HP 11807B Option 070

Motorola Micro C·I·T·E Base Station Test Software, *User's Guide*

Software Revision: B.00.00

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(Revision A)

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1

Product Description

What’s included in this chapter:

- About this Software
- Items Supplied in this Software Package
- Additional Equipment Needed
- Product Features & Tests Available
- Additional Services Available

HP 11807B Opt. 070 Motorola Micro C·I·T·E Software

About this software

The HP 11807B Option 070 Motorola Micro C·I·T·E software is one element of a cellular base station test system. The following items make up the cellular base station test system:

- HP 11807B Option 070 Motorola Micro C·I·T·E Test
- HP 8921A Cell Site Test Set
- and accessories:
    - HP 83202A Opt 070 Base Station Accessory Kit
    - This system performs tests that determine the RF and audio performance of Motorola Micro C·I·T·E AMPS/NAMPS Cellular Base Stations. Most of the measurement methods and specifications used for these tests are derived from Electronic Industries Association standards and procedures recommended by Motorola.

Items Supplied in this Software Package

Table 1

Item	Part number
HP 11807B Option 070 Software card	HP 11807-10036
HP 11807B Option 070 Software Reference Guide	HP 11807-90138
Software Licensing Agreement	HP 5180-1566
128K RAM Memory Card (for customizing software)	HP 85702A
Cable Assy. RJ11(M) to RJ11(M) (25 ft)	HP 08921-61015
Adapter RJ11 (F) to DB25 (M)	HP 08921-61016

Additional Equipment Needed

Table 2

Item	Model Number
HP Test Set	HP 8921A
Accessory Kit (See *"HP 83202A Opt. 070 Accessory Kit or Equivalent" on page 153* for more information.)	HP 83202A Opt. 070 (or equivalent)
Return Loss Bridge (See *"Return Loss Bridge" on page 155* for more information.)	HP 86205A
Resistive Power Splitter (See *"Resistive Power Splitter" on page 155* for more information.)	HP 0955-0733
High Power Frequency Reference (See *"High Accuracy Frequency Reference" on page 155* for more information.)	Electronic Research Co. Model 130

Optional Equipment

Table 3

Item	Testing Use
Motorola T1 Module	An external Motorola T1 module can be used to automate switching between audio test ports. (See appendix A for more information.)
External Power Meter and Sensor	Additional procedures for calibrating your equipment using an external power meter and sensor are provided. (See *"External Power Meter" on page 156* for more information.)

Product Features

The following features are available with this software package:

- This manual includes a getting started chapter. The getting started procedure provides a hands on tutorial for completing essential tasks.
- This software corrects for RF path losses and system inaccuracies, thus increasing measurement accuracy.
- This software includes a Laptop Emulator. Using the Laptop Emulator, commands can

be sent to the base station and the base station's responses viewed.

- This software can be customized for a particular base station. This significantly reduces the setup time.
- Test results and pass/fail indications can be printed or collected on a PC or a memory card.
- Equipment connections diagrams are provided on the Test Set's screen as they are needed.
- This software package supports equipment connections using an external Motorola T1 Module in addition to normal equipment connections.
- This software includes a demo mode. Demo mode allows you to observe the test environment without actually be connected to a base station.

Tests Available

- TEST_01 Laptop Emulator
- TEST_02 URDM Frequency/Level
- TEST_03 Voice Transceiver adj MANUAL mode
- TEST_04 Voice Transceiver
- TEST_05 Scanning receiver MANUAL mode
- TEST_06 Signaling transceiver MANUAL mode
- TEST_07 Manual switch & calibration aid
- TEST_08 Voice channel manual test mode
- TEST_09 VSWR swept return loss
- TEST_10 VSWR discrete channel return loss
- TEST_11 VSWR vs distance (cable fault)

Additional Services Available

For assistance:

The following resources are available if you need assistance or encounter a problem.

- HP 8921A Reference Guide, HP part number 08921-90022
- Your local sales representative
- HP 8921A Hotline 1-800-922-8920 (USA and Canada only)

For upgrade services or training courses

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

2

How to Use this Manual

What’s included in this chapter:

- Introduction
- How to Use this Manual
- Before You Begin Testing

Introduction

This manual is designed and structured to help you use this software package to perform base station testing. Its design is based on the *"Task Flow Diagram" on page 17*. The task flow diagram is a graphical representation of the steps required for completing a test.

Reference and problem solving chapters are also included in this manual to provide additional information and address problems if they should occur.

How to Use this Manual

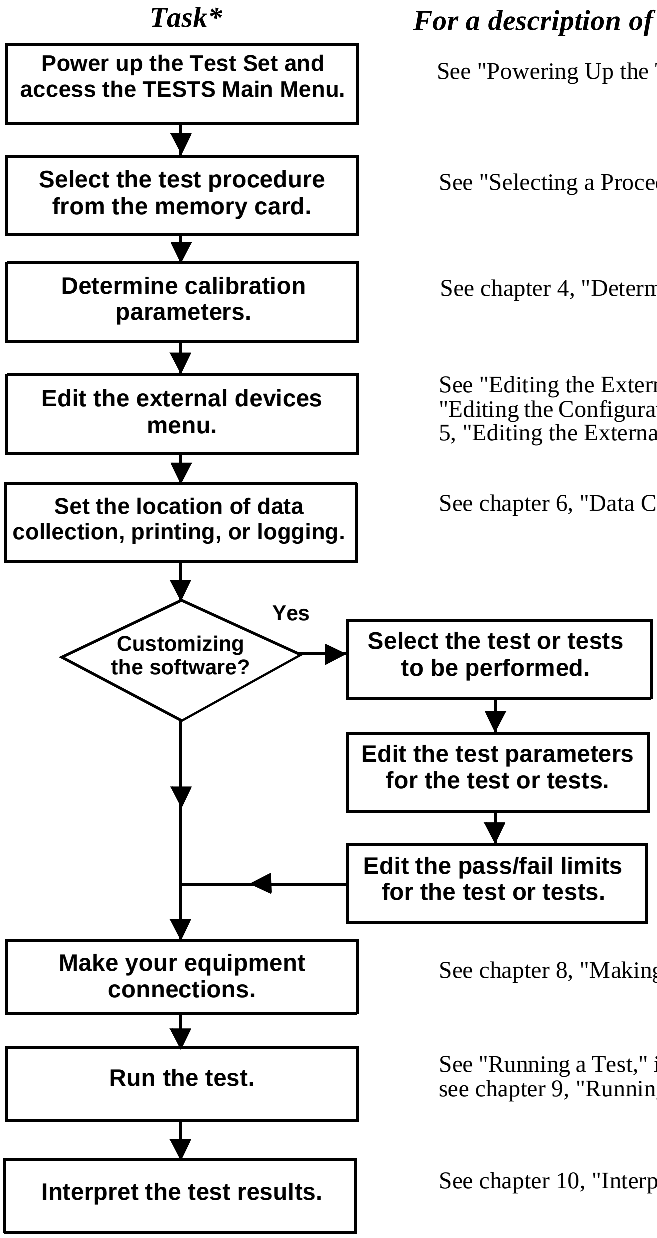
A chapter has been designated to represent each block of the *"Task Flow Diagram" on page 17*. Although the order of the task flow boxes are interchangeable in some instances, it is recommended that first time users follow the tasks in the order they are presented. A task flow diagram is provided at the beginning of each chapter. The task flow box corresponding to that chapter will be shaded.

This software package and this manual can be used with Test Sets of all firmware revision levels above A.06.09. At firmware revision level A.14.00, the layout and nomenclature of the Test Set’s screens was changed. To accomodate this change some of the chapters have been separeated into two sections, one for Test Sets with firware revisions A.14.00 and above and one for firmware revisions below A.14.00 (for example A.09.01). In other places where nomenclature changes, such as field’s name, both names are given in the instructions, one of them in parenthesis ( ).

Before You Begin Testing

If you are unfamiliar with the HP 8921A or its test software, it is recommended that you first complete the procedures outlined in *chapter 3, "Getting Started," on page 19*. Using the getting started guide is the most efficient way to learn how to use this software package and to begin testing.

Task Flow Diagram



For a description of the task or related information:

See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or see "Editing the Configuration Menu" on page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or see "Editing the Edit Specifications Menu" on page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

3 Getting Started

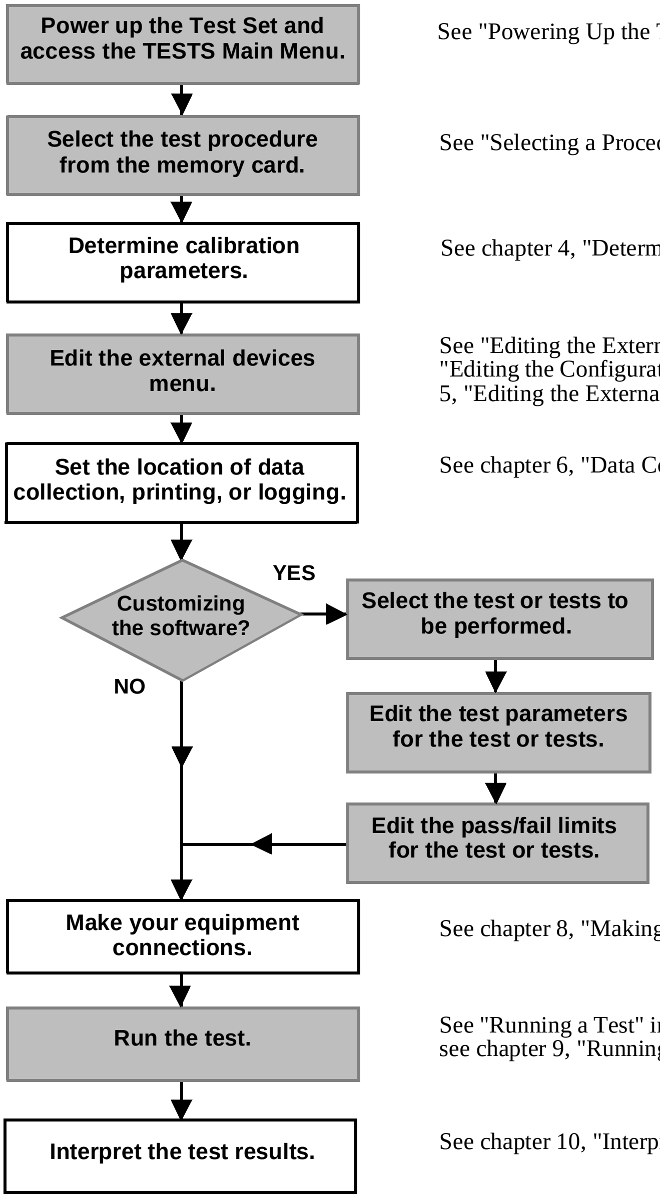
What’s included in this chapter:

- Introduction
- Getting Started with Firmware Revision Level A.14.00 and Above
- Getting Started with Firmware Revision Level Below A.14.00

Task Flow Diagram

*Task**

For a description of the task or related information:



See "Powering Up the Test Set" in chapter 3, on page 24 or page 46.

See "Selecting a Procedure" in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu" in chapter 3, on page 29 or see "Editing the Configuration Menu" on page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test" in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters" in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits" in chapter 3, on page 39 or see "Editing the Edit Specifications Menu" on page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test" in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

The purpose of this chapter is to familiarize you with the HP 11807B Option 070 Motorola Micro C·I·T·Ebase station software.

How to use this chapter

This chapter will teach you the some of the skills necessary for completing a test. Before you begin the getting started procedure, complete the following five preliminary steps:

Step One: Review the Task Flow Diagram

The shaded boxes in the *"Task Flow Diagram" on page 20* represent the tasks that will be taught in the getting started procedure.

Step Two: Equipment Needed

The following equipment is needed to complete the "Getting Started" procedure:

- HP 8921A Test Set
- HP 11807B Option 070 Motorola Micro C·I·T·E base station testing software card

The "Getting Started" procedures operate in the software demo mode. Therefore, actual base station connections are not required.

Step Three: Maneuvering the Test Set’s Cursor

Throughout this manual, the terms “position” and “select” are used to describe the action of the cursor.

To position the cursor

To position the cursor, rotate the CURSOR CONTROL knob on the front panel of the Test Set. See figure 1 below. Turning the knob moves the cursor from field to field or from menu item to menu item.

To select an item

To select an item, position the cursor next to the item and then push the CURSOR CONTROL knob. See figure 1 below. After selection, the item is underlined, or the background of the item selected becomes highlighted, or the item selected appears in an associated field.

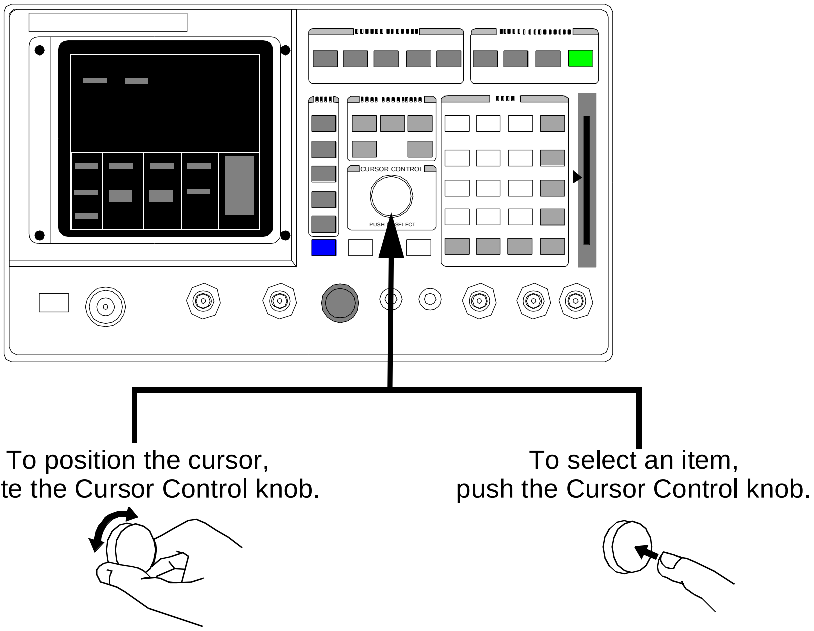


Figure 1 **Maneuvering the Test Set’s Cursor**

Step Four: Determining Your Firmware Revision Level

The "Getting Started" chapter is separated into two sections, one for firmware *revision level A.14.00 or above*, and one for firmware revision levels *below* A.14.00.

To determine your firmware level:

1. Press the SHIFT key and then press the DUPLEX key.

   The shift key allows you to access the CONFIG function printed in blue text.

2. Record your firmware revision level.

   Your firmware revision level is located in the upper right hand corner of the Test Set’s screen. Note whether it is below A.14.00.

NOTE: Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your Test Set’s firmware level if desired.

Step Five: Begin the Getting Started Procedure

- For firmware revision levels *A.14.00 and above* refer to *page 24*.
- For firmware revision levels *below* A.14.00 refer to *page 46*.

Getting Started With Firmware Revision Level A.14.00 And Above

Powering Up the Test Set

The following will guide you through the necessary steps to power up the Test Set and access the TESTS (Main Menu) screen.

The TESTS (Main Menu) screen allows access to the functions and submenus used to load, customize, and run automated test programs.

To power up the Test Set and access the TESTS (Main Menu) screen:

(Refer to the illustration below for steps 1 through 3.)

1 Press the POWER button to power-up the Test Set and wait for the RX TEST screen to appear.

2 Insert the HP 11807B Option 070 memory card into the Test Set's memory card slot.

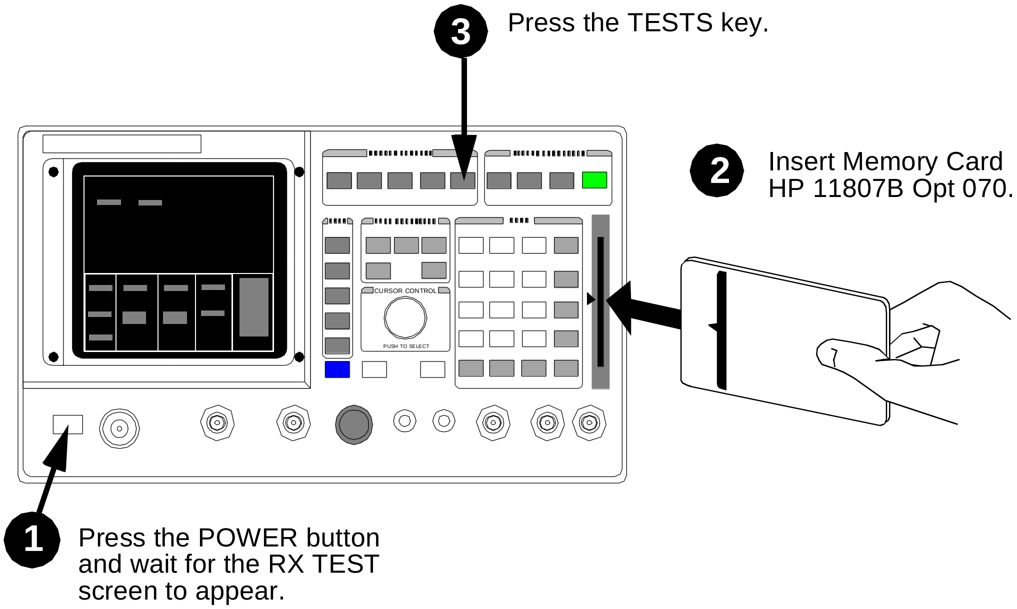
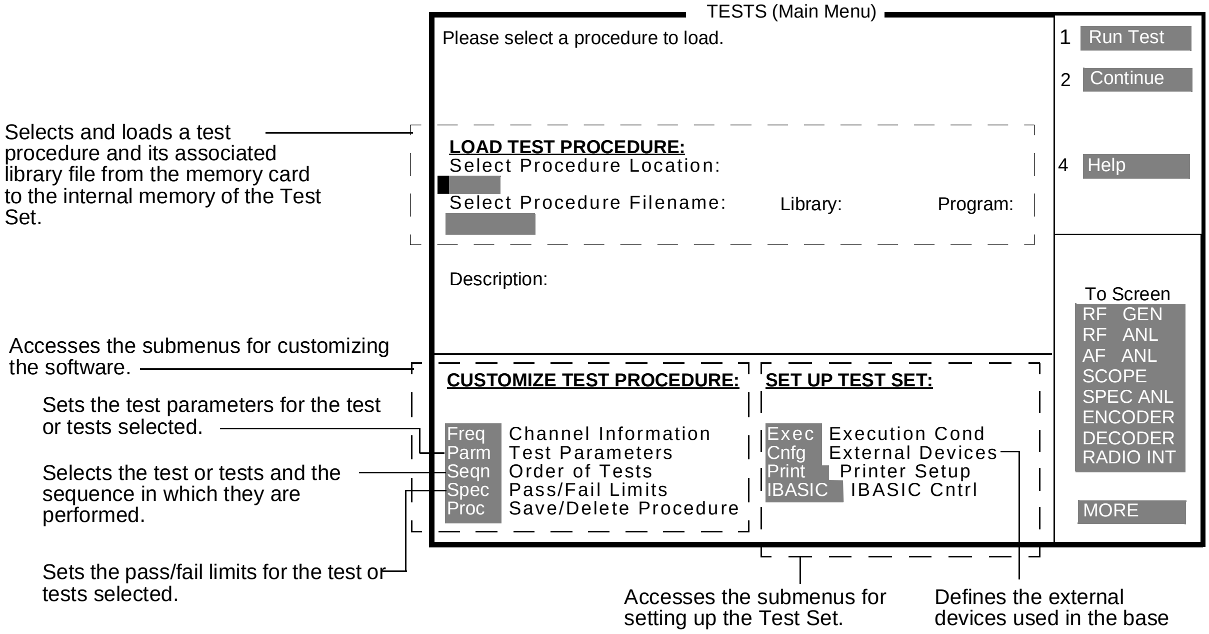


Figure 2

3 Press the TESTS key.

The TESTS (Main Menu) shown in figure 3appears.



Please select a procedure to load.

LOAD TEST PROCEDURE:

Select Procedure Location:

Select Procedure Filename:

Library:

Program:

Description:

Selects and loads a test procedure and its associated library file from the memory card to the internal memory of the Test Set.

Accesses the submenus for customizing the software.

Sets the test parameters for the test or tests selected.

Selects the test or tests and the sequence in which they are performed.

Sets the pass/fail limits for the test or tests selected.

Accesses the submenus for setting up the Test Set.

Defines the external devices used in the base

Figure 3

NOTE: The TESTS (Main Menu) screen that is displayed on your Test Set may not look like the blank screen in figure 3. It will usually include other information.

The TESTS (Main Menu) screen comprises three main parts:

- **LOAD TEST PROCEDURE**

  The **`LOAD TEST PROCEDURE`** section of the TESTS (Main Menu) is used to select a test procedure and its associated library file from the memory card. Once selected, both the procedure and library files are stored in the internal memory of the Test Set.

- **CUSTOMIZE TEST PROCEDURE**

  The functions under the **`CUSTOMIZE TEST PROCEDURE`** section of the main menu access the submenus needed for selecting, saving, deleting tests; and for editing the tests’ parameters and pass/fail limits of the test or tests selected.

- **SET UP TEST SET**

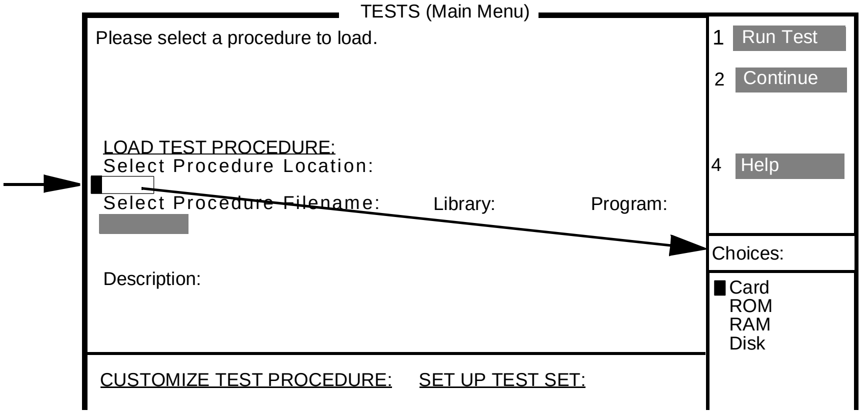
  The functions under the `SET UP TEST SET` section of the main menu access the submenus needed for configuring the Test Set with external devices, and for accessing the IBASIC controller.

Selecting a Procedure

To select a procedure:

1 Position the cursor in the **`Select Procedure Location`** field and select it.

The **`Choices:`** menu appears in the lower-right corner of the screen (see figure 4).



Please select a procedure to load.

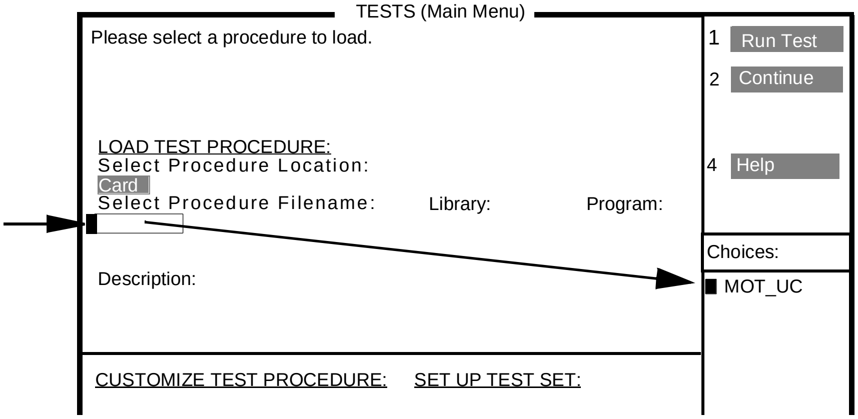
Figure 4

2 In the **`Choices:`** menu, position the cursor and select the **`Card`** option.

"**`Card`**" appears in the **`Select Procedure Location`** field (see figure 5).

3 Position the cursor in the **`Select Procedure Filename`** field and select it (see figure 5).

One or more options appear in the **`Choices:`** menu.



Please select a procedure to load.

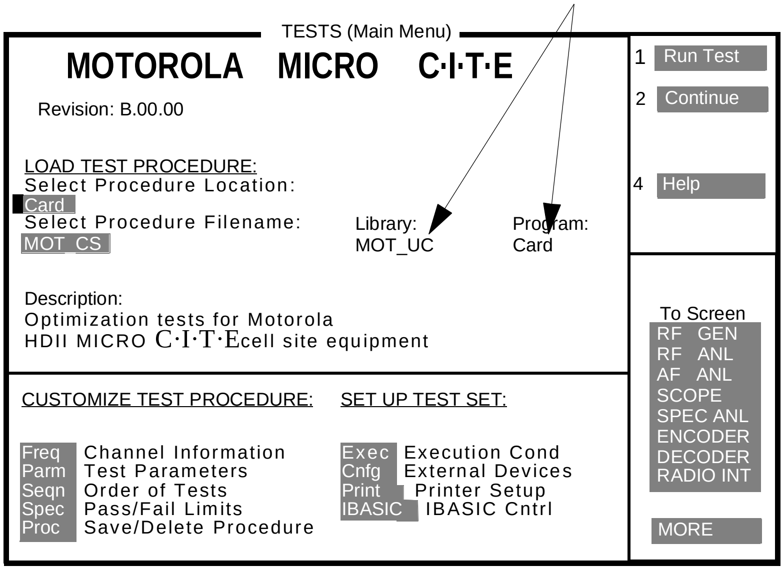
Select Procedure Location: Card

Figure 5

4 In the `Choices:` menu, position the cursor and select `MOT_UC` filename.

The TESTS (Main Menu) screen's `Library` and `Program` fields are automatically filled (see figure 6).

Library and Program fields



TESTS (Main Menu)

MOTOROLA MICRO C·I·T·E

Revision: B.00.00

LOAD TEST PROCEDURE:
Select Procedure Location:
Card
Select Procedure Filename:
MOT_CS

Library:
MOT_UC

Program:
Card

Description:
Optimization tests for Motorola
HDII MICRO C·I·T·Ecell site equipment

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

SET UP TEST SET:
Exec Execution Cond
Cnfg External Devices
Print Printer Setup
IBASIC IBASIC Cntrl

Figure 6

When you select a test procedure you are loading a library file and a procedure file.

- A library file can be thought of as a reference file. It contains the names and numbers of all the parameters, pass/fail limits, and tests in the software program. The library file cannot be changed.
- A procedure file is different from the library file in that it contains the values for all of the parameters, pass/fail limits, and tests in the software program. You can use the default values or enter your own values.

Editing the External Devices Menu

The Configure External Devices function, **`Cnfg External Devices`**, accesses the TESTS (External Devices) screen. This screen is used to define the external equipment you will use during testing, such as a RF switch or duplexer. The software uses your entries into the TESTS (External Devices) screen to provide connection diagrams during testing. This screen is also used to configure the Test Set for printing, data collection, or logging of base station messages.

The following instruction configures the Test Set for testing with a duplexer:

1 On the TESTS (Main Menu), position the cursor and select **`Cnfg External Devices`**. The TESTS (External Devices) screen appears (see figure 7).

2 Position the cursor next to the instruction-number**, `Inst#`,** field and select it.

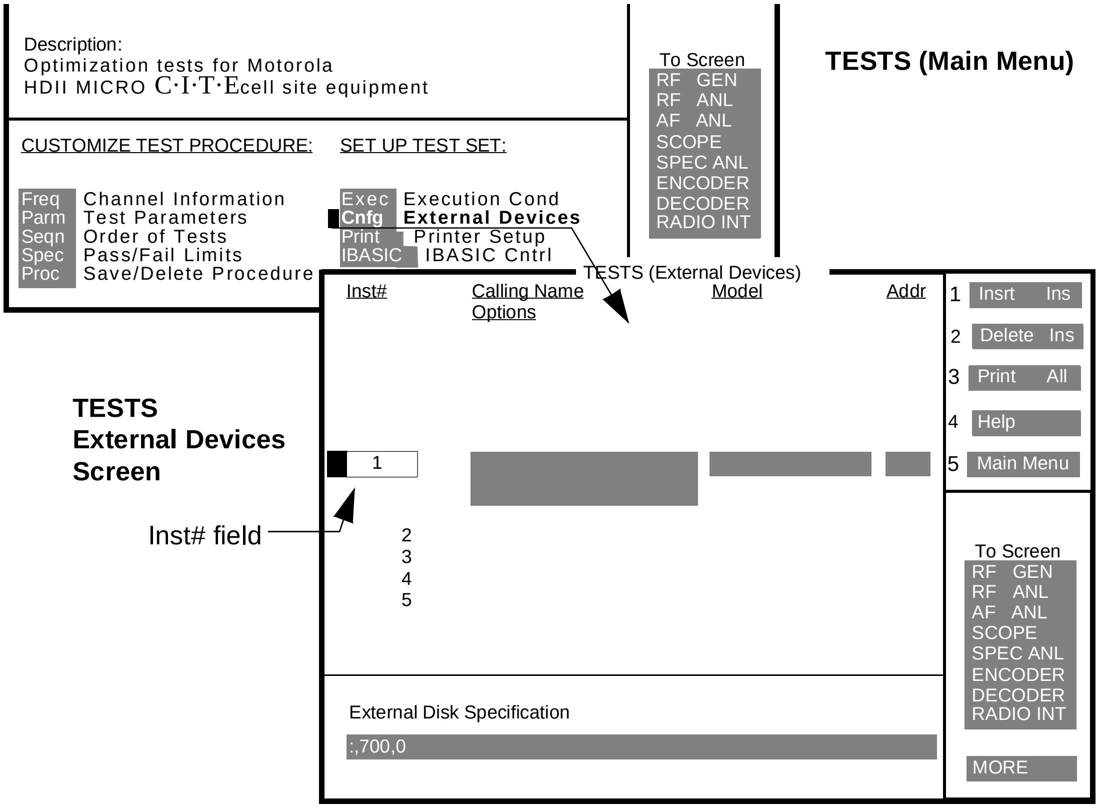


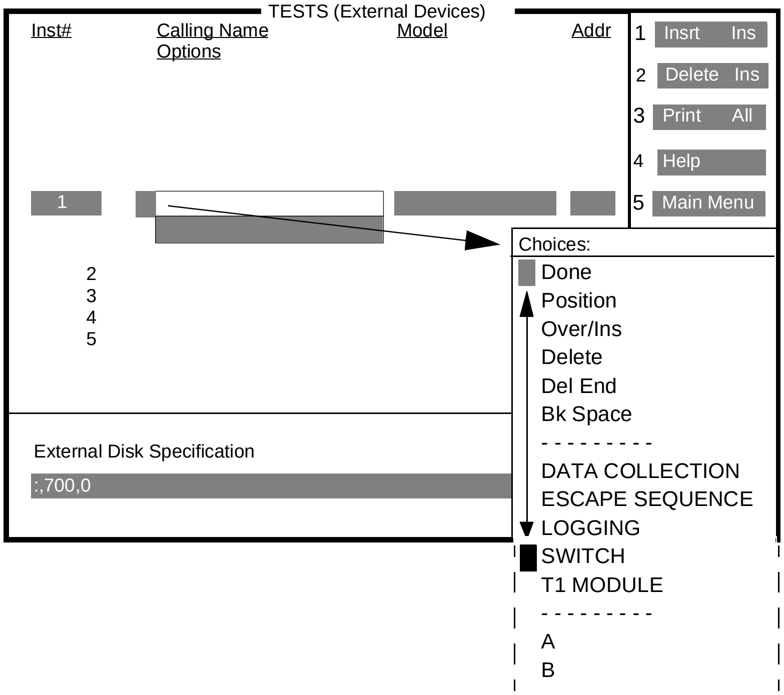
Figure 7

3 Using the DATA keypad on the front panel of the Test Set, press the 1 key and then the ENTER key for the program to accept the entry.

A "1" appears in the **`Inst#`** field (see figure 8).

4 Position the cursor next to the **`Calling Name Options`** field and select it.

The field is highlighted and the **`Choices:`** menu appears with the cursor positioned next to the **`Done`** option (see figure 8).



External Disk Specification

:,700,0

Figure 8

5 Position the cursor and select **`SWITCH`**.

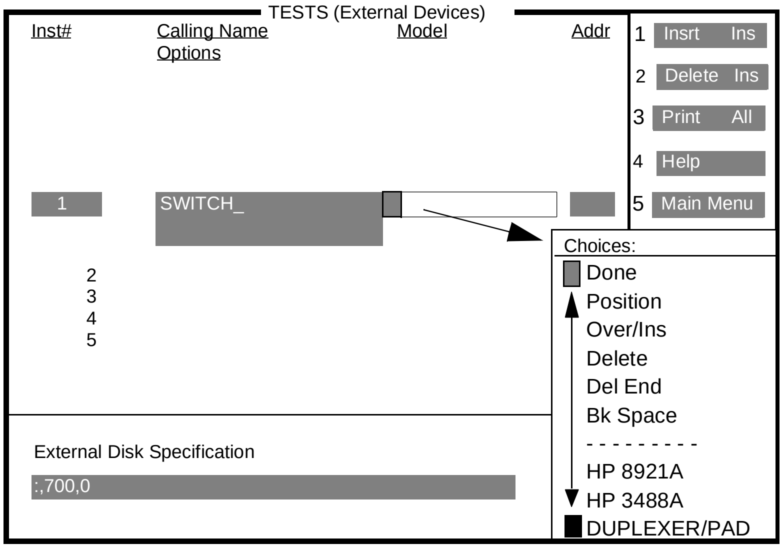
"**`SWITCH_`**" appears in the **`Calling Name Options`** field (see figure 9).

6 Re-position the cursor and select **`Done`**.

The **`Calling Name Options`** field is deselected.

7 Position the cursor next to the **`Model`** field and select it.

The **`Choices:`** menu appears with a new set of options (see figure 9).



Calling Name Options: SWITCH_

External Disk Specification

:,700,0

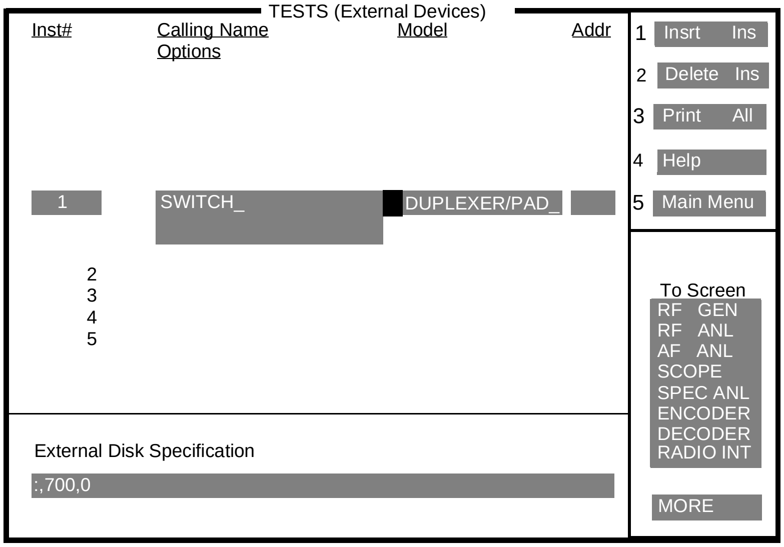
Figure 9

8 Position the cursor and select **`DUPLEXER/PAD`**.

"**`DUPLXER/PAD`**" appears in the **`Model`** field (see figure 10).

9 Re-position the cursor and select **`Done`**.

The screen should look similar to the screen shown in figure 10.



TESTS (External Devices)

Inst#	Calling Name Options	Model	Addr
1	SWITCH_	DUPLEXER/PAD_	
2			
3			
4			
5			

External Disk Specification

:,700,0

Figure 10

10 Press the TESTS key to return to the TESTS (Main Menu).

This concludes configuring the Test Set for use with a duplexer.

Selecting a Test

The TESTS (Order of Tests) screen, shown in figure 11, is used to select the test or tests for testing. For simplicity, only one test, TEST_04, is selected in the following instructions.

To select a test:

1 If you are not already at the TESTS (Main Menu), press the TESTS key.

2 On the TESTS (Main Menu) screen, position the cursor and select **`Seqn Order of Tests`**.

The TESTS (Order of Tests) menu appears.

3 Position the cursor and select the **`Step#`** field.

The field is highlighted (see figure 11).

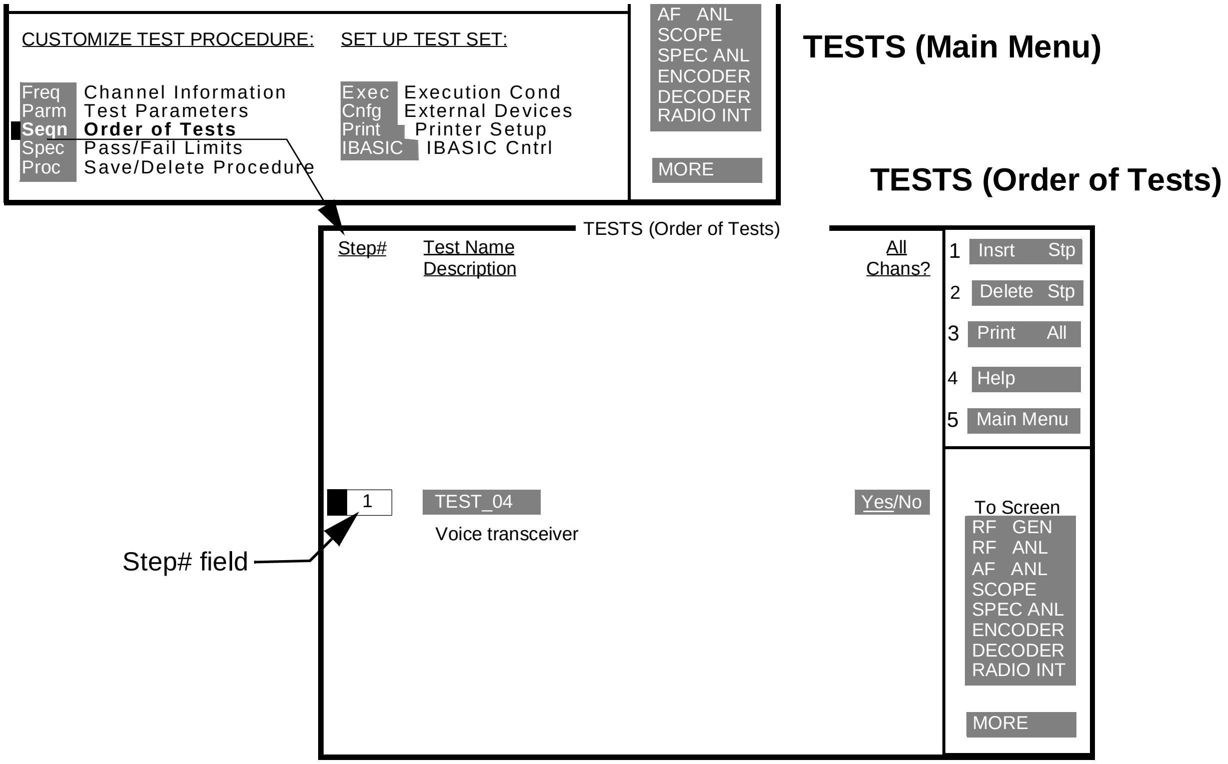


Figure 11

4 Using the DATA keypad on the front panel of the Test Set, press the 1 key, and then press the ENTER key for the program to accept the entry.

A "`1`" appears in the `Inst#` field.

5 Position the cursor and select the `Test Name Description` field.

The `Choices:` menu appears (see figure 12).

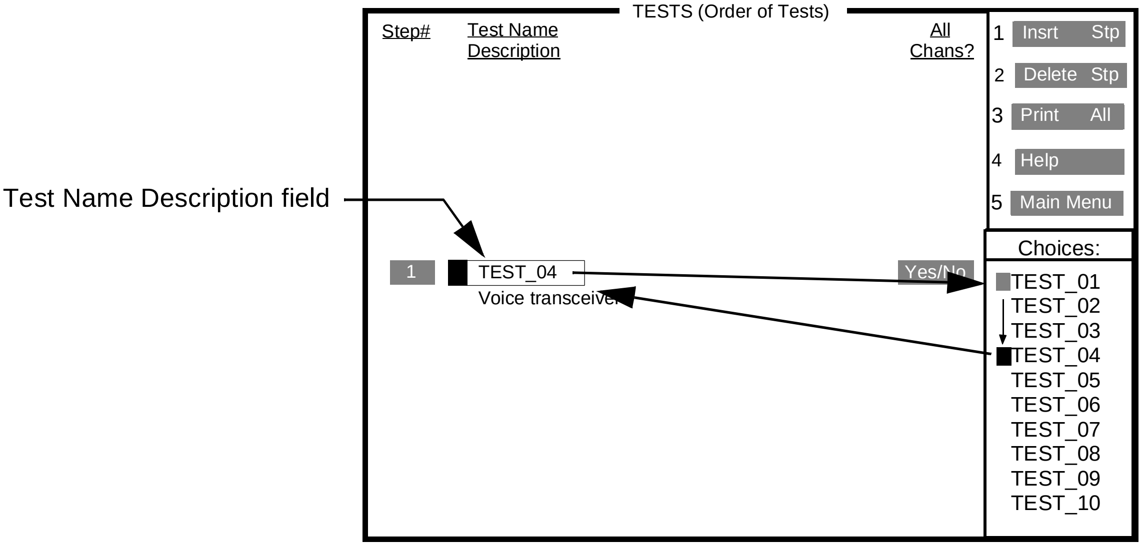


Figure 12

6 Position the cursor and select **`TEST_04`** in the **`Choices:`** menu.

"**`TEST_04`**" appears in the **`Test Name Description`** field, and the field is de-selected.

7 Position the cursor next to the `ALL Chans?` field and select it until the **`No`** response is *underlined*.

Pushing the CURSOR CONTROL knob toggles between the Yes and No response; the selected response is underlined. The `All Chan?` field instructs the software whether or not to execute this test on all channels in the frequency table of the Test Set. Frequency tables are not used in the software.

8 Press the TESTS key to return to the TESTS (Main Menu).

This concludes the "Selecting a Test" procedure.

Editing the Test Parameters

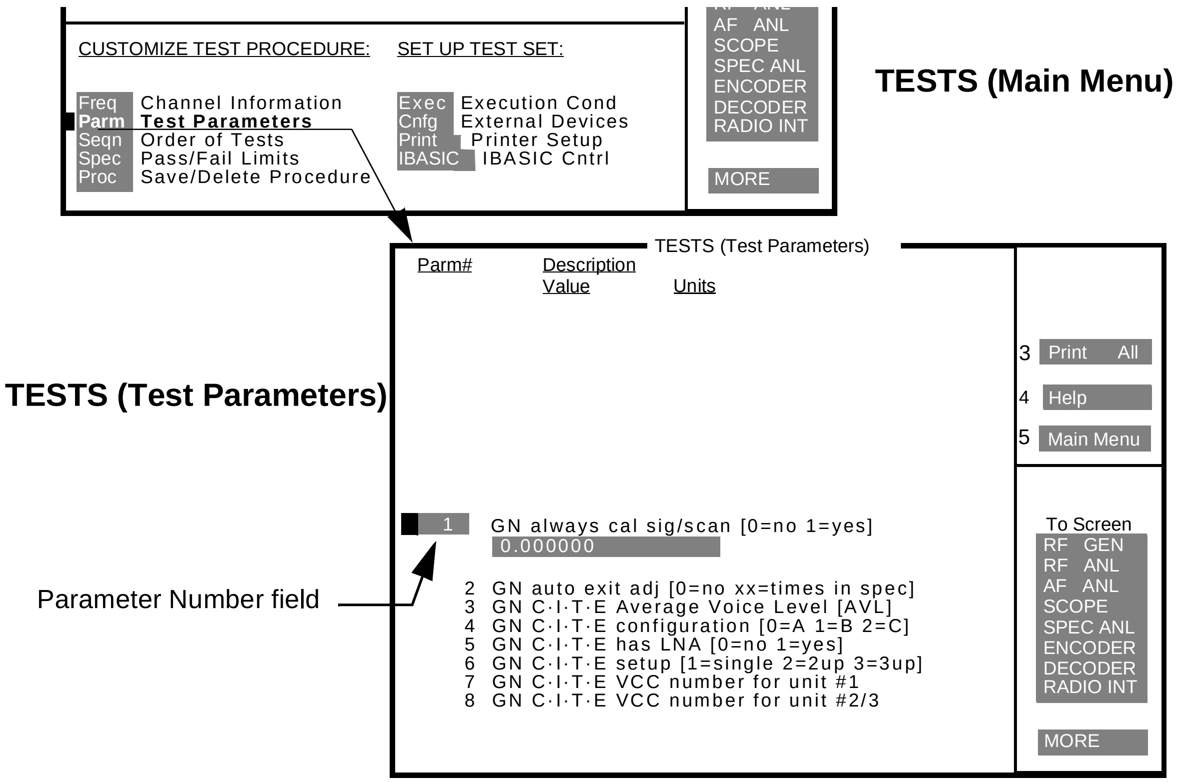
Test parameters are used by the software to define the conditions under which a test will run. Each test description contains a list of parameters associated with the test that must be edited before running it. In this exercise we will edit two parameters, the *GN C.I.T.E configuration* parameter and the demo-mode parameter (which places the Test Set in demo mode).

To edit the Test parameters:

1 If the TESTS (Main Menu) is not already displayed, press the TESTS key.

2 On the TESTS (Main Menu), position the cursor and select the test parameter function, `Parm Test Parameters`.

The TESTS (Test Parameters) screen appears (see figure 3).

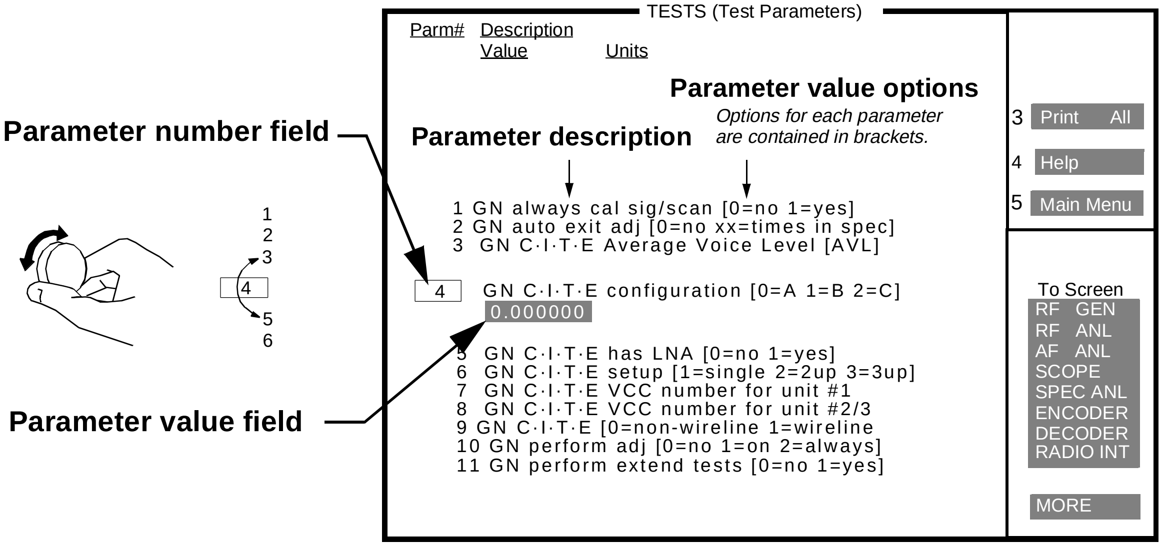


```
 1   GN always cal sig/scan [0=no 1=yes]
     0.000000

 2   GN auto exit adj [0=no xx=times in spec]
 3   GN C·I·T·E Average Voice Level [AVL]
 4   GN C·I·T·E configuration [0=A 1=B 2=C]
 5   GN C·I·T·E has LNA [0=no 1=yes]
 6   GN C·I·T·E setup [1=single 2=2up 3=3up]
 7   GN C·I·T·E VCC number for unit #1
 8   GN C·I·T·E VCC number for unit #2/3
```

Figure 13

3 Position the cursor and select the parameter number (`Parm#`) field.

The field is highlighted. Rotating the CURSOR CONTROL knob while this field is highlighted allows you to scroll through the list of parameter descriptions and values. That is, each time you rotate the CURSOR CONTROL knob, a different parameter number appears in the parameter number field, and this parameter’s description and value appear next to it as shown in figure 14.

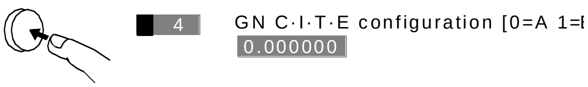


```
1 GN always cal sig/scan [0=no 1=yes]
2 GN auto exit adj [0=no xx=times in spec]
3  GN C·I·T·E Average Voice Level [AVL]

 4    GN C·I·T·E configuration [0=A 1=B 2=C]
      0.000000

5   GN C·I·T·E has LNA [0=no 1=yes]
6   GN C·I·T·E setup [1=single 2=2up 3=3up]
7   GN C·I·T·E VCC number for unit #1
8   GN C·I·T·E VCC number for unit #2/3
9 GN C·I·T·E [0=non-wireline 1=wireline
10 GN perform adj [0=no 1=on 2=always]
11 GN perform extend tests [0=no 1=yes]
```

Figure 14

4 Rotate the CURSOR CONTROL knob to parameter number 4, **`GN C.I.T.E configuration [0=A 1=B 2=C]`**, and select it.

The parameter number field is deselected (unhighlighted), see figure 15.

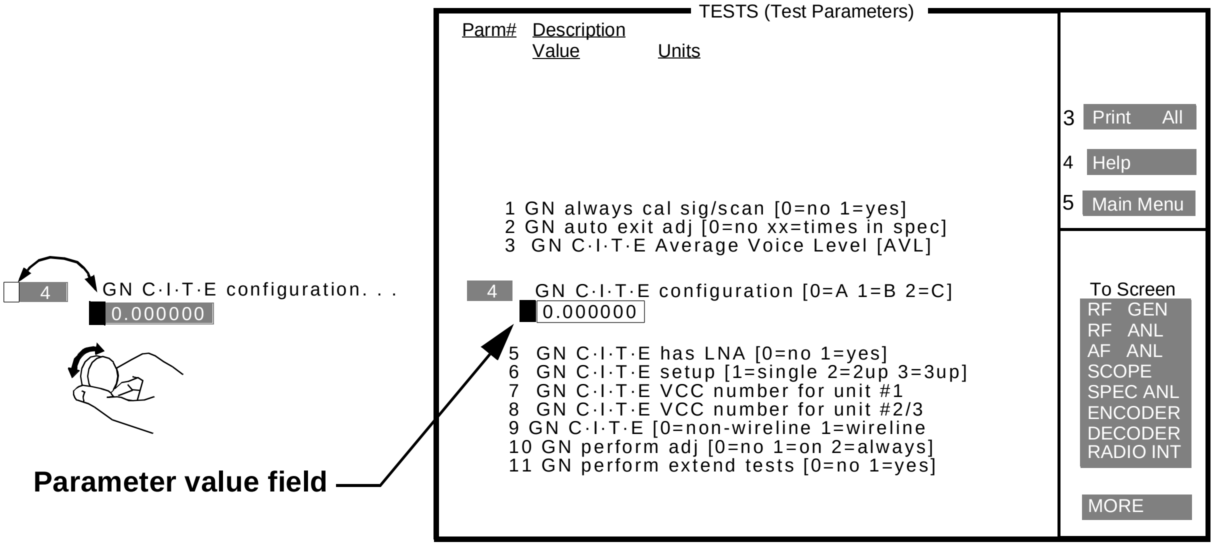


```
GN C·I·T·E configuration [0=A 1=
0.000000
```

Figure 15

5 Rotate the CURSOR CONTROL knob to move the cursor to the parameter value field and select it.

The field is highlighted (see figure 16).



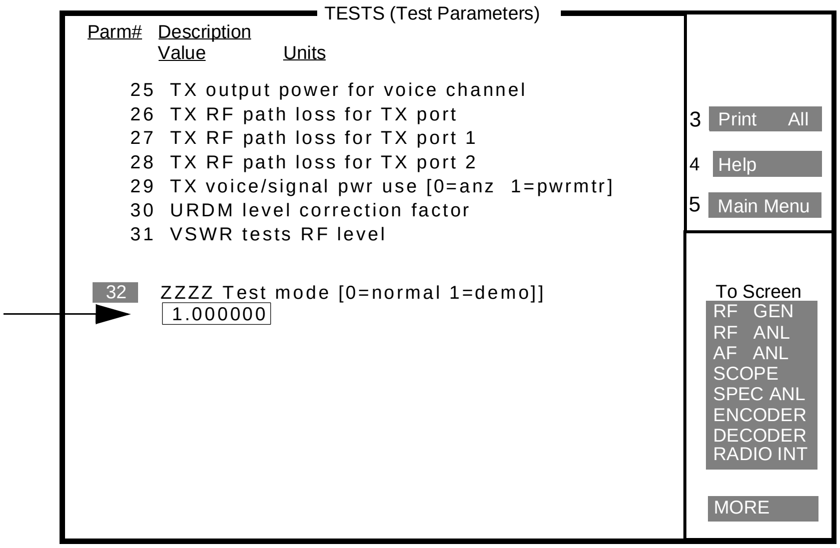
```
 1 GN always cal sig/scan [0=no 1=yes]
 2 GN auto exit adj [0=no xx=times in spec]
 3  GN C·I·T·E Average Voice Level [AVL]

 4   GN C·I·T·E configuration [0=A 1=B 2=C]
      0.000000

 5  GN C·I·T·E has LNA [0=no 1=yes]
 6  GN C·I·T·E setup [1=single 2=2up 3=3up]
 7  GN C·I·T·E VCC number for unit #1
 8  GN C·I·T·E VCC number for unit #2/3
 9 GN C·I·T·E [0=non-wireline 1=wireline
 10 GN perform adj [0=no 1=on 2=always]
 11 GN perform extend tests [0=no 1=yes]
```

Figure 16

6 Enter 0 using the DATA keypad on the front panel of the Test Set, and then press the ENTER key for the program to accept the entry.

7 Re-position the cursor and select the parameter number field again.

8 Using the techniques learned above, scroll to parameter 32, **`ZZZ Test mode [0=normal 1=demo]`**, and enter 1 for “demo” mode in the value field (see figure 17).



```
TESTS (Test Parameters)
Parm#  Description
       Value          Units

  25  TX output power for voice channel
  26  TX RF path loss for TX port
  27  TX RF path loss for TX port 1
  28  TX RF path loss for TX port 2
  29  TX voice/signal pwr use [0=anz  1=pwrmtr]
  30  URDM level correction factor
  31  VSWR tests RF level

 32   ZZZZ Test mode [0=normal 1=demo]]
       1.000000
```

Figure 17

9 Press the ENTER key for the program to accept the entry.

Demo mode allows the software to run a test without actual base station connections. It will simulate how the test will operate and provide measurement results.

10 Press the TESTS key to return to the TESTS (Main Menu).

This concludes the "Editing the Test Parameters" procedure.

Editing the Pass/Fail Limits

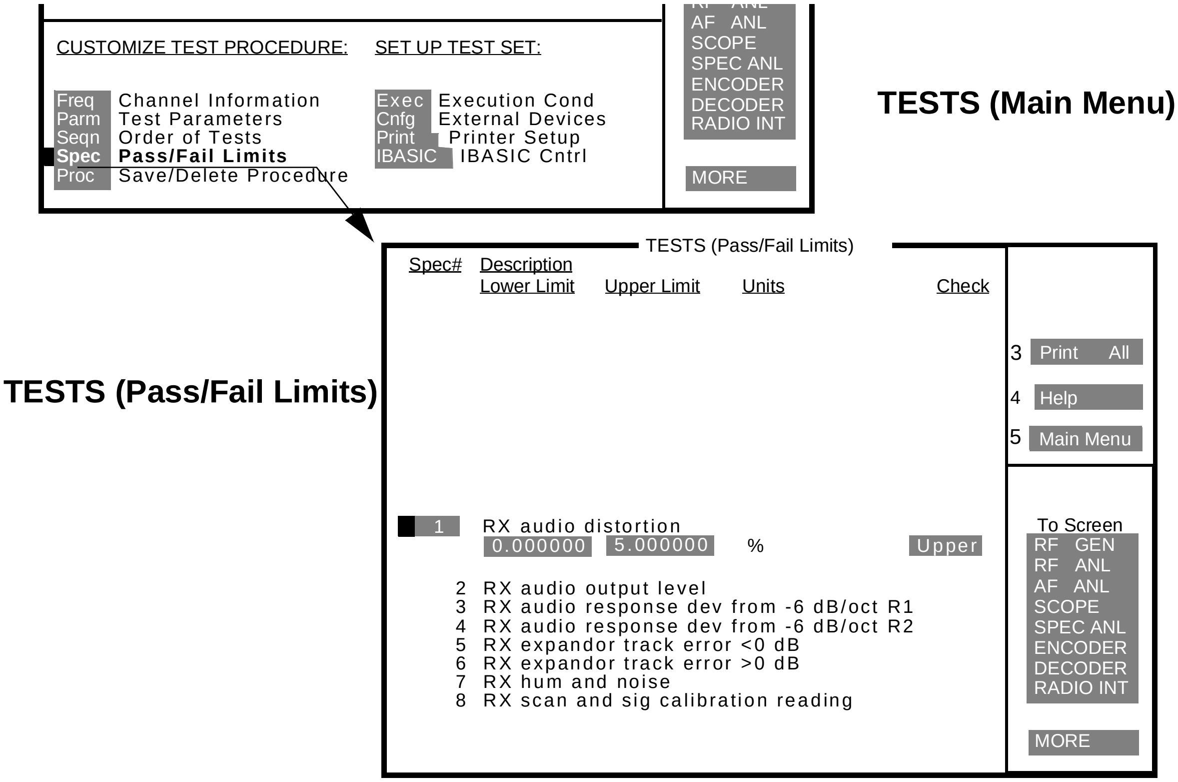
Pass/fail limits define the upper and lower limits of the measurement result. When the software completes a measurement, it compares the measured results against its pass/fail limits to determine if the unit-under-test (UUT) passed or failed a measurement. Normally, the user will edit the pass/fail limit values to correspond to industry standards.

