This Software Is Used With the HP 8920B Opt. 500,

HP 8921A Option 500, HP 8920D, or HP 8921D

HP 11807A,E Option 008
NA Dual-Mode Cellular Mobile Test Software
User's Guide

HP Part No. 11807-90123
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Rev C

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Palo Alto, CA 94304
U.S.A

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1

Getting Started with FW Above Rev. A.14.00

What You Will Test

NOTE: The firmware revision A.14.00 in the HP 8920A,D had several enhancements, which are standard in the HP 8920B. This chapter applies to users with:

- **HP 8920A, HP 8921A, HP 8920D, and HP 8921D test sets with firmware revision above A.14.00**
- **All HP 8920B test sets.**

The Test Set's firmware revision is displayed on the top right corner of the configuration screen.

- Press SHIFT CONFIG to display the configuration screen and read the firmware revision.

If you have an HP 8920A, HP 8921A, HP 8920D, or HP 8921D Test Set with firmware revision below A.14.00, refer to Chapter 1b. Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

Getting Started will quickly acquaint you with the operation of the Test Set and the HP 11807A,E Option 008 Software. You will setup and run the following two tests:

1. Registration test (TEST_02 - CPA Registration)
2. NAM test (TEST_01 - NAM Number Assignment Module Data)

Test Set or System is Defined As:

- HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
- HP 8921A, Option 500, Dual-Mode Cellular Test System
- HP8920D, Dual-Mode Cellular Mobile Test System
- HP 8921D, Dual-Mode Cell Site Test System

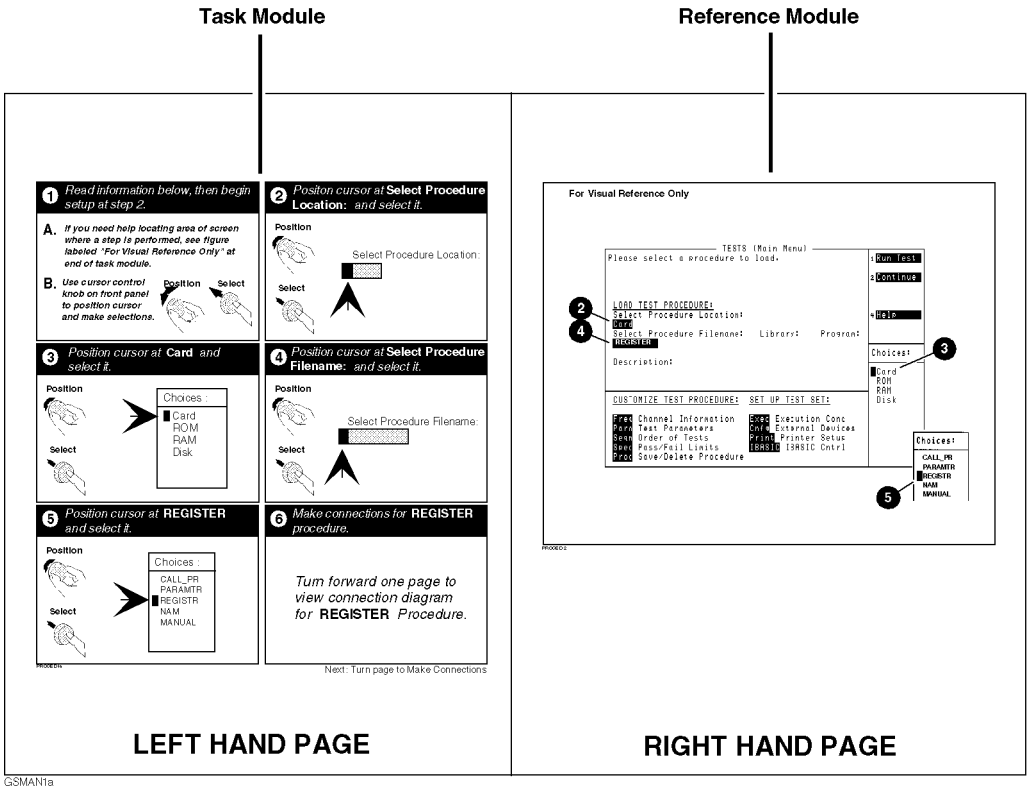
Equipment Needed to Get Started

You will need the following in order to complete the testing in Getting Started:

- HP 11807A,E Option 008 Software
- One of the following:
  - HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
  - HP 8921A, Option 500, Dual-Mode Cellular Test System
  - HP 8920D, Dual-Mode Cellular Mobile Test System
  - HP 8921D, Dual-Mode Cell Site Test System
- DC power supply (if the phone being tested requires an external power source) and appropriate cabling to the mobile
- A Test Interface Adapter specific to the mobile unit being tested. This adapter should be acquired from the mobile manufacturer.
- A NADC mobile unit with a handset
- Knowledge of the Control Channel of the mobile unit
- Type N (m) to BNC (f) adapter for mobile antenna connection to Test System RF IN/OUT
- BNC (f) to TNC (m) adapter for mobile antenna connection
- BNC (m) to BNC (m) cable, 4 to 6 feet for mobile antenna connection to Test System RF IN/OUT
- RJ-11 (m) to RJ-11 (m) cable, supplied with HP 11807A,E Option 008 Software for Test System to Test Interface Adapter connection
- RJ-11 (f) to DB-25 (m) adapter, supplied with HP 11807A,E Option 008 Software for Test System to Test Interface Adapter connection

