HP E6389A Northern Telecom
P-Series Cell Site Base Station Test Software
User's Guide

Software Revision A.00.00 and later

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Rev. A

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In This Manual

This manual consists of the following chapters:

Chapter 1 -- Product Description

This chapter provides a description of the HP E6389A Northern Telecom P-Series Cell Site Base Station Test Software.

Chapter 2 -- Introduction to Testing

This chapter provides information on loading the Test Software, setting up the Test Software, starting the tests, and the appropriate user responses to Test Software actions.

Chapter 3 -- Connections

This chapter provides information on equipment required for base station testing, and connections for cell site equipment, serial port, printer, and switch control.

Chapter 4 -- Reference

This chapter provides detailed descriptions of the general features and functions of the Test Software. Topics are arranged alphabetically for quick and easy reference.

Chapter 5 -- Tests, Parameters, and Pass/Fail Limits Descriptions

This chapter offers a suggested testing philosophy, and describes each test, parameter, and pass/fail limits.

Conventions Used

Special presentations of text in this manual reflect the appearance of the referenced item. Examples of these special presentations are:

Menu -- A Test Set front panel key.

Pause/Continue (Reset) -- A Test Set front panel *shift* function key. The key name in parentheses is the title of the function. Press the **Shift** key then the specified key to access the *shift* function.

`Procedure`: -- Characters displayed on the Test Set screen.

k1 (**`Run Test`**) -- A USER key in the key column next to the display. The words in parentheses are displayed on the screen.

Title -- Titles of documentation are printed in italics.

Test Set -- Refers to the HP 8935 Series E6380A CDMA Base Station Test Set or the HP 8935 Series E6381A TDMA Base Station Test Set.

Test Software -- Refers to the HP 6389A Northern Telecom P-Series Cell Site Test Software.

TEST -- Refers to the one of the individual test modules that is part of a test procedure.

PC card -- Refers to either the OTP card on which the Test Software is shipped or the SRAM card that is shipped with the Test Software for storing procedures.

PC card is an industry standard term that refers to two types of information storage cards. One meets the specifications of the Personal Computer Memory Card International Association (PCMCIA). The other meets the specifications of the Epson Corporation PC card standard. However, HP 8935 Series Test Sets use only the PCMCIA type card.

OTP card -- Refers to the type of PC card that is used to store the Test Software.

SRAM card -- Refers to the type of PC card that is shipped with the Test Software for storing procedures.

BTS -- Refers to the Base Transceiver Station.

In procedural steps in this manual, the following words are used to describe cursor and entry actions:

- **Select** refers to positioning the cursor at the appropriate field (**`inverse video`** area) and pressing the knob.
- **Enter** means to use the numeric keypad, and the Enter key or measurement units keys to make entries to fields. In some procedures, *enter* is used to describe the action of entering characters into a field.

Conventions Used

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1

Product Description

This chapter provides a description of the HP E6389A Northern Telecom P-Series Cell Site Base Station Test Software.

HP E6389A Northern Telecom P-Series Cell Site Base Station Test Software

The Test Software performs fast, accurate, and automated tests that determine if the RF and audio performance of Northern Telecom P-Series Cellular Base Stations is within prescribed limits. It is used with the HP E6380A CDMA Base Station Test Set or the HP E6381A TDMA Base Station Test Set and various ancillary equipment in testing those Base Stations (see **"Hardware Model Differences" on page 24**).

The Test Software can be used for the installation, maintenance, and/or repair of the Base Stations listed in table 1.

Table 1 Northern Telecom Analog P-Series Base Stations

Model Number	Product Code
P1NES	HT3P21HA
P1ES	HT3P21HD
P2NES	HT3P21HB
P2ES	HT3P21HC
P3	HT3P21HE

Items Supplied

The Test Software package contains the following listed items.

NOTE: The Test Software package contains two sets of software and documentation. It includes two PC cards that contain software, one for P-Series testing and one for TRU testing; and it includes two User's Guides, one for P-Series Test Software and one for TRU Test Software.

- HP E6389A Northern Telecom P-Series Cell Site Base Station
  Test Software PC card
  HP Part Number: E6389-10001
- HP E6389A Northern Telecom P-Series Cell Site Base Station
  Test Software User's Guide
  HP Part Number: E6389-90001
- HP E6389A Northern Telecom TRU Cell Site Base Station
  Test Software PC card
  HP Part Number: E6389-10002
- HP E6389A Northern Telecom TRU Cell Site Base Station
  Test Software User's Guide
  HP Part Number: E6389A-90002
- SRAM Card, 1-Megabyte
  HP Part Number: 0950-2635
- DB25 (m) to DB9 (f) 15-foot cable
  HP Part Number: E8302-61005

BTS Laptop Utility

Software Licensing Agreement

The SRAM card listed above is to be used for storing customized test programs and results, and must be initialized before use (see **"Initializing a PC Card" on page 100**.

Items Required

The equipment required to operate the Test Software is as follows:

- HP 8935 Series E6380A CDMA Base Station Test Set
  or
  HP 8935 Series E6381A TDMA Base Station Test Set
- HP 8935 firmware revision A.01.00 or later
- Accessories:

  HP 8935 Nortel Base Station Connection Kit
  HP Part Number: E8302-61001
  or
  Other interconnect arrangements
- Optional Items:

  Printer and printer connection cable for documenting test results

  PC or HP Palmtop computer and appropriate connection cable for storing test results

  Splitter or Switch Matrix

Printers Supported

The following printers are supported by the Test Software:

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

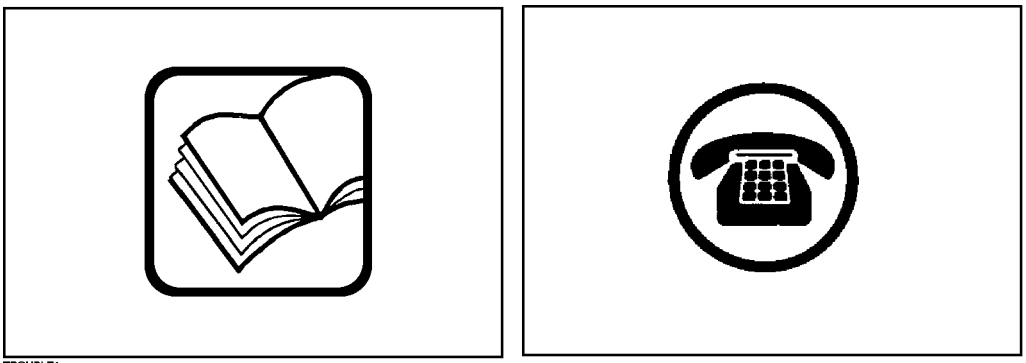
Hardware Model Differences

The Test Software will operate on either the HP 8935 Series E6380A CDMA Base Station Test Set or the HP 8935 Series E6381A TDMA Base Station Test Set.

There are hardware differences between these two Test Sets. However, those differences do not affect your use of the Test Software.

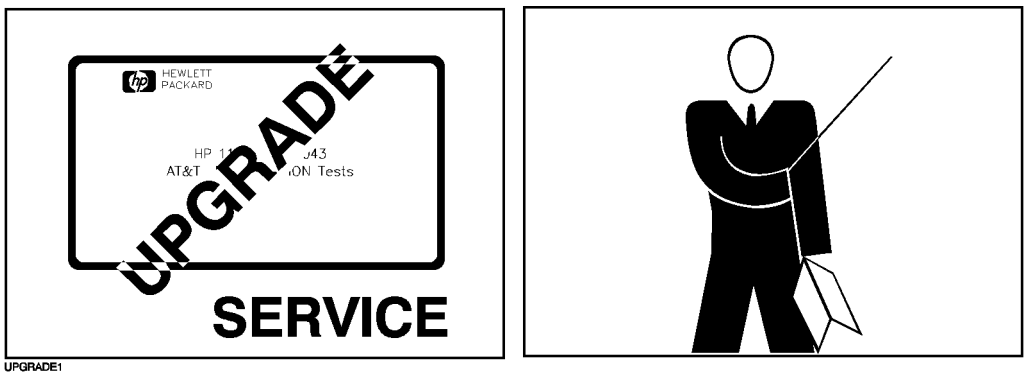
Additional Services Available

For information on services, see the *HP 8935 Series E6380A CDMA Test Set Assembly Level Repair Guide* or the *HP 8935 Series E6381A TDMA Test Set Assembly Level Repair Guide* (as appropriate). Call the HP Hotline (1-800-922-8920, USA and Canada only) and give your Test Software model number if you encounter a problem.



TROUBLE1

Contact your local HP Sales Representative for information about the Software Upgrade Service and the Start Up Assistance Training Course.



UPGRADE1

2

Introduction to Testing

This chapter provides information on loading the Test Software, setting up the Test Software, starting the test, and the appropriate user responses to Test Software actions.

Overview

The Test Software is designed for both ease of use and comprehensive testing. Operating the Test Software consists basically of a four-part process:

1. Loading the Test Software, which consists of turning on the Test Set, inserting the Test Software card, and selecting a procedure.
2. Setting up the Test Software for test operations.
3. Initiating the tests.
4. Responding to Test Set and Test Software actions.

This process is described in detail in the following sections.

Loading the Test Software

Before you can begin testing, you must load the Test Software into the Test Set's internal memory. The Test Software loading process is accomplished in ten steps as outlined in the following paragraphs.

The following illustration (see **figure 1**) outlines the first four steps, which consist of turning on the Test Set's power, inserting the Test Software PC card into the card slot on the Test Set's front panel, and initializing the Test Set.

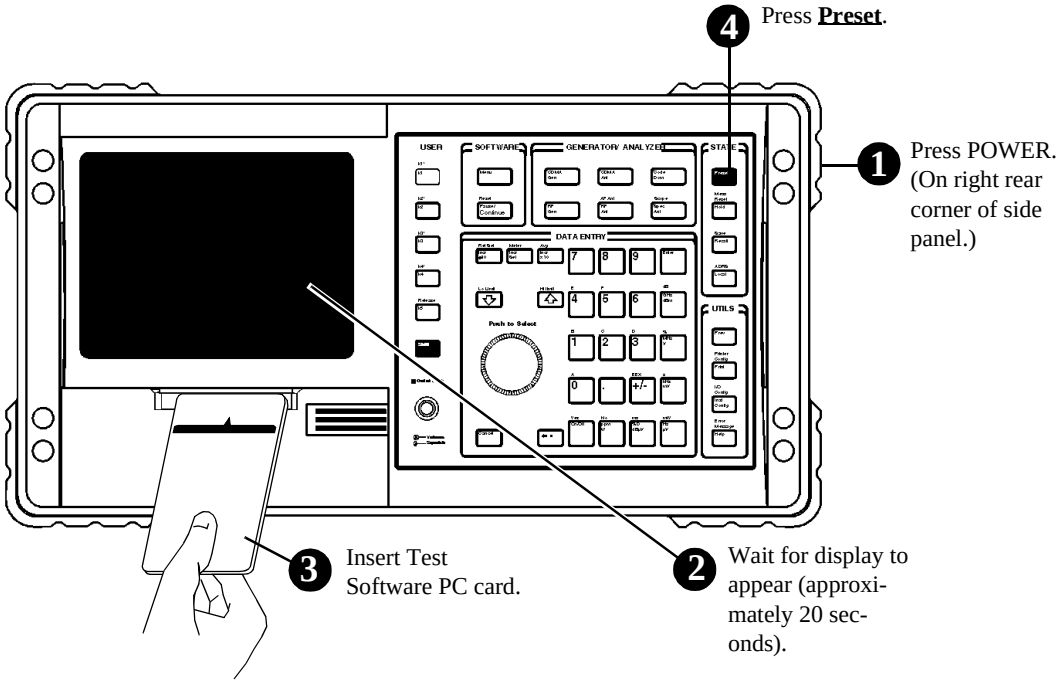


Figure 1 **Preparing for Loading the Test Software**

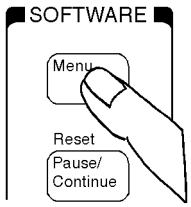
The following illustration (see **figure 2 on page 31**) outlines the next six steps, which consist of operating the Test Set's internal program to select and load the Test Software, select and load a test procedure, then run the Test Software.

NOTE: When you insert the Test Software PC card and select a procedure for the first time, the Test Software is not actually loaded into the Test Set's memory until you select **Run Test** or press the **k1** (**Run Test**) key. Loading the Test Software for the first time will require approximately 15 seconds. The Test Software will remain in the Test Set's memory (power for which is backed up by a battery) after a power-off/power-on cycle unless it is deleted manually or a new program is loaded.

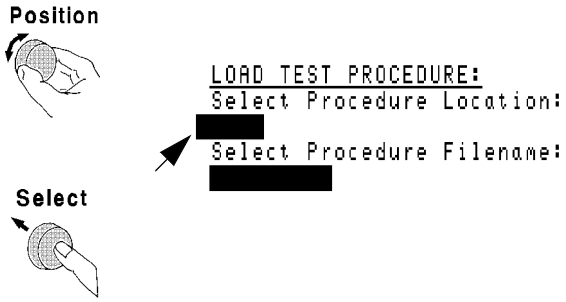
On the Test Software PC card are eight preprogrammed procedures. Each procedure contains a particular setting of testing order, parameter, and pass/fail limit defaults. Briefly, the procedures are as follows:

- PROCEDURE_01 TST_SHLF -- This procedure performs RX and TX measurements at the receiver shelf and the transmitter shelf. Only the transceivers on the shelf that is being tested are affected. Service to the rest of the cell site is unaffected.
- PROCEDURE_02 TST_RMC -- This procedure performs RX and TX measurements at the receive multi-coupler (RMC) and the transmit combiner. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.
- PROCEDURE_03 QCK_SHLF -- This procedure performs RX and TX measurements at the receiver shelf and the transmitter shelf. Only the receivers on the shelf that is being tested are affected. Therefore, service to the rest of the cell site is unaffected.
- PROCEDURE_04 QCK_RMC -- This procedure performs quick RX and TX measurements at the receive multi-coupler (RMC) and the transmit combiner. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.
- PROCEDURE_05 FULL_RX -- This procedure performs a full range of RX and TX measurements at the receive multi-coupler (RMC) and the transmit combiner. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.
- PROCEDURE_06 NT_P_SER -- This procedure verifies the RF parametric performance of the transceiver, and is intended for periodic maintenance.
- PROCEDURE_07 NT_LCR_A -- This procedure verifies that the operation of locating receiver A (RXA) is within specifications. This procedure also contains tests for received signal strength indicator (RSSI) offset and path gain.
- PROCEDURE_08 NT_LCR_B -- This procedure verifies that the operation of locating receiver B (RXB) is within specifications. This procedure also contains tests for received signal strength indicator (RSSI) offset and path gain.

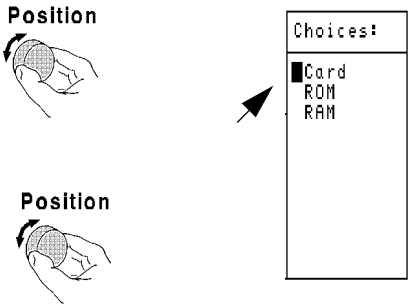
5 Press **Menu** key to display SOFTWARE MENU screen.



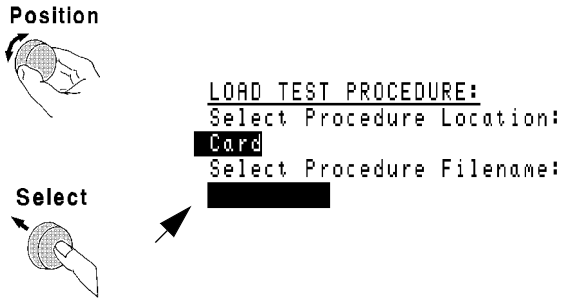
6 Position cursor at **Select Procedure Location:** and select it.



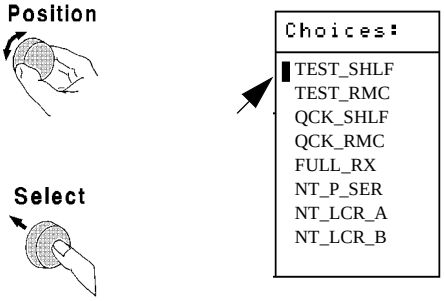
7 Position cursor at **Card** and select it.



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



9 Position cursor at a name in **Choices:** list, and select it.



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

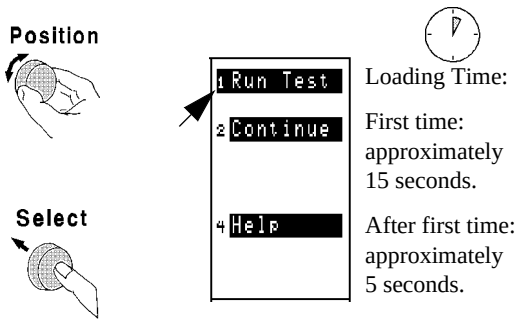


Figure 2 Loading the Test Software

If the Test Software did not load properly, check the following:

- Is the Test Set's power on?
  Is there a display?
  Is the CDMA ANALYZER screen on the display?
- Check the AC power connection. See the *HP 8935 Series E6380A CDMA Base Station Test Set Reference Guide* or the *HP 8935 Series E6381A TDMA Base Station Test Set Reference Guide*.
- Is the Test Software PC card inserted properly?
- Is the Test Software PC card firmly seated in the slot?
  It should slide in loosely, then require a firm push to seat properly.
- Was the SOFTWARE MENU screen displayed?
  Pressing the **Preset** key should display the CDMA ANALYZER screen.
  Pressing the **Menu** key should display the SOFTWARE MENU screen.

NOTE: If the Test Set displays an error message that states, "**`One or more self-tests failed.`**", there is a hardware problem. In such case, refer to the *HP 8935 Series E6380A CDMA Base Station Test Set Assembly Level Repair Guide*, or the *HP 8935 Series E6381A TDMA Base Station Test Set Assembly Level Repair Guide*, as appropriate. If the problem persists, call the HP Factory Hotline from anywhere in the USA or Canada (1-800-922-8920), 8:30 AM to 5:00 PM, Pacific time.

Setting up the Test Software

The Test Software displays the Initialization Screen (see **figure 2 on page 31**) upon initiation of the software and prior to running any procedure. All Test Software operations are started from this screen. The following sections describe the fields and the operations that are initiated from the fields.

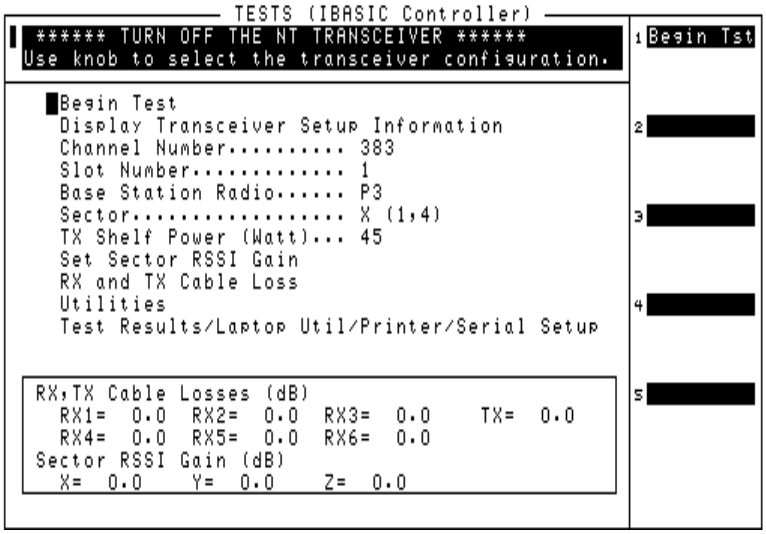


Figure 3 **Initialization Screen.**

Begin Test

Select the **`Begin Test`** field or press the **k1** (**`Begin Tst`**) key to start the test.

Display Transceiver Setup Information

Select the **`Display Transceiver Setup Information`** field to display a screen that contains information on how to set up the transceiver for testing.

Press the **k5** (**`Return`**) key after reading the information to return to the Initialization Screen.

Channel Number

Select the **Channel Number** field to enter the number of the channel to be tested. See**"PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]" on page 182**.

Slot Number

Select the **Slot Number** field to enter the shelf slot number of the radio to be tested.

Slots are numbered 1 through 8, starting from the left.

Base Station Radio

Select the **Base Station Radio** field to enter the choice for radio type from the **Choices:** list.

Five types or Northern Telecom Base Stations may be tested using the Test Software. These are: **P1NES**, **P1ES**, **P2NES**, **P2ES**, and **P3**.

Sector

Select the **Sector** field to enter the sector to be tested from the **Choices:** list. The sectors available in the list are: **X(1,4)**, **Y(2,5)**, **Z(3,6)**, **PARM(1,4)**, and **ALL**.

The numbers in parentheses following the selection letter represent the antennas in that selection.

NOTE: In the **`Parm`** selection, the numbers shown in parentheses are examples only. The first number represents the setting of **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**, and the second number represents the setting of **PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]**. For instance, if the actual numbers shown were 1 and 4, the RXA test would check antenna 1 and the RXB test would check antenna 4. These numbers thus change as you change the parameter settings.

TX Shelf Power (watts) - or - TX Combiner Power (watts)

NOTE: This field will pertain to shelf power or combiner power, dependent upon the location at which tests will be performed. This is determined by the setting of **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**.

If **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 0, select the **`TX Shelf Power (dBm)`** field to enter the value to be used by the Test Software as the maximum power value when calculating TX power error at the PA shelf.

If PARAMETER_37 is set to 1, select the **`TX Combiner Power (dBm)`** field to enter the value to be used by the Test Software as the maximum power value when calculating TX power error at the combiner.

If PARAMETER_37 is set to 1, take into account the losses of the combiner network when entering the value for TX power on the Initialization Screen. Generally, these losses reduce the power output of the PA by 3 to 4 dB.

Set Sector RSSI Gain (dB)

Select the **`Set Sector RSSI Gain (dB)`** field to display the Sector RSSI Gain Menu.

When testing at the receive multi-coupler (RMC) input, the sector gain is 4 dB in a typical Northern Telecom cell site Base Station. This accounts for the path gain between the RMC input and the radio backplane input. If testing is conducted at the shelf, the Test Software will always compensate the RF generator input level for the receiver shelf splitter loss. This makes the RF signal level appear to be at the radio backplane. In such case, there is no gain and the sector gain during shelf testing is 0 dB.

In a typical Northern Telecom cell site, there is a 4 dB signal or path gain between the RMC's input and the receiver's input connector on the back of the radio. For example, suppose the path gain is 4 dB and an RF signal of –84 dBm is applied to the RMC. Theoretically, a radio with no internal received signal strength indicator (RSSI) offset will report a –80 dBm RSSI level. Since the detector in a radio is not ideal, an internal RSSI offset is sometimes required to make the radio report –80 dBm. Because the reported RSSI level is different from the input level, the Test Software must use this difference to properly set the RSSI offset and check the RSSI linearity level. The three **`Sector Gain`** fields on the Initialization Screen indicate to the Test Software the difference between the input level and the reported level. It is possible for the receiver path gain to be increased to improve the signal strength in rural areas or decreased to reduce intermods in urban areas. In this case, the path gain is no longer 4 dB. Depending on the design of the system to be tested, it might be proper for the sector gains on the Initialization Screen to remain at 4 dB, or it might not. Consult with your engineering department to determine how to set the offsets for these areas.

It is possible to use the sector gains to create an artificial receiver path gain or path loss (sometimes referred to as a system offset) to vary the handoff levels between sectors. To allow for sector variations, three sector gain fields (X, Y, and Z) have been provided on the Initialization Screen. Varying handoff levels between sectors will probably result in better system performance if done correctly, and will certainly result in worse system performance if not done correctly.

The Sector RSSI Gain Menu fields are described in the following paragraphs:

Sector X, Sector Y, and Sector Z Fields

Select the **`Sector X`**, **`Sector Y`**, and **`Sector Z`** fields in turn and enter the gain value for each sector.

Return Field

Select the **Return** field or press the **k5** (**Return**) key to return to the Initialization Screen.

RX and TX Cable Loss (dB)

Select the **RX and TX Cable Loss(dB)** field to display the RX and TX Cable Loss Menu screen. Use this menu to edit previously entered values for the receiver 1 through 6 cable loss and for the transmitter cable loss, as appropriate.

Use this screen also to measure any cable loss values that are either unknown or suspect or that you wish to change.

NOTE: If a splitter, Switch Matrix device, or some other device is to be used in the signal path to be tested, the loss through that device must be considered when entering the total loss value.

The RX fields contain the receiver cable loss values stored during the cable loss test, and may be edited on this screen. During operation, the Test Set's RF signal generator level will be compensated automatically for the cable loss values. For example, if the RX1 cable loss is set to 1 dB, the generator level will be increased by 1 dB to compensate for the RX1 cable loss only when the RX1 path is being tested.

The TX field contains the transmitter cable loss value stored during the cable loss test, and may be edited on this screen. During operation, this value will be added to the TX power measurements to compensate for the cable loss.

The RX and TX Cable Loss Menu fields are described in the following paragraphs:

Return Field

Select the **Return** field in the RX and TX Cable Loss Menu or press the **k5** (**Return**) key to return to the Initialization Screen.

RX1 Cable Loss through RX6 Cable Loss Fields

Select each of the **RX1 Cable Loss (dB)** through **RX6 Cable Loss (dB)** fields in turn to edit the receiver cable loss values.

TX Cable Loss Field

Select the **TX Cable Loss (dB)** field to edit the transmitter cable loss value.

Measure Cable Loss Field

If you do not know the loss for a particular cable or device and wish to measure it, select the **Measure Cable Loss** field and follow the screen prompts to make the measurement for that cable or device.

Save the value for each receiver antenna cable, RX1 through RX6, by selecting the appropriate **Save RX1 =>** through **RX6 =>** field on the Cable Loss menu. If the same value is appropriate for multiple cables, save it to each field. It is not necessary to repeat the measurement.

Save the value for the transmitter antenna cable, TX, by selecting the **Save TX =>** field on the same screen.

If you wish to measure multiple cables, select the **Repeat or Test next cable** field and repeat the measurement process as required.

Select the **Return** field in the Cable Loss menu or press the **k5** (**Return**) key when finished with the cable loss measurement to return to the RX and TX Cable Loss Menu, then select the **Return** field in that menu or press the **k5** (**Return**) key to return to the Initialization Screen.

Utilities

Select the **Utilities** field to display the Utility Menu. Then, select the desired utility tool from the Utility Menu. The Utility Menu fields are described in the following paragraphs:

Return Field

Select the **Return** field to return to the Initialization Screen.

Measure Cable Loss Field

Select the **Measure Cable Loss** field to initiate the measurement. The Test Software will display the first of two cable loss test connection diagrams. Follow the screen prompts to make the measurement.

Save the value for each receiver antenna cable, RX1 through RX6, by selecting the appropriate **Save RX1 =>** through **RX6 =>** field on the Cable Loss menu. If the same value is appropriate for multiple cables, save it to each field. It is not necessary to repeat the measurement.

Save the value for the transmitter antenna cable, TX, by selecting the **Save TX =>** field on the same screen.

If you wish to measure multiple cables, select the **Repeat or Test next cable** field and repeat the measurement process as required.

Select the **Return** field or press the **k5** (**Return**) key to return to the Initialization Screen. For more information, see **"Cable Loss Test" on page 114**.

Laptop Emulator Field

Select the **Laptop Emulator** field to invoke the laptop emulator mode. The Test Software will display the Terminal Emulator Mode Screen. Scroll to the desired command using the cursor control knob and press the knob to send the command to the Base Station.

Press the **k5** (**Return**) key, then the **k2**(**No**) key when finished to return to the Utility Menu screen, and then either select the **Return** field or press the **k5** (**Return**) key to return to the Initialization Screen. For more information, see **"Laptop Emulator" on page 116**.

RF Tools Field

Select the **RF Tools** field to initiate loading the RF tools utilities. The Test Software will display the introductory screen that explains loading the RF Tools. For more information on RF Tools, see the *HP 8935 Series E6380A CDMA Base Station Test Set Reference Guide* or the *HP 8935 Series E6381A TDMA Base Station Test Set Reference Guide*.

Antenna Switch Control Field

Select the **Antenna Switch Control** field to select the method for antenna path connection. The Test Software will display a **Choices:** list that offers four selections: **Off**, **Splitter**, **HP3488**, and **HP83202A**.

Selecting **Off** indicates to the Test Software that you will make all antenna connections manually.

Selecting one of the other three items indicates to the Test Software that you will use that device. If a Switch Matrix is used, the Test Software will then command it to switch the antenna connections as appropriate to the test and will display the appropriate prompts on the Test Set's screen. If you select the HP 3488 Switch Matrix, you must enter its HP-IB address in its field.

NOTE: A Splitter is a widely available and relatively simple device that converts one signal path into multiple signal paths. All such paths are active and are not switchable.