To edit the pass/fail limits:

1 If the TESTS (Main Menu) screen is not already displayed, press the TESTS key.

2 On the TESTS (Main Menu), position the cursor and select **`Spec Pass/Fail Limits`**.

The TESTS (Pass/Fail Limits) screen appears (see figure 18).



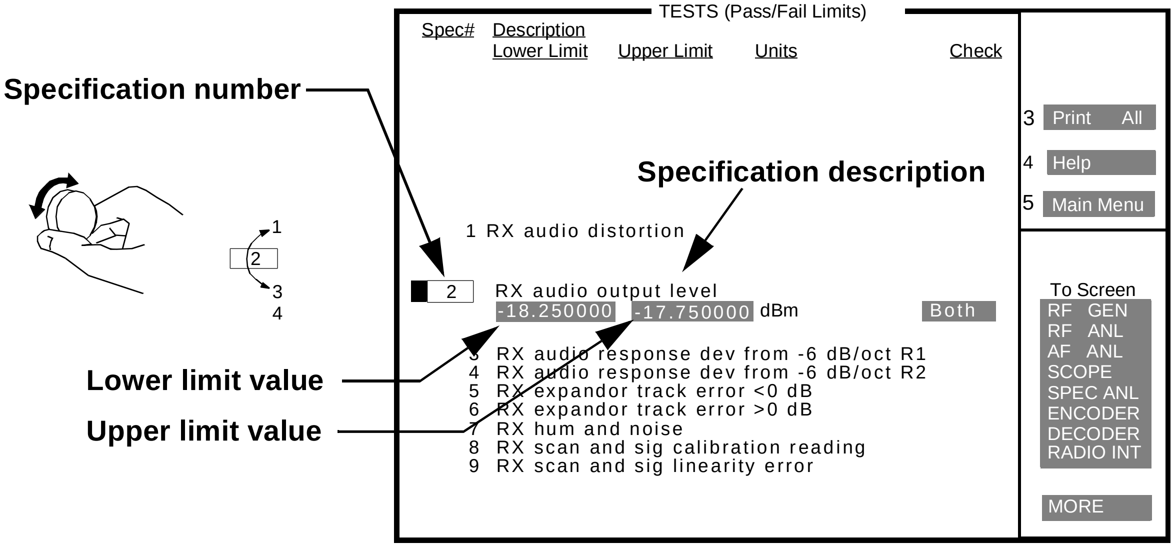
1 RX audio distortion
0.000000 5.000000 % Upper

2 RX audio output level
3 RX audio response dev from -6 dB/oct R1
4 RX audio response dev from -6 dB/oct R2
5 RX expandor track error <0 dB
6 RX expandor track error >0 dB
7 RX hum and noise
8 RX scan and sig calibration reading

Figure 18

3 Position the cursor and select the specification number (`Spec#`) field.

This field becomes highlighted (see figure 19). Rotating the CURSOR CONTROL knob while this field is highlighted allows you to scroll through the list of specification numbers. Each specification number has an associated description and pass/fail specification, that is, a lower and upper limit value.

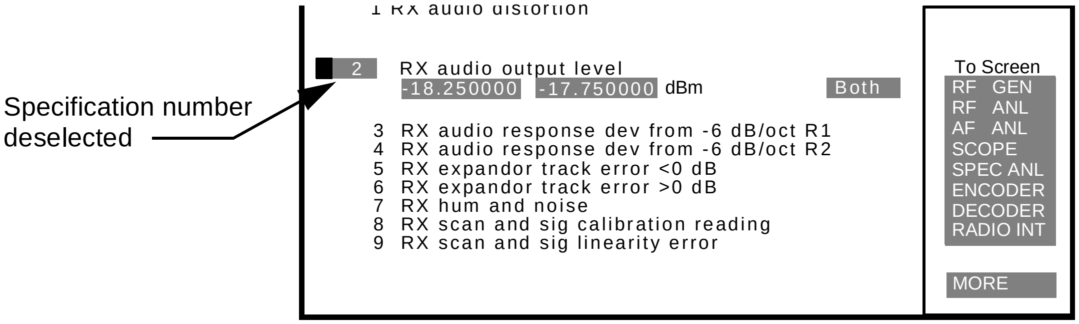


```
TESTS (Pass/Fail Limits)
Spec#  Description
       Lower Limit   Upper Limit   Units                Check

1 RX audio distortion
2 RX audio output level
  -18.250000   -17.750000  dBm                          Both
3 RX audio response dev from -6 dB/oct R1
4 RX audio response dev from -6 dB/oct R2
5 RX expandor track error <0 dB
6 RX expandor track error >0 dB
7 RX hum and noise
8 RX scan and sig calibration reading
9 RX scan and sig linearity error
```

Figure 19

4 Rotate the CURSOR CONTROL knob to move the cursor to specification number 2 and select it.

The `Spec#` field is deselected (see figure 20).



```
1 RX audio distortion

2 RX audio output level
  -18.250000   -17.750000  dBm                          Both

3 RX audio response dev from -6 dB/oct R1
4 RX audio response dev from -6 dB/oct R2
5 RX expandor track error <0 dB
6 RX expandor track error >0 dB
7 RX hum and noise
8 RX scan and sig calibration reading
9 RX scan and sig linearity error
```

Figure 20

5 Rotate the CURSOR CONTROL knob to move the cursor to the **`Lower Limit`** value field and select it (see figure 21).

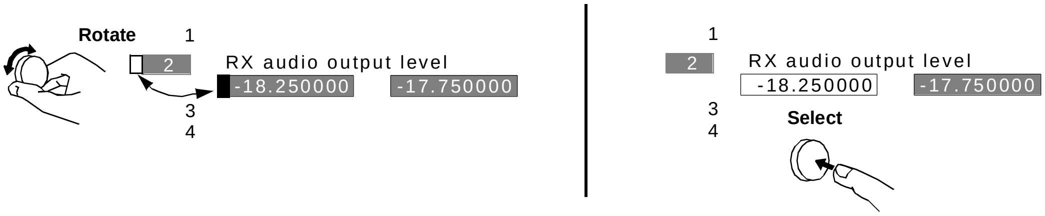


Figure 21

6 In the **`Lower Limit`** value field, enter -18.000000 (or other desired value) using the DATA keypad on the front panel of the TEST SET, and then press the ENTER key for the program to accept the entry. The field is deselected.

7 Rotate the CURSOR CONTROL knob to move the cursor and select the **`Upper Limit`** value field (see figure 22).

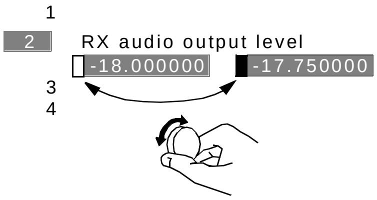
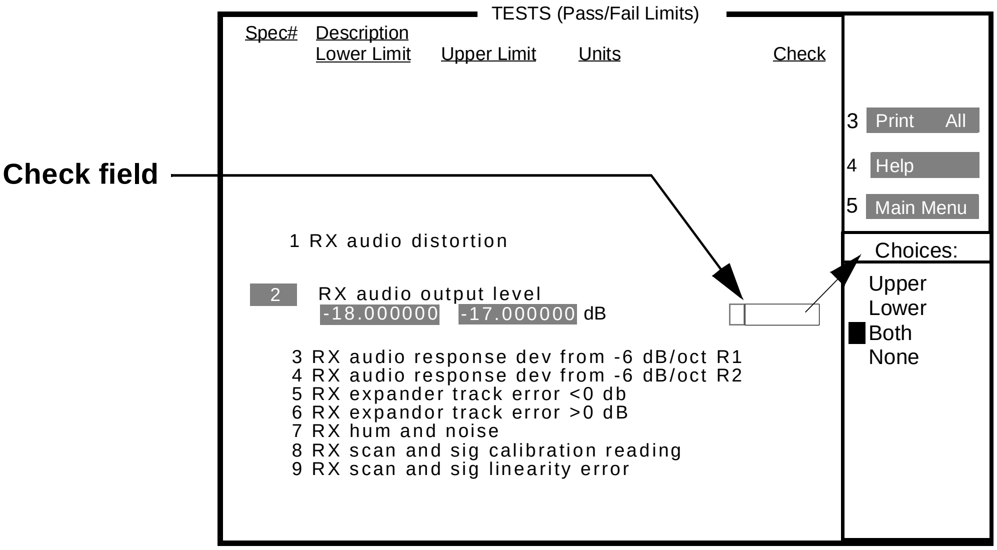


Figure 22

8 In the **`Upper Limit`** value field, enter -17.000000 (or other desired value) using the DATA keypad on the front panel, and then press the ENTER key for the program to accept the entry.

9 Position the cursor and select the `Check` field.

The `Choices:` menu appears (see figure 23). The `Check` field allows you to select whether to compare the measurement's results with the upper limit, lower limit, both upper and lower limits, or just report the value without comparing the results.



```
Spec#  Description
       Lower Limit   Upper Limit   Units                Check

   1 RX audio distortion

 2    RX audio output level
       -18.000000   -17.000000 dB

   3 RX audio response dev from -6 dB/oct R1
   4 RX audio response dev from -6 dB/oct R2
   5 RX expander track error <0 db
   6 RX expandor track error >0 dB
   7 RX hum and noise
   8 RX scan and sig calibration reading
   9 RX scan and sig linearity error
```

Figure 23

10 In the `Choices:` menu, position the cursor and select `Both`.

"`Both`" appears in the `Check` field.

11 Press the TESTS key to return to the TESTS (Main Menu).

This concludes the "Editing the Pass/Fail Limits" procedure.

Running a Test

Once you have selected a test and edited the parameters and pass/fail limits associated with it, the next step is to run the test.

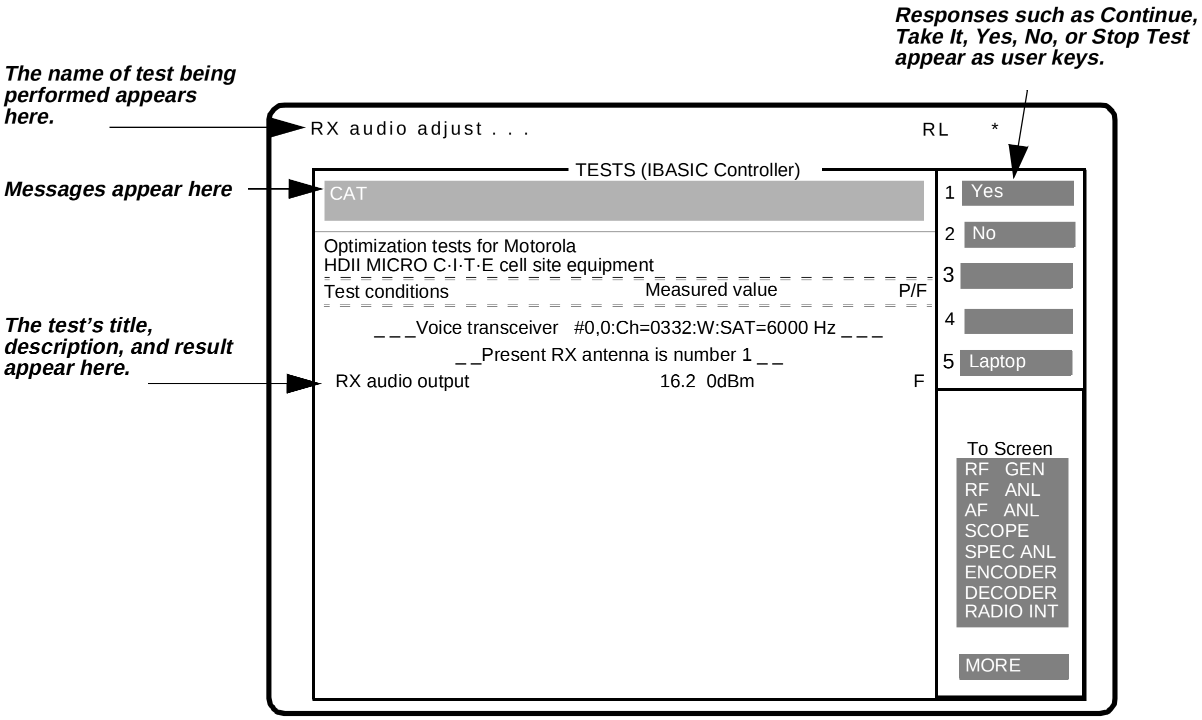
Remember that you edited the parameters so the software will run in demo mode. In this mode, the software simulates actual base station responses and formulates measurement results as if actual base station connections existed.

To run a test:

1 If you are not already at the TESTS (Main Menu), press the TESTS key.

2 Press the k1 **`(Run Test)`** key.

The TESTS (IBASIC Controller) screen appears (see figure 24).



Responses such as Continue, Take It, Yes, No, or Stop Test appear as user keys.

The name of test being performed appears here.

Messages appear here

The test's title, description, and result appear here.

RX audio adjust . . .

RL *

TESTS (IBASIC Controller)

CAT

Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test conditions	Measured value	P/F
___Voice transceiver #0,0:Ch=0332:W:SAT=6000 Hz ___		
__Present RX antenna is number 1 __		
RX audio output	16.2 0dBm	F

Figure 24

3 Follow the instructions provided on the Test Set screen.

From this point on, the demo simulation will take you through a series of screens and ask you to select, choose, or decide various factors while the test is being run. Follow the instructions that appear on the screen.

This concludes the "Running a Test" procedure.

This also concludes the Getting Started procedure for firmware revision level A.14.00 and above.

NOTE: **In this getting started procedure, parameter *`32_ZZZZ Test mode [0=normal 1=demo]`* was edited to place the Test Set in demo mode. In order for the Test Set to perform actual tests it must be returned to its normal test mode. Edit this parameter and enter 0 to return the Test Set to normal its operation.**

Getting Started with Firmware Below Revision Level A.14.00

Powering Up the Test Set

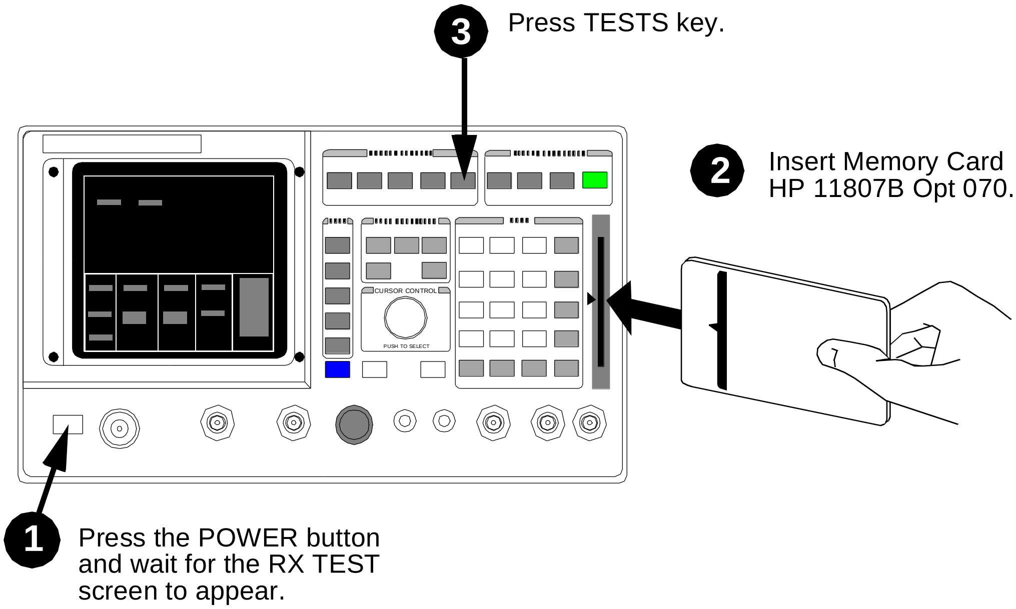
The following will guide you through the necessary steps to power up the Test Set and access the TESTS main menu screen.

To power up the Test Set and access the TESTS screen:

(Refer to the illustration below for steps 1 through 3.)

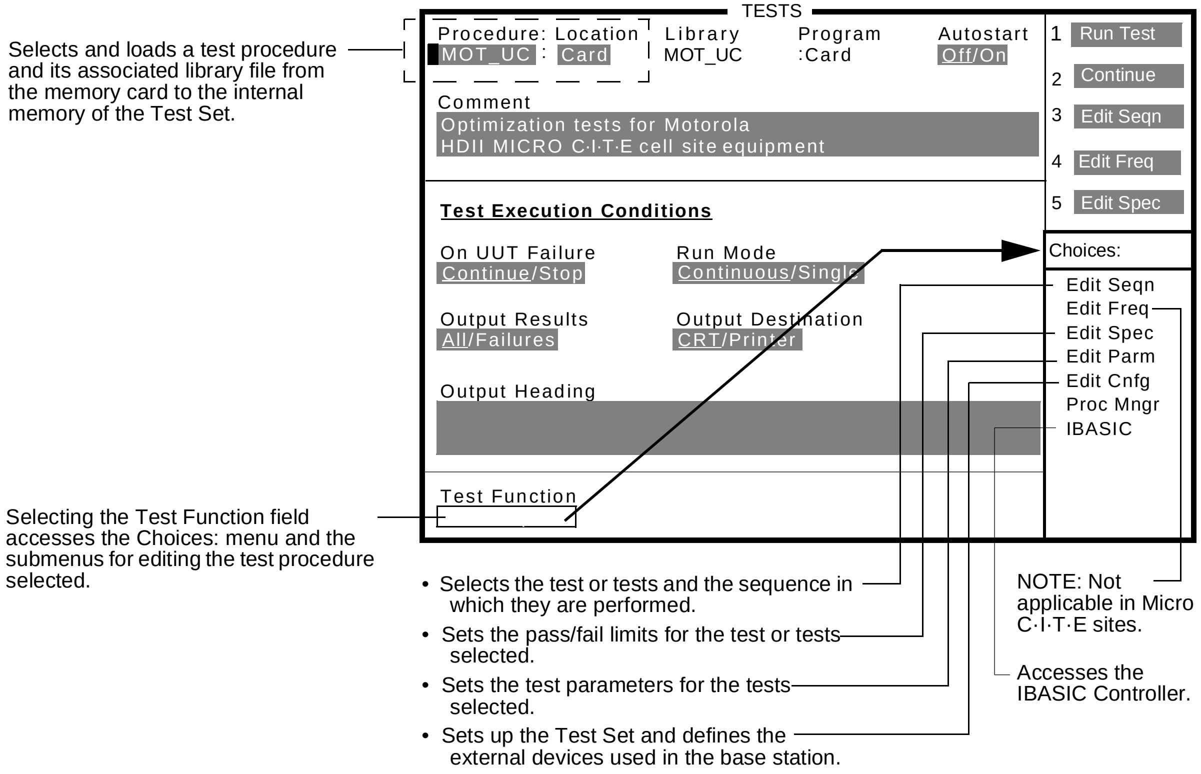
1 Press the POWER button to power-up the Test Set and wait for the RX TEST screen to appear.

2 Insert the HP 11807B Option 070 memory card into the Test Set's memory card slot.



3 Press the TESTS key.

The TESTS screen similar to the one shown in figure 25 appears.



TESTS

Procedure: MOT_UC

Location: Card

Library MOT_UC

Program :Card

Autostart Off/On

Comment

Optimization tests for Motorola HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure Continue/Stop

Run Mode Continuous/Single

Output Results All/Failures

Output Destination CRT/Printer

Output Heading

Test Function

Selects and loads a test procedure and its associated library file from the memory card to the internal memory of the Test Set.

Selecting the Test Function field accesses the Choices: menu and the submenus for editing the test procedure selected.

- Selects the test or tests and the sequence in which they are performed.
- Sets the pass/fail limits for the test or tests selected.
- Sets the test parameters for the tests selected.
- Sets up the Test Set and defines the external devices used in the base station.

NOTE: Not applicable in Micro C·I·T·E sites.

Accesses the IBASIC Controller.

Figure 25

The TESTS screen allows you to access the functions and submenus used to load, customize, and run automated test programs.

The upper portion of the menu provides the means of loading a test procedure and its associated library file from a memory card to the internal memory of the Test Set.

The `Test Function` field accesses the `Choices:` menu and the submenus for:

- editing the test parameters,
- editing the pass/fail limits,

- editing the sequence of the individual tests selected,
- configuring the Test Set with external devices, and
- accessing the IBASIC controller.

Selecting a Procedure

To select a procedure:

1 Position the cursor next to the **`Location`** field and select it.

The **`Choices:`** menu appears in the lower-right corner of the screen (see figure 26).

Select the "Location" field.

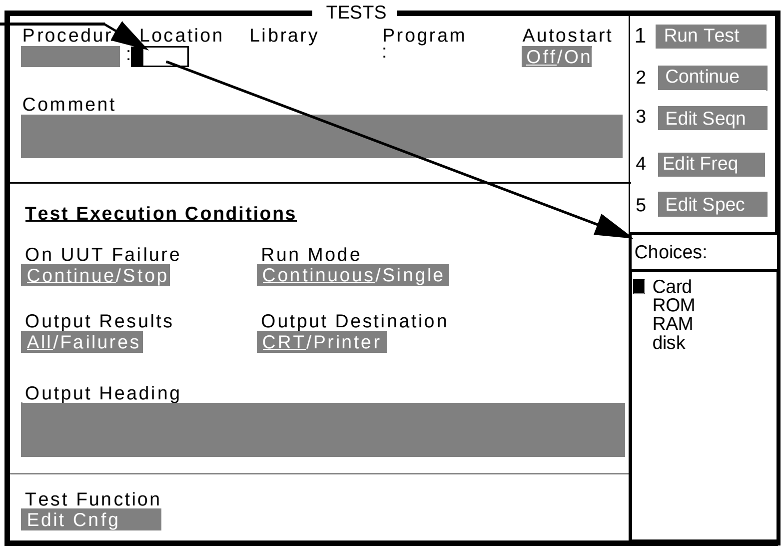
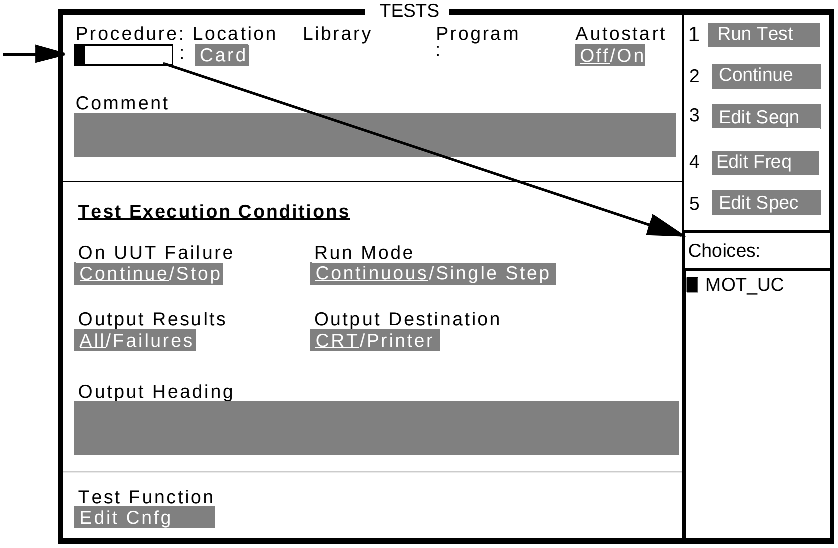


Figure 26

2 In the **`Choices:`** menu, position the cursor and select the **`Card`** option. "**`Card`**" appears in the **`Location`** field (see figure 27).

3 Position the cursor next to the **`Procedure`** field and select it (see figure 27). One or more options appear in the **`Choices:`** menu.

Select the "Procedure" field.



TESTS

Procedure: Location: Card
Library
Program :
Autostart Off/On
Comment

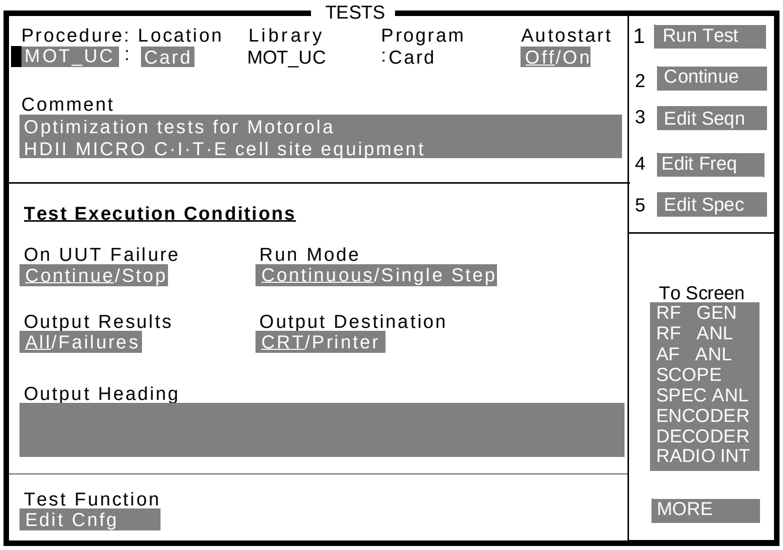
Test Execution Conditions

On UUT Failure Continue/Stop
Run Mode Continuous/Single Step
Output Results All/Failures
Output Destination CRT/Printer
Output Heading
Test Function Edit Cnfg

Figure 27

4 In the **`Choices:`** menu, position the cursor and select **`MOT_UC`**.

The TESTS screen’s **`Library`** and **`Program`** fields are automatically filled in (see figure 29).


TESTS

Procedure: MOT_UC
Location: Card
Library: MOT_UC
Program: Card
Autostart: Off/On

Comment
Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure: Continue/Stop
Run Mode: Continuous/Single Step
Output Results: All/Failures
Output Destination: CRT/Printer
Output Heading

Test Function: Edit Cnfg

Figure 28

Figure 29 **When you select a test procedure you are loading a library file and a procedure file.**

- A library file can be thought of as a reference file. It contains the names and numbers of all the parameters, pass/fail limits, and tests in the software program. The library file cannot be changed.
- A procedure file is different from the library file in that it contains the values for all of the parameters, pass/fail limits, and tests in the software program. You can use the default values or enter your own values.

Editing the Configuration Menu

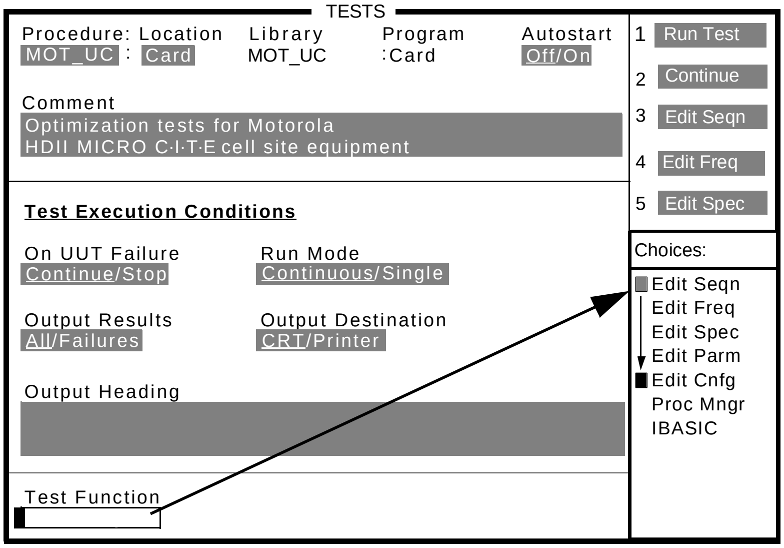
The Edit Configuration function, **`Edit Confg`**, of the **`Choices:`** menu accesses the TEST (Edit Configuration) screen. This screen is used to define the external equipment you will use during testing, such as an RF switch or duplexer. The software uses your entries into the TEST (Edit Configuration) screen to provide connection diagrams during testing. Your entries are also used to configure the Test Set for printing, collecting data, or logging of base station messages.

The following instruction configures the Test Set to include a duplexer:

1 If you are not already at the TESTS screen, press the TESTS key.

2 Position the cursor and select the `Test Function` field.

The `Choices:` menu appears (see figure 30).



TESTS

Procedure: Location MOT_UC : Card

Library MOT_UC

Program :Card

Autostart Off/On

Comment
Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure Continue/Stop

Run Mode Continuous/Single

Output Results All/Failures

Output Destination CRT/Printer

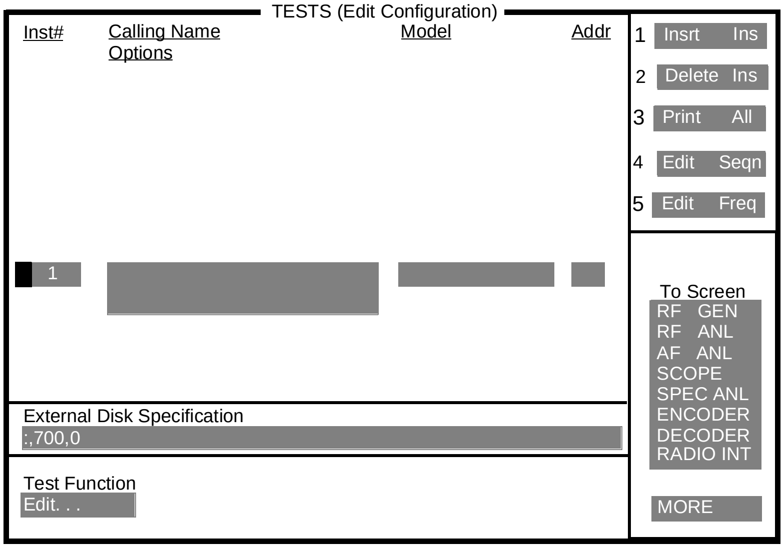
Output Heading

Test Function

Figure 30

3 Select the **`Edit Cnfg`** option in the **`Choices:`** menu.

The TESTS (Edit Configuration) screen appears (see figure 31).



TESTS (Edit Configuration)

1

External Disk Specification
:,700,0

Test Function
Edit. . .

Figure 31

4 Position the cursor next to the instruction-number, **`Inst#`**, field and select it.

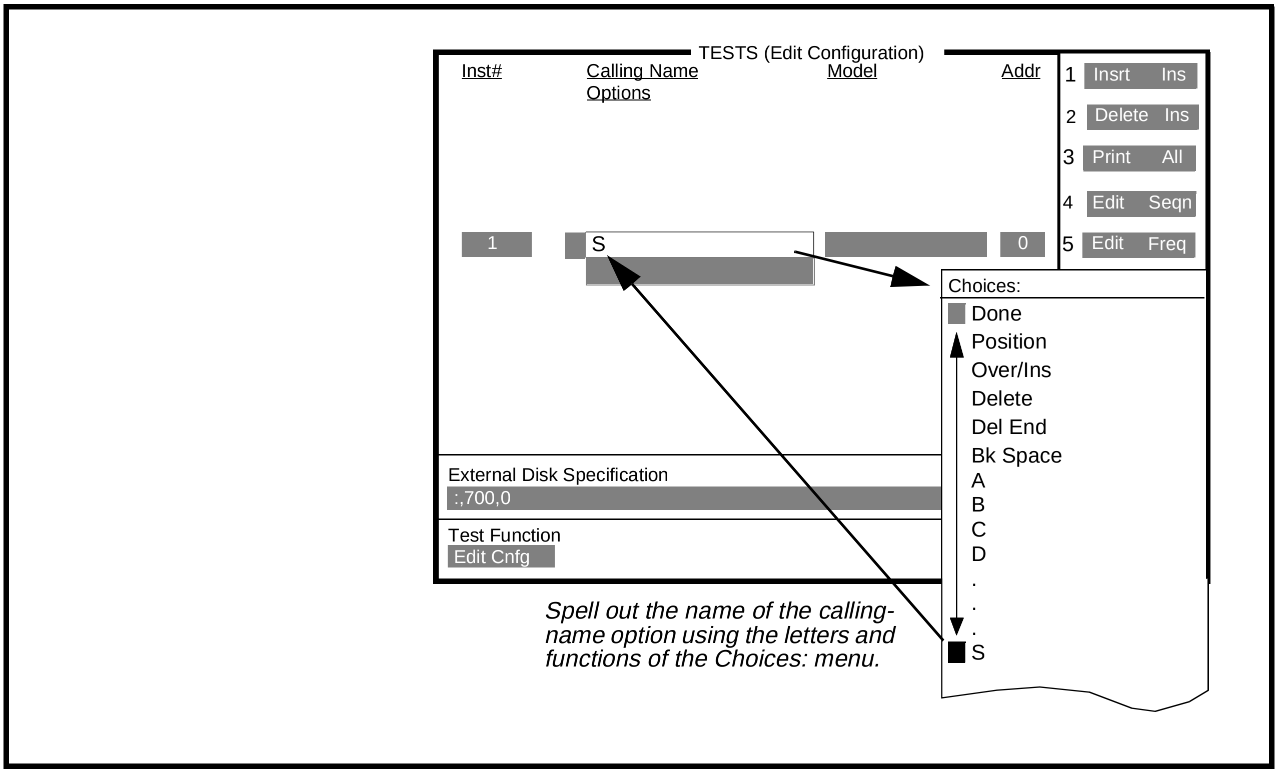
5 Using the DATA keypad on the front panel of the Test Set, press the 1 key, and then press the ENTER key for the program to accept the entry.

"**`1`**" appears in the **`Inst#`** field.

6 Position the cursor next to the **`Calling Name Options`** field and select it.

The field is highlighted and the **`Choices:`** menu appears (see figure 32) with the cursor positioned at **`Done`**.

7 Spell out the word SWITCH in the **`Calling Name Options`** field by positioning the cursor and selecting each letter of the word from the **`Choices:`** menu.



External Disk Specification
:,700,0

Test Function
Edit Cnfg

Spell out the name of the calling-name option using the letters and functions of the Choices: menu.

Figure 32

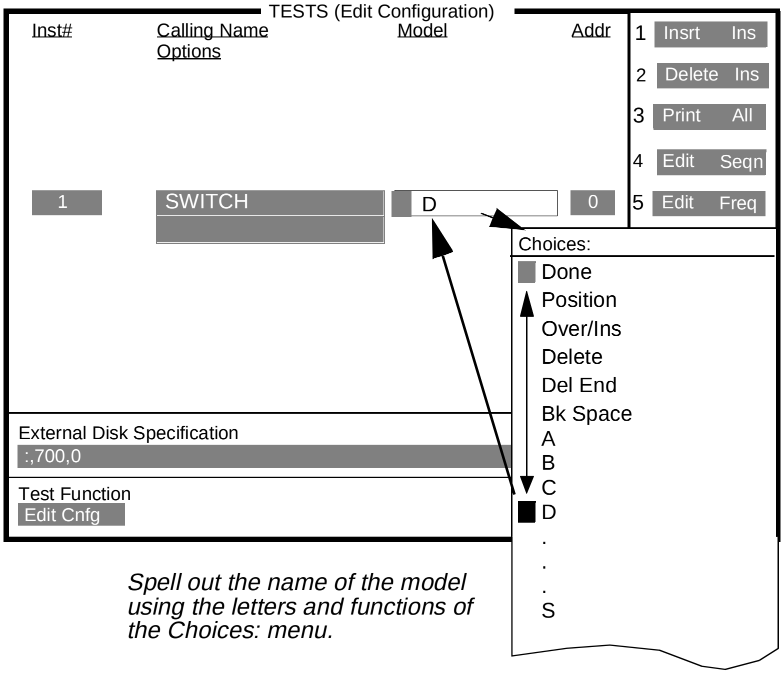
8 When the word SWITCH is completed, re-position the cursor and select **`Done`** from the **`Choices:`** menu.

The **`Calling Name Options`** field is deselected (unhighlighted).

9 Position the cursor and select the **`Model`** field.

The field is highlighted and the **`Choices:`** menu appears.

10 Spell out the word DUPLEXER in the **`Model`** field by positioning the cursor and selecting each letter of the word from the **`Choices:`** menu (see figure 33).

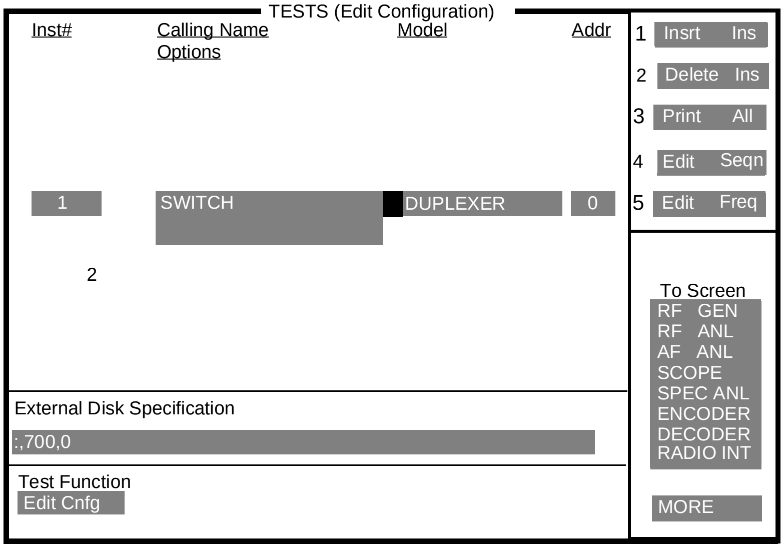


Spell out the name of the model using the letters and functions of the Choices: menu.

Figure 33

11 When the word DUPLEXER is completed, re-position the cursor and select **`Done`** from the **`Choices:`** menu

The **`Calling Name Options`** field is deselected (unhighlighted). The screen should look similar to the screen shown below (see figure 34).



TESTS (Edit Configuration)

Inst#	Calling Name Options	Model	Addr
1	SWITCH	DUPLEXER	0
2			

External Disk Specification
:,700,0

Test Function
Edit Cnfg

Figure 34

12 Press the TESTS key to return to the TESTS screen.

This concludes configuring the Test Set for use with a duplexer.

Selecting a Test

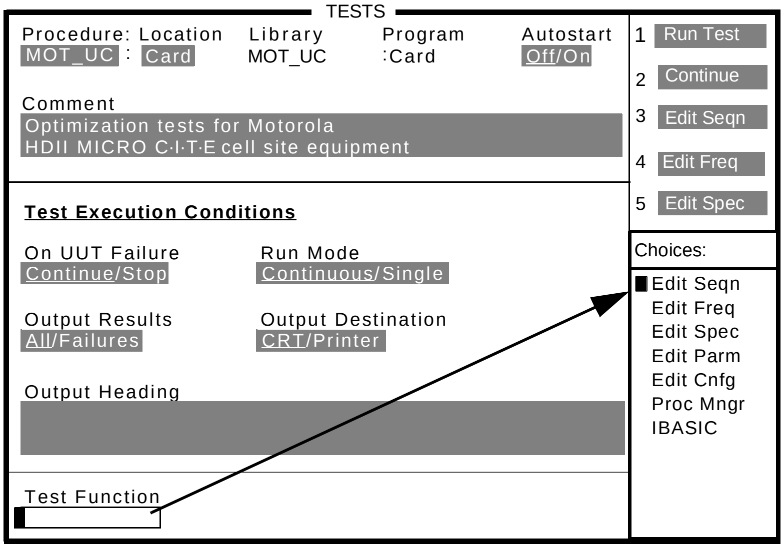
The TESTS (Edit Sequence) screen, shown in figure 36, is used to select the test or tests to used on the unit-under-test. For simplicity, only one test, *TEST_04*, is selected in the following instruction.

To select a Test:

1 If you are not already at the TESTS screen, press the TESTS key.

2 On the TESTS screen, position the cursor and select the **`Test Function`** field.

The `Choices:` menu appears (see figure 35).



TESTS

Procedure: Location
MOT_UC : Card

Library
MOT_UC

Program
:Card

Autostart
Off/On

Comment
Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure
Continue/Stop

Run Mode
Continuous/Single

Output Results
All/Failures

Output Destination
CRT/Printer

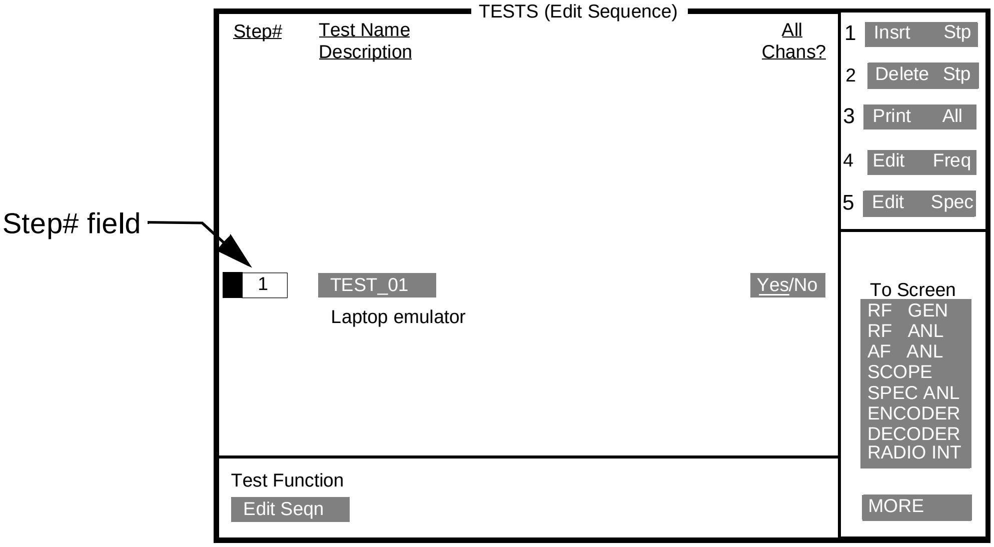
Output Heading

Test Function

Figure 35

3 In the **`Choices:`** menu, position the cursor and select **`Edit Seqn`**.

The TESTS (Edit Sequence) screen appears (see figure 36).



TESTS (Edit Sequence)

Step# 1

Test Name TEST_01

Description Laptop emulator

All Chans? Yes/No

Test Function Edit Seqn

Figure 36

4 Position the cursor and select the **`Step#`** field.

The field is highlighted.

5 Using the DATA keypad on the front panel of the Test Set, press the 1 key, and then press the ENTER key for the program to accept the entry.

6 Position the cursor and select the **`Test Name Description`** field.

The **`Choices:`** menu appears (see figure 37).

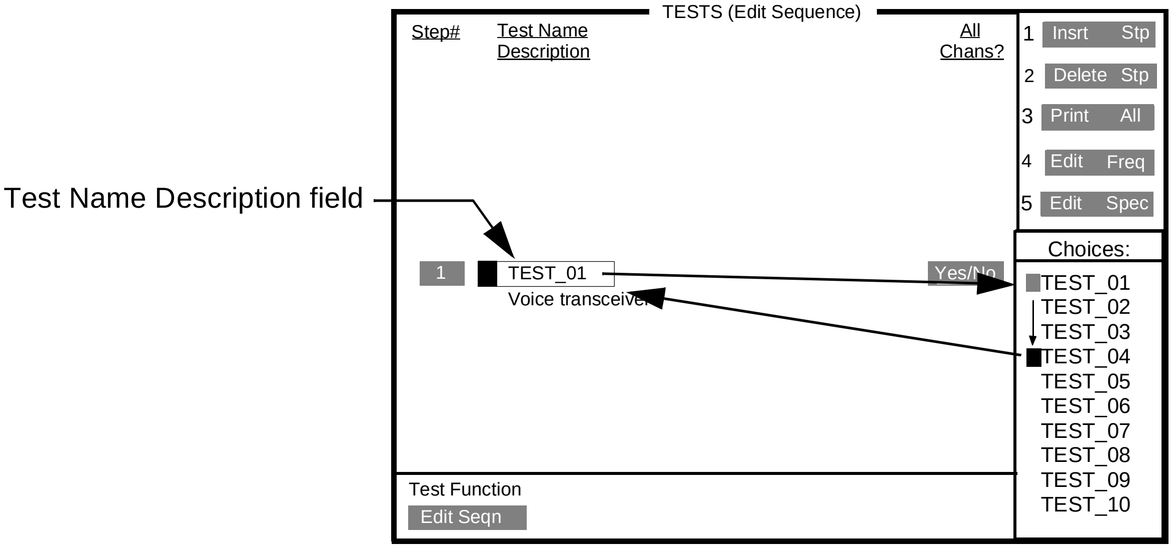


Figure 37

7 Position the cursor and select **`TEST_04`**.

"**`TEST_04`**" appears in the **`Test Name Description`** field, and the field is de-selected.

8 Position the cursor next to the **`ALL Chans?`** field and select it until the <u>**`No`**</u> response is underlined.

Pushing the CURSOR CONTROL knob toggles between the Yes and No response; the selected response is underlined. The All channels, **`All Chan?`**, field instructs the software whether or not to execute this test on all channels in the frequency table of the Test Set. Frequency tables are not applicable in Micro C·I·T·E sites.

9 Press the TESTS key to return to the TESTS screen.

This concludes selecting a test.

Editing the Test Parameters

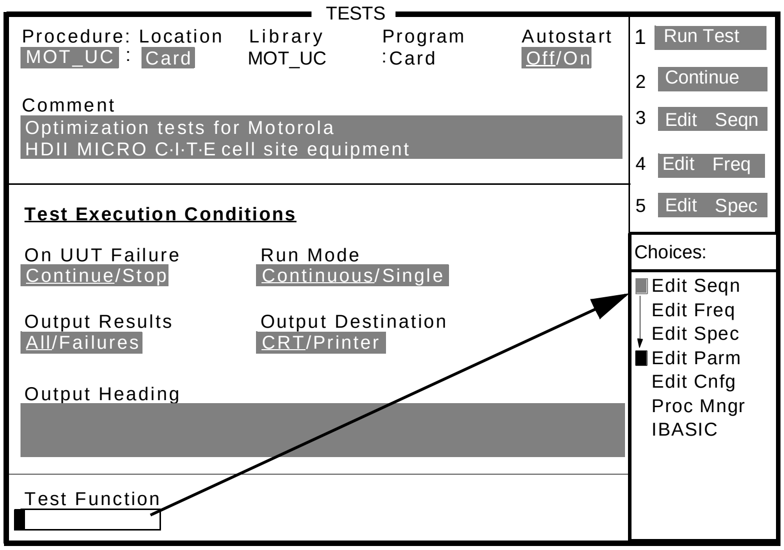
Test parameters are used by the software to define the conditions under which a test will run. Each test has a list of parameters that must be edited before running it. A list of the parameters associated with each test can be found in *chapter 11, "Tests Descriptions"*. In this exercise we will edit two parameters, one parameter which is listed in the test description for *TEST_04 Voice Transceiver* and one parameter which places the Test Set in demo mode.

To edit the Test parameters:

1 If the TESTS screen is not already displayed, press the TESTS key.

2 On the TESTS screen, position the cursor and select the **`Test Function`** field.

The **`Choices:`** menu appears (see figure 38).



TESTS

Procedure: Location MOT_UC : Card

Library MOT_UC

Program :Card

Autostart Off/On

Comment

Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure Continue/Stop

Run Mode Continuous/Single

Output Results All/Failures

Output Destination CRT/Printer

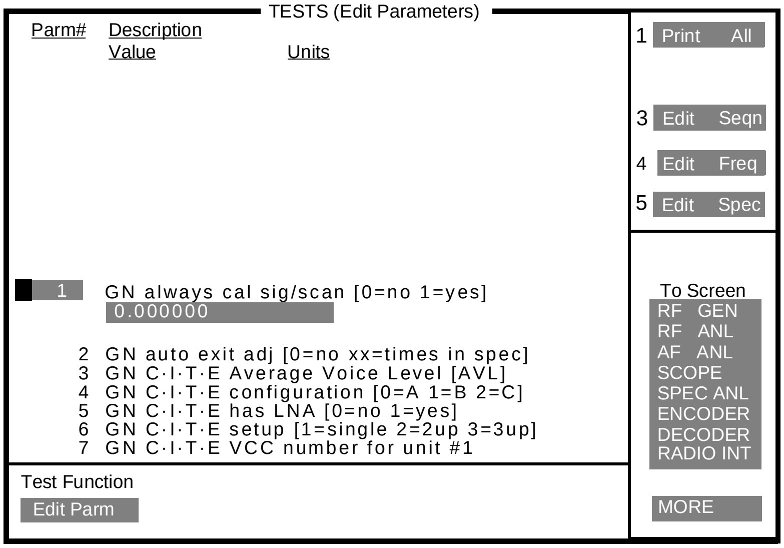
Output Heading

Test Function

Figure 38

3 Position the cursor and select `Edit Parm`.

The TESTS (Edit Parameters) screen appears (see figure 39).

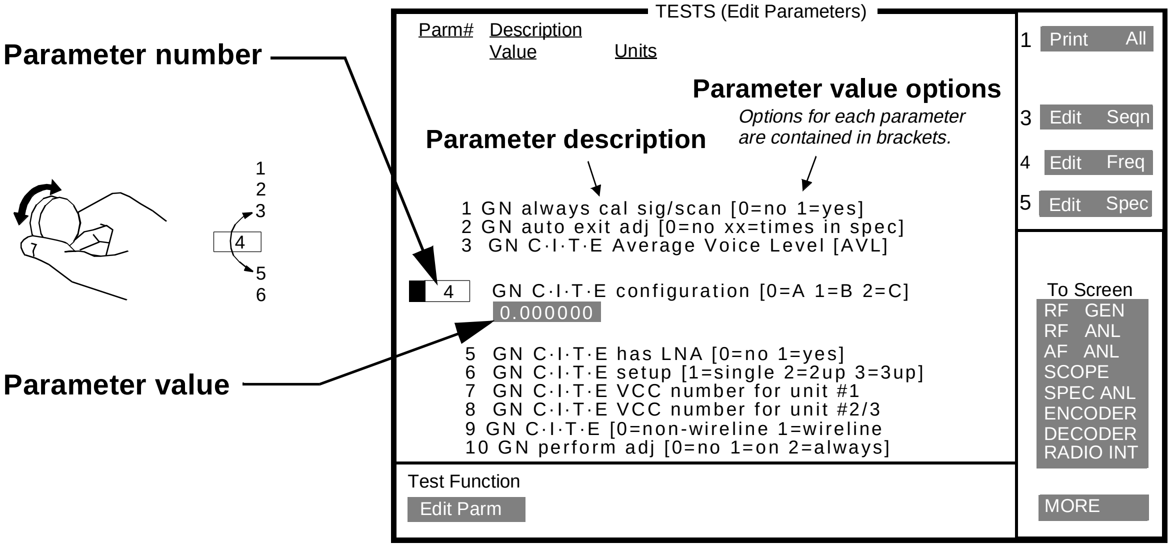


```
Parm#  Description
       Value                Units

   1   GN always cal sig/scan [0=no 1=yes]
       0.000000

   2   GN auto exit adj [0=no xx=times in spec]
   3   GN C·I·T·E Average Voice Level [AVL]
   4   GN C·I·T·E configuration [0=A 1=B 2=C]
   5   GN C·I·T·E has LNA [0=no 1=yes]
   6   GN C·I·T·E setup [1=single 2=2up 3=3up]
   7   GN C·I·T·E VCC number for unit #1
Test Function
 Edit Parm
```

Figure 39

4 Position the cursor and select the parameter number (`Parm#`) field.

The field is highlighted (see figure 40). Rotating the CURSOR CONTROL knob while this field is highlighted allows you to scroll through the list of parameter descriptions and values. That is, each time you rotate the CURSOR CONTROL knob a different parameter number appears in the `Parm#` field, and this parameter's description and value appear next to it as shown in figure 40.

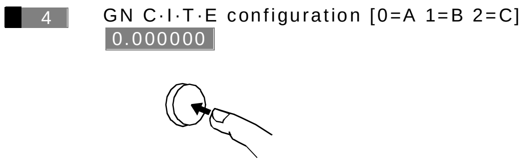


```
 1 GN always cal sig/scan [0=no 1=yes]
 2 GN auto exit adj [0=no xx=times in spec]
 3 GN C·I·T·E Average Voice Level [AVL]
 4  GN C·I·T·E configuration [0=A 1=B 2=C]
    0.000000
 5 GN C·I·T·E has LNA [0=no 1=yes]
 6 GN C·I·T·E setup [1=single 2=2up 3=3up]
 7 GN C·I·T·E VCC number for unit #1
 8 GN C·I·T·E VCC number for unit #2/3
 9 GN C·I·T·E [0=non-wireline 1=wireline
10 GN perform adj [0=no 1=on 2=always]
```

Figure 40

5 Rotate the CURSOR CONTROL knob to parameter number 4, **`GN C.I.T.E configuration [0=A 1=B 2=C]`**, and select it.

The `Parm#` field is deselected (unhighlighted), see figure 41.

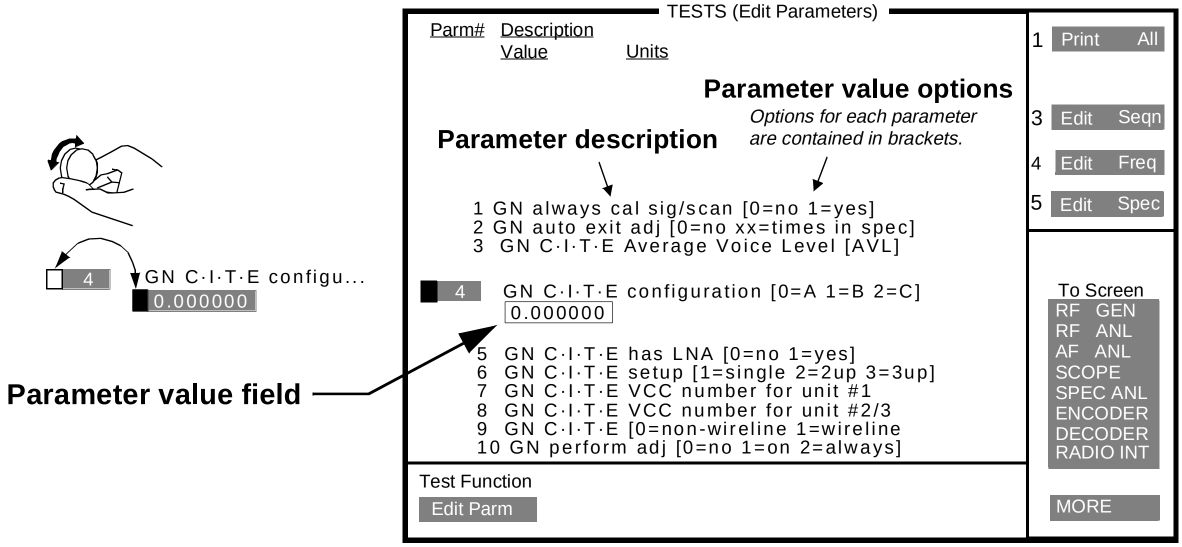


```
4  GN C·I·T·E configuration [0=A 1=B 2=C]
   0.000000
```

Figure 41

6 Rotate the CURSOR CONTROL knob to the parameter value field and select it.

The field is highlighted (see figure 42).



```
Parm#  Description
       Value        Units

 1 GN always cal sig/scan [0=no 1=yes]
 2 GN auto exit adj [0=no xx=times in spec]
 3  GN C·I·T·E Average Voice Level [AVL]

   4    GN C·I·T·E configuration [0=A 1=B 2=C]
        0.000000

 5  GN C·I·T·E has LNA [0=no 1=yes]
 6  GN C·I·T·E setup [1=single 2=2up 3=3up]
 7  GN C·I·T·E VCC number for unit #1
 8  GN C·I·T·E VCC number for unit #2/3
 9  GN C·I·T·E [0=non-wireline 1=wireline
10 GN perform adj [0=no 1=on 2=always]
```

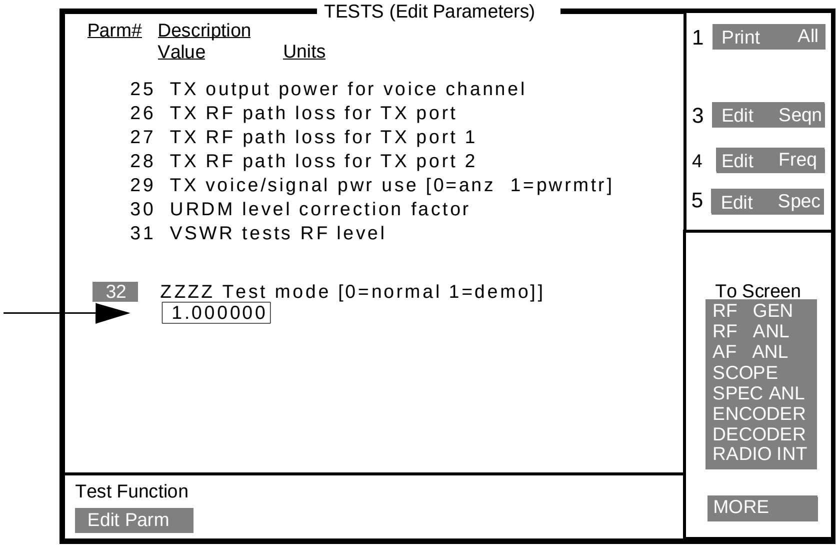
Figure 42

7 In the parameter value field, enter 0 using the DATA keypad on the front panel of the Test Set, and then press the ENTER key for the program to accept the entry.