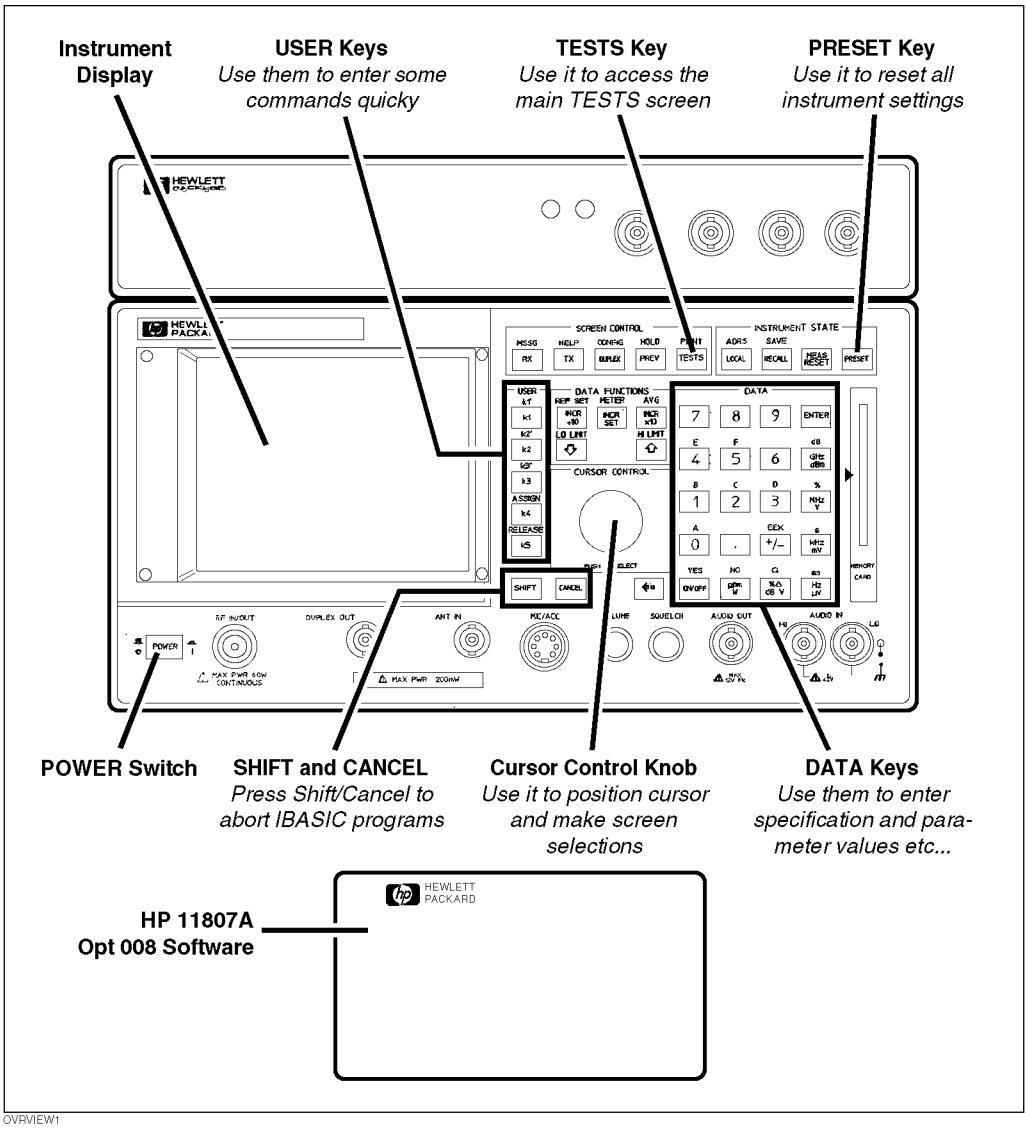
How to Use This Getting Started

The instructions in this guide are presented as Task and Reference Modules. Use the Task Modules to perform the steps required to run testing and use the Reference Modules to locate where on the screen the steps are performed.