The HP 3488 Switch Matrix is a software controllable device that switches one signal path to any of several paths. It offers the advantage of testing a complete signal path without the possibility of the effects of extraneous signals.

The HP 83202A Switch Matrix is another software controllable device that switches one signal path to any of several paths. It offers the advantage of testing a complete signal path without the possibility of the effects of extraneous signals.

IMPORTANT CONSIDERATION: If you elect to use a Splitter and two or more receiver cables on the Base Station are mis-wired, the Test Software will not detect that fact. This is because all connections on the Splitter remain fixed and active. However, if you elect to use one of the Switch Matrix units, the Test Software will switch and test each path individually. Thus, if a pair of cables is mis-connected, the associated test will fail because of that mis-connection.

For more information on these devices, see **"Splitter or Switch Matrix" on page 108**.

Test Results/Laptop Util/Printer/Serial Setup

Select the **`Test Results/Laptop Util/Printer/Serial Setup`** field to display the Test Results/Laptop Util/Printer/Serial Setup menu. The Test Results/ Laptop Util/Printer/Serial Setup menu fields are described in the following paragraphs:

Return Field

Select the **`Return`** field to return to the Initialization Screen.

Edit Test Results Header Field

Select the **`Edit Test Results Header`** field to edit or enter the header text. Edit or add text using selections from the **`Choices:`** list in the lower right-hand area of the screen. The text will appear as entered in the box at the top of the screen.

Select **`Done`** when finished. The text that you edited or entered will then appear at the beginning of the test results.

Use BTS Laptop Utility Field

NOTE: The BTS Laptop Utility is a PC-based program that allows you to view and save your test results on a PC. If the utility is loaded on your PC, and you wish to send the test result to the PC, toggle this field to **Yes**. For more information on this subject, see **"Sending Test Results to a PC Using the BTS Laptop Utility" on page 78**.

Select the **Use BTS Laptop Utility** field to select whether you wish to use the utility. When you select the field, the **Yes/No** section of the field will toggle.

If it is set to **No**, and you toggle it to **Yes**, three fields will be displayed below: **Serial Port 9 Settings**, **Send Test Page to BTS Laptop Utility TR Window**, and **Echo BTS communication to**. These fields are described starting on this page.

If it is set to **Yes**, and you toggle it to **No**, six fields will be displayed below: **Send Test Results to Printer at**, **Send Test Results to**, **Serial Port 9 Settings**, **Print Setup**, **Print Test Page**, and **Echo BTS communication to**. These fields are described starting on **page 42**.

Toggle to Yes -- If you toggle the **Use BTS Laptop Utility** field to **Yes**, set the three fields as described in the following three sub-sections.

Serial Port 9 Settings Field

For the Test Set to communicate with the PC, the SERIAL 9 port configuration on the Test Set and the PC must match. This field allows you to configure the Test Set's port to match the PC port.

Select the **Serial Port 9 Settings** field to configure the SERIAL 9 port. The Test Software will display the Serial Port 9 Settings menu. This menu allows you to match the configuration of the SERIAL 9 port to that of the port of the PC or similar device to which data will be transmitted. For each field, select from the **Choices:** list.

For **Serial Baud**, select **300** to **115200** baud.

For **Parity**, select **None**, **Odd**, **Even**, **Marking**, or **Spacing**.

For **Data Length**, select **7 bits** or **8 bits**.

For **Stop Length**, select **1 bit** or **2 bits**.

For **Flow Control**, select **None**, **Xon/Xoff**, or **Hardware**.

Select the **Return** field or press the **k5** (**Return**) key when finished to return to the previous screen.

Send Test Page to BTS Laptop Utility TR Window Field

Select the **Send Test Page to BTS Laptop Utility TR Window** field to test the connection between the Test Set and the PC that is running the BTS Laptop Utility. The Test Software will transmit one page of data to the laptop TR (test results) window as a test.

Echo BTS Communications to Field

Select the **Echo BTS communications to** field to select whether the Test Software will send an echo of the commands exchanged between the Test Set and the Base Station, and, if so, the destination of that information. The Test Software will display a drop-down **Choices:** list that offers five choices.

If you select **Off**, the Test Software will not echo the commands to another destination.

If you select **Serial 9**, **Parallel 15**, or **HP-IB 701**, the Test Software will echo the commands to the respective port.

If you select **Display**, the Test Software will echo the commands to the Test Set's screen and display those commands along with the test results.

Toggle to No -- If you toggled the **Use BTS Laptop Utilities** field to **No**, set the six fields as described in the following six sub-sections.

Send Test Results to Printer at Field

Test results are always displayed on the Test Set's screen. In addition, you may direct the Test Software to send the results to a printer.

Select the **Send Test Results to Printer at** field to indicate to the Test Software the port address of the printer connection. Select the address from the **Choices:** list. If you select **Off**, no port will be used for transmitting test results to a printer. If you select **Serial 9**, **Parallel 15**, or **HP IB**, the selected port will be used for transmitting test results to a serial, parallel, or HP-IB printer, respectively. If you select the HP-IB printer, you must enter its address in the field. For more information, see **"Sending Test Results to a Serial Printer" on page 92**,**"Sending Test Results to a Parallel Printer" on page 94**, and **"Sending Test Results to an HP-IB Printer" on page 96**.

Send Test Results to Field

In addition to test results being displayed on the Test Set's screen, those results may be saved on an SRAM card or sent to a PC connected to the SERIAL 9 port. If you wish to send the results to a printer and also to a PC, this will require the use of a PC communication program such as Procomm (a product of DataStorm Technologies, Inc.).

Select the **Send Test Results to** field to indicate to the Test Software the destination to which you wish to send test results. Select the destination from the **Choices:** list.

If you select **Off**, the Test Software will assume no destination (other than the Test Set's screen) for test results.

If you select **Serial 9**, the Test Software will transmit the test results to a device connected to the SERIAL 9 port. For more information, see **"Sending Test Results to a PC" on page 82**.

If you select **PC Card**, the test results will be sent to an SRAM card. In such case, you must insert an initialized SRAM card into the Test Set's card slot. For more information, see **"Sending Test Results to an SRAM Card" on page 87**.

Serial Port 9 Settings Field

Select the **Serial Port 9 Settings** field to configure the SERIAL 9 port. See the earlier description of this field.

Print Setup Field

Select the **Print Setup** field to set the print configuration. The Test Software will display the Print Setup menu.

Enter the desired value for the **Lines/Page** field.

Set the toggles appropriately for the **Form Feed at Start of Page** and **Form Feed at End of Page** fields.

Select the **Printer Model** field to choose the printer model from the **Choices:** list.

Select the **Return** field or press the **k5** (**Return**) key to return to the previous screen.

Print Test Page Field

Select the **Print Test Page** field to check the connection between the Test Set and the printer before a test. The Test Software will send one page of data to the printer as a test.

A printer must be connected to a Test Set port and set up for printing, and the **Send Test Results to Printer at** field must be set to the port to which the printer is connected in order to print a test page.

Echo BTS Communication to Field

Select the **`Echo BTS Communication to`** field to select whether the Test Software will send an echo of the commands between the Test Set and the Base Station, and, if so, the destination of the information. See the earlier description of this field.

Cable Loss and Sector Gain Information Box

Across the bottom of the Initialization Screen is a text box that includes two classes of information:

In the upper section (**`RX, TX Cable Losses (dB)`**), receiver and transmitter cable losses are shown for each of the six receive antennas (**`RX1`** through **`RX6`**), and for the transmit antenna (**`TX`**).

In the lower section (**`Sector RSSI Gain (dB)`**), the gain is shown for each of the sectors (**`X`**, **`Y`**. and **`Z`**).

NOTE: The values shown for these items will change as you make changes in the associated control fields (**`RX1 Cable Loss`** through **`RX6 Cable Loss`**, and **`TX Cable Loss`**) in the RX and TX Cable Loss Menu, which is called from the **`RX and TX Cable Loss`** field in the Initialization Screen.

Initiating Testing

After setting all relevant fields on the Initialization Screen to appropriate values, initiate testing by either selecting the **`Begin Test`** field or pressing the **k1** (**`Begin Tst`**) key. If a test has been run before, the Test Software probably will still be in the Test Set's internal memory, and it will run. If not, the Test Set will load the Test Software, including the procedure previously selected on the SOFTWARE MENU screen, into its internal RAM, and then run the Test Software.

Responding to Test Set and Test Software Actions

This section provides information on actions that you might be required to perform during the testing process.

Test Flow

When you select the **`Begin Test`** field or press the **k1** (**`Begin Tst`**) key, the Test Software will establish communications with the Base Station. Once communications are established, the Test Software will control the Base Station so that it operates in the various modes required for efficient testing. During operation in each mode, the Test Software will control the Test Set to measure the required RF and audio characteristics of the Base Station.

At appropriate points in the testing process, the Test Software will pause, then prompt you to perform some required action or actions. These prompts may require that you turn the Base Station on or off, make or change connections, or perform adjustments.

At the end of a test sequence, the Test Software will display a summary of the test results, showing the number of data points at which the test passed and the number at which the test failed.

Also, at the end of a test sequence, the Test Software will display the time elapsed during the test.

Dependent upon your testing regimen, you might wish to perform certain tests again to obtain more complete information on tests that failed, or you might wish to perform the entire test sequence again.

Actions if a Test Fails

If **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]** is set to 1, the Test Software will prompt you to press one or more of the following keys.

Proceed Key

Press the **k1** (**Proceed**) key to continue test operations after a pause.

Repeat Key

Press the **k2** (**Repeat**) key to perform a test again.

Abort Key

If it is displayed, press the **k4** (**Abort**) key at any time during the testing process to stop the test sequence. The Test Software will stop the test properly, close any files saved to the PC card, end communication with the Base Station, and display a summary of the testing to the point of stoppage.

Laptop Key

If it is displayed, press the **k5** (**Laptop**) key to invoke the Laptop Emulator Mode. You may use this mode at any point during the testing process at which you wish to send a command to the Base Station to cause it to perform some specific action. For more information on this mode, see **"Laptop Emulator" on page 116**.

Actions if Adjustment Is Required

At points at which adjustment is required, the Test Software will prompt you to press one or more of the following keys.

No Retest Key

Press the **k1** (**No Retest**) key when you do not wish to have the Test Software repeat the test after an adjustment.

Retest Key

Press the **k2** (**Retest**) key when you wish to have the Test Software repeat the test after an adjustment.

Not Set Key

Press the **k3** (**Not Set**) key when you do not wish to perform a prompted adjustment.

Tns loud/Tns quiet/Tns off Key

Press the **k4** (**`Tns loud`**/**`Tns quiet/Tns off`**) key to set the level of the audible signals produced by the Test Set's audio tone generator during pauses for adjustments. The tone may be set to loud, quiet, or off. Press the key repeatedly until the desired audio level is obtained.

Laptop Key

If it is displayed, press the **k5** (**`Laptop`**) key to invoke the Laptop Emulator Mode. You may use this mode at any point during the testing process at which you wish to send a command to the Base Station to cause it to perform some specific action. For more information on this mode, see **"Laptop Emulator" on page 116**.

3

Connections

This chapter provides information on equipment required for Base Station testing, and connections for cell site equipment, serial port, printer, and switch control.

Equipment Required

The following equipment is required for testing:

- Cellular Site Base Station to test.
- HP 8935 Series E6380A CDMA Base Station Test Set.
  or
  HP 8935 Series E6381A TDMA Base Station Test Set.
- HP 8935 Nortel Base Station Connection Kit. (Recommended, but not required.)

Accessory Kit Cables, Connectors, and Small Accessories

The cables, connectors, and small accessories listed in **table 2** may be purchased together in the HP 8935 Nortel Base Station Connection Kit (HP Part Number: E8302-61001) or separately through a local vendor.

CAUTION: The Test Set and other equipment in this test system are susceptible to damage by transient RF power, continuous RF power, high voltage, electrostatic discharge from cables and other sources, and transients caused by lightning. Connections to equipment, switch settings, and power-on conditions must be selected and accomplished carefully to reduce the risk of damage to the equipment.

NOTE: The HP 8935 Nortel Base Station Connection Kit contains items that are used in both P-Series and TRU Base Station testing.

Table 2 Cables and Adapters in Connection Kit

Description	Purpose	Quantity	Part Number
Cable, DB25(m)-to-DB9(f), 15 ft	Connects control signals, Test Set to P-Series Base Station.	1	E8302-61005
Cable, BNC(m)-to-BNC(m), RF400, 20 ft	Accessory.	2	E8302-61003

Table 2 Cables and Adapters in Connection Kit

Description	Purpose	Quantity	Part Number
Cable, N (m)-to-N(m), 20 ft	Connects Test Set's RF IN/OUT connector to Base Station's TX output connector. Connects Test Set's DUPLEX OUT connector to Base Station's RX input connector.	2	E8302-61002
Cable, N(m)-to-N(m), 2 ft	Acts as cable loss test reference cable.	1	E8302-61005
Cable, DB25(f)-to-Bantam	Connects control signals, Test Set to P-Series Base Station.	1	08921-61034
Cable, BNC(m)-to-Bantam	Connects forward and reverse audio signals, Test Set to Base Station.	2	08921-61024
Cable, RJ45(m)-to-RJ45(m), 4 ft	Connects control signals, Test Set to TRU Base Station.	1	81020-6343
Cable, DB9(f)-to-DB9(f), null, 10 ft	Connects Test Set to PC.	1	5182-4794
Attenuator, N(m)-to-N(f), 6 dB	Accessory, cable loss test.	2	0955-0819
Adapter, N(f)-to-BNC(m)	Adapts N-to-N cable to RX shelf input connector.	1	1250-0077
Adapter, N(f)-to-N(f)	Connects reference cable to cable or device under test in cable loss test.	1	1250-0777
Adapter, N(f)-to-SMA(f)	Adapts N-to N-cable to TRU Base Station TX connector.	1	1250-1404
Adapter, BNC(m)-to-Banana(f), single	Connects Test Set's AUDIO IN HI/LO connector to dual banana adapter.	2	1250-2164
Adapter, N(f)-to-TNC(m)	Accessory.	1	1250-2361
Adapter, N(f)-to-TNC(m)	Accessory.	1	1250-2162

Table 2 Cables and Adapters in Connection Kit

Description	Purpose	Quantity	Part Number
Adapter, BNC(m)-to-Banana(m), dual	Connects Test Set's AUDIO IN HI/LO connector to balanced line input.	1	1251-2277
Adapter, DB25(f)-to-RJ45(f)	Connects control signals to TRU Base Station.	1	08921-61027
Cable Wrap, Velcro	Accessory.	5	1400-2157
Verification Guide	Accessory.	1	E8302-90001
Transit Case	Houses connection kit items.	1	E8302-61004

Cell Site to Test Set Connections

Many arrangements of test equipment and cell site equipment are possible. In this manual, two of these possibilities are presented:

- Performing transmitter tests at the PA shelf and receiver tests at the receiver shelf.

  This method will affect service at that shelf only.

- Performing transmitter tests at the duplexer or combiner and receiver tests at the receive multi-coupler (RMC) output.

  This method will affect the whole cell site.

After you set up the system, you must calibrate some system components before initiating testing. After calibration, tests must be performed with the equipment connected the same way it was connected when calibrated.

See **figure 6 on page 56** for an overall system block diagram, **figure 4 on page 54** for connections to the PA shelf and receiver shelf, and **figure 5 on page 55** for connections to the receive multi-coupler output and duplexer output.

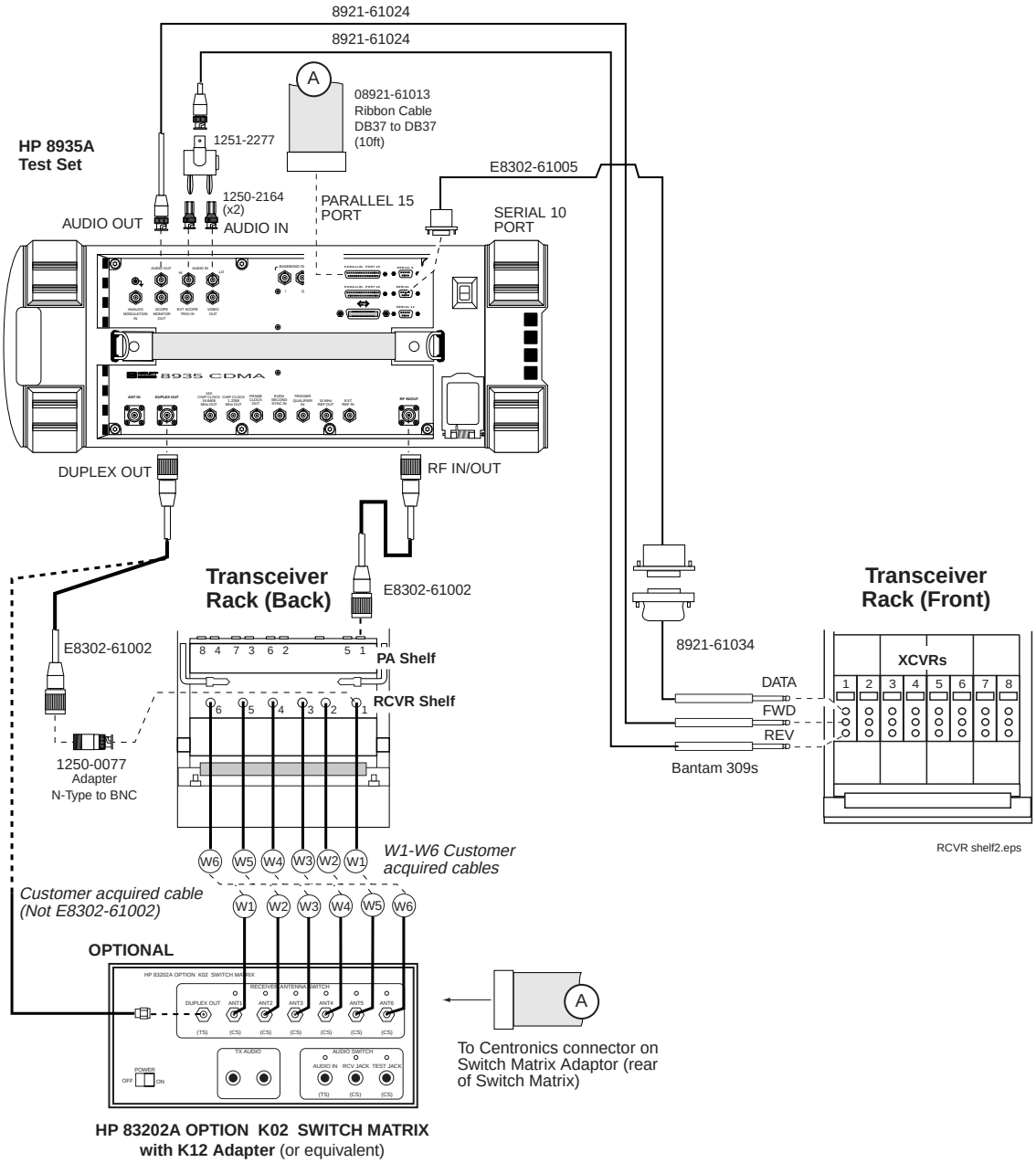


Figure 4 **Connecting the Test Set to the Receiver Shelf and PA Shelf**

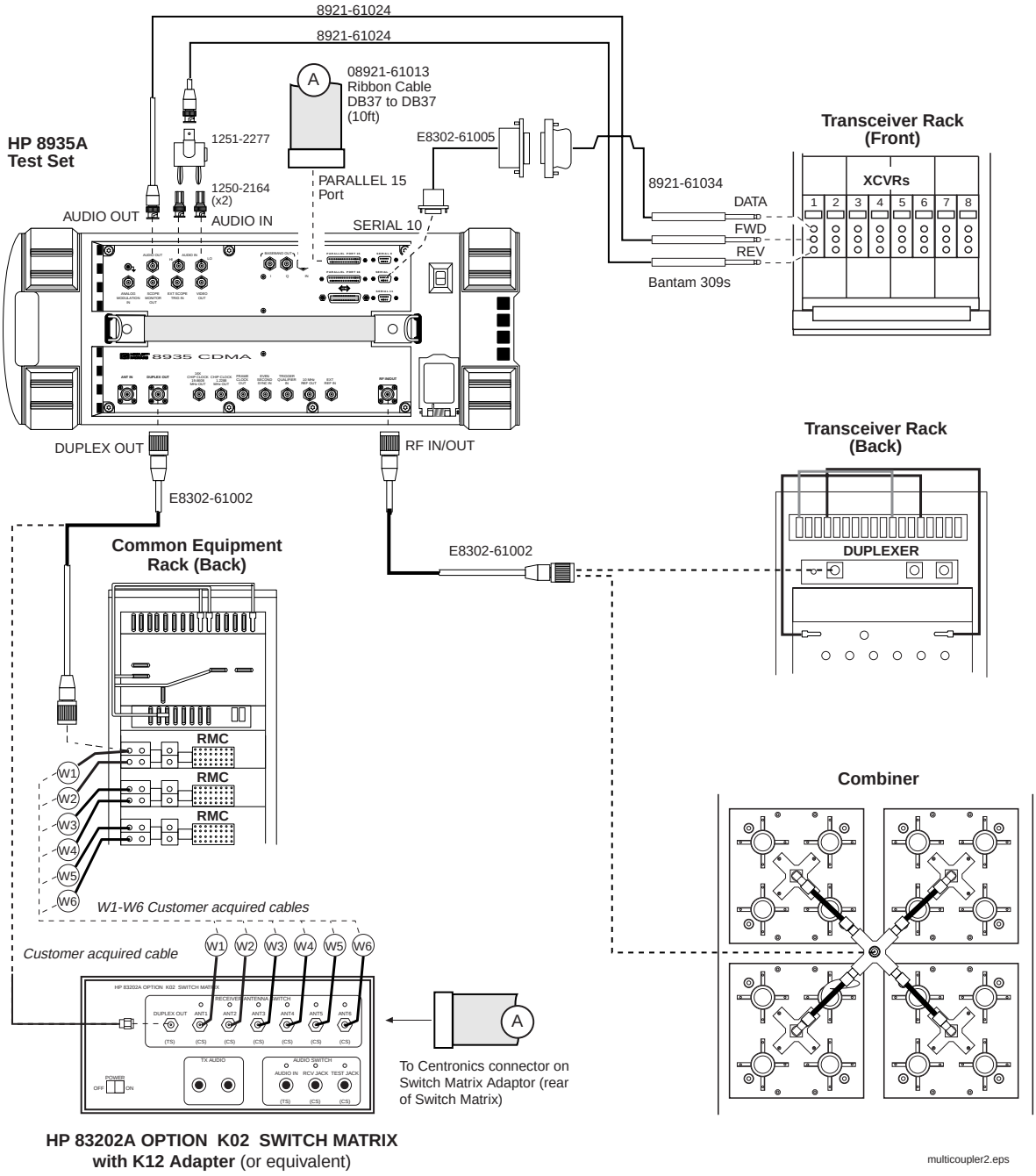


Figure 5 **Connecting the Test Set to the Receiver Multi-Coupler Output and Duplexer Output**

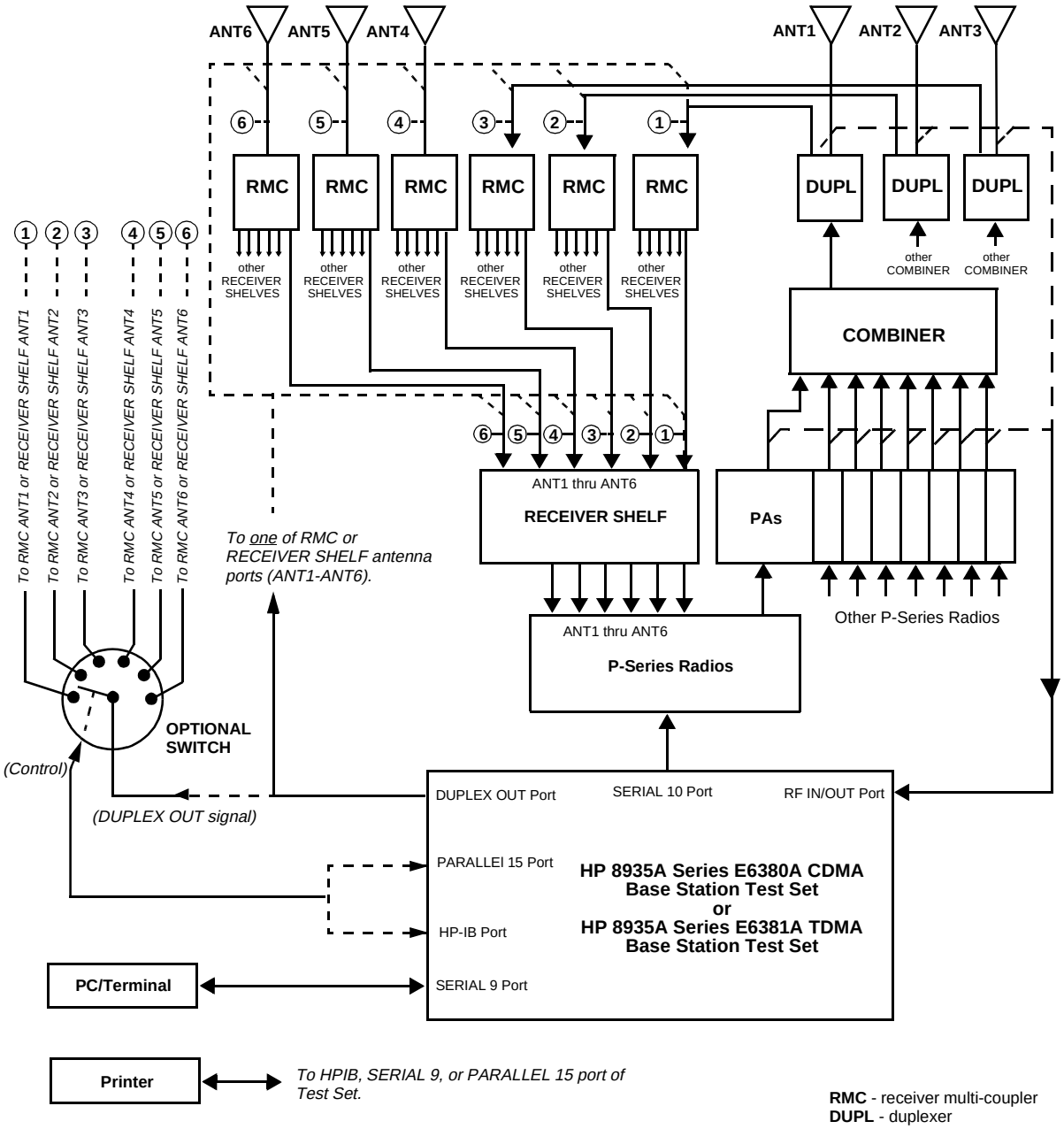


Figure 6 **Overall System Block Diagram**

Receiver RF

As shown in **figure 4 on page 54** and **figure 5 on page 55**, an RF cable is used to connect the RX shelf input or receive multi-coupler (RMC) input to the Test Set's DUPLEX OUT connector. The Test Software will display a prompt at each point in testing at which the connection must be changed.

You may connect the Test Set's DUPLEX OUT connector to the various receiver antenna connectors in several ways:

You may make the connections individually when prompted by the Test Software.

You may use a splitter and connect all of the antennas at once.

You may use an RF switch to switch the Test Set's DUPLEX OUT connector to the various receiver antenna connectors under Test Software control (see **"Splitter or Switch Matrix" on page 108**.

CAUTION: The application of RF power greater than approximately 60 milliwatts can damage the Test Set's DUPLEX OUT port. Make certain that signals greater than 60 milliwatts are never applied. As an extra safeguard, the Test Set includes an over-power relay in the port circuit. If an RF signal greater than approximately 60 milliwatts is inadvertently applied, this relay will trip. To resume operations, remove the problem signal, and press the ***Shift***, then the **Hold** (**Meas Reset)** keys, or turn the Test Set's power off and back on to reset it.

Transmitter RF

As shown in **figure 4 on page 54** and **figure 5 on page 55**, the PA shelf's or combiner/duplexer's outputs are connected one at a time to the Test Set's RF IN/OUT connector. Use a low-loss cable with Type N connectors. Type RG-214 cable may be used. The Test Software will display a prompt at each point in testing at which the connection must be changed.

Audio

As shown in **figure 4 on page 54** and **figure 5 on page 55**, the transceiver is connected to the Test Set's audio input and output connectors.

The transceiver's FWD connector or audio input is connected to the Test Set's AUDIO OUT connector. A Bantam 309-to-BNC cable is required to make the connection. The Bantam tip must be wired to the Test Set's AUDIO OUT BNC center conductor and the Bantam ring must be wired to the Test Set's AUDIO OUT BNC outer conductor.