8 Re-position the cursor and select **`Parms#`** field again.

9 Using the techniques learned above, scroll to parameter 32, **`ZZZ Test mode [0=normal 1=demo]`** (see figure 43) and enter 1 for “demo” mode in the value field, and then press the ENTER key for the program to accept the entry.

Demo mode allows the software to run a test without actual base station connections. It will simulate how the test will operate and provide measurement results.



```
Parm#  Description
       Value          Units

    25  TX output power for voice channel
    26  TX RF path loss for TX port
    27  TX RF path loss for TX port 1
    28  TX RF path loss for TX port 2
    29  TX voice/signal pwr use [0=anz  1=pwrmtr]
    30  URDM level correction factor
    31  VSWR tests RF level

 32   ZZZZ Test mode [0=normal 1=demo]]
      1.000000
```

Figure 43

10 Press the TESTS key to return to the TESTS screen.

This concludes the "Editing the Test Parameters" procedure.

Editing the Edit Specifications Menu

Selecting the Edit Specifications function, **`Edit Spec`**, of the TESTS screen accesses the TESTS (Edit Specifications) menu which contains the pass/fail limits for the tests selected under the Edit Sequence function. Pass/fail limits define the upper and lower limits that the measurement result must fall between. When the software completes a measurement, it compares it against its pass/fail limits to determine if the unit-under-test (UUT) passed or failed a measurement. Normally, the user will edit the pass/fail limit values to correspond to industry standards.

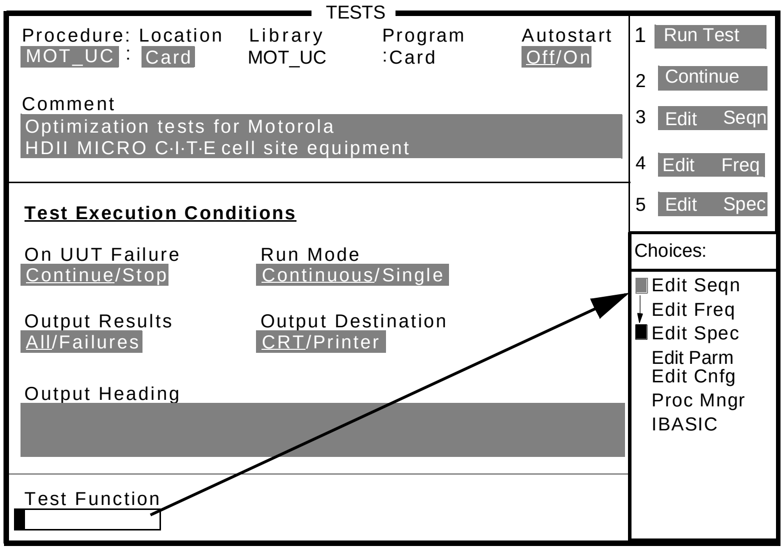
NOTE: The terms "pass/fail limits" and "specifications" are synonymous and are used interchangeably throughout this manual.

To edit the pass/fail limits:

1 If the TESTS screen is not already displayed, press the TESTS key.

2 On the TESTS screen, position the cursor and select the **`Test Function`** field.

The **`Choices:`** menu appears (see figure 44).



TESTS

Procedure: Location MOT_UC : Card

Library MOT_UC

Program :Card

Autostart Off/On

Comment
Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test Execution Conditions

On UUT Failure Continue/Stop

Run Mode Continuous/Single

Output Results All/Failures

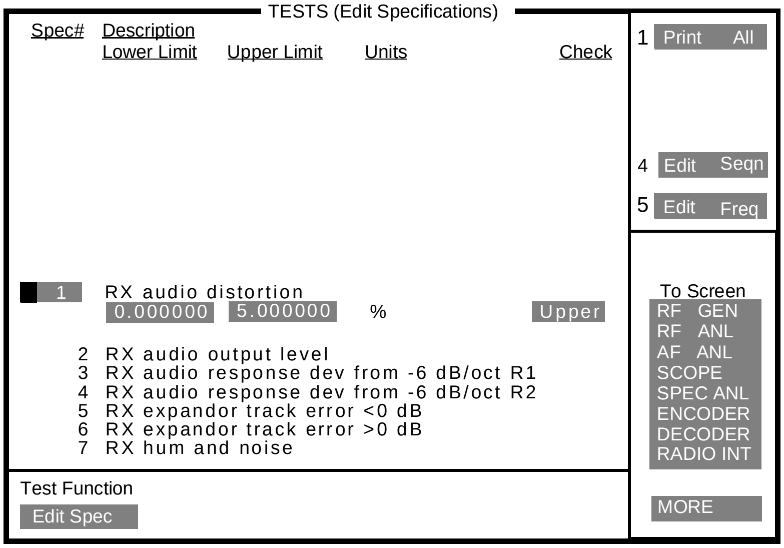
Output Destination CRT/Printer

Output Heading

Test Function

Figure 44

3 Position the cursor and select the Edit Specifications, **`Edit Spec`**, option. The TESTS (Edit Specifications) screen appears (see figure 45).



TESTS (Edit Specifications)

Spec#	Description			
	Lower Limit	Upper Limit	Units	Check
1	RX audio distortion			
	0.000000	5.000000	%	Upper

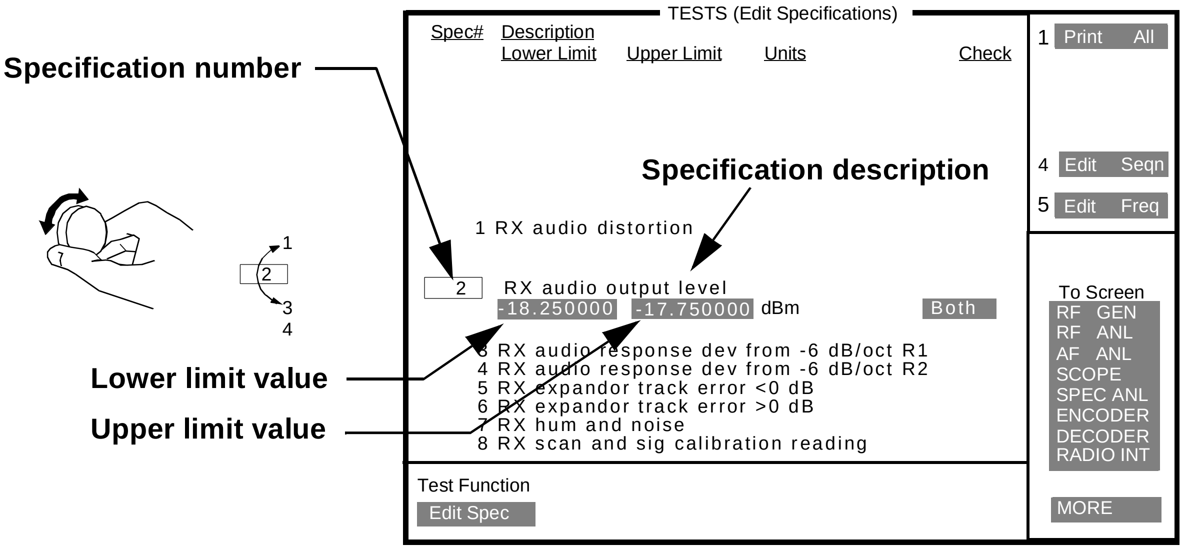
2 RX audio output level
3 RX audio response dev from -6 dB/oct R1
4 RX audio response dev from -6 dB/oct R2
5 RX expandor track error <0 dB
6 RX expandor track error >0 dB
7 RX hum and noise

Test Function
Edit Spec

Figure 45

4 Position the cursor and select the specification number (**`Spec#`**) field.

This field is highlighted (see figure 46). Rotating the CURSOR CONTROL knob while this field is highlighted allows you to scroll through the list of specification numbers. Each specification number has an associated description and pass/fail specifications, that is, a lower and upper limit value.



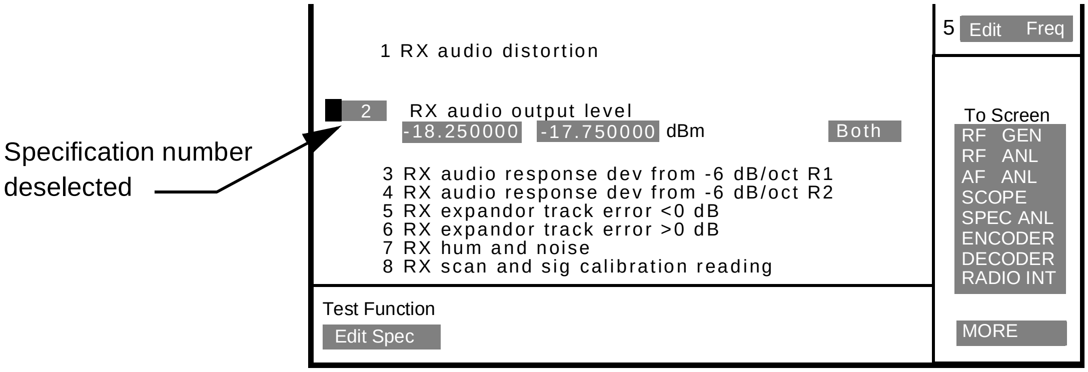
TESTS (Edit Specifications)

```
Spec#  Description
       Lower Limit   Upper Limit   Units          Check

       1 RX audio distortion

  2      RX audio output level
       -18.250000  -17.750000 dBm                Both

       3 RX audio response dev from -6 dB/oct R1
       4 RX audio response dev from -6 dB/oct R2
       5 RX expandor track error <0 dB
       6 RX expandor track error >0 dB
       7 RX hum and noise
       8 RX scan and sig calibration reading
```

Figure 46

5 Rotate the CURSOR CONTROL knob to specification number 2 and select it.

The **`Spec#`** field is deselected (unhighlighted), see figure 47.



```
       1 RX audio distortion

  2      RX audio output level
       -18.250000  -17.750000 dBm                Both

       3 RX audio response dev from -6 dB/oct R1
       4 RX audio response dev from -6 dB/oct R2
       5 RX expandor track error <0 dB
       6 RX expandor track error >0 dB
       7 RX hum and noise
       8 RX scan and sig calibration reading
```

Figure 47

6 Position the cursor and select the `Lower Limit` value field (see figure 48).

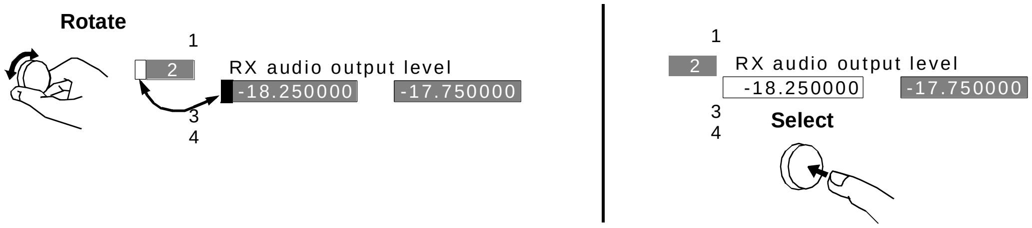


Figure 48

7 In the `Lower Limit` value field, enter -18.000000 (or other desired value) using the DATA keypad on the front panel of the Test Set, and then press the ENTER key for the program to accept the entry.

8 Rotate the CURSOR CONTORL knob to move the cursor and select the `Upper Limit` value field (see figure 49).

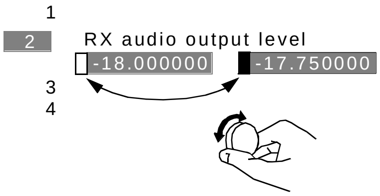
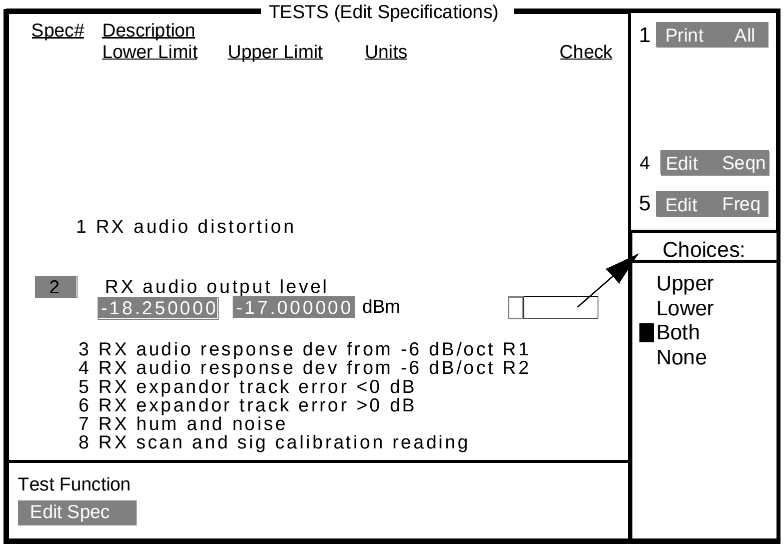


Figure 49

9 In the `Upper Limit` value field, enter -17.000000 (or other desired value) using the DATA keypad on the front panel, and then press the ENTER key for the program to accept the entry.

10 Position the cursor and select the **`Check`** field.

The **`Choices:`** menu appears (see figure 50). The **`Check`** field allows you to select whether to compare the measurement's results with the upper limit, lower limit, both upper and lower limits, or just report the value without comparing the results.



TESTS (Edit Specifications)

```
Spec#  Description
       Lower Limit   Upper Limit   Units                Check

     1 RX audio distortion

  2    RX audio output level
      -18.250000   -17.000000  dBm

     3 RX audio response dev from -6 dB/oct R1
     4 RX audio response dev from -6 dB/oct R2
     5 RX expandor track error <0 dB
     6 RX expandor track error >0 dB
     7 RX hum and noise
     8 RX scan and sig calibration reading

Test Function
Edit Spec
```

Figure 50

11 In the **`Choices:`** menu, position the cursor and select **`Both`**.

"**`Both`**" appears in the **`Check`** field.

12 Press the TESTS key to return to the TESTS screen.

This concludes the "Editing the Edit Specifications Menu" procedure.

Running a Test

Once you have selected a test and edited the parameters and specifications associated with it, the next step is to run the test.

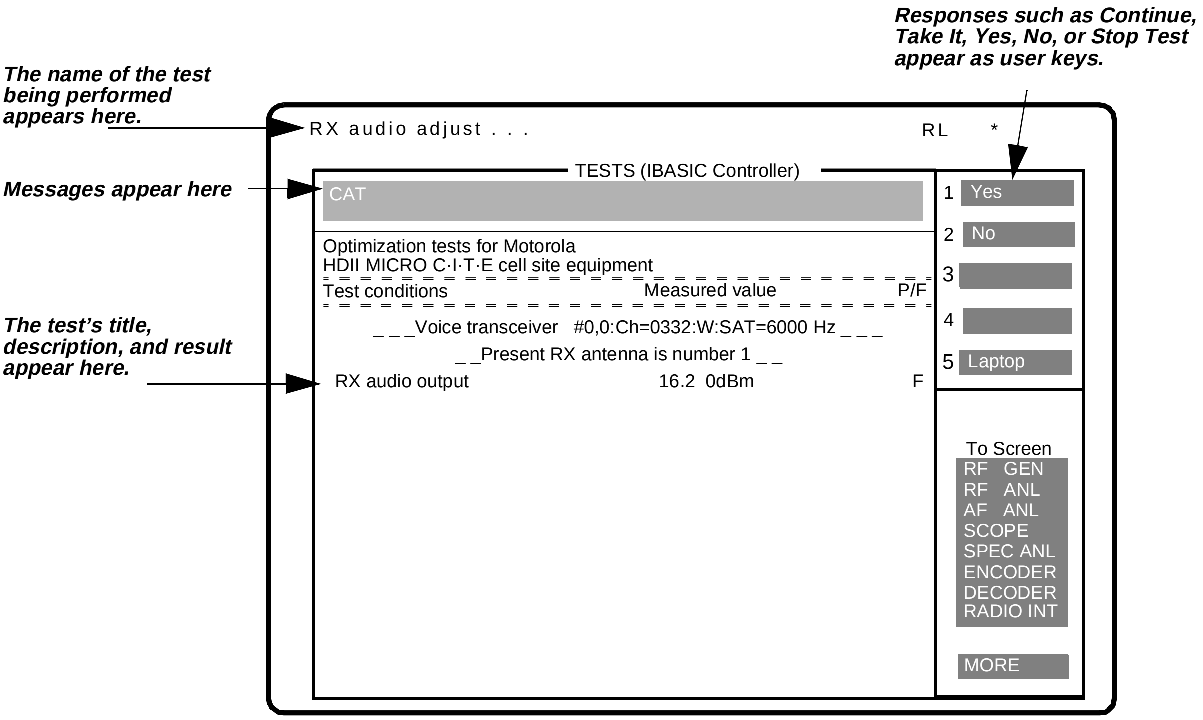
Remember that you edited the parameters so the software will run in demo mode. In this mode, the software simulates actual base station responses and formulates measurement results as if actual base station connections existed.

To run a Test:

1 If you are not already at the TESTS screen, press the TESTS key.

2 Press the k1**(**`Run Test`**)** key.

The TESTS (IBASIC Controller) Screen appears (see figure 51).



Responses such as Continue, Take It, Yes, No, or Stop Test appear as user keys.

The name of the test being performed appears here.

Messages appear here

The test's title, description, and result appear here.

RX audio adjust . . .   RL   *

TESTS (IBASIC Controller)

CAT

Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment

Test conditions   Measured value   P/F

_ _ _Voice transceiver   #0,0:Ch=0332:W:SAT=6000 Hz _ _ _

_ _Present RX antenna is number 1 _ _

RX audio output   16.2 0dBm   F

Figure 51

3 Follow the instructions provided on the Test Set's screen.

From this point on, the demo simulation will take you through a series of screens and ask you to select, choose, or decide various factors while the test is being run. Follow the instructions that appear on the screen.

This concludes the "Running a Test" procedure.

This also concludes the Getting Started procedure for firmware revision levels below A.14.00.

NOTE: **In this getting started procedure, parameter `32_ZZZZ Test mode [0=normal 1=demo]` was edited to place the Test Set in demo mode. In order for the Test Set to perform actual tests it must be returned to its normal test mode. Edit this parameter and enter 0 to return the Test Set to normal its operation.**

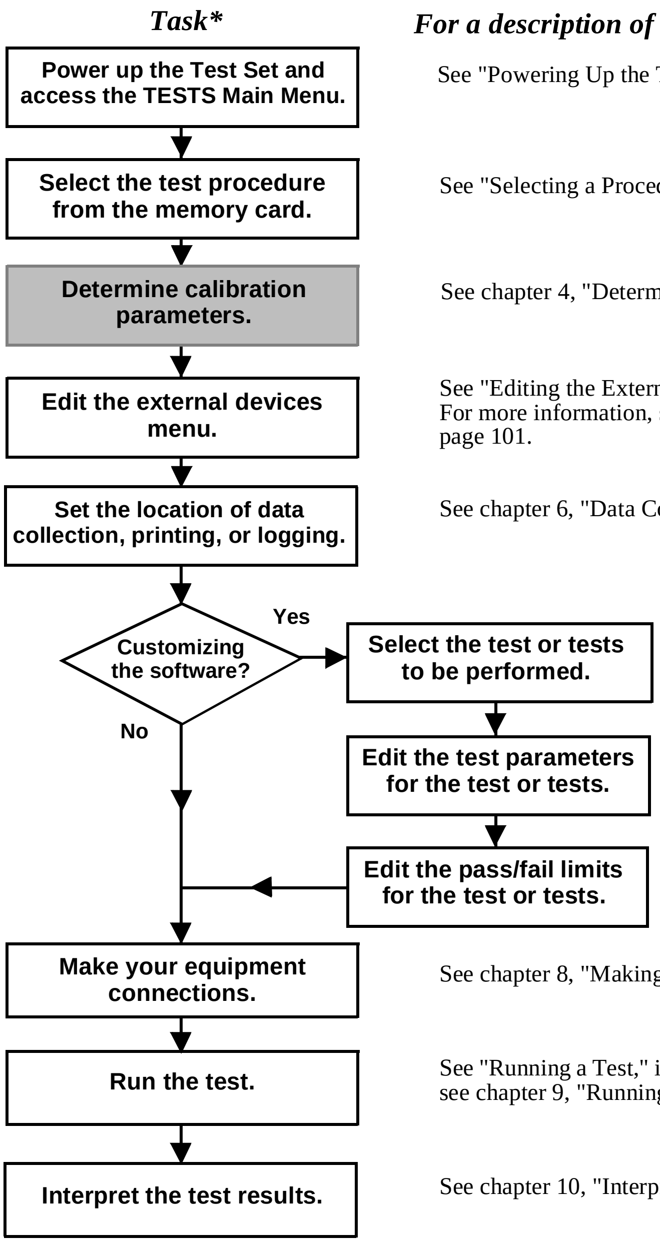
4

Determining Calibration Parameters

What’s included in this chapter:

- Introduction
- Determining Transmitter Path Loss
- Determining Receiver Path Loss
- Determining URDM Correction Factor

Task Flow diagram



For a description of the task or related information:

See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

In order for the software to provide accurate measurement results it must be able to account for the losses and inaccuracies in your test system. In this chapter you will determine your:

- TX path loss
- RX path loss
- URDM correction factor

NOTE: The diagrams in this chapter support equipment connections using the HP 83202A Opt. 070 accessory kit.

After you have determined these values, you will enter them into their corresponding parameters. The software will use those parameter values during testing to compensate for the losses and inaccuracies in your system.

Approximating Losses

Table 4 provides approximate loss values for the equipment included in the HP 83202A Option 070 Motorola Micro C·I·T·E kit. This table will be referred to throughout this calibration section. Use it to approximate expected path loss. Compare your approximations with your actual path loss to verify that test results are reasonable.

Table 4

Equipment	Approximate Loss
Duplexer	.5 dB
6-dB pad	6 dB
Splitter	3.5 dB
RF cable N(M) to N(M)	0.5 dB
30-dB pad	30 dB

Determining TX Path Loss

The following section will guide you through the steps for determining the loss values of your TX path. The loss values measured in this section will be entered into the following parameters.

26_TX RF path loss for TX port [dB] (base station configuration A only)
27_TX RF path loss for TX port 1 [dB] (base station configuration B or C)
28_TX RF path loss for TX port 2 [dB] (base station configuration C only)

The software will use these parameters during testing to compensate for the losses of your TX paths.

There are two different methods for determining TX Path Loss parameters.

1. **Using the Measure Cable Loss routine**

   This is the recommended method for making TX path loss measurements, and will provide the best accuracy. Use this procedure if you are testing in MANUAL mode or using a T1 module. This method does not require connections to the base station, and therefore TX path loss parameters can be determined prior to testing.

2. **Using the Test Set’s Spectrum Analyzer**

   Use this procedure if you are testing in Ins-Optimization mode since it will measure path losses and compensate for the HP 8921A’s Spectrum Analyzer errors.

1. Using the Measure Cable Loss routine

Table 5 **What you will need:**

Item	Qty	Description
Test Set	1	HP 8921A
Adapter	2	1250-0077
6-dB pad	2	0955-0698
50-Ohm termination	1	909A Opt. 012
Ref. cable N(M) to N(M) (1 ft.)	1	8120-6829
Any external equipment associated with your TX path such as a duplexer, splitter, or RF cable. See *figure 52 on page 79* for TX path diagrams.		

Examples are based on typical results for base station configuration A, TX port.

Steps for determining TX Path Loss using the Measure cable loss routine

Steps 1through 5 establish a reference power level.

1 Run *TEST_07 Manual switch & calibration aid*.

2 Select the `Measure cable loss` routine from the given routine list.

3 When prompted, enter the start and stop frequencies associated with your transmitter. This defines what frequency range the `Measure cable loss` routine will test over. Be sure to use only base station transmitter frequencies.

Example:

Start frequency: 869 MHz

Stop Frequency: 894 MHz

4 After the frequencies are entered, press k2`(Continue)`.

5 Make the connections shown in *figure 51, "TX Power Reference"* and then press `k2` **`(Continue)`**.

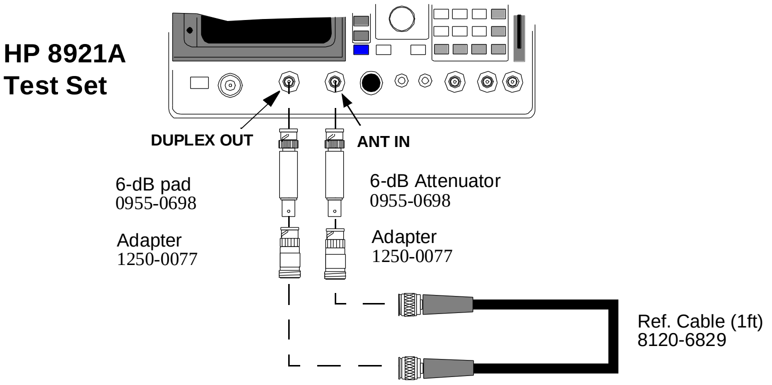


Figure 51 **TX Power Reference**

The Test Set measures the power level and stores it as the reference level.

Steps 6 through 10 measure the resulting power level through your TX path.

6 Disconnect one end of the reference cable from the 6-dB pad and insert the equipment associated with your TX path.

Figure 52 on page 79 shows the connection diagrams for each base station configuration’s TX path (A, B, and C).

7 After connections are made, press `k2` **`(Continue)`**.

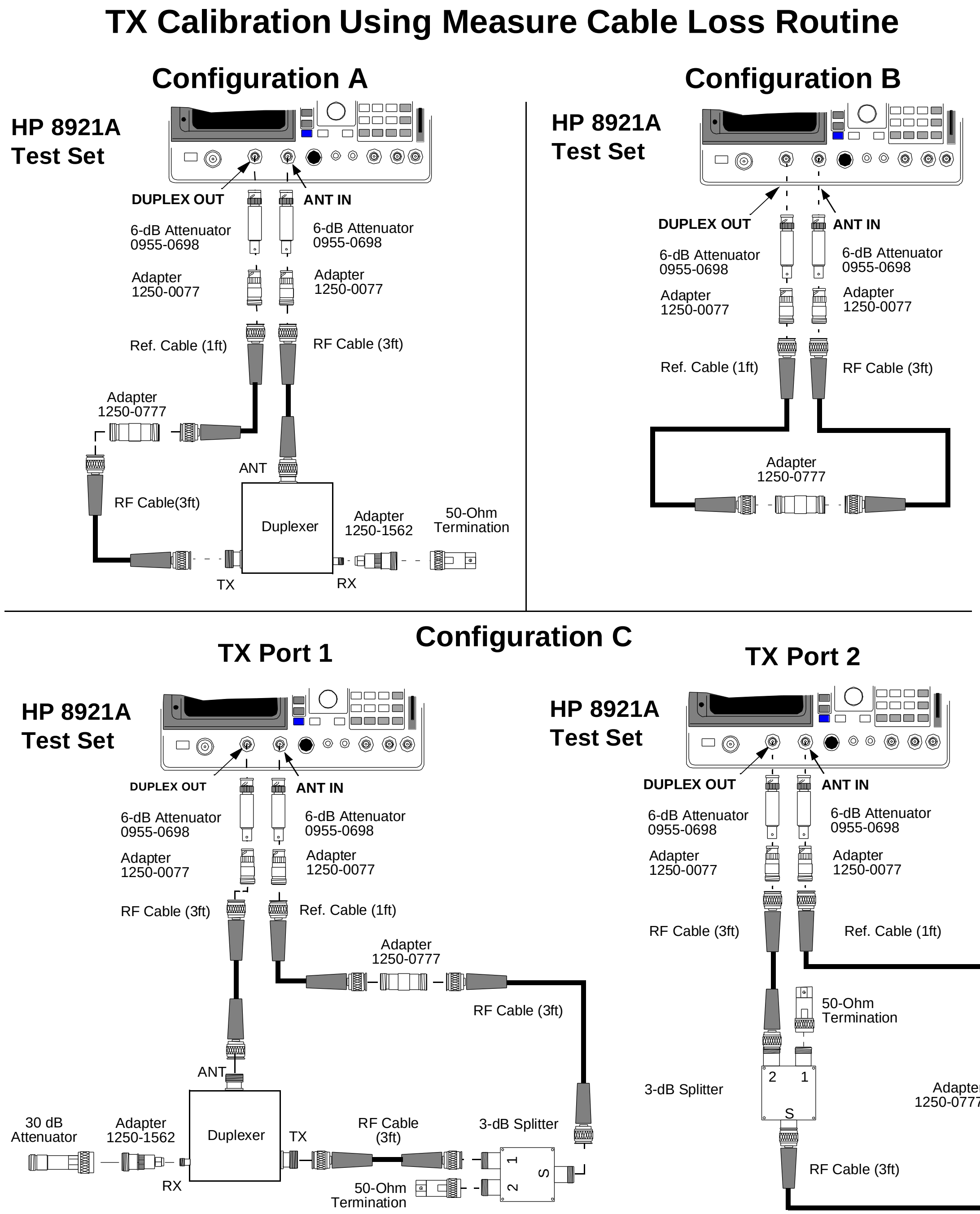

TX Calibration Using Measure Cable Loss Routine
Configuration A
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
Ref. Cable (1ft)
RF Cable (3ft)
Adapter 1250-0777
ANT
RF Cable(3ft)
Duplexer
Adapter 1250-1562
50-Ohm Termination
TX
RX
Configuration B
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0777
Adapter 1250-0777
Ref. Cable (1ft)
RF Cable (3ft)
Adapter 1250-0777
Configuration C
TX Port 1
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
Adapter 1250-0777
RF Cable (3ft)
ANT
30 dB Attenuator
Adapter 1250-1562
Duplexer
TX
RX
RF Cable (3ft)
3-dB Splitter
1
2
S
50-Ohm Termination
TX Port 2
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
50-Ohm Termination
3-dB Splitter
2
1
S
Adapter 1250-0777
RF Cable (3ft)

Figure 52

8 View the TX path loss results on the Test Set’s screen.

Example:

Average cable loss = 4.09 dB

Maximum cable loss = 4.16 dB

Minimum cable loss = 3.99 dB

VERIFY LOSS VALUES

Approximate loss values for the equipment included in the HP 83202A Opt. 070 kit are listed in *table 4 on page 75*. Use these values to approximate the expected path loss and verify that your loss measurements are reasonable.

EXPECTED PATH LOSS VALUES

The **`Measure cable loss`** routine is only capable of accurately testing up to 15 dB of loss. It is not expected that any TX path loss should exceed this value. If your path loss value exceeds 15 dB, check to make sure you have made the correct equipment connections.

Steps 9 through 11 record and store the TX path loss parameter.

9 Record the **`Average cable loss`** value and store it for the corresponding TX path loss parameter listed in the beginning of this section. See *"Editing the Test Parameters" on page 139* for more information on editing parameters if needed.

Example:

In this example, measurements were made for base station configuration A, TX port. Loss values would be stored for parameter *26_TX RF path loss for TX port [dB]*.

10 If testing cell site configuration C, repeat this procedure to determine the path loss for TX port 2.

11 Testing is complete.

2. Using the Test Set’s Spectrum Analyzer

Table 6

What you will need:

Item	Qty	Description
Test Set	1	HP 8921A
Power Meter and Sensor	1	External
Adapter	1	1250-0777

Table 6 **What you will need:**

Item	Qty	Description
30-dB attenuator (optional, see note below)	1	0955-0990
50-Ohm termination	1	909A Opt. 012
Any external equipment associated with your TX path such as a duplexer, splitter, or RF cable. See *figure 54 on page 83* for TX path diagrams.		

NOTE: The attenuator protects the sensor head and power meter from being damaged. It is not required if the power meter and sensor ranges are rated within the range of the cell site's output power. If an attenuator is needed, it should have a 50-Ohm input and output impedance with a VSWR less than 1.1:1.

Examples are provided based on typical results for base station configuration A, TX port.

Steps for determining TX Path Loss using the spectrum analyzer

Steps 1 through 6 establish a reference power level.

1 Make the connections shown in *figure 53, "TX Power Meter Reference"* . Zero your power meter and calibrate it as necessary.

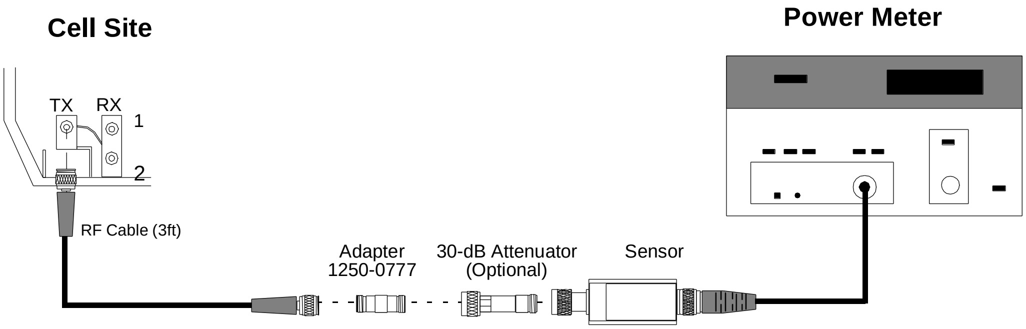


Figure 53 **TX Power Meter Reference**

2 If using an attenuator, record its attenuation value as ATTVALUE in dB.

Example:

ATTVALUE = 30 dB

3. Key a single transmitter, with no modulation.
4. Record the reading on the power meter as PMLEVEL in dBm.

   Example:

   PMLEVEL = 0 dBm
5. De-key the transmitter.
6. The reference power equals the attenuation value of your attenuator added to the power meter’s level. Determine and record your reference power level using the following equation:

   Example:

   POWERREF = ATTENVALUE + PMLEVEL

   POWERREF = 30 dB + 0 dBm = 30 dBm (1 Watt)

Steps 7 through 11 measure the resulting power level through your TX path.

7. Connect the HP 8921A and your TX path equipment to the TX output port of the cell site. *Figure 54 on page 83* shows the connections for each base station configuration (A, B, and C).

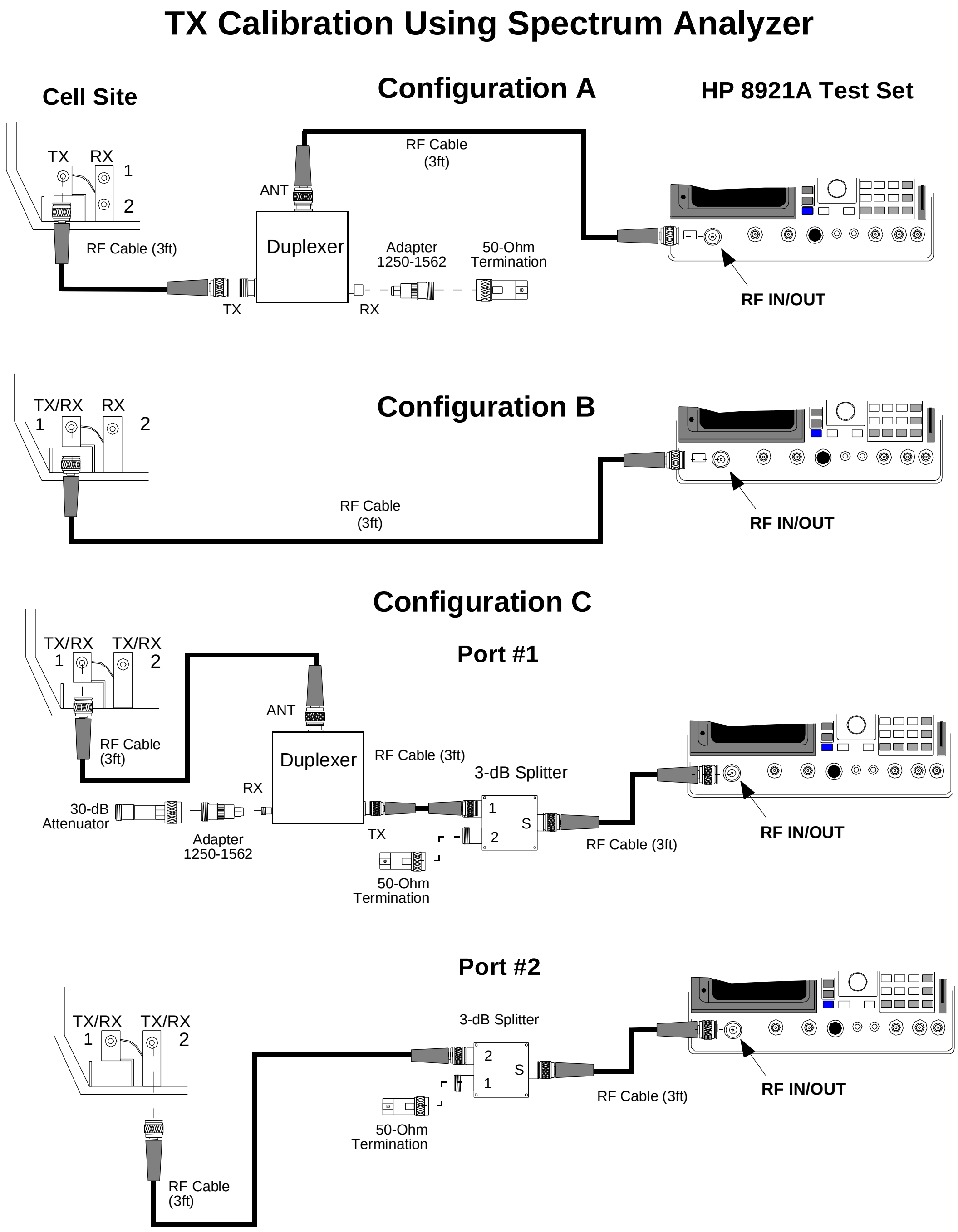

TX Calibration Using Spectrum Analyzer
Cell Site
Configuration A
HP 8921A Test Set
TX
RX
1
2
ANT
RF Cable
(3ft)
RF Cable (3ft)
Duplexer
Adapter
1250-1562
50-Ohm
Termination
TX
RX
RF IN/OUT
Configuration B
TX/RX
1
RX
2
RF Cable
(3ft)
RF IN/OUT
Configuration C
Port #1
TX/RX
1
TX/RX
2
ANT
RF Cable
(3ft)
Duplexer
RF Cable (3ft)
3-dB Splitter
RX
30-dB
Attenuator
Adapter
1250-1562
TX
1
S
2
RF Cable (3ft)
RF IN/OUT
50-Ohm
Termination
Port #2
TX/RX
1
TX/RX
2
3-dB Splitter
2
S
1
RF Cable (3ft)
RF IN/OUT
50-Ohm
Termination
RF Cable
(3ft)

Figure 54

8 Key the same transmitter that was keyed in step 3.

9 Run *TEST_07 Manual switch & calibration aid* and select `Read the spec. analyzer TX path calibration.` routine. This routine will automatically set up the HP 8921A spectrum analyzer for making this measurement.

10 Record the measured power level as POWER8921. The power level is displayed in the upper-left corner of the Test Set’s screen.

Example:

The spectrum analyzer measured: -4.12 dBm.

POWER8921 = -4.12 dBm

11 De-key the transmitter.

Steps 12 through 15 calculate and store the TX path loss parameter.

12 The TX Path Loss parameter is the difference between your POWERREF and your POWER8921 measurement. Use your recorded values in the following equation to calculate the calibration parameter:

Example:

TX Path Loss Parameter = POWERREF - POWER8921

TX Path Loss Parameter = 30 dBm - (-4.12 dbm) = 34.12 dBm

VERIFY LOSS VALUES

Approximate loss values for the equipment included in the HP 83202A Opt. 070 kit are listed in *table 4 on page 75*. Use these values to approximate the expected path loss and verify that your loss measurements are reasonable.

13 Store the TX path loss value from step 12 for the corresponding TX path loss parameter listed in the beginning of this section on page 76. See *"Editing the Test Parameters" on page 139* for more information on editing parameters.

Example:

In this example, measurements were made for base station configuration A, TX port. A loss value of 34.12 dBm would be stored for parameter *26_TX RF path loss for TX port [dB]*.

14 If testing cell site configuration C, repeat this procedure to determine the path loss for TX port 2.

15 Testing is complete.

Determining RX Path Loss

The following procedure will guide you through the steps for determining the loss values associated with your RX path. These loss values will be entered into the following parameters.

19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]

The software will use these parameters to compensate for the losses associated with your RX paths.

There are two different methods for determining RX path loss parameters.

1. **Using the Measure Cable Loss routine**

   This is the recommended method for making RX path loss measurements. This method does not require connections to the base station and therefore RX path loss parameters can be determined prior to testing. Use this procedure if you are testing in MANUAL mode or using a T1 module.

2. **Using the Power Meter**

   This method does not require connections to the base station and therefore RX path loss parameters can be determined prior to testing. However, it does require that you provide an external power meter.

1. Using the Measure Cable Loss routine

Table 7 **What you will need:**

Item	Qty	Description
Test Set	1	HP 8921A
Ref. Cable N(M) to N(M) (1ft)	1	8120-6829
Adapter	2	1250-0077
6-dB pad	2	0955-0698
50-Ohm termination	1	909A Opt. 012

Table 7 **What you will need:**

Item	Qty	Description
Any external equipment associated with your RX path such as a duplexer, splitter, or RF cable. See *figure 56 on page 88* and *figure 57 on page 89* for RX path diagrams.		

Examples are provided based on typical values for base station configuration A, RX port 1.

Steps for determining RX path loss using the Measure cable loss routine

Steps 1 through 6 will establish a reference power level.

1 Run *TEST_07 Manual switch & calibration aid*.

2 Select the **`Measure cable loss`** routine from the given routine list.

3 When prompted, enter the start and stop frequencies associated with your receiver. This defines what frequency range the Measure Cable loss routine will test over. Be sure to use only the base station RX frequencies.

Example:

Start Frequency: 824 Mhz

Stop Frequency: 849 MHz

4 After frequencies are entered, press k2 **`(Continue)`**.

5 Make the connections shown in *figure 55, "RX Power Reference Diagram"* .

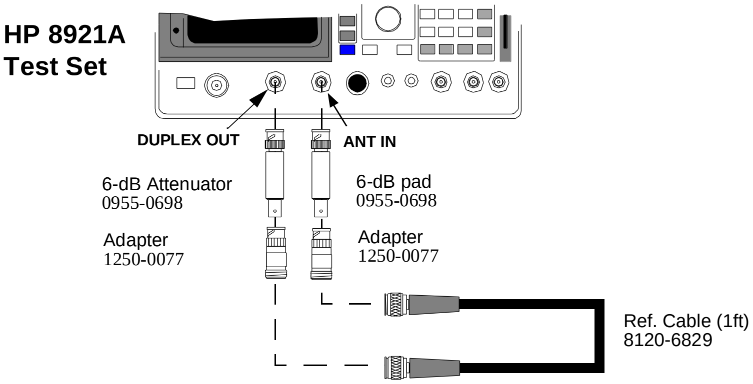


Figure 55 **RX Power Reference Diagram**

6 After connections have been made, press k2 **`(Continue)`**.

The Test Set measures the resulting power level and stores it as a reference level.

Steps 7 through 11 will measure the resulting power level through your RX path.

7 Disconnect one end of the reference cable from the 6-dB pad and insert the equipment associated with your RX path. *Figure 56 on page 88* and *figure 57 on page 89* show the connection diagrams for each base station configuration A, B, and C.

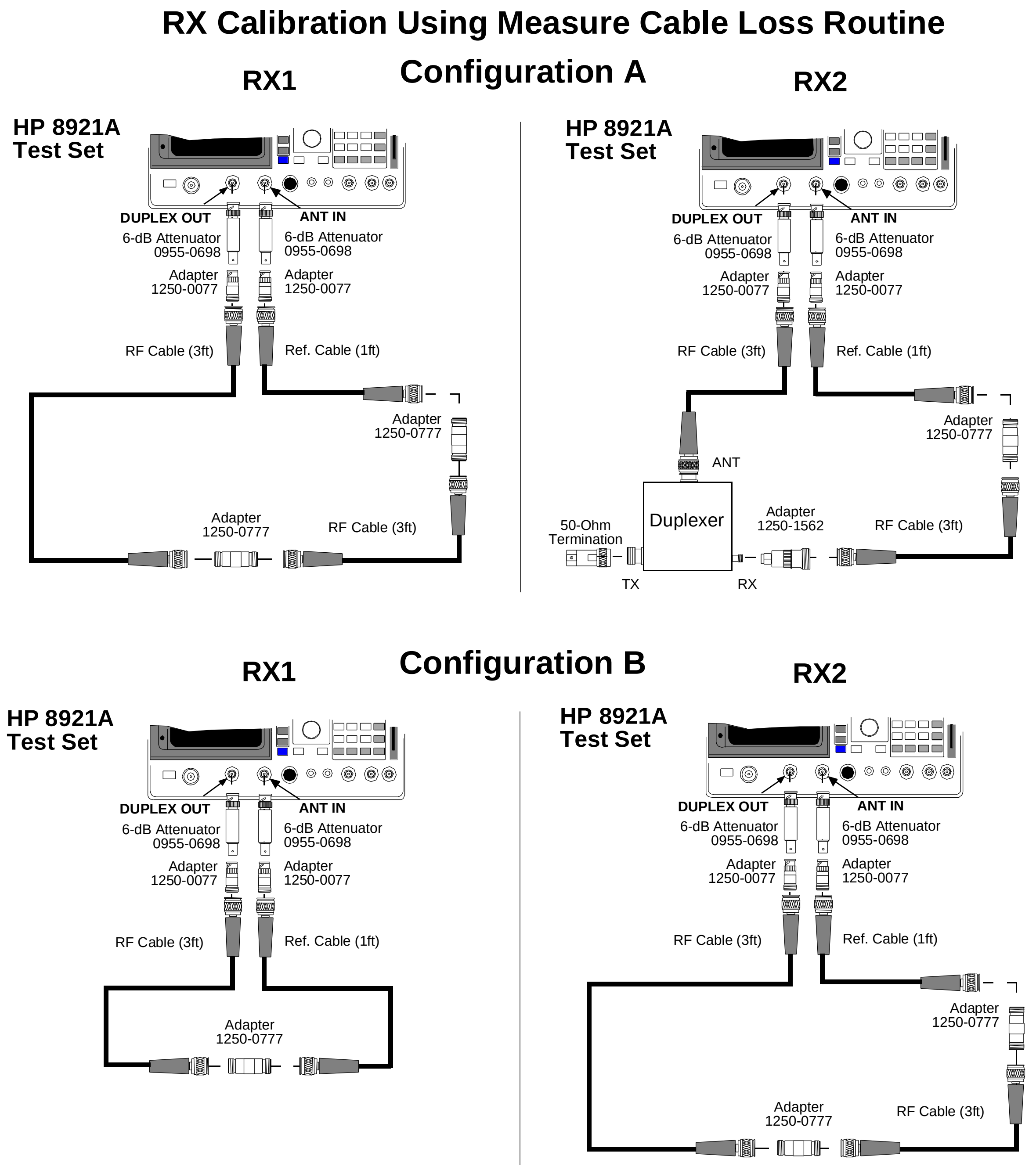
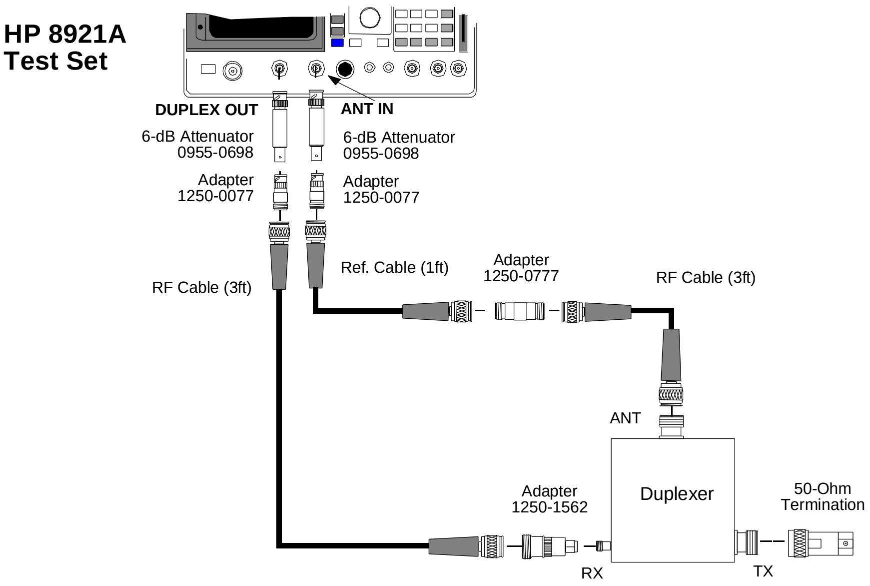

RX Calibration Using Measure Cable Loss Routine
Configuration A
RX1
RX2
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
Adapter 1250-0777
Adapter 1250-0777
RF Cable (3ft)
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
Adapter 1250-0777
ANT
Duplexer
50-Ohm Termination
Adapter 1250-1562
RF Cable (3ft)
TX
RX
Configuration B
RX1
RX2
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
Adapter 1250-0777
HP 8921A Test Set
DUPLEX OUT
ANT IN
6-dB Attenuator 0955-0698
6-dB Attenuator 0955-0698
Adapter 1250-0077
Adapter 1250-0077
RF Cable (3ft)
Ref. Cable (1ft)
Adapter 1250-0777
Adapter 1250-0777
RF Cable (3ft)

Figure 56

RX Calibration Using Measure Cable Loss Routine

Configuration C

RX1



RX2

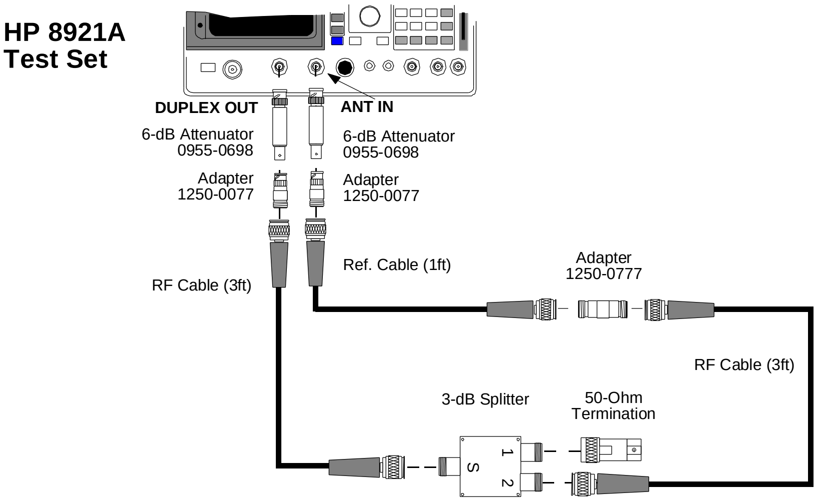


Figure 57

ATTENUATOR MUST BE REMOVED

Notice that the RX path diagrams in *figure 56* and *figure 57* do not include the 30-dB attenuator normally associated with the RX path. It has been removed to ensure accurate results. See the EXPECTED PATH LOSS VALUES warning below for more information.

8 Record the attenuation value of the attenuator that is usually included in your RX path as ATTENVALUE.

Example:

ATTENVALUE = 30 dB

9 Press k2 `(Continue)`.

10 The routine will take a few seconds to run. The RX path loss results will be displayed on the Test Set's screen.

Example:

Average cable loss =0.97 dBm

Maximum cable loss = 1.01 dBm

Minimum cable loss =0.93 dBm

EXPECTED PATH LOSS VALUES

The `Measure cable loss` routine is only capable of accurately testing up to 15 dB of loss. It is not expected that any RX path loss should exceed this value. If your path loss value exceeds 15 dB, verify your RX path connections.

VERIFY LOSS VALUES

Approximate loss values for the equipment included in the HP 83202A Opt. 070 kit are listed in *table 4 on page 75*. Use these values to approximate the expected path loss and verify that your loss measurements are reasonable.

11 Record the average cable loss value as AVERAGELOSS in dBm.

Example:

AVERAGELOSS =0.97 dBm

Steps 12 through 15 calculate and store the RX path loss parameter.

12 The total loss associated with your RX path is equal to the Average cable loss plus the 30-dB attenuation normally associated with your RX path. Calculate the total loss using the equation below.

Example:

TOTALLOSS = AVERAGELOSS + ATTENVALUE

TOTALLOSS =0.97 dBm + 30 dB = 30.97 dBm

13 Record the TOTALLOSS value and store it for the corresponding RX parameter listed in the beginning of this section on page 85. See *"Editing the Test Parameters" on page 139* for more information on editing parameters.

Example:

In this example, measurements were made for base station configuration A, RX port 1. A loss value of 30.97 dBm would be stored for parameter *19_RX path loss to antenna 1 [dB]*.

14 Repeat this measurement for RX Port 2.

You must determine the path loss for each RX port. The first time to determine the losses associated with RX path loss to port 1 (antenna 1), and the second time to determine the losses associated with RX path loss to port 2 (antenna 2).

15 Testing is complete.

2. Using the Power Meter

Table 8 **What you will need:**

Item	Qty	Part number
Test Set	1	HP 8921A
Power Meter and Sensor	1	External
Adapter	1	1250-0077
6-dB pad	1	0955-0698
50-Ohm termination	1	909A Opt. 012
Any external equipment associated with your TX path such as a duplexer, splitter, or RF cable. See *figure 59 on page 93* and *figure 60 on page 94* for RX path diagrams.		

Examples are based on typical values for base station configuration A, RX port 1.

Steps for determining RX Path Loss using the Power Meter

Steps 1 through 6 establish a reference power level.

1 Zero the power meter.

2 Set the power meter’s calibration factor if necessary.

3 Make the connections shown in *figure 58, "RX Path Power Meter Reference"* .

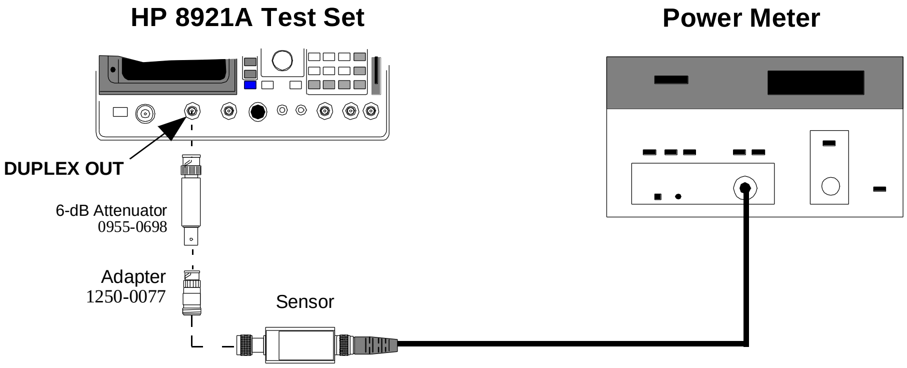


Figure 58 RX Path Power Meter Reference

4 After connections are made, run *TEST_07 Manual switch & calibration aid* and select the **Set the HP 8921A for RX path calibration** routine. This routine will automatically set up the Test Set's RF generator for testing.

5 When prompted, enter the desired RF amplitude from the Test Set. Choose an amplitude so that the signal level with the path losses remains within the range of the sensor head.

Example:

Enter: 10 dBm

6 Record the power meter reading as POWERREF in dBm.

Example:

POWERREF = 3.85 dBm

Steps 7 through 8 measure the resulting power level through your RX path.

7 Connect your RX path equipment to the Test Set and power meter. *Figure 59 on page 93* and *figure 60 on page 94* show the connections for each base station configuration (A, B, and C).

