 4.** Scroll to and select **Format Card**.

The Test Set will display a message asking “Erase and format the PCMCIA Card?” (YES/NO)

- Step 5.** Press the **Yes On/Off** key, located below and to the right of the knob, to format the card.

The card is formatted when the cursor stops blinking.

Troubleshooting PC Card Usage

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

Directory Overflow.

- The 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 PC card.

Medium uninitialized. Do you want to initialize?

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

Write protected.

- This card has been write protected (the switch in the WP position). Slide the write protect switch into the other 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 PC 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 loading or running the Software. The errors are listed roughly in the order that you might encounter them when getting started using the Software:

[“Errors When Loading and Running the Software” on page 195](#)

[“Errors When First Setting Up or Connecting to MSC” on page 196](#)

[“Communications Errors During Testing” on page 197](#)

[“Errors While Attempting Measurements” on page 200](#)

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 197](#)

[“Troubleshooting Tools for Communications Problems” on page 199](#)

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 19. The errors are presented with the error text, followed by a description of the cause, followed by some possible solutions.

❑ **Symptom: Memory Overflow Errors**

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

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

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

To delete a single register:

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

To delete *all* saved registers:

- Step 1.** Press the **Recall** key.
- Step 2.** Scroll to ***Clr All*** and press the knob.
- Step 3.** Press the **Yes On/Off** key to confirm.
- Step 4.** All save registers are now 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 [“Using an External Modem” on page 35](#).

- 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 message 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 197](#) 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 183](#).

- 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 message 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.

Also check the items in “[Troubleshooting Checks for Communications Problems](#)” for possible causes of interruptions to the communication between the Test System and the MSC.

Troubleshooting Checks for Communications Problems

The following list provides items to check when you are having communication difficulties using the external 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 Set's serial port, the modem, the phone line, and the PC (if used). See the connection diagram in [Figure 5-6 on page 111](#).

A list of cables and their part numbers is provided in “[HP E8300A Base Station Connection Kit Contents](#)” on page 113.

- External Modem operation:

Verify that you have supplied power to the external 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 needed to verify that it works with the Test Set and MSC. See “[Configuring and Initializing the External Modem](#)” on page 38.

❑ Dialing difficulties:

In some cases, you may have to customize the dialing information in order to properly dial and connect to the MSC. For example, if you have a 9 in your dialing 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 directly in the Laptop Emulator screen (see [“Laptop Emulator” on page 118](#)) and in a custom file in the Define Auto menu (see [“Creating User-Defined Commands” on page 127](#)).

❑ Modem autobaud being set to on:

If you have made changes to the system baud rate since applying power to the modem, you might 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:

- Check serial connections between the Test Set's SERIAL 10 port and the external modem.
- Check power to the modem and that the power switch is on.
- Check 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 137](#).
- Verify external modem configuration. Follow the steps in [“Configuring and Initializing the External Modem” on page 38](#).

Use the Laptop > Modem mode and a PC to perform the connection and to send custom commands once connected. See [“Laptop Emulator” on page 118](#).

Logging Data Communications:

The Software provides a logging feature that prints the commands between the Test Set and the MSC. This allows you to view the outgoing commands and the MSC's responses (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 183](#) 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 Base Station Configuration 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 Set 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 Base Station Configuration Menu—if you have entered an incorrect value for PN offset, the Test Set will not be able to correlate CDMA measurements. You may use the PN Offset Search test from the Main Menu to find the valid PN offset value (see [“PN Offset Search” on page 93](#)).
- ❑ 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 Test Set.
- ❑ 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 REF IN port on the Test Set (there are alternative connections; see [“Connections” on page 105](#)). If a valid clock signal is present during testing, the front-panel Unlock LED on the Test Set 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 Set 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.

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