The transceiver's REV connector or audio output is connected to the Test Set's AUDIO INPUT connectors. The Test Set's audio input circuit has an impedance of 600 ohms between the HI and LO input connectors. This load is required to obtain proper REV power readings. Therefore, the transceiver's REV Bantam connector tip must be wired to the Test Set's AUDIO IN HI BNC center conductor and the REV Bantam connector ring must be wired to the Test Set's AUDIO INPUT LO BNC center conductor.

NOTE: If you use the connectors supplied in the Accessory Kit, you must connect the BNC-to-Bantam 309 cable to the dual banana-to-BNC Adapter, and to the two BNC-to-single banana Adapters as shown in **figure 4 on page 54** and **figure 5 on page 55**.

RS-232 Control

The Test Software automatically controls the transceiver through the Test Set's SERIAL 10 port and the transceiver's front-panel DATA Bantam connector. Other connections to the transceiver are not supported.

As shown in **figure 4 on page 54** and **figure 5 on page 55**, the Test Set communicates with the transceiver for control and messaging signals via a test cable.

NOTE: If you use the connectors supplied in the Accessory Kit, you must connect the Test Set's SERIAL 10 port to the receiver's DATA connector using a DB9-to-DB25 cable and a DB25-to-Bantam cable connected together.

PC and Printer Connections

This section provides information on PC and printer connections for data collecting and recording.

PC

NOTE: The Test Software includes the capability to transfer test results to an external PC. This may be done quickly and easily by running the BTS Laptop Utility on a laptop or other computer to save the information.

Connect the Test Set's SERIAL 9 port to the PC's serial port using a DB9-to-DB9 null modem cable (see **figure 7**).

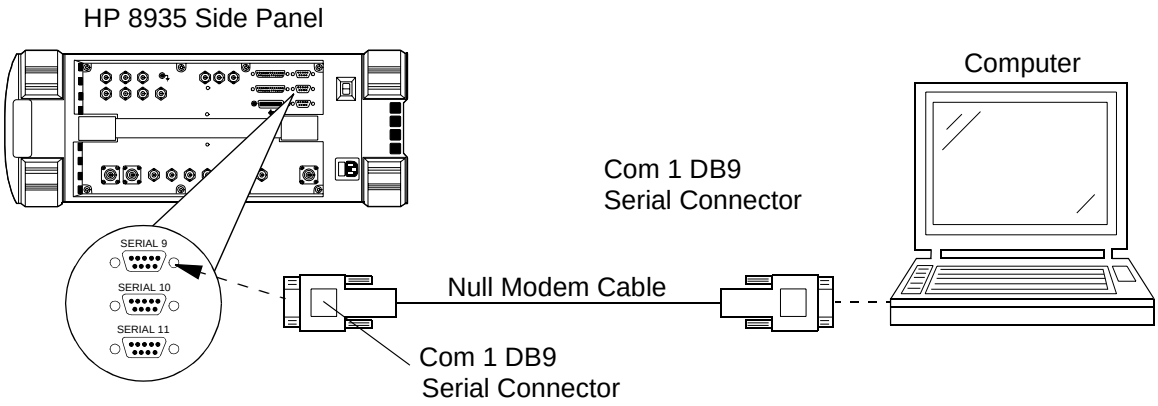


Figure 7 Test Set to PC Serial Connection

Serial Printer

Connect the Test Set's SERIAL 9 port to the serial printer using a standard serial (DB9-to-DB9) cable (see **figure 8**).

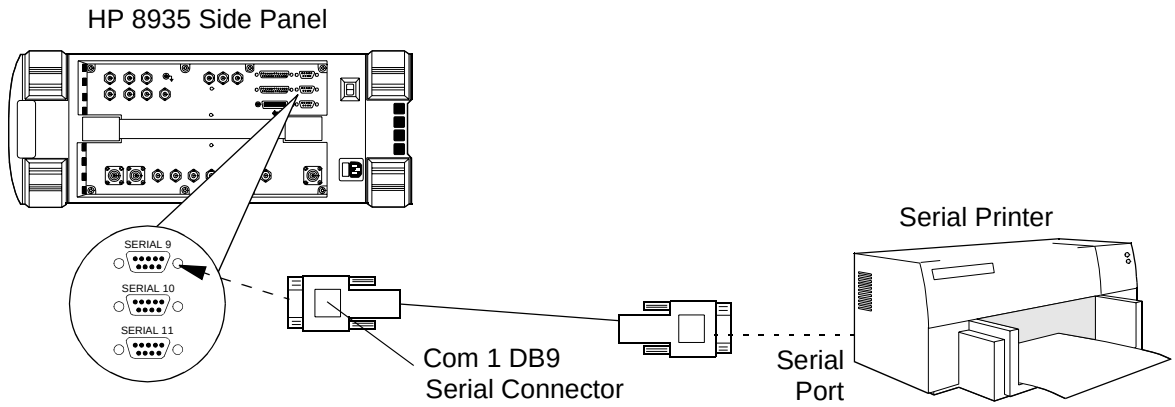


Figure 8 **Test Set to Serial Printer Connection**

Parallel Printer

Connect the Test Set's PARALLEL 15 port to the printer using a standard parallel printer cable (see **figure 9**).

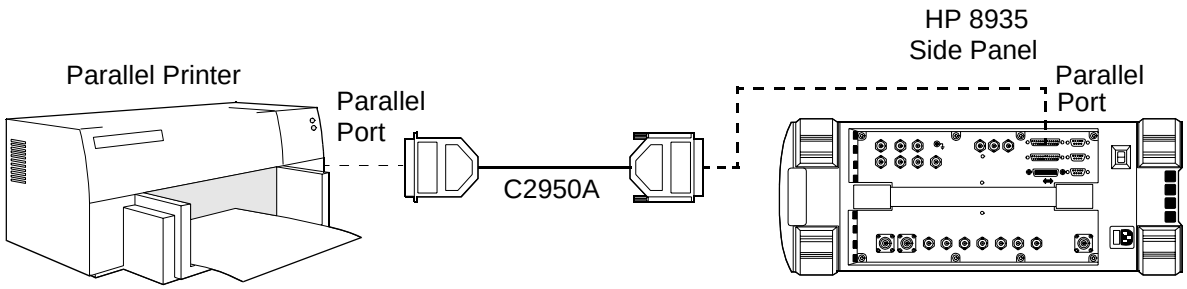


Figure 9 **Test Set to Parallel Printer Connection**

HP-IB Printer

Connect the Test Set's HP-IB port to the printer using a standard HP-IB printer cable (see **figure 10**).

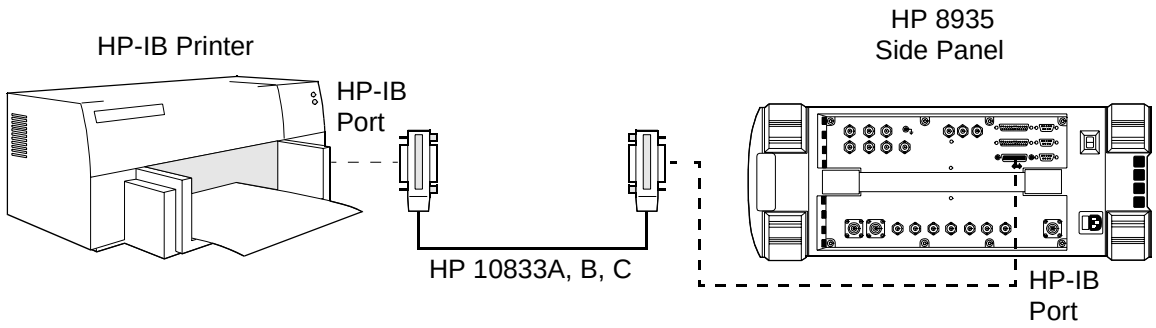


Figure 10 **Test Set to HP-IB Printer Connection**

4

Reference

This chapter provides detailed descriptions of the general features and functions of the Test Software. Topics are arranged alphabetically for quick and easy reference.

Customizing Test Procedures

Customizing test procedures is accomplished from the SOFTWARE MENU screen (**figure 11**).

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

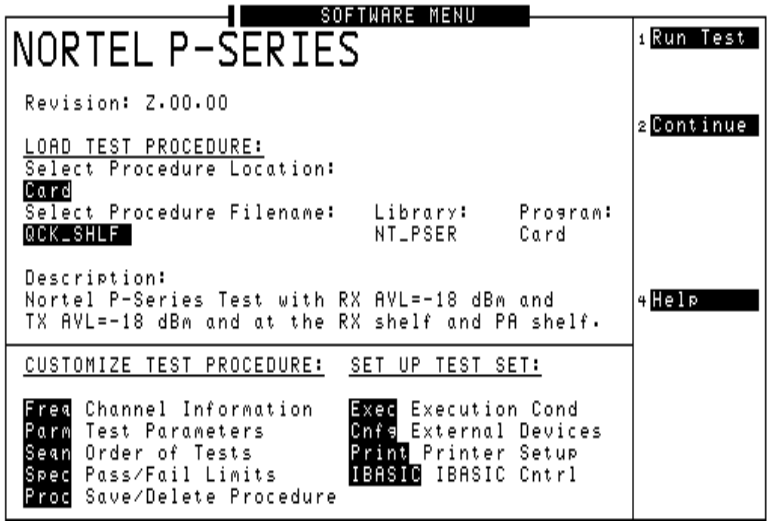


Figure 11 **SOFTWARE MENU Screen**

Test Procedures have been designed so that changes may be made easily from the Test Set's front panel. For example, tests may be inserted or deleted and, after running the tests, you may change the pass/fail limits or test different channels. You may store your customized procedure on an SRAM card so that you may use it in the future (see **"Saving/Deleting Procedures to/from a Card" on page 71**).

Changing Pass/Fail Limits

Changing pass/fail limits is accomplished from the TESTS (Pass/Fail Limits) screen (**figure 12**).

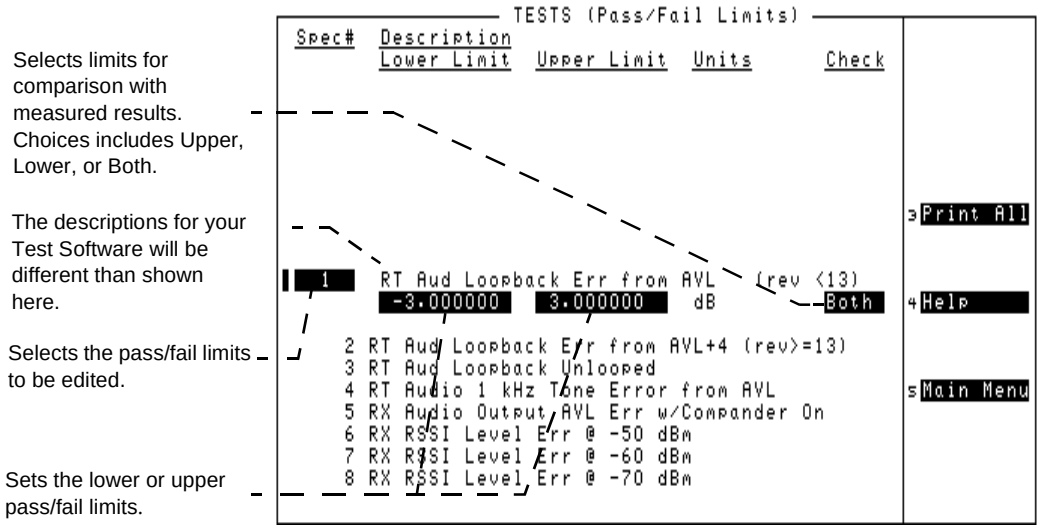
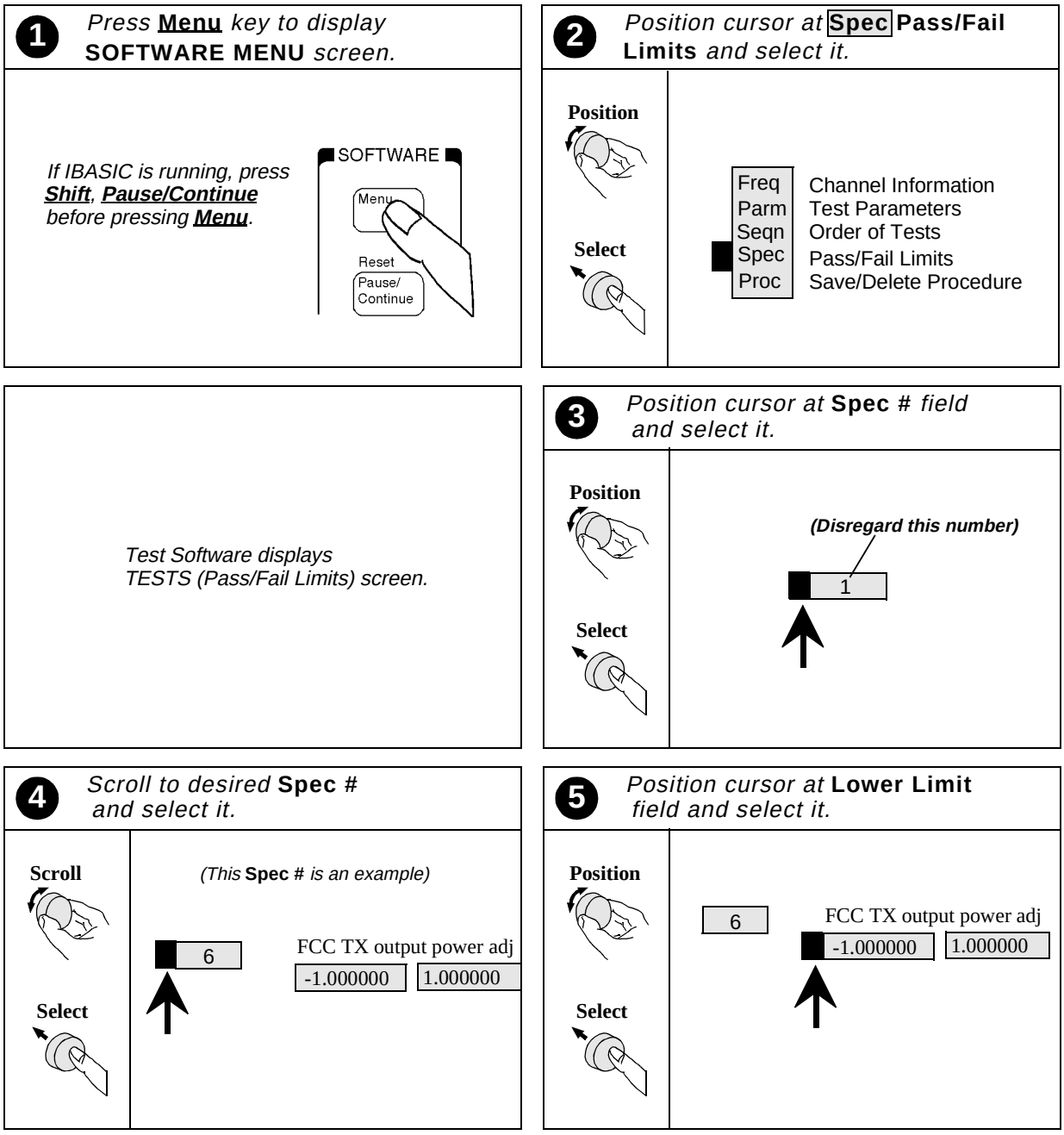


Figure 12 **Changing Pass/Fail Limits**

Pass/Fail limits define the values a measurement result is compared against to determine if the system under test meets specified standards. Default values are set in the Test Software. These default values may be changed to meet the requirements of the particular application.

The procedure shown in **figure 13 on page 66** and **figure 14 on page 67** describes the process for changing pass/fail limits through the TESTS (Pass/Fail Limits) screen to optimize your testing conditions. For information on saving customized pass/fail limits, see **"Saving/Deleting Procedures to/from a Card" on page 71**.



Continue on next page

Figure 13 Changing Pass/Fail Limits Specifications

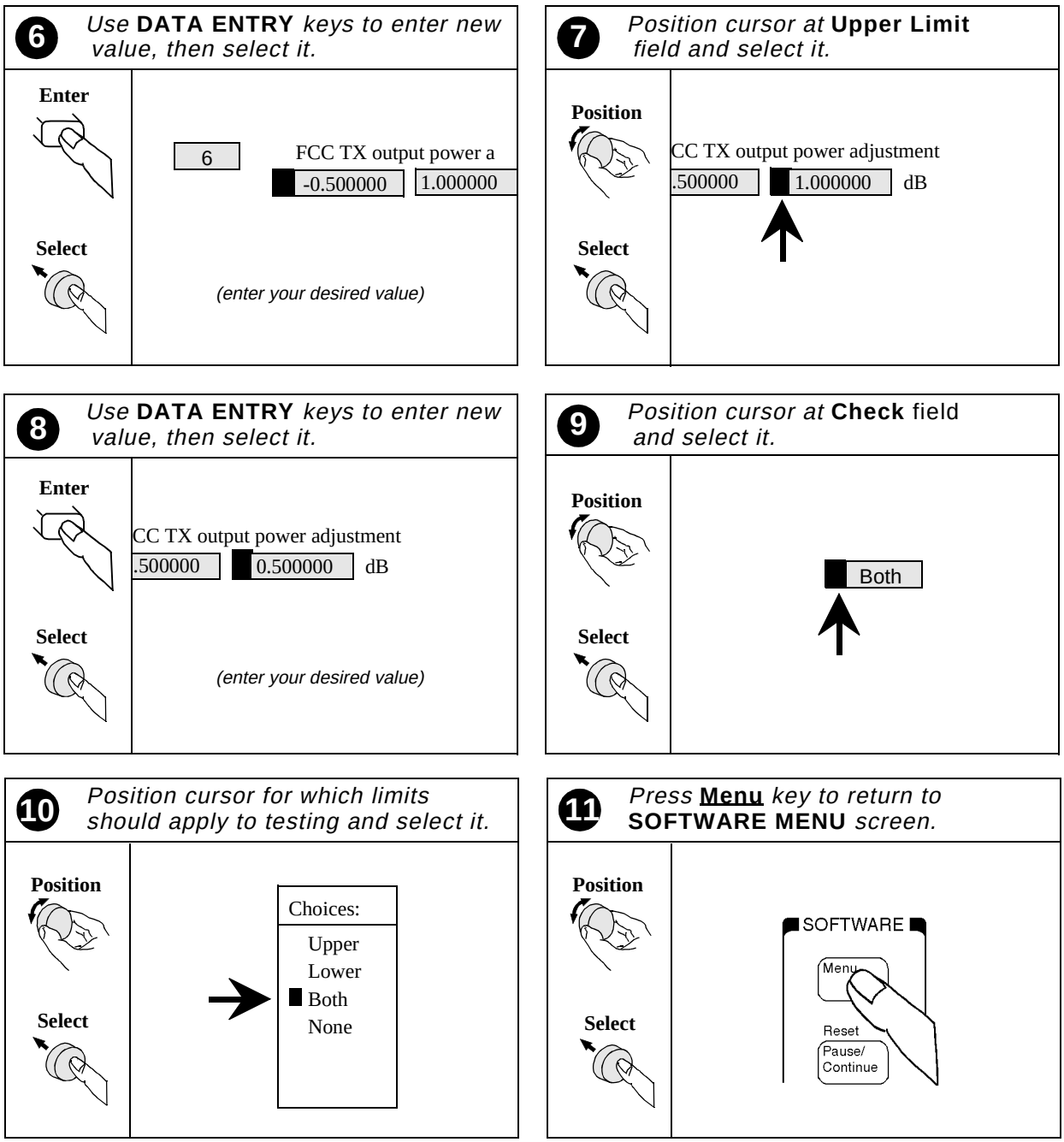


Figure 14 **Changing Pass/Fail Limits Specifications (continued)**

Changing Test Parameters

Changing test parameters is accomplished from the TESTS (Test Parameters) screen (**figure 15**).

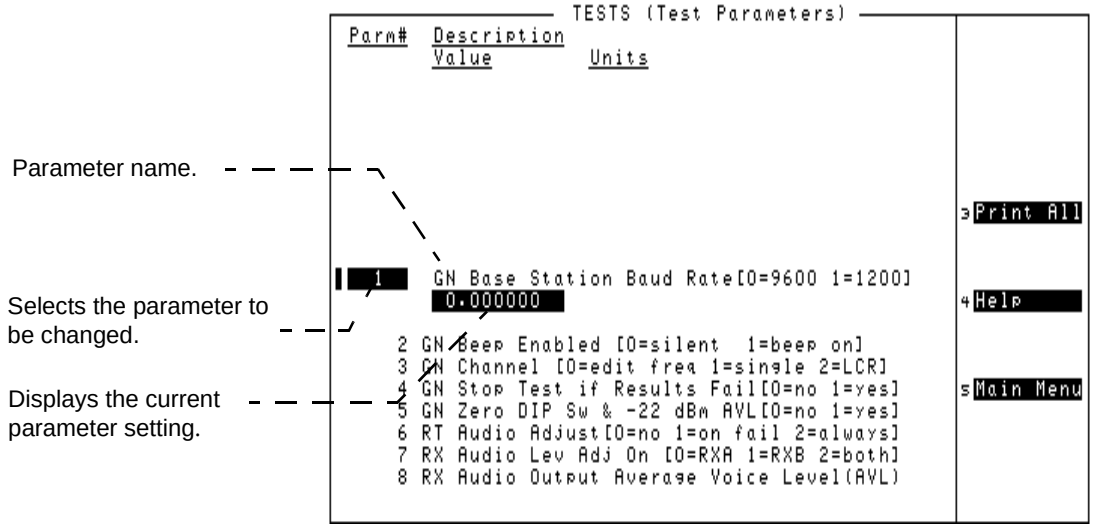


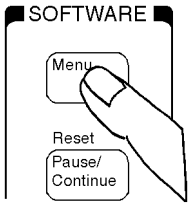
Figure 15 **TESTS (Test Parameters) Screen**

The Software uses parameters to optimize the test environment and conditions for the testing application. The default test parameters were determined by examining test requirements and specifications from the equipment manufacturer. The Test Software comes with default settings for all test parameters.

The procedure shown in **figure 16 on page 69** and **figure 17 on page 70** describes the process for changing test parameters through the TESTS (Test Parameters) screen to optimize your testing conditions. For information on saving customized test parameters, see **"Saving/Deleting Procedures to/from a Card" on page 71**.

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

If IBASIC is running, press ***Shift***, ***Pause/Continue*** *before pressing* ***Menu***



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

Position

Select

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

Test Software displays TESTS (Test Parameters) screen.

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

Position

Select

(Entries on your display may be different)

1 RT audio test to 0.00000

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

Scroll

Select

(This parameter number and description are examples)

15 TX cable loss

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

Position

Select

15 TX cable loss 0.000000

Continue on next page

Figure 16 Changing Test Parameters

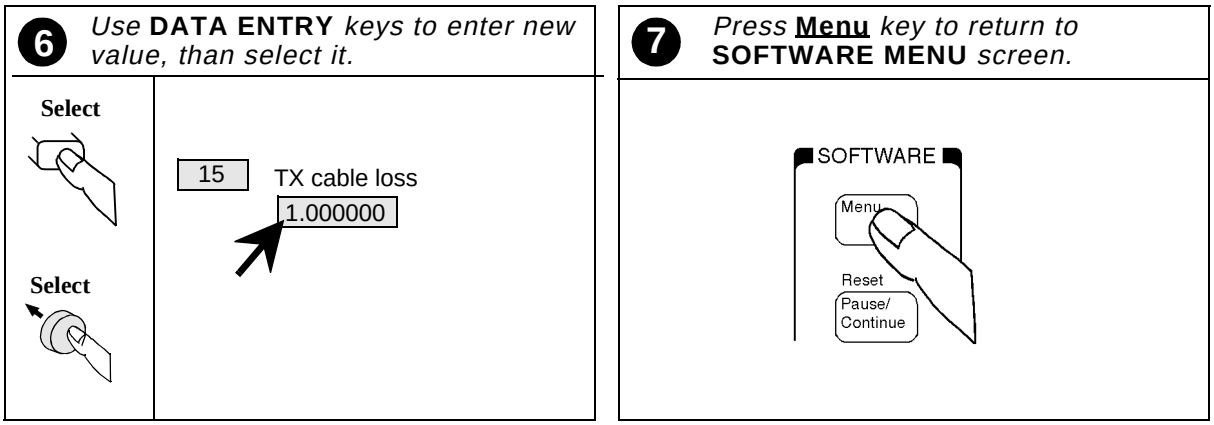


Figure 17 Changing Test Parameters (continued)

Saving/Deleting Procedures to/from a Card

Saving procedures to an SRAM card and deleting procedures from a card are accomplished from the TESTS (Save/Delete Procedure) screen (**figure 18**).

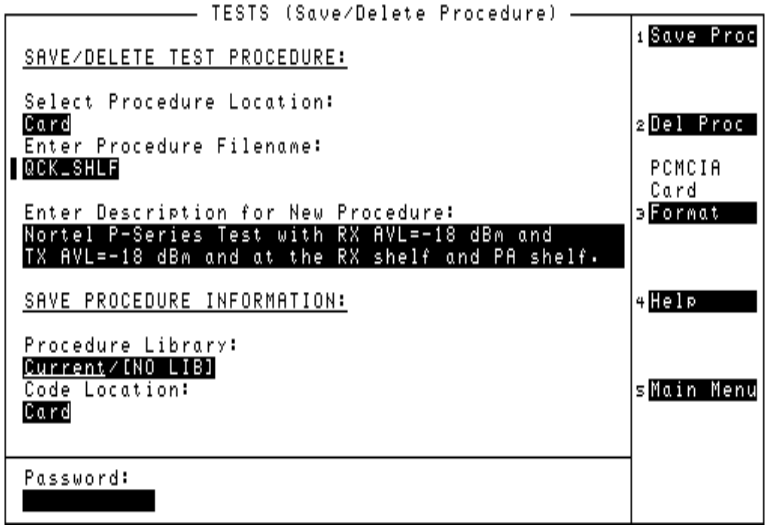


Figure 18 **TESTS (Save/Delete Procedure) Screen**

A test procedure is a collection of channel information, test parameters, testing order, and pass/fail limits saved in a file. This file might be one of the default procedures that is supplied on the Test Software PC card, or it might be an application specific procedure that customizes the Test Software to a specific application. Ordinarily, custom procedures are saved on an SRAM card.

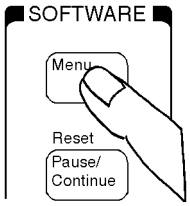
When you save a custom procedure, it consists of channel information, test parameters, pass/fail limits, and testing order, plus a library that contains the names of all test parameters, pass/fail limits, and tests that are resident in the Test Software. The library file comes from the Test Software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

The procedure shown in **figure 19 on page 72**, **figure 20 on page 73**, and **figure 21 on page 74** describes the process for saving a procedure through the TESTS (Save/Delete Procedure) screen.

Delete a procedure using the same process, except for step 13. To delete a procedure, select the **`Del Proc`** field or press the **k2** (**`Del Proc`**) key.

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

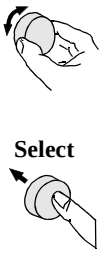
If IBASIC is running, press ***Shift***, ***Pause/Continue*** *before pressing* ***Menu*****.**



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

Position

Select



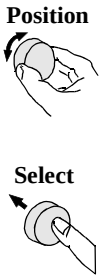
Freq	Channel Information
Parm	Test Parameters
Seqn	Order of Tests
Spec	Pass Fall Limits
Proc	Save/Delete Procedure

Test Software displays TESTS (Save/Delete Procedure) screen.

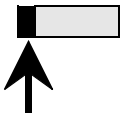
3 *Position cursor at* **Select Procedure Location** *and select it.*

Position

Select

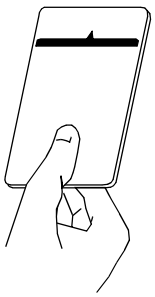


Select Procedure Location:



4 *Insert initialized SRAM* ***card.***

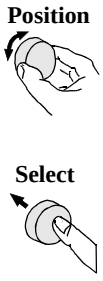
To initialize an SRAM card, press the **k3** (**Format**) key and follow the prompts on the TESTS (Save/Delete Procedure) screen.