GSMAN1a

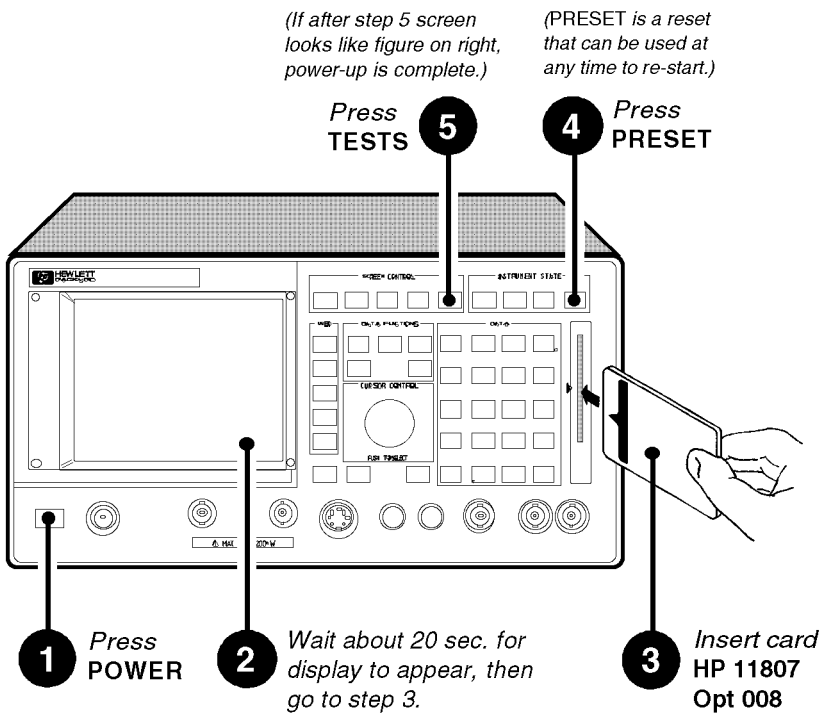
Test System Overview



OVRVIEW1

Load the Software

Do steps 1-5 in numbered order.