8 Record the power meter reading as POWERRECEIVER in dBm.

Example:

POWERRECEIVER = -28.15

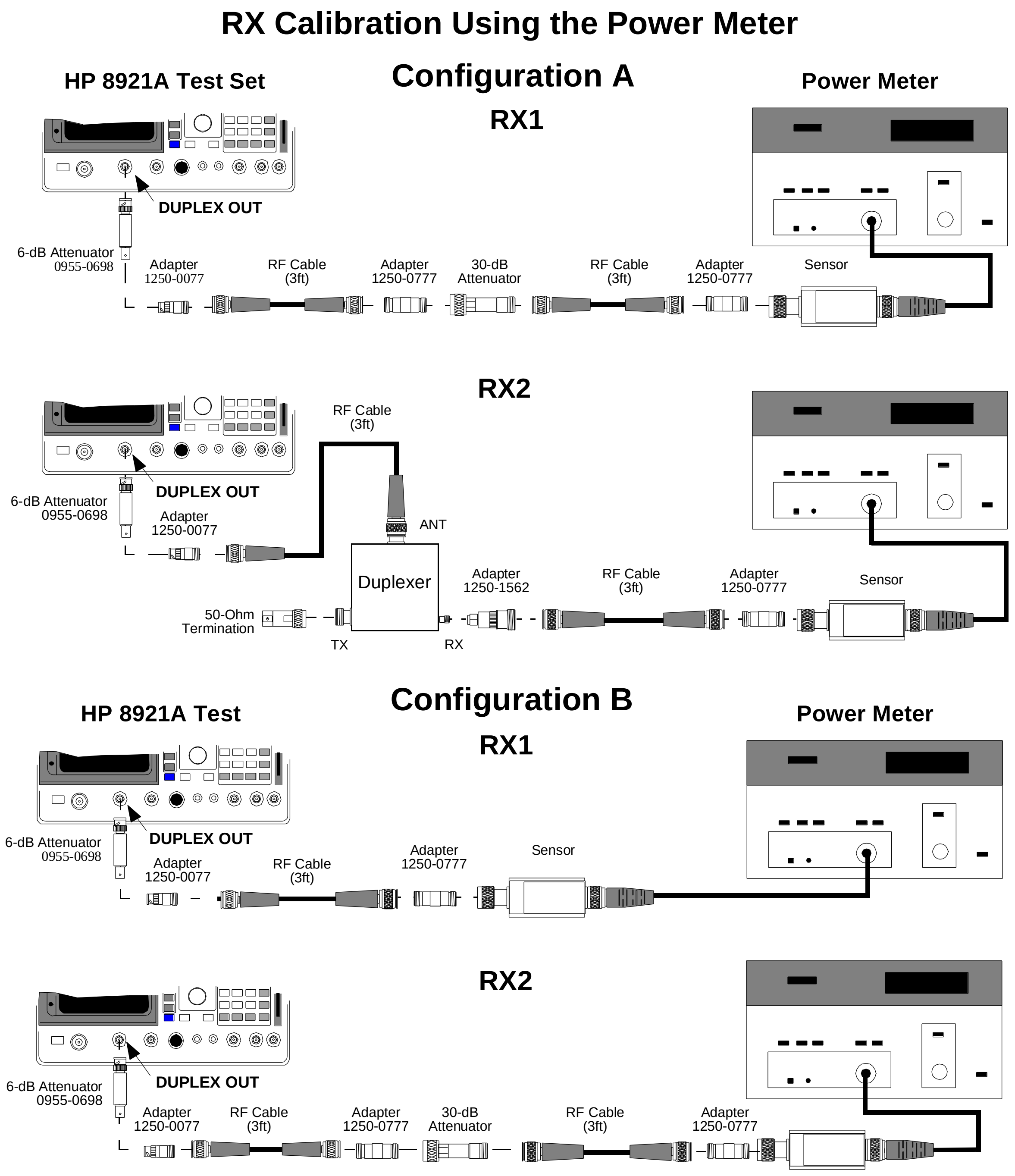

RX Calibration Using the Power Meter
HP 8921A Test Set
Configuration A
Power Meter
RX1
DUPLEX OUT
6-dB Attenuator
0955-0698
Adapter
1250-0077
RF Cable
(3ft)
Adapter
1250-0777
30-dB
Attenuator
RF Cable
(3ft)
Adapter
1250-0777
Sensor
RX2
RF Cable
(3ft)
DUPLEX OUT
6-dB Attenuator
0955-0698
Adapter
1250-0077
ANT
Duplexer
Adapter
1250-1562
RF Cable
(3ft)
Adapter
1250-0777
Sensor
50-Ohm
Termination
TX
RX
HP 8921A Test
Configuration B
Power Meter
RX1
DUPLEX OUT
6-dB Attenuator
0955-0698
Adapter
1250-0077
RF Cable
(3ft)
Adapter
1250-0777
Sensor
RX2
DUPLEX OUT
6-dB Attenuator
0955-0698
Adapter
1250-0077
RF Cable
(3ft)
Adapter
1250-0777
30-dB
Attenuator
RF Cable
(3ft)
Adapter
1250-0777

Figure 59

RX Calibration Using the Power Meter

Configuration C

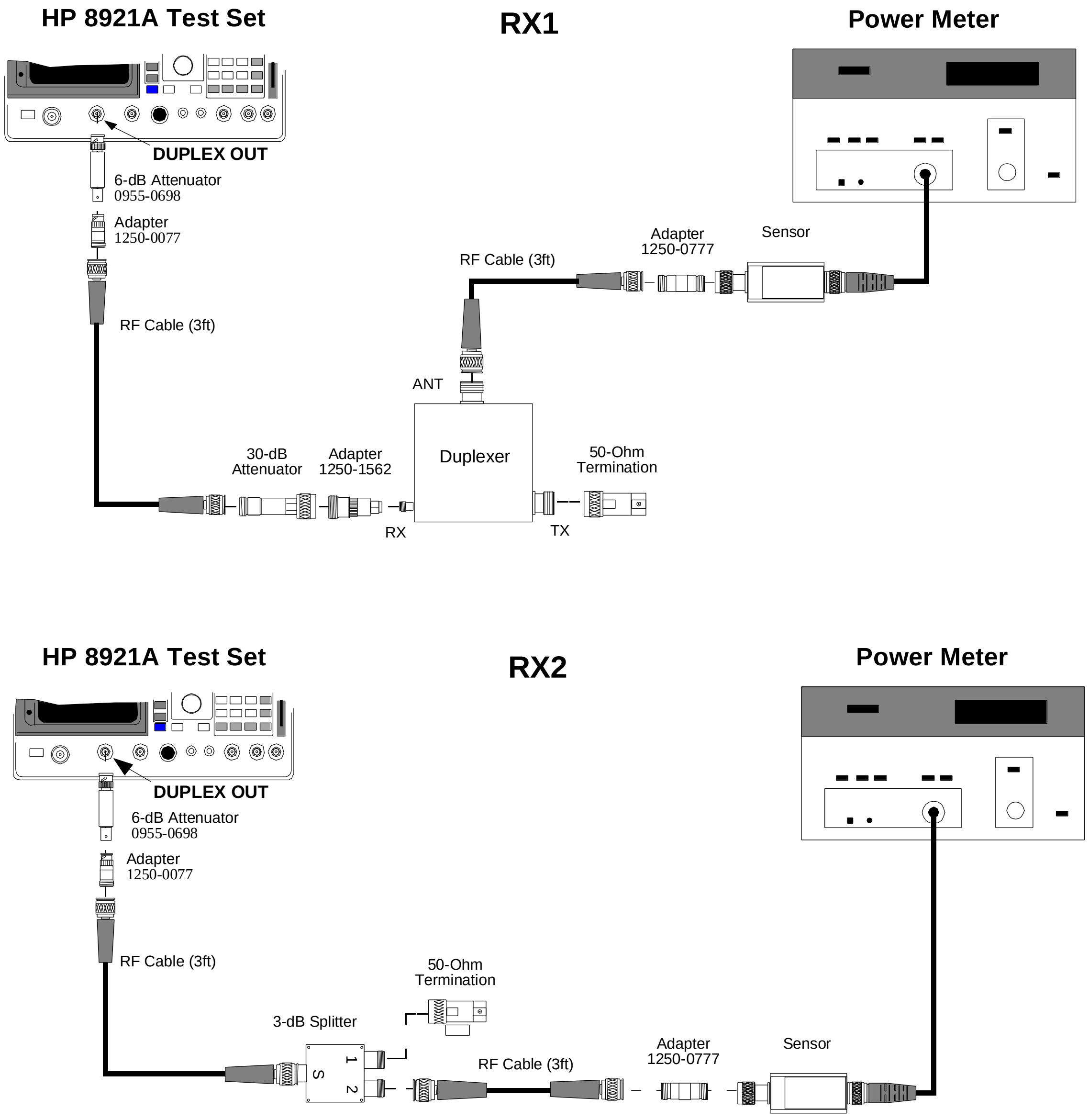


Figure 60

Steps 9 through 12 calculate and store the RX path loss parameter.

9 The RX path loss parameter equals the difference between the POWERREF value and the POWER RECEIVER value. Calculate the RX path loss value using the following equation:

Example:

RX path loss parameter = POWERRECEIVER - POWERREF

RX path loss parameter = 3.85 dBm - (-28.15 dBm) = 32 dBm

VERIFY LOSS VALUES

Approximate loss values for the equipment included in the HP 83202A Opt. 070 kit are listed in *table 4 on page 75*. Use these values to approximate the expected path loss and verify that your loss measurements are reasonable.

10 Store the path loss parameter from step 9 for the associated RX path loss parameter listed in the beginning of this section on page 85. See *"Editing the Test Parameters" on page 139* for more information on editing parameters.

Example:

In this example, measurements were made for base station configuration A, RX port 1. A path loss value of 32 dBm would be stored for parameter *19_RX path loss to antenna 1 [dB]*.

11 Repeat this measurement for RX port 2.

You must determine the path loss for each RX port. The first time to determine the losses associated with RX path loss to port 1 (antenna 1), and the second time to determine the losses associated with RX path loss to port 2 (antenna 2).

12 Testing is complete.

Determining the URDM Correction Factor

The following procedure will guide you through the steps to determine the correction factor for the following parameter.

- 30_URDM level correction factor [dB]

The software will use this correction factor to enhance the accuracy of the 3 MHz measurements made during *TEST_02 URDM Frequency/Level*.

Table 9 **What you will need:**

Item	Qty	Part number
Test Set	1	HP 8921A
Power Meter and Sensor	1	External
Adapter	1	1250-0077
Adapter	1	1250-0780
Adapter	1	1250-1853
Test cable BNC to BNC (6 ft.)	1	8120-6827

Steps for measuring the URDM Correction Factor

1 Zero the power meter.

2 Set the power meter calibration factor if necessary.

3 Remove the 50-Ohm load on URDM Phono #2 jack.

4 Make the connections shown in *Figure 61, "URDM Power Meter Diagram"* .

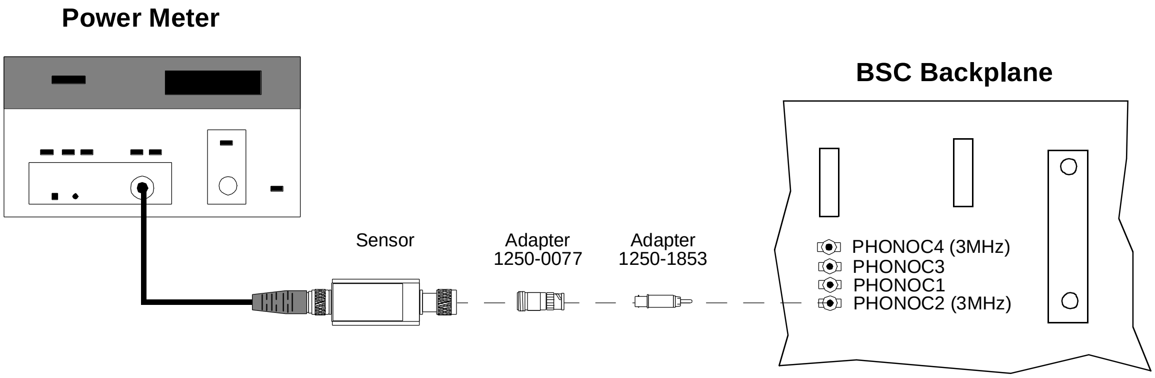


Figure 61 URDM Power Meter Diagram

5. Record the power meter reading as POWERREF in dBm.
6. Disconnect the power meter and sensor.
7. Make the connections shown in *figure 62, "URDM Test Set Diagram"* .

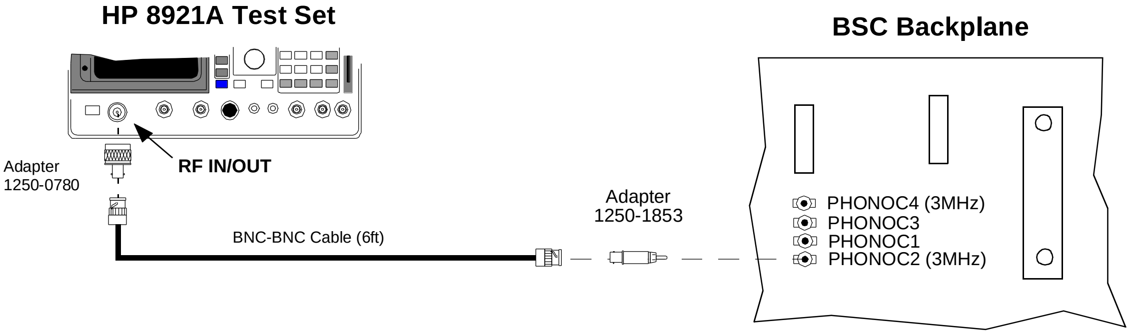


Figure 62 URDM Test Set Diagram

8. Run *TEST_07 Manual switch & calibration aid* and select the **`Read the spec. analyzer RDM calibration`**. routine. This routine automatically sets up the Test Set’s spectrum analyzer, measures the signal level, and displays it on the Test Set’s screen.
9. Record the signal level as POWER8921.
10. Calculate the calibration factor using the following formula:

Calibration factor = POWERREF - POWER8921

11 Store this value for parameter *30_URDM level correction factor [dB]*.

See *"Editing the Test Parameters" on page 139* for more information on editing test parameters if needed.

12 Testing is complete.

5

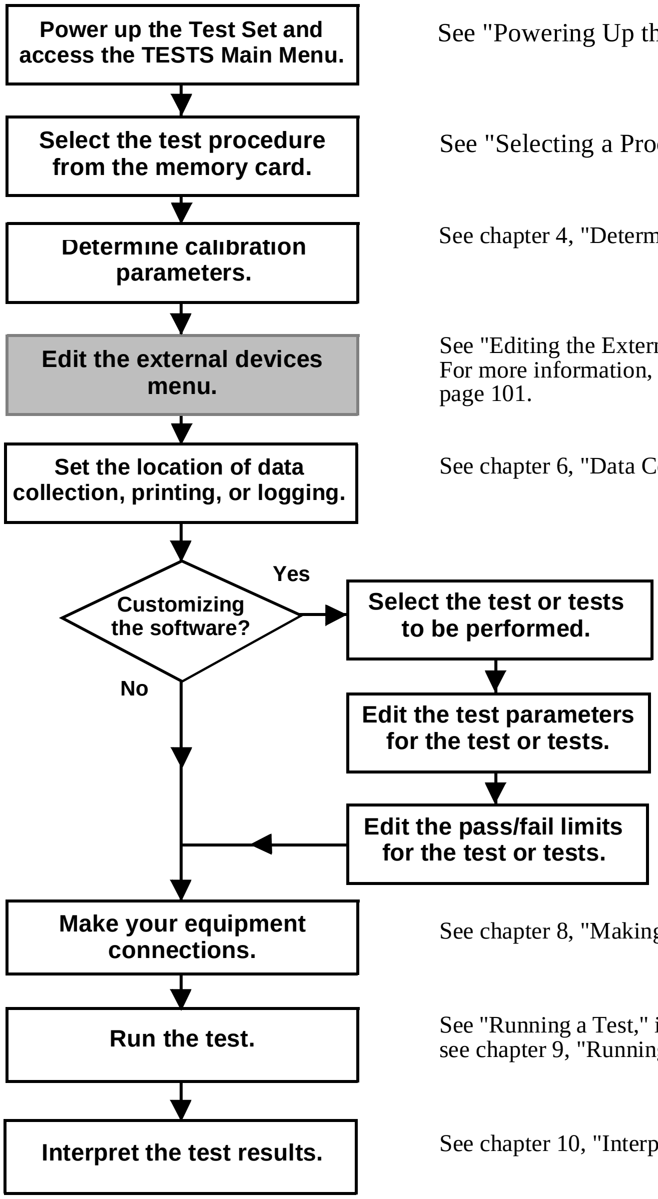
Editing the External Devices Screen

What's included in this chapter:

Task Flow diagram

*Task**

For a description of the task or related information:



See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

Before you begin testing, you will want to make entries into the External Devices screen to define the equipment you are using and to set up any additional Test Set features.

The External Devices (or Edit Configuration) screen can be used to:

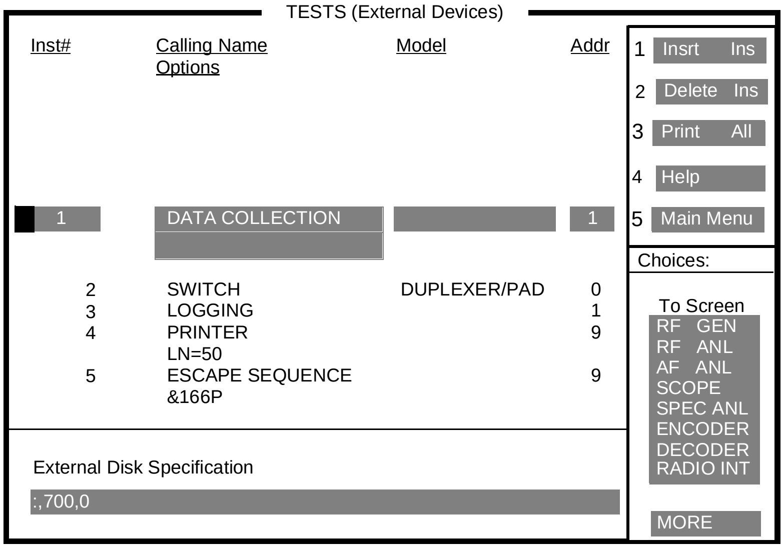
- Define the equipment you are using for testing.

  The software will provide connection diagrams and generate signals at the appropriate ports based on the equipment you are using.
- Set up the Test Set’s data collection feature for collecting test results to a memory device or PC.
- Set up the Test Set’s serial or HP-IB ports for printing.
- Set up the Test Set’s logging feature to log the communication between the Test Set and base station and send it to the Test Set’s screen or to a serial or HP-IB printer.

SAVING ENTRIES TO THE EXTERNAL DEVICES SCREEN

Entries to the External Devices screen cannot be saved in a procedure file. They will remain in the Test Set’s battery-backed-up memory during a power down power-up cycle. After power-up the Test Set will use the entries that were in the Test Set’s memory when the last power-down occurred.

Editing the External Devices Screen



TESTS (External Devices)

Inst#	Calling Name Options	Model	Addr
1	DATA COLLECTION		1
2	SWITCH	DUPLEXER/PAD	0
3	LOGGING		1
4	PRINTER LN=50		9
5	ESCAPE SEQUENCE &166P		9

External Disk Specification

:,700,0

Figure 63 **External Devices Screen**

Field descriptions

The External Devices screen is made up of six main fields:

1 **`Inst#`**

The numbers in the **`Inst #`** column correspond to the item numbers produced by the Test Set's firmware. The order that you enter items in the **`Inst #`** field is not important and may not match the example shown above.

2 **`Calling Name`**

Items can be entered into the **`Calling Name`** field either by using the cursor control knob to type names from the letters provided in the Choices menu or by selecting items already available in the **`choices`** menu. See *table 10 on page 108* for a list of the calling names that the Test Set will recognize.

3 **`Options`**

Options can be entered to control the features of a calling name. See *table 10 on page 108* for list of the calling names and their available options.

4 **`Model`**

A model number may be required to further define the instrument being used. See *table 10 on page 108* for a description of which calling names require a model number.

5 **`Addr`**

The numbers entered into the Addr field are either set to determine the Test Set’s port to be used or set to reflect the address of the instrument in the calling name field.

6 **`External Disk Specification`**

This field specifies the location of a connected external disk drive for saving and retrieving different types of files.

:, <disk address>, <volume>

Example

The example entries shown in the *figure 63 on page 104* configure the Test Set to do the following:

1. Instrument #1, data collection, configures the Test Set to collect data (test results) to a memory card (Addr 1). *See "Data Collection to a Memory Card" on page 116* for more information on configuring the Test Set for data collection.
2. Instrument #2, switch, configures the Test Set for testing using a duplexer/pad. The software will provide equipment connection diagrams and make any internal changes required for testing using an duplexer/pad.
3. Instrument #3, logging, configures the Test Set to log the commands sent from the Test Set to the base station and the responses sent from the base station to the Test Set on the Test Set’s screen (Addr 1). *See "Logging" on page 130* for more information on configuring the Test Set for logging.
4. Instrument #4, printer, configures the Test Set for use with a serial printer (Addr 9). The option, LN=50, instructs the Test Set to print 50 lines before a form feed.

NOTE: The method for entering the printing feature into the External Devices screen described above is only required for firmware revision levels below A.14.00. Firmware revision levels A.14.00 and above contain a new screen which is used to configure the Test Set for printing. *See "Printing" on page 124* for information on printing for your firmware revision level.

5. Instrument #5, escape sequence, configures the Test Set to set the page length to 166 lines (&166P) when printing to a serial printer (Addr 9). *See "Sending Escape Sequences to a Printer" on page 274* for a table of the available escape sequences.

NOTE: The escape sequence feature is only available in Test Sets with firmware revision levels A.14.00 and above. *See "Sending Escape Sequences to a Printer" on page 274* for more information.

Entering an Item into the External Devices Screen

To enter an item into the External Devices screen:

1. Press the TESTS key.
2. Select **`External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
3. Position the cursor to the field in the column labeled **`Inst#`** and select it.
4. Rotate the knob and select the desired instrument number (the next available field).
5. Press k1 (**`Insrt Ins`**) or k2 (**`Delet Ins`**) to insert or delete instruments.
6. Position the cursor to the **`Calling Name`** field and select it.
7. Using the characters available in the Choices menu, enter the desired **`Calling Name`**. (See *table 10 on page 108*)
    - Use the ⇐ key to backspace.
    - Press CANCEL to cancel entries and retain the old entry.

SHORTCUT The Test Set searches for and recognizes only the italicized portions of the calling names shown in table 10 on page 108. For example, you only need to type “data c” for the Test Set to recognize the data collection feature.

8 Choose **`Done`** from the list after the entry is made.

9 Repeat for **`Options`**, **`Model`**, or **`Addr`** fields as appropriate.

Table 10, "Configuration Table Entries" on page 108 lists all the acceptable entries to the External Devices screen.

Table 10 Configuration Table Entries

Purpose	Inst#	Calling Name Options	Model	Addr	Description
Data Collection	1[1]	*data* collection		7xx[2]	To HP-IB disk drive.
		Options:[3]			
		ascii[4]			LIF format[5]
		or *bdat*[4]			LIF format[5]
		or *(ext)*[6]			DOS file type
		or blank[7]			DOS or HP-UX file type[7]
		rec=xxxxx[8]			Number of records
	1	*data* collection		1	To memory card
		Options:[3]			
		ascii[4]			LIF format[5]
		or *bdat*[4]			LIF format[5]
		or *(ext)*[6]			DOS file type
		or blank[7]			DOS or HP-UX file type[7]
		rec=xxxxx[8]			Number of records
	1	*data* collection		9	Serial to external computer (laptop)

Table 10 Configuration Table Entries (Continued)

Purpose	Inst#	Calling Name Options	Model	Addr	Description
External Equipment	2[1]	*switch*	HP 8921A		Test Set Radio Interface
		Options:[3]			
		low[9]			Inverts polarity
		switch	HP 3488A		HP 3488A Switch Control Unit
		switch	DUPLEXER/ PAD		Duplexer/Pad Switch Unit
		*spl*itter			RF Splitter in RX path
		t1 module			External T1 Module

Table 10 Configuration Table Entries (Continued)

Purpose	Inst#	Calling Name Options	Model	Addr	Description
Printing Test Results	3[1]	*printer*		7xx[2]	HP-IB Printer
		printer		9	Printer, Serial
		printer		15	Printer, Parallel
		Options:			
		ln=xx			xx
		start[10]			Form feed at the start of each TEST in the sequence
		end			Form feed at the end of each TEST in the sequence
	4[1]	*escape seq*uence		7xx[2]	Printer options to HP-IB printer
				9	Printer options to Serial Printer
				15	Printer options to Parallel Printer
		Options: See table 20 on page 275.			Options to control printing features

Table 10 **Configuration Table Entries (Continued)**

Purpose	Inst#	Calling Name Options	Model	Addr	Description
Logging Commands/ Messages	4[1]	*logging*		0	Logging off
		logging		1	Log to CRT
		logging		7xx[2]	HP-IB Printer
		logging		9	Serial Printer

1. The instrument numbers can be in any order. For example. DATA Collection can have Inst#-3.
2. xx = Last two digits of HP-IB address.
3. These options apply to disk drive and memory card data collection. They do not apply when collecting data with `Addr=`9.
4. A file type. *See chapter 6, "Data Collection, Printing, and Logging" on page 113*.
5. *See chapter 6, "Data Collection, Printing, and Logging" on page 113*
6. A DOS file name extension. For example, the file name may be CELL1.EXT.
7. DOS is used if the disk format is DOS. HP-UX is used if the disk format is LIF.
8. Number of records. *See chapter 6, "Data Collection, Printing, and Logging" on page 113*.
9. LOW results in a TTL/CMOS low-state drive selecting a switch position.
10. Multiple options can be separated by a comma or space.

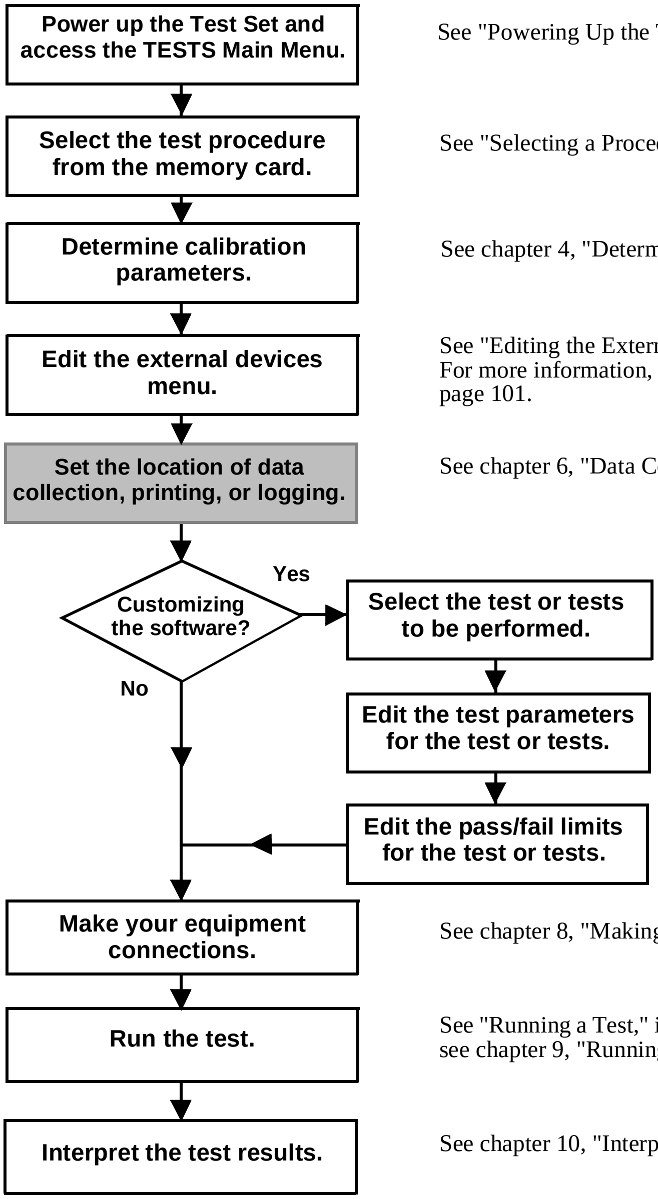
6

Data Collection, Printing, and Logging

What’s included in this chapter:

- Introduction
- Data Collection (Saving Test Results)
- Data Collection (Retrieving Test Results)
- Printing
- Logging

Task Flow Diagram



*Task**	***For a description of the task or related information:***
Power up the Test Set and access the TESTS Main Menu.	See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.
Select the test procedure from the memory card.	See "Selecting a Procedure," in chapter 3, on page 26 or page 48.
Determine calibration parameters.	See chapter 4, "Determining Calibration Parameters" on page 73.
Edit the external devices menu.	See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.
Set the location of data collection, printing, or logging.	See chapter 6, "Data Collection, Printing, and Logging" on page 113.
Select the test or tests to be performed.	See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.
Edit the test parameters for the test or tests.	See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.
Edit the pass/fail limits for the test or tests.	See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.
Make your equipment connections.	See chapter 8, "Making Equipment Connections" on page 151.
Run the test.	See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.
Interpret the test results.	See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

This software package supports three different methods for storing test results.

Data Collection

The data collection capabilities of the Test Set allow you to save and retrieve test results to a memory device. The software has the capability to save test results to an SRAM memory card or PC. This chapter also provides methods for retrieving test results.

Printing

The printing capabilities of the Test Set allow you to print the test results as they appear on the Test Set’s screen. The HP 8921A supports serial and HP-IB printers.

Logging

The logging capabilities of the Test Set allow you to monitor all the commands sent from the Test Set to the base station and all the messages returning from the base station to the Test Set.

Data Collection (Saving Test Results)

Data collection procedures are provided for:

- Data collection to a memory card
- Data collection to a terminal or PC

Data Collection to a Memory Card

INITIALIZING YOUR MEMORY CARD

See *"Initializing a Memory Card" on page 264* if using a new memory card.

Making equipment connections for data collection to a memory card

External equipment connections are not required for data collection to a memory card.

To edit the External Devices screen or (Edit Config) screen for collection to a memory card:

1 Press the TESTS key.

2 Select **`Cnfg External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).

3 Position the cursor to the **`Calling Name`** field and select it.

4 Using the list of characters in the **`Choices`** menu, enter **`DATA C`** into the **`Calling Name`** next to **`Inst#`** **`1`**. The entry will look like:

1 DATA C

NOTE: For some SW revisions, DATA C will appear in the **`Choices`** menu. In this case, you may select **`DATA C`**, then **`Done`** instead of typing each character individually.

5 Position cursor to the **`Addr`** field and select it.

6 Using the DATA keypad, enter the number 1 into the **`Addr`** field for the type of storage media you will be using (press ENTER when complete):

```
1      DATA C                          1
```

Calling names can be entered in any order.

7 Specify the file type with the entry you make into the **`Options`** field immediately below **`DATA C`**.

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

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

If no file type is entered, and the memory card format is LIF, the software will select an HP-UX file type. If no file type is entered, and the memory card format is DOS, the software will select a DOS file type.

NOTE:

For some software revisions, **`REC=`** and **`ASCII REC=`** will appear in the **`Choices`** menu. In this case, you may select **`REC=`** or **`ASCII REC=`**, enter the number of records using the DATA keypad, then select **`Done`**, instead of typing in each character individually.

The display will appear as follows:

```
x      DATA C                          1
       ASCII REC=200
```

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

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

DATA COLLECTION OPTIONS

See *table 11, "Data Collection (Saving/Retrieving Tests) Configuration Summary" on page 118* for a summary and description of all the available entries for data collection.

Table 11 Data Collection (Saving/Retrieving Tests) Configuration Summary

Inst#	Calling Name Options	Model	Addr	Description
first unused #	*data* collection		7xx[1]	To HP-IB disk drive
	Options[2]			
	File types of *ascii,*		7xx[1]	LIF format
	or *bdat*			LIF format
	or *(ext)*[3]			DOS file type
	or blank[4]			DOS or HP-UX file type[4]
	rec=xxxxx (number of records)			Number of records
first unused #	*data* collection		1	To memory card
	Options[2]			
	File types of *ascii,*		7xx[1]	LIF format
	or *bdat*			LIF format
	or *(ext)*[3]			DOS file type
	or *blank*[4]			DOS or HP-UX file type[4]
	rec=xxxxx (number of records)			Number of records
first unused #	*data* collection		9	Serial to external computer (laptop)

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

Data Collection to a Terminal or PC

Test results can be output through the serial port to a variety of devices including an HP Palmtop PC, PC, laptop, or terminal.

TERMINAL EMULATOR USE

Examples of terminal emulator programs are HP AdvanceLink and ProComm, a product of DataStorm Technologies, Inc. An example for data collection using HP Advancelink is provided on *page 120*.

A terminal can also be used to send front panel control characters to the Test Set. *See "Sending Characters to the Test Set Using a Terminal or PC" on page 270* for more information.

Making equipment connections for data collection to a terminal or PC

Data collection to a terminal or PC requires equipment connection to the Test Set serial port. Make connections to the serial port as shown in *figure 66 on page 164*.

To edit External Devices screen or (Edit Config) for data collection to a a terminal or PC:

1. Press the TESTS key.
2. Select **`External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
3. Position the cursor to the **`Calling Name`** field and select it.
4. Using the list of characters in the **`Choices`** menu, enter **`DATA C`** (next to **`Inst# 1`**):

```
1    DATA C
```

5. Position the cursor to the **`Addr`** field and select it.
6. Using DATA keypad, enter **`9`** and press ENTER :

```
1    DATA C                    9
```

Calling names can be entered in any order. In this example, **`DATA C`** was entered into **`Inst #=1`**. The calling names can be ordered in other ways. **`DATA C`** may be in **`Inst#=2`**; and **`PRINTER`** may be in **`Inst#=1`**.

DATA COLLECTION OPTIONS

See *table 11, "Data Collection (Saving/Retrieving Tests) Configuration Summary" on page 118* for a summary and description of all the available entries into the External Devices screen for data collection.

To edit the IO CONFIG screen for data collection to a terminal or PC

The characteristics of the serial port, when used for instrument control from a PC or terminal emulator, are determined by settings on the Test Set's I/O CONFIGURE screen.

1. Press the TESTS key.
2. Select **`More`** from the **`To Screen:`** list.
3. Select **`IO CONFIG`** from the **`Choices:`** menu.

   When data collection is entered into the External Devices screen the software will automatically set the following:

   - **`Serial In`** to **`IBASIC`**
   - **`IBASIC Echo`** to **`Off`**
   - **`Inst Echo`** to **`Off`**
4. Set the remaining configuration entries to match the settings of your terminal or PC program (baud, parity, data length, and so forth).

Example: Configuring an IBM-Compatible PC with HP Advancelink for DOS:

1. Load and run HP AdvanceLink on your PC.
2. Use the following tables to set the *Global Configuration*, *Terminal Configuration*, and *Remote Configuration* settings.

Table 12 **Global Configuration Settings**

FIELD	SETTING	FIELD	SETTING
Keyboard	USASCII	Memory Size	32K
Personality	HP	Plotter I/F	None
Language	English	HP Mode	Yes
Terminal Mode	Alphanumeric	Video Type	Select your display type
Remote to	enter PC's serial port #	Forms Path	Enter path if used
Printer I/F	None	Screen Size	Enter the size

Table 13 **Terminal Configuration Settings**

FIELD	SETTING	FIELD	SETTING
Terminal ID	2392A	Esc Xfer(N)	YES
Local Echo	OFF	ASCII 8 Bits	YES
CapsLock	OFF	FldSeparator	US
Start Col	01	BlkTerminator	RS
Bell	ON	ReturnDef	CR
XmitFnctn(A)	NO	Line/Page(D)	LINE
SPOW(B)	NO	InhHndShk(G)	NO
InhEolWrp(C)	NO	Inh DC2(H)	NO
Copy	Fields	Host Prmpt Char	D1
Type Ahead	NO	Horiz. Scroll. Incr.	08
ROW Size	80	Large [+] Key	+

Table 14 **Remote Configuration Settings**

FIELD	SETTING
Baud Rate	4800
Parity/Data Bits	None/8
Eng Ack	No
Asterisk	OFF
Chk Parity	NO
SR(CH)	LO
Recv Pace	None
Xmit Pace	None
CS(CB)Xmit	NO

Data Collection (Retrieving Test Results)

Retrieving Data from a Memory Card

To retrieve the test results after they have been saved on an SRAM memory card, you will have to run an IBASIC program. The following program to transfers data from a memory card to a terminal emulator. You can type the program lines into the IBASIC command line from a terminal emulator. *See "Sending Characters to the Test Set Using a Terminal or PC" on page 270*.

To enter the data retrieval program:

1. Press the TESTS key.
2. Select `IBASIC Cntrl` from the `SET UP TEST SET` list (or `IBASIC` from the `Test Function` field).
3. Position the cursor to the IBASIC command field (large field in the upper part of the display) and select it. From the list of characters in the `Choices` field, enter the following IBASIC program statements and commands.
4. Enter `SCRATCH` to delete the previous IBASIC program. Be sure it’s saved first.
5. Enter the following program:

```
10 DIM A$[120]
```

Sets the string length to 120.

```
20 ASSIGN @File TO ”RES:INTERNAL”;FORMAT ON
```

Opens a path to the memory card file called “RES” (for results).

```
30 ON ERROR GOTO 80
```

Exits at end of file if an error is encountered.

```
40 LOOP
```

Extracts file contents.

```
50 ENTER @File;A$
```

Transfers part of the file to the string.

```
60 OUTPUT 9;A$
```

The string is output at the serial port.

```
70 END LOOP
```

Goes back to get more of the file.

```
80 END
```

End of the program.

6 Press k1 (**`Run`**) to run the entered IBASIC program.

Difference between *RUN* and *RUN TEST*

The k1 (**`Run`**) key, assigned as a default key on the IBASIC Controller screen, will start an IBASIC program that is resident in the Test Set’s memory. The k1 (**`Run Test`**) key, assigned as a default key on the TESTS screens, will load and run the program that is called from the **`Select Procedure Filename:`** and **`Select Procedure Location:`** entries on the TESTS Main Menu screen.

Printing

There are four basic steps to printing:

1. Determine your firmware revision level.
2. Determine printer port connections.
3. Configure the Test Set for your printer.
4. Instruct the Test Set what to print.

Step One: Determine Your Firmware Revision Level

The HP 8921A has had several firmware enhancements. The screens and steps required to print will depend on whether your firmware revision level is A.14.00 and above or whether it below A.14.00.

To determine your firmware revision level:

1. Press the SHIFT key and then press the DUPLEX key.
2. Record your firmware revision level.

   Your firmware revision level is located in the upper right-hand corner of the Test Set screen.

Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

Step Two: Determine Printer Port Connections

Determine if your printer requires serial, parallel, or HP-IB connection and connect the printer to the appropriate port on the Test Set. See *"Test Set Rear Panel Connections" on page 159* for more information on serial, parallel, or HP-IB port equipment connections.

SERIAL PORT

If using a serial printer, you cannot use the serial port for other connections at the same time, such as Data Collection (saving test results).

Supported Printers

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

If you do not have one of these printers, consult your printer's manual for the correct printer settings to emulate one of the supported printers.

Step Three: Configure the Test Set for Printing

This section contains the steps for configuring your Test Set for serial or HP-IB printing. Steps for configuring the Test Set will differ depending on your firmware revision level. Follow the procedure listed below for your firmware revision level.

- *"To configure the Test Set for printing with firmware revision level A.14.00 and above:" on page 126.*
- *"To configure the Test Set for printing with firmware revision level below A.14.00:" on page 127*.

To configure the Test Set for printing with firmware revision level A.14.00 and above:

1. Press the TESTS key.
2. Select **`Printer Setup`** from the **`SET UP TEST SET`** list.
3. Position the cursor to **`Model`** and select the desired printer.
4. Position the cursor to **`Print Port`** and select the desired port.
5. This step is only required if you are using an HP-IB printer. Position the cursor to **`Printer Adrs`** and enter the last two digits of the HP-IB address of your printer (0-30).
6. Set the following options if desired:
    - Lines/Page (controls the number of lines, 20-120, printed on a page before a form feed is sent to the printer)
    - FF at Start (to cause a form feed at the start of a test sequence)
    - FF at End (to cause a form feed at the end of a test sequence)
7. From the **`To Screen`** menu, select **`More`**.
8. From the **`Choices`** menu, select **`IO CONFIG`**.
    - For serial printing, set the **`Serial Baud`** field and other serial communications fields listed under it to correspond to your printer's configuration.
    - For HP-IB printing, set the **`Mode`** field to **`Control`**.
9. Press the TESTS key to return to the TESTS (Main Menu) screen.

If you have revision B.xx.xx software, you may use the Test Set to send escape sequences to control printer options such as pitch, margins, paper size, and so forth. *See "Sending Escape Sequences to a Printer" on page 274* for more information.

To configure the Test Set for printing with firmware revision level below A.14.00:

1. Press the TESTS key.
2. Select **`Edit Cnfg`** from the **`Test Function`** field.
3. Position the cursor to the **`Inst#`** field and select it.
4. Rotate the knob until an empty **`Calling Name`** field appears, and select it.
5. Position the cursor to the **`Calling Name`** field and select it.
   - a. Using the list of characters in the **`Choices:`** menu, enter the word **`Printer`**. Select **`Done`** when complete.
6. Position the cursor to the **`Model`** field and select it (optional).
7. Using the DATA keypad, enter the Model # and press ENTER.
   - a. Position the cursor to the **`Addr`** (address) field and select it.
   - b. Using the DATA keypad, enter **`9`** for serial printers, **`15`** for parallel printers, or **`70X`** for HP-IB printers, then press ENTER.
8. Position the cursor to the **`Options`** field (directly under **`Calling Name`**) and select it.
   - a. Using the list of characters from the **`Choices`** menu, the following commands may be entered. Separate the commands with commas (example; **`LN=60,START,END`**)
   - b. **LN** equals the number of printed lines per page.
   - c. **START** causes a form feed at the start of each printout.
   - d. **END** causes a form feed at the end of each printout.
9. From the **`To Screen`**: menu, select **`More`**.
10. From the **`Choices`**: menu, select **`IO CONFIG`**.
11. For Serial Printers:
    - Set the **`Serial Baud`** field and other serial communications fields listed under it to correspond to your printer’s configuration.
12. For HP-IB Printers:
    - Position the cursor to the **`Mode`** field and select it.
    - From the **`Choices`** menu, select **`Control`**.
    - Position the cursor to the **`Print Adrs`** field and select it.
    - Rotate the knob and select the HP-IB address of your printer.
    - Position the cursor to the **`Print To`** field. Pressing knob will toggle the underlined selection. Select to underline **`HP-IB`**.
13. Press the TESTS key to return to the TESTS main menu screen.

Step Four: Instruct the Test Set what to Print

The following may be printed:

- Test results
- TESTS(Main Menu) screens:
  - External Devices screen (Edit Cnfg)
  - Order of Tests screen (Edit Seqn)
  - Channel Information screen or (Edit Freq)
  - Pass/Fail Limits screen or (Edit Spec)
  - Test Parameters screen or (Edit Parm)

Follow the procedure for your firmware level.

Printing test results with firmware revision level A.14.00 and above:

1. Press the TESTS key.
2. Select **`Printer Setup`** from the **`SET UP TEST SET`** list.
3. Position the cursor to **`Output Results To`** and select **`Printer`**.
4. Position the cursor to **`Output Results For`** and select **`All`** if you want all results printed, or **`Failures`** if you want failures only printed.
5. (Optional) Position the cursor to **`Output Heading`** and enter your desired heading.

Printing test results with firmware revision level below A.14.00:

1. Make sure that your printer is properly connected and configured as explained earlier in this section.
2. Press the TESTS key.
3. Position the cursor to the **`Output Results To:`** field (or the **`Output Destination`** field). Pressing knob will toggle the underlined selection. Select to underline **`Printer`**.
4. Position the cursor to the **`Output Heading`** field and select it.
5. Using the list of characters in the **`Choices`** menu, enter a printout heading (optional). Select **`Done`** when the heading is complete.

Printing TESTS screens with firmware revision level A.14.00 and above:

1. Make sure that your printer is properly connected and configured as explained earlier in this section.
2. Press the TESTS key.
3. Select the **`CUSTOMIZE TEST PROCEDURE`** or **`SET UP TEST SET`** screen of your choice.
4. Press k3 (**`Print All`**) and select it.
5. Press the TESTS key to return to the TESTS (Main Menu) screen.

To print TESTS screens for firmware revision level below A.14.00:

1. Make sure that your printer is properly connected and configured as explained earlier in this section.
2. Press the TESTS key.
3. Select the TESTS screen you desire.
4. Press k3 **(`Print All`**) and select it.
5. Press the TESTS key to return to the TESTS screen.

Logging

The logging feature can be used to monitor the commands sent from the Test Set to the base station and all the messages returning from the base station to the Test Set. These commands and messages can be displayed on the CRT or output to a printer.

Making equipment connections for logging

No equipment connections are required for logging to the Test Set’s screen. If you are logging data to an HP-IB or serial printer, make appropriate connections to the Test Set’s port. *See "Test Set Rear Panel Connections" on page 159* for more information on the Test Set’s serial and HP-IB ports.

To enable the logging function:

1. Press the TESTS key.
2. Select **`External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
3. Press k1 **`(Insrt Ins`**).
4. Position the cursor to the **`Inst#`** field and select it.
5. Rotate the knob to the first vacant **`Calling Name`** field and select it.
6. Position the cursor to the **`Calling Name`** field and select it.
7. Some versions of firmware provide LOGGING in the list under the **`Choices:`** menu. Select LOGGING from the choices menu or enter L O G into the Calling Name field by:
   - rotating the knob and positioning the cursor beside L in the **`Choices`**: menu and selecting it.
   - repeating for O and G.
   - positioning the cursor to **`Done`** in the **`Choices`**: menu and selecting it.
8. Position the cursor to the **`Addr`** field and select it.
9. Choose output mode:
   - For CRT: Press 1 on the DATA keypad and press ENTER.
   - For HP-IB printer: Press 70x on the DATA keypad and press ENTER.
   - For serial printer: Press 9 on the DATA keypad and press ENTER.

10 If logging to an HP-IB printer:

 a Rotate the cursor control knob and select **`More`** from the **`To Screen:`** menu.
 b Select **`IO CONFIG`** from the **`Choices:`** menu.
 c Rotate the cursor control knob to the **`Mode`** field and select it.
 d Select **`Control`** from the **`Choices:`** menu.

11 Press the TESTS key to return to the TEST (Main Menu) screen.

NOTE: Logging occurs rapidly on the screen. To stop for inspection, press CANCEL. To continue, press k2 (**`Continue`**).

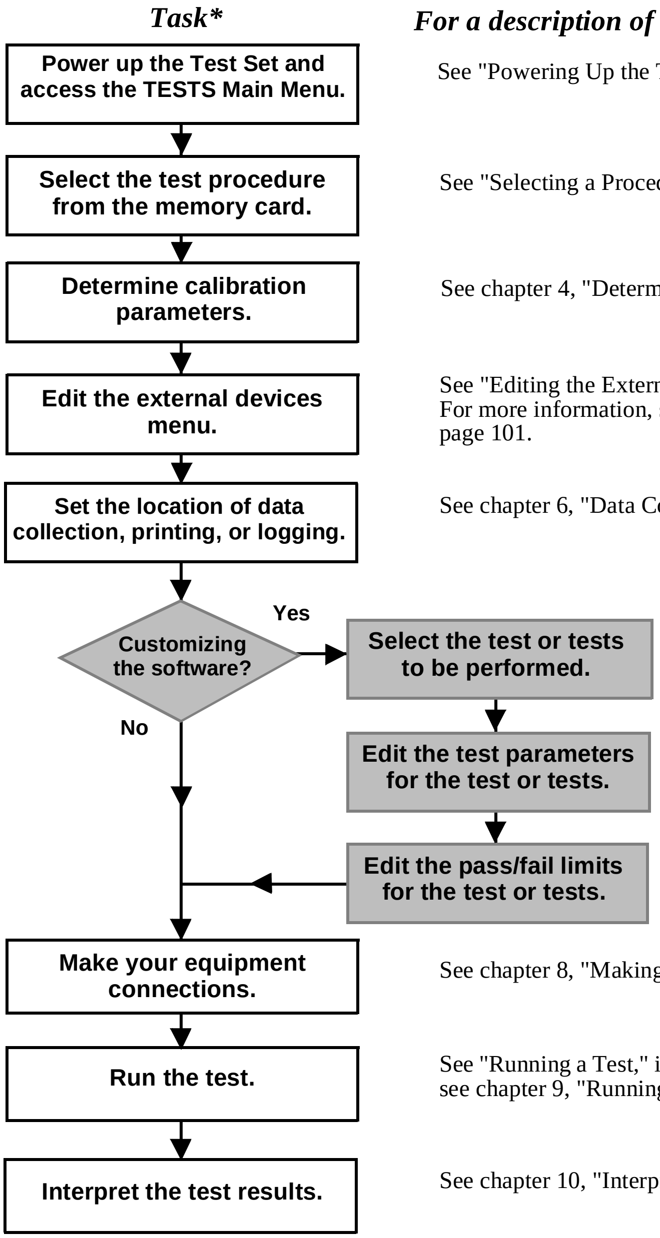
7

Customizing the Software

What's included in this chapter:

- Introduction
- Selecting a Test or Testing Sequence
- Editing the Test Parameters
- Editing the Pass/Fail Limits
- Test Procedures (saving, loading, deleting, securing, and copying)

Task Flow diagram



For a description of the task or related information:

See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

This chapter describes the steps necessary for customizing the software for your specific application. The tasks required for customizing the software are as follows:

- selecting a test or sequence of tests
- editing the test parameters
- editing the pass/fail limits

Test Procedures

Once you have customized the software to your specific application you can save your changes as a test procedure. A test procedure is a collection of parameters, pass/fail limits, and a testing sequence, all saved in a file that customizes the test software to a specific application. A procedure can be saved to a memory card or to the Test Set’s internal RAM.

Selecting a Test or Testing Sequence

Tests

This software comes pre-programmed with several different tests. Turn to *chapter 11, "Tests Descriptions," on page 197* for a listing and detailed description of the tests available in this software package.

You may want to run only one test at a time or you may prefer to run a sequence of tests. A testing sequence is two or more tests linked together which run consecutively. For example, in a testing sequence containing two tests, when the first test is finished then the second test will automatically begin. You can specify which tests and in what order they will run. The following procedure will explain how to select a single test or enter a testing sequence.

To enter a single test or testing sequence:

1 Press the TESTS key.

2 Select **`Order of Tests`** from the **`CUSTOMIZE TEST PROCEDURE`** list (or **`Edit Seqn`**).

3 Position the cursor to the **`Step #`** field and select it.

4 Using the DATA key pad, press the 1 key and then press the enter key.

Entering 1 in the **`Step #`** field designates that this test will be the first performed in your testing sequence.

5 Position the cursor to the **`Test Name Description`** field and select it.

The cursor appears next to a numbered list of tests in the **`Choices:`** menu. The numbers of these tests correspond to the numbers and names of the tests described in *chapter 11, "Tests Descriptions," on page 197*.

6 Position the cursor to the desired test number and select it.

The test number should appear in the **`Test Name Description`** field with its name directly under it.

7 You have successfully entered a single test into your testing sequence. To enter additional tests into your testing sequence proceed to *step 8*. Else, skip to step 15.

8 Press the k1 (**`Insrt Stp`**) user key.

A replica of the previously entered test appears as step #2.

9 Position the cursor to the **`Step #`** field and select it.

Notice you can now scroll through the **`Step #`** field to select step 1 or step 2.

10 Rotate the cursor control knob until the **`Step #`** field containing the number 2 is highlighted.

11 Press the cursor control knob again to deselect it.

12 Position the cursor to the **`Test Name Description`** field and select it.

The cursor appears next to a numbered list of tests in the **`Choices:`** menu. The numbers of these tests correspond to the tests described in *chapter 11, "Tests Descriptions," on page 197*.

13 Rotate the cursor control knob to the desired test number and select it.

The test number should appear in the field with its name directly under it. The tests will run in the order that they appear in the **`Step #`** field.

14 Repeat *step 8* through *step 13* until all desired tests have been entered into the testing sequence.

If the testing sequence steps scroll past the bottom or top of the display, select the field in the column labelled **`Step #`** and rotate the knob to display all or part of the sequence.

15 After all the desired tests have been entered into the testing sequence, press the k5 (**`Main Menu`**) key.

See "Selecting a Test" in chapter 3, "Getting Started" for your firmware revision level if a more detailed description on how to select a test is needed.

NOTE:

The Yes/No selection in the column labelled **`All Chans?`** on the TESTS (Edit Sequence) screen is not used by the HP 11807B Option 070 software.

SAVING THE ORDER TESTS

The testing sequence will remain in battery-backed-up memory until you select a new procedure to run. Once a new procedure has been loaded all previous testing sequences are lost. You can save your current testing sequence as a test procedure for future use. See *"Saving a Test Procedure" on page 143* for more information.

SECURING THE ORDER OF TESTS

A lock is provided to prevent access to the order of tests once they have been entered. See *"Securing a Procedure" on page 146*.

To remove a test from the testing sequence:

1 Rotate the cursor control knob to the **`Step #`** field and select it.

Notice you can now scroll through the **`Step #`** field to select any of the tests you have entered into the testing sequence.

2 Rotate the cursor control knob until the **`Step #`** field of the test you would like to remove is highlighted.

3 Press the k2 (**`Delet Stp`**) user key.

The test you highlighted no longer appears and has been removed from the testing sequence.

4 Repeat step 1 through step 3 to remove any additional tests from the testing sequence.

5 After all the undesired tests have been removed from the testing sequence, press the k5 (**`Main Menu`**) key.

Editing the Test Parameters

Parameters

After you have entered the desired tests into your testing sequence, you will need to edit the values of parameters associated with each test. Each test description contains a list of “Parameters Used”. The software uses the values you enter for each of these parameters to customize the software to your testing needs.

See chapter 11, "Tests Descriptions" for a list of the “Parameters Used” for a specified tests. *See chapter 12, "Parameter Descriptions"* for a complete description of each parameter.

To edit a parameter value:

1. Press the TESTS key.
2. Select **`Test Parameters`** from the **`CUSTOMIZE TEST PROCEDURE`** list (or **`Edit Parm`** from the **`Test Function`** field).
3. Position the cursor to the **`Parm#`** field and select it.
4. Rotate the cursor control knob until the desired parameter number is highlighted and select it.
5. Position the cursor to the **`Description Value`** field and select it.
6. Enter the desired value using the DATA keypad and press ENTER.
   - Use the €⇐key to backspace.
   - Press CANCEL to cancel entries and retain the old value.
7. Press k5 (**`Main Menu`**) or press the TESTS key to return to the TESTS screen.

See "Editing the Test Parameters" in chapter 3, "Getting Started" for your firmware revision level if a more detailed description on how to edit test parameters is needed.

SAVING PARAMETER VALUES

Parameters remain in battery-backed-up memory until you select a new procedure to run. Once a new procedure has been loaded, all previous parameter values are lost. You can save your current parameter values as a test procedure for future use. See *"Saving a Test Procedure" on page 143* for more information.

DEFAULT VALUES

The software comes preprogrammed with default values for each parameter. Some default values are derived from standard methods of measurement and some are derived from Motorola requirements. To view the default values, load the MOT_UC procedure and select the **`Edit Parameters`** field.

SECURING PARAMETER VALUES

A lock is provided to prevent access to the parameter values once they have been set. See*"Securing a Procedure" on page 146*

Editing the Pass/fail Limits

Pass/fail limits (Specifications)

After you have entered the desired tests into your testing sequence, you will need to edit the values of pass/fail limits associated with each test. Each test description contains a list of “Pass/fail Limits Used.” The software uses your entries for each pass/fail limit to set the upper and lower limits for test results. The pass/fail limits in this software package have been derived from standard methods of measurement or from Motorola requirements.

See chapter 11, "Tests Descriptions" for a list of the “Pass/fail Limits Used” for a specified test. See *chapter 13, "Pass/fail Limit Descriptions"* for a complete description of each pass/fail limit.

To edit a pass/fail limit value:

1. Press the TESTS key.
2. Select **`Pass/Fail Limits`** from the **`CUSTOMIZE TEST SET`** list (or **`Edit Spec`** from the **`Test Function`** field).
3. Position the cursor to the **`Spec#`** field and select it.
4. Rotate the knob to the desired pass/fail limit number and select it.
5. Position the cursor to the **`Lower Limit`** or the **`Upper Limit`** field and select it.
6. Enter desired value using the DATA keypad and press ENTER.
   - Use the ⇐ key to backspace.
   - Press CANCEL to cancel entries and retain the old value.
7. Position the cursor to the **`Check`** field and select it.
8. From the **`Choices:`** menu, select the combination of upper and lower limits to be checked.

See "Editing the Edit Specifications Menu" in chapter 3, "Getting Started" for your firmware revision level if a more detailed description on how to edit pass/fail limits is needed.

SAVING PASS/FAIL LIMITS

Pass/fail limits remain in battery-backed-up memory until you select a new procedure to run. Once a new procedure has been loaded, all previous pass/fail limit values are lost. You can save your current pass/fail limit values as a test procedure for future use. See *"Saving a Test Procedure" on page 143* for more information.