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

Position

Select

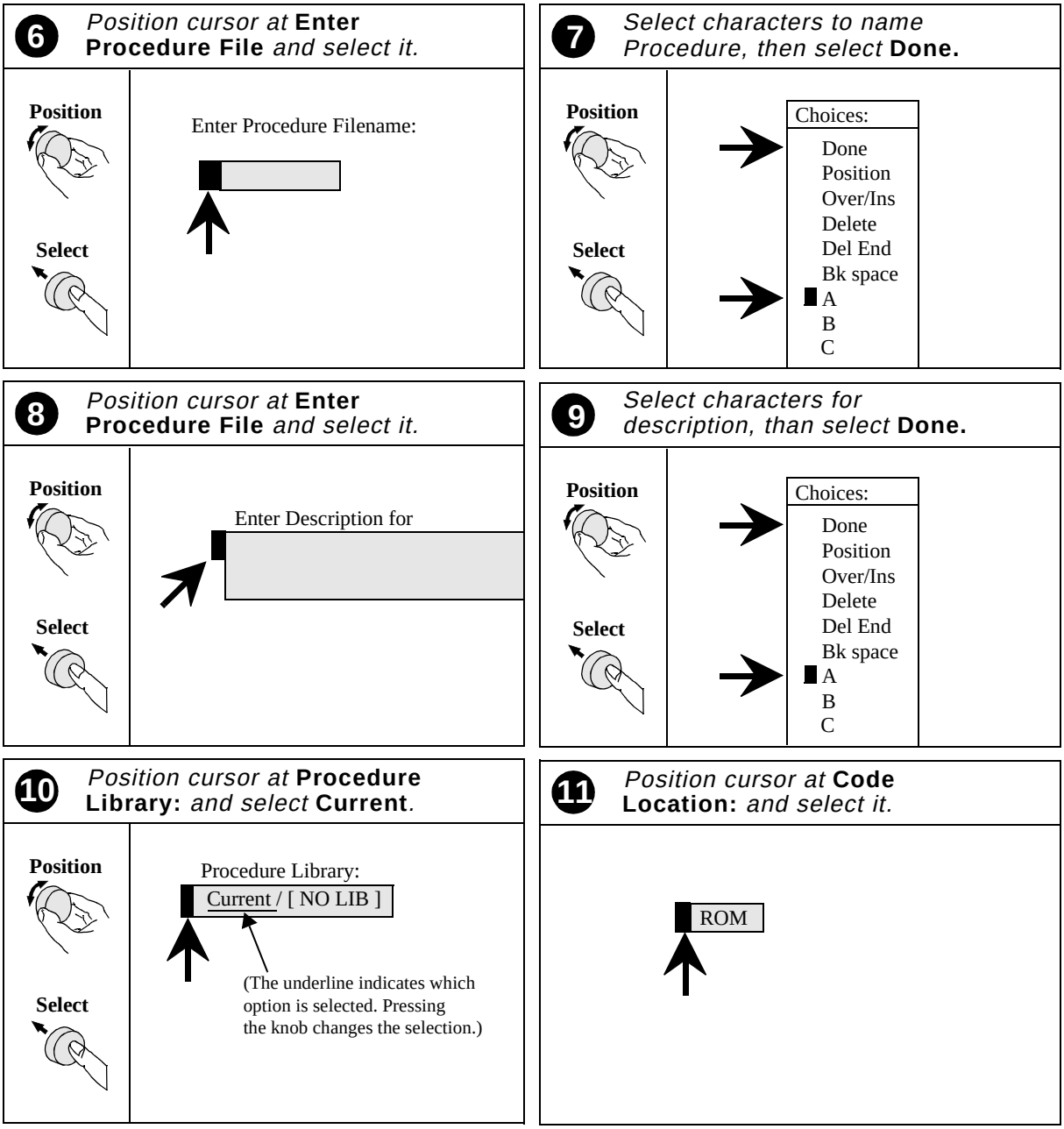


Choices:
- Card
- RAM

(You may also save procedures to an internal RAM disk).

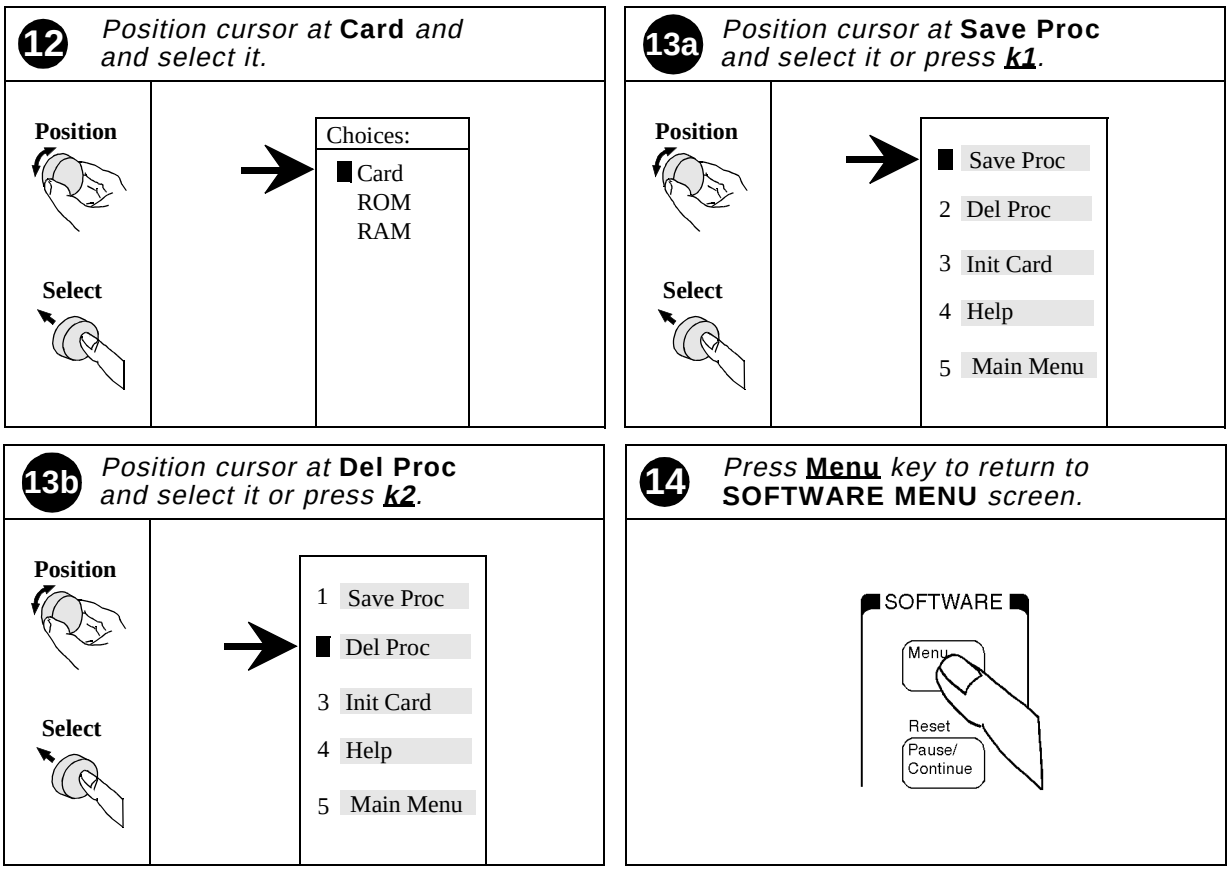
Continue on next page

Figure 19 Saving or Deleting a Procedure



Continue on next page

Figure 20 **Saving or Deleting a Procedure (continued)**



15 *Run saved procedure as follows:*

1) Insert the SRAM Card with your saved procedure.

2) On the SOFTWARE MENU screen, a) select Select Procedure Location: then select Card, b) select Select Procedure Filename:, then select your saved file name.
3) Remove the SRAM Card, then insert the original Test Software PC card.
4) Press Run Test.

The original card contains the full program required to run your procedure.

Figure 21 Saving or Deleting a Procedure (continued)

Saving/Deleting Procedures to/from Internal RAM

Saving procedures to Test Set's internal RAM and deleting procedures from internal RAM are accomplished from the TESTS (Save/Delete Procedure) screen (**figure 18 on page 71**) much as shown in **figure 19 on page 72**, **figure 20 on page 73**, and **figure 21 on page 74**, except for the following:

1. In **figure 19 on page 72**, step 4, initialize the RAM disk as outlined in **"Initializing a RAM Disk" on page 99**.
2. In **figure 19 on page 72**, step 5, select **RAM** instead of **Card**.
3. In **figure 21 on page 74**, step 15, sub-step 1 is not applicable.
4. In step 15, sub-step 2, select **RAM** instead of **Card**.
5. In step 15, sub-step 3, if the Test Software PC card is not inserted in the Test Set's front panel card slot, do so.

Frequency Table

The frequency table, shown in the TESTS (Channel Information) screen, is used to enter and store channel numbers and transceiver slot location numbers (for example, location 1-8). Procedures may be set up to test consecutively all eight radios on a shelf by entering the information into the frequency table. The procedure (including the frequency table) may also be saved to an SRAM card for later use.

The **Test?** field is useful if you have saved all of the shelf information to a frequency table and wish to go back and test some (but not all) of the channels. By setting this field to **No** for the transceiver location slot(s) you do not wish to test, you may retain the channel and shelf number information in the procedure, but not test the channel(s). Change this setting back to **Yes** when you wish to test the channel(s).

PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR] allows you to choose whether the software should read frequency information from the frequency table (set parameter to 0), or from the Initialization Screen (set parameter to 1). Setting this parameter to 1 will allow you to test only one channel at a time. The default setting is 1. You must change it to 0 if you wish to use the frequency table.

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Select the **Freq Channel Information** field from the **SET UP TEST SET:** list. The Test Set will display the TESTS (Channel Information) screen.
3. Select the **Channel#** field.
4. Using the DATA ENTRY keys, enter the channel number and select it.
5. Select the **Slot# (1-8)** field.
6. Using the DATA ENTRY keys, enter the slot number (position on the shelf, 1-8), and select it.
7. Select the **Test?** field.
8. Press the knob to toggle the field to the desired response (**Yes** or **No**).
9. Press the **Menu** key or press the **k5** (**Main Menu**) key to return to the SOFTWARE MENU screen.

Handling Test Results

It is often desirable to record test results for future reference or evaluation. The Test Software provides the capability to save test results to a variety of destination devices. These are:

- A PC
- An SRAM card
- A serial printer
- A parallel printer
- An HP-IB printer

The capability to save test results remains on until you turn it off.

Sending Test Results to a PC Using the BTS Laptop Utility

Test results can be supplied directly to a PC through the Test Set's SERIAL 9 port (**figure 22**) using a laptop computer running the HP BTS Laptop Utility.

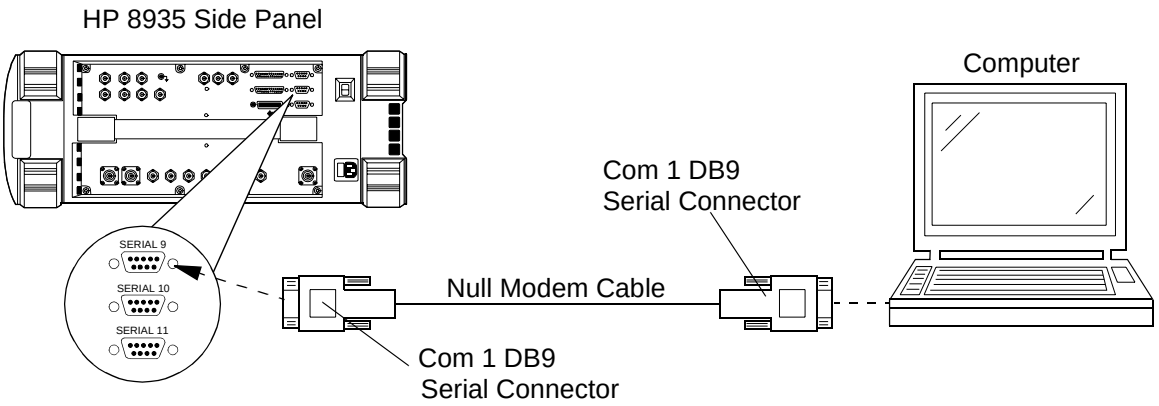


Figure 22 **Test Set to PC Serial Connection**

The requirements to save test results to a PC are as follows:

- The Test Set's SERIAL 9 port must be connected to the PC using a null modem cable.
- The configured BTS Laptop Utility must be running on the PC.
- The **`Use BTS Laptop Utility`** field in the Test Results/Laptop Util/Printer/ Serial Setup menu must be set to **`Yes`**.
- The Test Set's SERIAL 9 port communications parameters must be configured to match the communications parameters of the PC.

Configuring the PC Terminal Program.

Sending test results to a PC requires starting the BTS Laptop Utility on the PC, then setting the Test Software to use the utility.

Perform the setup as follows:

1. From the PC, start the BTS Laptop Utility program (**figure 23**).

Figure 23 **Starting the BTS Laptop Utility Program**

2. On the PC screen, click on the **TR** button to display the window in which the test results will be displayed (**figure 24**).

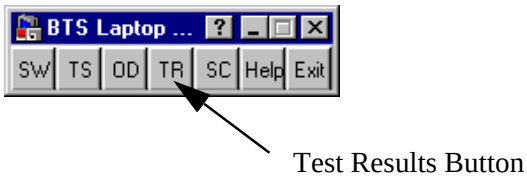


Figure 24 **Selecting the Test Results Window**

NOTE: The Test Software does not use communications with the Switch for testing purposes. Thus, you might find it advantageous to turn off the SW button in the BTS Laptop Utility tool bar. To do this, select the File Properties window in the BTS Utility, then add **-No Switch** at the end of the Shortcut Tab in the Target field.

3. On the PC screen, click on the **Preferences** field, then click on the **Comm Parameters** field to display the Comm Port Setup screen (**figure 25**).

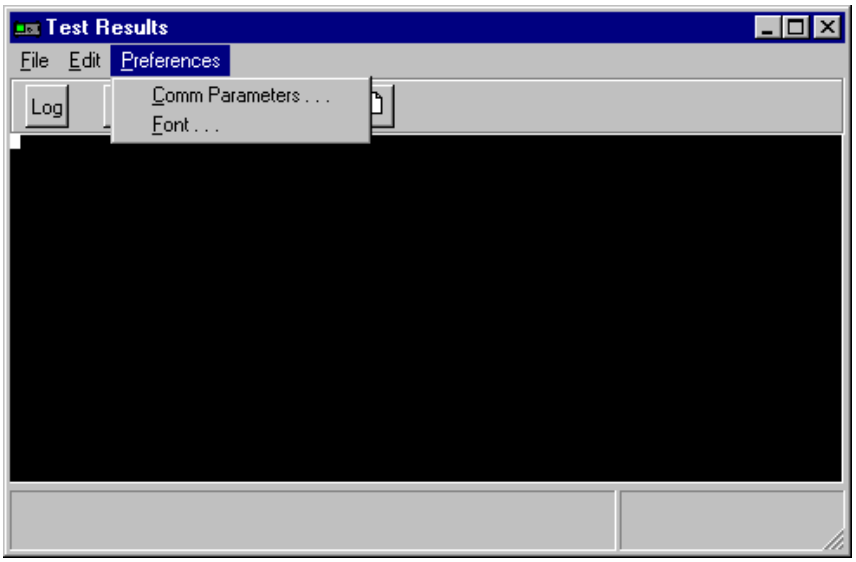


Figure 25 **Comm Port Setup Screen**

4. On the Comm Port Screen, set the Test Set port to the serial port to which the null modem cable is connected on the Test Set (SERIAL 9).
5. On the Comm Port Setup screen, set the Test Set's baud rate to match the baud rate of the PC.

NOTE: If the rate is higher than 19200 baud, the Test Set's serial port flow control must be set to **Hardware**.

6. On the Comm Port Setup screen, set the Switch Port to **No Port**.

NOTE: The Test Software does not use communications with the Switch for testing. If you have already set the Shortcut Tab as shown in the note in step 2, step 6 will not be required. The **No Port** selection will not appear.

7. On the Comm Port screen, click on the **OK** button.

Sending the Results

To send test results to a PC, you must enable sending test results within the software. Do this as follows:

1. Connect the PC to the Test Set's SERIAL 9 port using a null modem cable.
2. On the Test Set, press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
3. On the Test Set, press the **k1** (**`Run Test`**) key to start the Test Software. The Test Software will display the Initialization Screen.
4. On the Test Set, select the **`Test Results/Laptop Util/Printer/Serial Setup`** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
5. On the Test Set, select the **`BTS Laptop Utility`** field so that the choice field toggles to **`Yes`**.

NOTE: If the Test Software does not change the field to **`Yes`**, see the BTS Laptop Utility help tool for hardware flow control. Also, make certain that you have completed all steps of this procedure correctly.

6. On the PC, start the BTS Laptop Utility program.
7. On the Test Set, select the **`Serial 9 Port Settings`** field. Verify that the communications parameters match those of the BTS Laptop Utility program.

The Test Set will send test results to the PC using the BTS Laptop Utility until you set the **`Use BTS Laptop Utility`** field to **`No`** in the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.

Sending Test Results to a PC

Test results can be supplied directly to a PC (with a communications program) through the Test Set's SERIAL 9 port (**figure 26**). A variety of devices may be used to receive the data. An HP Palmtop computer, PC, laptop, or terminal may be used. A terminal emulator may be used to write the test results directly to a file. Examples of terminal emulator programs are Microsoft Windows Terminal and ProComm (a product of DataStorm Technologies, Inc.).

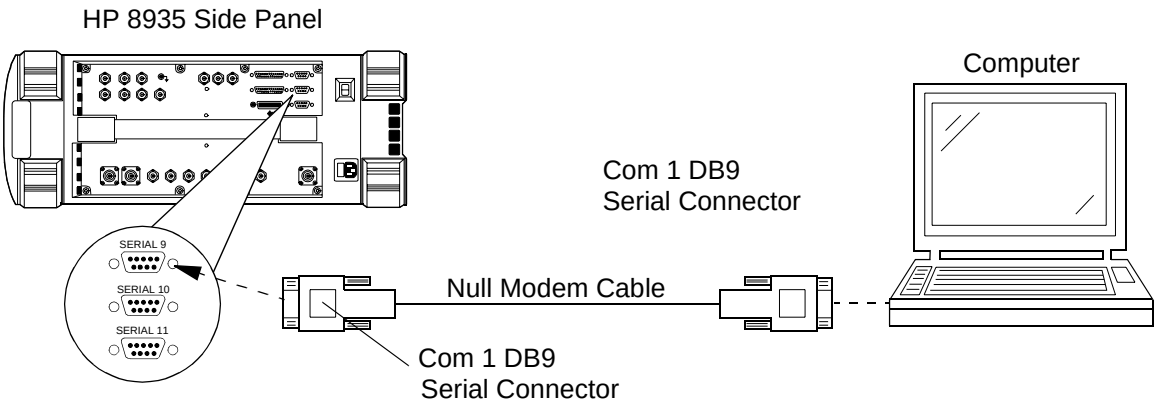


Figure 26 Test Set to PC Serial Connection

The requirements to save test results to a PC are as follows:

- The Test Set's SERIAL 9 port must be connected to the PC.
- A configured terminal program must be running on the PC.
- The Send Test Results to Serial 9 function must be activated in the Software.
- The Test Set's SERIAL 9 port communications parameters must be configured to match the communications parameters of the PC.

Configuring the PC Terminal Program

Sending test results to a PC requires that a configured terminal emulator be running while sending test results is enabled. See **figure 27 on page 84** and **figure 28 on page 85** for the detailed procedures required to configure a terminal program for saving test results to a PC.

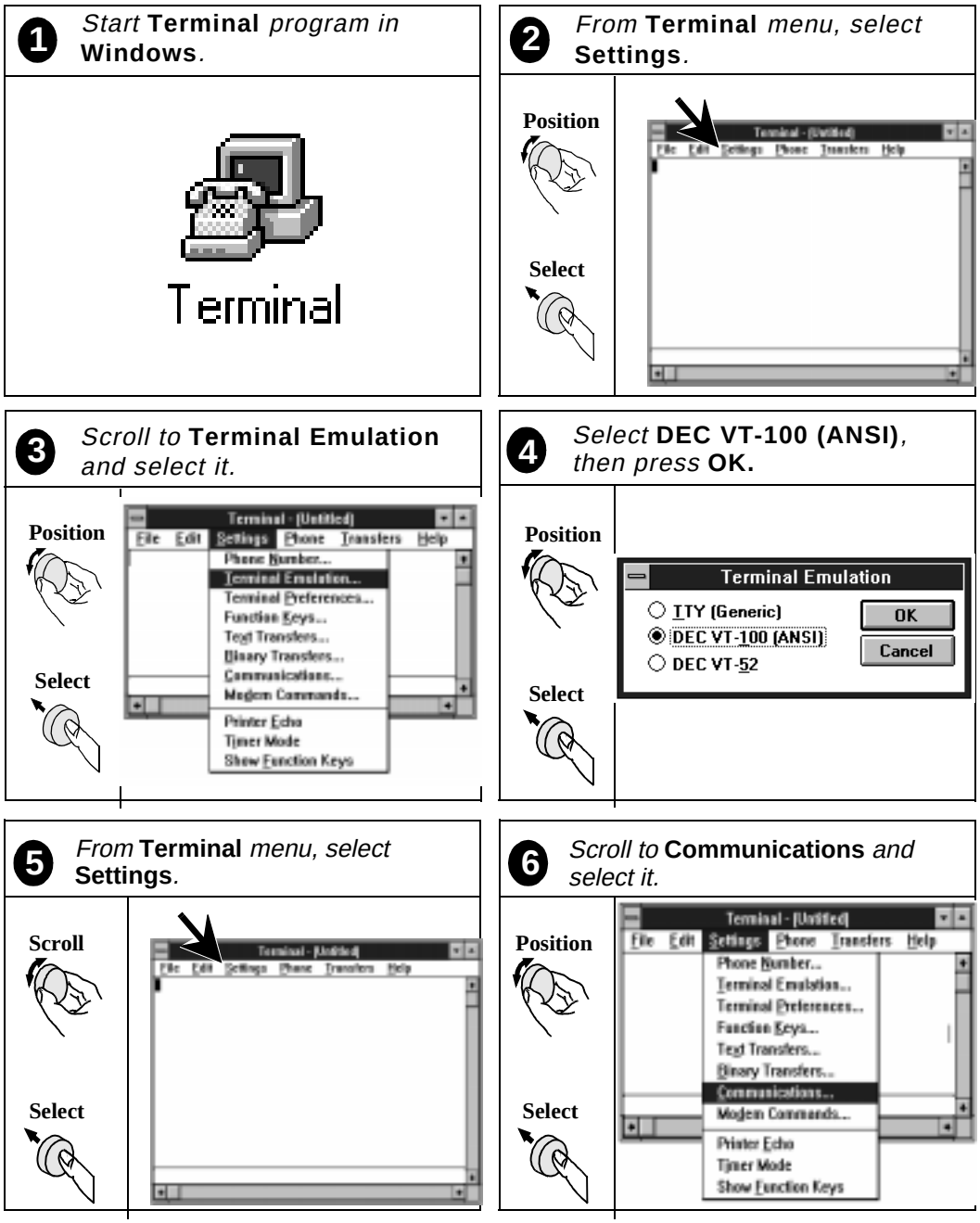
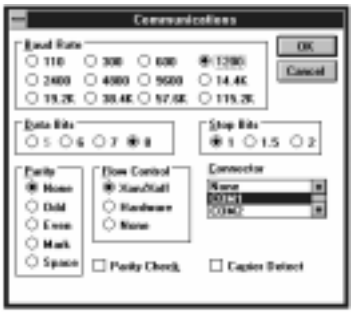


Figure 27 **Configuring a Terminal Program for Sending Test Results to a PC**

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

Enter

Select



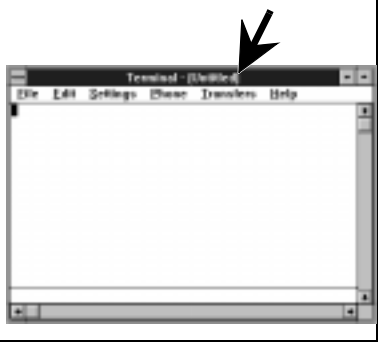
Example Communications Setup:

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

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

Enter

Select



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

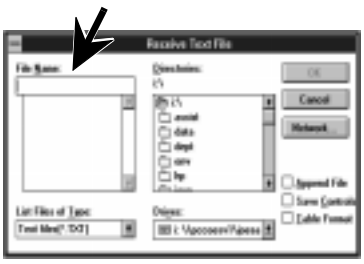
Enter

Select

10 *Enter path and filename of file that you wish to save.*

Enter

Select



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

Figure 28 Configuring a Terminal Program for Sending Test Results to a PC (continued)

Sending the Results

To send test results to a PC, you must enable sending test results within the software. Do this as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**Run Test**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **Test Results/Laptop Util/Printer/Serial Setup** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Verify that the **Use BTS Laptop Utility** field is toggled to **No**.
5. Select the **Send Test Results to** field, then select **Serial 9** from the **Choices:** list.
6. Start the terminal program.
7. Select the **Serial 9 Port Settings** field. Verify that the communications parameters match those of the terminal program.

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

The Test Set will send test results to the PC until you turn off the **Send Test Results to** field in the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.

Sending Test Results to an SRAM Card

To send test results to an SRAM card, you must enable the Sending Test Results to a PC Card function within the software. The Test Set will create test result files on the SRAM card automatically, based on the name that you enter at the start of testing. The Test Software will append ".txt" to your file name so that the files will be recognized on the SRAM card.

NOTE: Do not remove the card or stop the test during testing operations while sending test results to an SRAM card. If you do so, the files will not be closed properly and the test results will be lost.

Once testing is complete and the test results are in files on the SRAM card, perform the procedure outlined in **"Retrieving Data from an SRAM Card" on page 89** to transfer the data to a PC or printer.

NOTE: Before attempting to send test results to an SRAM card, verify that the card is not write-protected. The write-protect switch should not be set toward the edge of the card.

Send test results to an SRAM card as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**Run Test**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **Test Results/Laptop Util/Printer/Serial Setup** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Insert an SRAM card into the front panel card slot. If the card is uninitialized, see **"Initializing a PC Card" on page 100**.
5. Select the **Send Test Results to** field, then select **PC Card** from the **Choices:** list.
6. The Test Set will display a message asking for a file name under which to store the test results. Enter a name using the characters from the **Choices:** list. Select **Done** when finished.

The Test Set will send test results to the SRAM card until you turn off the **Send Results to** field in the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.

When the test is completed, the Test Set will close the file on the SRAM card and will change the **Send Test Results to** field in the Test Results/Laptop Util/Printer/Serial Setup menu screen from **PC Card** to **Off**. Thus, each time you run the test and wish to record the results to the SRAM card, you must open the Test Results/Laptop Util/Printer/Serial Setup menu and enter a new file name as outlined above.

Retrieving Data from an SRAM Card

Use the software utility (FILE_XFER), which is included in the Test Set to transfer data files from the memory card to a serial printer, an HP-IB printer, or a PC.

NOTE: Loading and running the utility to perform these procedures will replace any software and procedures in the Test Set's internal RAM. Thus, the Test Software must be reloaded when this procedure is complete. This requires that you have the Test Software PC card with you on-site.

Transferring Data to a Printer Via the SERIAL 9 Port

Transfer data to a printer via the SERIAL 9 port as follows:

1. If the Test Software is running, exit it from the Initialization Screen by pressing the **Shift** and **Pause/Continue (Reset)** keys, then the **k5** (**`Main Menu`**) key.
2. Make certain that the serial printer is turned on and set up to print when the data is sent to the Test Set's SERIAL 9 port.
3. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
4. Select the **`Select Procedure Location:`** field. The Test Set will display a **`Choices:`** list containing the following items: **`Card`**, **`ROM`**, and **`RAM`**.
5. Select **`ROM`**. This allows the loading of various utility programs resident in the Test Set.

NOTE: In the following step, the items in the **`Choices:`** list are as shown on the printing date of this manual. However, this list could change in later versions of the Test Software.

6. Select the **`Select Procedure Filename:`** field. The Test Set will display a **`Choices:`** list containing the following items: **`SERVICE4`**, **`RFTOOLS`**, **`IB_UTIL`**, **`LISTOPTS`**, **`ST_PLT`**, and **`DEMO`**.
7. Select **`IB_UTIL`**.
8. Press the **k1** (**`Run Test`**) key to run the utility software. The Test Set will display a the IB_UTIL menu on the TESTS (IBASIC Controller) screen.
9. Select the **`FILE_XFER`** field. The Test Set will prompt you to insert the SRAM card that contains the test result files.
10. Insert the card and select the **`Continue`** field. The Test Set will display the file transfer menu.
11. Select the **`Output Port`** field and press the knob to select **`Serial Port, 9600 baud`**. This configures the Test Set to send the data via the SERIAL 9 port at 9600 baud.

12. Scroll down the list of file names to the file that you wish to transfer and select it. An asterisk (*) will appear next to the name. You may send more than one file at a time. Scroll to and select any other files that you wish to transfer.

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

13. When all files to be transferred have been selected, select the **`Start Transfer`** field. The data will be sent to the printer via the SERIAL 9 port.
14. When printing is complete, you may select other files to transfer or exit the software utility by selecting the **`Exit Data-Collection-File-Transfer`** field.
15. To return to the Test Software again, press the **k1** (**`Run Test`**) key from the SOFTWARE MENU screen.