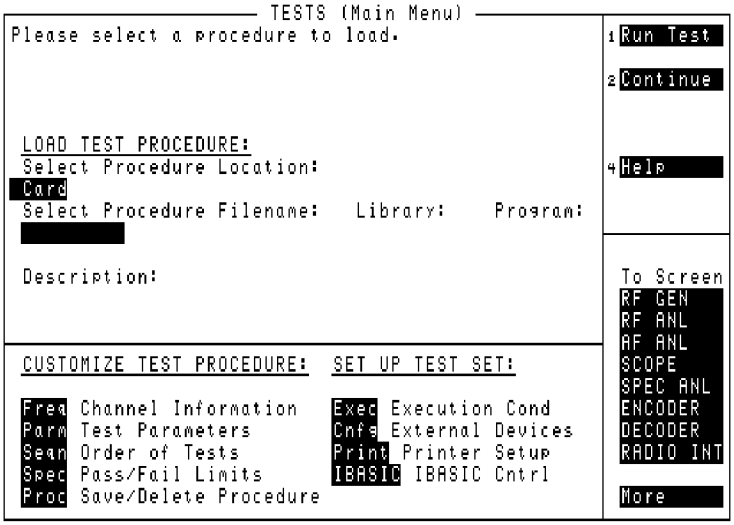


LOAD1

Next: Turn page to select REGISTER procedure

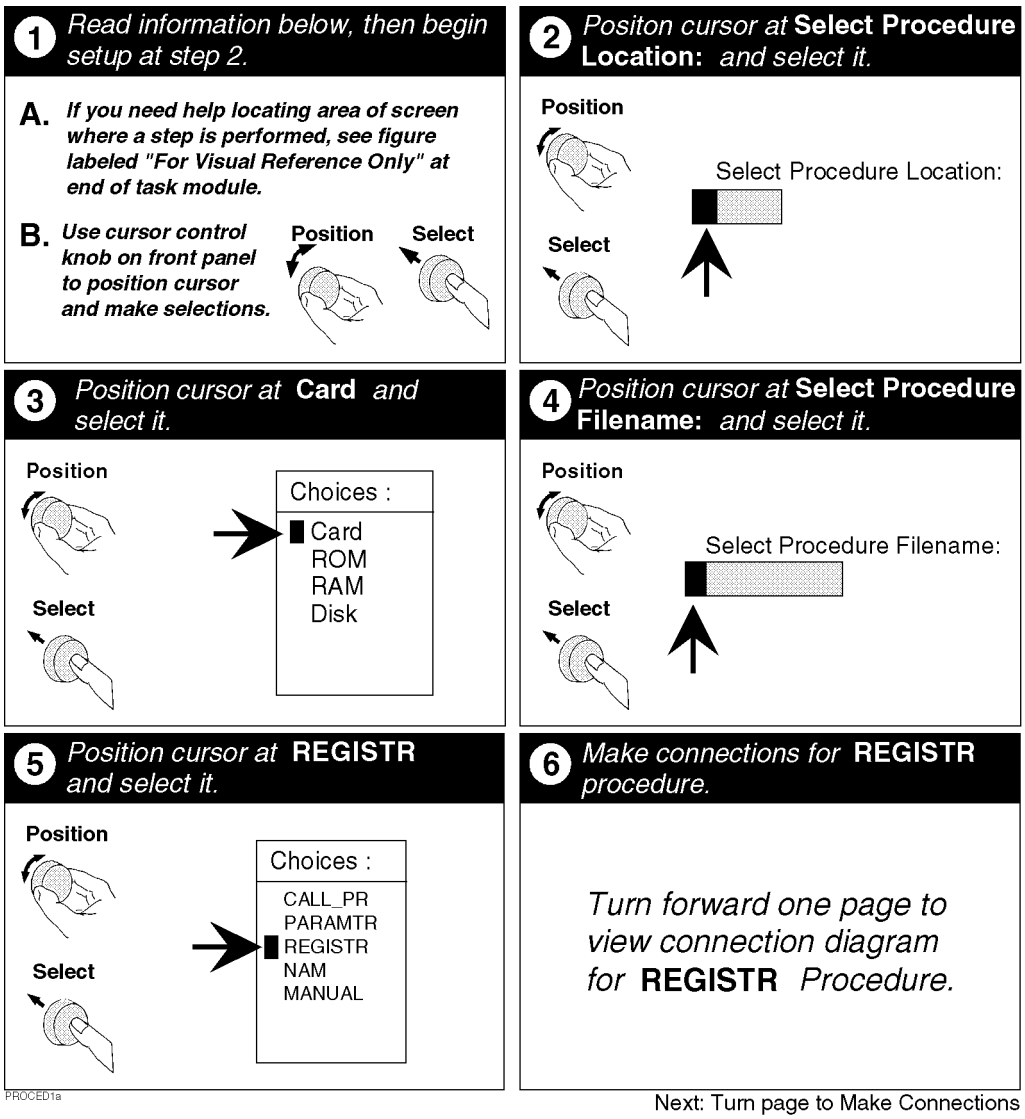
For Visual Reference Only

Field entries on your screen may be different.