SECURING PASS/FAIL LIMIT VALUES

A lock is provided to prevent access to the pass/fail limits (specifications) values once they have been set. See *"Securing a Procedure" on page 146*.

DEFAULT VALUES

The software comes preprogrammed with default values for each pass/fail limit. Some default values are derived from standard methods of measurement and some are derived from Motorola requirements. To view the default values, load the MOT_UC procedure and select the **`Pass/Fail Limits`** field.

Test Procedures

What is a Test Procedure

Once you have customized the software by entering a test sequence, editing the test parameter values, and editing the pass/fail limits, you can save these changes as a test procedure. Saving a test procedure which has been customized for a specific application can significantly reduce your testing time.

When you save a test procedure you will be saving the parameter values, pass/fail limit values, and the testing sequence currently stored in the Test Set's memory. A library file which contains the names of all of the parameters, pass/fail limits and tests that are in the software package is automatically saved to the memory card when you save a procedure. The library file will be the `MOT_UC` library that is supplied with your software.

Example

For example, let us suppose you have two different base stations to optimize, base station A and base station B. Each base station has different specifications it must meet. Without a test procedure, you will have to customize the software for each base station every time you test it. Let's suppose we have customized the software for base station A and saved all those changes in a procedure named A_Optimize on a memory card. Now let's assume we have done the same for base station B and saved all those changes in a procedure named B_Optimize on a memory card. The next time you choose to test either of these base stations you can simply load the corresponding procedure, A_Optimize or B_Optimize, into the Test Set's memory. The parameter values, pass/fail limits, and testing sequence will appear for the base station just as you saved them. Wow! No time wasted entering parameters, pass/fail limits, and a testing sequence each time.

Saving a Test Procedure

A memory card is the preferred medium for saving a test procedure. This manual also supports saving a procedure to RAM disk, a section of the Test Set's internal memory.

INITIALIZING YOUR MEMORY CARD OR RAM DISK

The memory card or RAM disk that you save your procedure to must be initialized before its first use. *See "Initializing a Memory Card" on page 264* or *"Initializing RAM Disks" on page 268* for more information on initializing these mediums.

To save a test procedure:

1 Press the TESTS key.

2 On the TESTS screen verify that the library reads **`MOT_UC`**..

If it doesn't, load the MOT_UC procedure from the software card. *See "Selecting a Procedure," in chapter 3, on page 26* or *page 48* for information on how to load a procedure.

3 Select **`Save/Delete Procedure`** from the **`CUSTOMIZE TEST PROCEDURE`** list (or **`Proc Mngr`** from the **`Test Function`** field).

4 Position the cursor to the **`Select Procedure Location`** (or **`Location`**) field and select it.

5 From the **`Choices`** menu, select **`Card`** `or` **`RAM`**.

When RAM is selected, the software automatically designates the RAM disk volume 0 as the location for storage. See *"Initializing RAM Disks" on page 268* for more information.

6 Enter the procedure filename.

- **a** Position the cursor to the **`Enter Procedure Filename`** (or **`Procedure`**) field and select it.
- **b** From the list of characters in the **`Choices`** menu, enter a filename.

  Filename must be nine characters or less.
- **c** When filename is complete, position cursor to **`Done`** and select it.

7 Enter a description for the new procedure.

- **a** Position the cursor to the **`Enter Description for New Procedure`** (or **`Comment for new procedure`**) field and select it.
- **b** From the list of characters in the **`Choices`** menu, enter a description of the test procedure.

  You may prefer to use a terminal to type long strings of characters. See *"Sending Characters to the Test Set Using a Terminal or PC" on page 270* for more information.
- **c** When the comments are complete, position the cursor to **`Done`** and select it.

8 Position the cursor to the **`Procedure Library`** (or **`Library for new procedure`**) field and select **`Current`**.

This assigns the MOT_UC library file currently loaded in the Test Set's memory as the library file for your new procedure.

9 Position the cursor to the **`Code Location`** (or **`Program location for new Procedure`**) field and select it.

10 Select **`Card`** from the Choices menu.

This determines where the code file for your new procedure will reside. When this field is set to **`Card`**, the Test Set first looks to see if the code file is stored in the Test Set's battery-backed-up memory and then looks to the current card for the code file.

11 Press k1 (**`Save Proc`**)(or position the cursor to the **`Action`** field and select **`Make Procedure`**).

Your procedure has been saved.

Loading a Test Procedure

1 Press the TESTS key.

2 Position the cursor to the **`Select Procedure Location:`** field and select it.

3 From the Choices: menu, select the location of the procedure (card, ROM, RAM, or Disk).

4 Position the cursor to the **`Select Procedure Filename:`** field and select it.

The Test Set will search the medium chosen in *step 3* and list the names of the procedures contained there.

5 From the Choices: menu, select the name of the desired procedure.

Deleting a Procedure

Procedures can be deleted from a memory card or RAM disk.

To delete a procedure:

1. Press the TESTS key.
2. Select `Save/Delete Procedure` from the `CUSTOMIZE TEST PROCEDURE` list (or `Proc Mngr` from the `Test Function` field).
3. Position the cursor to the `Select Procedure Location` (or `Location`) field and select it.
4. From the `Choices` menu, select the location of the procedure you wish to delete.
5. Position the cursor to the `Enter Procedure Filename` or (`Procedure`) field and select it.
6. From the `Choices` menu, select the name of the procedure you wish to delete.
7. Press k2 (`Del Proc`)(or position the cursor to the `Action` field and select `Delete Procedure`).
8. Verify your entries and press the SHIFT key and then the ON/OFF key.

   Pressing the SHIFT key and then the ON/OFF key accesses the YES key.

   Your procedure has been deleted.

Securing a Procedure

After you have customized your software with a testing sequence, test parameters, and pass/fail limits, and saved them as a procedure, you may wish to secure them.

Securing an item denies access to its corresponding TESTS screen. As a result, no changes can be made.

You can secure a procedure that is stored on a memory card or on the Test Set's RAM.

You can secure the following:

- Order of tests
- Channel information
- Pass/fail limit values
- Parameter values
- External Devices

To secure a procedure:

1. Press the TESTS key.
2. Position the cursor to the **`Select Procedure Location`** (or **`Location`**) field and select it.
3. From the **`Choices`** menu, select **`ROM`**.
4. Position the cursor to the **`Select Procedure Filename`** (or **`Procedure`**) field and select it.
5. From the **`Choices`** menu, select **`IB_UTIL`** (or **`SECURE_IT`**).
6. Press k1 (**`Run Test`**).
7. Select the location of the procedure you want to secure k1(**`Memory Card)`** or k2 (**`RAM`**.).

NOTE: RAM refers to the RAM Disk memory within the Test Set. By default, the software will secure RAM volume 0. This not changeable.

8. Using the cursor control knob and the list in the Choices menu, enter the name of the procedure you wish to secure.
9. A list of the items available to secure appears on the Test Set's screen. Each user key is assigned an item from the list. Press the assigned key to change the status of a screen from secured to unsecured.
10. When you have finished securing the desired screens, press the k5 (**`More`**) key and then press the k3 (**`Done`**) key.
11. Enter a pass number using the Data key pad and press the ENTER key.

    The secure function is complete.

Un-securing a procedure

To un-secure a procedure:

To un-secure a procedure, you must know the **`pass number`**.

1 Press the TESTS key.

2 Position the cursor to the **`Select Procedure Location`** (or **`Location`**) field and select it.

3 From the **`Choices`** menu, select **`ROM`**.

4 Position the cursor to the **`Select Procedure Filename`** (or **`Procedure`**) field and select it.

5 From the **`Choices`** menu, select **`IB_UTIL`** (or **`SECURE_IT`**).

6 Press the k1 (**`Run Test`**) key.

7 Select the location of the procedure you want to un-secure: k1(**`Memory Card`**) or k2 (**`RAM`**) key.

8 Using the cursor control knob, enter the name of the procedure you wish to un-secure.

9 If the procedure has any items that are secured, you will be asked for the **`pass number`**.

10 Proceed with the on-line instructions. Select the items you wish to un-secure.

11 When you are prompted, enter the **`pass number`** using the DATA keypad.

The un-secure function is complete.

Copying a Procedure

You may wish to have more than one copy of the procedures you use.

The program **`COPY_PL`** in Test Set’s ROM backs up procedure and library files onto an SRAM memory card. It can also be used to initialize an uninitialized SRAM memory card. This program does not copy executable program (code) files. The memory card used must be SRAM (Static Random Access Memory), not OTP (One Time Programmable).

To run `COPY_PL`:

1. Press the TESTS key.
2. Select the **`Select Procedure Location`** (or **`Location`**) field.
3. From the **`Choices`** menu, select **`ROM`**.
4. Select the **`Select Procedure Filename`** (or **`Filename`**) field.
5. Choose **`IB_UTIL`** (or **`COPY_PL`**).
6. Select the **`Run Test`** field to start the program.
7. Follow the displayed instructions.

Copying files using IBASIC commands

Files can be copied from one mass storage device to another using IBASIC COPY commands. For example, to copy a file from an inserted memory card to the left drive of an external dual-disk drive with HP-IB address 700, enter the following command into the TESTS screen IBASIC command line:

```
COPY “MU_TEST:INTERNAL” TO “MYFILE:,700,0”
```

NOTE: A terminal may be used to enter characters into the IBASIC command line. See *"Sending Characters to the Test Set Using a Terminal or PC" on page 270* for more information.

You can copy a file from a memory card to an SRAM memory card by loading the program from the memory card into the Test Set, inserting an initialized SRAM memory card, and then using the IBASIC SAVE command. Enter the following:

```
SAVE “MY_TEST:INTERNAL”
```

You can list the names of the files stored in a memory card or disk catalog by using the IBASIC CAT command. To display the file names on a memory card, enter the following:

```
CAT “:INTERNAL” or CAT
```

If the mass storage is already defined to be the memory card, then `”:INTERNAL”` is optional. File names displayed with the `CAT` IBASIC command scroll past the top of the Test Set’s CRT and cannot be scrolled down.

Detailed descriptions of IBASIC commands are contained in *HP Instrument BASIC* (HP part number E2083-90000).

8

Making Equipment Connections

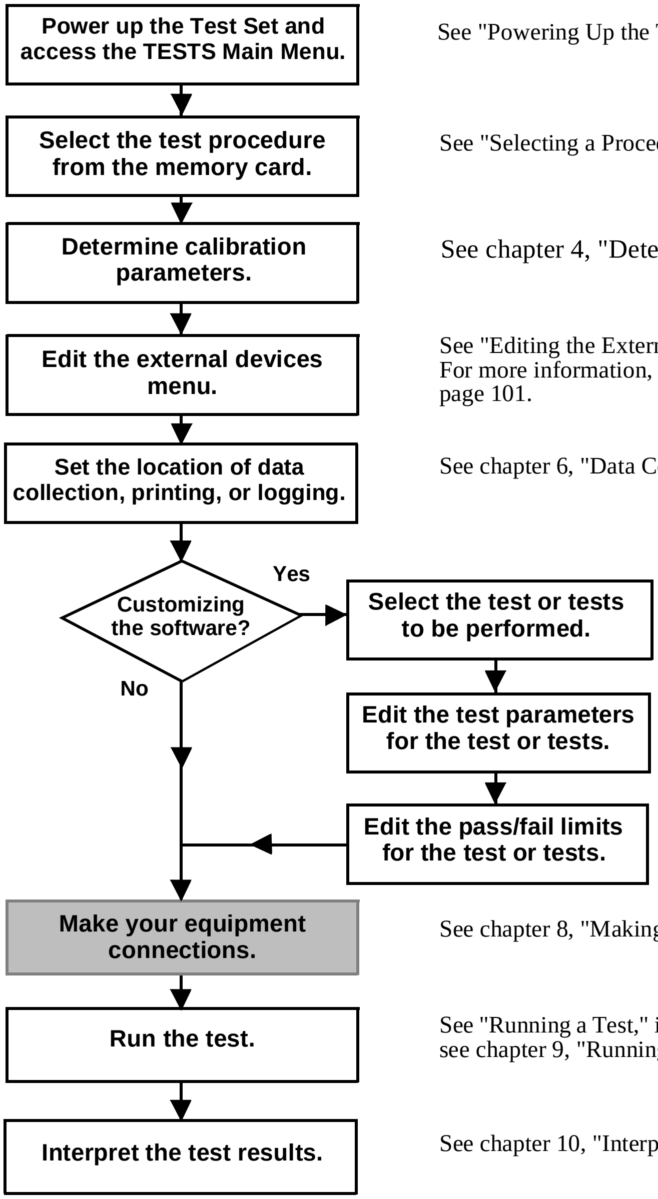
What’s included in this chapter:

- Equipment Needed
- Optional Equipment
- Warnings and Additional Informational on Equipment and Equipment Connections
- Test Set Rear Panel Connections
- Equipment Connection Diagrams for Testing

Task Flow diagram

*Task**

For a description of the task or related information:



See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Equipment Needed

Cell Site Equipment

A Motorola Micro C·I·T·E Base Station is required. Equipment to be tested must be located at an active cell site. All firmware and downloadable software must be installed.

HP 8921A Test Set

The HP 11807B Opt. 070 Software runs on the HP 8921A Cell Site Test Set.

The HP 8921A firmware revision number must be A.06.09 or higher. At the time this manual was published, firmware revision A.15.00 was being shipped.

To determine your firmware revision level:

1. Press the SHIFT key and then press the DUPLEX key.
2. Record your firmware revision level.

   Your firmware revision level is located in the upper right hand corner of the Test Set's screen.

Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

If you are testing a base station with NAMPS capability, you will need a revision greater than or equal to A.06.11 (excluding A.06.12).

Software Memory Card

The HP 11807B Option 070 Software card is normally supplied on a One-Time Programmable memory card (HP part number 11807-10036). It may also be supplied on an SRAM memory card. You can tell the difference between the two types by looking for a write protect switch on the top edge of the card. If there is a switch, the card is an SRAM. Otherwise, it is an OTP. For more information on memory cards *see "Memory Cards" on page 262*.

128K SRAM Memory Card

The 128K RAM Memory Card supplied in this software package is used for customizing test procedures and data collection. For more information on memory cards *see "Memory Cards" on page 262*.

HP 83202A Opt. 070 Accessory Kit or Equivalent

The connection diagrams and procedures in this manual support equipment connections using the HP 83202A Opt. 070 Accessory Kit. See *table 15* for a complete inventory list of the accessory kit.

Table 15 Accessory Kit Inventory List

Description	Part Number	Quantity
Transit Case	08921-90028	1
50-Ohm termination	909A Opt. 012	1
Bandpass Duplexer	9135-5338	1
6-dB pad BNC(M) to BNC(F)	0955-0698	2
30-dB pad N(F) TO N(F), 10 Watts	0955-0990	1
3-dB Hybrid Splitter 3 way N(F) 3X	0955-0991	1
Adapter N(F) to BNC(M)	1250-0077	2
Adapter N(F) to N(F)	1250-0777	2
Adapter N(F) to SMA(M)	1250-1562	1
Adapter N(M) to BNC(F)	1250-0780	1
Adapter BNC(M) to Banana(F)	1250-2164	2
Adapter BNC(F) to Banana(M)	1251-2277	1
Adapter DB-25(M) to RJ11(F)	08921-61016	1
RF cable N(M) to N(M) RG 233 3 ft	8120-6828	5
RF cable N(M) TO N(M) RG 223 1 ft	8120-6829	1
Cable BNC(M) to RCA 6 ft.	8120-6891	1
Cable BNC(M) to Bantam 309 5 ft	08921-61008	1
Cable RJ11(M) to RJ11(M) 25 ft	08921-61015	1
Cable RJ11(M) Splitter 2 ft	08921-61031	1
Cable RJ11(M) to DB9(F) 7 ft	08921-61038	1

Return Loss Bridge

If you expect to perform *TEST_09 VSWR swept return loss* or *TEST_10 VSWR discrete channel return loss Equipment Connections* you will need a return loss bridge. A return loss bridge with necessary characteristics is available from HP (P/N HP 86205A) or Eagle (P/N RLB150N3B). *See "Vendor Information" on page 277* for more vendor information.

A resistive power splitter cannot be used for VSWR tests.

Resistive Power Splitter

If you expect to perform *TEST_11 VSWR vs distance (cable fault)* a resistive power splitter is required. The HP 11850C power splitter is available from HP (P/N 0955-0733).

High Accuracy Frequency Reference

To verify the performance of the URDM and the frequency accuracy of NAMPS signal, a highly accurate 10 MHz reference source is required. The Electronic Research Co. Model 130 has the necessary characteristics. *See "Vendor Information" on page 277* for more vendor information.

Optional Equipment

Motorola T1 Module

An external Motorola T1 module can be used to automate switching between audio test ports. See *"Appendix A: External T1 Module" on page 289* for additional information on testing using a T1 Module.

External Power Meter

A second procedure for calibrating your equipment using an external power meter and sensor are provided. See *"Steps for determining RX Path Loss using the Power Meter" on page 91* for more information on how the external power meter is used.

Manuals

In addition to this manual, you may want to have your HP 8921A User's Guide, (HP part number 08921-90022) handy while you are testing.

Your optimization manual may be necessary if you are troubleshooting or if module replacement is required.

Cautions and Additional Information on Equipment Connections

This section provides information and warnings about the equipment connections required for testing. Warnings for equipment connections using a switch are limited. Read this material prior to making your connections to avoid damaging the Test Set and to ensure proper test results.

Test Set Connections

DAMAGE TO EQUIPMENT

The Test Set and other equipment in this test system can be damaged by transient RF power, continuous RF power, high voltage, electrostatic discharge from cables and other sources, and transients caused by lightning. Connections to equipment and power-on conditions must be chosen to reduce the risk of damage to the equipment.

Receiver RF Connections

DAMAGE TO THE DUPLEX OUT PORT

The application of RF power greater than 200 mW (+23 dBm) can damage the Test Set’s DUPLEX OUT port. Be certain that signals applied to this port are less than 200 mW. If an RF power higher than about 200 mW is applied, an overpower relay will trip. Press MEAS RESET or turn the Test Set’s power off and on to reset it.

Manual mode testing is the recommended mode for testing.

Transmitter RF Connections

The mode of testing supported by this software is MANUAL mode. If you are testing in Ins-Optimization mode, read the warning below before proceeding.

WARNING: FOR INS-OPTIMIZATION MODE TESTING

This warning applies if you are testing in Ins-Optimization mode. While testing the SIG unit, a high-power load must be placed on the RF coupler output leading to the antenna. It must be capable of handling at least 30 watts. The load is necessary to prevent the SIG unit’s transmitter signal from being radiated to mobiles.

Audio Connections

Audio measurements are no longer made from the Test Jack. Electronic adjustments during manufacturing have reduced the number of manual adjustments required and as a result the Test Jack is no longer used for testing.

600 Ω LOAD

An internal switchable 600 Ω load was supported in firmware revisions A.06.11 and greater. If the load is not installed in your Test Set you will have to place an external load in line with the connection from the RCV LINE JK to the Test Set’s AUDIO IN port.

Test Set Rear Panel Connections

Serial Port Connections

The Test Set has two serial ports, serial port and serial B port.

Serial port

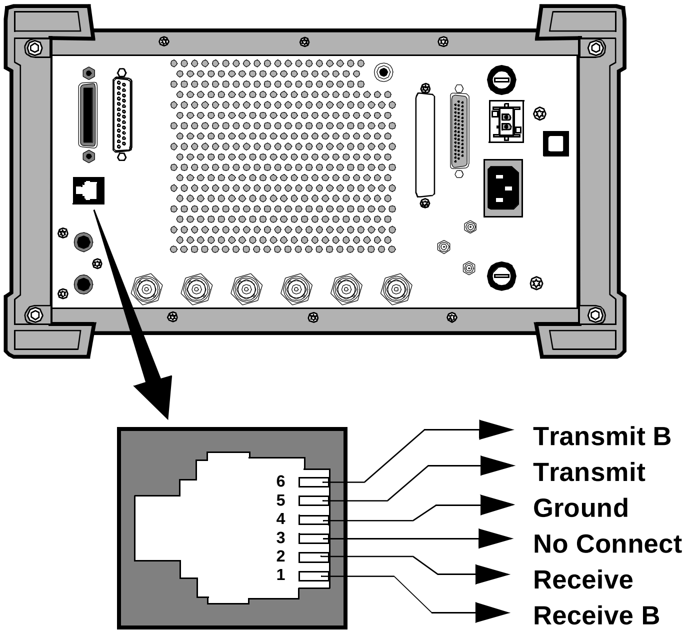
The Serial port is available when you use the instrument manually. You can use this port to print screens or to connect a terminal to remotely operate the Test Set.

Serial B port

The other serial port, the serial B port, can only be controlled from IBASIC. It is used by the test software to send commands to and receive messages from the base station. The setup conditions for this port cannot be entered manually. They are automatically set by the software.

Test Set Serial Port Location

Connector on Test Set Rear Panel



Serial B Port Connection for RS-232 Base Station Control

This software supports RS-232 control of the base station through the TTYMP base station port.

Connections between the Test Set’s RJ-11 connector and the DB-25 TTYMP Network Address connector for base station control are shown in figure 64 on page 161. This adapter is provided in the HP 83202A Opt. 070 Accessory kit.

Serial Port Connections for a Laptop or Printer

The HP 11807B Option 070 software has the capability to upload test results to an external laptop or printer. These connections support the methods for data collection explained in *chapter 6, "Data Collection, Printing, and Logging"*.

Connections between the Test Set’s RJ-11 connector and the DB-25 TTYMP Network Address connector for a laptop or printer are shown in figure 64 on page 161. Cover any unused pins with tape to avoid shorts. This adapter is provided in the HP 83202A Opt. 070 Accessory Kit.

Serial Port Connections for a Terminal or PC

The HP 11807 B Option 070 software has the capability to upload test results to an external terminal or PC. These connections support the methods for data collection explained in *chapter 6, "Data Collection, Printing, and Logging"*.

Connections between the Test Set’s RJ-11 connector and the DB-9 Network Address connector for a PC are shown in figure 64 on page 161. Cover any unused pins with tape to avoid shorts.

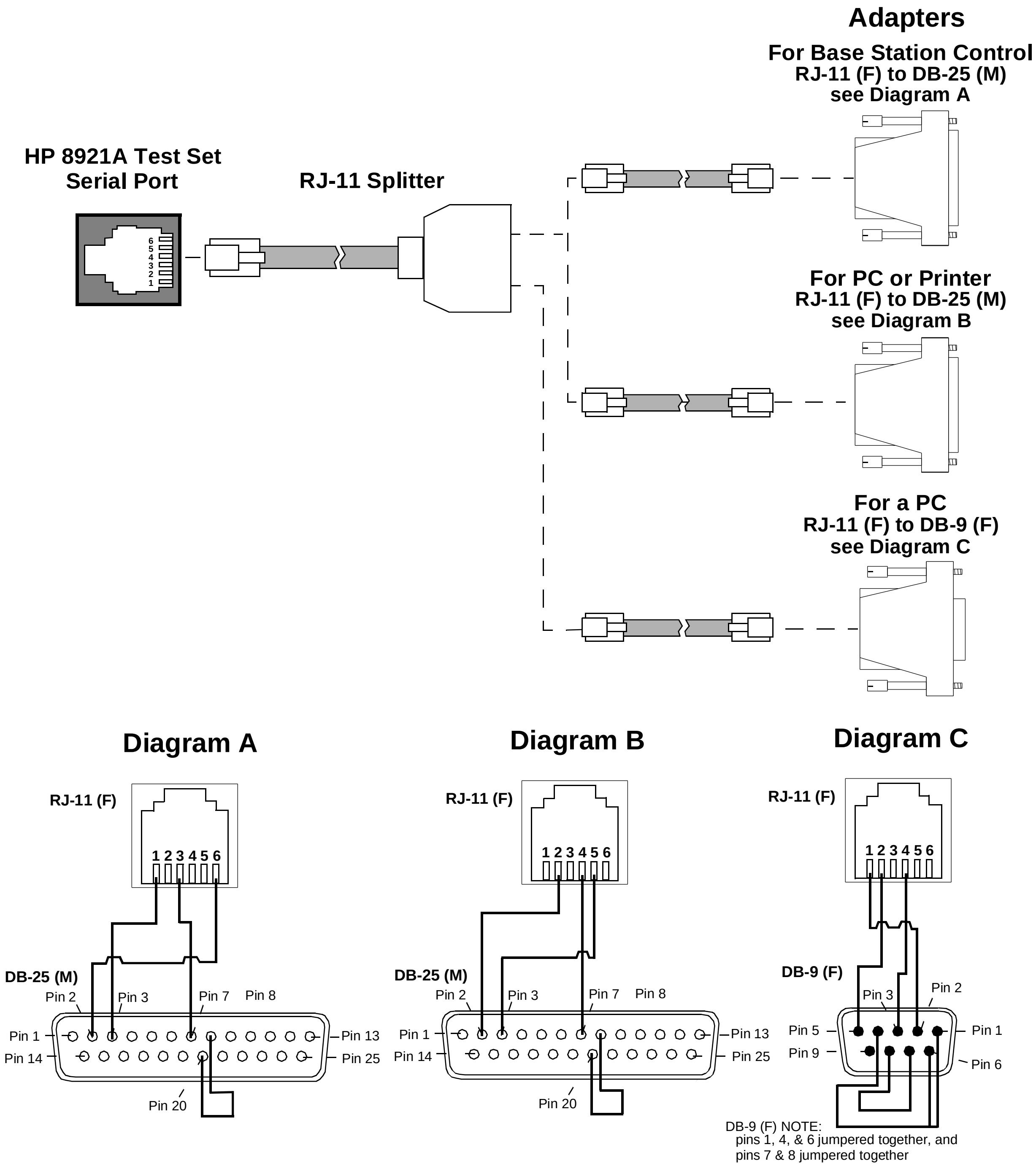

Adapters
For Base Station Control
RJ-11 (F) to DB-25 (M)
see Diagram A
HP 8921A Test Set
Serial Port
RJ-11 Splitter
6
5
4
3
2
1
For PC or Printer
RJ-11 (F) to DB-25 (M)
see Diagram B
For a PC
RJ-11 (F) to DB-9 (F)
see Diagram C
Diagram A
RJ-11 (F)
1 2 3 4 5 6
DB-25 (M)
Pin 2
Pin 3
Pin 7
Pin 8
Pin 1
Pin 14
Pin 13
Pin 25
Pin 20
Diagram B
RJ-11 (F)
1 2 3 4 5 6
DB-25 (M)
Pin 2
Pin 3
Pin 7
Pin 8
Pin 1
Pin 14
Pin 13
Pin 25
Pin 20
Diagram C
RJ-11 (F)
1 2 3 4 5 6
DB-9 (F)
Pin 3
Pin 2
Pin 5
Pin 9
Pin 1
Pin 6
DB-9 (F) NOTE:
pins 1, 4, & 6 jumpered together, and
pins 7 & 8 jumpered together

Figure 64

HP-IB Port Connections

An HP-IB printer can be connected to the Test Set’s rear-panel HP-IB connector. The HP-IB port on the HP 8921A Test Set is standard.

Parallel Port Connections

A parallel port is available as an option to the HP 8921A. A parallel printer can be attached to the parallel port. See *figure 65* for pin information.

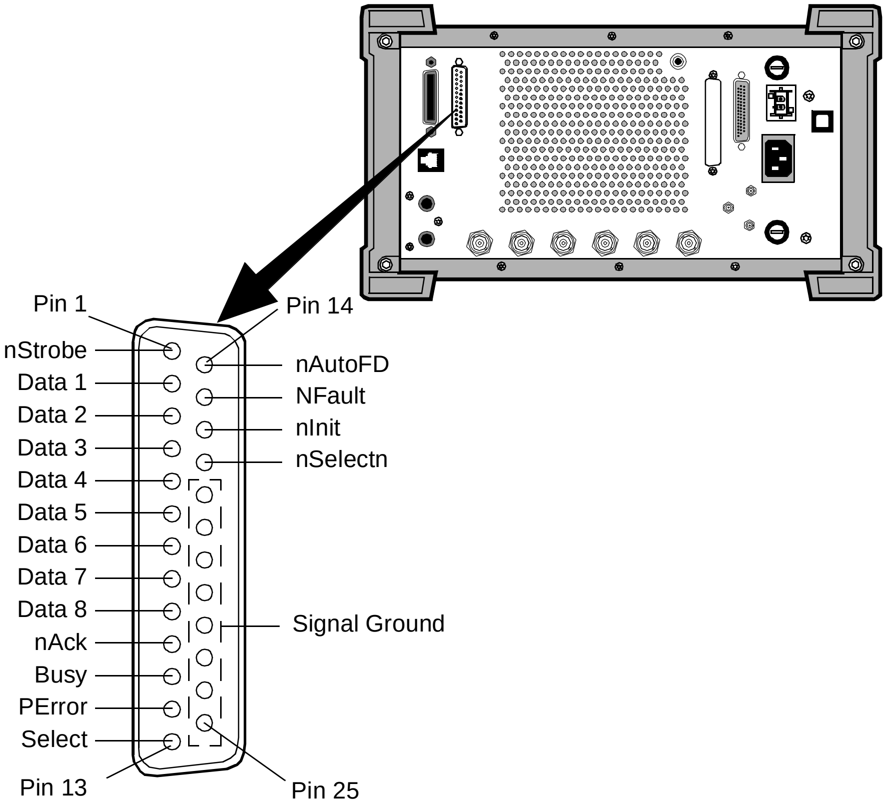


Figure 65 **Test Set Parallel Port**

Equipment Connection Diagrams

Section contents:

- Equipment connection diagrams for base station configuration A, B, and C.

  Figure 66 on page 164, *figure 67 on page 166*, and *figure 68 on page 168* show the initial equipment connections required for running TEST_01 through TEST_08.

- Equipment connection diagrams for specific tests.
  - *TEST_02 URDM Frequency/Level* requires equipment connections in addition to the initial equipment connection diagrams shown in *figure 66* , *figure 67* , and *figure 68* . The software will prompt you to make additional equipment connections when they are needed. See *"TEST_02 URDM Frequency/Level Equipment Connections" on page 170* for more information.

    TEST_09 VSWR swept return loss, *TEST_10 VSWR discrete channel return loss*, or *TEST_11 VSWR vs distance (cable fault)* require separate equipment connection diagrams. See *"TEST_09 VSWR swept return loss Equipment Connections" on page 171*, *"TEST_10 VSWR discrete channel return loss Equipment Connections" on page 172*, and *"TEST_11 VSWR vs distance (cable fault) Equipment Connections" on page 173* for more information.

CAUTION: Make sure you have entered any external equipment such as splitters or switches into the Cnfg External Devices screen. If these external devices are not entered into this screen, the Test Set will operate under the assumption that none are being used. The Test Set will generate signals from its ports according to your entries to the External Devices screen. If your entries are incorrect, it may result in damage to the Test Set or to your base station.

NOTE: Equipment connection diagrams for testing using a T1 Module are provided in *"Appendix A: External T1 Module" on page 289.*

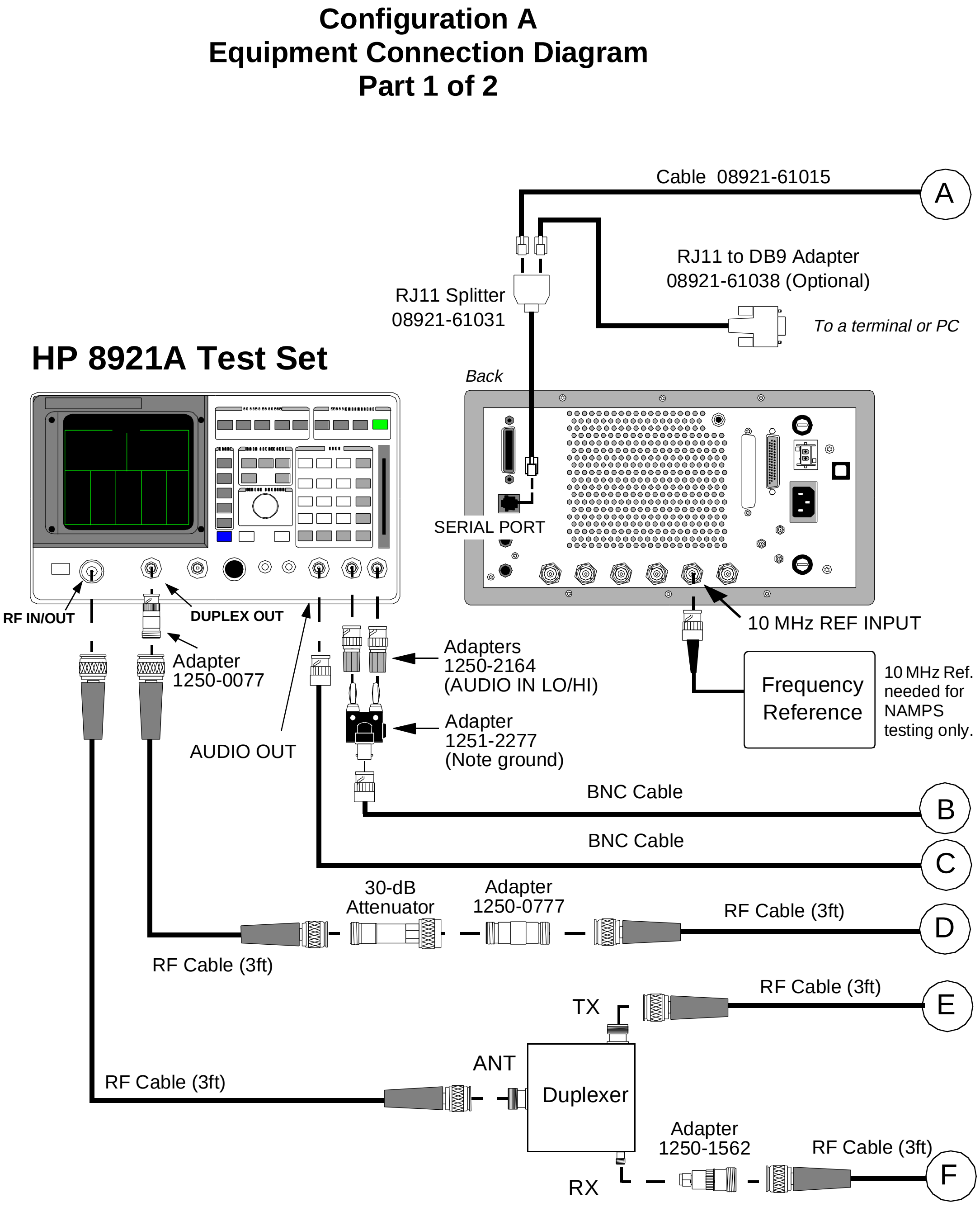
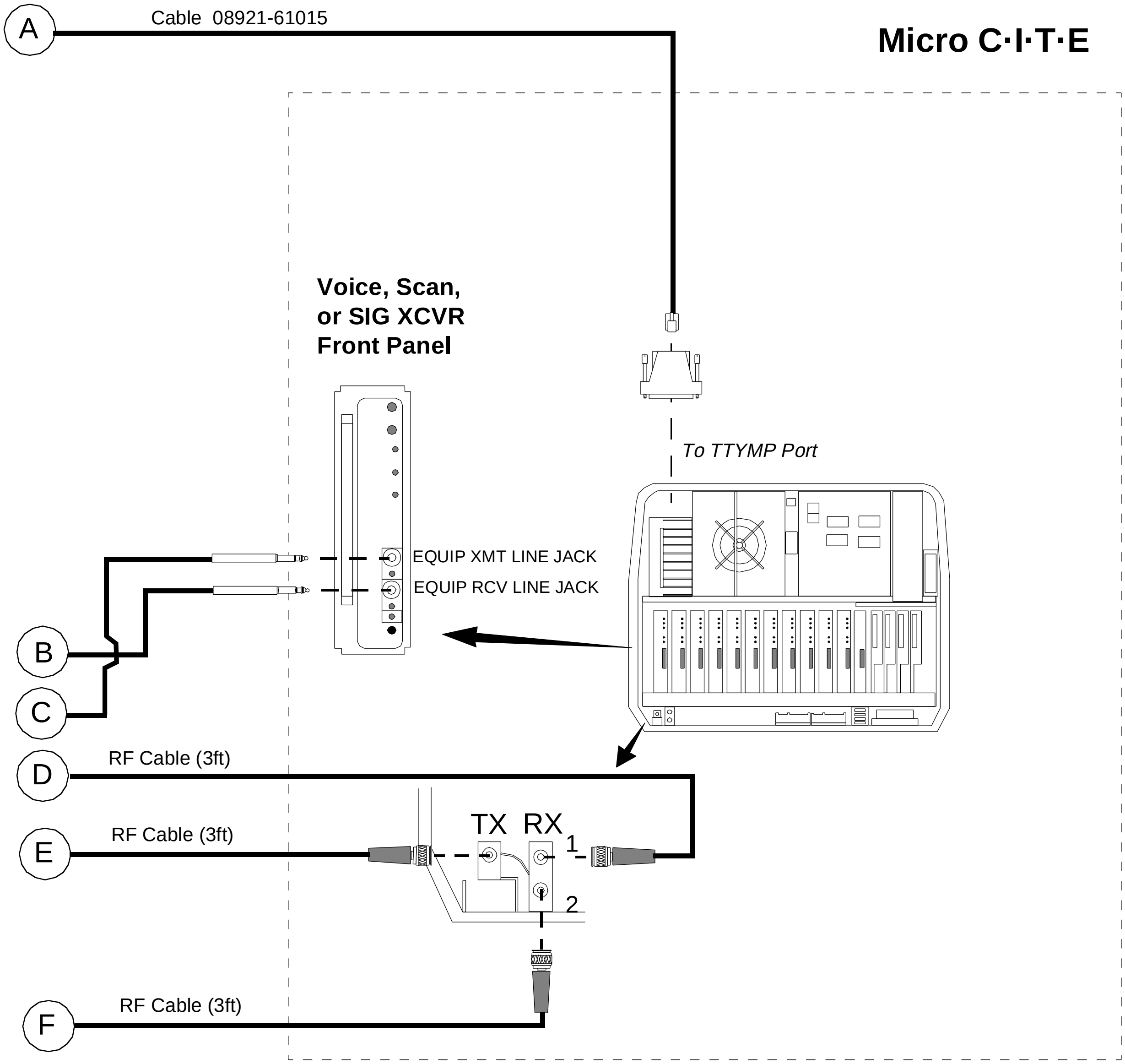


Figure 66 Configuration A Equipment Connections

Configuration A
Equipment Connection Diagram
Part 2 of 2



Configuration B
Equipment Connection Diagram
Part 1 of 2

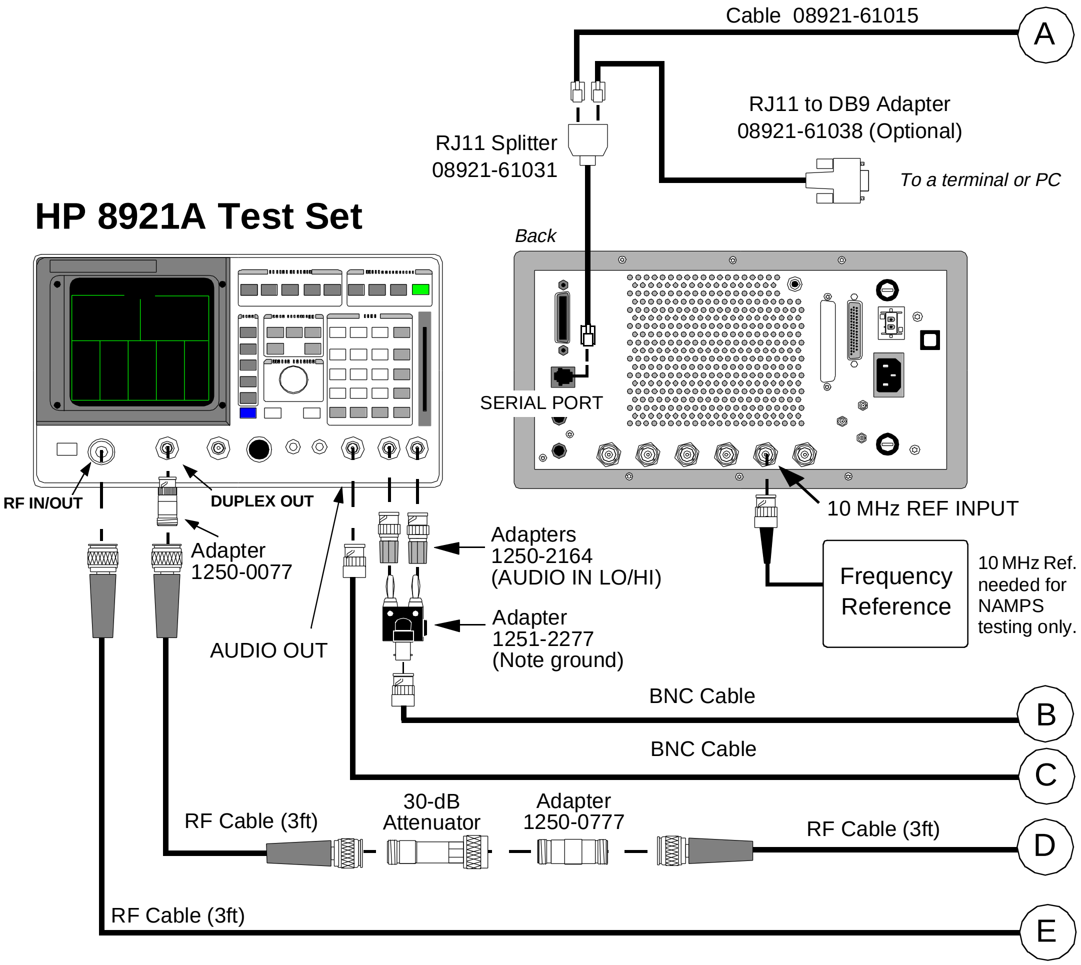
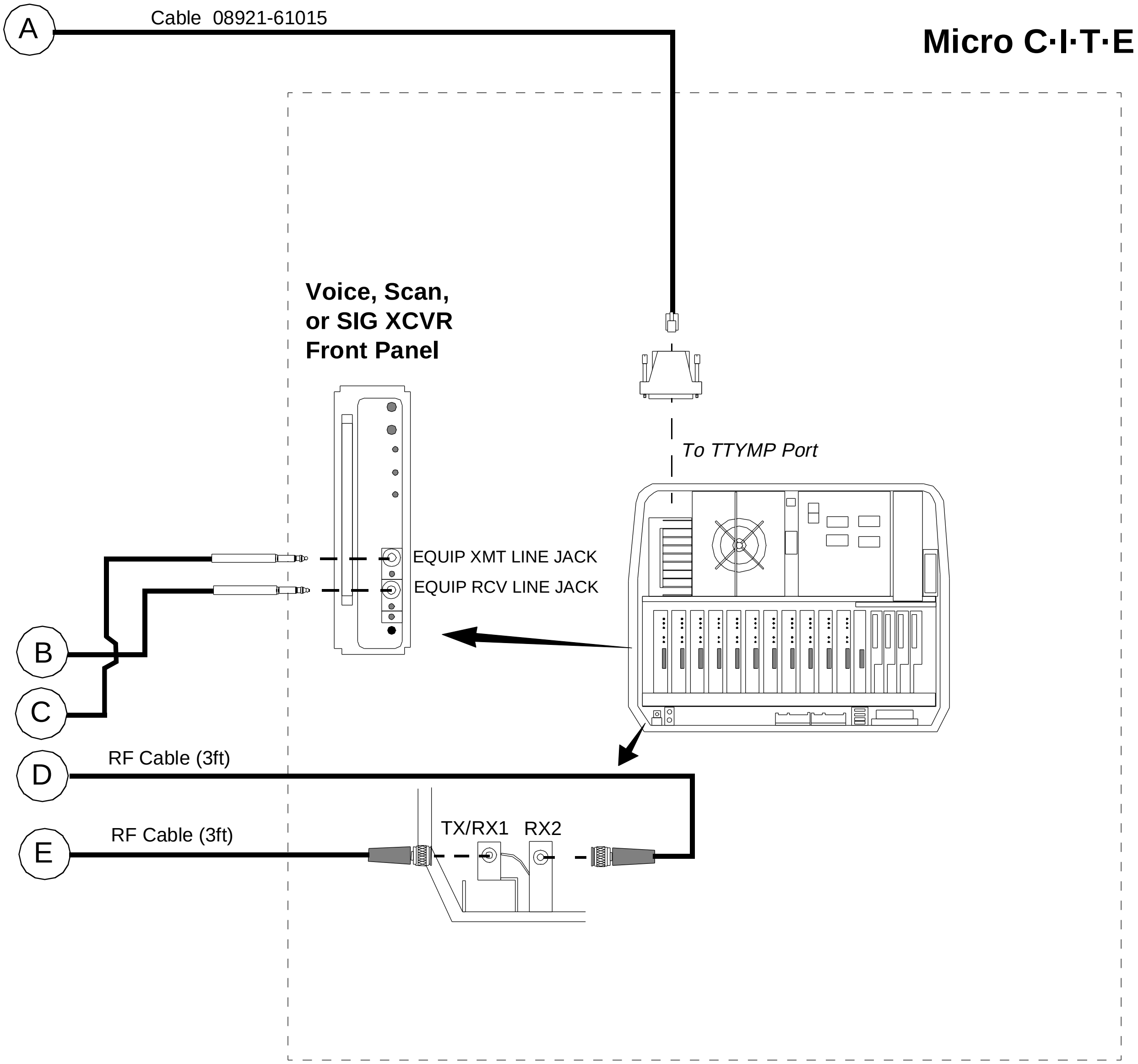


Figure 67 **Configuration B Equipment Connections**

Configuration B
Equipment Connection Diagram
Part 2 of 2



Configuration C
Equipment Connection Diagram
Part 1 of 2

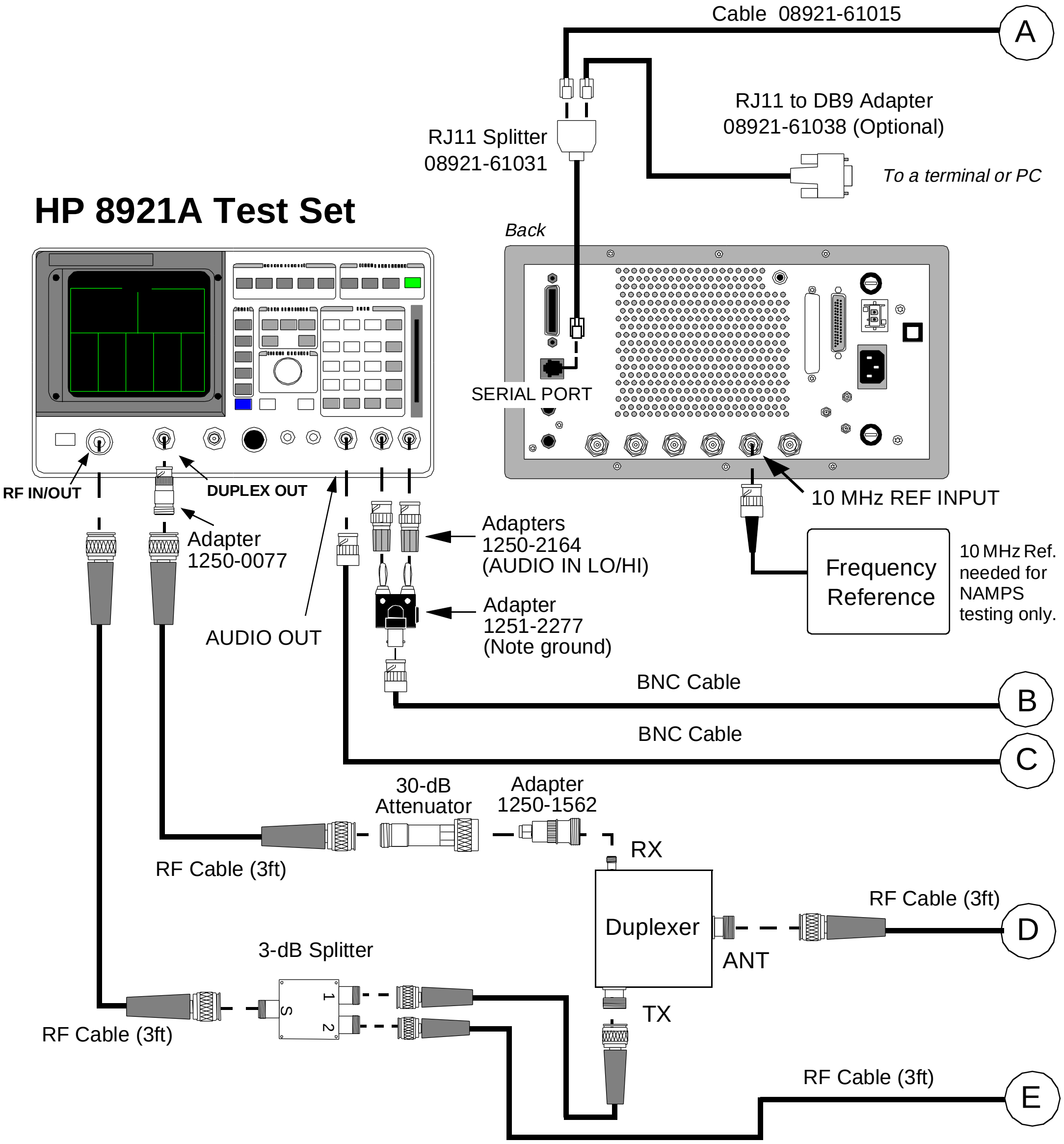
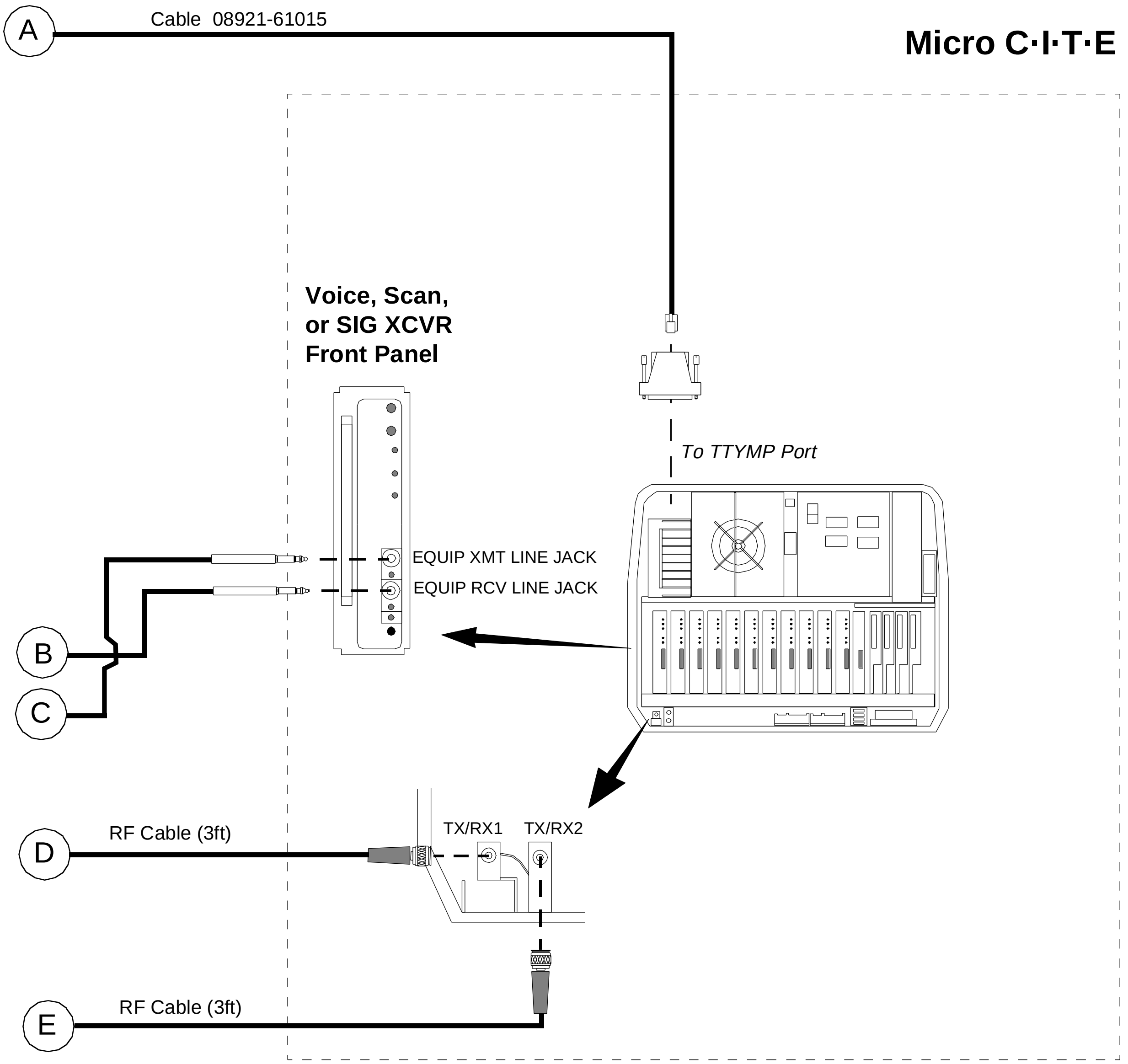


Figure 68 **Configuration C Equipment Connections**

Configuration C
Equipment Connection Diagram
Part 2 of 2



TEST_02 URDM Frequency/Level Equipment Connections

Make the initial equipment connections for your base station configuration (A, B, or C) as shown in *figure 66* , *figure 67* , or *figure 68* .

During the URDM level measurement portion of the test, the software will prompt you to make the equipment connection changes shown in *figure 69* .

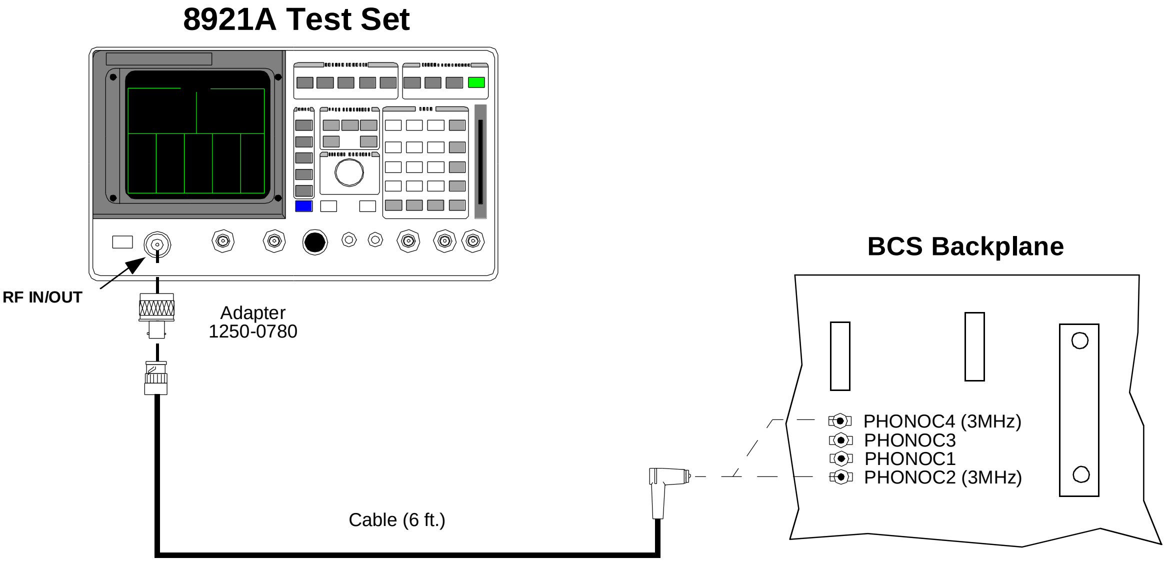


Figure 69 **Test_02 URDM Level Equipment Connections**

TEST_09 VSWR swept return loss Equipment Connections

Figure 71 shows the equipment connections required to run *TEST_09 VSWR swept return loss*.