Transferring Data to a PC Via the SERIAL 9 Port

Transfer data to a PC via the SERIAL 9 port as follows:

1. If the Test Software is running, exit it from the Initialization Screen by pressing the **Shift** and **Pause/Continue (Reset)** keys, then the **k5** (**`Main Menu`**) key.
2. Connect the Test Set to your PC using the SERIAL 9 port and a null modem cable.
3. Load a PC software utility for communicating on the PC serial port such as Microsoft Windows Terminal.
4. Configure the PC software to prepare the PC to receive a text file via the serial port.
5. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
6. Select the **`Select Procedure Location:`** field. The Test Set will display a **`Choices:`** list containing the following items: **`Card`**, **`ROM`**, and **`RAM`**.
7. Select **`ROM`**. This allows the loading of various utility programs resident in the Test Set.
8. Select the **`Select Procedure Filename:`** field. The Test Set will display a **`Choices:`** list containing the following items: **`SERVICE4`**, **`RFTOOLS`**, **`IB_UTIL`**, **`LISTOPTS`**, **`ST_PLT`**, and **`DEMO`**.
9. Select **`IB_UTIL`**.
10. Press the **k1** (**`Run Test`**) key to run the utility software. The Test Set will display a the IB_UTIL menu on the TESTS (IBASIC Controller) screen.
11. Select the **`FILE_XFER`** field. The Test Set will display a prompt to insert the SRAM card that contains the test result files.
12. Insert the card and select the **`Continue`** field. The Test Set will display the file transfer menu.

13. Select the **`Output Port`** field and press the knob to select **`Serial Port, 9600 baud`**. This configures the Test Set to send the data via the SERIAL 9 port at 9600 baud.
14. Scroll down the list of file names to the file that you wish to transfer and select it. An asterisk (*) will appear next to the name. You may send more than one file at a time. Scroll to and select any other files that you wish to transfer.

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

15. When all files to be transferred have been selected, select the **`Start Transfer`** field. The data will be sent to the PC via the serial port.
16. When data transfer is complete, you may select other files to transfer or exit the software utility by selecting the **`Exit Data-Collection-File-Transfer`** field.
17. To return to the Test Software again, press the **k1** (**`Run Test`**) key from the SOFTWARE MENU screen.

Stop Sending Test Results to a PC or an SRAM Card

Stop sending test results to a PC or SRAM card as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**`Run Test`**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **`Test Results/Laptop Util/Printer/Serial Setup`** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Select the **`Send Test Results to`** field, then select **`Off`** from the **`Choices:`** list.

Sending Test Results to a Serial Printer

Test results may be sent directly to a printer through the Test Set's SERIAL 9 port. To do so, you must enable sending test results to the printer within the software.

Send test results to a serial printer as follows:

Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.

Press the **k1** (**`Run Test`**) key to start the Test Software. The Test Software will display the Initialization Screen.

Select the **`Test Results/Laptop Util/Printer/Serial Setup`** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.

Select the **`Send Test Results to Printer at`** field, then select **`Serial 9`** from the **`Choices:`** list.

5. Connect the serial printer to the Test Set's SERIAL 9 port (see **figure 29**).

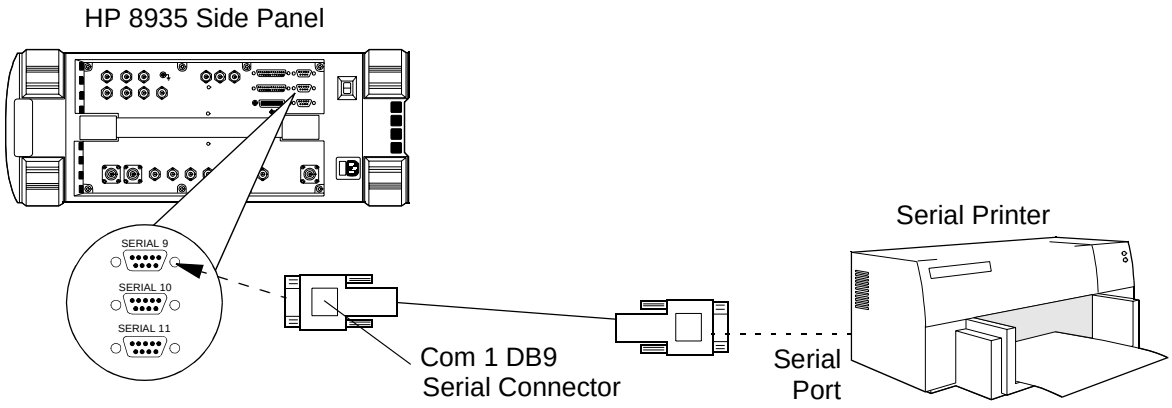


Figure 29 **Test Set to Serial Printer Connection**

6. Select the **`Print Setup`** field. The Test Software will display the Print Setup menu on the TESTS (IBASIC Controller) screen.
7. Set the following parameters:
   - Lines/Page
   - Form Feed (Start and End)
   - Printer Model

The Test Set will send test results to the serial printer connected to the SERIAL 9 port until you turn off the **`Send Test Results to Printer at`** field in the Test Results/Laptop Util/Printer/Serial Setup menu of the TESTS (IBASIC Controller) screen.

Sending Test Results to a Parallel Printer

Test results may be sent to a parallel printer through the Test Set PARALLEL 15 port. To do so, you must enable sending test results to the printer within the software.

NOTE: Because a parallel printer and an HP 83202A Switch Matrix both receive information from the Test Set via the PARALLEL 15 port, it is not possible to use the two devices at the same time. If your test plan requires both the Switch Matrix and printed test results data, you might use either a serial or an HP-IB printer, or collect the data to a PC for later printing.

Send test results to a parallel printer as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**`Run Test`**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **`Test Results/Laptop Util/Printer/Serial Setup`** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Select the **`Send Test Results to Printer at`** field, then select **`Parallel 15`** from the **`Choices:`** list.
5. Connect the parallel printer to the Test Set's PARALLEL 15 port (see **figure 30**).

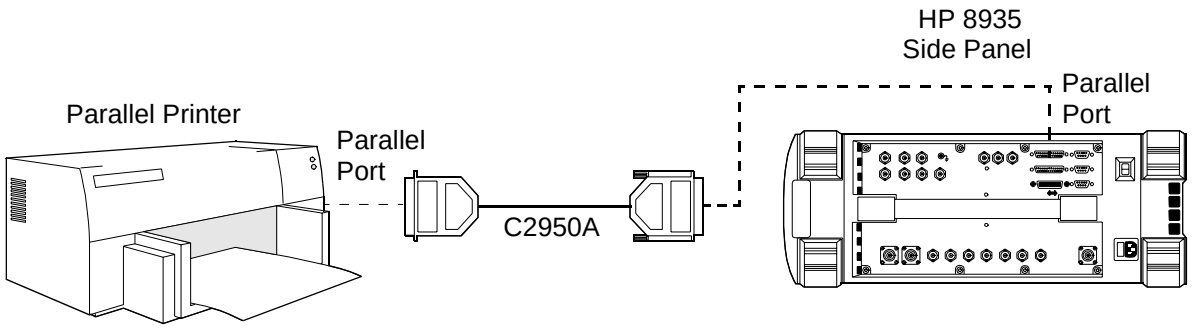


Figure 30 **Test Set to Parallel Printer Connection**

6. Select the **`Print Setup`** field. The Test Software will display the Print Setup menu on the TESTS (IBASIC Controller) screen.

7. Set the following parameters:
   - Lines/Page
   - Form Feed (Start and End)
   - Printer Model

The Test Set will send test results to the parallel printer connected to the PARALLEL 15 port until you turn off the **`Send Test Results to Printer at`** field in the Test Results/Laptop Util/Printer/Serial Setup menu of the TESTS (IBASIC Controller) screen.

Sending Test Results to an HP-IB Printer

Test results may be sent to an HP-IB printer through the Test Set's HP-IB port. To do so, you must enable sending test results to the printer within the software.

Send test results to an HP-IB printer as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**`Run Test`**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **`Test Results/Laptop Util/Printer/Serial Setup`** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Select the **`Send Test Results to Printer at`** field, then select **`HP-IB 701`** from the **`Choices:`** list.
5. Edit the three-digit HP-IB address (the default is 701) in the address field at the right of **`HP-IB`**.
6. Connect your HP-IB printer to the Test Set's HP-IB port (see **figure 31**).

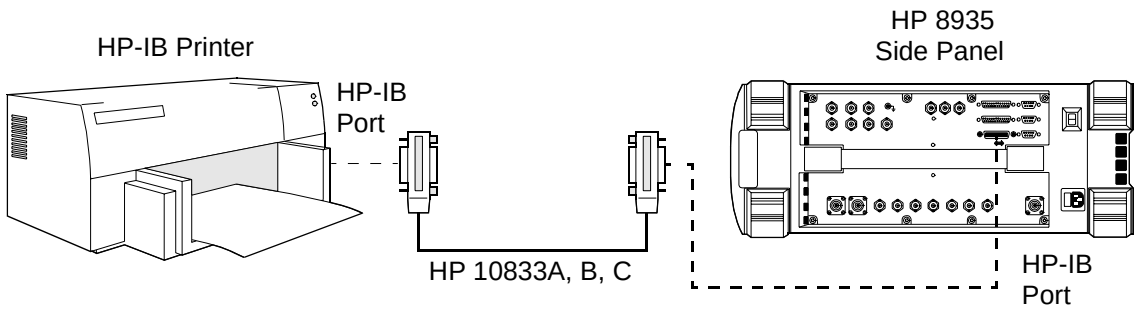


Figure 31 **Test Set to an HP-IB Printer Connection**

7. Select the **`Print Setup`** field. The Test Software will display the Print Setup menu on the TESTS (IBASIC Controller) screen.

8. Set the following parameters:

- Lines/Page
- Form Feed (Start and End)
- Printer Model

The Test Set will send test results to the HP-IB printer connected to the HP-IB port until you turn off the **`Send Test Results to Printer at`** field in the Test Results/Laptop Util/Printer/Serial Setup menu of the TESTS (IBASIC Controller) screen.

Stop Sending Test Results to a Printer

Stop sending test results to a printer as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Press the **k1** (**Run Test**) key to start the Test Software. The Test Software will display the Initialization Screen.
3. Select the **Test Results/Laptop Util/Printer/Serial Setup** field. The Test Software will display the Test Results/Laptop Util/Printer/Serial Setup menu on the TESTS (IBASIC Controller) screen.
4. Select the **Send Test Results to Printer at** field, then select **Off** from the **Choices:** list.

Initializing a RAM Disk

RAM disk is a section of the Test Set's internal memory that acts much like a flexible disk. Programs in this area of memory may be stored, re-stored, erased, and retrieved.

The RAM disk is partitioned into four separate volumes; 0-3. Each volume is treated as a separate 'disk'. You may also specify the size of each disk in 256-byte increments.

The four RAM disk volumes are designated :MEMORY,0,0 to :MEMORY,0,3. For example, to catalogue the contents of RAM disk volume '0' from the TESTS (IBASIC Controller) screen, enter the following:

```
CAT ":MEMORY,0,0"
```

NOTE: Any existing programs or formatting on RAM is erased if you use the RAM_MANAGER program to initialize a RAM disk. Therefore, you should use RAM disks only for short-term storage of files.

Each RAM disk volume must be initialized before it can be used. Volume 0 can be initialized using the RAM_MANAGER program from the IB_UTIL menu. Volumes 1, 2, and 3 must be initialized from the TESTS (IBASIC Controller) screen.

NOTE: Use only Volume 0 for storing procedures.

The optional 'volume size' in the following procedure allows you specify the memory area to be set aside for each disk in 256 byte blocks.

Initialize volumes 1, 2, or 3 as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Select the **IBASIC IBASIC Cntrl** field from the **SET UP TEST SET:** list.
3. Position the cursor to the data entry field at the top of the screen and select it.
4. From the list of characters in the **Choices:** list, enter the following command:

   ```
   INITIALIZE ":MEMORY,0,<volume number 1-3>",<volume size>
      or
   INITIALIZE ":MEMORY,0,1",50
   ```

   Select **Done** when finished.
5. Press the **k1** (**Run**) key.

Initializing a PC Card

A new PC card or a card from which the battery has been removed and replaced while not inserted into the Test Set's card slot must be initialized before it may be used. This section provides information on the initialization procedure.

Initialize a card as follows:

1. Insert the card into the Test Set's card slot.
2. Press the **Shift** key then the **Inst Config** key. The Test Software will display the I/O CONFIGURE screen.
3. Select the **`Format Card`** field. The Test Software will display the message: **`Erase and format the PCMCIA Card? (YES/NO)`**.
4. If you wish to format the card, press the DATA ENTRY **Yes On/Off** key. The Test Set will format the card. Formatting is complete when the cursor stops blinking.

   If you do not wish to format the card, press the DATA ENTRY **No ppm W** key.

Operating the Test Set

This section provides information that will help you to operate the Test Set easily and efficiently. It includes a basic overview of the functions of groups of the more commonly used functions. It does not include detailed operation information on those functions. For detailed information on the operation of the display and the various keys and other controls, see the *HP 8935 Series E6380A CDMA Base Station Test Set Reference Guide* or the *HP 8935 Series E6381A TDMA Base Station Test Set Reference Guide*, as appropriate.

Some Test Set keys include a second title printed in blue above the key. This indicates a *shifted* function. Press the blue **Shift** key, then the subject key to activate the title function. For instance, the title “Reset” appears above the **Pause/Continue** key. To reset the Test Software, press the **Shift** key, then the **Pause/Continue (Reset)** key.

Screens

The various operation screens of the Test Software are accessible through several methods, as described in the following paragraphs.

Access the screens to modify test procedures from the **CUSTOMIZE TEST PROCEDURE:** list in the lower section of the SOFTWARE MENU screen. These screens are:

TESTS (Channel Information) -- Access this screen to verify or change the information in the frequency table.

TESTS (Test Parameters) -- Access this screen to verify or change the values of parameters used in the TESTs.

TESTS (Order of Tests) -- Access this screen to verify or change the TESTs complement or order in which TESTs will be performed.

TESTS (Pass/Fail Limits) -- Access this screen to verify or change the values of pass/fail limits used in the TESTs.

TESTS (Save/Delete Procedure) -- Access this screen to save procedures to the Test Set internal RAM or an SRAM card, or delete procedures from those same locations.

For more information on these screens, see **"Frequency Table" on page 76** and **"Customizing Test Procedures" on page 64**.

NOTE: Four additional screens are ordinarily used to configure and set up the Test Set for operation from the **SET UP TEST SET:** list in the lower section of the SOFTWARE MENU screen. These screens are:

TESTS (Execution Conditions)
TESTS (External Devices)
TESTS (Printer Setup)
and
TESTS (IBASIC Controller)

These screens **are not used** in the Test Software. All relevant functions in these screens are set by other means, such as parameters, in the Test Software.

Access the Initialization Screen, from which all operations inside the Test Software are invoked, from the SOFTWARE MENU screen by selecting the **Run Test** field or pressing the **k1** (**Run Test**) key. For detailed information on this screen, see **figure 3, "Initialization Screen.," on page 33**.

If you select the screen title bar at the top of the SOFTWARE MENU screen the Test Software will display a menu listing the ancillary operation screens. These screens are not used by the Test Software.

SOFTWARE Keys

The SOFTWARE keys (see **figure 32 on page 104**), Menu and Pause/Continue (Reset), control the basic start/pause/stop functions of the Test Set and Test Software.

Press the **Menu** key to display the SOFTWARE MENU screen, which is the screen from which all Test Set operations start.

Press the **Pause/Continue** key to pause the Test Set's or Test Software's operation, then press it again to re-start the operation at the same place.

Press the **Shift** key, then the **Pause/Continue (Reset)** key to reset the Test Set or Test Software.

The Test Software cannot be "continued" after the **Shift** and **Pause/Continue (Reset)** keys have been pressed. Press these keys only if the Test Software must be stopped and pressing the **Pause** key does not do so.

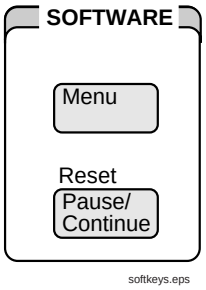


Figure 32 SOFTWARE Keys

USER Keys

The five USER keys, **k1** through **k5** (see **figure 33 on page 105**), are programmable and control various functions according to current activities in the Test Software. The keys are listed along with the programmed functions in the right-hand section of appropriate screens. Only appropriate keys are shown in each screen instance. You may use these keys for more efficient operation instead of positioning the cursor to an item and pressing the knob.

NOTE: Each USER key includes a second title printed in blue above the key. This *shifted* function is part of the key programmability. However, currently, no USER key *shifted* functions are used in the Test Software.

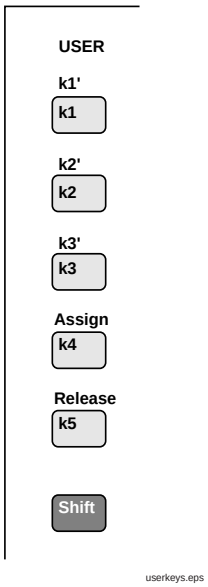


Figure 33 USER Keys

DATA ENTRY Keys

The DATA ENTRY keys include the **0** through **9** number keys plus the associated keys required for entering number values and the various characteristics of those values **figure 34**. (Note that a number of the DATA ENTRY keys are *shifted* keys.)

Although it is obviously not a key, the cursor control/entry knob is also located in the DATA ENTRY section of the Test Set's front panel. Turn the knob to position the cursor, then press the knob to select the item indicated by the cursor.

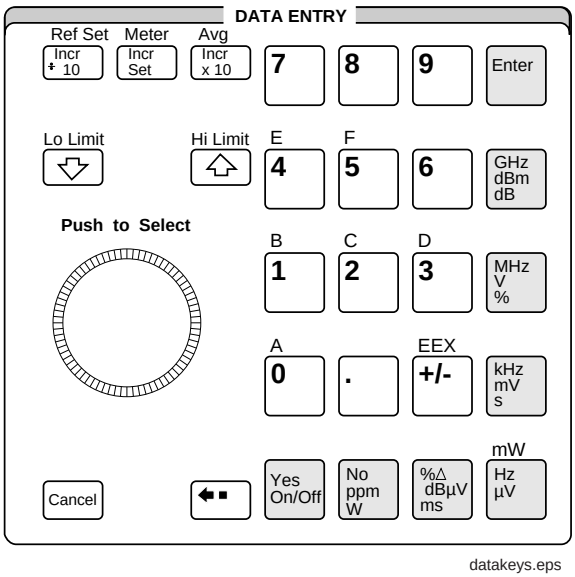


Figure 34 DATA ENTRY Keys

GENERATOR/ANALYZER Keys

The GENERATOR/ANALYZER keys invoke the various testing tools, and are not used by the Test Software.

NOTE: Make certain that you do not inadvertently press one of these keys while the Test Software is running. Unpredictable test results could occur.

STATE Keys

The STATE keys allow user control over certain Test Set operational states, and are not used by the Test Software.

NOTE: Make certain that you do not inadvertently press one of these keys while the Test Software is running. Unpredictable test results could occur.

UTILS Keys

The UTILS keys provide the means to reach certain functions that control utilitarian aspects of Test Set operation, and are not used by the Test Software.

NOTE: Make certain that you do not inadvertently press one of these keys while the Test Software is running. Unpredictable test results could occur.

Splitter or Switch Matrix

To reduce the number of cable connections and reduce the time required for measurements, you might elect to use any of three optional devices: a splitter, the HP 83202A Switch Matrix, or the HP 3488 Switch Matrix. Any of these may be used to connect to all six receiver antenna connectors at once. This section provides detailed information on using a Splitter or Switch Matrix.

Using a Splitter

To use a Splitter, simply connect it as shown in **figure 6 on page 56**, **figure 4 on page 54**, and **figure 5 on page 55**. All cables will remain connected during the test process, and all signals will be applied at all times.

Using an HP 83202A Switch Matrix

NOTE: If you wish use an HP 83202A Switch Matrix (HP Part Number: 83202A K02), make certain that you also have available the Switch Matrix Adapter (HP Part Number: 83202A K12) and the DB25-to-Centronics control cable (HP Part Number: C2951A) to allow the Test Set to control the Switch Matrix.

To use an HP 83202A Switch Matrix, connect the DB25-to-Centronics switch control cable (supplied with the Switch Matrix) between the Switch Matrix and the Test Set's PARALLEL 15 port, and connect the Base Station cables as shown in **figure 6 on page 56**, **figure 4 on page 54**, and **figure 5 on page 55**. All cables will remain connected during the test process, and the Test Software will switch the signals as required.

DC power must be supplied to the Switch Matrix. The Switch Matrix Adapter supplied with the Switch Matrix converts AC line voltage to the DC level (24 volts) required by the Switch Matrix. Connect the 24-volt plug to the Switch Matrix power connector and insert the AC power plug into any standard AC power receptacle.

Using an HP 3488 Switch Matrix

To use an HP 3488 Switch Matrix, connect the HP-IB switch control cable (supplied with the Switch Matrix) between the Switch Matrix and the Test Set, and connect the Base Station cables as shown in **figure 6 on page 56**, **figure 4 on page 54**, and **figure 5 on page 55**. All cables will remain connected during the test process, and the Test Software will switch the signals as required.

AC power must be supplied to the Switch Matrix. Plug the supplied power cord into any standard AC power receptacle.

Procedure for Using a Splitter or Switch Matrix

To use a Splitter or Switch Matrix, you must configure the Test Software to recognize the device. If you are using a Splitter, the connections remain fixed and the Test Software will handle the testing accordingly. If you are using a Switch Matrix, the Test Software will change the antenna connections automatically, as required during testing.

Configure the Test Software for operation with the Splitter or Switch Matrix as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Select the **`Select Procedure Location:`** field, then select **`Card`** from the **`Choices:`** list.
3. Select the **`Select Procedure Filename:`** field and select the desired procedure.
4. Press the **k1** (**`Run Test`**) key. The Test Software will display the Initialization Screen.
5. Select the **`Utilities`** field. The Test Software will display the Utility Menu.

6. Select the **Antenna Switch Control** field, then select the desired connection method from the **Choices:** list.

   If you wish to use a Splitter, select the **Splitter** field, then select the **Return** field. The Test Software will display the Initialization Screen again so that you may run the test. No further actions are necessary regarding the Splitter.

   If you wish to use the HP 83202A Switch Matrix, select the **HP83202A** field. The Test Software will display an information prompt that indicates the Switch Matrix setting and allows you to change it if you wish. Proceed to the next step.

   If you wish to use the HP 3488 Switch Matrix, select the **HP3488 709** field, then insert the HP-IB address into the field immediately to the right. The Test Software will display a prompt regarding Test Set control. Follow the on-screen instructions. Proceed to the next step.

7. Select the **Return** field. The Test Software will display the Initialization Screen again.

8. Press **k1** (**Begin Tst**). The Test Software will initiate the tests.

Securing/Unsecuring Procedures

This section describes the processes for securing and unsecuring a procedure.

NOTE: If a procedure is located in Test Set's RAM, securing that procedure will result in initializing a section of the RAM. See **"Initializing a RAM Disk" on page 99**.

NOTE: Loading an running the utility to perform these procedures will replace any software and procedures in the Test Set's internal RAM. Thus, the Test Software must be reloaded when this procedure is complete. This requires that you have the Test Software PC card with you on-site.

Securing a Procedure

After you have set up your Test Software with a testing order, channel information, test parameters, and pass/fail limits, thereby creating a Procedure, you may wish to secure it. This will prevent the viewing and changing of those functions. In this process, you may select the items that you wish to secure. Use the IBASIC SECURE_IT program in the Test Set's ROM to do this.

You might wish to secure the procedure that is supplied with the Test Software. It is shipped unsecured.

Secure a procedure as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Select the **`Select Procedure Location:`** field. The Test Software will display a **`Choices:`** list.
3. Select **`ROM`**.
4. Select the **`Select Procedure Filename:`** field. The Test Software will display a **`Choices:`** list.
5. Select **`IB_UTIL`**.
6. Press the **k1** (**`Run Test`**) key. The Test Set will display the IB_UTIL menu screen.
7. Select the **`SECURE_IT`** field. The Test Set will display a menu containing two possible locations (**`Card`** or **`RAM`**).
8. Select the location of the procedure that you wish to secure.

NOTE: RAM refers to the RAM disk memory within the Test Set. Before selecting RAM, you must initialize the RAM as a disk. See **"Initializing a RAM Disk" on page 99**.

9. Proceed with the on-line instructions. You might wish to secure only one of the items, such as pass/fail limits.

10. When prompted to enter the pass number (password), enter any sequence of 9 or less numerals using the DATA ENTRY keys. The numerals may be 0 through 9 in any order.

Unsecuring a Procedure

After you have secured a procedure, you may unsecure it. In this process, you may select the items that you wish to un-secure. Use the IBASIC SECURE_IT program in the Test Set ROM to do this. To unsecure a procedure, you must know the pass number.

Unsecure a procedure as follows:

1. Press the **Menu** key. The Test Set will display the SOFTWARE MENU screen.
2. Select the **Select Procedure Location:** field. The Test Software will display a **Choices:** list.
3. Select **ROM**.
4. Select the **Select Procedure Filename:** field. The Test Software will display a **Choices:** list.
5. Select **IB_UTIL**.
6. Press the **k1** (**Run Test**) key. The Test Set will display the IB_UTIL menu screen.
7. Select the **SECURE_IT** field. The Test Set will display a menu containing two possible locations (**Card** or **RAM**).
8. Select the location of the procedure that you wish to unsecure.
9. Enter the name of the procedure that you wish to unsecure.

NOTE: If the procedure includes any item that is secured, you will be prompted for the **pass number**.

10. Proceed with the on-line instructions. Select the items that you wish to unsecure.
11. When prompted, enter the pass number using the DATA ENTRY keys.

Utilities

The Test Software contains utilities that are useful to both general testing and advanced testing operations. These utilities are described in this section.

Cable Loss Test

The accuracy of RF power measurements and receiver sensitivity measurements is affected by the losses in cables, Switch Matrixes, attenuators, and other such items that connect the transceiver and the Test Set. The cable loss test allows the Test Set to measure and store the loss associated with the cables and other devices to be used during testing. The Test Set thus can provide greater accuracy by accounting for these losses in later tests.

At the start of each procedure, a text box containing cable loss information appears across the lower section of the Initialization Screen. If new or different cable loss information is available, change values as follows:

1. On the Initialization Screen, select the **RX and TX Cable Loss** field. The Test Software will display the Cable Loss Screen.
2. On the RX and TX Cable Loss Menu, select the value of interest among the following fields: **RX1 Cable Loss (dB)** through **RX6 Cable Loss (dB)** and **TX Cable Loss (dB),** and enter the new value by either using the DATA ENTRY keys or turning and pressing the knob.
3. Repeat step 2 for any other loss values to be changed.
4. Press the **k5** (**Return**) key to return to the Initialization Screen.

If new cable's or other device's loss information is not available, but changes are required, measure such losses as follows:

1. On the Initialization Screen, select the **RX and TX Cable Loss** field. The Test Software will display the Cable Loss Screen.
2. Select the **Measure Cable Loss** field. The Test Software will display a cable connection diagram.

NOTE: In the measurement process, you will require a cable, or perhaps two cables, to connect the device to be measured to the Test Set. This cable (or cables) is (are) referred to as the calibration cable. The Test Software must have in memory the loss value for the cable(s) so as to test accurately the device to be measured.

3. Connect the calibration cable as shown on the diagram, then press the **k1** (**Proceed**) key. The Test Software will measure the calibration cable, then display another cable connection diagram that includes the addition of a cable to be tested.

NOTE: The second connection diagram depicts a cable as the device to be measured. Although a cable is the most common device to be measured, there are other devices that you might wish to measure. These include switches (including a Switch Matrix), attenuators, and such. Each device may be measured individually, or, for instance, if a cable and switch are to be used together, those items may be connected together and the Test Software will measure the loss value through the combination. You may then save that value in the appropriate field.

4. Connect the cable or other device to be measured to the calibration cable and the Test Set as shown on the diagram, then press the **k1** (**Proceed**) key. The Test Software will measure the loss of the cable or other device and display the Cable Loss (dB) menu. The loss will be displayed near the top of the menu.
5. Select the relevant cable location among the fields shown below the value and press the knob to save the value. If the same value is applicable to other fields, repeat this step for each of those.
6. To test another cable or other device, select the **Repeat or Test next cable** field from the menu and repeat steps 3 and 4. Continue until all cables and devices are measured and all values are saved.
7. Press the **k5** (**Return**) key to return to the Cable Loss Screen.
8. Press the **k5** (**Return**) key to return to the Initialization Screen.

NOTE: The cable loss test information text box will appear on the Initialization Screen any time that a procedure is selected. This serves as a procedural reminder because cable loss values are required in the testing procedure.