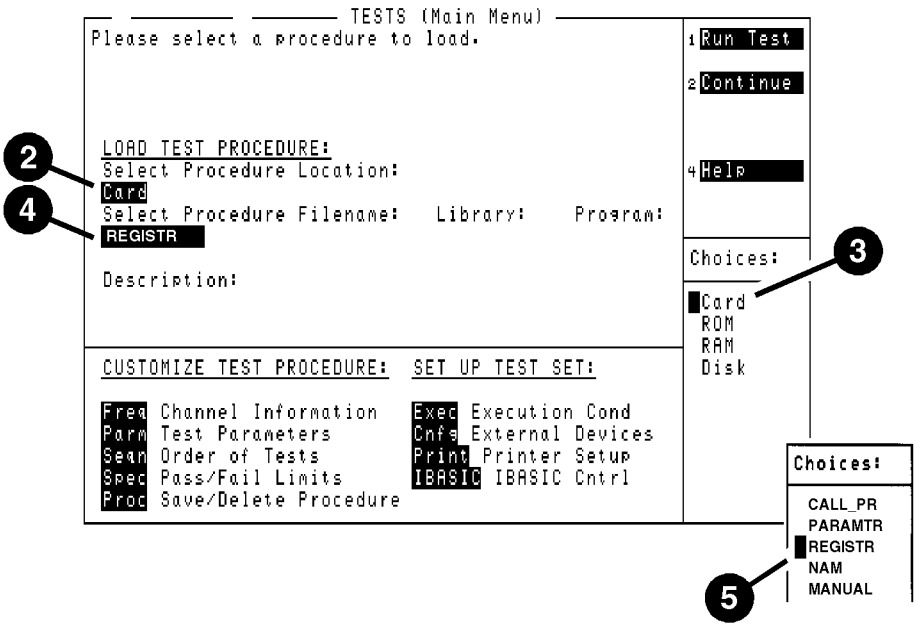
LOAD2a

Begin Setup for Registration Test



Next: Turn page to Make Connections

For Visual Reference Only



PROCED2a

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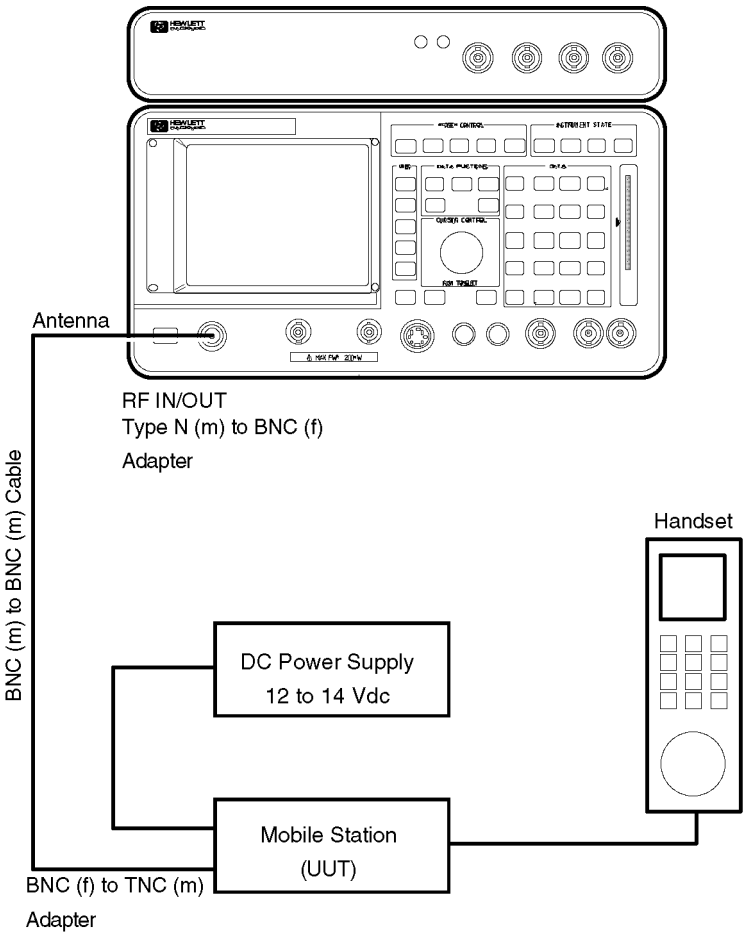
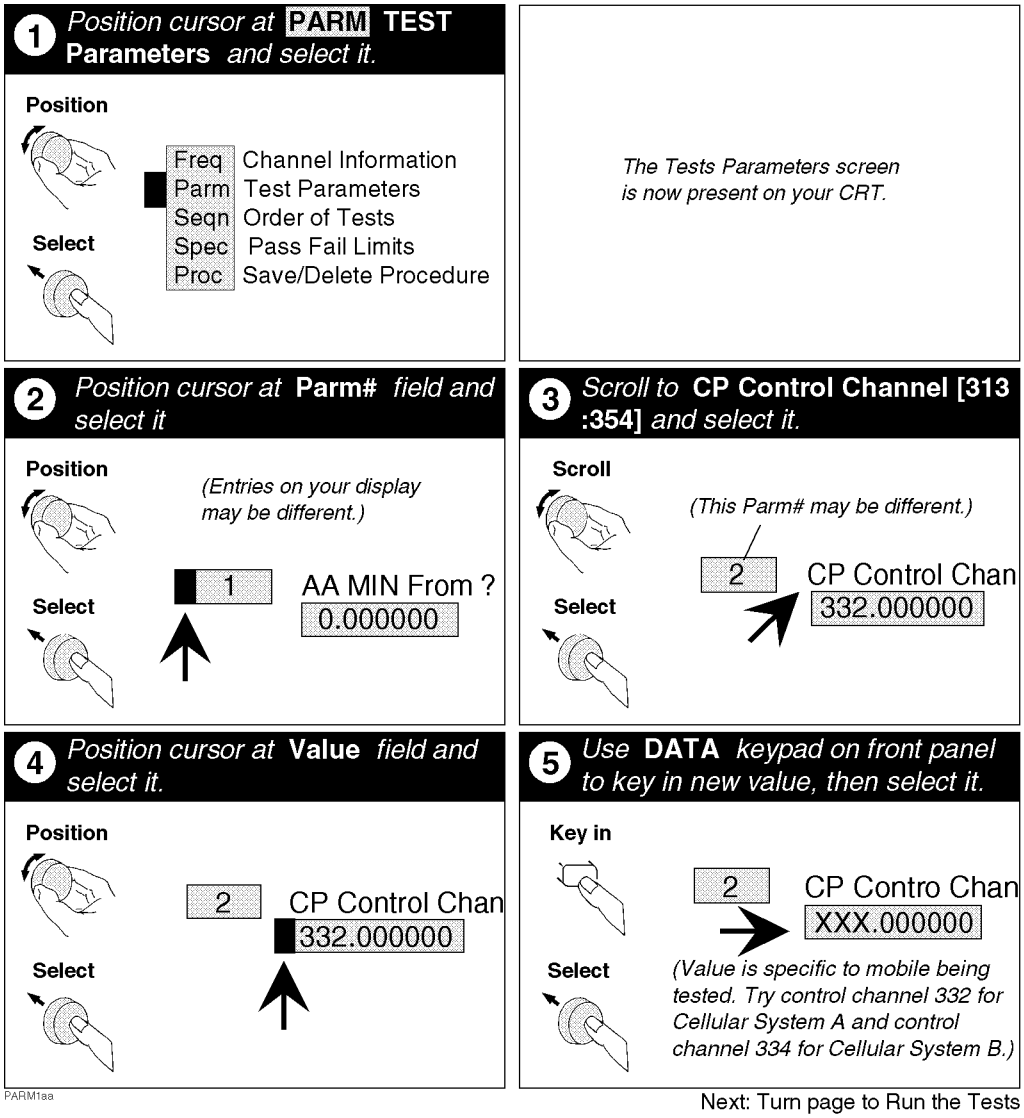
Make Connections for Registration Test