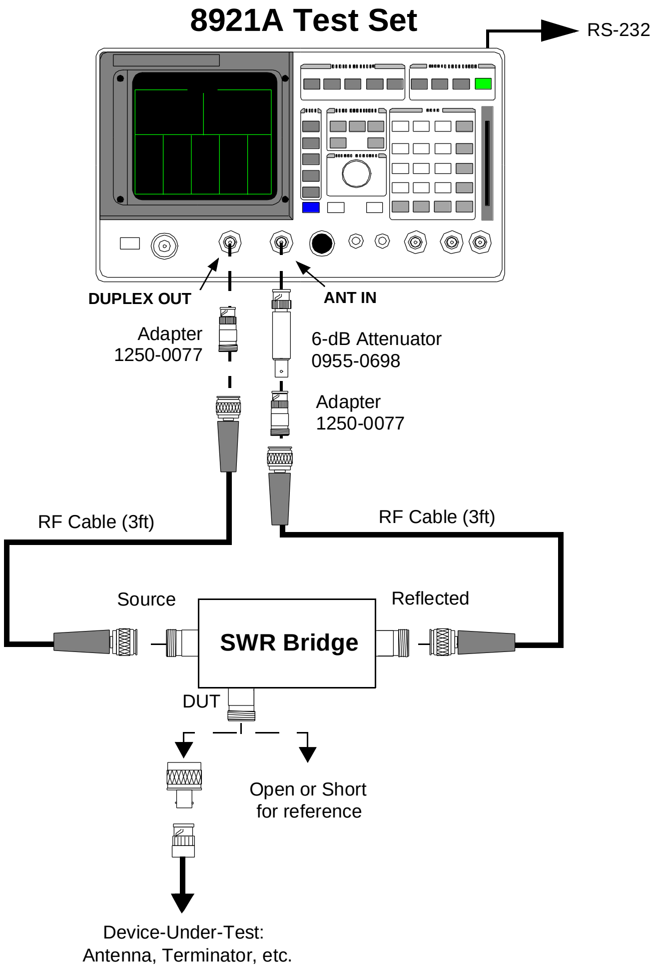


Figure 70 **Test_09 Equipment Connections**

TEST_10 VSWR discrete channel return loss Equipment Connections

Figure 71 shows the equipment connections required for *TEST_10 VSWR discrete channel return loss.*

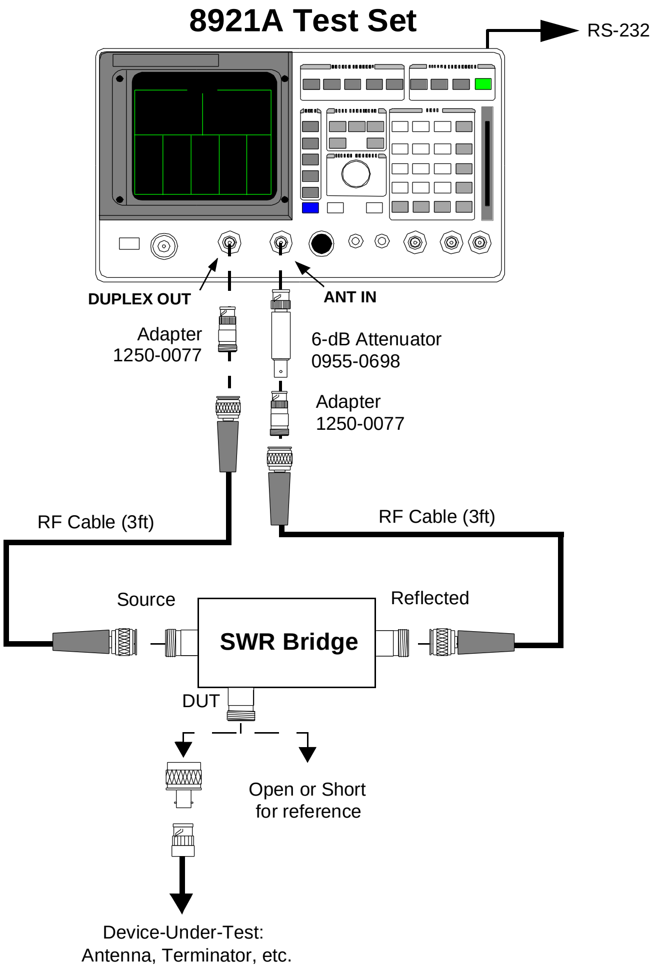


Figure 71 **Test_10 Equipment Connection**

TEST_11 VSWR vs distance (cable fault) Equipment Connections

Figure 72 below shows the equipment connections required for *TEST_11 VSWR vs distance (cable fault)*.

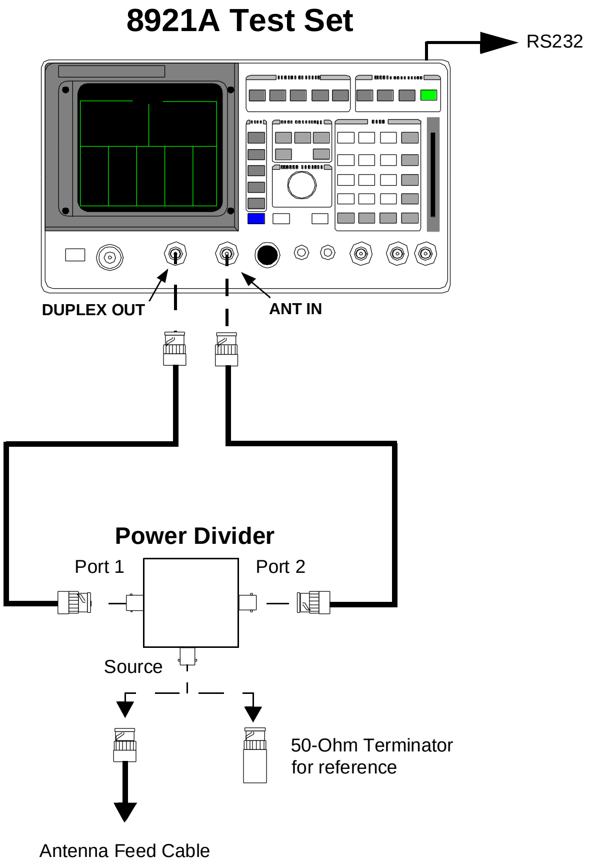


Figure 72 **Test_11 Equipment Connection**

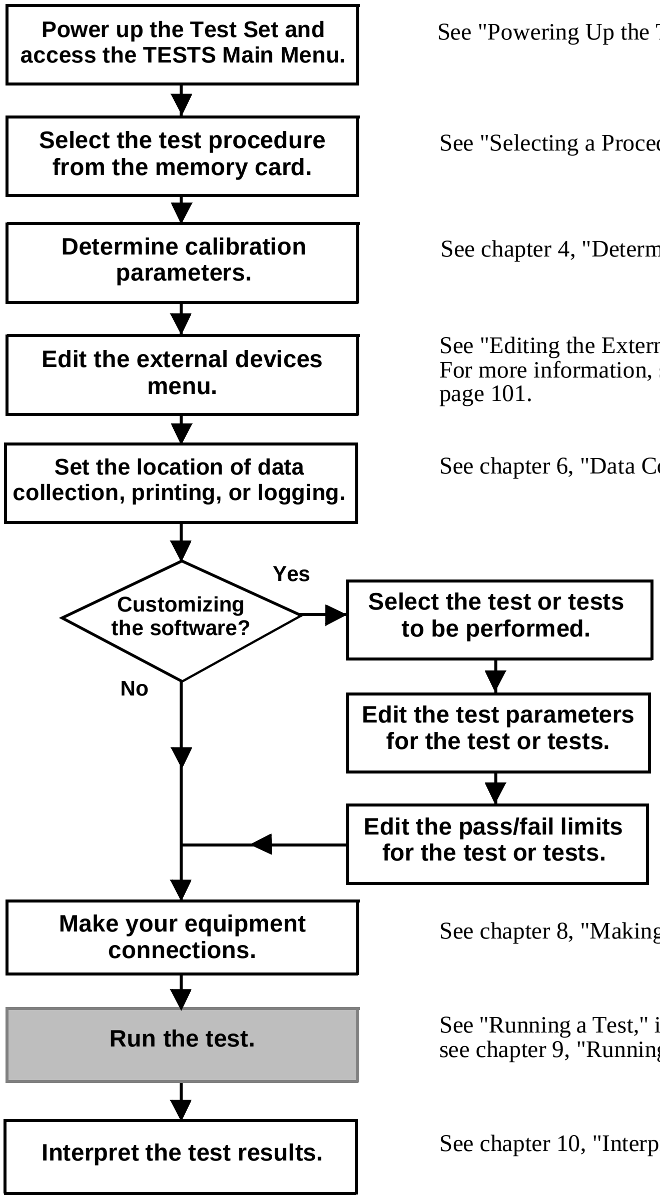
9

Running the Test

What’s included in this chapter:

Task Flow diagram

*Task**



For a description of the task or related information:

See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

Once you have determined your calibration parameters, edited the External Devices screen, customized the software to your application, and made your equipment connections, you are ready to perform a test.

Test execution conditions

Before you begin running the test you may wish to edit the Text Execution Conditions screen. The Test Execution Conditions screen allows you to:

- Set the way the Test Set responds after a measurement has failed
- Change the Test Set run mode
- Define where you want the test results displayed (printer or Test Set screen)

See "Test Execution Conditions Field Descriptions" on page 178 for a complete description.

Adjustment meter

An adjustment meter is available during the adjustment portions of some tests. The adjustment meter can be used to assist you when making manual adjustments.

HP-IB control characters

HP control characters are displayed on the Test Set’s screen to indicate the status of the Test Set. See "HP-IB Control Characters" on page 186 for a complete listing of the control characters and their meanings.

USER Keys

Throughout testing, the k1 through k5 keys change functionality. The USER Keys are assigned and changed by the software as needed during testing.

Editing the Test Execution Conditions

The Test Execution Screen can be edited to change the way a test runs.

To access the Test Execution Conditions fields if your firmware revision level is below A.14.00:

1. Press the TESTS key.
2. The Test Execution Conditions are in the center portion of the TESTS screen.

To access the Test Execution Conditions screen if your firmware revision is A. 14.00 or above:

1. Press the TESTS key.
2. Position the cursor to the `Execution Cond` field in the `SET UP TEST SET`: portion of your screen, and select it.

   You are now at the Execution Conditions screen.

NOTE: Test execution conditions are not retained after a power-down/ power-up cycle.

Test Execution Conditions Field Descriptions

The following Test Execution fields can be edited:

If Unit-Under-Test Fails (On UUT Failure)

This field determines what the software will do when a measurement fails to meet its pass/fail limits.

You can select either:

`Continue` or `Stop`

Default:

`Continue`

If you set this field to `Continue` (continue is underlined), and the current test result fails to meet its pass/fail limits, an `F` will appear on the test results screen and the program will continue on to the next measurement. If you set this field to **Stop** (stop is underlined), and the current test result fails to meet its pass/fail limits, an `F` will appear on the test results screen and the program will stop.

Test Procedure Run Mode (Run Mode)

This field determines whether the software will pause after a measurement is made or automatically continue with the next measurement.

You can select either:

`Continuous` or **`Single Step`**

Default:

`Continuous`

If this field is set to **`Single Step`**, (single step is underlined), the program will pause after a measurement result obtained and compared with its pass/fail limits. If this field is set to **`Continuous`** (continuous is underlined), the program will compare the current measurement result with its pass/fail limits and then continue with the next measurement. You can continue from the paused state by pressing the k2 (**`Continue`**) key.

Output Results For (Output Results)

This field is used to specify what tests results you would like displayed or printed.

You can select either:

`All` or **`Failures`**

Default:

`All`

If this field is set to **`All`** (all is underlined), the program will display or print the measurement result regardless of whether is passes or fails its pass/fail limits. If this field is set to **`Failures`** (failures is underlined), the program will display or print only the measurement results that fail to meet their pass/fail limits.

Output Results To (Output Destination)

This field is used to specify where you would like your test results to be sent.

You can select either:

`Crt` or **`Printer`**

Default:

`Crt`

If you select **`Crt`** (crt is underlined), test results will be displayed on the Test Set’s screen. If you select **`Printer`** (printer is underlined), test results will be sent to the CRT and to the printer configured in the External Devices screen.

NOTE: You must make entries to the External Devices (or Edit Cnfg) screen to specify the address of your printer. If you are using a serial printer, you will also have to make entries to the I/O CONFIGURE screen to match the serial port characteristics to those of your printer. See *"Printing" on page 124* for more information on configuring the Test Set for printing.

Output Heading

You can use this field to enter a heading that will be printed or displayed:

To enter an output heading:

1. Position the cursor to the **`Output Heading`** field and select it.
2. Enter a heading by rotating the cursor control knob to desired character and selecting it.
3. Select **`Done`** when you are finished.

Autostart Test Procedure on Power-Up

You can select either:

`Off` or **`On`**

Default:

`Off`

If you select **`On`** (on is underlined), at the next power-up the Test Set will automatically begin running the last procedure entered into the TESTS (Main Menu) screen. If you select **`Off`** (off is underlined), at next power-up the Test Set will default to the RX screen.

NOTE: When **`On`** is selected and the Test Set is powered-up, the Test Set will first look to its internal RAM to see if the code file matching the procedure name that was last entered into the TESTS screen exists. If it does, it begins running the procedure. If no code exists in the internal RAM, the Test Set will check if the code exists on the current software card. If the code exists, it begins running the procedure. If no code exists on the software card or no software card is inserted into the Test Set, at power-up the Test Set will automatically default to the RX screen.

Running the Test or Testing Sequence

The following instructions for running a test assume you have already performed the previous steps in the *"Task Flow diagram" on page 176*.

If you have not customized the software by entering a testing sequence, editing the parameters, and editing the pass/fail limit, the software will use the last set of entries in the Test Set's memory.

To run a test:

1. Press the TESTS key.
2. Press k1 (**`Run Test`**).

   The program will begin executing.

NOTE: When you select k1 (**`Run Test`**) the Test Set looks to see if the software code is in the Test Set's memory. If the code file does not already exist in memory, it will take a few minutes for the Test Set to load the code file from the software card to its memory.

3. Follow the instructions provided on the Test Set's screen.

Pausing or Stopping a Test

Pausing a Test

Pausing a program will allow you to stop the program line counter after the current program line is executed. A paused program can be restarted again. *See "Re-starting a Paused Test"*.

To pause a test:

1 Press the CANCEL key.

The program has been paused and the next program line to be executed appears in the upper-left corner of the Test Set’s screen.

CHANGING SETTINGS WHILE PAUSED

If you make changes to instrument settings while the program is paused, subsequent operation may be unpredictable. Error messages may or may not be displayed. *See "Exiting the Program" on page 280* for more information.

Re-starting a Paused Test

A paused program can be restarted again at the same program line it was paused at.

To re-start a paused test:

1 Press the TESTS key.

2 Press the k2 (**`Continue`**) key.

The program will start running again beginning at the program line which appeared in the upper-left corner of the Test Set’s screen when the program was paused.

NOTE:

If the program is performing an input/output operation, the CANCEL key may not immediately pause the program. A time-out placed in the software will cause the program to automatically pause in approximately ten seconds. Wait for this time-out to occur.

Stopping a Test

If the software does not pause after some time, you may have to stop the program. This performs an IBASIC RESET operation.

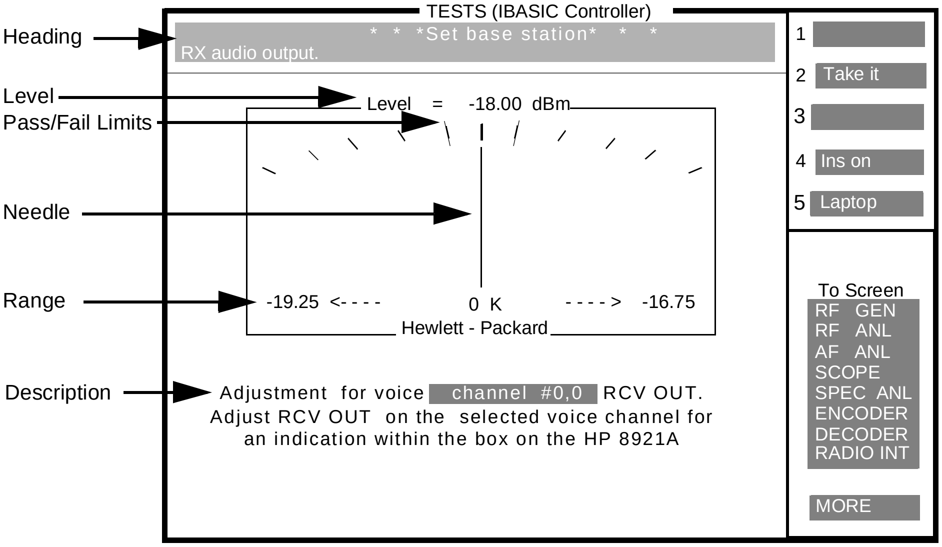
To stop a test:

1 Press the SHIFT key and then press the CANCEL key.

`IBASIC Reset` appears in the upper-left corner of the Test Set’s screen.

The Adjustment Meter

Several tests in this software package support an adjustment meter when manual adjustments are required. The appearance of the adjustment meter depends on your entry into parameter *10_GN perform adj [0=no 1=on fail 2=always]*. You can edit parameter *02_GN auto exit adj [0=no xx=times in spec] [0-99]* to control the adjustment meter's attributes. *See chapter 12, "Parameter Descriptions" on page 243* for a complete description of these parameters.



* * *Set base station* * *
RX audio output.

Level = -18.00 dBm

Adjustment for voice channel #0,0 RCV OUT.
Adjust RCV OUT on the selected voice channel for
an indication within the box on the HP 8921A

Figure 73 **Adjustment meter screen**

Descriptions of call-outs

Heading

Displays the title of the measurement currently displayed on the adjustment meter.

Level

The level reading displays the measurement value of the needle.

Pass/fail limit lines

The longer lines shown in the center portion of the adjustment meter correspond to the values you entered for the upper and lower limits of the measurement being made. The values between these two lines are considered acceptable and within specifications. In this example for RX audio adjust, the pass/fail limit lines correspond to the values entered into the upper and lower limit fields of pass/fail limit *02_RX audio output level [dBm]*.

Needle

The needle represents the current value of the measurement being made. The needle will change position as the measured value changes. Tones are associated with the position of the needle to help you determine its location when the Test Set's screen cannot easily be seen.

Range

The values in the lower left-hand and right-hand sides of the meter define the meter range. These two numbers correspond to the outer edges of the meter's display.

Description

This portion of the adjustment meter screen provides information on the measurement being made. It contains transceiver and channel information as well as providing adjustment instructions. Information provided in the description portion of this screen will vary from test to test.

HP-IB Control Characters

Control characters appear in the top right corner of the Test Set’s screen throughout testing and indicate the following conditions:

Table 16 **HP-IB Control Annunciators**

	Description
`DE-KEYED`	Indicates that the base station transceiver is de-keyed.
`KEYED`	Indicates that the base station transceiver is keyed.
`R`	Indicates remote operation from an external controller or IBASIC program in the Test Set. This letter will be displayed while the HP 11807B Option 070 software is running.
`L`	Indicates the Test Set is listening, and is ready to receive a manual or remote command.
`T`	Indicates the Test Set is talking to another HP-IB device.
`S`	Indicates a service request has been generated.
`C`	Indicates the Test Set is currently an active controller. Control mode is set on the CONFIGURE screen. The Test Set must be a controller if HP-IB peripherals are to be controlled.
`*`	Indicates an IBASIC program is running, or the IBASIC controller is executing a command.
`?`	Indicates an IBASIC program is waiting for a user response.
`-`	Indicates that the IBASIC program is paused.
`SHIFT`	Indicates that the SHIFT key was pressed, and that the next key entry will be shifted.

USER Keys

As you are running the software, titles and functions will be assigned to USER Keys. These titles will change as needed by the software. The titles and descriptions of the USER Keys that are available with this software package are described as follows:

`All Cal`	Pressing this key causes the program to download scan receiver calibration data.
`Clr Scr`	This key clears the Test Set's CRT display.
`Continue`	This key continues the program after it has been paused.
`Delet Ins`	This allows you to delete an instrument from the list at the bottom of the screen.
`Delet Stp`	This key is can be used when editing of items in a testing sequence. When you press this key, the test in the displayed sequence that has its **`Step #`** highlighted (inverse video) will be deleted.
`Disp Data`	Cable fault data can be displayed in graphical or tabular form. Pressing this key toggles the display from graphical form to tabular form.
`Done`	Press this key when you want to exit a test or have completed a task. The program will continue if there is a next test in the sequence or if there are additional program steps in the test being run.
`Ent Block`	This key is provided during *TEST_05 Scanning receiver MANUAL mode* and used with the DBO base station command. When this key is pressed the software will prompt you to enter the number of the frequency block you wish to display. See your base station's commands manual for more information on the DBO command and the corresponding frequency blocks.

Edit Seqn Edit Freq Edit Spec	These keys can be used to quickly access a tests sub-screen, used only in firmware below revision A.14.00. For example, when you press **Edit Seqn**, the Edit Sequence screen will be displayed. This sub-screen is used to enter one or more tests into a sequence.
Insrt Ins	This allows you to enter an instrument in the list at the bottom of the screen.
Insrt Stp	This key is used during the entry of items into a test sequence. When you press this key, the test in the displayed sequence that has its **Step #** highlighted (inverse video) will be copied into a new sequence location, immediately after the highlighted one. The tests that follow in the sequence will be scrolled down by one step. This key does nothing if there are no items in the sequence.
Laptop	When this key is displayed, you can exit the test and control the base station through the laptop emulator. Selecting **Done** on the Laptop Emulator screen causes the program to continue execution from the exit point.
Next Wind	In *TEST_08 Voice channel manual test mode*, several windows are displayed on the CRT. The cursor can be used to change test conditions and send commands in different windows. Pressing this key causes the cursor to the next window. The cursor will not move to a window unless a change is permitted in that window.
Next Chan	This key is displayed at times in *TEST_08 Voice channel manual test mode*. After you have selected **Tune test set** from the list in the **Measure** window, you can use this key to change the channel displayed above the parameters window. Pressing this key will select the next channel in the scan receiver channel list. **Tune test set** is provided in this test so you can use your laptop to manually check messages such as the RSSI of a scan receiver.
Next Ant	This key is displayed at times in *TEST_08 Voice channel manual test mode*. After you have selected **Tune test set** from the list in the **Measure** window, you can use this key to change the antenna displayed above the parameters window. Pressing this key will select the next antenna. **Tune test set** is provided in this test so you can use your laptop to manually check messages such as the RSSI of a scan receiver.

`Nxt block`	This key is provided during *TEST_05 Scanning receiver MANUAL mode* and used with the DBO base station command. When this key is pressed the software will display the next block of frequency channels. For example, if you are currently viewing the bay level offsets for block 1, when you press the **`NXT block`** key the Test Set will display the bay level offsets for block 2.
`Page Up Page Down`	These keys move a selection list up and down in the Test Set's CRT display. They are used to quickly display items in the list when some of the items won't fit on the screen.
`Prev Ant`	This key is displayed at times in *TEST_08 Voice channel manual test mode*. After you have selected **`Tune test set`** from the list in the **`Measure`** window, you can use this key to change the antenna displayed above the parameters window. Pressing this key will select the previous antenna. **`Tune test set`** is provided in this test so you can use your laptop to manually check messages such as the RSSI of a scan receiver.
`Prev Chan`	This key is displayed at times in *TEST_08 Voice channel manual test mode*. After you have selected **`Tune test set`** from the list in the **`Measure`** window, you can use this key to change the channel displayed above the parameters window. Pressing this key will select the previous channel. **`Tune test set`** is provided in this test so you can use your laptop to manually check messages such as the RSSI of a scan receiver.
`Print All`	This key can be used to print the parameters, pass/fail limits, configuration, and sequence you have entered into the TESTS sub-screens. The serial port or the HP-IB port can be used. Your Test Set must be configured for printing. See *"Printing" on page 124* for more information on configuring your Test Set for printing.
`Prt Full`	Pressing this key will expand the display of the base station messages.
`Re-test`	This key is displayed after a cable fault test has been performed. Pressing this key causes the software to re-display the connection diagram so that another test can be started.
`Run`	This key starts an IBASIC program that has been loaded into the Test Set's memory.

Run Test	This key loads the program code into the Test Set's memory and begins running the first test in your testing sequence. If the program is already loaded into Test Set's memory, it begins running your first test.
Send DBO	When this key is pressed the software will instruct the Test Set to send the DBO command to the base station. See your base station's commands manual for more information on this command.
Send ESC	After this key is pressed, the Test Set will send an escape command to the base station. See your base station's commands manual for more information on this command.
Show Log	This key is displayed during *TEST_08 Voice channel manual test mode*. Pressing this key causes the program to display a log of recent base station commands and messages that have been sent or received. This key will only be displayed when the cursor is in the **BS commands sent** window.
Skip Sens ,Skip SAT, Next Ant, Skp N SSI	These keys can be used to cause the program to skip over some tests in a Scan Receiver test. They are displayed when parameter *23_SC skip items in scan test [0=no 1=yes]* is set to 1. The **N** in **Skp N SSI** refers to the antenna being tested.
Sngl Step	This key steps the IBASIC program one line at a time. *See "Editing the Test Execution Conditions" on page 178* for more information on **Continuous/ Single Step** run mode.
Stop Test	This key pauses the base station test software.
Take It	Press this key when the measured result is with in an acceptable range. The Test Set will accept the current value as the final measured value.
Tns off, Tns quiet, Tns loud	These keys set the volume of tones that provide feedback to you during testing.
Yes No	Press these keys to answer questions on the Test Set's screen.
Zoom	This key can be used to expand the display of a measurement while *TEST_08 Voice channel manual test mode* is running.

10

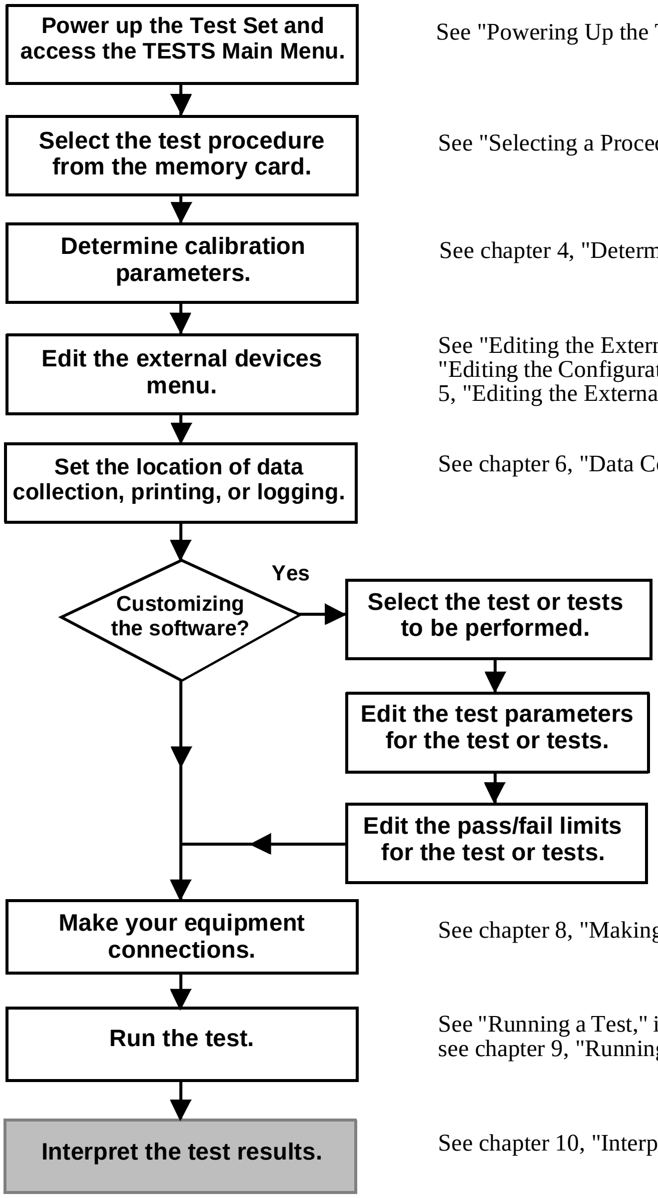
Interpreting the Test Results

What's included in this chapter:

- Introduction
- Example Test Results Screen

Task Flow Diagram

*Task**



For a description of the task or related information:

See "Powering Up the Test Set," in chapter 3, on page 24 or page 46.

See "Selecting a Procedure," in chapter 3, on page 26 or page 48.

See chapter 4, "Determining Calibration Parameters" on page 73.

See "Editing the External Devices Menu," in chapter 3, on page 29 or see "Editing the Configuration Menu" on page 51. For more information, see chapter 5, "Editing the External Devices Screen" on page 101.

See chapter 6, "Data Collection, Printing, and Logging" on page 113.

See "Selecting a Test," in chapter 3, on page 32 or page 56. For more information, see "Selecting a Test or Testing Sequence," in chapter 7, on page 136.

See "Editing the Test Parameters," in chapter 3, on page 35 or page 60. For more information, see "Editing the Test Parameters," in chapter 7, on page 139.

See "Editing the Pass/Fail Limits," in chapter 3, on page 39 or see "Editing the Edit Specifications Menu" on page 64. For more information, see "Editing the Pass/fail Limits," in chapter 7, on page 141.

See chapter 8, "Making Equipment Connections" on page 151.

See "Running a Test," in chapter 3, on page 43 or page 69. For more information, see chapter 9, "Running the Test" on page 175.

See chapter 10, "Interpreting the Test Results" on page 191.

**Shaded tasks are described in this chapter.*

Introduction

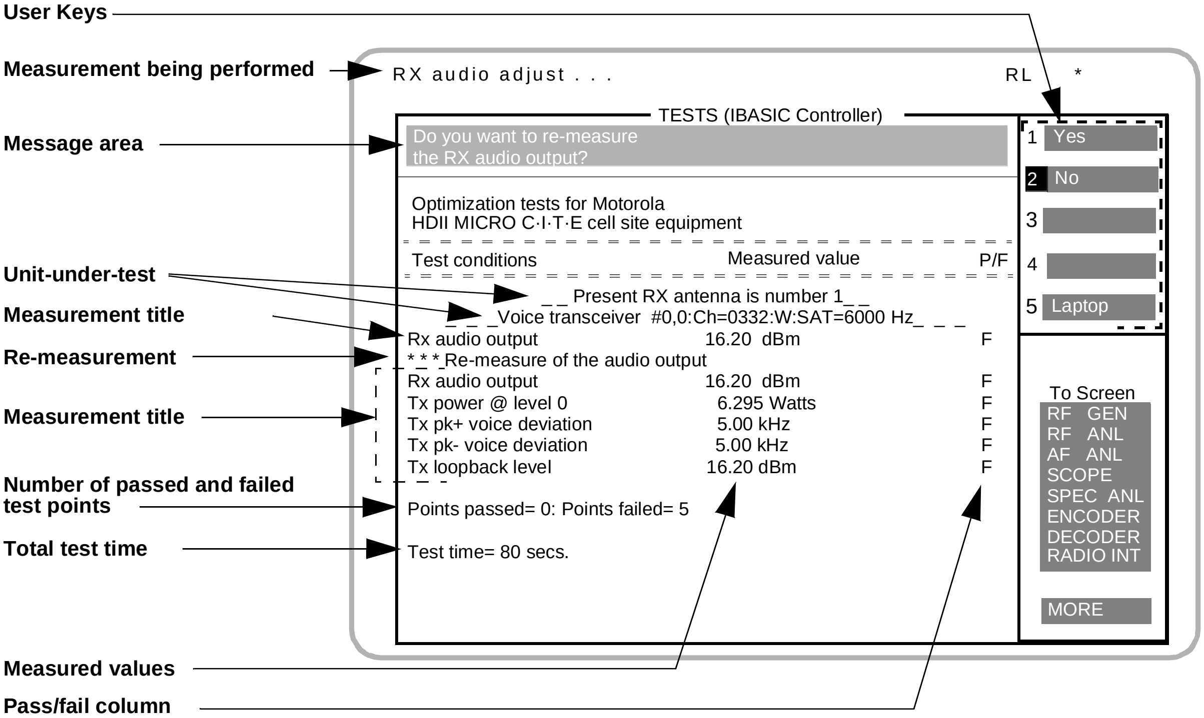
The TESTS (IBASIC Controller) screen is used to perform various functions, including displaying test results. As the Test Set completes each measurement of a Test Procedure, it displays each measurement result on the TESTS (IBASIC Controller) screen. For simplicity, when the TESTS (IBASIC Controller) screen is used to display measurement results we will refer to it as the Test Results screen.

NOTE: This chapter only discusses the Test Results screen. An adjustment meter may appear during testing when a measurement fails to meet its pass/fail limits. *See "The Adjustment Meter" on page 184* for more information.

The Test Results Screen

The best way to understand and interpret the Test Results screen is to look at an example of one. *Figure 74* below shows an example screen containing the measurement results of the test *TEST_03 Voice transceiver adj MANUAL mode.* Review the screen below and *see "Callout Descriptions"* for a description of each callout.

Example Test Results Screen



```
RX audio adjust . . .                                   RL    *
TESTS (IBASIC Controller)
Do you want to re-measure
the RX audio output?

Optimization tests for Motorola
HDII MICRO C·I·T·E cell site equipment
Test conditions                    Measured value          P/F
                __ Present RX antenna is number 1__
        ___Voice transceiver  #0,0:Ch=0332:W:SAT=6000 Hz___
Rx audio output                  16.20  dBm                 F
***Re-measure of the audio output
Rx audio output                  16.20  dBm                 F
Tx power @ level 0                6.295 Watts               F
Tx pk+ voice deviation            5.00 kHz                  F
Tx pk- voice deviation            5.00 kHz                  F
Tx loopback level                16.20 dBm                  F

Points passed= 0: Points failed= 5

Test time= 80 secs.
```

Figure 74 **Test Results Screen Example**

Callout Descriptions

- **User Keys**

  The User Keys on the Test Results screen are most commonly used to reply to prompts in the message area or to perform a task. For a detailed description of each USER Key *see "USER Keys" on page 187*.

- **Measurement being performed**

  The top left portion of the CRT displays the title of the measurement the Test Set is currently performing. Depending on the measurement being performed, the Test Set may present on the CRT an intermediate screen before or after a measurement. If a measurement is performed and fails to meet its pass-limit specification, an intermediate screen may appear before the next measurement is performed.

- **Message area**

  The message area is used by the Test Set to display messages or to prompt you to perform a task. Use the Test Set’s USER Keys to respond. In this particular example, the current measurement did not meet its pass/fail limits and the message area reads “Do you want to re-measure the audio output?”

- **Unit-under-test**

  This portion of the Test Results screen contains information about the unit-under-test. In this particular example, we were making measurements on voice transceiver #0,0 channel 332. The “W” indicates that it is a wideband channel and that it is operating with a SAT tone at 6000 Hz.

- **Measurement title**

  Each measurement title will be displayed on the left side of the CRT as the Test Set completes it.

- **Re-measurement**

  If a measurement fails to meet its pass/fail limits it can be re-measured. The re-measured value will appear directly across from the measurement title. See parameter *10_GN perform adj [0=no 1=on fail 2=always]* on page 247 for more information.

- **Number of passed and failed test points**

  This row displays the number of passed and failed test points (or measurements) that passed or failed the specifications defined in of the test procedure.

- **Total test time**

  This row displays the time it took to perform the entire test procedure.
- **Measured values**

  Across from each measurement title is the measurement value. This is the value measured by the Test Set.
- **Pass/fail column**

  Across from each measurement title/description and measured value is the pass/fail status of each measurement. If the measured value fails to fall within its pass/fail limits a “F” appears in the pass/fail column. If the measured value is within its pass/fail limits nothing will appear.

11

Tests Descriptions

What’s included in this Chapter:

- Introduction
- Test Descriptions

Introduction

This chapter contains the test descriptions for all the tests available in the HP 11807B Option 070 base station software package.

What is a Test?

A test is a collection of measurements designed to optimize a certain portion of your base station. Each test uses a set of parameters and pass/fail limits to optimize the measurements to your needs.

Test Available in this Software Package

Tests available:

- TEST_01 Laptop Emulator
- TEST_02 URDM Frequency/Level
- TEST_03 Voice Transceiver adj MANUAL mode
- TEST_04 Voice Transceiver
- TEST_05 Scanning receiver MANUAL mode
- TEST_06 Signaling transceiver MANUAL mode
- TEST_07 Manual switch & calibration aid
- TEST_08 Voice channel manual test mode
- TEST_09 VSWR swept return loss
- TEST_10 VSWR discrete channel return loss
- TEST_11 VSWR vs distance (cable fault)

Test Description Information

Each test description includes the following sections:

- **Introduction:**

  The “Introduction” section describes what the test is used for and what measurements are made during the test.

- **PRECAUTIONS:**

  The “PRECAUTIONS” section contains any precautions you should take or information that you should be aware of before you begin testing.

- **Parameters Used:**

  The “Parameters Used” section contains a list of the parameters specific to that test. The software uses the values entered into each parameter to customize the software to your testing needs.

- **Pass/fail limits:**

  The “Pass/fail Limits Used” section contains a list of the pass/fail limits specific to that test. The software compares the measurement results to the values you entered in the pass/fail limits to determine whether the measurement passed or failed.

- **Making Connections:**

  The “Making Connections” section refers you to the necessary equipment connection diagram for the test.

- **Testing Theory:**

  The “Testing Theory” section contains specific information on how each measurement is made. This information includes where the signal is generated, what path the generated signal takes, how the Test Set and base station communicate and which of the Test Set’s instruments are used to make each measurement.

- **Running the Test:**

  The “Running the Test” portion of each description provides information on how to perform specific tasks required for each test.

- **Troubleshooting:**

  The “Troubleshooting” portion of each test description contains information to help you if you are having difficulty performing a test or measurement.

Not all test descriptions will provide information in every section listed above. Information will be provided only where applicable.

TEST_01 Laptop Emulator

TEST_01 Laptop Emulator allows you to send commands from the Test Set to the base station and view the base station's response.

This test simplifies testing by eliminating the need for an external PC for base station control. This test can be used separately, can be inserted into a testing sequence, or can be accessed during a test when the `k5` (**`Laptop`**) user key is available.

PRECAUTIONS

CAUTION The base station commands you send using the Laptop emulator may effect the operation of the cell site. Know the effect of the command before you send it. See your Motorola Main Monitor Commands manual for more information on base station commands.

Parameters Used

There are no parameters used during this test.

Pass/fail limits Used

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

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

This test establishes communication through the Test Set's RS-232 port and the base station's TTYMP port. Commands can be selected and sent to the base station and the base station's responses can be viewed on the Test Set screen through this link.

Running the Test

Verify that a link exists between the base station and the Test Set

The Serial B port's baud rate used by this software is fixed at 1200 baud. This value cannot be changed by the user. After starting *TEST_01 Laptop Emulator*, the software automatically sends the **`Autobaud`** command to the base station. You can verify that a link exists by observing if a response appears on the Test Set's screen, shortly after the test starts.

Verify the status of the channels under the current Voice Channel Controller

Send the REP VCC# GROUP# command to the base station to display the status of the channels under this Voice Channel Controller. You can verify the availability of the channel you are testing by looking for INSOPT after the channel number.

Sending commands to the base station

There are two ways to send commands to the base station.

1 **Sending listed commands**

On the left side of the test screen is a list of commands that can be sent to the base station. To send a listed command:

a Position the cursor control knob to the command you wish to send.
b Push the knob. Pushing the knob sends the command to the base station or prompts you for additional entries if needed.

Some of the listed commands may prompt you for additional entries. A more detailed description of these commands and the additional entries they require can be found in the commands section of the your optimization manual.

Some base station firmware may require special syntax programmed into the listed commands. Examples are those that use NAMPS parameters. Determine the syntax of these commands and follow the procedure in the “Sending Unlisted Commands to the Base Station.”

2 **Sending unlisted commands**

Commands not included in the list on the Test Set’s screen may be manually entered. To send an unlisted command:

a Select **`Enter Command`** from the given command list.
b Use the cursor control knob and the **`Choices:`** menu to type the command.
c When you have finished typing the command, select **`Done`** from the top of the **`Choices:`** menu.
d The command has been sent.

Viewing the base station’s response

Messages from the base station appear in the window labeled “Base Station Response” on the right-hand side of the test screen. Messages that have scrolled past the top of the message display cannot be retrieved. See the “Troubleshooting” section of this test description for more information.

Example for placing the base station in manual mode

1. Notify the switch personnel of your plan.
2. Verify that the voice channels have been adequately handed off.
3. Take the precautions to ensure that the switch will not be adversely affected when you power down, disconnect or loopback modems.
4. Power down, disconnect, or perform local loopback to the modems that connect the switch to the base station.
5. Run *TEST_01 Laptop Emulator*.
6. Select the **`Manual`** command from the given command list using the `k4` **`(Page Down)`** key or the cursor control knob.
7. If you are performing a SIG TEST, terminate the RF power from the SIG units so mobiles do not attempt access.
8. If you are testing modules other than the SIG units, send SIG OFF 0 and SIG OFF 1 commands using this test. This will turn off the signalling transceiver's RF power.

Troubleshooting

If the base station is locked and unable to be controlled

If the base station is locked and unable to be controlled, it will send a "#" to the Test Set's display each time a command is sent to it. A password must be sent to the base station to unlock it. Send your password using the **`Password`** command from the command list to unlock it.

If the base station does not respond to the command you send

Some base station firmware may require special syntax programmed into the listed commands. Examples are those that use NAMPS parameters. Determine the required syntax of these commands and refer to "Sending unlisted commands" on page 201 for how to send them.

If you are unable to view all the base station responses

When many long reports are being sent from the base station a buffer overflow may occur. When this happens, some messages may not be displayed. Only the first 27 characters sent by the base station can be displayed in the base station's response window. The following options are available to view base station's responses:

- Press `k5` `(`**`PRT FULL`**`)`. This will expand the "base station response window" to full screen.
- Press `k2` `(`**`CONTINUE`**`)`. This returns the display to its normal size.
- *See chapter 6, "Data Collection, Printing, and Logging"* for ways to log base station responses to a printer or PC.

TEST_02 URDM Frequency/Level

TEST_02 URDM Frequency/Level verifies the performance of the URDM in your base station and allows you to make adjustments if necessary.

The following measurements are performed:

- The frequency error of the URDM’s primary and secondary oscillators
- The signal level of the URDM’s primary and secondary oscillators

PRECAUTIONS

ALLOW EQUIPMENT TO WARM UP

Testing in NAMPS requires an external reference. Allow the 10 MHz external reference and Test Set to warm up prior to testing. This allows the oscillator to stabilize before any measurements are made. Check equipment instructions for length of warm-up time needed.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

- 02_GN auto exit adj [0=no xx=times in spec] [0-99]
- 04_GN CITE configuration [0=A 1=B 2=C]
- 06_GN CITE setup [1=single 2=2up 3=3up]
- 07_ GN CITE VCC number unit #1 [number]
- 08_GN CITE VCC number for unit #2/3 [number]
- 10_GN perform adj [0=no 1=on fail 2=always]
- 12_GN test state of [0=ins-opt 1=manual]
- 14_GN voice ch sel if T1 [0=manual 1=auto]
- 26_TX RF path loss for TX port [dB]
- 27_TX RF path loss for TX port 1 [dB]
- 28_TX RF path loss for TX port 2 [dB]
- 30_URDM level correction factor [dB]

Pass/fail Limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

- 33_URDM frequency error [Hz]
- 34_URDM output level [dBm]

Making Connections

See "TEST_02 URDM Frequency/Level Equipment Connections" on page 170 for equipment connections required during testing.

Theory of Operation

URDM frequency error

The frequency of the URDM 3 MHz reference is checked by measuring a voice channel's transmitter frequency. Enter the desired transceiver number for testing and the Test Set will set up the channel. A jumper is placed on the J607 pins 3 and 4 to select the secondary oscillator. The voice channel's unmodulated RF signal from the base station's TX port is routed to the Test Set's RF IN port, and the frequency is measured using the Test Set's frequency counter. Next, the jumper is moved to J607 pins 1 and 2 to select the primary oscillator. The frequency measurement is repeated. RF analyzer settings are: **`AF Cnt Gate`** 1 s.

URDM signal level

The level of the URDM 3 MHz reference signal is measured using the Test Set's spectrum analyzer. A signal from the PHONOC2 port, oscillator #1, on the BSC backplane is measured at the RF IN port of the Test Set. The signal level is measured using the Test Set's spectrum analyzer, corrections are made to account for parameter *30_URDM level correction factor [dB]*, and the results displayed on the Test Set's screen. The connections are moved to the PHONOC4 port, oscillator #2, on the BSC backplane and the signal level measurement repeated. Spectrum Analyzer settings are: **`Center Freq`** 3 MHz, **`Span`** 50 kHz, **`Sensitivity`** 2 dB/div.

Running the Test

Entering your Base Station Configuration

The connections diagrams and prompts provided by the software will change depending on the equipment you are using for testing. The software uses parameters *04_GN CITE configuration [0=A 1=B 2=C]*, *06_GN CITE setup [1=single 2=2up 3=3up]*, *12_GN test state of [0=ins-opt 1=manual]*, and your entries into the Externnal Devices screen to determine the equipment you are using. Set these parameters to reflect your base station's configuration and the equipment you are using for testing. For a detailed description of these parameters, see *chapter 12, "Parameter Descriptions"*. See *chapter 5, "Editing the External Devices Screen"* for more information on the External Devices screen.

Making adjustments

An adjustment meter is available during this test. *See "The Adjustment Meter" on page 184* for more information on using the adjustment meter.

Troubleshooting

If frequency measurements vary

It is necessary to allow the URDM 3 MHz oscillator to warm up at least 60 minutes before testing. Errors in frequency measurements may be a result of oscillator instability.

TEST_03 Voice Transceiver adj MANUAL mode

TEST_03 Voice Transceiver adj MANUAL mode is a subset of the measurements contained in *TEST_04 Voice Transceiver*.

This test is specifically designed for use with an external T1 module. It will make transceiver testing more efficient by performing only the measurements from *TEST_04 Voice Transceiver* that require manual adjustments. Once *TEST_03 Voice Transceiver adj MANUAL mode* has been run and the transceiver has been adjusted, *TEST_04 Voice Transceiver* can be run without interruption for manual adjustments.

The following measurements are made:

- RX audio output
- TX power level
- TX voice deviation
- TX/RX loopback

PRECAUTIONS

MANUAL MODE TESTING

This test requires that the base station be placed in MANUAL mode. Take the base station out-of-service before you begin this test. *See "Example for placing the base station in manual mode" on page 202* for instructions on placing the base station in MANUAL mode.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions".*

02_GN auto exit adj [0=no xx=times in spec] [0-99]
03_GN CITE Average Voice Level [AVL] [dBm]
04_GN CITE configuration [0=A 1=B 2=C]
06_GN CITE setup [1=single 2=2up 3=3up]
07_ GN CITE VCC number unit #1 [number]
08_GN CITE VCC number for unit #2/3 [number]
10_GN perform adj [0=no 1=on fail 2=always]
12_GN test state of [0=ins-opt 1=manual]
14_GN voice ch sel if T1 [0=manual 1=auto]
19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]
25_TX output power for voice channel [Watts]
26_TX RF path loss for TX port [dB]
27_TX RF path loss for TX port 1 [dB]
28_TX RF path loss for TX port 2 [dB]
29_TX voice/signal pwr use [0=anz 1=pwrmtr]

Pass/fail Limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions".*

02_RX audio output level [dBm]
14_T1 total audio loss [dB]
23_TX loopback level [dBm]
25_TX output power error for voice channel [%]
29_TX voice deviation [kHz]
30_TX voice deviation narrow mode [kHz]

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

RX audio output

The Test Set generates a 1 kHz tone with deviation (2.9 kHz for wide mode or 1.5 kHz for narrow) at -60 dBm from its DUPLEX OUT port (base station configurations A and C) or its RF OUT port (base station configuration B). The signal is routed to the base station’s RX antenna port where it is demodulated. The resulting audio signal is returned to the AUDIO IN port of the Test Set and the RX audio output level is measured using the Test Set’s AF analyzer. AF analyzer settings are: **AF Anl In** Audio In**,** **Filter1** C-Message, **Filter2** >99 kHz LPF, **Detector** RMS, **De-Emphasis** off, **Audio In Lo** 600 Ω to Hi.

TX power level

The software commands the base station to key a transceiver. The transmitted RF signal from the base station’s TX port is routed to the RF IN port of the Test Set. Depending on how parameter *29_TX voice/signal pwr use [0=anz 1=pwrmtr]* is set, the power level is measured using the Test Set’s power meter (inactive site) or the spectrum analyzer (active site). Spectrum analyzer settings are: **Span** 2 MHz, **Resolution** 2 dB/div

TX voice deviation

The Test Set generates an audio signal at the level indicated by parameter *03_GN CITE Average Voice Level [AVL] [dBm]* from its AUDIO OUT port and applies it to the EQUIP XMT line jack of the voice transceiver. The modulated signal from the base station’s TX antenna port is returned to the Test Set’s RF IN port where it is demodulated. Voice deviation is measured using the Test Set’s AF analyzer. AF analyzer settings are: **AF Anl In** FM Demod, **Filter1** 300 kHz HPF, **Filter2** 3 kHz LPF, **Detector** Pk+/Pk-, **De-Emphasis** 750 µs

Loopback

The Test Set generates an audio signal at the level indicated by parameter *03_GN CITE Average Voice Level [AVL] [dBm]* from its AUDIO OUT port. The signal enters the voice transceiver’s EQUIP XMT jack and is routed through the transceiver’s loopback circuitry to the EQUIP RCV jack. The audio signal is returned from the EQUIP RCV jack to the Test Set’s AUDIO IN port and the signal level is measured using the Test Set’s AF analyzer. AF analyzer settings are: **AF Anl In** Audio In, **Filter1** C-Message, **Filter2** >99 kHz LPF, **Detector** RMS, **De-Emphasis** off.

Running the Test

Entering your Base Station Configuration

The connections diagrams and prompts provided by the software will change depending on the equipment you are using for testing. The software uses parameters *04_GN CITE configuration [0=A 1=B 2=C]*, *06_GN CITE setup [1=single 2=2up 3=3up]*, *12_GN test state of [0=ins-opt 1=manual]*, and your entries into External Devices screen to determine the equipment you are using. Set these parameters to reflect your base station’s configuration and the equipment you are using for testing. For a detailed description of these parameters, see *chapter 12, "Parameter Descriptions"*. See *chapter 5, "Editing the External Devices Screen"* for more information on the **`Cnfg External Devices`** field.

Making adjustments

An adjustment meter is available during this test. *See "The Adjustment Meter" on page 184* for more information on using the adjustment meter.

Troubleshooting

No troubleshooting information is provided for this test description.

TEST_04 Voice Transceiver

TEST_04 Voice Transceiver allows you to test the performance of the voice transceiver and make adjustments if necessary.

The following measurements are performed:

- RX audio output
- RX sensitivity
- RX diversity
- RX SAT/ST detect
- RX DSAT/DST detect
- TX freq error
- TX power level
- TX SAT/DSAT deviation and frequency
- TX voice deviation
- TX voice limiting
- Loopback

Additional measurements are available. See "Performing extended tests" on page 215 for more information.

If your testing configuration contains a T1 module, you may find it beneficial to run *TEST_03 Voice Transceiver adj MANUAL mode* prior to running this test.

PRECAUTIONS

MANUAL MODE TESTING

You may find it preferable to take the cell-site-out of service when you are performing voice transceiver tests. In MANUAL mode you will be able to terminate antenna ports so that extraneous signals will not affect measurements. See *TEST_01 Laptop Emulator* for instructions on placing the base station is MANUAL mode.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

02_GN auto exit adj [0=no xx=times in spec] [0-99]
03_GN CITE Average Voice Level [AVL] [dBm]
04_GN CITE configuration [0=A 1=B 2=C]
05_GN CITE has LNA [0=no 1=yes]
06_GN CITE setup [1=single 2=2up 3=3up]
07_ GN CITE VCC number unit #1 [number]
08_GN CITE VCC number for unit #2/3 [number]
10_GN perform adj [0=no 1=on fail 2=always]
11_GN perform extended tests [0=no 1=yes]
12_GN test state of [0=ins-opt 1=manual]
14_GN voice ch sel if T1 [0=manual 1=auto]
17_RX level for voice DSAT/DST detector [dBm]
18_RX level for voice SAT/ST detector [dBm]
22_RX/TX audio freq response step [.01-2.7] [kHz]
25_TX output power for voice channel [Watts]
29_TX voice/signal pwr use [0=anz 1=pwrmtr]

Pass/fail Limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

01_RX audio distortion [%]
02_RX audio output level [dBm]
03_RX response dev from -6 dB/oct R1 [dB]
04_RX response dev from -6 dB/oct R2 [dB]
05_RX expandor track error <0 dB [dB]
06_RX expandor track error >0 dB [dB]
07_RX hum and noise [dB]
10_RX sensitivity with LNA [dBm]
11_RX sensitivity without LNA [dBm]
12_RX sensitivity without LNA narrow mode [dBm]
13_RX SINAD at sensitivity spec [dB]
14_T1 total audio loss [dB]
15_TX audio distortion [%]
16_TX audio response dev from 6 dB/oct [dB]
17_TX compressor track error <0 dB [dB]
18_TX compressor track error >0 dB [dB]
19_TX data deviation [kHz]
20_TX DSAT deviation [Hz]
21_TX FM hum and noise [dB]
22_TX frequency error [ppm]
23_TX loopback level [dBm]
25_TX output power error for voice channel [%]
26_TX SAT deviation [kHz]
27_TX SAT frequency error [Hz]
29_TX voice deviation [kHz]
30_TX voice deviation narrow mode [kHz]
31_TX voice limiting deviation [kHz]
32_TX voice limiting deviation narrow mode [kHz]

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

RX audio output

See *"RX audio output" on page 207* for a complete description.

RX sensitivity

This measurement verifies that the voice receiver can properly detect signals at a predefined level. The Test Set generates an RF signal out its RF OUT port (base station configurations A and C) or DUPLEX OUT port (base station configuration B) and applies it to the RX antenna ports. The applied signal level is set according to your upper RX sensitivity pass/fail limit (*10_RX sensitivity with LNA [dBm]*, *11_RX sensitivity without LNA [dBm]*, or *12_RX sensitivity without LNA narrow mode [dBm]*) with 8 kHz (wide) or 3 kHz (narrow) deviation. The demodulated signal is routed from the base station's EQUIP RCV port to the Test Set's AUDIO IN port. SINAD is measured using the Test Set's AF analyzer. AF analyzer settings are: **`AF Anl In`** Audio In**`, Filter1`** C-Message, **`Filter2`** >99 kHz LPF, **`Detector`** RMS, **`De-Emphasis`** off, **`Audio In Lo`** 600 Ω to Hi.

RX diversity

The Test Set instructs the base station, through the TTYMP to Test Set's RS-232 connection, to select receive antenna one or two. The signal level is measured at the selected antenna port to verify that antenna selection was made successfully and that the proper antenna is receiving.

RX SAT/ST detect

The Test Set generates a source signal modulated with a SAT tone (6 kHz tone with 2 kHz deviation) and a signaling tone (10 kHz tone with 8 kHz deviation) at the level indicated by parameter *18_RX level for voice SAT/ST detector [dBm]*. This RF signal is sent out the Test Set's DUPLEX OUT port (base station configurations A and C) or the RF OUT port (base station configuration B) to the RX1/RX2 antenna port of the base station. The Test Set requests information from the base station through the RS-232 port to verify that the SAT/ST signal was detected. Next, no SAT/ST signal is applied to the base station. The Test Set requests information from the base station to verify that no SAT/ST signal was detected. Filter and detector settings are not necessary for this measurement.

RX DSAT/DST detect

The DSAT and DST signal detection are tested separately. Through the RS-232 to TTYMP connection, the Test Set requests DSAT/DST information from the base station. The Test Set generates a source signal modulated with the DSAT vector (with 700 Hz deviation) at the level indicated by parameter *17_RX level for voice DSAT/DST detector [dBm]*. This RF signal is sent from the Test Set's DUPLEX OUT port (base station configurations A and C) or the RF OUT port (base station configuration B) to the RX1/RX2 antenna port of the base station. The Test Set requests information from the base station through the RS-232 port to verify that the DSAT/DST signal was detected. Next, no DSAT/DST signal is applied to the base station. The Test Set requests information from the base station to verify that no DSAT/DST signal was detected. Filter and detector settings are not necessary for this measurement.

TX freq error

The Test Set requests the channel frequency of the voice transceiver-under-test from the base station through the RS-232 port. The Test Set commands the base station to key the voice transceiver. The transmitted signal is routed from the base station's TX antenna port to the Test Set's RF IN port. The actual frequency is measured using the Test Set's RF analyzer's frequency counter. The actual frequency of the transmitted signal is compared with its intended frequency and the error determined. RF analyzer settings: **`Tune Mode`** Manual, **`Tune Freq`** TX center frequency of transceiver under test, **`Input Port`** RF In, **`RF Cnt Gate`** 1 s.

TX power level

See *"TX power level" on page 208* for a complete description.

TX SAT/DSAT deviation and frequency

The Test Set queries the base station to determine whether the voice transceiver-under-test is operating in wide or narrow mode.

If operating in wide mode, the software performs TX SAT deviation and frequency measurements. When measuring frequency, the Test Set instructs the base station to enable the SAT tone. The SAT frequency is measured at the TX antenna port of the base station using the AF analyzer's frequency counter. When measuring the SAT deviation, the signal is once again measured at the TX antenna port. The deviation is determined using the Test Set's AF analyzer. AF analyzer settings are: **`AF Anl In`** FM Demod**`, Filter1`** 300 Hz HPF, **`Filter2`** 15 kHz LPF, **`Detector`** RMS, **`De-Emphasis`** off, **`Audio In Lo`** 600 Ω to Hi, **`AF Cnt Gate`** 1 s.