The cable loss values stored during this test may be changed at the start of any procedure.

Laptop Emulator

The Laptop Emulator utility provides for sending individual control commands to the Cell Site Base Station. Using the Laptop Emulator Mode, the Test Software sends the selected commands through the RS232 interface, then displays the responses from the Base Station. This utility may be accessed also by the **Laptop** user key when a failure causes the test to stop (if the Test Set is set to stop on fail mode, see **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**.

Invoke the Laptop Emulator mode as follows:

1. On the Initialization Screen, select the **Utilities** field. The Test Software will display the Utility Screen.
2. On the Utility Screen menu, select the **Laptop Emulator** field. Within several seconds, the Test Software will display the Terminal Emulator Mode Screen.

The Terminal Emulator Mode menu includes the complete list of commands, and the status of each. Turn the knob to move the cursor arrow up and down the list. Note that the list of commands extends beyond the bottom of the screen. Dependent upon the cursor position, press either the **k3** (**Page Up**) key or the **k4** (**Page Down**) key to display more commands. Press the knob to select the command indicated by the cursor arrow. Press the **k5** (**Return**) key, then the **k2** (**No**) key to return to the Utility Screen. Press the **k5** (**Return**) key to return to the Initialization Screen.

In some instances, the Test Software will display a menu from which you may select. In other instances, the command will toggle.

If you change a parameter in the Base Station using the Laptop Emulator Mode, the Test Software will not restore that parameter before testing starts. Therefore, you must restore the Base Station to its original state if you wish to continue testing.

If an “error” response appears in a STATUS field, this indicates a communication problem with the Base Station. Try sending the command again. If this does not work, you might have to turn off a previous command, such as TX data. Refer to the Northern Telecom manual for a description of the commands. If everything else fails, the communication link with the Base Station might be locked. In such case, turn the Base Station off, then back on, and run the test again.

One parameter is used in Laptop Emulator Mode. It is **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**. No pass/fail limit specification are used.

RF Tools

For information on using the RF Tools Utilities, see the *HP 8935 Series E6380A CDMA Base Station Test Set Reference Guide* or the *HP 8935 Series E6381A TDMA Base Station Test Set Reference Guide.*

5

Test, Parameter, and Pass/Fail Limit Descriptions

This chapter offers a suggested testing philosophy, and describes each test, parameter, and pass/fail limits.

Testing Philosophy

This section offers suggestions that will help you to devise a plan to maximize your testing efficiency. Use this section to customize a testing sequence for the cell site requirements.

Testing the Transceiver Shelf as a Unit

The transceivers in a Northern Telecom cell site are located on shelves with space for eight transceivers per shelf. The antenna inputs on all eight transceivers are connected together through a splitter, the other side of which is a single antenna input on the back of the shelf. Thus, in an omni site, there are two antenna inputs on the back of the shelf that connect to all eight receivers. In a sectored site, there are six antenna inputs on the back of the shelf.

Since all eight transceiver antenna inputs are tied together, it makes sense to test all eight transceivers as a unit. The Test Software can be set up to test the eight transceivers in this manner. This is done by creating a test procedure with the AMPS channel for each of the eight transceivers listed in the TESTS (Channel Information) screen. A procedure set up in this manner will run all of the tests defined in the TESTS (Order of Tests) screen on the first defined transceiver channel number, then run the set of tests on the second defined transceiver channel, and so forth until all of the channels in the TESTS (Channel Information) screen are tested.

Once you have created a procedure with all of the channels for a particular cell site defined in the TESTS (Channel Information) screen, you may save that procedure on a card for testing at a future date. For testing on a different shelf, you will change the channel numbers in the **`Channel #`** field to match the channels for the transceivers on that shelf. If you wish to test all of the transceivers as a unit, you must set **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]** to 0.

Testing Transceivers Individually

The Test Software is shipped with the default for **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]** set to 1. In this state, the Test Software will read the entries in the **`Channel Number`** and **`Slot Number`** fields on the Initialization Screen at the start of each test sequence, and will test only that one channel.

Testing at the Receiver Shelf Versus the RMC

Receiver testing can be performed at either the receiver shelf or the receive multi-coupler (RMC). If testing is conducted at the shelf, the Test Software will compensate the Test Set's RF generator for cable losses and the eight-way-splitter loss in the shelf. This will make the desired RF signal level appear to be at the receiver input on the radio backplane. If testing is conducted at the RMC, the Test Set's RF generator will be compensated for only cable losses. In this case, the desired RF level will be referenced at the input on the RMC.

It is important to keep in mind the location at which the receiver testing is performed when interpreting your test results.

Saving Cell Site Parameters on a PC Card for Later Use

Since the configuration of each cell site is different, customizable procedures in the Test Software are supplied to accommodate site variations. On the Test Set's screen, you may customize the procedures to correspond to each cell site configuration. You may change testing sequence, testing conditions, test channels, and pass/fail limits to conform to the system to be tested. Once you have created this customized procedure, you may save it for future maintenance of the particular cell site (see **"Saving/Deleting Procedures to/from a Card" on page 71**). You might wish to do this for each cell site.

Preprogrammed Procedures on the Test Software's PC Card

The procedures on the Test Software's PC card are set up to test omni sites. To test a sectored site, you must decide on the method for testing the receivers.

Since there are six antennas but only two receivers in each Base Station, you might wish to perform only one receiver test on all six antennas to verify all of the paths, and then perform all of the other receiver tests on just two antennas to make certain that each receiver is operating properly for each test. Three parameters in the Test Software package allow you to do what is described above: **PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes]**, **PARAMETER_18 RX RSSI Offset Test All Ants [0=no 1=yes]**, and **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**. Selecting 1 for any of these parameters will perform that particular test on all six antennas and perform all of the other receiver tests on the antennas specified by the **`Sector`** field on the Initialization Screen. Testing in this manner will save test time.

If you wish to check every receiver test on each antenna, select **`All`** in the drop-down list from the **`Sector`** field on the Initialization Screen. This is a very thorough test, but it will take longer.

Testing SAT and ST at Extremes

In congested areas such as cities, SAT and ST performance becomes very important. You may wish to perform more extensive testing of SAT and ST in such instances. **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]** is provided to test SAT and ST at the extreme deviation limits.

BSTRX 800 Transceivers before Revision 13

BSTRX 800 transceivers before revision 13 have unity gain when looped back between FWD and REV audio. BSTRX 800 transceivers of revision 13 and later have a 4 dB loss between FWD and REV audios. The Test Software compensates for this difference in audio gains in the loop back test. Because the P1NES and P2NES transceivers might be of either type, the Test Software will display one of the following two prompts after you enter the type in the **`Base Station radio`** field on the Initialization Screen.

```
Is P1NES hardware revision 13 or greater?

Is P2NES hardware revision 13 or greater?
```

Tests Using Audio Input and Output Levels and Audio Adjustments

There are two methods of performing tests that use audio REV outputs and FWD inputs and adjusting audio levels.

- The first is the method specified in the Northern Telecom manual. It consists of zeroing all of the FWD and REV DIP switches, performing all audio tests with a reference AVL of –22 dBm, then adjusting the audio levels to the system AVLs at the end of testing.
- The second method can be used if the audio levels are already set for the system AVLs. With this method, leave the DIP switches set to the system AVLs and use the AVLs as the reference for all audio tests. Both methods can be performed with the Test Software.

Method 1

The first method is done by setting **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** to 1. The comparison AVL will be –22 dBm. The Test Software will display a prompt at the first audio test to zero the DIP switches. To adjust the audio DIP switches to the AVLs for the system to be tested, place the RXB Audio Level test as the last receiver test in the sequence and set **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]** to 1. This parameter specifies the receiver on which to adjust the audio level. The RX Standard Test and RX Quick Test always places the audio adjustment at the end of the test sequence.

Set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 2. This will cause adjustments to be performed always at the end of the audio and modulation tests. When an adjustment is made, the AVL for the adjustment *always* will be the value for **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** and **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**. You must enter the AVLs for the system to be tested in the RX and TX AVL parameters. This allows you to adjust the audio level to the system after you have checked the audio level with the DIP switches zeroed.

Method 2

For the second method, leave the DIP switches set and make all RX and TX measurements with that switch setting. This allows you to check the Base Station with settings already in place. Set **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** to 0.

Under these conditions, the AVL defined by **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** and **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** will be used for the reference in the respective audio measurements. You may then set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 1. In this case, the audio levels will be adjusted only if the initial audio measurement fails. You may wish to put **TEST_11 - RXA Audio Level and Adjustment** first in the sequence of receiver tests. Set **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]** to 0 so that the audio adjustment is performed first. Verify that this testing philosophy works for the system to be tested before testing.

Procedures Supplied

The Test Software is supplied on a PC card. Also on the same card are eight preprogrammed procedures. Each procedure includes a particular setting of testing order, parameter, and pass/fail limit defaults.

You may customize a procedure and save it by another name for a particular application, or you may construct your own procedure, perhaps using one of those procedures as a model.

The following sections describe each of those procedures.

PROCEDURE_01 -- TST_SHLF

This procedure performs RX and TX measurements at the receiver shelf, as depicted in **figure 4 on page 54**. Only the transceivers on the shelf that is being tested are affected. Therefore, service to the rest of the cell site is unaffected.

The tests performed in this procedure are the same ones that are performed in **PROCEDURE_02 -- TST_RMC**, **PROCEDURE_03 -- QCK_SHLF**, and **PROCEDURE_04 -- QCK_RMC**. The default settings for the following parameters constitute the differences:

- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** is set to –22 dBm.
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 1, so that the received signal strength indicator (RSSI) linearity will be checked without an offset.
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 0, so that RSSI offset will not be adjusted.
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 0, so that the RMC gain will not be checked.
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]** is set to 1, so that SINAD will be tested using the set and measure method.
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 0, so that the RX measurements will be performed at the receiver shelf.
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** is set to –22 dBm.
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 1, so that the TX power will be adjusted if the measurement fails.
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 0, so that the TX measurements will be performed at the PA shelf.

Several more parameters are used in this procedure. The parameters listed above include default settings that are different from those in **PROCEDURE_01 -- TST_SHLF** through **PROCEDURE_04 -- QCK_RMC** . See the individual test descriptions for a complete listing of parameters affecting this procedure (see **"Test Descriptions" on page 136**).

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_24 - RX Quick Tests**
- **TEST_15 - TX Power Level and Adjustment**
- **TEST_25 - TX Quick Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_02 -- TST_RMC

This procedure performs RX and TX measurements at the receive multi-coupler (RMC), as depicted in **figure 5 on page 55**. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.

The tests performed in this procedure are the same ones that are performed in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_03 -- QCK_SHLF**, and **PROCEDURE_04 -- QCK_RMC**. The default settings for the following parameters constitute the differences:

- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** is set to –22 dBm.
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 0, so that the received signal strength indicator (RSSI) linearity will be checked with an offset.
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 2, so that RSSI offset always will be adjusted.
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 1, so that the RMC gain will be checked.
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]** is set to 1, so that SINAD will be tested using the set and measure method.
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 1, so that the RX measurements will be performed at the RMC.
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** is set to –22 dBm.
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 2, so that the TX power always will be adjusted.
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 1, so that the TX measurements will be performed at the combiner.

Several more parameters are used in this procedure. The parameters listed above include default settings that are different from those in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_03 -- QCK_SHLF**, and **PROCEDURE_04 -- QCK_RMC**. See the individual test descriptions for a complete listing of parameters affecting this procedure (see **"Test Descriptions" on page 136**).

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_24 - RX Quick Tests**
- **TEST_15 - TX Power Level and Adjustment**
- **TEST_25 - TX Quick Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_03 -- QCK_SHLF

This procedure performs RX and TX measurements at the Receiver Shelf, as depicted in **figure 4 on page 54**. Only the transceivers on the shelf that is being tested are affected. Therefore, service to the rest of the cell site is unaffected.

The tests performed in this procedure are the same ones that are performed in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_02 -- TST_RMC**, and **PROCEDURE_04 -- QCK_RMC**. The default settings for the following parameters constitute the differences:

- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** is set to –18 dBm.
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 0, so that the received signal strength indicator (RSSI) linearity will be checked with an offset.
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 0, so that RSSI offset will not be adjusted.
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 0, so that the RMC gain will not be checked.
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]** is set to 0, so that SINAD will not be tested using the set and measure method.
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 0, so that the RX measurements will be performed at the receiver shelf.
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** is set to –18 dBm.
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 2, so that the TX power always will be adjusted.
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 0, so that the TX measurements will be performed at the PA shelf.

Several more parameters are used in this procedure. The parameters listed above include default settings that are different from those in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_02 -- TST_RMC**, and **PROCEDURE_04 -- QCK_RMC**. See the individual test descriptions for a complete listing of parameters affecting this procedure (see **"Test Descriptions" on page 136**).

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_24 - RX Quick Tests**
- **TEST_15 - TX Power Level and Adjustment**
- **TEST_25 - TX Quick Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_04 -- QCK_RMC

This procedure performs RX and TX measurements at the receive multi-coupler (RMC), as depicted in **figure 5 on page 55**. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.

The tests performed in this procedure are the same ones that are performed in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_02 -- TST_RMC**, and **PROCEDURE_03 -- QCK_SHLF**. The default settings for the following parameters constitute the differences:

- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** is set to –18 dBm.
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 0, so that the received signal strength indicator (RSSI) linearity will be checked with an offset.
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 2, so that RSSI offset always will be adjusted.
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 0, so that the RMC gain will not be checked.
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]** is set to 0, so that SINAD will not be tested using the set and measure method.
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 1, so that the RX measurements will be performed at the RMC.
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** is set to –18 dBm.
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 2, so that the TX power always will be adjusted.
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 1, so that the TX measurements will be performed at the combiner.

Several more parameters are used in this procedure. The parameters listed above include default settings that are different from those in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_02 -- TST_RMC**, and **PROCEDURE_03 -- QCK_SHLF**. See the individual test descriptions for a complete listing of parameters affecting this procedure (see **"Test Descriptions" on page 136**).

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_24 - RX Quick Tests**
- **TEST_15 - TX Power Level and Adjustment**
- **TEST_25 - TX Quick Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_05 -- FULL_RX

This procedure performs RX and TX measurements at the receive multi-coupler (RMC), as depicted in **figure 5 on page 55**. The antennas for the cell site must be disconnected. Therefore, service to the entire cell site will be interrupted.

The default settings for the following parameters are set to test RX SAT and ST at extremes:

- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** is set to –18 dBm.
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 1, so that the received signal strength indicator (RSSI) linearity will be checked without an offset.
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 2, so that RSSI offset always will be adjusted.
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 0, so that RMC gain will not be checked.
- **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)** is set to –80 dBm.
- **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]** is set to 1, so that RX SAT and ST will be tested at extremes.
- **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]** is set to 1, so that RX SAT will be tested with audio and ST tones, and RX ST will be tested with audio and SAT tones.
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]** is set to 1, so that SINAD will be tested using the set and measure method.
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 1, so that the RX measurements will be performed at the RMC.
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** is set to –21 dBm.
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 2, so that the TX power always will be adjusted.
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]** is set to 1, so that the TX measurements will be performed at the Combiner.

Several more parameters are used in this procedure. The parameters listed above include default settings that are different from those in **PROCEDURE_01 -- TST_SHLF**, **PROCEDURE_02 -- TST_RMC**, **PROCEDURE_03 -- QCK_SHLF**, and **PROCEDURE_04 -- QCK_RMC**. For the individual test descriptions and a complete listing of parameters affecting this procedure (see **"Test Descriptions" on page 136**).

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_24 - RX Quick Tests**
- **TEST_25 - TX Quick Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_06 -- NT_P_SER

This procedure verifies the RF parametric performance of the transceiver to verify that it is working correctly, and is intended for periodic maintenance of cell sites. This procedure requires the RX and TX connections at the shelf as depicted in **figure 4 on page 54**.

NOTE: The total test time for this procedure is considerably longer than for the other procedures, but it is included to provide backward compatibility for those users who require such compatibility.

Tests Used

- **TEST_01 - GN Standard Test Cabling**
- **TEST_02 - RT Audio Loopback and 1 kHz Test Tone**
- **TEST_22 - RX Standard Tests**
- **TEST_23 - TX Standard Tests**

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_07 -- NT_LCR_A

This procedure verifies that the operation of locating receiver A (RXA) is within specifications. This procedure contains tests for received signal strength indicator (RSSI) offset and path gain. RSSI offset and path gain require that the equipment be configured as depicted in **figure 4 on page 54**.

During this procedure, testing of the RSSI is performed across the frequency range of all selected channels. Select the desired channels on the TESTS (Channel Information) screen.

RSSI adjustments may be made only on the first channel tested. If, after the first channel is adjusted, other channels fail, you might wish to check the RX filter, duplexer, cables, 8-way splitter, and the radio.

Tests Used

- **TEST_13 - RXA RSSI Offset and Path Gain**
- **TEST_05 - RXA RSSI Linearity**

This procedure is designed to test receiver A only. To test receiver B, run **PROCEDURE_08 -- NT_LCR_B**.

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

PROCEDURE_08 -- NT_LCR_B

This procedure verifies that the operation of locating receiver B (RXB) is within specifications. This procedure contains tests for received signal strength indicator (RSSI) offset and path gain. RSSI offset and path gain require that the equipment be configured as depicted in **figure 4 on page 54**.

During this procedure, testing of the RSSI is performed across the frequency range of all selected channels. Select the desired channels on the TESTS (Channel Information) screen.

RSSI adjustments may be made only on the first channel tested. If, after the first channel is adjusted, other channels fail, you might wish to check the RX filter, duplexer, cables, 8-way splitter, and the radio.

Tests Used

- **TEST_14 - RXB RSSI Offset and Path Gain**
- **TEST_06 - RXB RSSI Linearity**

This procedure is designed to test receiver B only. To test receiver A, run **PROCEDURE_07 -- NT_LCR_A**.

Tests are arranged in the order above to minimize testing time. For descriptions of the specific tests listed above, see **"Test Descriptions" on page 136**.

Test Descriptions

Each test is a series of measurements. One test or more can constitute a procedure. While you may change the tests that make up a procedure, you may not change the measurements that the test will perform. Generally, the order in which the tests are run is not important.

The following types of analyzer settings are listed as applicable:

- IF Filter choices
- Audio filter choices
- Audio level detectors used
- Frequency gate times

The tests are derived from the Northern Telecom Cellular Handbook.

The first two or three letters in the name of the test, parameter, or pass/fail limit indicate the classification of the item. The classifications are:

- **GN** - General
- **RT -** Receiver-Transmitter
- **RX** - Receiver
- **RXA** - Receiver A
- **RXB** - Receiver B
- **TX** - Transmitter

TEST_01 - GN Standard Test Cabling

This test displays an arrangement of connections between the Base Station and the Test Set.

This test is the first in the sequence of tests in the NT_P_SER procedure that is supplied on the card. If you are customizing a sequence of tests, you might wish to place this test at the start of the sequence. It will provide the required prompts for some of the equipment connections.

Table 3 Cabling

From Test Set	To Base Station
RF IN/OUT	PA # based on slot # selected
DUPLEX OUT	ANT # based on parameter settings
AUDIO OUT	FWD D
AUDIO IN	REV D

Parameters Used

- **PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes]**
- **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**
- **PARAMETER_26 RX ST Detection RF Level (dBm)**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**

Pass/Fail Limits Used

There are no pass/fail limits in this test.

TEST_02 - RT Audio Loopback and 1 kHz Test Tone

This test performs three measurements. First, a FWD audio signal is applied, looped back, and measured at the REV audio output. Second, the FWD audio remains on, but loopback is turned off and the amount of feed-through audio is measured at the REV audio output. Third, the internal 1 kHz tone is turned on and the audio level is measured at the REV audio output.

Input FWD audio levels are defined by the AVL parameter settings and output REV audio levels are compared against the AVLs defined in the parameters. If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 1, the AVLs will be –22 dBm. If the parameter is set to 0, the AVLs will be the value in **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** and **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**.

Note that there are different audio loopback output error pass/fail limits, depending on the hardware revision of the Base Station. See **"Pass/Fail Limits Descriptions" on page 194** for more information.

Analyzer Settings

- Detector: RMS
- High Pass Filter: 300 Hz
- Low Pass Filter: 3 kHz
- IF Filter: 30 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_01 RT Aud Loopback Err from AVL (rev <13)**
- **PASS/FAIL LIMIT_02 RT Aud Loopback Err from AVL+4 (rev>=13)**
- **PASS/FAIL LIMIT_03 RT Aud Loopback Unlooped**
- **PASS/FAIL LIMIT_04 RT Audio 1 kHz Tone Error from AVL**

TEST_03 - RXA SINAD Sensitivity

The Test Software provides two methods for measuring the sensitivity of the receivers in the Base Station.

In the first method, the RF level into the receiver are varied iteratively until the measured SINAD is equal to the value entered into **PARAMETER_22 RX SINAD (dB)**. The RF level is checked against **PASS/FAIL LIMIT_16 RX SINAD Sensitivity RF Level (dBm)** to determine the pass/fail status.

In the second method, the RF level entered into **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)** is applied to the receiver, and the SINAD is measured. It is compared to **PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)** to determine the pass/fail status.

The Test Software will automatically select the method by checking the value in **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]**. Set this parameter to 1 if you wish to use the second, set and measure, method.

The second method always provides a result in a shorter time. However, it does not determine the actual RF level for a particular SINAD value.

Both methods check the sensitivity at the inputs to the receiver shelf. Select the inputs that you wish to check by making entries into **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]** and the **`Sector`** field of the Initialization Screen. If **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]** is set to 1, the SINAD test will be run and all three RXA antennas will be checked, regardless of the Initialization Screen setting. Two parameters are provided so that you may test SINAD using every antenna input, and perform other tests at a particular primary input.

The signal generator level will be set to account for the receiver shelf splitter loss if **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 0. Enter the loss into the **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

The sensitivity is measured by looping the receiver audio through the transmitter and demodulating the audio on the transmitter's signal.

Analyzer Settings

- AF Filter: C-Message
- Number of SINAD Averages : 20
- Detector: RMS before and after the 1 kHz notch

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_22 RX SINAD (dB)**
- **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)**
- **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)**
- **PASS/FAIL LIMIT_16 RX SINAD Sensitivity RF Level (dBm)**

TEST_04 - RXB SINAD Sensitivity

This test is the same as **TEST_03 - RXA SINAD Sensitivity**, except that all references to receiver A (RXA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_05 - RXA RSSI Linearity

This test checks the linearity of the reported received signal strength indicator (RSSI) as the RF level is varied from low to high.

The RF levels can be set from –100 to –50 dBm in 10 dB steps with a check at 0 dBm. The RF signal is modulated with a 6 kHz SAT tone at 2 kHz deviation and a 1 kHz audio tone at 8 kHz deviation. The low RF level is set by **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)** and the high RF level is set by **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)**.

The signal from the RF generator can be applied at either the Base Station receiver shelf or at the receive multi-coupler (RMC). This is determined by **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**. The generator RF level is compensated for RX cable losses defined on the Initialization Screen regardless of the input location. If the signal is applied at the receiver shelf, the generator output also will be compensated for the receiver shelf splitter loss defined in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

The Test Software will display the output results in one of two methods, depending on the setup of the parameters in the Test Software.

In the first method, if **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 1, the following results will be displayed:

- ANTx RSSI level @ –xx dBm: Reported RSSI level from the radio at the –xx level.
- ANTx RSSI err @ –xx dBm: This is the RSSI error from the desired level. The RSSI pass/fail limits are compared against this RSSI error.

The RSSI error is calculated using the following equation:

RSSI error = Reported RSSI – Sector Gain – RF level

The RSSI error takes into account the sector gain defined on the Initialization Screen. This allows the user to define different gains between sectors or cell sites and still use the same pass/fail limit.

In the second method, when testing a P3 transceiver (**P3** is selected in the **Base Station radio** field on the Initialization Screen), if **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 0, and if **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]** is set to 1, the following results will be displayed:

- ANTx RSSI level @ –xx dBm: This is the reported RSSI level from the radio at the –xx level.
- ANTx RSSI level w/o RSSI offset: This is the reported RSSI without the radio's internal RSSI offset.
- ANTx RSSI err w/o offset: This is the RSSI error from the desired level. The RSSI pass/fail limits are compared against this RSSI error.

The RSSI w/o offset is calculated by using the following equation:

RSSI w/o offset = Reported RSSI – RSSI internal offset

The RSSI error is calculated by using the following equation:

RSSI error = Reported RSSI – RSSI internal offset – RF level

NOTE: When testing at the RMC input, the sector gain is 4 dB in a typical Northern Telecom cell site to account for the path gain between the RMC input and the radio backplane input. If testing is conducted at the shelf, the Test Software always will compensate the RF generator input level for the receiver shelf splitter loss. This makes the RF signal level appear to be at the radio backplane. In this case, there is no gain and the sector gain during shelf testing is 0 dB.

In a typical Northern Telecom cell site, there is a 4 dB signal or path gain between the RMC's input and the receiver's input connector on the back of the radio. For example, suppose the path gain is 4 dB and an RF signal of –84 dBm is applied to the RMC. Theoretically, a radio with no internal RSSI offset will report a –80 dBm RSSI level. Since the detector in a radio is not ideal, in some instances, an internal RSSI offset is required to make the radio report –80 dBm. Because the reported RSSI level is different from the input level, the Test Software must use the difference to properly set the RSSI offset and check the RSSI linearity level. The three **`Sector Gain`** fields on the Initialization Screen indicate to the Test Software the difference between the input level and the reported level. It is possible for the receiver path gain to be increased to improve the signal strength in rural areas or decreased to reduce intermods in urban areas. In this case, the path gain is no longer 4 dB. Depending on the design of the system to be tested, it might be proper for the sector gains on the Initialization Screen to remain at 4 dB, or it might not. Consult with your engineering department to determine how to set the offsets for these areas.

It is also possible to use the sector gains to create an artificial receiver path gain or path loss (sometimes referred to as a system offset) to vary the handoff levels between sectors. To allow for sector variations, three sector gain fields (X, Y, and Z) have been provided on the Initialization Screen. Varying handoff levels between sectors will probably result in better system performance if done correctly, and will certainly result in worse system performance if not done correctly.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]**
- **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)**
- **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**
- **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_06 RX RSSI Level Err @ –50 dBm (dB) through PASS/FAIL LIMIT_11 RX RSSI Level Err @ –100 dBm (dB)**

TEST_06 - RXB RSSI Linearity

This test is the same as **TEST_05 - RXA RSSI Linearity**, except that all references to receiver A (RXA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_07 - RXA SAT Detection

This test determines the SAT that receiver A (RXA) reports when each of the three SAT frequencies is modulated at 2 kHz deviation onto the RF signal that is applied to the inputs on the receiver shelf. Falsing in the absence of applied SAT modulation is also verified.

The RF level of the signal is determined by the value in **PARAMETER_21 RX SAT Detection RF Level (dBm)**. The Test Software uses the value entered into the **`Sector`** field on the Initialization Screen to determine which of the receiver shelf inputs will be tested.

NOTE: It is unlikely that all of the antenna inputs will require the SAT detection test.

If **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]** is set to 1, the SAT deviation will be changed to the extremes of 1.8 kHz and 2.2 kHz and SAT detection will be performed at these points as well as at 2 kHz deviation.

If **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]** is set to 1, the RX SAT also will be detected at each of the three SAT frequencies with an audio tone and an ST present.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]**
- **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]**
- **PARAMETER_21 RX SAT Detection RF Level (dBm)**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

There are no pass/fail limits used in this test.

TEST_08 - RXB SAT Detection

This test is the same as **TEST_07 - RXA SAT Detection**, except that all references to receiver A (RXA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_09 - RXA ST Detection

This test determines the performance of the signaling tone (ST) detector in receiver A (RXA).

An RF signal with a 10 kHz tone modulated at 8 kHz deviation is applied to RXA. ST presence is checked. The ST deviation is removed and ST falsing is checked. The RF level of the signal is determined by the value entered into **PARAMETER_26 RX ST Detection RF Level (dBm)**.

If **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]** is set to 1, the deviation will be changed to the extremes of 8.2 kHz and 8.8 kHz and ST detection will be checked.

If **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]** is set to 1, the RX ST also will be detected with an audio tone and a SAT tone present.

The Test Software will use the value entered into the **`Sector`** field on the Initialization Screen to determine which of the receiver shelf inputs will be tested.

NOTE: It is unlikely that all of the receiver shelf inputs will require the ST detection test.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]**
- **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]**
- **PARAMETER_26 RX ST Detection RF Level (dBm)**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

There are no pass/fail limits associated with this test.

TEST_10 - RXB ST Detection

This test is the same as **TEST_07 - RXA SAT Detection**, except that all references to receiver A (RXA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_11 - RXA Audio Level and Adjustment

This test injects an RF signal into receiver A with the compandor on, tests the Base Station receiver's A audio level, and adjusts that level.