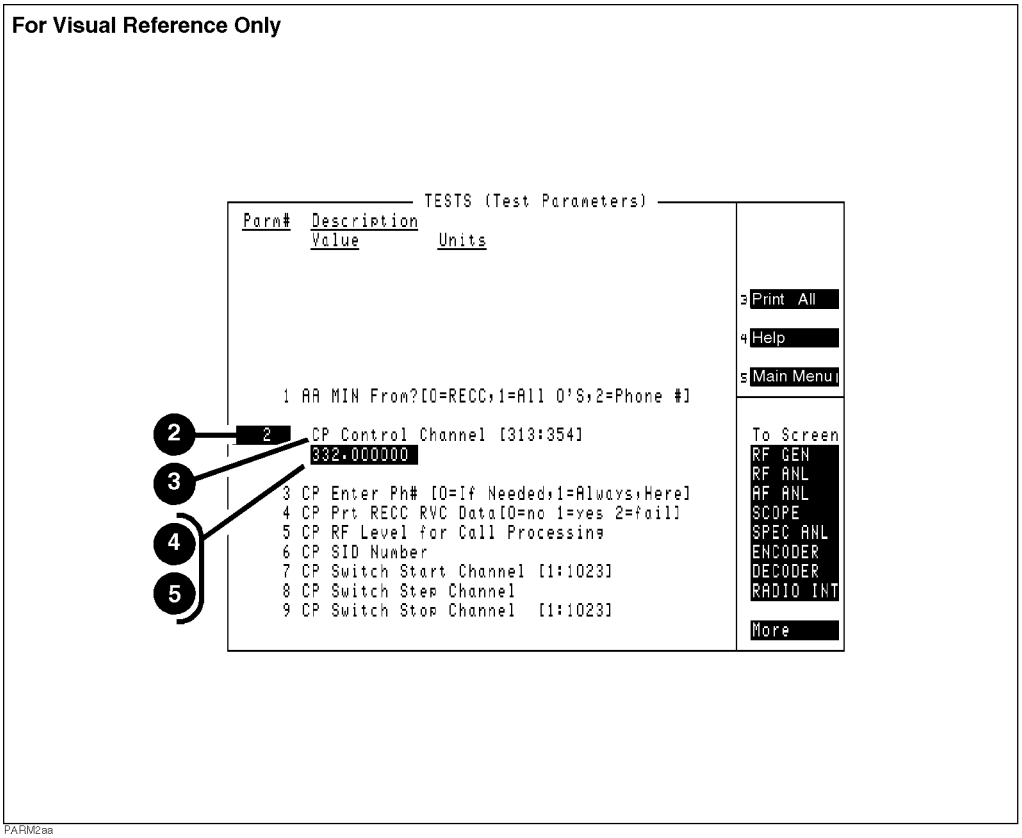
Continue Setup for Registration Test



PARM1aa

Next: Turn page to Run the Tests

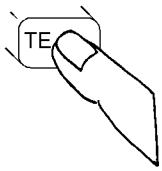
For Visual Reference Only



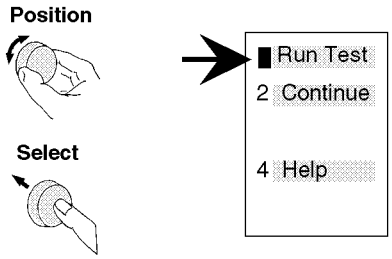
PARM2aa

Run the Registration Test

6 *Power on mobile, then press* **TESTS**.



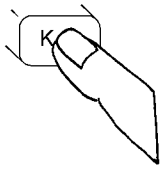
7 *Position cursor at* **Run Test** *and select it.*



8 *Disregard* **WARNING**, *it does not apply to* **REGISTER** *test. If test stops and error message is displayed, check 1-4 below, then press* **K1**.

1. RF IN/OUT to Antenna connection
2. Mobile is powered on
3. Handset is connected
4. Control Channel parameter

K1 *resumes testing*



9 *When screen appears as shown below, testing is complete.*

```
____Voice Ch=201: RX=876.03 MHz: TX=831.03 MHz____
Phone number:  (111) 111-0111
Serial number: 146-08388805
               928000C5 hex
Power Class:   Class I
Transmission:  Continuous
Bandwidth:     25 MHz

Test time= 26 secs.
```

(Values for your mobile may be different.)

PARM1aaa

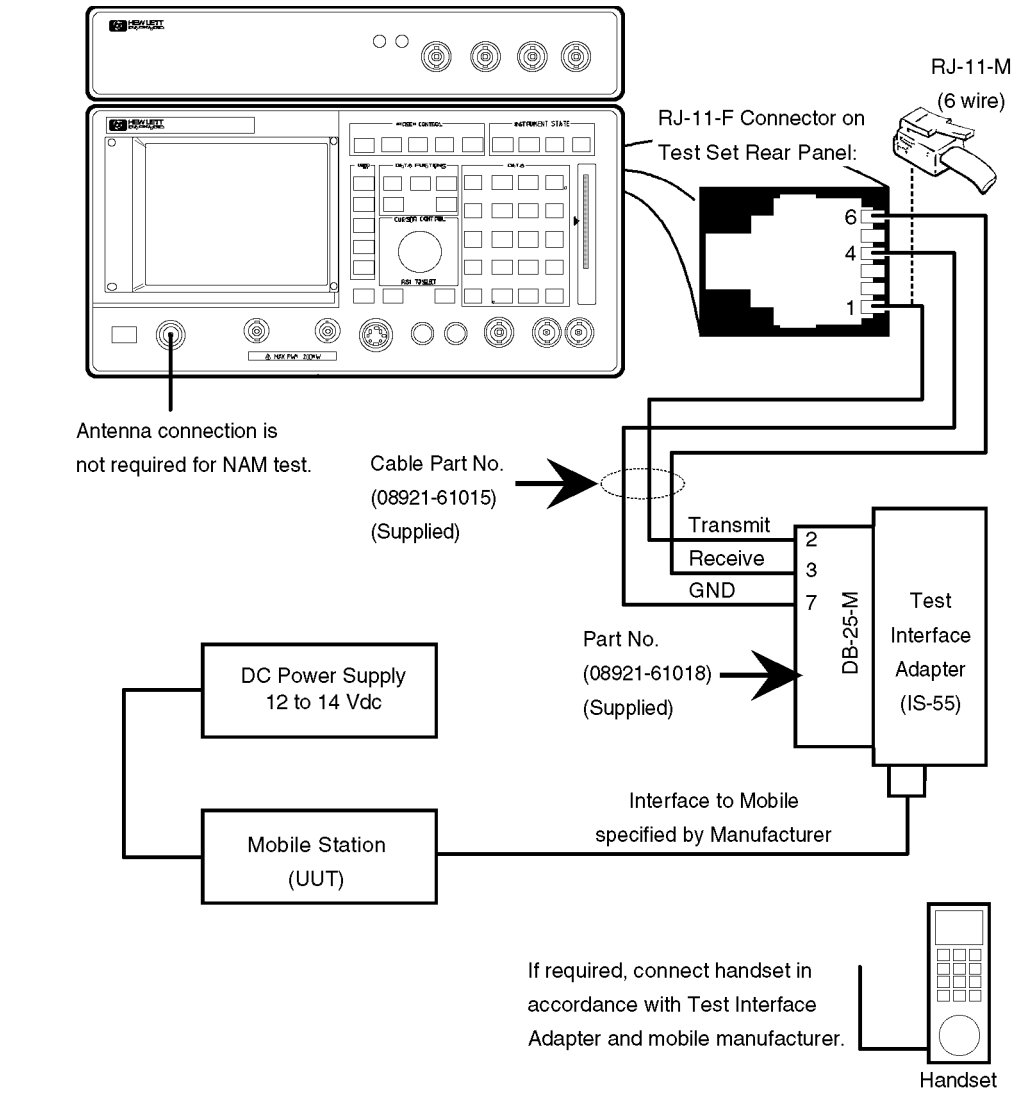
10 *Now make connections for NAM test procedure. (See next page)*