If the receiver is operating in narrow mode, the software performs TX DSAT deviation and decoding. When measuring the DSAT deviation, the Test Set instructs the base station to enable the DSAT code. The signal is measured at the TX antenna port and the deviation determined using the AF analyzer's peak detector. AF analyzer settings are: **`AF Anl In`** FM Demod**`, Filter1`** <20 Hz HPF, **`Filter2`** 300 Hz LPF, **`Detector`** Pk+ Pk-, **`De-Emphasis`** off, **`Audio In Lo`** 600 Ω to Hi, **`AF Cnt Gate`** 1 s. When decoding the DSAT signal, the signal is once again measured from the TX antenna port. The signal is decoded using the Test Set's signaling decoder. Signaling decoder settings are: **`Measure`** DSAT, **`Channel`** Voice, **`Mode`** NAMP-NTAC, **`AF Anl In`** FM Demod.

TX voice deviation

See *"TX voice deviation" on page 208* for a complete description.

TX voice limiting

The Test Set initially generates a 1 kHz audio tone l at 10 dBm from its AUDIO OUT port and applies it to the transceiver's EQUIP XMT jack. The frequency of the signal is stepped between 1 kHz and 3.5 kHz at a step size indicated by parameter *22_RX/TX audio freq response step [.01-2.7] [kHz]*. The modulated RF signal is routed to the Test Set's RF IN port where it is demodulated and the deviation is determined using the AF analyzer. AF analyzer settings are: **`AF Anl In`** FM Demod, **`Filter1`** <20 Hz HPF, **`Filter2`** >99 kHz LPF, **`Detector`** Pk+/Pk-, **`De-Emphasis`** off.

TX data deviation

The software instructs the base station to transmit wideband data on the voice channel-under-test. The transmitted signal is routed from the base station's TX port to the Test Set's RF IN port where it is demodulated and the deviation of the data determined using the Test Set's AF analyzer. AF analyzer settings are: **`AF Anl In`** FM Demod**`, Filter1`** <20 Hz HPF, **`Filter2`** >99 kHz LPF, **`Detector`** Pk+/Pk-, **`De-Emphasis`** off, **`IF Filter`** 230 kHz.

TX/RX loopback

See *"Loopback" on page 208* for a complete description.

Running the Test

Performing extended tests

Entering your Base Station Configuration

The connections diagrams and prompts provided by the software will change depending on the equipment you are using for testing. The software uses parameters *04_GN CITE configuration [0=A 1=B 2=C]*, *06_GN CITE setup [1=single 2=2up 3=3up]*, *12_GN test state of [0=ins-opt 1=manual]*, and your entries into the External Devices Screen to determine the equipment you are using. Set these parameters to reflect your base station’s configuration and the equipment you are using for testing. For a detailed description of these parameters, see *chapter 12, "Parameter Descriptions"*. See *chapter 5, "Editing the External Devices Screen"* for more information on the **`Cnfg External Devices`** field.

Making adjustments

An adjustment meter is available during this test. *See "The Adjustment Meter" on page 184* for more information on using the adjustment meter.

Testing in MANUAL or In-Service Optimization mode

If you are testing in the MANUAL mode, TX peak voice deviation will be measured. It cannot be measured in the In-Service Optimization mode.

Troubleshooting

If you see a small frequency error when measuring TX frequency

If you see a small frequency error when you are measuring the TX frequency, the cause of this error will usually be the URDM. This is because the frequency reference for the transceivers is the URDM. You may run *TEST_02 URDM Frequency/Level* prior to running this test if you suspect the URDM is the source of error.

TEST_05 Scanning receiver MANUAL mode

TEST_05 Scanning receiver MANUAL mode will allow you to test and calibrate the scanning receivers. The tests will be performed sequentially until all scan receivers have been optimized.

The following measurements are made:

- RX scan sensitivity
- RX SAT/DSAT sensitivity
- RX SSI calibration and linearity

PRECAUTIONS

MANUAL MODE TESTING

This test requires that the base station be placed in MANUAL mode. Take the base station out of service before you begin this test. See *TEST_01 Laptop Emulator* for instructions on placing the base station in MANUAL mode.

TEST THE WIDE BAND FIRST

You should first verify that the receiver meets wide band requirements first, then repeat *TEST_05 Scanning receiver MANUAL mode* for the narrow band.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

01_GN always cal sig/scan [0=no 1=yes]
04_GN CITE configuration [0=A 1=B 2=C]
05_GN CITE has LNA [0=no 1=yes]
06_GN CITE setup [1=single 2=2up 3=3up]
07_ GN CITE VCC number unit #1 [number]
08_GN CITE VCC number for unit #2/3 [number]
09_GN CITE [0=non-wireline 1=wireline]
10_GN perform adj [0=no 1=on fail 2=always]
12_GN test state of [0=ins-opt 1=manual]
14_GN voice ch sel if T1 [0=manual 1=auto]
15_RX level for scanner DSAT detector [dBm]
16_RX level for scanner SAT detector [dBm]
19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]
21_RX scan/sig RSSI output [0=dBm 1=hex]
23_SC skip items in scan test [0=no 1=yes]

Pass/fail limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

08_RX scan and sig calibration reading [dBm]
09_RX scan and sig linearity error [dBm]
10_RX sensitivity with LNA [dBm]
11_RX sensitivity without LNA [dBm]
12_RX sensitivity without LNA narrow mode [dBm]
13_RX SINAD at sensitivity spec [dB]

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

RX scan sensitivity

This measurement verifies that the scanning receiver can properly detect signals at a predefined level. The Test Set generates an RF signal from its RF OUT port (base station configurations A and C) or DUPLEX OUT port (base station configuration B) and applies it to the RX antenna ports. The applied signal level is set according to your upper RX sensitivity pass/fail limit (*10_RX sensitivity with*

LNA [dBm], *11_RX sensitivity without LNA [dBm]*, or *12_RX sensitivity without LNA narrow mode [dBm]*) with 8 kHz (wide) or 3 kHz (narrow) deviation. The demodulated signal is routed from the base station's EQUIP RCV port to the Test Set's AUDIO IN port. SINAD is measured using the AF analyzer. AF analyzer settings are: **`AF Anl In`** Audio In**`, Filter1`** C-Message, **`Filter2`** >99 kHz LPF, **`Detector`** RMS, **`De-Emphasis`** off, **`Audio In Lo`** 600 Ω to Hi.

RX SAT/DSAT sensitivity

This measurement verifies that the scanning receiver can tune to a specified carrier and detect SAT/DSAT. First, the Test Set generates a signal at the level indicated by *15_RX level for scanner DSAT detector [dBm]* or *16_RX level for scanner SAT detector [dBm]*. The modulated signal is applied to the base station receiver's antenna ports. The Test Set requests information from the base station through the RS-232 port to verify that the SAT/DSAT signal was detected. Next, no SAT/DSAT signal is applied to the base station. The Test Set requests information from the base station to verify that no SAT/DSAT signal was detected. There are no analyzer settings required for this measurement.

RX SSI calibration and linearity

The RX SSI calibration is performed in wide mode only and linearity is performed in narrow and wide mode. Test Set and base station communication is established through the Test Set's RS-232 and the base station TTYMP port. The Test Set delivers an unmodulated signal at -90 dBm to the base station's receiver antenna port.The Test Set queries the base station to report its SSI level and compares the reported SSI level with pass/fail limits. Calibration can be performed if necessary.

During the RX scan linearity measurement, Test Set and base station communication is established through the Test Set's RS-232 and the base station TTYMP port. The Test Set delivers a signal, first at -60 dBm and then at -100 dBm, to the base station's receiver antenna port. The Test Set compares the reported SSI level from the base station at each of these levels with the pass/fail limit to verify linearity.

No analyzer settings are required for these measurements.

Running the Test

Placing the cell site in MANUAL mode

See "Example for placing the base station in manual mode" on page 202 for instructions on placing the base station in MANUAL mode.

Performing SSI calibration

If the reported SSI level from the base station does not meet pass/fail limits, you may choose to calibrate your scan receiver. After a failed measurement, the software will ask “Do you want to calibrate this frequency?” If you choose to calibrate, the software sends the CAL SCAN 0 71 command to the base station.

If you have set parameter *01_GN always cal sig/scan [0=no 1=yes]* to one, you will not see this question. The software will assume you always want to calibrate.

The “All Cal” USER Key will become available during the calibration portion of the test. Pressing this key will instruct the software to perform calibration on all scanning receivers from that point in the test on.

Uploading the calibration offset values to the VCC

The Test Set will ask “Do you want to upload scan cal data to the VCC?” If you choose to upload the scanning calibration data, the software sends the GET SCA command to the base station.

Displaying the scan data

After you have uploaded the scan cal data to the VCC, the software will ask “Do you want to display the scan data?” If you choose to view the scan calibration data, the software sends the DBO command to the base station. The scan calibration data for both the VCC and the scan receiver can be compared on the Test Set’s screen.

Troubleshooting

No troubleshooting information is provided for this test.

TEST_06 Signaling transceiver MANUAL mode

This TEST determines the performance of the Signaling Transceiver and allows any needed calibrations to be made.

The following measurements are made:

- TX freq error
- TX power
- TX data deviation
- RX sensitivity
- RX SSI calibration and linearity

PRECAUTIONS

MANUAL MODE TESTING

This test requires that the base station be placed in MANUAL mode. Take the base station out of service before you begin this test. *See "Example for placing the base station in manual mode" on page 202* for instructions on placing the base station in MANUAL mode.

RUN THE URDM TEST PRIOR TO THIS

TEST_02 URDM Frequency/Level must be run prior to running this test. This test is not intended to test the accuracy of the URDM.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

01_GN always cal sig/scan [0=no 1=yes]
02_GN auto exit adj [0=no xx=times in spec] [0-99]
04_GN CITE configuration [0=A 1=B 2=C]
05_GN CITE has LNA [0=no 1=yes]
06_GN CITE setup [1=single 2=2up 3=3up]
10_GN perform adj [0=no 1=on fail 2=always]
12_GN test state of [0=ins-opt 1=manual]
14_GN voice ch sel if T1 [0=manual 1=auto]
19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]
21_RX scan/sig RSSI output [0=dBm 1=hex]
24_TX output power for signaling unit [Watts]
26_TX RF path loss for TX port [dB]
27_TX RF path loss for TX port 1 [dB]
29_TX voice/signal pwr use [0=anz 1=pwrmtr]

Pass/fail limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

08_RX scan and sig calibration reading [dBm]
09_RX scan and sig linearity error [dBm]
10_RX sensitivity with LNA [dBm]
11_RX sensitivity without LNA [dBm]
13_RX SINAD at sensitivity spec [dB]
19_TX data deviation [kHz]
22_TX frequency error [ppm]
24_TX output power error for signaling unit [%]

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

TX freq error

The Test Set requests the channel frequency of the voice transceiver-under-test from the base station through the RS-232 port. The Test Set commands the base station to key the signaling transceiver. The transmitted signal is routed from the base station’s TX antenna port to the Test Set’s RF IN port. The actual frequency is measured using the Test Set’s RF analyzer frequency counter. The actual frequency of the transmitted signal is compared with its intended frequency and the error determined. RF analyzer settings: **`Tune Mode`** Manual, **`Tune Freq`** TX center frequency of transceiver-under-test, **`Input Port`** RF In, **`RF Cnt Gate`** 1 s.

TX power

The software commands the base station to key the signalling transceiver. The transmitted RF signal from the base station’s TX port is routed to the RF IN port of the Test Set. Depending on how parameter *29_TX voice/signal pwr use [0=anz 1=pwrmtr]* is set, the power level is measured using the Test Set’s power meter (inactive site) or the spectrum analyzer (active site). Spectrum analyzer settings are: **`Span`** 2 MHz, **`Resolution`** 2 dB/div

TX data deviation

The software commands the base station to transmit wideband data on the signaling transceiver. The transmitted signal is routed from the base station’s TX port to the Test Set’s RF IN port where it is demodulated and the deviation of the data is determined using the Test Set’s AF analyzer. AF analyzer settings are: **`AF Anl In`** FM Demod**`,`** **`Filter1`** <20 Hz HPF, **`Filter2`** >99 kHz LPF, **`Detector`** pk+/pk-, **`De-Emphasis`** off, **`IF Filter`** 230 kHz.

RX sensitivity

This measurement verifies that the signaling receiver can properly detect signals at a predefined level. The Test Set generates a signal from its RF OUT port (base station configuration A or C) or DUPLEX OUT port (base station configuration B) to the receiver’s antenna ports. The applied signal level is set according to your upper RX SINAD pass/fail limit (*10_RX sensitivity with LNA [dBm]*, *11_RX sensitivity without LNA [dBm]*, or *12_RX sensitivity without LNA narrow mode [dBm]*) with 8 kHz (wide) or 3 kHz (narrow) deviation. The signal is returned to the Test Set’s AUDIO IN port and SINAD is measured using the AF analyzer. AF analyzer settings are: **`AF Anl In`** Audio In**`,`** **`Filter1`** C-Message, **`Filter2`** >99 kHz LPF, **`Detector`** RMS, **`De-Emphasis`** off, **`Audio In Lo`** 600 Ω to Hi.

RX SSI calibration and linearity

The RX SSI calibration and linearity measurements are performed in wide mode only. Test Set and base station communication is established through the Test Set’s RS-232 and the base station’s TTYMP port. The Test Set delivers an unmodulated signal at -90 dBm to the base station receiver’s antenna port.The Test Set queries the base station to report its SSI level and compares the reported SSI level with pass/fail limits. Calibration can be performed if necessary.

During the RX SSI linearity measurement, Test Set and base station communication is established through the Test Set’s RS-232 and the base station’s TTYMP port. The Test Set delivers a signal, first at -60 dBm and then at -100 dBm, to the base station receiver’s antenna port. The Test Set compares the reported SSI level from the base station at each of these levels with the pass/fail limit to verify linearity.

No analyzer settings are required for these measurements.

Running the Test

Placing the cell site in MANUAL mode

See "Example for placing the base station in manual mode," in chapter 11, on page 202 for instructions on placing the base station in MANUAL mode.

Performing SSI calibration

If you have set parameter *01_GN always cal sig/scan [0=no 1=yes]* to one you will not be asked whether you would like to calibrate. The software will assume you always want to calibrate.

If the reported SSI level from the base station does not meet pass/fail limits you may choose to calibrate your signaling receiver. After a failed measurement, the software will ask “Do you want to calibrate this frequency?” If you choose to calibrate, the software sends the CAL SIG 0 71 command to the base station.

The “All Cal” user key will become available during the calibration portion of the test. Pressing this key will instruct the software to perform calibration on all signaling receivers from that point in the test on.

Uploading the calibration offset values to the SCC

The Test Set will ask “Do you want to upload sig cal data to the SCC?” If you choose to upload the signaling calibration data, the software sends the GET SIG command to the base station.

Displaying the sig data

After you have uploaded the sig cal data to the SCC, the software will ask you “Do you want to display the sig data?” If you choose to view the sig calibration data, the software sends the DBO monitor command to the base station. The scan calibration data for both the SCC and the signalling receiver can be compared on the Test Set’s screen.

Troubleshooting

No troubleshooting information is provided for this test.

TEST_07 Manual switch & calibration aid

TEST_07 Manual switch & calibration aid is made up of several individual routines. The following routines are available:

- Go to the Laptop Emulator
- Set the HP 8921A for RX path calibration
- Read the spec. analyzer TX calibration
- Read the spec. analyzer RDM path calibration
- Tune the HP 8921A to a channel number
- Switch to receiver antenna #1
- Switch to receiver antenna #2

PRECAUTIONS

TEST SET SETTINGS WILL CHANGE

Running some of the routines in this test will automatically change the Test Set settings. Read each routine description to understand what changes will take place during execution.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

04_GN CITE configuration [0=A 1=B 2=C]
19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]

Pass/fail limits Used

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

Making Connections

This Test does not require any external equipment connections. Routines affect internal Test Set settings only.

Theory of Operation

This test comprises routines designed to simplify several procedures for setting up the Test Set.

Running the Test

Go to the Laptop Emulator

This routine will place the HP 8921A into laptop emulator mode by accessing *TEST_01 Laptop Emulator*. It will allow you to send commands to the base station and receive base station responses. This routine is described in more detail in *TEST_01 Laptop Emulator*.

Set the HP 8921A for RX path calibration

This routine automates a portion of the of the RX calibration procedure. *See step 4 on page 92*. When selected, this routine will set up the RF generator for calibration by automatically performing the following steps:

1. Press the PRESET key.
2. Choose **`RF GEN`** from the **`Choices:`** menu.
3. Select the **`RF Gen Freq`** field and enter 834.5 MHz.
4. Select the **`AFGen1 To`** field. Press the ON/OFF key. Off is displayed in the field.
5. Set **`Output Port`** field to **`Dupl`**.

   This selects the DUPLEX OUT port.
6. Select the RF Gen **`Amplitude`** field.
7. Enter an amplitude within the rated level of your power sensor.

Read the spec. analyzer TX path calibration

This routine automates a portion of the TX calibration procedure. *See step 9 on page 84*. When selected, this routine will set up the spectrum analyzer for calibration by automatically performing the following steps:

1. Press PRESET key.
2. Choose the **`SPEC ANAL`** from the **`To Screen:`** field.
3. Select the **`Center Freq`** field. Enter a value equal to your transmitter frequency.
4. Select the **`Span`** field. Enter 50 kHz.
5. Select the **`Main`** field and then choose **`Marker`**.
6. Select the **`Marker To`** field and the select **`Peak`**.
7. Select the **`Marker To`** field and then select **`Ref Level`**.
8. Select the **`Marker`** field and then choose **`Auxiliary`**.
9. Select the **`Sensitivity dB/div`** field. Choose **`2 dB/div`**.
10. Select **`Auxiliary`** and choose **`Marker`**.

11 Select the **Marker To** field and then select **Peak**.

12 Select the **Marker To** field and then select **Ref Level**.

13 Select **Marker** and then select **Main**.

14 Select **Ref Level**. Enter a value that is 8 dB higher than the previous value shown. For example, if the current RF level is 10 dB, you would enter 18 dB. Use the numeric keypad or knob. You can change the resolution of the reference level by pressing the INCR DATA FUNCTION KEYS.

15 Verify that the peak of the signal is close to the center of the spectrum analyzer's display.

16 Select **Main** and then select **Marker**.

17 Select **Marker to Peak**.

18 Record the **Marker Lv**l (in upper-right corner of CRT display) as POWER8921 in dBm.

Read the spec. analyzer RDM path calibration

This routine automates a portion of the URDM Module Level Correction factor procedure. *See step 8 on page 97*. When selected, this routine will automatically set up the Spectrum Analyzer for RDM calibration by performing the following steps:

1 Press the PRESET key.

2 Choose the **SPEC ANAL** from the **To Screen:** field.

3 Select the **Center Freq** field. Enter 3 MHz.

4 Select the **Span** field. Enter 50 kHz.

5 Select the **Main** field and then choose **Marker**.

6 Select the **Marker To** field and the select **Peak**.

7 Select the **Marker To** field and then select **Ref Level**.

8 Select the **Marker** field and then choose **Auxiliary**.

9 Select the **Sensitivity dB/div** field. Choose **2 dB/div**.

10 Select **Auxiliary** and choose **Marker**.

11 Select the **Marker To** field and then select **Peak**.

12 Select the **Marker To** field and then select **Ref Level**.

13 Select **Marker** and then select **Main**.

14 Select **Ref Level**. Enter a value that is 8 dB higher than the previous value shown. For example, if the current RF level is 10 dB, you would enter 18 dB. Use the numeric

keypad or knob. You can change the resolution of the reference level by pressing the INCR DATA FUNCTION KEYS.

15 Verify that the peak of the signal is close to the center of the spectrum analyzer display.

16 Select `Marker to Peak`.

17 Record the `Marker Lv`l (in upper-right corner of CRT display) as POWER8921 in dBm.

Tune the HP 8921A to a channel number

This routine can be used to set the Test Set's RF generator frequency and tune frequency. When selected, this routine will prompt you to enter the desired channel number and it will set up the RF Generator accordingly.

Measure cable loss

This routine will perform individual cable or path loss measurements. You will be required to perform the following steps:

1 Enter the start and stop frequencies for the frequency sweep.

2 Make the connections needed for the Test Set to establish a reference. You will need two 6-dB pads and a reference test cable. The software will provide a connection diagram.

3 Disconnect one end of the reference cable from the 6-dB pad. Insert the test cable or path equipment for determining loss. The Test Set will be generating a signal from its DUPLEX OUT port to the ANT IN port. Make sure you have connected your cables/ path equipment so that the signal is flowing in the same direction as it will be in the actual connections.

DIRECTION OF SIGNAL FLOW

When measuring cable loss, it is important that the equipment is set up the same as it would be at the cell site. For example, if you are determining the loss associated with a cable and duplexer connection, determine whether the signal first flows through the duplexer and then through the cable or the opposite. The signal should travel the same way through the cable loss equipment as it would in actual base station connections.

4 The `Average Cable Loss` measurement result should be used for your calibration factor.

Switch to receiver antenna #1

This routine is only available if you are working with a manual switch (HP 3488A or DUPLEXER/PAD) and you have entered the switch into External Devices screen.

Selecting **`Switch to receiver antenna #1`** will designate the Test Set’s DUPLEX OUT port for the location of signal output. Selecting to switch to receiver antenna #2 will designate the Test Set’s RF OUT port for the location of signal output.

This test can simplify path loss tests by allowing both receiver paths to be tested without having to change connections to the Test Set ports.

Switch to receiver antenna #2

See **`Switch to receiver antenna #1`** routine for a description.

Troubleshooting

No troubleshooting information is available for this test.

TEST_08 Voice channel manual test mode

TEST_08 Voice channel manual test mode is a collection of transceiver tests which can each be run independently. This test is particularly useful for:

- Running individual transceiver tests
- Troubleshooting test results

This test can be run in Ins-Opt or MANUAL mode.

PRECAUTIONS

TESTING MODE

This test can be run in Ins-Opt or MANUAL mode. Make sure you have set parameter *12_GN test state of [0=ins-opt 1=manual]* to reflect your testing state.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

02_GN auto exit adj [0=no xx=times in spec] [0-99]
03_GN CITE Average Voice Level [AVL] [dBm]
04_GN CITE configuration [0=A 1=B 2=C]
06_GN CITE setup [1=single 2=2up 3=3up]
07_ GN CITE VCC number unit #1 [number]
08_GN CITE VCC number for unit #2/3 [number]
12_GN test state of [0=ins-opt 1=manual]
14_GN voice ch sel if T1 [0=manual 1=auto]
19_RX path loss to antenna 1 [dB]
20_RX path loss to antenna 2 [dB]
25_TX output power for voice channel [Watts]
26_TX RF path loss for TX port [dB]
27_TX RF path loss for TX port 1 [dB]
28_TX RF path loss for TX port 2 [dB]
29_TX voice/signal pwr use [0=anz 1=pwrmtr]

Pass/fail limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

02_RX audio output level [dBm]
14_T1 total audio loss [dB]
19_TX data deviation [kHz]
20_TX DSAT deviation [Hz]
23_TX loopback level [dBm]
25_TX output power error for voice channel [%]
26_TX SAT deviation [kHz]
29_TX voice deviation [kHz]
30_TX voice deviation narrow mode [kHz]
31_TX voice limiting deviation [kHz]
32_TX voice limiting deviation narrow mode [kHz]
33_URDM frequency error [Hz]

Making Connections

See *chapter 8, "Making Equipment Connections" figure 66* , *figure 67* , and *figure 68* for equipment connection diagrams.

Theory of Operation

The measurements included in this test are identical to those in *TEST_04 Voice Transceiver*. See the “Testing Theory” portion of *TEST_04 Voice Transceiver* for specific descriptions on how each measurement is made.

Running the Test

Selecting a window

The test is comprised of five windows.

1 **`Conditions`**

This window contains your channel information including VCC, VOC, and SAT.

2 **`Parameters`**

This window contains the parameters that will be used in the test you have selected. You may edit these values if needed. These parameters are not associated with the parameters from the Test Parameter screen.

3 **`BS commands sent`**

This window is broken into two sections. First is a list of commands that were automatically sent to the base station when you selected the transceiver test. The second section contains a list of commands that you may choose to send to the base station. You may want to send one or a combination of these commands to help you during troubleshooting.

4 **`Measured Value`**

This window contains the measurement result. The title of this window will change to reflect the measurement you are making.

5 **`Measure`** This window contains:

- **`Done`**

  Select **`Done`** to indicate that you are done testing.

- **`Laptop emulator`**

  Select **`Laptop`** emulator to access *TEST_01 Laptop Emulator*. This can be used to send commands to the base station that are not provided in the **`BS commands sent`** window.

- **`Opt Channel`**

  Select **`Opt Channel`** for manual transceiver testing. This indicates that channel optimization testing is desired.

To change windows press the k5 **`(Next Window)`** User Key. The cursor will only move to the windows available for your chosen measurement.

Example of using this test to make an RX SINAD measurement.

After selecting **`Run Test`** from the TESTS screen:

1 Select **`Opt Channel`** from the **`Measure`** window.

This indicates that channel optimization testing is desired.

2 Select **`Test Set`** from the given list.

This indicates that the Test Set will be used to control the base station.

3 From the list of voice transceivers, select **`Voice Transceiver #00`**.

4 Make the connections to Voice Transceiver #00 as shown in the diagram on the Test Set’s screen.

5 Press `k2` **`(Continue)`**.

Notice that a list of transceiver tests has been added to the **`Measure`** window.

6 Select the **`RX SINAD`** measurement.

The software sets up the Test Set for making a RX SINAD measurement. The base station commands sent during set up can be seen in the **`BS commands sent`** window.

7 Let’s change the **`RF level (dBm)`** parameter to -122 dBm.

a Press `k5` **`(Next Wind)`** until the cursor is inside the **`Parameters`** window.

b Position the cursor in front of the **`RF level (dBm)`** field and press the knob.

c Enter -122 using the numeric key pad and press the knob again.

Notice that the reading in the **`RX SINAD`** window has changed. The software is continuously measuring and updating this value.

8 Now let's assume that the measured RX SINAD value was not what was expected. Place your cursor in the **`BS commands sent`** window.

We will use the **`Additional`** commands from this window to troubleshoot this value.

9 Position the cursor next to the **`DIV VOC 0 1`** command and press the knob.

Pressing the knob sends the command to the base station. This command will change the testing path to a different antenna (see your Motorola Base Station commands book for more details).

10 The measurement is complete. Press k1 **`(Stop Test)`**.

Troubleshooting

If the cursor will not move to the desired window

The software will only allow the cursor to move to windows associated with the specific measurement you have chosen. If the cursor will not access a window, the information provided by that window is not needed to make the measurement.

TEST_09 VSWR swept return loss

TEST_09 VSWR swept return loss measures the return loss of a cable or device with the spectrum analyzer in the swept mode.

This test is most commonly used to determine the return loss associated with an antenna.

PRECAUTIONS

TEST SIGNAL MAY CAUSE INTERFERENCE

A test signal is radiated during this test. If you are testing an antenna or a cable with an antenna attached to it, the radiated signal may interfere with another antenna nearby. Take the following precautions if necessary.

- Set parameter *31_VSWR tests RF level [dBm]* to the minimal level that will still provide good signal resolution and test results.
- Set your sweep frequency range carefully. The software will give you the opportunity to change this sweep range before testing begins.
- If you are concerned with interference to nearby antennas, consider running *TEST_10 VSWR discrete channel return loss*. This test allows testing to take place at discrete channel frequencies or at an offset from the channel frequency and reduces the chance of interference.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

31_VSWR tests RF level [dBm]

Pass/fail limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

36_VSWR swept return loss [dB]

Making Connections

See *"TEST_09 VSWR swept return loss Equipment Connections" on page 171* for connection diagrams.

This test requires a SWR bridge and a 6-dB pad. The pad is used to improve mismatch between the SWR bridge and the antenna port on the Test Set.

Theory of Operation

The software instructs you to make connections using a cable and SWR bridge so it can make a reference measurement. The Test Set measures the loss and stores it as reference value. Next, the software prompts you to connect your device-under-test to the SWR bridge's output port. The Test Set generates a signal at the level indicated by parameter *31_VSWR tests RF level [dBm]* and measures the loss over the start and stop frequency span you entered. The software compensates for reference losses and displays the loss of your device-under-test. Spectrum analyzer and tracking generator settings depend on parameters and values entered.

Running the Test

Viewing test results on the Test Set's screen

The test result displayed on the Test Set's screen will be the worst case return loss in the sweep.

Viewing return loss trace on the spectrum analyzer

In addition to the return loss value displayed at the end of this test, you may also view a trace of the signal. To view the trace, follow the steps below.

1. When the screen asking "Do you want to test another device at the same frequency?" appears, press the CANCEL key.
2. Press the TESTS key. This will take you to the main test screen.
3. Select **`SPEC ANAL`** from the **`To Screen`** menu in the lower-right corner of the display.
4. The spectrum analyzer displays your return loss results.

Calculating VSWR from the return loss measurement

VSWR can be calculated using your return loss measurement (RL) in the following equation:

$$\mathrm{VSWR} = \frac{1 + 10^{\frac{-\mathrm{RL}}{20}}}{1 - 10^{\frac{-\mathrm{RL}}{20}}}$$

VSWR is often stated as a ratio, for example 1.3:1 or “one point three to one.” The first number is the VSWR number calculated previously and the second number is always one. The following table contains some of the values from the calculation.

Table 17 **Return Loss (dB) to VSWR**

Return Loss (dB)	**0**	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
VSWR	infinite	8.7	4.4	3.0	2.3	1.92	1.67	1.5	1.38	1.29	1.22
Return Loss (dB)	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**38**	**40**
VSWR	1.22	1.17	1.13	1.11	1.08	1.07	1.05	1.04	1.03	1.03	1.02

Estimating Antenna Loss from Return Loss Measurement

If you are measuring the return loss of an antenna connected to a cable, you can approximate the loss of the antenna if you know the loss of the cable it is connected to. The approximate antenna loss equals the return loss minus twice the cable loss. For example, if this test measures a return loss of 24 dB and the connected cable has a known loss of 2 dB the estimated loss of the antenna is 20 dB.

Troubleshooting

If you experience interference on nearby antennas

If you are concerned with interference to nearby antennas, consider running *TEST_10 VSWR discrete channel return loss*. This test allows testing to take place at discrete channel frequencies or at an offset from the channel frequency and reduces the chance of interference

TEST_10 VSWR discrete channel return loss

TEST_10 VSWR discrete channel return loss measures the return loss for discrete frequency channels. This test reduces the chance of interference by testing only the channels and offset you specify.

This test should be used instead of *TEST_09 VSWR swept return loss* when there is a chance that a full frequency sweep of the band may cause interference with nearby antennas.

PRECAUTIONS

No precautions are provided for this test.

Parameters Used

Enter values for the parameters listed below. These values are used by the software to determine your base station configuration and to optimize the program for your application. You can find specific descriptions for each of the parameters listed below in *chapter 12, "Parameter Descriptions"*.

31_VSWR tests RF level [dBm]

Pass/fail limits Used

Enter values for the following pass/fail limits. These values are used by the software to determine the pass or fail status of a test. You can find specific information for each of the pass/fail limits listed below in *chapter 13, "Pass/fail Limit Descriptions"*.

35_VSWR discrete return loss [dB]

Making Connections

See *"TEST_10 VSWR discrete channel return loss Equipment Connections" on page 172* for connection diagrams.

This test requires a SWR bridge and a 6-dB pad. The pad is used to improve mismatch between the SWR bridge and the antenna port on the Test Set.

Theory of Operation

The software prompts you to enter the frequency band for testing, either TX or RX, the frequency offset, and the frequency step. The software instructs you to make connections using a cable and SWR bridge for a reference measurement. The Test Set measures the loss and stores it as reference value. Next, the software prompts you to connect your device-under-test to the SWR bridge’s output port. The Test Set generates a signal at your specified channels with the given offset and measures the loss. Spectrum analyzer and tracking generator settings depend on parameters and values entered.

Running the Test

Setting up Testing Channels

The following is an example of how the software is used to set up testing channels.

1. `Enter test band [0=RX 1=TX]?` Enter 0.

   This indicates that you will be testing the receive frequencies.

2. `Enter the offset frequency in kHz?` Enter 15 kHz.

   Testing will occur at an offset of 15 kHz from the center frequency of each channel.

3. `Enter the start channel?` Enter 334.

   This establishes the first channel number in the testing range.

4. `Enter the stop channel?` Enter 666.

   This establishes the last channel number in the testing range.

5. `Enter the step channel?` Enter 100.

   This establishes the step increment within your testing range.

6. Steps one through five establish the following channels for testing: 334, 434, 534, 634, 666, + 15 kHz at each channel.

If you are measuring the return loss of an antenna connected to a cable, you can approximate the loss of the antenna if you know the loss of the cable it is connected to. The approximate antenna loss equals the return loss minus twice the cable loss. For example, if this test measures a return loss of 24 dB and the connected cable has a known loss of 2 dB the estimated loss of the antenna is 20 dB.

Troubleshooting

No Troubleshooting information is provided for this test.

TEST_11 VSWR vs distance (cable fault)

TEST_11 VSWR vs distance (cable fault) measures the loss of a transmission line and displays the loss as a function of distance down the line.

This test is typically used to check the condition of a cable that is not readily accessible. For example, a cable connected to an antenna on top of a tower.

PRECAUTIONS

TEST SIGNAL CAN CAUSE INTERFERENCE

A test signal is radiated during this test. Verify that the signal used for the test cannot result in interference to another antenna. The software reduces the signal level when measurements are not being performed.

Parameters Used

There are no parameters used during this test.

Pass/fail limits Used

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

Making Connections

See *"TEST_11 VSWR vs distance (cable fault) Equipment Connections" on page 173* for connection diagrams.

Theory of Operation

A frequency swept signal from the DUPLEX OUT port is applied through a resistive power divider to the cable-under-test. Signals reflected from faults return to the power divider where they are combined with the original DUPLEX OUT signal. This combined signal is returned to the ANT IN port. The changing interference of the forward and reflected signals, over the swept frequency band, contains information about the distance to one or more faults. The software uses a Fast Fourier Transform (FFT) to convert the frequency domain into the distance domain.

Running the Test

Selecting Cable Type and Length

1. This software is designed to test Heliax cables. After the test begins, a list will appear with three different Heliax cable mediums of varying thickness. Use the knob to select the cable type you are testing.
2. **`Enter the cable length unit [0=feet 1=meter]?`** Specify what units your cable length is measured in. Enter the number corresponding to the unit [0=feet 1=meter]. The software will use this unit of measurement to interpret the cable length you enter and to display cable fault distances.
3. **`Enter the cable length?`** To obtain the greatest accuracy, enter a length slightly longer than the actual cable length (approximately 1.5 times greater). Because of the return loss of the antenna or device, you may see a high mismatch at the end of the actual cable. Extending your cable length should make this mismatch more visible.

The distance displayed on the CRT is the physical distance to the fault including correction for the velocity factor of the cable.

Graphical display of mismatch vs. distance

At the completion of the test, a graphical display of mismatch versus distance down the line is shown. High peaks represent areas of high relative mismatch.

Numerical display of mismatch vs. distance

Press the k3 **`(DISP DATA)`** key. Numeric data for the six largest relative mismatch levels and distance at which the they occur is displayed. Each data point is shown on a scale from 0 to 1. This number represents the likelihood of a fault. Values less than 0.1 are typically due to noise. See "Multiple faults along a cable" on page 241 for more information.

The largest mismatch reading is most likely the location of a cable fault. Other numeric data points, particularly if they are farther down the line from a point of high relative mismatch, can be ignored.

Accuracy of cable fault results

Measurements of the cable fault location can accurately be made on low-loss cable up to 1,000 feet long and on high-loss cables up to 300 feet long.

Resolution of the fault location is approximately 0.4 feet for cable lengths up to 100 feet and then linearly increases to 4 feet for a 1,000 foot cable.

Typical accuracy is approximately ± 1 foot for a fault located up to 100 feet away. The typical accuracy linearly increases to 4 feet for a 1,000 foot cable.

Troubleshooting

Multiple faults along a cable

Large fault locations cause a significant amount of the original signal to be reflected back toward the Test Set. These reflections can echo back and forth between the Test Set and the large fault and result in false fault readings. If your cable shows a large fault followed by several smaller ones, the smaller ones may be a result of these reflections. Fix the large fault and repeat this test to determine validity of smaller fault readings.

The Test Set looks at this signal with a scalar network analyzer. With a scalar network analyzer, only the magnitude is analyzed, and as a result you get nonlinear system responses. These responses may show up as false faults. For example, if the test detects two large faults (over 6 dB) 5 feet apart, several smaller faults also 5 feet apart may appear in test results. These smaller faults are most likely a result of the nonlinear system response. Fix the larger faults and repeat this test to determine the validity of the smaller fault readings.

12

Parameter Descriptions

What's included in this chapter:

- Introduction
- Parameter Descriptions

Introduction

This chapter provides a numerical listing of all the parameters provided in the HP 11807B Option 070 Software package for the Motorola Micro C·I·T·E Base Station. Parameters are used by the software to optimize the program for your specific application.

See *"Editing the Test Parameters" on page 139* for information on editing parameter values.

Abbreviation Used

The following abbreviations are used throughout this chapter:

- GN=General
- URDM=Universal Reference Distribution Module
- RX=Receiver
- TX=Transmitter
- RX/TX=Receiver or Transmitter
- SC=Scan
- VSWR=Voltage Standing Wave Ratio
- ZZZ is used to place the demo mode parameter at the end of the list

Parameter Descriptions

Parameter_01

01_GN always cal sig/scan [0=no 1=yes]

This parameter is used to determine when the calibration data is sent to the base station.

> **`0=no`** When this parameter is set to zero and the SIG or scan receiver fails to meet its RSSI level pass/fail limits the software asks “Do you want to send calibration data?” You can choose whether or not to send the calibration data by pressing the “Yes” or “No” user keys. Also when this parameter is set to zero, the software will provide the “All Cal” user key during calibration. Pressing the “All Cal” user key instructs the software to automatically perform calibration on all signaling or scan transceivers from that point in the test on. After pressing the “All Cal” user key, even though the software is automatically sending calibration data to the signaling or scan transceiver, your entry to this parameter still remains a zero.
>
> **`1=yes`** When this parameter is set to one and the SIG or scan receiver fails to meet its RSSI level pass/fail limits the software automatically sends calibration data to the base station.

When calibration is performed, the Test Set sends the CAL SIG 71 or Cal SCA 71command to the signaling or scan transceiver.

Parameter_02

02_GN auto exit adj [0=no xx=times in spec] [0-99]

This parameter determines whether the software will automatically exit the meter adjustment or wait for you to press the k1 (**`Take It`**) key. This parameter applies only to tests using the adjustment meter.

> **`0=no`** Setting this parameter to zero will require that you accept the measurement result when it is within its pass/fail limits. To accept a measurement result, press k1 **`(Take It)`** when the needle reading on the meter is acceptable and within your pass/fail limits.
>
> **`xx=times in spec`** Entering a number between 1 and 99 sets the number of times the meter reading must fall between your pass/fail limits. When the meter needle falls within your pass/fail limits xx number of times, the software will automatically exit the meter adjustment screen.

Parameter_03

03_GN CITE Average Voice Level [AVL] [dBm]

This parameter should be set to the cell site's average voice level (typically -18 dBm). Obtain your average voice level from the site documentation Test Level Plan.

Parameter_04

04_GN CITE configuration [0=A 1=B 2=C]

This parameter notifies the software of the type of cell site you are working with.

`0=A` Setting this parameter to zero indicates that you are using Motorola base station configuration A.

`1=B` Setting this parameter to one indicates that you are using Motorola base station configuration B.

`2=C` Setting this parameter to two indicates that you are using Motorola base station configuration C.

Parameter_05

05_GN CITE has LNA [0=no 1=yes]

This parameter is used to notify the software that Low Noise Amplifiers are installed at the base station's receiver inputs.

`0=no` Enter zero if LNAs are not installed.

`1=yes` Enter one if LNAs are installed.

Parameter_06

06_GN CITE setup [1=single 2=2up 3=3up]

This parameter should be set to reflect the number of bays in your general cell site setup.

1=single One bay.

2=2 up Two bays.

3=3 up Three bays.

Parameter_07

07_ GN CITE VCC number unit #1 [number]

This parameter should be set to equal the VCC number of the base station under test. If you are working with a 2up or 3up configuration this parameter should be set to equal the VCC number of unit #1.

Parameter_08

08_GN CITE VCC number for unit #2/3 [number]

This parameter is used only when working with a 2up or 3up base station configuration. This parameter should be set to equal the VCC number of the unit in your base station configuration.

Parameter_09

09_GN CITE [0=non-wireline 1=wireline]

This parameter determines which scan measurement channels are to be tested. Set this parameter to reflect the type of base-station-under-test. The specific scan measurement channels for wireline and non-wireline sites are listed in your optimization manual.

Parameter_10

10_GN perform adj [0=no 1=on fail 2=always]

This parameter determines under what conditions the adjustment meter appears and under what conditions the re-measurement option is available.

`0=no` Setting this parameter to zero sets the software so that the adjustment meter and re-measure feature never appears.

`1=on fail` Setting this parameter to one prompts the software to display an adjustment meter when a measurement that can be adjusted has failed to meet its pass/fail limit. After the adjustment meter is exited, the Test Set will ask “Do you want to re-measure?” Use the User Keys “Yes” or “No” to respond.

`2=always` Setting this parameter to two prompts the software to display an adjustment meter regardless of whether the measurement has passed or failed its pass/fail limit. After the adjustment meter is exited, the Test Set will ask “Do you want to re-measure?” Use the User Keys “Yes” or “No” to respond.

Parameter_11

11_GN perform extended tests [0=no 1=yes]

`0=no` Enter zero if no extended testing is needed.

`1=yes` Enter one to perform the following list of tests in addition to tests normally performed.

RX audio distortion
RX hum & noise
RX expandor response
RX audio response
TX audio distortion
TX hum & noise
TX compandor track error
TX audio frequency response

Parameter_12

12_GN test state of [0=ins-opt 1=manual]

This parameter notifies the software of the base station’s mode. Set this parameter to reflect the mode of your base station during testing.

`0=ins-opt` Enter zero if you will be testing while the base station is in the in-service optimization state.

`1=manual` Enter one if you will be testing while the base station is out-of-service and in MANUAL mode.

Parameter_13

13_GN verify all selections [0=no 1=yes]

This parameter can be used in any test. This parameter asks for a second verification after any selections are made. It is designed to prevent you from mistakenly altering the operation of the base station. This is recommended for first time users as a precautionary step.

`0=no` Enter zero if verification is not needed.

`1=yes` Enter one if you would like the software to provide a verification prompt after each selection you make.

Parameter_14

14_GN voice ch sel if T1 [0=manual 1=auto]

This parameter is only used for testing configurations using an external T1 module. Unless you have entered a T1 module into the External Devices screen to indicate that you are testing with a T1 module, the software will ignore this parameter.

`0=manual` Entering zero indicates that you would like to manually select a transceiver for testing. When this parameter is set to zero, the software will prompt you to enter a transceiver for testing.

`1=auto` Entering one indicates that you would like transceivers to automatically be selected using the T1 module.

Parameter_15

15_RX level for scanner DSAT detector [dBm]

This parameter is used to set the signal generator level that is applied to the scan receiver during DSAT tests.

Parameter_16

16_RX level for scanner SAT detector [dBm]

This parameter is used to set the signal generator level that is applied to the scan receiver during SAT tests.

Parameter_17

17_RX level for voice DSAT/DST detector [dBm]

This parameter is used to set the signal generator level that is applied to the voice receiver during DSAT and DST tests.

Parameter_18

18_RX level for voice SAT/ST detector [dBm]

This parameter is used to set the signal generator level that is applied to the voice receiver during SAT tests and ST tests.

Parameter_19

19_RX path loss to antenna 1 [dB]

This parameter is used to compensate for the systems losses from cables and the equipment inaccuracies in the path from the Test Set to the base station’s RX1antenna port. Enter the loss value determined for your path during the calibration procedure. See *"Determining RX Path Loss" on page 85* for more information on determining this parameter value.

Parameter_20

20_RX path loss to antenna 2 [dB]

This parameter is used to compensate for the systems losses from cables and the equipment inaccuracies in the path from the Test Set to the base station’s RX2 antenna port. Enter the loss value determined for your path during the calibration procedure. See *"Determining RX Path Loss" on page 85* for more information on determining this parameter value.

Parameter_21

21_RX scan/sig RSSI output [0=dBm 1=hex]

This parameter determines what units-of-measurement the RX scan and sig RSSI output will be displayed in.

`0=dBm` Enter zero if you want measurement results to be displayed in dBm.

`1=hex` Enter one if you want measurement results to be displayed in hexadecimal.

Parameter_22

22_RX/TX audio freq response step [.01-2.7] [kHz]

This value determines the audio frequency step that occurs as the frequency of the de-emphasis or pre-emphasis is measured. The audio frequency response of the two endpoints, 300 Hz and 3 kHz, is always measured.

Parameter_23

23_SC skip items in scan test [0=no 1=yes]

This parameter allows you to set up testing so certain scan receiver tests can be skipped.

`0=no` Enter zero if you do not want to skip certain scanning tests.

`1=yes` Enter one if you would like the option to skip certain scanning tests. The software will provide an additional user key that can be pressed during testing to skip the current measurement. Skip keys are available for sensitivity and SAT measurements. For example, a `k3` (**`Skip SENS`**) key will appear during the sensitivity portion of the test. Press `k3 (`**`Skip SENS`**`)` to skip the sensitivity measurement.

Parameter_24

24_TX output power for signaling unit [Watts]

This parameter defines the rated RF power level of the signaling transmitter. Enter the TX output power for your signaling transceiver.

Parameter_25

25_TX output power for voice channel [Watts]

This parameter defines the rated RF power level of the voice transmitter. Enter the TX output power for your voice transceiver.

Parameter_26

26_TX RF path loss for TX port [dB]

This parameter is used to compensate for the system losses from cables and equipment inaccuracies in the path from the Test Set to the base station’s TX antenna port. Enter the loss value determined for your path during the calibration procedure. See *"Determining TX Path Loss" on page 76* for more information on determining this parameter value.

Parameter_27

27_TX RF path loss for TX port 1 [dB]

(Configuration B or C base station only)

This parameter is used to compensate for the system losses from cables and equipment inaccuracies in the path from the Test Set to the base station’s TX1 antenna port. Enter the loss value determined for your path during the calibration procedure. See *"Determining TX Path Loss" on page 76* for more information on determining this parameter value.

Parameter_28

28_TX RF path loss for TX port 2 [dB]

(Configuration C base station only)

This parameter is used to compensate for the system losses from cables and equipment inaccuracies in the path from the Test Set to the base station’s TX2 antenna port. Enter the loss value determined for your path during the calibration procedure. See *"Determining TX Path Loss" on page 76* for more information on determining this parameter value.

Parameter_29

29_TX voice/signal pwr use [0=anz 1=pwrmtr]

This parameter determines whether the RF power output of the base station is measured using the Test Set's spectrum analyzer or power meter. Use the following criteria determine how to set this parameter:

Set this parameter to **`0=anz`**

- if there are multiple high-level signals present
- if you are testing in the In-Service Optimization mode.

Set this parameter to **`1-pwrmtr`**

- for the most accurate measurement of one high-level signal.
- if you are testing in the MANUAL mode.

If using the power meter, you will need to verify that adequate power is applied to the Test Set's RF IN/OUT port. The power applied must be greater than 17 dBm.

Parameter_30

30_URDM level correction factor [dB]

This parameter is used to compensate for Test Set inaccuracies. Enter the correction factor determined during the calibration procedure. See *"Determining the URDM Correction Factor" on page 96* for more information on determining this correction factor.

Parameter_31

31_VSWR tests RF level [dBm]

This parameters sets the value of the RF level applied to the bridge during VSWR measurements.

If you are testing an antenna, an RF signal will be generated and may cause interference. You may want to minimize this level to reduce the chance of interference.

Parameter_32

32_ZZZZ Test mode [0=normal 1=demo]

This parameter determines whether the software will run in normal or demonstration mode.

`0=normal` Enter zero for normal testing conditions.

`1=demo` Enter one if you are using the software for training or demonstration purposes. Setting this parameter to 1 allows the software to bypass actual communication with the base station and perform tests using dummy values.

13

Pass/fail Limit Descriptions

What’s included in this chapter:

- Introduction
- Pass/fail Limit Descriptions

Introduction

This chapter provides a numerical listing of all the pass/fail limits provided in the HP 11807B Option 070 Software package for the Motorola Micro C·I·T·E Base Station. Pass/fail limits contain an upper and lower limit. The software compares each measurement result with its upper and lower pass/fail limit to verify that the measurement result is within and allowable range. Your entries for each pass/fail limit should be derived from EIA and Motorola standards.

See *"Editing the Pass/fail Limits" on page 141* for information on editing pass/fail limit values.

Abbreviations Used

The following abbreviations are used throughout this chapter:

- URDM=Universal Reference Distribution Module
- RX=Receiver
- TX=Transmitter
- VSWR=Voltage Standing Wave Ratio
- T1=T1 module

Pass/fail Limit Descriptions

Pass/fail limit_01

01_RX audio distortion [%]

This pass/fail limit sets the maximum acceptable distortion of a 1-kHz rate sine wave from the receiver’s audio output.

Pass/fail limit_02

02_RX audio output level [dBm]

This pass/fail limit sets the maximum and minimum receiver output power acceptable. This is the power level that results from an input signal modulated with a standard deviation at a 1 kHz rate. The standard deviation is 2.9 kHz (AMPS) and 1.5 kHz (NAMPS). The receiver’s output power is based on the voltage applied to a 600-Ω load.

Pass/fail limit_03

03_RX response dev from -6 dB/oct R1 [dB]

This pass/fail limit sets the acceptable level variation of the receiver audio output compared to the expected response. The ideal frequency response should result in an output level reducing by 6 dB when the audio frequency is doubled. This pass/fail limit sets the deviation (in dB) from this ideal response for audio frequencies in the range of 0.4 to 2.4 kHz. The frequency response is checked from 0.3 to 3 kHz.

Pass/fail limit_04

04_RX response dev from -6 dB/oct R2 [dB]

This pass/fail limit sets the acceptable level variation of the audio output compared to the expected response. The ideal frequency response should result in an output level reducing by 6 dB when the audio frequency is doubled. This pass/fail limit sets the deviation (in dB), from this ideal response below 0.4 kHz and above 2.4 kHz. The frequency response is checked from 0.3 to 3 kHz.

Pass/fail limit_05

05_RX expandor track error <0 dB [dB]

The expandor increases the output level by 2 dB for every 1 dB increase in input level. This pass/fail limit sets the acceptable deviation from the desired characteristic for levels less than a 2.9 kHz (AMPS) or 1.5 kHz (NAMPS) reference deviation.

Pass/fail limit_06

06_RX expandor track error >0 dB [dB]

The expandor increases the output level by 2 dB for every 1 dB increase in input level. This pass/fail limit sets the acceptable deviation from the desired characteristic for levels greater than a 2.9 kHz (AMPS) or 1.5 kHz (NAMPS) reference deviation.

Pass/fail limit_07

07_RX hum and noise [dB]

This pass/fail limit sets the minimum acceptable signal level ratio of a 1 kHz sine wave output and the noise that is present when the signal generator is not modulated.

Pass/fail limit_08

08_RX scan and sig calibration reading [dBm]

This pass/fail limit sets the level that the reported RSSI level is compared to during the calibration of a scan or SIG receiver. For example, if the upper and lower limits are set to -90 dBm, the test will fail if there is any offset from -90 dBm.

Pass/fail limit_09

09_RX scan and sig linearity error [dBm]

This pass/fail limit sets the maximum acceptable deviation between the level that the scan or SIG receiver reports and the level applied to the scan receiver by the Test Set.

Pass/fail limit_10

10_RX sensitivity with LNA [dBm]

This pass/fail limit sets the signal generator level that is applied to an AMPS receiver with a Low Noise Amplifier during SINAD tests. The upper limit is used to determine the generator’s level.

Pass/fail limit_11

11_RX sensitivity without LNA [dBm]

This pass/fail limit sets the signal generator level that is applied to an AMPS receiver without a Low Noise Amplifier during SINAD tests. The upper limit is used to determine the generator’s level.

Pass/fail limit_12

12_RX sensitivity without LNA narrow mode [dBm]

This pass/fail limit sets the signal generator level that is applied to an NAMPS receiver during SINAD tests. The upper limit is used to determine the generator’s level.

Pass/fail limit_13

13_RX SINAD at sensitivity spec [dB]

This pass/fail limit sets the SINAD level used during sensitivity tests. If the measured SINAD is greater than the value of this pass/fail limit, the RX sensitivity test will pass.

Pass/fail limit_14

14_T1 total audio loss [dB]

This parameter is only used if you are testing with an external T1 module.

This pass/fail limits sets the limits for the losses associated with testing using the T1 module. The path loss value includes internal T1 losses, external T1 losses, and connector cables losses.

Pass/fail limit_15

15_TX audio distortion [%]

This is the pass/fail limit of the distortion of the transmitter's modulation at a 1 kHz rate.

Pass/fail limit_16

16_TX audio response dev from 6 dB/oct [dB]

This pass/fail limit sets the maximum acceptable level variation of the modulation on the transmitter signal compared to the expected response. The ideal frequency response should result in a deviation increasing by 6 dB when the frequency is doubled. This pass/fail limit sets the deviation in dB from this ideal response. The frequency response is checked from 0.3 to 3 kHz.

Pass/fail limit_17

17_TX compressor track error <0 dB [dB]

The compressor increases the output level by 1 dB for every 2 dB increase in input level. This pass/fail limit sets the acceptable deviation from the desired characteristic for levels less than a 2.9 kHz (AMPS) or 1.5 kHz (NAMPS) reference deviation.

Pass/fail limit_18

18_TX compressor track error >0 dB [dB]

The compressor increases the output level by 1 dB for every 2 dB increase in input level. This pass/fail limit sets the acceptable deviation from the desired characteristic for levels less than a 2.9 kHz (AMPS) or 1.5 kHz (NAMPS) reference deviation.

Pass/fail limit_19

19_TX data deviation [kHz]

This pass/fail limit sets the maximum and minimum acceptable peak frequency deviation of the data signal.

Pass/fail limit_20

20_TX DSAT deviation [Hz]

This pass/fail limit sets the maximum and minimum acceptable peak frequency deviation of the DSAT signal in an NAMPS transmitter.

Pass/fail limit_21

21_TX FM hum and noise [dB]

This pass/fail limit sets the minimum acceptable ratio of the level of a signal modulated with a 1 kHz tone to the level of the noise that is present when the transmitter is not modulated.

Pass/fail limit_22

22_TX frequency error [ppm]

This pass/fail limit sets the acceptable ratio, in parts per million (ppm), of the difference between the measured and assigned transmitter frequencies and the assigned transmitter frequency. The error will usually be contributed by the URDM.

Pass/fail limit_23

23_TX loopback level [dBm]

This pass/fail limit of sets the acceptable signal power level measured at the base station’s EQUIP RCV jack when the Average Voice Level is applied to the base station’s EQUIP XMT jack.

Pass/fail limit_24

24_TX output power error for signaling unit [%]

This pass/fail limit sets the maximum acceptable difference in the measured power level of a signaling transmitter and the nominal output power. The nominal output power is entered into the software as a parameter *24_TX output power for signaling unit [Watts]*.

Pass/fail limit_25

25_TX output power error for voice channel [%]

This pass/fail limit sets the maximum acceptable difference in the measured power of a voice transmitter and the nominal output power. The nominal power is entered into the software as parameter *25_TX output power error for voice channel [%]*.

Pass/fail limit_26

26_TX SAT deviation [kHz]

This pass/fail limit sets the maximum and minimum acceptable frequency deviation of the SAT tone.

Pass/fail limit_27

27_TX SAT frequency error [Hz]

This pass/fail limit sets the maximum acceptable frequency error of the 5970 Hz, 6000 Hz, or 6030 Hz Supervisory Audio Tones.

Pass/fail limit_28

28_TX test point JK output [dBm]

This pass/fail limit is not used in this software version.

Pass/fail limit_29

29_TX voice deviation [kHz]

This pass/fail limit sets the maximum and minimum acceptable peak frequency deviation that results when the Average Voice Level is applied to the transmitter. The modulation signal is a 1 kHz tone.

Pass/fail limit_30

30_TX voice deviation narrow mode [kHz]

This pass/fail limit sets the maximum and minimum acceptable peak frequency deviation that results when the Average Voice Level is applied to the transmitter. The modulation signal is a 1 kHz tone.

Pass/fail limit_31

31_TX voice limiting deviation [kHz]

This pass/fail limit sets the maximum acceptable frequency deviation of an AMPS transmitter caused by a high-level modulating signal.

Pass/fail limit_32

32_TX voice limiting deviation narrow mode [kHz]

This pass/fail limit sets the maximum acceptable frequency deviation of an NAMPS transmitter caused by a high-level modulating signal.

Pass/fail limit_33

33_URDM frequency error [Hz]

This is pass/fail limits is used in *TEST_02 URDM Frequency/Level* to set the acceptable limits for URDM frequency error. Check your Motorola Micro C·I·T·E Optimization manual for the allowablefrequency error.

Pass/fail limit_34

34_URDM output level [dBm]

This pass/fail limit is used in *TEST_02 URDM Frequency/Level* to set the acceptable limits for the measured URDM level. Check your Motorola Micro C·I·T·E Optimization manual for the level limits.