The RF level is –50 dBm modulated with a 1 kHz tone. The tone deviation is specified by **PARAMETER_27 RX SINAD Test Level Deviation**. The Test Set measures the REV audio signal level out of the Base Station. The audio level is compared against the average voice level (AVL) defined by the parameter settings. If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 1, the comparison AVL will be –22 dBm. If PARAMETER_05 is set to 0, the AVL will be the value in **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**.

You may use this test also to adjust the REV audio level to match the pass/fail limits of the system to be tested. To do this, set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 2. This will always perform an adjustment after the above measurement is made. When an adjustment is made, the AVL for the adjustment will *always* be the value for **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**. This allows you to adjust the audio level to the system after you have checked the audio level with the DIP switches zeroed.

After the adjustments have been made, pressing the **k1** (**Repeat**) key allows you to repeat the measurement of the RX audio level. This allows you to update a test printout to show a pass result for the RX Audio Level and Adjustment test.

If you are performing all of the receiver tests with the REV audio DIP switches zeroed as is defined in the Northern Telecom test document, make certain that the audio adjustment is the last receiver test performed. To do this, place **TEST_12 - RXB Audio Level and Adjustment** as the last receiver test in the sequence and set **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]** to 1. This parameter defines the receiver on which to adjust the audio level. **TEST_22 - RX Standard Tests** always performs the audio adjustment at the end of the test sequence.

Another method of adjustment may be used if the Base Station REV DIP switches are already aligned to the system to be tested. Leave the switches set as is and make all the receiver measurements with the switches set. This allows you to check the Base Station with the settings already in place. To do this, set **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** to 0. Under these conditions, the AVL defined by **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** will be used for the initial audio measurement. You can then set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 1. In this case, the audio level will be adjusted only in the initial audio measurement fails. You might wish to place **TEST_11 - RXA Audio Level and Adjustment** first in the sequence and set **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]** to 0 so that the audio adjustment will be done first. Verify that this testing philosophy will work for the system to be tested before beginning testing.

Analyzer Settings

- Detector: RMS
- High Pass Filter: 300 Hz
- Low Pass Filter: 3 kHz
- IF Filter: 30 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]**
- **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]**
- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_27 RX SINAD Test Level Deviation**
- **PARAMETER_28 RX Test w/External Splitter [0=no 1=yes]**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_05 RX Audio Output AVL Err w/Compandor On**

TEST_12 - RXB Audio Level and Adjustment

This test is the same as **TEST_11 - RXA Audio Level and Adjustment**, except that all references to receiver A (RXA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_13 - RXA RSSI Offset and Path Gain

This test measures the received signal strength indicator (RSSI) offset and the RX path gain.

The signal from the RF generator can be applied at either the Base Station's receiver shelf or at the receive multi-coupler (RMC). This is determined by **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**. The generator's RF level is compensated for RX cable losses defined on the Initialization Screen regardless of the input location.

If the signal is applied at the receiver shelf, the generator output will be compensated for the receiver shelf splitter loss defined in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

If **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 1, and **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]** is set to 1, the RX path gain test will be performed. The path gain test begins by making the measurement of path gain from the antenna to the radio. This path gain includes the RMC gain, receiver shelf splitter loss, and any cable losses associated with the signal path. The test is performed in the following manner.

The Test Set injects an RF signal into the RMC input. The Test Software queries the radio for the reported RSSI level. The resulting path gain is determined by the equation below and is displayed on the Test Set's screen.

Path Gain = Reported RSSI level – RSSI offset – Injected RF level

If the path gain exceeds the limits set by **PASS/FAIL LIMIT_14 RX RSSI Path Gain (dB)**, the Test Software will display the prompt option to adjust the RMC gain. If you press the **k1** (**Yes**) key, the Test Software will display an adjustment meter. Adjust the RMC gain manually until the needle is within the specification lines of the meter.

NOTE: It is not recommended that you make changes to the RMC gain without thoroughly examining other factors that may have caused error. The Test Set will provide several scenarios for you to examine before making any hardware adjustments.

The second part of this test measures the RSSI offset and allows the user to minimize the RSSI error from the detector by adjusting the radio's internal RSSI offset. The Test Set injects the modulated RF signal into the RMC's input or receiver shelf's input. The Test Software queries the radio for the reported RSSI level, and calculates the RSSI error using the following equation:

RSSI error = reported RSSI from Radio – sector gain – RF level.

When testing P3 radios only, if the resulting RSSI error exceeds the limits set by **PASS/FAIL LIMIT_12 RX RSSI Offset Error (dB)**, the Test Software will adjust the radio's RSSI offset until the reported RSSI error equals zero (to minimize RSSI error), if **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** is set to 1 or 2. If the Test Software cannot set the offset after five attempts, the it will display a prompt to set the offset manually. Because there is only one internal offset for all six antennas, you must select the antenna on which to perform the adjustment. The combination of **PARAMETER_15 RX RSSI Offset Adjust On [0=RXA 1=RXB]** and the **`Sector`** field on the Initialization Screen determine the antenna for which the RSSI internal offset can be adjusted.

If **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]** is set to 1, or you have set the Test Execution Conditions to stop on a failure, you may elect to repeat a test that has failed or you may elect to continue with testing, accepting the failure.

See **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]** for details on using these features.

The last part of the test is a query of the RSSI offset value that has been programmed into the radio. The programmed value is compared to **PASS/FAIL LIMIT_13 RX RSSI Internal Offset (dB)** to determine if the programmed value is within acceptable limits.

NOTE:

When testing at the RMC input, the sector gain is 4 dB in a typical Northern Telecom cell site to account for the path gain between the RMC input and the radio backplane input. If testing is conducted at the shelf, the Test Software always will compensate the RF generator input level for the receiver shelf splitter loss. This makes the RF signal level appear to be at the radio backplane. In this case, there is no gain and the sector gain during shelf testing is 0 dB.

In a typical Northern Telecom cell site, there is a 4 dB signal or path gain between the RMC's input and the receiver's input connector on the back of the radio. For example, suppose the path gain is 4 dB and an RF signal of -84 dBm is applied to the RMC. Theoretically, a radio with no internal RSSI offset will report a -80 dBm RSSI level. Since the detector in a radio is not ideal, in some instances, an internal RSSI offset is required to make the radio report -80 dBm. Because the reported RSSI level is different from the input level, the Test Software must use the difference to properly set the RSSI offset and check the RSSI linearity level. The three Sector Gain fields on the Initialization Screen indicate to the Test Software the difference between the input level and the reported level. It is possible for the receiver path gain to be increased to improve the signal strength in rural areas or decreased to reduce intermods in urban areas. In this case, the path gain is no longer 4 dB. Depending on the design of the system to be tested, it might be proper for the sector gains on the Initialization Screen to remain at 4 dB, or it might not. Consult with your engineering department to determine how to set the offsets for these areas.

It is possible also to use the sector gains to create an artificial receiver path gain or path loss (sometimes referred to as a system offset) to vary the handoff levels between sectors. To allow for sector variations, three sector gain fields (X, Y, and Z) have been provided on the Initialization Screen. Varying handoff levels between sectors will probably result in better system performance if done correctly, and will certainly result in worse system performance if not done correctly.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]**
- **PARAMETER_15 RX RSSI Offset Adjust On [0=RXA 1=RXB]**
- **PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]**
- **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**
- **PARAMETER_18 RX RSSI Offset Test All Ants [0=no 1=yes]**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_12 RX RSSI Offset Error (dB)**
- **PASS/FAIL LIMIT_14 RX RSSI Path Gain (dB)**
- **PASS/FAIL LIMIT_13 RX RSSI Internal Offset (dB)**

TEST_14 - RXB RSSI Offset and Path Gain

This test is the same as **TEST_13 - RXA RSSI Offset and Path Gain**, except that all references to receiver A (RZA) are applied to receiver B (RXB). See the previous test. The Test Software will use parameters with an *RXB* prefix.

TEST_15 - TX Power Level and Adjustment

This test performs TX power measurements at PA outputs.

The power levels at which the measurement is performed are determined by the transceiver type identified at the prompt at the beginning of the test sequence. The Test Software is set up to test the following transceivers at the power levels specified:

Table 4 **Power Levels for each Transceiver Type**

PA	Power Level(s)
P1NES	0
P2NES	0
P2ES	0-3
P1ES ≥software rev 1.1	0-7
P1ES <software rev1.1	0
P3ES	0-7

Table 4 lists the entire set of possible power level measurements. These power level settings may be overridden to make fewer measurements by setting **PARAMETER_36 TX PA Power, Check Down to Level (0-7)** to a number less than shown in **table 4**. If the power level requires adjustment, a meter will appear on the screen if **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]** is set to 1 or 2.

The Test Software uses the **`TX Max Power`** field on the Initialization Screen and **PARAMETER_35 TX PA Power Step Size** to obtain the value of the maximum power setting and the value of the PA's power step size.

The PA's power is measured using a peak detector connected to the output of a dual-diode RF detector. If there is amplitude modulation on the signal, the measured power will include the effect of the peak fluctuations of the power and will read higher than the average power.

Results Output

Three outputs are displayed for each power level tested:

- TX power level x in dBm
- TX power level x in Watts
- TX pwr x err from (calculated power) dBm

The defined power is determined by using the **`TX Max Pow`** field on the Initialization Screen and **PARAMETER_35 TX PA Power Step Size** to calculate the power for each step.

Calculated Power = Max Power (dBm) – (power level * power step)

Power measurement accuracy depends on the accuracy of the values obtained for the PA's path losses. Path losses may be measured and stored using the Measure Cable Loss test in the Utility Menu from the Initialization Screen.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]**
- **PARAMETER_35 TX PA Power Step Size**
- **PARAMETER_36 TX PA Power, Check Down to Level (0-7)**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_18 TX Power Error (dB)**
- **PASS/FAIL LIMIT_19 TX Power Error at Power Level 0 (dB)**

TEST_16 - TX Frequency Error

This test turns on the PA connected to the transceiver being tested, measures the frequency, and computes the frequency error based on the channel number entered in the Initialization Screen.

The PA's power is set to level 0.

Pass/fail limits and measured results are displayed in kHz.

The tune mode of the RF analyzer in the Test Set is set to **`Auto`**. In this mode, the Test Set will acquire the strongest signal that exceeds the frequency counter threshold. At least one milliwatt must be supplied to the Test Set's RF IN/OUT connector for the counter to acquire and measure the frequency.

Analyzer Settings

- Frequency Counter Gate Time : 50 ms

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_17 TX Frequency Error (kHz)**

TEST_17 - TX Voice Modulation Limiting

This test injects a large audio signal into the TX audio input, keys the transmitter, and measures the transmitter's peak+ and peak– deviation. The initial audio signal injected is determined by **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**. If this parameter is set to 1, the initial injected signal will be –22 dBm. If this parameter is set to 0, the Test Software will examine **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** and use it as the initial audio signal. The Test Software will then add 17.7 dB to the initial audio level. This should set the TX deviation to approximately 8 kHz. The audio level will be increased until it obtains maximum deviation (at which, a further increase in level will decrease deviation). The measurement will be taken at the point at which this happens. The Test Software will test both positive-peak and negative-peak deviation.

Analyzer Settings

- Detector: ± peak
- High Pass Filter: 50 Hz
- Low Pass Filter: 15 kHz
- IF Filter: 30 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_24 TX Voice Deviation Limiting**

TEST_18 - TX Voice Modulation and Adjustment

This test applies an audio signal at the specified average voice level (AVL) to the Base Station's FWD audio input, keys the transmitter, and measures the deviation on the RF signal produced by the audio signal.

The AVL is defined by the parameter settings. If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 1), the input AVL will be –22 dBm. If the parameter is set to 0, the AVL will be the value in **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**.

You may use this test also to adjust the FWD audio level to match the specifications of the system to be tested. To do this, **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** should be set to 2. This will always perform an adjustment after the above measurement is made. When an adjustment is made, the AVL input to the FWD jack will *always* be the value of **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**. This allows you to adjust the voice modulation level to the system after you have checked the voice modulation with the DIP switches zeroed.

If all transmitter audio tests are being conducted with the FWD audio DIP switches zeroed as specified in the Northern Telecom test document, make certain that the voice modulation adjustment is the last transmitter audio test performed. To do this, place **TEST_18 - TX Voice Modulation and Adjustment** after **TEST_17 - TX Voice Modulation Limiting**. **TEST_23 - TX Standard Tests** is set up in this way.

Another method of adjustment may be used if the Base Station FWD DIP switches are already aligned to the system to be tested. In such case, leave the switches set as is and make all the transmitter audio measurements with the switches set. This allows you to check the Base Station with the settings already in place. To do this, set **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** to 0. Under these conditions, the AVL defined by **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** will be used for the initial voice modulation measurement. You may then set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 1. In this case, the voice modulation level will be adjusted only if the initial modulation measurement fails. You might wish to put **TEST_18 - TX Voice Modulation and Adjustment** first in the sequence and set the parameter. Verify that this testing philosophy works for the system to be tested before performing.

If **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]** is set to 1, or you have set the Test Execution Conditions to stop on a failure, you may elect to repeat a test that has failed or you may continue the testing, accepting the failure.

See **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]** for details on using these features.

Analyzer Settings

- Detector: RMS times 1.414
- High Pass Filter: 300 Hz
- Low Pass Filter: 3 kHz
- IF Filter: 30 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]**
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_23 TX Voice Deviation**

TEST_19 - TX Residual FM

This test keys the transmitter and measures the residual FM on the transmitter.

Analyzer Settings

- Detector: RMS
- High Pass Filter: 50 Hz
- Low Pass Filter: 15 kHz
- IF Filter: 30 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_20 TX Residual FM Deviation (%)**

TEST_20 - TX Wideband Modulation

This test turns on the TX data A pattern, keys the transmitter, and measures wideband modulation deviation. It measures both positive peak and negative peak.

Analyzer Settings

- Detector: ± peak
- High Pass Filter: 50 Hz
- Low Pass Filter: >99 kHz
- IF Filter: 230 kHz

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_25 TX Wideband Data Deviation (kHz)**

TEST_21 - TX SAT Modulation

This test turns on the internal SAT frequency of the Base Station, keys the transmitter, and measures all three SAT deviations and frequencies (5970 Hz, 6000 Hz, 6030 Hz).

Analyzer Settings

- Detector: RMS times 1.414
- High Pass Filter: 300 Hz
- Low Pass Filter: 15 kHz
- Frequency Counter Gate Time: 1 second

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_21 TX SAT Deviation (kHz)**
- **PASS/FAIL LIMIT_22 TX SAT Frequency Error (Hz)**

TEST_22 - RX Standard Tests

NOTE: This test performs a comprehensive receiver check. It is similar to **TEST_24 - RX Quick Tests**. However, the total time for this test is considerably longer than for Test 24. This test is included in the current software version to provide backward compatibility for those users who need it.

This test performs the receiver tests in an optimum order to minimize cable connections. The tests are performed in the following order, first on receiver A, then on receiver B.

Receiver A tests:

- **TEST_03 - RXA SINAD Sensitivity**
- **TEST_05 - RXA RSSI Linearity**
- **TEST_07 - RXA SAT Detection**
- **TEST_09 - RXA ST Detection**
- **TEST_11 - RXA Audio Level and Adjustment**

Receiver B tests:

- **TEST_04 - RXB SINAD Sensitivity**
- **TEST_06 - RXB RSSI Linearity**
- **TEST_08 - RXB SAT Detection**
- **TEST_10 - RXB ST Detection**
- **TEST_12 - RXB Audio Level and Adjustment**

The antennas on which each test is performed are determined by **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**, **PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]**, **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**, and **PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes]**.

The first antenna will be tested completely before testing begins for the next antenna. This will minimize the cable connections, and thus speed up the testing process.

If the REV audio is to be adjusted, it is important that this be done last. This test will always perform the adjustment on the last antenna selected for the receiver selected in **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]**.

To speed up testing when the received signal strength indicator (RSSI) linearity is selected to be tested on all antennas, the RSSI level will be checked on the primary antennas at the RF levels determined by **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)** and **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**. On the other antennas, it will be checked only at the level determined by **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**. The primary antennas are those selected in the **`Sector`** field on the Initialization Screen.

Analyzer Settings

Analyzer settings will change throughout the test. Refer to the settings for each of the individual tests.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]**
- **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)**
- **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**
- **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**
- **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]**
- **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]**
- **PARAMETER_21 RX SAT Detection RF Level (dBm)**
- **PARAMETER_22 RX SINAD (dB)**
- **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)**
- **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]**
- **PARAMETER_26 RX ST Detection RF Level (dBm)**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_05 RX Audio Output AVL Err w/Compandor On**
- **PASS/FAIL LIMIT_06 RX RSSI Level Err @ –50 dBm (dB) through PASS/FAIL LIMIT_11 RX RSSI Level Err @ –100 dBm (dB)**
- **PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)**
- **PASS/FAIL LIMIT_16 RX SINAD Sensitivity RF Level (dBm)**

TEST_23 - TX Standard Tests

NOTE: This test performs a comprehensive transmitter check. It is similar to **TEST_25 - TX Quick Tests**. However, the total time for this test is considerably longer than for Test 25. This test is included in the current software version to provide backward compatibility for those users who need it.

This test performs the transmitter tests in the following order:

- **TEST_15 - TX Power Level and Adjustment**
- **TEST_16 - TX Frequency Error**
- **TEST_17 - TX Voice Modulation Limiting**
- **TEST_18 - TX Voice Modulation and Adjustment**
- **TEST_19 - TX Residual FM**
- **TEST_20 - TX Wideband Modulation**
- **TEST_21 - TX SAT Modulation**

Analyzer Settings

Analyzer settings will change throughout the test. Refer to the settings for each of the individual tests.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]**
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**
- **PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]**
- **PARAMETER_35 TX PA Power Step Size**
- **PARAMETER_36 TX PA Power, Check Down to Level (0-7)**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_17 TX Frequency Error (kHz)**
- **PASS/FAIL LIMIT_18 TX Power Error (dB)**
- **PASS/FAIL LIMIT_19 TX Power Error at Power Level 0 (dB)**
- **PASS/FAIL LIMIT_20 TX Residual FM Deviation (%)**
- **PASS/FAIL LIMIT_21 TX SAT Deviation (kHz)**
- **PASS/FAIL LIMIT_22 TX SAT Frequency Error (Hz)**
- **PASS/FAIL LIMIT_23 TX Voice Deviation**
- **PASS/FAIL LIMIT_24 TX Voice Deviation Limiting**
- **PASS/FAIL LIMIT_25 TX Wideband Data Deviation (kHz)**

TEST_24 - RX Quick Tests

NOTE: This test performs all of the receiver measurements. It is similar to **TEST_22 - RX Standard Tests**. However, because of significant differences in the code, it runs considerably faster.

This test performs the receiver tests in an optimum order to minimize cable connections. The tests are performed in the following order, first on receiver A, then on receiver B.

Receiver A tests:

- **TEST_13 - RXA RSSI Offset and Path Gain**
- **TEST_05 - RXA RSSI Linearity**
- **TEST_11 - RXA Audio Level and Adjustment**
- **TEST_03 - RXA SINAD Sensitivity**
- **TEST_07 - RXA SAT Detection** (does not check falsing)
- **TEST_09 - RXA ST Detection** (does not check falsing)

Receiver B tests:

- **TEST_14 - RXB RSSI Offset and Path Gain**
- **TEST_06 - RXB RSSI Linearity**
- **TEST_12 - RXB Audio Level and Adjustment**
- **TEST_04 - RXB SINAD Sensitivity**
- **TEST_08 - RXB SAT Detection** (does not check falsing)
- **TEST_10 - RXB ST Detection** (does not check falsing)

The antennas on which each test is performed are determined by the **`Sector`** field on the Initialization Screen, and **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**, **PARAMETER_18 RX RSSI Offset Test All Ants [0=no 1=yes]**, and **PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes]**.

The first antenna will be tested completely before testing begins for the next antenna. This will minimize the cable connections, and thus speed up the testing process.

To speed up testing when the received signal strength indicator (RSSI) linearity is selected to be tested on all antennas, the RSSI level will be checked on the primary antennas at the RF levels determined by **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)** and **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**. On the other antennas, it will be checked only at the level determined by **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**. The primary antennas are those selected in the **`Sector`** field on the Initialization Screen.

Analyzer Settings

Analyzer settings will change throughout the test. Refer to the settings for each of the individual tests.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]**
- **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]**
- **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**
- **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**
- **PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]**
- **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)**
- **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**
- **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**
- **PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]**
- **PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]**
- **PARAMETER_21 RX SAT Detection RF Level (dBm)**
- **PARAMETER_22 RX SINAD (dB)**
- **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)**
- **PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]**
- **PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]**
- **PARAMETER_26 RX ST Detection RF Level (dBm)**
- **PARAMETER_27 RX SINAD Test Level Deviation**
- **PARAMETER_28 RX Test w/External Splitter [0=no 1=yes]**
- **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]**
- **PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]**
- **PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_05 RX Audio Output AVL Err w/Compandor On**
- **PASS/FAIL LIMIT_06 RX RSSI Level Err @ –50 dBm (dB) through PASS/FAIL LIMIT_11 RX RSSI Level Err @ –100 dBm (dB)**
- **PASS/FAIL LIMIT_12 RX RSSI Offset Error (dB)**
- **PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)**
- **PASS/FAIL LIMIT_16 RX SINAD Sensitivity RF Level (dBm)**

TEST_25 - TX Quick Tests

NOTE: This test performs all of the TX measurements. It is similar to **TEST_23 - TX Standard Tests**. However, because of significant differences in the code, and because **TEST_15 - TX Power Level and Adjustment** is not performed, it runs considerably faster.

This test performs the transmitter tests in an optimum order to minimize cable connections. The tests are performed in the following order:

- **TEST_16 - TX Frequency Error**
- **TEST_18 - TX Voice Modulation and Adjustment**
- **TEST_17 - TX Voice Modulation Limiting**g
- **TEST_19 - TX Residual FM**
- **TEST_20 - TX Wideband Modulation**
- **TEST_21 - TX SAT Modulation**

Analyzer Settings

Analyzer settings will change throughout the test. Refer to the settings for each of the individual tests.

Parameters Used

- **PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]**
- **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]**
- **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]**
- **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**
- **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]**
- **PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]**

Pass/Fail Limits Used

- **PASS/FAIL LIMIT_17 TX Frequency Error (kHz)**
- **PASS/FAIL LIMIT_20 TX Residual FM Deviation (%)**
- **PASS/FAIL LIMIT_21 TX SAT Deviation (kHz)**
- **PASS/FAIL LIMIT_22 TX SAT Frequency Error (Hz)**
- **PASS/FAIL LIMIT_23 TX Voice Deviation**
- **PASS/FAIL LIMIT_24 TX Voice Deviation Limiting**
- **PASS/FAIL LIMIT_25 TX Wideband Data Deviation (kHz)**

Parameter Descriptions

Parameters are used to define the conditions under which a test will run. You may edit the parameters to change the default values, and to meet specific testing requirements and conditions. Each parameters may be used in one test or more.

For information on editing parameters, see **"Customizing Test Procedures" on page 64**.

The list of parameters is arranged alphabetically. The first two or three letters in the title of each parameter indicate its classification. The classifications are:

GN - General

RT - Receiver and Transmitter

RX - Receiver

RXA - Receiver A

RXB - Receiver B

TX - Transmitter

ZZZZ - Test/demo mode selection

PARAMETER_01 GN Base Station Baud Rate [0=9600 1-1200]

Enter the desired control choice for the Base Station baud rate. Select 0 for 9600 baud; select 1 for 1200 baud.

PARAMETER_02 GN Beep Enabled [0=silent 1-beep on]

Enter the desired beep control choice to determine the state of the Test Set's audible action indicator. Select 0 for beep silent; select 1 for beep on.

PARAMETER_03 GN Channel [0=edit freq 1=single 2=LCR]

Enter the desired control choice to determine the source of the channel information to be read. Select 0 for the entries in the frequency table; select 1 for the entry in the **`Channel`** field on the Initialization Screen; or select 2 for the channel numbers from the frequency table for LCR testing.

If you select 2, the Initialization Screen will be displayed one time only, at the start of testing on the first channel. Additional channels may then be tested without setting up the transceiver each time.

PARAMETER_04 GN Stop Test if Results Fail [0=no 1=yes]

Enter the desired control choice to determine the testing status in the event that a test fails. Select 0 to continue testing on failure; select 1 to stop on a failure.

If you select 1, upon failure when testing, the Test Set's USER keys will provide choices on how to proceed. Press the associated keys for the following:

`Proceed` - The Test Software will proceed with testing despite the failed data point. The next test of the sequence will be performed.

`Repeat` - The Test Set will perform the same test again and post the results. If the test fails again, the Test Software will again offer these four options.

`Abort` - The Test Software will stop the testing. If tests remain in the sequence, those will not be performed. A summary of the number of passed and failed tests will be printed and Test Software execution will halt.

`Laptop` - The Test Software will display the Terminal Emulator Mode screen. This screen allows you to send control commands to the radio when such commands are required to continue testing.

PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]

Enter the desired control choice to determine whether the test will be conducted with the audio DIP switches set to zero and the average voice level set to –22 dBm. Select 0 for different settings; select 1 for zero and –22 dBm.

Earlier versions of the Northern Telecom test procedures specified that the tests using audio inputs and outputs be performed with the forward and reverse audio DIP switches zeroed and also an average voice level (AVL) of –22 dBm. If you wish to perform the tests this way, set this parameter to 1.

Another method is to leave the DIP switches set to the AVLs for the system and use those AVLs for the audio input and output levels. To perform the test in this way, set the parameter to 0 (**no**). The audio levels are then set to the AVLs specified by **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** and **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**.

You may make all of the measurements at the –22 dBm AVL and then adjust DIP switches to the system AVL at the end of testing. This can be done because the adjustment parts of **TEST_11 - RXA Audio Level and Adjustment** and **TEST_12 - RXB Audio Level and Adjustment**, and **TEST_18 - TX Voice Modulation and Adjustment** only use **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** and **PARAMETER_32 TX Audio Input Average Voice Level (AVL)**. To do this, set these parameters to the AVL for the system. Set **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** to 2 (**always**), and set **PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]** to 1 (**RXB**). Construct a testing procedure in which **TEST_12 - RXB Audio Level and Adjustment** is the last RX test in which audio levels are used. Also place the **TEST_18 - TX Voice Modulation and Adjustment** so that it is the last TX test that uses audio levels.

PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]

Enter the desired control choice to determine whether the Test Software will automatically adjust the audio output and audio input average voice level (AVL). Select 0 for no adjustment; select 1 for adjustment on test failure; or select 2 for adjustment regardless of test result. If an adjustment is performed, the Test Software will use the value in **PARAMETER_08 RX Audio Output Average Voice Level (AVL)** for **TEST_11 - RXA Audio Level and Adjustment** and **TEST_12 - RXB Audio Level and Adjustment** or the value in **PARAMETER_32 TX Audio Input Average Voice Level (AVL)** for **TEST_18 - TX Voice Modulation and Adjustment**.

PARAMETER_07 RX Audio Lev Adj On [0=RXA 1=RXB 2=both]

Enter the desired control choice to determine the receiver on which the RX audio level adjustment will be made during the RX audio level test. Select 0 for receiver A; select 1 for receiver B; or select 2 for both. To perform the adjustment, **PARAMETER_06 RT Audio Adjust [0=no 1=on fail 2=always]** must be set to something other than 0. See **See "TEST_11 - RXA Audio Level and Adjustment" on page 152** for additional information on setting this parameter.

Setting this parameter to 2 is intended for use when the radio is being serviced and both RXA and RXB can be adjusted.

PARAMETER_08 RX Audio Output Average Voice Level (AVL)

Enter the RX average voice level (AVL) or audio output level from the transceiver REV D jack that meets the requirements of the system to be tested. This parameter is always used for adjusting the RX audio level in TEST_11 and TEST_12. If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 0, this parameter will be used for all RX audio output levels rather than –22 dBm.

PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)

Enter the value of the loss through the receiver shelf's Splitter. For the eight-way receiver shelf's Splitter, this value is typically 11 dB. Obtain the exact value for this parameter from P-Series cell site documentation or from Northern Telecom.

This parameter is used only if **PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]** is set to 0.

The value that is entered in this parameter is added to the values of other losses in the system to be tested to determine the required correction to the Test Set's signal generator RF output level. For example, if this parameter is set to 11 dB, the RF generator level will be increase by 11 dB to compensate for the splitter loss. The purpose of this parameter is to reference RX measurements at the shelf to the transceiver backplane RF input.

PARAMETER_10 RX RSSI Lin Chk w/o Offset [0=no 1=yes]

Enter the control choice to determine whether the received signal strength indicator (RSSI) linearity check will be conducted with or without offset. Select 0 for test with offset; select 1 for test without offset. This parameter allows the Test Software to check RSSI linearity in **TEST_05 - RXA RSSI Linearity** and **TEST_06 - RXB RSSI Linearity**, without the transceiver internal offset. Removing the internal offset allows a check of RSSI linearity without having to change the pass/fail limits.

PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes]

Enter the control choice to determine whether tests will be conducted on all antenna ports on the receiver shelf during received signal strength indicator (RSSI) linearity tests. Select 0 to not check all antenna ports; select 1 to check RSSI linearity on all six antenna ports.

This parameter overrides the value entered in the **`Sector`** field on the Initialization Screen for **TEST_13 - RXA RSSI Offset and Path Gain** and **TEST_14 - RXB RSSI Offset and Path Gain** only.

PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)

Enter the value for the highest level of RF signals to be injected into the receive multi-coupler (RMC) input by the Test Set. This value is the high level to which the signal is incremented in 10 dB steps. See **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**.

NOTE: When choosing a level to enter, make the choice in consideration of the choice that you will make for the low level that you will enter in **PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)**. Make certain that you choose a level that can be incremented in 10 dB steps from the value of PARAMETER 13.

The actual RF level will be corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen. If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

In **TEST_22 - RX Standard Tests** and **TEST_24 - RX Quick Tests**, only the primary antennas are tested at this range of RF levels. This is to optimize testing time. Secondary antennas are tested at the single value entered in **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**. Primary antennas are determined by the **`Sector`** field on the Initialization Screen.

PARAMETER_13 RX RSSI Linearity RF Level Low (–100 min)(dBm)

Enter the value for the minimum level of RF signals to be injected into the receive multi-coupler (RMC) input by the Test Set. This level is incremented in 10 dB steps until it reaches the value entered in **PARAMETER_12 RX RSSI Linearity RF Level High (–50 max) (dBm)**.

The actual RF level is corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen. If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

In **TEST_22 - RX Standard Tests** and **TEST_24 - RX Quick Tests**, only the primary antennas are tested at this range of RF levels. This is to optimize testing time. Secondary antennas are tested at the single value entered in **PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)**. Primary antennas are determined by the **`Sector`** field on the Initialization Screen.

PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]

Enter the control choice to determine whether the Test Software will adjust the transceiver received signal strength indicator (RSSI) offset until the reported RSSI error equals zero. Select 0 for no adjustment; select 1 for adjustment if RSSI offset error exceeds the limits set by **PASS/FAIL LIMIT_12 RX RSSI Offset Error (dB)**, or select 2 for adjustment regardless of the measurement results.

PARAMETER_15 RX RSSI Offset Adjust On [0=RXA 1=RXB]

When testing P3 radios only, enter the desired control choice to determine the receiver on which the RX received signal strength indicator (RSSI) offset adjustment will be made during the RX RSSI offset and path gain test. Select 0 for receiver A; select 1 for receiver B. To perform the adjustment, **PARAMETER_14 RX RSSI Off Adj [0=no 1=fail 2=always]** must be set to other than 0.

PARAMETER_16 RX RSSI Offset Chk RMC Gain [0=no 1=yes]

Enter the desired control choice to determine whether receive multi-coupler (RMC) gain will be checked during **TEST_13 - RXA RSSI Offset and Path Gain** and **TEST_14 - RXB RSSI Offset and Path Gain**. Select 0 to not check the gain; select 1 to check the gain. See **"TEST_13 - RXA RSSI Offset and Path Gain" on page 156** for more information.

PARAMETER_17 RX RSSI Offset RF Level (–50 to –100) (dBm)

Enter the RF level to be applied to the receiver during **TEST_13 - RXA RSSI Offset and Path Gain** and **TEST_14 - RXB RSSI Offset and Path Gain**. The actual RF level is corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen.

If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

See the description for **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB) on page 184**.

For **TEST_22 - RX Standard Tests** and **TEST_24 - RX Quick Tests**, this value is used for checking the received signal strength indicator (RSSI) level on the secondary antennas (set by the **`Sector`** field on the Initialization Screen).

PARAMETER_18 RX RSSI Offset Test All Ants [0=no 1=yes]

Enter the control choice to determine whether tests will be conducted on all antenna ports on the receiver shelf during **TEST_13 - RXA RSSI Offset and Path Gain** and **TEST_14 - RXB RSSI Offset and Path Gain**. Select 0 to not check all antenna ports; select 1 to check received signal strength indicator (RSSI) offset on all six antenna ports. This parameter overrides the value entered in the **`Sector`** field on the Initialization Screen, for TEST_13 and TEST_14 only.

PARAMETER_19 RX SAT & ST Test @ Extremes [0=no 1=yes]

Enter the control choice to determine whether SAT and ST tests will be conducted under extended test conditions. Select 0 for no testing at extremes; select 1 for testing at extremes.

See the description of **TEST_07 - RXA SAT Detection** and **TEST_09 - RXA ST Detection**.

PARAMETER_20 RX SAT & ST Test with Tones [0=no 1=yes]

Enter the desired control choice to determine whether tones will be used in performing SAT and ST detection tests. Select 0 for no tones to be used; select 1 for both audio and ST tones to be used in **TEST_07 - RXA SAT Detection**, **TEST_08 - RXB SAT Detection**, and both audio and SAT tones to be used in **TEST_09 - RXA ST Detection** and **TEST_10 - RXB ST Detection**.

PARAMETER_21 RX SAT Detection RF Level (dBm)

Enter the signal generator level that is to be applied to the receiver during SAT tests when the minimum detectable level must be determined.

The actual RF level is corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen. If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**. See the description for **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB) on page 184**.

PARAMETER_22 RX SINAD (dB)

Enter the SINAD value to be is used when the set and measure method is not selected. The RF level is adjusted to the SINAD level defined by this parameter during **TEST_03 - RXA SINAD Sensitivity** and **TEST_04 - RXB SINAD Sensitivity**. Ordinarily, this value is set to 12 dB.

See the description for **"PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)" on page 188**.

PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)

Enter the level that is to be applied to the Base Station during SINAD tests when the set and measure method is used. This level is the minimum RF level at which the SINAD must be acceptable.

The actual RF level is corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen. If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**. See the description for **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB) on page 184**.

PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes]

Enter the control choice to determine whether tests will be conducted on all antenna ports on the receiver shelf during **TEST_03 - RXA SINAD Sensitivity** and **TEST_04 - RXB SINAD Sensitivity**. Select 0 to not check all antenna ports; select 1 to perform a SINAD check all six antenna ports. If this parameter is set to 1, the Test Software will prompt the user to test all six antennas for the SINAD test.

During the SINAD test, this parameter overrides the value entered into the **`Sector`** field on the Initialization Screen for TEST_03 and TEST_04 only.

PARAMETER_25 RX SINAD Test by Set & Meas [0=no 1=yes]

Enter the control choice to determine which of two methods is to be used for the measurement of receiver sensitivity.

Select 0 for the first method, in which the RF level that results in a particular SINAD value will be determined through an iterative technique.

Select 1 or the second method (set and measure), in which the RF level will be set by the value in **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)** and the SINAD will be measured and compared to **PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)**.

See the description for **"TEST_03 - RXA SINAD Sensitivity" on page 140**.

PARAMETER_26 RX ST Detection RF Level (dBm)

Enter the signal generator level that is to be applied to the receiver during signaling tone (ST) tests, when the minimum detectable level must be determined.

The actual RF level is corrected by the RX1 through RX6 cable loss values entered on the Initialization Screen. If the signal is applied to the receiver shelf's inputs, the RF level also will be corrected for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**.

See the description for **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB) on page 184**.

PARAMETER_27 RX SINAD Test Level Deviation

Enter the Test Set's RF deviation to be used for the RX audio level test. This value is typically 2.9 kHz.

PARAMETER_28 RX Test w/External Splitter [0=no 1=yes]

NOTE: In some instances, it will be beneficial to use a six-way external Splitter or Switch Matrix between the Test Set's duplex output and the six antenna inputs on the receiver shelf. This will reduce the number of connections that must be made during testing.

Enter the desired control choice to determine whether receiver TESTs will be conducted using an external Splitter or Switch Matrix. Select 0 to use no Splitter or Switch Matrix in the TESTs; select 1 to use a Splitter; select 2 to use an HP 3488 Switch Matrix; or select 3 to use an HP 83202A Switch Matrix.

If you select 1, 2, or 3, the Test Software will display the correct connection diagram on the Test Set's screen.

NOTE: Make certain that you compensate for the Splitter or Switch Matrix loss by adding it to each cable loss field (**`RX1 Cable Loss`** through **`RX6 Cable Loss`**, and **`TX Cable Loss`**) in the RX and TX Cable Loss menu, which is called from the **`RX and TX Cable Loss`** field on the Initialization Screen.

PARAMETER_29 RX Tests Perform at [0=rcvr shelf 1=RMC]

Enter the point at which receiver tests are to be performed at the cell site. Select 0 for the receiver shelf; select 1 for receive multi-coupler (RMC) input.

The two most common locations are the receiver shelf or the RMC input. The Test Software will display prompts for the correct connection based on this parameter setting. If you select 0, the Test Set's RF generator will compensate for the receiver shelf's Splitter loss in **PARAMETER_09 RX Rcvr Shelf Splitter Loss (typ 11 dB) (dB)**. If you select 1, no compensation for the splitter will occur. The Test Set's RF generator output is available at the DUPLEX OUT port.

NOTE: Connecting to the RMC will affect service on the whole cell site.

PARAMETER_30 RXA Test Ant [0=none 1,2,3=single 7=all]

Enter the desired control choice to determine the antenna ports of the receiver shelf that will be tested. Select 0 for no port test; select 1, 2, or 3 to test at port 1, 2, or 3 if the **`Sector`** field on the Initialization Screen is set to **`Parm`**; or select 7 to test at all three ports.

If you select 0, the test sequence will skip RXA *unless* one (or more) of the following parameters is (are) set to 1:

PARAMETER_11 RX RSSI Linear Test All Ants [0=no 1=yes] on page 185
PARAMETER_18 RX RSSI Offset Test All Ants [0=no 1=yes] on page 187
PARAMETER_24 RX SINAD Test All Ants [0=no 1=yes] on page 188

PARAMETER_31 RXB Test Ant [0=none 4,5,6=single 7=all]

Same as PARAMETER_30 except for RXB and antenna ports 4, 5, and 6.

PARAMETER_32 TX Audio Input Average Voice Level (AVL)

Enter the TX average voice level (AVL) or audio input level to the transceiver FWD D Jack that meets the requirements of the system to be tested. This parameter is always used for adjusting the TX voice deviation. If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 0, this parameter will be used for all TX audio input levels rather than –22 dBm.

PARAMETER_33 TX Duplexer/Combiner Loss (dB)

Enter the combined loss of the duplexer and combiner. If **PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb] on page 192** is set to 1, the value entered into this parameter will be subtracted from the 45 watts to set the initial value in the **`TX shelf power`** field on the Initialization Screen.

PARAMETER_34 TX PA Power Adj [0=no 1=on fail 2=always]

Enter the desired control choice to determine whether the Test Software will provide a meter display for the adjustment of the TX PA power. Select 0 for if you do not wish to perform an adjustment under any conditions; select 1 if you wish to perform an adjustment only if the test fails; or select 2 if you wish to perform an adjustment regardless of test result. This adjustment may be performed while **TEST_15 - TX Power Level and Adjustment** is running.

PARAMETER_35 TX PA Power Step Size

Enter the TX power step size to be used in transmitter power tests. This step size will be used as the difference between the various power levels in **TEST_15 - TX Power Level and Adjustment**.

PARAMETER_36 TX PA Power, Check Down to Level (0-7)

If the transceiver is capable of dynamic power stepping, enter the lowest power at which testing is to be conducted. **TEST_15 - TX Power Level and Adjustment** will check down to the power level specified. See the description for **"TEST_15 - TX Power Level and Adjustment" on page 161** for information on transceiver power levels.

PARAMETER_37 TX Tests Perform at [0=PA shelf 1=comb]

CAUTION: If you connect to the duplexer's or combiner's outputs, no other transmitted signals may be present or damage to the Test Set's RF input will result.

Enter the desired control choice to determine the location at which tests are to be conducted. Select 0 to test at the output of each power amplifier; select 1 to test at the combiner.

If you select 0, the Test Software will display prompts to connect the Test Set's RF input to the PA's output on the PA shelf.

NOTE: It is possible to make the transmitter measurements at the duplexer or combiner port. This reduces the number of connections to be made, but adds uncertainty to the measurement.

If you select 1, the Test Software will display prompts to connect the Test Set's RF input to the combiner.

It is important to remember that connecting to the combiner will affect service to the entire site.

PARAMETER_38 ZZZZ Test Mode [0=normal 1=demo]

Enter the desired control choice for a demo mode. Select 0 for normal operation; select 1 for operation in demo mode.

If you select 1, the Test Software will bypass most communication with the Base Station, allowing the program to be demonstrated without the delay caused by Base Station response time. This mode is useful if you are working in a training or practice situation without a Base Station attached to the Test Set.

As an operational safety feature, the Test Software will display the following message in large type on the TESTS (IBASIC Controller) screen when you select the **`Run Test`** field or press the **k1** (**`Run Test`**) key after selecting demo mode:

```
THE SOFTWARE IS IN DEMO MODE!
```

Pass/Fail Limits Descriptions

Pass/fail limits define the values with which a measurement result is compared to determine if the system under test meets specified standards. For information on editing Pass/Fail Limit Specifications, see **"Customizing Test Procedures" on page 64**.

All pass/fail limits have lower and upper limits that can be entered or modified. The column labeled **`Check`** on the **`Pass/Fail Limits`** screen specifies whether the lower limit, the upper limit, or both of the limits will be used when compared with measurements. Some of the default pass/fail limits provided in the Test Software include only one of the limits. If you enter the other limit, make certain that you change the **`Check`** column to **`Both`**.

Pass/fail limits remain in battery-backed-up memory until you select a procedure to run. If you wish to prevent pass/fail limits from being lost when a new procedure is selected, save those in a procedure. See **"Saving/Deleting Procedures to/from a Card" on page 71**..

Pass/fail limits may be secured (see **"Securing/Unsecuring Procedures" on page 111**).

The list of pass/fail limits is arranged alphabetically. The first two or three letters in the title of each pass/fail limit indicate its classification. The classifications are:

RT = Receiver and Transmitter

RX = Receiver

TX = Transmitter

PASS/FAIL LIMIT_01 RT Aud Loopback Err from AVL (rev <13)

Enter the upper and lower pass/fail limits for audio loopback error from average voice level (AVL) for BSTRX800 transceivers before Hardware Revision 13.

NOTE: If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 1, the AVL is –22. If PARAMETER_05 is set to 0, the AVL is the value entered in **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**.

PASS/FAIL LIMIT_02 RT Aud Loopback Err from AVL+4 (rev>=13)

Enter the upper and lower pass/fail limits for audio loopback error from average voice level (AVL) for transceiver type BSTRX800 of Hardware Revision 13 or later, and transceiver type BSTRX800 EX.

NOTE: If **PARAMETER_05 GN Zero DIP Sw & –22 dBm AVL [0=no 1=yes]** is set to 1, the AVL is –22. If this parameter is set to 0, the AVL is the value entered in **PARAMETER_08 RX Audio Output Average Voice Level (AVL)**.

PASS/FAIL LIMIT_03 RT Aud Loopback Unlooped

Enter the upper pass/fail limit for the highest allowable audio level between the forward and reverse audio channels with no loopback selected.

PASS/FAIL LIMIT_04 RT Audio 1 kHz Tone Error from AVL

Enter the upper and lower pass/fail limits for the 1 kHz audio tone output level error from the average voice level (AVL).

PASS/FAIL LIMIT_05 RX Audio Output AVL Err w/Compandor On

Enter the upper and lower pass/fail limits for the audio output level error or reverse audio level error from the average voice level (AVL) with the compandor on.

PASS/FAIL LIMIT_06 RX RSSI Level Err @ –50 dBm (dB) through PASS/FAIL LIMIT_11 RX RSSI Level Err @ –100 dBm (dB)

Enter the upper and lower pass/fail limits for the reported level of the received signal strength indicator (RSSI), when –50 to –100 dBm is applied to an RX input of the receiver.

See **"TEST_05 - RXA RSSI Linearity" on page 143**.

PASS/FAIL LIMIT_12 RX RSSI Offset Error (dB)

Enter the upper and lower pass/fail limits for the maximum and minimum error allowable from the user-specified received signal strength indicator (RSSI) offset after the offset has been set.

PASS/FAIL LIMIT_13 RX RSSI Internal Offset (dB)

Enter the upper and lower pass/fail limits for the acceptable range for the internal received signal strength indicator (RSSI) offset value programmed into the radio.

See **See "TEST_13 - RXA RSSI Offset and Path Gain" on page 156** and **"TEST_14 - RXB RSSI Offset and Path Gain" on page 160**.

PASS/FAIL LIMIT_14 RX RSSI Path Gain (dB)

Enter the upper and lower pass/fail limits for the received signal strength indicator (RSSI) path gain, including the receive multi-coupler (RMC), receiver shelf's Splitter loss, and any cable losses associated with the signal path.

Gain is determined by the following equation:

Path Gain = Reported RSSI level - RSSI offset - Injected RF level

If the path gain exceeds the limits entered in these pass/fail limits, the Test Software will prompt the option to adjust the RMC gain. If you select **yes**, the Test Software will display an adjustment meter.

PASS/FAIL LIMIT_15 RX SINAD for Set & Measure (dB)

Enter the lower pass/fail limit for the SINAD measurement. If the measured SINAD is greater than the number entered, an RX sensitivity test will pass. For example, if the lower limit is set to 12 dB, a sensitivity test will pass if the measured SINAD is greater than 12 dB. The RF level applied to the receiver will be determined by **PARAMETER_23 RX SINAD RF Level for Set & Measure (dBm)**.

See **"TEST_03 - RXA SINAD Sensitivity" on page 140**.

PASS/FAIL LIMIT_16 RX SINAD Sensitivity RF Level (dBm)

Enter the upper pass/fail limit for the Base Station receiver's RF input level when the receiver sensitivity for a particular SINAD is determined using an iterative technique.

See **"TEST_03 - RXA SINAD Sensitivity" on page 140**.

PASS/FAIL LIMIT_17 TX Frequency Error (kHz)

Enter the upper and lower pass/fail limits for the difference between the measured and assigned transmitter frequencies.

PASS/FAIL LIMIT_18 TX Power Error (dB)

Enter the upper and lower pass/fail limits for the acceptable error of the PA's output power level. The error is derived by subtracting the measured power from the power defined by the **`TX Max Power`** field on the Initialization Screen, and **PARAMETER_35 TX PA Power Step Size**. These pass/fail limits will be used when the power error is checked at each power level.

See **"TEST_15 - TX Power Level and Adjustment" on page 161**.

PASS/FAIL LIMIT_19 TX Power Error at Power Level 0 (dB)

Enter the upper and lower pass/fail limits for the acceptable error of the PA's output power at power level 0. Adjustments are performed at power level 0, so you might wish to set this pass/fail limit tighter than **PASS/FAIL LIMIT_18 TX Power Error (dB)**.

PASS/FAIL LIMIT_20 TX Residual FM Deviation (%)

Enter the upper pass/fail limit for the acceptable RMS frequency modulation of the PA's output signal.

See **"TEST_19 - TX Residual FM" on page 167**.

PASS/FAIL LIMIT_21 TX SAT Deviation (kHz)

Enter the upper and lower pass/fail limits for the maximum and minimum SAT tone FM deviation. Transmitter deviation resulting from the SAT tone is nominally 2 kHz.

PASS/FAIL LIMIT_22 TX SAT Frequency Error (Hz)

Enter the upper and lower pass/fail limits for the error in the frequency of the 5970 Hz, 6000 Hz, or 6030- Hz SAT tones modulated onto the transmitter.

PASS/FAIL LIMIT_23 TX Voice Deviation

Enter the upper and lower pass/fail limits for the maximum and minimum deviation limits for the transmitted voice deviation.

PASS/FAIL LIMIT_24 TX Voice Deviation Limiting

Enter the upper and lower pass/fail limits for the maximum and minimum deviation limits for the transmitter's voice deviation when in limiting.

PASS/FAIL LIMIT_25 TX Wideband Data Deviation (kHz)

Enter the upper and lower pass/fail limits for the maximum and minimum peak frequency deviation resulting from a wideband data signal.

Glossary

`Abort` A USER key. Pressing this key exits the testing process.

AMPS (Advanced Mobile Phone System) The cellular system in use on the North American continent and on other continents.

AVL (Average Voice Level) A standard audio voltage that is used to set the level of the signal applied to the modulator in the base station. It is expressed in dBm into a 600-ohm load.

BPF (Band-Pass Filter) A filter that increasingly rejects frequency components of signals as those components diverge above and below certain cutoff frequencies. In the Test Set, audio band pass filters are used to reduce the level of out-of-band signals during certain measurements.

BTS (Base Transceiver Station) A set of transmitter, receiver, and control equipment at a cell site.

`Choices:` A context-driven drop-down list on the Test Set screen that includes several possible functions for selection.

CDMA (Code Division Multiple Access) A technique for spread-spectrum multiple-access digital communication that creates channels through the use of unique code sequences.

cursor A movable brightened region of the Test Set screen that indicates the field or function currently selected.

`Del Step` A USER key. Pressing this key deletes a step in the procedure.

Epson card A PC card that meets the Epson Corporation standards. There are two types of Epson cards: OTP and SRAM. (The Test Set does not accommodate Epson type cards.)

ESD (ElectroStatic Discharge) A transfer of electric charge from one place to another. Devices can be damaged by the energy transferred during the discharge.

field An area of interest on the Test Set screen, often with an inverse video display in which entries may be made.

function A particular field, feature, or operation of the test set.

GN (Abbreviation for General) Appears in some titles in the software and indicates that it relates to the general system, as opposed to a transmitter (TX) or receiver (RX).

`Help` A Test Software feature that provides specific information about the current screen or function.

HELP A Test Set feature that provides information on Test Set functions. It is accessed by pressing the Help key.

highlight A brightened region of the test set screen.

HPF (High-Pass Filter) A filter that has a single transmission band extending from some cutoff frequency (not zero) and extending to an infinite frequency.

Glossary

HP-IB (Hewlett-Packard Interface Bus) The Hewlett-Packard implementation of the interface bus system described in Specification IEEE-488.2.

IBASIC (Instrument BASIC) A computer language (code or software) used in the Test Set by the built-in controller.

initialize The process of formatting a storage medium before storage may take place.

key Any of the push buttons on the front panel. Also, a USER key, which is one of the k1 through k5 group. These keys perform associated numbered functions listed in the action field at the right-hand side of the screen. USER keys are user programmable.

knob The large tuning dial for cursor control located in the DATA ENTRY section of the Test Set front panel. This knob is rotated to position the cursor on the screen and then pressed to select the particular field or function.

library A collection of the names of all of the parameters, specifications, and tests in the Test Software. The Test Software and the Test Set firmware use the library, test software program code file, and a procedure to run a customized application program. A library is stored as a file on a PC card with its associated procedure files.

location A device to which to store and from which to retrieve information (for instance, card, RAM, ROM, or a PC.

LPF (Low-Pass Filter) A filter that has a single transmission band extending from zero to some cutoff frequency, not zero.

measurement A series of calculations performed by the Test Set on data from a base station under test.

Menu A Test Set front panel key. Pressing this key displays the SOFTWARE MENU screen.

menu A list of functions on the Test Set screen among which the user may select using the cursor.

message A block of text characters in the upper portion of the Test Set screen that contains information of interest to the user. This area is reserved for messages and prompts. Messages give an indication of the status of the Test Set, for example, **System initialization**. Prompts direct the user to perform some function or action.

OTP card (One Time Programmable card) A type of PC card on which data may be stored once only; similar to integrated-circuit ROM.

parameter A Test Software function that is user modifiable and that is used to specify certain values and control information to the Test Software. These include calibration data, base station characteristics, or test customization. Parameters provide flexibility in the manner in which the Test Software is used. Default values for all parameters are included in the Test Software.

pass/fail limit A Test Software function that is user modifiable and that is used to specify the measurement criteria for verifying the performance of the base station. Specifications can include high limits, low limits, and high/low limits. The associated measurement value must meet or fall within the pass/fail values to pass the test. Default values are included in the Test Software and have been derived from standard methods of measurement or from standard base station test requirements.

Pause/Continue A Test Set front panel key that is used to pause (temporarily stop) or continue (restart) the program running in the Test Set. Pressing the key the first time pauses the program, pressing it a second time restarts the program.

Pause/Continue (Reset) A Test Set front panel shift function key that is used to reset the program running in the Test Set. Pressing the **Shift** key, then this key resets the program.

peak+/- max A detector in the Test Set that measures and computes the maximum of the absolute value of the positive and negative excursions of the measurement. For example, when an FM waveform with a +10 kHz and -9 kHz deviation is applied, 10 kHz will be displayed.

PC Card A PCMCIA or Epson card that contains the procedures for testing the base station. (The Test Set accommodates PCMCIA type cards only.)

PCMCIA card A PC card that meets the specification of the Personal Computer Memory Card International Association. There are two types of PCMCIA cards: OTP and SRAM. (The Test Set accommodates PCMCIA type cards only.)

Preset A Test Set front panel key. Pressing this key sets the test set to its initial power-up state.

procedure A collection of test operations that are performed on a base station under test. Also, a group of channels, parameters, pass/fail limits, and testing order, saved in a file, that customizes the Test Software to a specific application.

prompt The upper portion of the test set (inverse video field) is reserved for prompts and messages. A prompt directs the user to take some action. A messages gives an indication of the status of the Test Set.

RAM (Random-Access Memory) A type of integrated circuit that is capable of data storage, with the data read- or write-accessible on an address-selectable, or random-access, basis. RAM is used in the Test Set to store program code and data. The Test Set RAM is backed up by a battery so that data and program code are retained when the power is turned off.

ROM (Read-Only Memory) A type of integrated circuit that is capable of data storage, into which data may be loaded one time only, with the data read-accessible on an address-selectable, or random-access, basis. ROM is used primarily for control applications in which data must be read multiple times.

RSSI (Received Signal Strength Indicator) A level in a receiver that is related to the signal strength of the incoming signal.

Run Test A USER key. Pressing this key directs the Test Set to load the Test Software, including the selected procedure, and begin testing.

SAT (Supervisory Audio Tone) A 5970 Hz, 6000 Hz, or 6030 Hz tone that is transmitted by a base station on a forward analog voice channel and transponded by a mobile station on the reverse analog voice channel. It is used to confirm that the mobile station has connected to the desired base station on the voice channel.

screen The video display of the Test Set. Also, a particular display related to a specific function, as in Initialization Screen.

select To choose a particular field or function. This is done by rotating the cursor control knob to move the highlighted cursor to the chosen field or function, then pressing the knob. In some instances, an alternative method is to press the numbered USER key having the same number as displayed alongside the desired function.

sequence The method used in the test set to run one or more TESTs in a desired order. A sequence is entered using the TESTS (Channel Information) screen.

SINAD (Signal plus Noise And Distortion) A representation of signal plus noise and distortion divided by noise and distortion. A measurement result that determines the quality of an audio tone in the presence of noise and distortion. A 12-dB SINAD value is often used when measuring receiver sensitivity.

softkey (familiar name) The set of five keys to the right of the Test Set display that can be assigned to certain special actions or fields. The keys are also called USER keys.

SOFTWARE MENU The Test Set screen that is accessed by pressing the **Menu** key or the k5 (**Main Menu**) key. It is used to customize and execute (run) automated testing.

specification See pass/fail limits.

SRAM (Static Random-Access Memory) A sub-type of RAM integrated circuit that is optimized for relatively high-speed general memory applications.

SRAM card (Static Random Access Memory card) A type of PC card that is used for data storage. An SRAM card may be used with the Test Set to save programs and test results.

Step A Test Software function that orders the sequence of tests. For instance, Step 1 might be Test_5, and Step 2 might be Test_26.

TEST A collection of measurements (or a series of other tests) that verify a particular specification value or operation of the base station under test. A sequence of tests is contained in a test procedure.

Initialization Screen The screen that is accessed by pressing the k1 (**Run Test**) key. It is used to customize the Test Software and execute (run) all automated testing.

Glossary

USER keys A group of programmable keys located immediately to the right of the Test Set display that allow the user to select more rapidly certain functions without rotating and pressing the knob. The key assignments are displayed in fields in the right-hand area of the screen. The number to the left of the field corresponds to the number of the USER key (k1 through k5).

value The scaler quantity or number entered in a section of a menu field or in a specification or parameter field. Units of measure (dB, inches, volts, watts, and so forth) are contained in the menu item, parameter, or pass/fail limit.

VSWR (Voltage Standing Wave Ratio) The absolute value of the antenna impedance, normalized to that of the RF transmission line (50 ohms). Note that, because the impedance matching properties of the antenna are important primarily for power matching, the phase information is of less importance. Phase change with frequency, which is related to the group delay and to the frequency dispersion, may also be of importance.

Glossary

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