Note

If required, connect handset in accordance with Test Interface Adapter and mobile manufacturer.

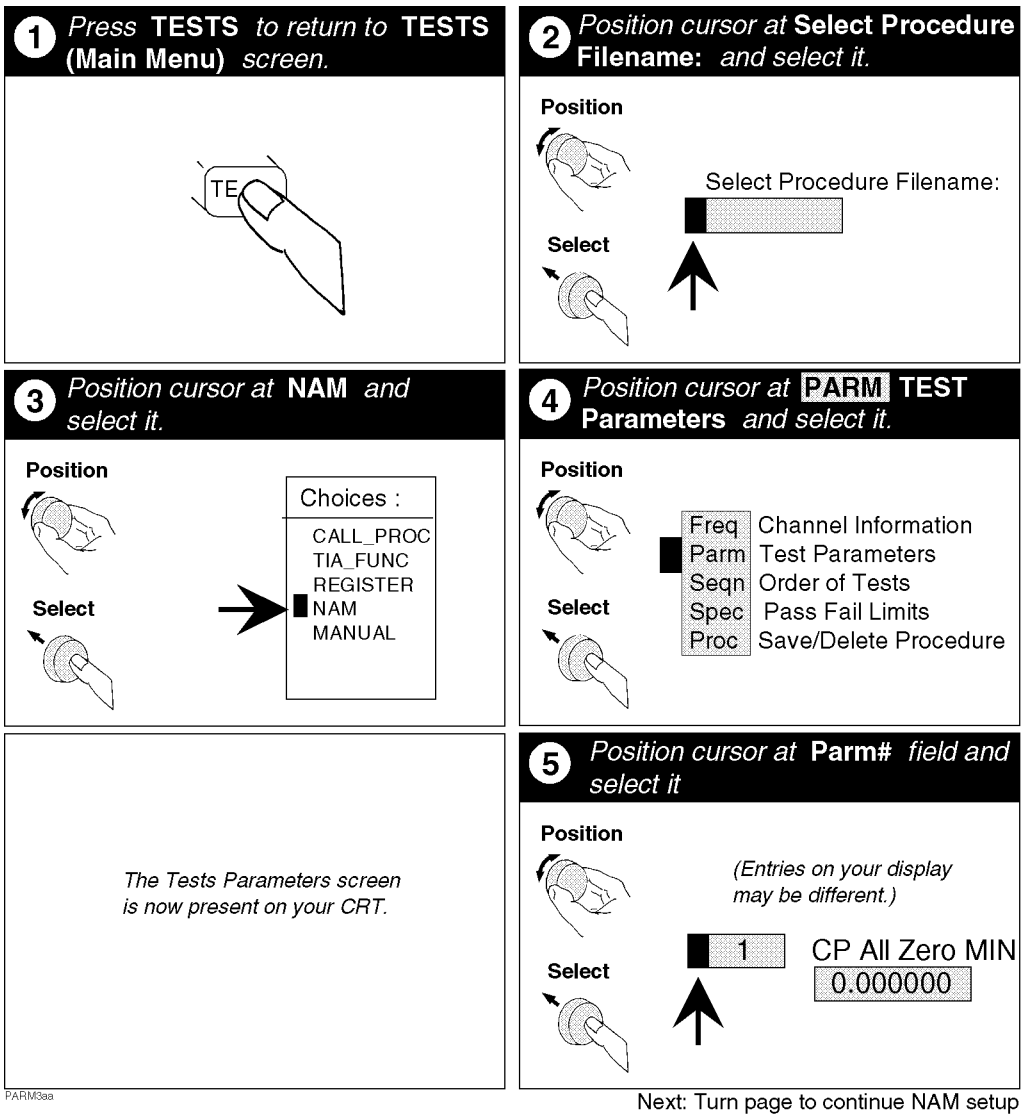
Next: Turn page to set up NAM procedure

Make Connections for NAM Test (Number Assignment Module data)