Pass/fail limit_35

35_VSWR discrete return loss [dB]

This pass/fail limit sets the acceptable level of the return loss for a device tested at discrete frequencies.

Pass/fail limit_36

36_VSWR swept return loss [dB]

This pass/fail limit sets the acceptable level of the return loss for a device tested over a range of frequencies.

14

Reference

What’s included in this chapter:

- Memory Cards
- RAM Disk
- Sending Characters to the Test Set Using a Terminal or PC
- Sending Escape Sequences to a Printer
- Vendor Information

Memory Cards

Memory cards are inserted into the slot on the Test Set’s front panel. The memory card is powered by the Test Set while it is inserted. Arrows printed on the memory card and Test Set’s front panel indicate the direction and orientation of card insertion.

Memory cards are used to store or retrieve the following:

- HP 11807B Option 070 software code
- An HP-supplied Procedure, containing:
  - A default testing order
  - Default parameter values
  - Default pass/fail limits
- A Library file
- Procedures you make, optimized for your application
- Data collection files

Two types of memory cards

- Static Random Access Memory (SRAM)
- One Time Programmable (OTP)

SRAM cards have read and write capability. Once programmed, OTP cards have read-only capability.

Software Memory Cards

The HP 11807B Option 070 Software package is normally supplied on a One Time Programmable memory card (HP part number 11807-10036).

ACCIDENTALLY ERASING SOFTWARE

If your software is resident on an SRAM card, it is possible to delete it from the card. To prevent the loss of your program, check the write protect switch on the SRAM memory card and verify that the card is write protected. Leave the switch set toward the outside of the card except while you are writing to it.

The software memory card can be removed after the program is loaded into the Test Set’s memory. The program will remain in memory after a power-down/ power-up cycle.

SRAM Memory Cards

A Static Random Access Memory Card (SRAM) supplied in this software package can be used to store test results and procedures you make. The following parts can be used.

Table 18 **SRAM Memory Card Part Numbers**

Memory	Part Number
32 kilobytes	HP 85700A
128 kilobytes	HP 85702A
256 kilobytes	HP 85704A
512 kilobytes	HP 85705A

The SRAM memory card must be initialized before its first use. See *"Initializing a Memory Card" on page 264*.

SRAM MEMORY CARD BATTERY LIFE

The Static Random Access Memory cards use a battery to retain data while the card is not plugged into a powered-up Test Set. The lifetime of the battery depends on the memory card size and the average temperature in its environment. See the next paragraph.

SRAM memory cards use a lithium battery (part number CR 2016 or HP part number 1420-0383). Programs and data will be retained for over one year if the memory card is stored at 25° C. The memory card is powered by the Test Set while it is inserted. Replace the battery while the memory card is inserted into a powered-up Test Set. To retain data and procedures, the battery should be replaced annually. If you are storing memory cards in a warm environment, you should replace the battery more often.

A procedure to replace the battery is described in the *HP 8921A User’s Guide*.

NL

Batterij niet
weggooien, maar
inleveren als KCA.

Memory Card Storage Space

A record is 256 bytes. When saved to a memory card, a procedure file uses approximately 16 records (16× 256=4,096 bytes) and a library file uses approximately 22-35 records (22×256=5,632 bytes) of memory space. To verify the number of records for your library access the IBASIC Controller screen. Position the cursor to the command line in the upper-left corner of the Test Set's screen and select it. Using the cursor control knob, type **`CAT`** and then select **`Done`**. A list of the files and their memory allocations will appear on the Test Set's screen.

Each memory card that is used for customizing the software must contain a library file. Therefore, every card will need approximately 6,000-9,00 bytes of memory space for your library file (depending on the size) and approximately 4,100 bytes for each procedure.

To calculate the memory space needed:

Memory space = bytes of library file + (4,100bytes × number of procedures)

Let's say you are testing ten cell sites and the size of your library file is 22 records (approximately 4,100 bytes). You will probably need ten procedures (one for each site). Using the equation above you will need 47 kbytes of memory space. Therefore, a 128 kilobyte card is sufficient.

The storage space you need for data collection depends on the number of test results that are saved. You will need approximately 4 kilobytes per page of test results that you save. A page of test results is about 57 lines of CRT or printer output.

The storage space of smaller SRAM cards can be quickly used. If you are collecting large quantities of data, data collection using a PC or printer may be preferable.

Initializing a Memory Card

The format of your memory card must match the format entered into the External Devices screen under your data collection entry.

To initialize a memory card using the Save/Delete Procedure Screen:

(Firmware revision levels A.14.00 and above only)

1. Press the TESTS key.
2. Select **`Save/Delete Procedure`** from the **`CUSTOMIZE TEST PROCEDURE`** list.
3. Insert the SRAM card in the slot on the front panel. (Make sure the switch on the card is not in the write-protected position).

4. Press k3 **(Init Card)**.
5. Press the YES on the Test Set’s front panel to continue.

If you have firmware below revision A.14.00, you must use on of the following two methods to initialize a memory card. If you have a terminal emulator attached to the Test Set, you can type the initialize command into the IBASIC command line. A second way to initialize a card is to run the ROM program RAM_MNG.

To initialize an SRAM card using IBASIC

1. Press the TESTS key.
2. Select **IBASIC Cntrl** from the **SET UP TEST SET** list (or **IBASIC** from the **Test Function** field).
3. Position the cursor to the IBASIC command line and select it.
4. Using the list of characters under the **Choices** menu, enter the following IBASIC command:

For LIF format:

```
INITIALIZE “:INTERNAL”
```

For DOS format:

```
INITIALIZE “DOS:INTERNAL”
```

To initialize an SRAM memory card using RAM_MNG

1. Press the TESTS key.
2. Position the cursor to the **Select Procedure Location** (or **Location**) field and select it.
3. From the **Choices** menu, select **ROM**.
4. Position the cursor to the **Select Procedure Filename** (or **Procedure**) field and select it.
5. From the **Choices** menu, select **IB_UTIL** (or **RAM_MNG**).
6. Press k1 **(Run Test)**.
7. Follow the displayed instructions.

NOTE: Loading RAM_MNG will delete any procedure or program in memory.

RAM Disk

RAM disk is a section of internal memory that acts much like a flexible disk. Programs can 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 can 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 **`IBASIC Cntrl`** screen, enter

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

Volume 0's contents can be viewed.

ram disk erasure

Any existing programs or formatting on RAM is erased if you use the RAM_MNG or COPY_PL ROM programs, or the SERVICE screen's RAM Initialize function. Therefore, you should only use RAM disks for short-term storage of files.

Initializing RAM Disks

Each RAM disk volume must be initialized before it can be used.

NOTE: If you are using a RAM disk to store a test procedure, you must initialize the RAM disk volume 0. When the software saves a procedure to the Test Set's RAM, it automatically stores the procedure into the memory location volume 0. This is not changeable.

To initialize RAM disk Volume 0:

Volume 0 can be initialized using the **`RAM_MNG`** procedure stored on the internal ROM's **`IB_UTIL`** menu.

1. Press the TESTS key.
2. Position the cursor to the **`Select Procedure Location`** field and select it.
3. From the list in the **`Choices:`** menu, select **`ROM`**.
4. Position the cursor to the **`Select Procedure Filename`** field and select it.
5. From the list in the Choices menu, select **`RAM_MNG`**.

   `RAM_MNG` is the RAM manager program.
6. Press the k1 (**`Run Test`**) key.

   The program will begin execution.

7 Read the precautions provided on the Test Set’s screen and then press the k1 (**`Yes`**) key to continue.

8 Press the k3 (**`Int RAM`**) key.

This selects the Test Set’s internal RAM as the location to be initialized.

9 Enter the number of records you wish to initialize using the data key pad and then press the ENTER key.

50 records should be sufficient for saving a procedure.

10 Press the k1 (**`Yes`**) key to verify the number of records was entered correctly.

The internal RAM :MEMORY,0,0 is initialized.

To initialize RAM volumes 1,2, or 3:

Volumes 1, 2, and 3 must be initialized from the **`IBASIC Cntrl`** screen.

1 Press the TESTS key.

2 Select **`IBASIC Cntrl`** from the **`SET UP TEST SET`** list (or the Test Function field).

3 Position the cursor to the data entry field and select it.

4 Using the list of characters from the **`Choices`**: menu, enter the following command:

```
INITIALIZE “:MEMORY,0,<volume number 1-3>”,<volume size>
```

or

```
INITIALIZE “:MEMORY,0,1”,50
```

The optional ‘volume size’ in the command lets you specify the memory area set aside for each disk in 256-byte blocks.

Sending Characters to the Test Set Using a Terminal or PC

To make equipment connections for Terminal or PC operation

See "Serial Port Connections for a Terminal or PC," in chapter 8, on page 160 for equipment connections.

To edit the IO CONFIG screen for terminal or PC operation:

The characteristics of the serial port, when used for instrument control from a PC or terminal emulator, are determined by settings on the test set's IO CONFIGURE screen.

1. Press the TESTS key.
2. Position the cursor and select **`More`** from the **`Choices:`** menu.
3. Position the cursor and select **`IO CONFIG`** from the **`Choices:`** menu.
4. Set the following portions of the **`IO CONFIG`** screen as shown:
    - **`Serial In`** to **`Inst`**
    - **`IBASIC Echo`** to **`On`**
    - **`Inst Echo`** to **`On`**

    Set the remaining configuration entries (Serial Baud, Parity, Data Length, Stop Length, Rcv Pace, Xmt Pace) to match the settings of your terminal or PC program.

To send characters to the Test Set

A terminal emulator or PC uses the IBASIC command line to send commands to the Test Set.

1. Press the TESTS key.
2. Select the **`IBASIC Cntrl`** screen from the **`SET UP TEST SET`** list (or the Test Function Field).
3. Select the IBASIC command line at the top of the IBASIC Controller screen.

    The cursor appears at the top of the IBASIC command line when you enter the IBASIC controller screen. Press the cursor control knob to select this field. The field should be highlighted.
4. Type your command from your terminal emulator keyboard.

    As you type, the commands will appear on the IBASIC command line. If they are not there, check to see that the IBASIC command line is selected (highlighted).

Equivalent Front Panel Control Characters

The following table lists the terminal/computer keystrokes that equate to front-panel controls. *Each equivalent character must be preceded by pressing the* **Escape** *key*.

For example, to remotely access the **CONFIGURE** screen, you press and release Esc, then type C on your terminal/computer. (Be sure to use upper-case C for this example.)

Alternate sequences for 5 commonly-used functions are also available. Press and hold down the Ctrl (control) key and select the corresponding key for the desired function. (Example: Ctrl/H moves the cursor to the left one space.)

ENTER -^J or ^M

CANCEL - ^C

BACKSPACE - ^H

KNOB_TURN_CW - ^R

KNOB_TURN_CCW - ^L

Table 19 Equivalent Front-Panel Control Characters

Function	Equiv. ESC Char.	Function	Equiv. ESC Char.
CANCEL	!	K2_PRIME	7
PERCENT MHZ_V	(	K3_PRIME	8
S_KHZ_MV	)	ASSIGN	9
BACKSPACE	-	KNOB_TURN_CCW	<
ENTER	.	KNOB_TURN_CW	>
RELEASE	0	MSSG	A
K1	1	HELP	B
K2	2	CONFIG	C
K3	3	HOLD	D
K4	4	PRINT	E
K5	5	ADRS	F
K1_PRIME	6	SAVE	G
REF_SET	J	MEAS_RESET	h
METER	K	PRESET	i
AVG	L	INCR_DIV_10	j
LO_LIMIT	M	INCR_SET	k
HI_LIMIT	N	INCR_TIMES_10	l
E	R	DOWN	m
F	S	UP	n
B	U	SEVEN	o
C	V	EIGHT	p
D	W	NINE	q
A	X	FOUR	r
EEX	Z	FIVE	s

Table 19 Equivalent Front-Panel Control Characters (Continued)

Function	Equiv. ESC Char.	Function	Equiv. ESC Char.
YES_ON_OFF	[	SIX	t
NO_PPM_W	]	ONE	u
RX	a	TWO	v
TX	b	THREE	w
DUPLEX	c	ZERO	x
PREV	d	POINT	y
TESTS_MAIN	e	PLUS_MINUS	z
LOCAL	f	OHM_PCT_DEL_DB UV	{
RECALL	g	DB_GHZ_DBM	|
MS_HZ_UV	}		

Sending Escape Sequences to a Printer

You may use the Test Set to send escape sequences to control printer options such as pitch, margins, paper size, and so forth. The software comes with some predefined escape sequences compatible with HP printers, listed below, or you have the option to enter others which are compatible with your printer (use your printer's user's manual for the available print features and corresponding escape sequences).

If you are linking two or more sequences together, you must use the **~** to indicate the escape character between each sequence. If the sequence exceeds the space allotted in the options field, you may continue with additional escape sequences in the next available `Options` field. You must however, still enter `Escape Seq` in the `Calling Name` field and the appropriate address in the `Addr` field for all subsequent entries.

Table 20 Escape Sequence Options

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

How to Enter an Escape Sequence

1. Press TESTS.
2. Select **`External Devices`** from the **`SET UP TEST SET`** list (or Test Function Field).
3. Position the cursor to the **`Inst#`** field and select it.
4. Rotate the knob until an empty **`Calling Name`** field appears, and select it.
5. Position the cursor to the **`Calling Name`** field and select it.
6. Select **`Escape Seq`** from the **`Choices`** menu.
7. Position the cursor to the **`Addr`** (address) field and select it.
8. Using the DATA keypad, enter **`9`** for serial printers, **`15`** for parallel printers, or **`70X`** for HP-IB printers, then press ENTER.
9. Position the cursor to the **`Options`** field (directly under **`Calling Name`**) and select it.
10. Select the desired escape sequence from the **`Choices`** menu if applicable, or enter an appropriate sequence using the list of characters below the choices.

Vendor Information

Eagle
PO Box 4010
Sedona, AZ 86340
(520) 204-2597

Electronic Research Co.
7618 Wedd St.
Overland Park, KS 66204
(913) 631-6700

Hewlett-Packard Co. See the list of sales offices your *HP 8921A User’s Guide*.

15

Problem Solving

What's included in this chapter:

- Base Station Control Difficulties
- Exiting the Program
- Equipment Control
- Memory Space Problems
- Test Results are Unexpected
- Unstable SINAD Readings
- Test Set Doesn't Power-up

This chapter contains problem modules which alphabetically list the location of the problem with a brief symptom (for example, Test Set Doesn’t Power Up). Each problem module describes possible causes and corrections.

If a problem persists, call the HP Factory Hotline from anywhere in the USA or Canada (1-800-922-8920, 8:30 a.m. - 5:00 p.m. Pacific time).

NOTE: If the Test Set displays an error that states “One or more self-tests failed” you have a hardware problem. In this case, refer to the Test Set’s *Assembly Level Repair* manual.

Base Station Control Difficulties

You may see the following message displayed:

```
No RS-232 response from base station. Program stopped.
```

This message is displayed when the software is unable to receive a response after the VER command is sent to the base station. This command is sent in many of the tests. It is not sent automatically in *TEST_01 Laptop Emulator*.

Base station and Test Set baud rates may not match. You can check this by sending an Autobaud command. This command will match the baud rate of the base station to that of the Test Set. If the base station has been recently connected to a PC or other RS-232 source, the baud rate may have changed. See "TEST_01 Laptop Emulator" on page 200.

Check that the RS-232 and RJ-11 receive and transmit lines are properly wired.

Data-Collection Function Does Not Work

❒ Check that you have **`DATA C`** entered in the **`External Devices`** (or **`Edit Cnfg`**) menu.

1 Press the TESTS key.
2 Select the **`External Devices`** screen, from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
3 Position the cursor to the **`Calling Name`** field, push the knob and enter:

`DATA C`.

❒ Check the **`Model`** field, it should be kept empty since it is not used.

❒ Check the **`Addr`** (address) field to make sure the correct address is entered for where the data is to be stored.

1 If data is to be stored on an SRAM memory card, enter 1 into the Addr field.
2 If data is to be stored on an external computer through the test set’s RS-232 serial port (if available), enter 9 into the Addr field.
3 If data is to be stored on an external disk drive over HP-IB, enter an address of 700 or greater into the Addr field.

❒ Check the **`Options`** field to make sure it is correctly set up:

1 **For an external disk drive (LIF format) or an SRAM memory card:**
  a Enter ASCII for saving data as an ASCII file.
  b Enter BDAT for saving data as a Binary-Data file.
  c As an option, you may enter REC=xxx, where xxx is the number of records for each file. (The software defaults to 80 records. However, if too small a record size is used, you’ll get an “End of file error” when the test is run.)

2 **For a DOS disk drive, you may keep the Options field empty, or you may enter any of the following key words**:
   - **a** Enter ASCII for saving data as an ASCII file.
   - **b** Enter BDAT for saving data as a Binary-Data file.
   - **c** Enter REC=xxx for the file’s record size, where xxx is the number of records for each file. (The software defaults to 80 records. However, DOS systems automatically change record size if it’s too small.)
   - **d** Enter a (dot extension) of 3 characters or less for the file name. For example, all model ABCD radio’s tested may be organized to have a “.ABC” file extension.

❒ Check the test set to make sure it’s in the controller mode if you are using an external disk drive.

1 Access the I/O CONFIG screen from the More field in the To Screen menu.
2 Position the cursor to the Mode field and select Control.

NOTE: When the test operator is prompted to enter a file name where data is to be stored, the protocol for the mass-storage device being used must be followed.

Hierarchial directory paths are not allowed, and all files are created with “**`FORMAT ON`**”.

Also, when initializing a disk, use the following format (”**`7xx`**” is the disk address, “**`y`**” is the device selector):

DOS disk: **`INITIALIZE “DOS:CS80,7xx,y”`**
LIF disk: **`INITIALIZE “:,7xx,y”`**

Exiting the Program

It is possible to pause (by pressing CANCEL) the software program, display a screen other than TESTS **(IBASIC Controller)** screen, return to the TESTS (Main Menu) screen, and then press the USER **(Continue)** user key to proceed with a test. There is a very good possibility that these actions will affect subsequent program operation. Error messages may or may not be displayed.

Carefully determine the effect of the changes you make while a program is paused. You may have to rerun the program to undo the effect of the changes.

If you exit the program to a screen other than RX TEST or TX TEST, the settings necessary to resume testing will be retained. Selecting the RX TEST or TX TEST screen causes signal paths internal to the Test Set to be modified. Avoid pressing the RX and TX keys.

After you have made the manual settings you want, press the DUPLEX key as a last step before continuing the software. This will cause the Test Set to be properly set up.

Another way to safely exit is to:

1. Press the CANCEL key.
2. Press the DUPLEX key.
3. Press the SHIFT key and then the SAVE key.
4. Enter a register name or number.
5. Choose **Done**.
6. Operate the Test Set manually.
7. Press the RECALL key.
8. Choose the name of the saved setup.
9. Press the TESTS key.
10. Press k2(**Continue**).

It may be necessary to use *TEST_01 Laptop Emulator* to send commands to the Base Station Controller if it is not responding after you have exited the program.

You should, with few exceptions, exit the program by pressing CANCEL. When you do this, the software will be in a state that is ready to run. When you subsequently press k1**`(Run Test)`**, the software will start running. If the software is in an Input/Output state, it may not immediately respond to the CANCEL key. A time-out will occur in approximately ten seconds. If the program is paused waiting for a value to be entered by you, try to enter a value so the program can be paused with the CANCEL key.

If the software will not pause some time after you press CANCEL, you can stop the program by pressing SHIFT then CANCEL.

If you exit the program by pressing CANCEL, and then change specifications, parameters, or configuration, the new values may not be used by the software after you press k1**`(Continue)`**. Start the program over again to ensure that your changes are used.

Equipment Control

Verify that you have made the correct entries to the **`External Devices`** (or **`Edit Cnfg`**) screen if you are using a switch/splitter or other external equipment.

Memory Space Problems

The program uses a substantial amount of the Test Set's RAM space. If you see a message that indicates a memory problem, check the memory space that has been used.

To determine the memory space used:

1 Load the program, if it is not already loaded, by pressing k1 (**`Run Test`**) and waiting for the program display to appear.

2 Press SHIFT CANCEL to stop the program.

3 Press DUPLEX to exit the TESTS screen.

4 Press SHIFT SAVE.

5 Read the number in front of **`free memory`**.

If this number is a few percent or less, you may get an error message after saving additional set-ups to SAVE registers.

If you do not have sufficient memory space available, you may need to delete unnecessary save registers.

To delete save_recall registers:

1 Press DUPLEX.

2 Press RECALL.

3 Press ON/OFF to clear register.

4 Press the ON/OFF button again to answer **`YES`**.

Printing Problems

☐ Check that the printer is turned on.

☐ Check that the HP-IB, parallel, or serial cable from the Test Set to the printer is connected.

1. Press the TESTS key.
2. Check that the Printer was selected as the **`Output Results To:`**.
3. Check that the Test Set is correctly configured for HP-IB, parallel, or serial printing.

   For a HP-IB printer:

   - **a** Check that the printer’s Calling Name is “PRINTER” and its address is correctly set up in the External Devices screen.
   - **b** Check that the IO CONFIGURE screen has been set up correctly:
     - **i** Mode=Control
     - **ii** Print To=HP-IB
     - **iii** Print Adrs=address of your printer

   For a parallel printer:

   - **c** Check that the printer’s Calling Name is PRINTER and its address is set correctly in the External Devices screen.

   For a serial printer:

   - **d** Check that the printer’s Calling Name is PRINTER and its address is set to **`9`** in the External Devices screen.
   - **e** Check that the **`IO CONFIGURE`** screen has been set up correctly for the printer’s baud rate, parity, and so forth.

Test Results are Unexpected

If one or more tests fail unexpectedly, or you believe there is a problem with the way tests are running, check the settings that are used for the tests.

1. Press the TESTS key.
2. Select **`Execution Cond`** from the **`SET UP TEST SET`** list.
3. Position the cursor to the **`Run Mode`** field and select **`Single Step`**.
    a. Run the test.
    b. When the message **`Press continue when ready`** is displayed in the top line of the IBASIC Controller screen, press CANCEL to pause the IBASIC program.
4. From the **`To Screen`** menu, position the cursor to the desired instrument screen and select it.
5. After viewing the instrument settings, press PREV to return to the TESTS screen.

NOTE: Do not alter the instrument settings. The IBASIC program will not re-configure the settings when continue is executed. You can alter settings to experiment with the measurement, but they must be returned to their initial settings before leaving the instrument screen.

6. Press k2 (**`Continue`**) to return to the IBASIC controller.
7. Press k2 (**`Continue`**) to continue the program.

Test Set Doesn’t Power Up

Check the AC or DC power connection and the setting of the AC/DC switch on the rear panel. See the Test Set’s *User’s Guide*.

Unstable SINAD Readings

If readings of SINAD are unstable, the measurement may be affected by a signal from an antenna. Co-channel or other interference can be detected by turning up the speaker volume of the Test Set.

SINAD readings may appear to be unstable due to normal fluctuations in the readings. If you are manually making SINAD measurements, see “Averaging Measurements” in the Test Set’s *User’s Guide*.

A

Appendix A: External T1 Module

What’s included in this appendix:

- Information on Testing Using an External T1 Module
- Recalling the T1 Module Factory Option Set
- Equipment Connections Using an External T1 Module

Information on Testing Using a T1 Module

The Motorola Micro C·I·T·E Option 070 software package supports base station testing using external T1 Module. Testing with an external T1 Module will significantly reduce your testing time by allowing consecutive transceiver testing without equipment connection changes.

Accessory Kit

For information on obtaining an accessory kit for testing using a T1 Module, contact your local sales representative or call the HP 8920 factory support hotline at 1-800-922-8920.

Testing Using a T1 Module

NOTE: To perform the tests contained in this software package, the T1 Module inside the Micro C·I·T·E and the external T1 Module that you supply must be programmed with the same option set. *See "Recalling the T1 Module Factory Option Set" on page 291* for more information.

Recalling the T1 Module Factory Option Set

For proper communication, both the external T1 Module and the T1 Module within the Micro C·I·T·E must be programmed with the Factory Option Set.

The following will explain how to store the Factory Option Set in both T1 Modules.

Steps For Recalling the Factory Option Set

To recall the Factory Option Set

Follow steps 1 through 3 to store the Factory Option Set in the Micro C·I·T·E T1 Module and your external T1 Module. If your external T1 Module is not programmed with a User Option Set you may omit steps 1 and 3 below and perform step 2 only.

1. Store your present T1 User Option Set
2. Recall the Factory Option Set
3. After testing is complete, recall your stored T1 User Option Set.

Step 1: Store Your User Option Set

The T1 Module inside the Micro C·I·T·E may be programmed with a User Option Set. You will need to store your User Option Set (present T1 module settings) so that the settings can be recalled after testing is complete. If you do not store your User Option Set, it will be overwritten when the Factory Option Set is recalled.

To store your User Option Set on the external T1 Module:

1. Press the HOME key to enter the Main #1 menu.
2. Continue to press the NO button until “LOAD OR STORE OPTION SET?” appears, then press the YES key. This takes you to the NonVol Menu, Main #7 screen level.
3. The flow chart in *figure 75* shows the steps necessary to store your User Option Set from the Main #7 screen. Follow the steps outlined in the flowchart.

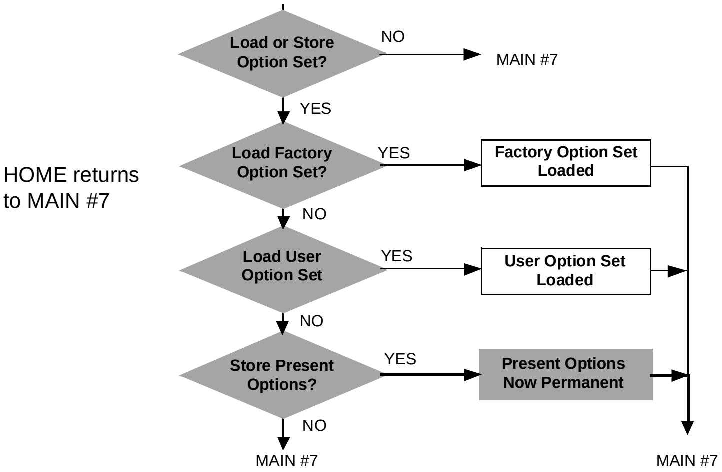


Figure 75 **Store Your User Option Set**

Step 2: Recall the Factory Option Set

The Factory Option Set must be recalled in both T1 Modules in order for them to communicate correctly with one another. The procedure for recalling the Factory Option Set is similar for both T1 Modules; however, the external T1 Module will require a few additional steps.

CAUTION: If you are recalling the Factory Option Set on the T1 Module in the Micro C·I·T·E, make sure you have stored any present settings or they will be overwritten. See step one for more information on storing present settings.

To recall the Factory Option Set in the Micro C·I·T·E T1 Module and the external T1 Module:

1. Press the HOME key to enter Main #1 menu.
2. Continue to press the NO button until “LOAD OR STORE OPTION SET?” appears, then press the YES key. This takes you to the NonVol Menu, Main #7 screen level.
3. The flow chart in *figure 76* shows the steps necessary recall the Factory Option Set from the Main #7 screen. Follow the steps outlined in the flowchart.

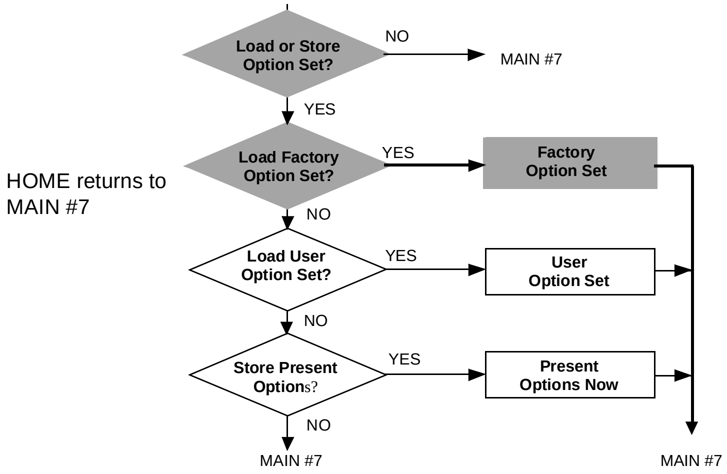


Figure 76 **Store the Factory Option Set**

Additional steps required in the external T1 Module only:

1. Press the HOME key to return to the Main #1 menu.
2. Press the NO key until "CHANGE TTY OPTIONS?" appears then press the YES key.
3. Press the NO key until "TTY REMOTE CNFG. ENABLED?" appears.
4. Press the YES key until "DISABLED" appears.
5. Press the "NO" key.
6. Press the HOME key twice.

VERIFY COMMUNICATION EXISTS

Verify communication exists between the Micro C·I·T·E T1 Module and the external T1 Module by selecting *TEST_01 Laptop Emulator*. You should see a "#" appear on the Test Set's screen.

Step 3: Recall Your Stored User Option Set

After testing is complete, you will want to recall the User Option Set you stored in step 1 and return your external T1 module to its normal mode of operation.

To recall your stored User Option Set:

1. Press the HOME key to enter Main #1 menu.
2. Continue to press the NO button until "LOAD OR STORE OPTION SET?" appears, then press the YES key. This takes you to the NonVol Menu, Main #7 screen level.
3. The flow chart in *figure 77* shows the steps necessary to recall your User Option Set from the Main #7 screen. Follow the steps outlined in the flowchart.

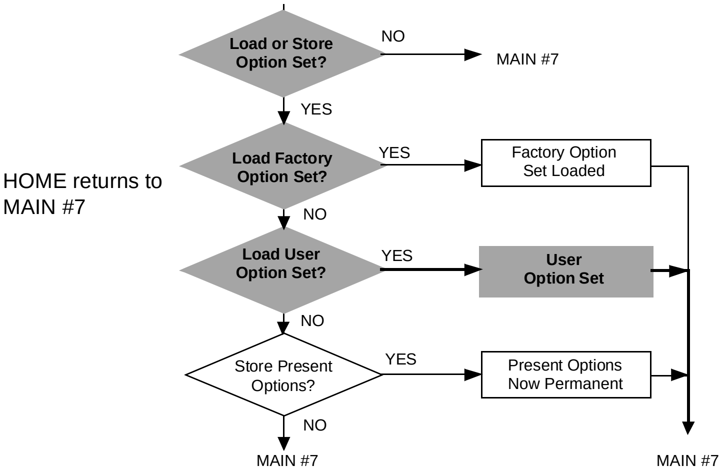
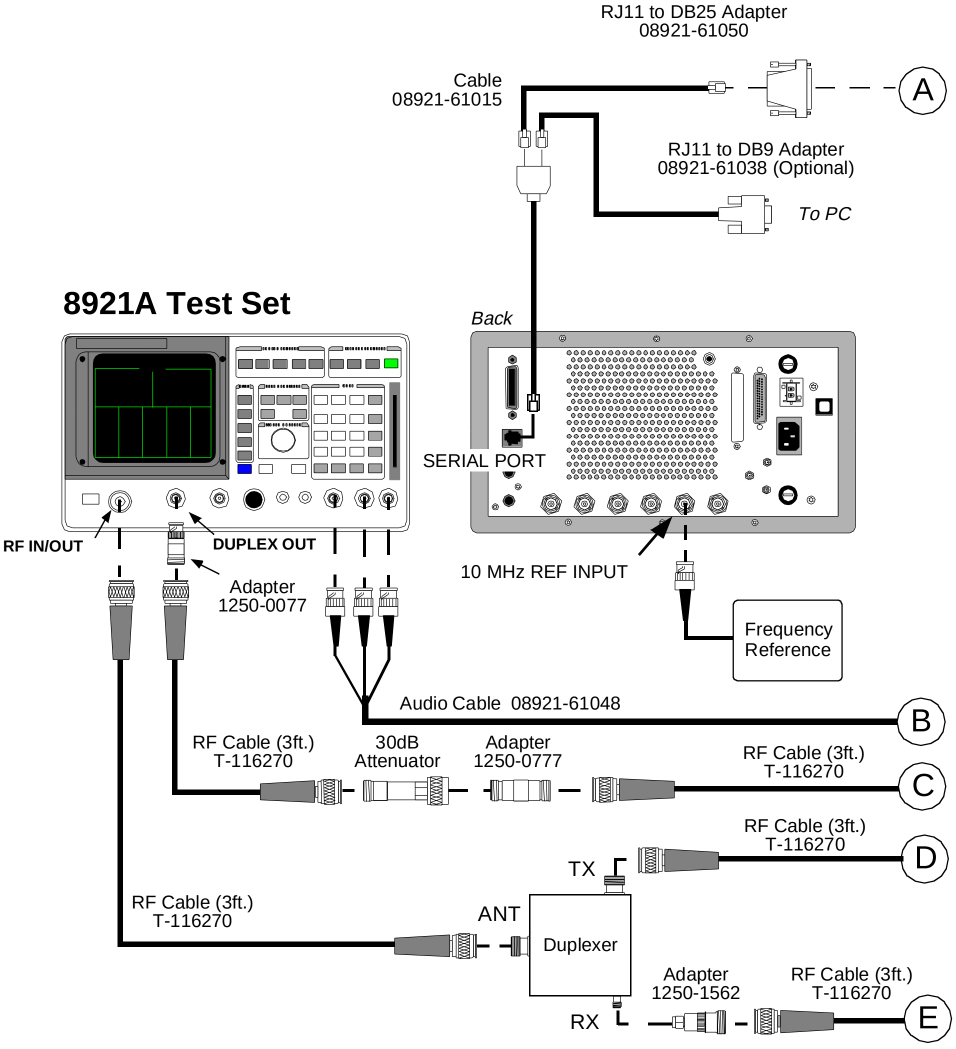


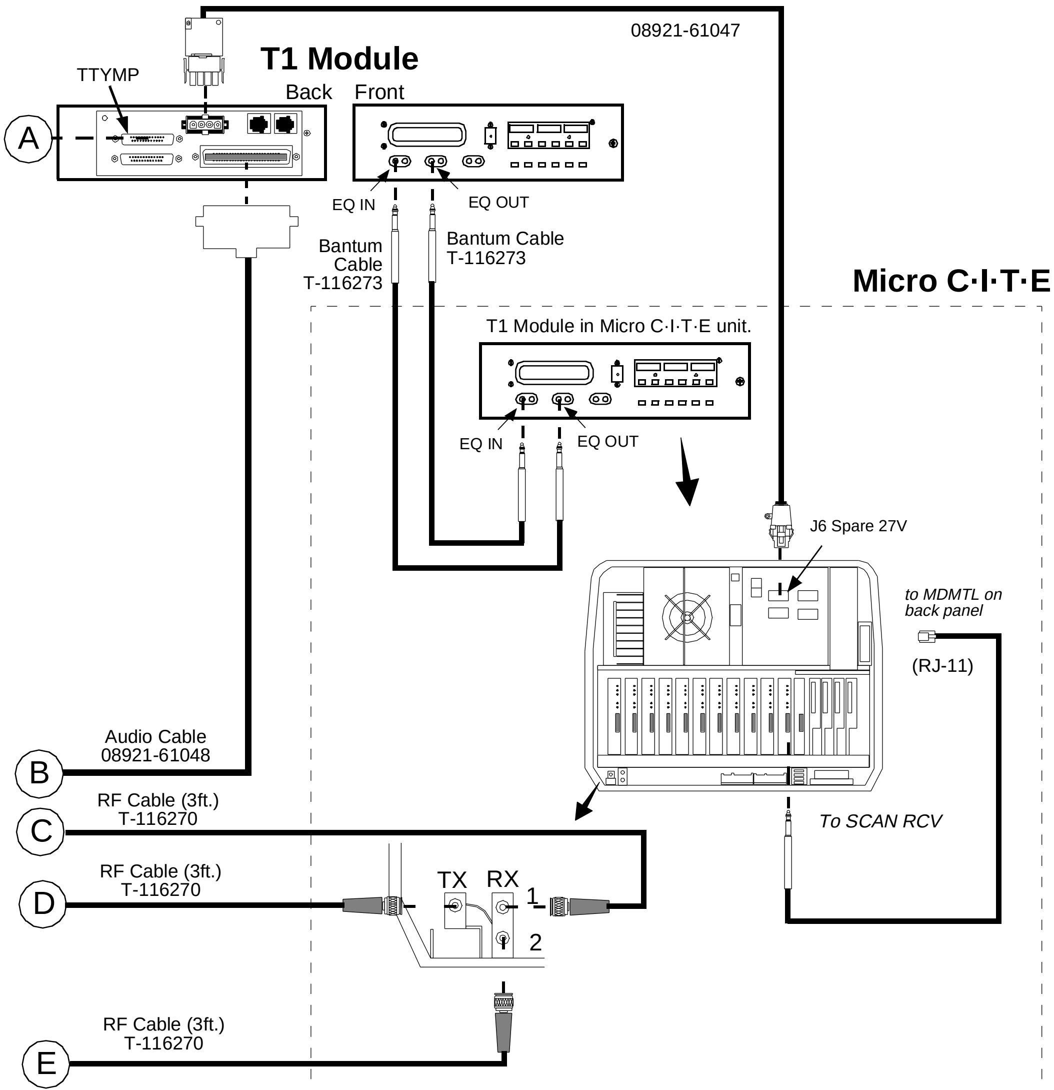
Figure 77 **Recall your User Option Set**

Equipment Connections Using an External T1 Module

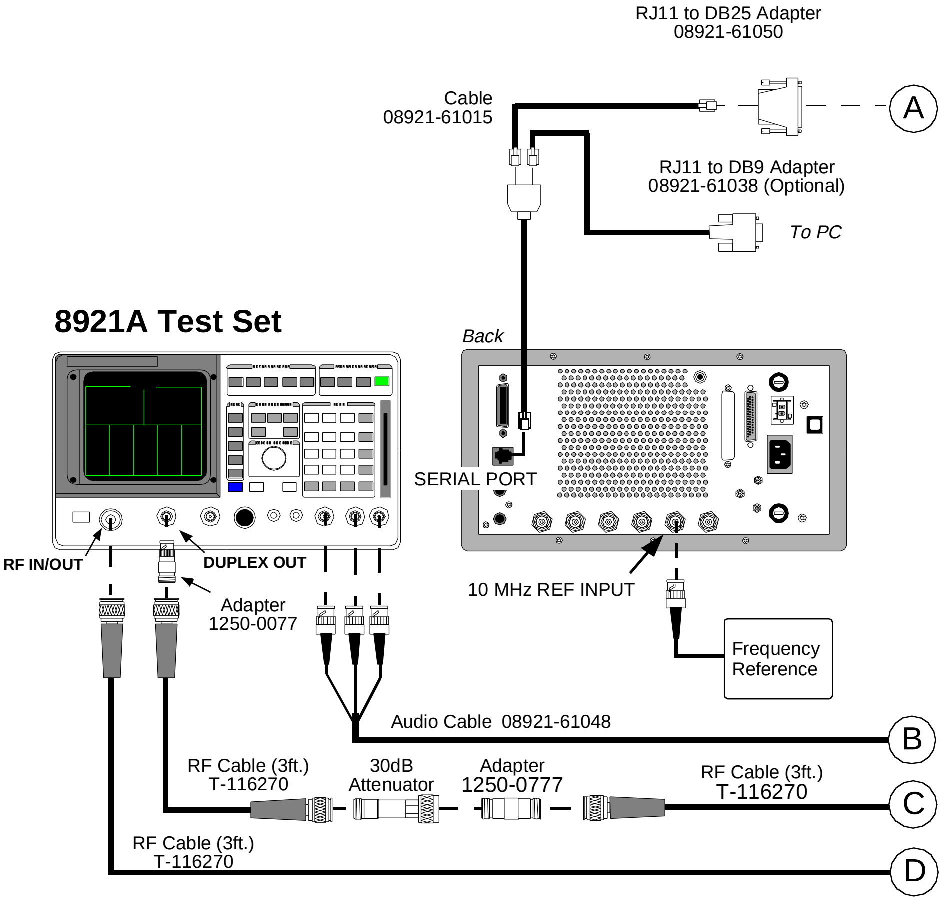
Equipment Connection Diagram
Configuration A (Part 1 of 2)



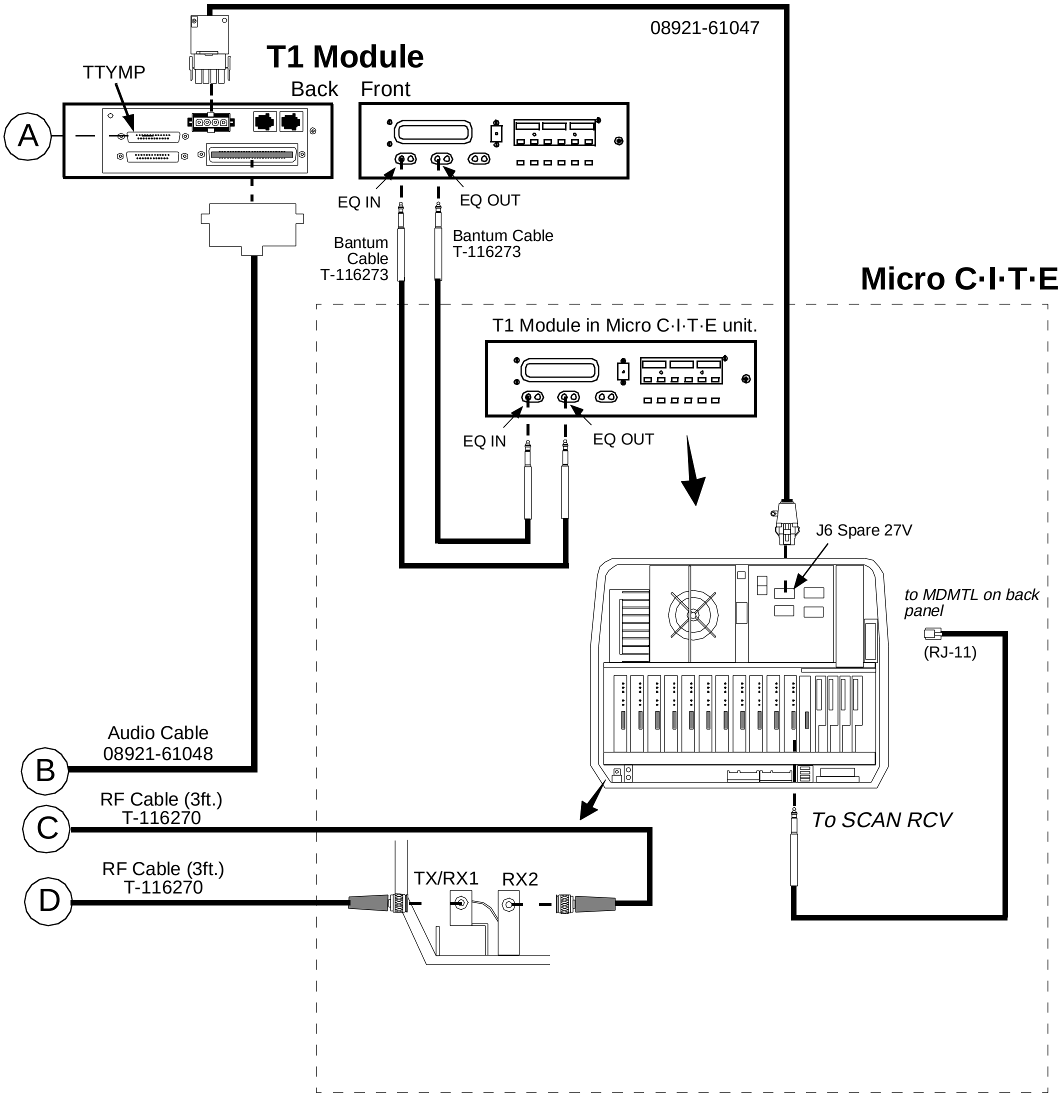
Equipment Connection Diagram
Configuration A (Part 2 of 2)



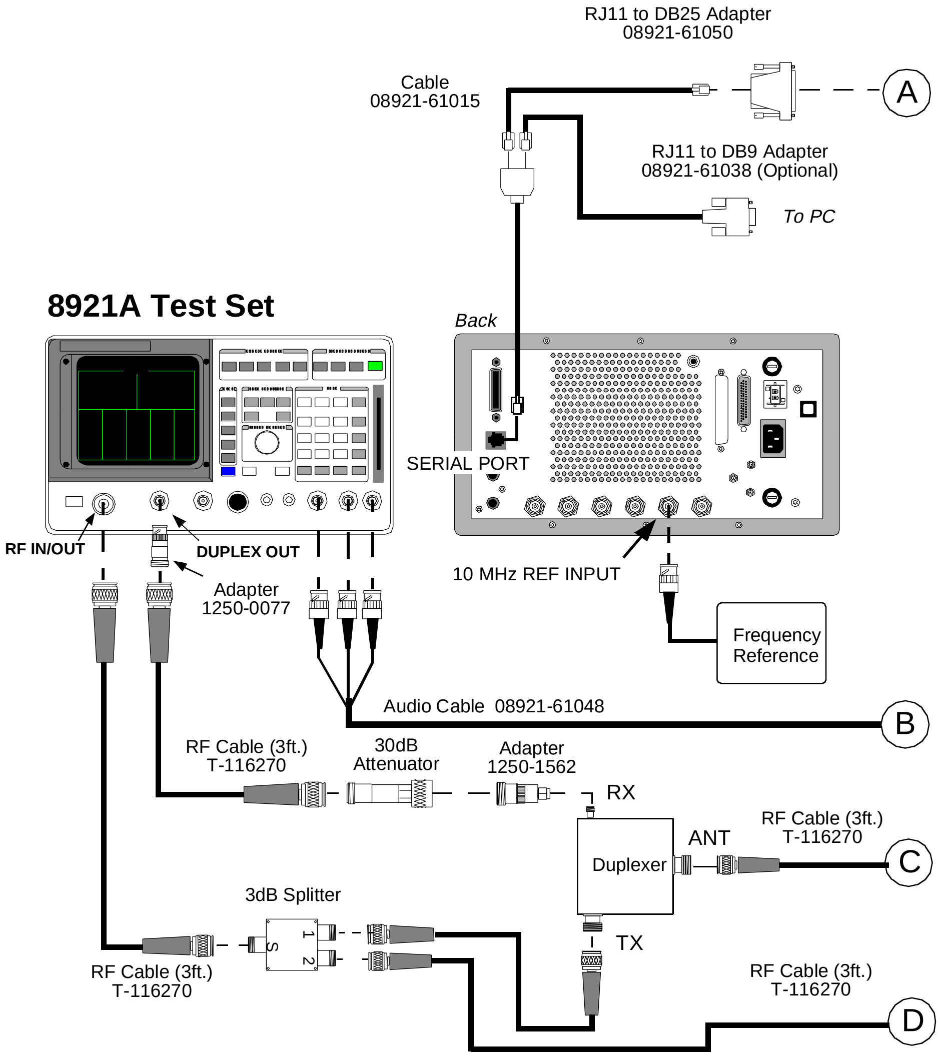
Equipment Connection Diagram
Configuration B (Part 1 of 2)



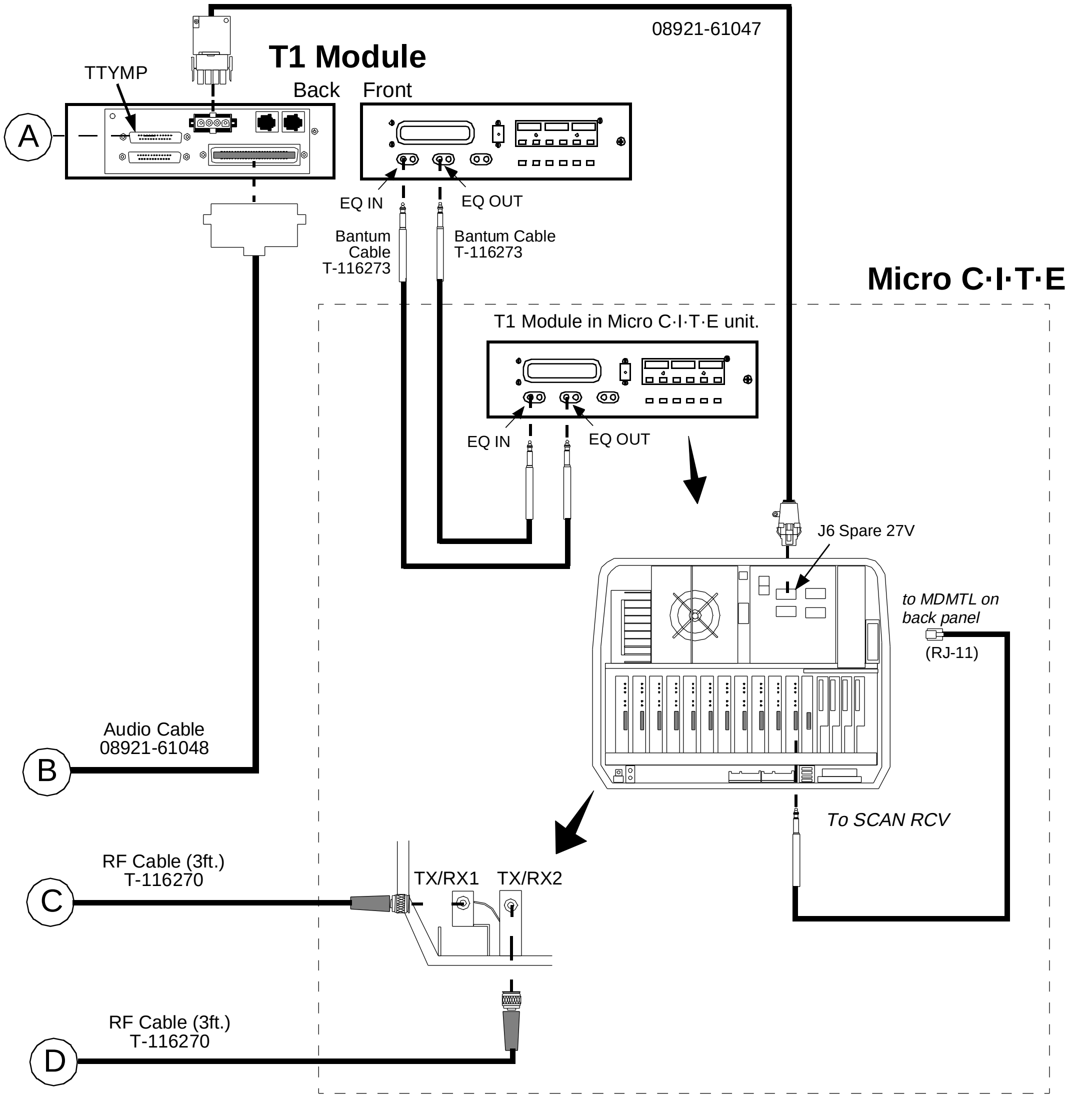
Equipment Connection Diagram
Configuration B (Part 2 of 2)



Equipment Connection Diagram
Configuration C (Part 1 of 2)



Equipment Connection Diagram
Configuration C (Part 2 of 2)



Glossary

AMPS Advanced Mobile Phone Service - The cellular system in use on the North American continent and on other continents.

AVL Average Voice Level - A standard audio voltage used to set the level of the signal applied to modules in the cell site. It is expressed in dBm into a 600-Ω load.

BSC Base Site Controller - A set of modules including the Voice Channel Controller, Signaling Channel Controller, Cell Site Controller, and Extended Multiple Port Interface. It is the interface between the cell site and the Electronic Mobile Exchange.

choose This word is used in step-by-step procedures in this manual. It refers to the steps of turning and pressing the knob to pick an item from a list of choices. Choices are displayed in the lower right corner of the CRT display.

CSC Cell Site Controller - The module that controls the cell site and interfaces with the main Electronic Mobile Exchange. A serial interface port communicates with the Test Set.

DSAT Digital Supervisory Audio Tone - A sub-audible data signal that frequency modulates an NAMPS cell site voice channel transmitter. The signal is transponded by the mobile station and is used to help determine RF path integrity.

DST Digital Signaling Tone - A sub-audible data signal that frequency modulates an NAMPS cell site voice channel transmitter. The signal is sent by the mobile to the base station when certain signaling operations must occur.

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 on the CRT with an inverse video display where entries can be made.

FOCC FOrward Control Channel - The method by which data is transferred from a base station to a mobile station when the mobile station receiver frequency is set to a control, paging, or access channel. The base station transmitter is frequency modulated by a 10 kbit/s data stream.

FVC Forward Voice Channel - The method by which data is transferred from a base station to a mobile station when the mobile station receiver frequency is set to a voice channel. The base station transmitter is frequency modulated by a 10 kbit/s data stream.

GN Abbreviation for General. GN appears in some parameter titles in the software and indicates that the parameter relates to the general system, as opposed to a transmitter (TX) or receiver (RX).

Help A feature providing specific information about how to use the current screen in the TESTS environment. This feature is accessed by pressing k4 Help from any TEST screen. Note: this feature is only available in the HP 8921A,D firmware above revision A.14.00.

HELP A feature providing additional test set information accessed by pressing SHIFT, then TX (HELP) keys.

IBASIC Instrument BASIC. A computer language, derived from HP BASIC, used in Hewlett-Packard instruments. Programs written in IBASIC run on the computer in the instrument.

JK Abbreviation for jack.

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 memory card or other mass storage with its associated procedure files.

Main Menu The screen accessed by pressing the TESTS key, or k5 Main Menu. It is used to customize and execute (run) automated testing.

Also referred to as the “TESTS” screen.

MAN MANUAL - An operation mode of the base station characterized by equipment being taken out of service.

MTTY Maintenance TeleTYpe - The terminal or terminal emulator that is used to transfer data to and from a Cell Site Controller. The Test Set performs the functions of the MTTY in the software described in this manual. MTTY is also used to label the connector on some external terminals.

NAMPS Narrow (band) Advanced Mobile Phone Service - A mobile telephone system that provides greater capacity than the AMPS system by reducing the voice channel spacing to 10 kHz.

OOS Out Of Service - The removal of some or all of a base station from active service.

PA Power Amplifier - The module that amplifies transceiver RF power.

parameters Entries you make for calibration data, cell site characteristics, or test customization. They give you flexibility in the way you use the software. Default values for parameters are entered into the software.

pass/fail limits Pass/fail limits are the names of criteria verifying the performance of the unit-under-test. Usually, the associated measurement value must fall within the HI/LO limits of pass/fail values to verify performance of the unit-under-test. Default values in the test software have been derived from standard methods of measurement or from the unit-under-test’s requirements. Pass/fail limits are also called specifications.

Procedure A procedure is a collection of parameters, specifications, and a test sequence, saved in a file, that customizes the test software to a specific application.

RECC REverse Control Channel - The method by which data is transferred from a mobile station to a base station when the mobile station transmitter frequency is set to a control, paging, or access channel. The mobile station transmitter is frequency modulated by a 10 kbit/s data stream.

RSSI Received Signal Strength Indicator - A level in a receiver that corresponds to the signal strength of the incoming signal.

RVC Reverse Voice Channel - The method by which data is transferred from a mobile station to a base station when the mobile station transmitter frequency is set to a voice channel. The mobile station transmitter is frequency modulated by a 10 kbit/s data stream.

SAT Supervisory Audio Tone - A5970 Hz, 6000-Hz, or 6030-Hz sine-wave signal that frequency modulates an AMPS cell site voice channel transmitter. The signal is transponded by the mobile station and is used to help determine RF path integrity.

SCC Signaling Channel Controller - The module that controls signaling transceivers.

select This word is used in step-by-step procedures in this manual. It refers to the steps of turning and pressing the knob to locate and highlight, with full inverse video, a field on the CRT display.

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 `(Edit Sequence)` screen.

SIG Signaling unit - A signaling transceiver module.

SINAD 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 the receiver sensitivity.

softkey The name of the set of labels on the CRT display that can be assigned to certain special actions or fields. The keys are also called USER keys.

specifications Specifications are values you enter that set passing limits for tests. Default values are in the test software. They have been derived from standard methods of measurement or from Motorola requirements. Specifications are also called pass/fail limits.

SRAM Static Random Access Memory - A data storage device. SRAM memory cards can be used with the Test Set to save programs and test results.

SSI Signal Strength Indicator - SSI is synonymous with Received Signal Strength Indicator (RSSI).

ST Signaling Tone - A 10 kHz tone that the mobile sends to the base station when certain signaling operations must occur.

test A term to refer to one of the tests included in this software package.

A term to refer to one of the TESTs, TEST_01 through TEST_09, available in the base station test software.

TTY TeleTYpe - Same as MTTY.

TTYMP TeleTYpe Maintenance Port - The RS-232 connector on the base station, through which data is transferred between the Cell Site Controller and the MTTY.

URDM Universal Reference Distribution Module. The 3 MHz reference module of the Motorola Micro C·I·T·E base station.

USER The name of the labels on the CRT display that can be assigned to certain special actions or fields. The keys are also called softkeys.

VOC VOiCe - The module that contains the voice transceiver.

VCC Voice Channel Controller - The module that interfaces with the Base Station Controller to control one or more voice transceivers.

VSWR Voltage Standing Wave Ratio - A ratio that quantifies the level of reflected power that results from the application of forward power to a transmission line. A VSWR exists on a transmission line terminated in its characteristic impedance.

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