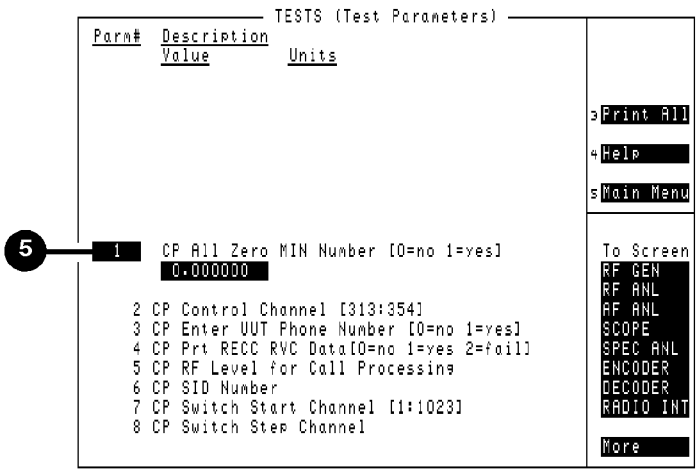
PARM2A

Setup for NAM



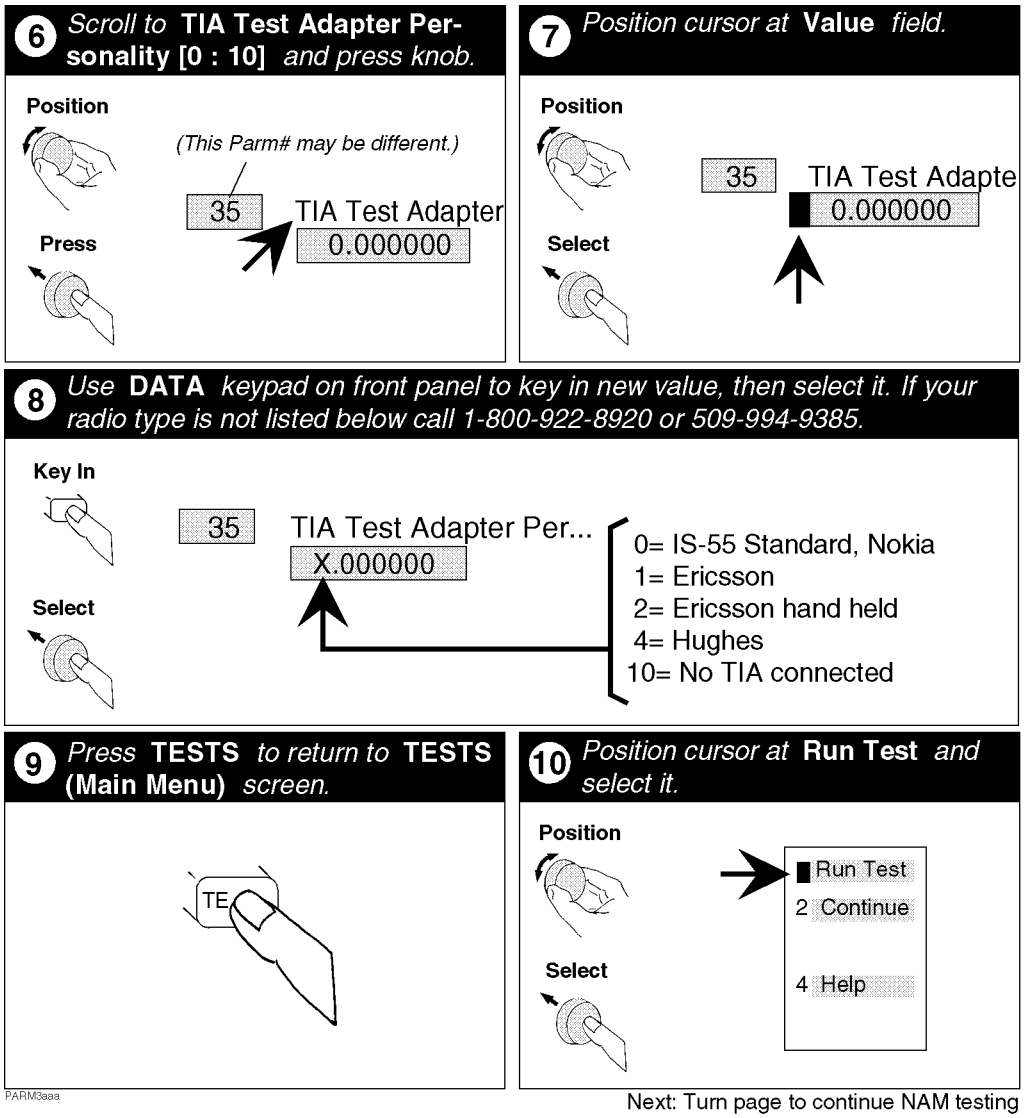
Next: Turn page to continue NAM setup

For Visual Reference Only



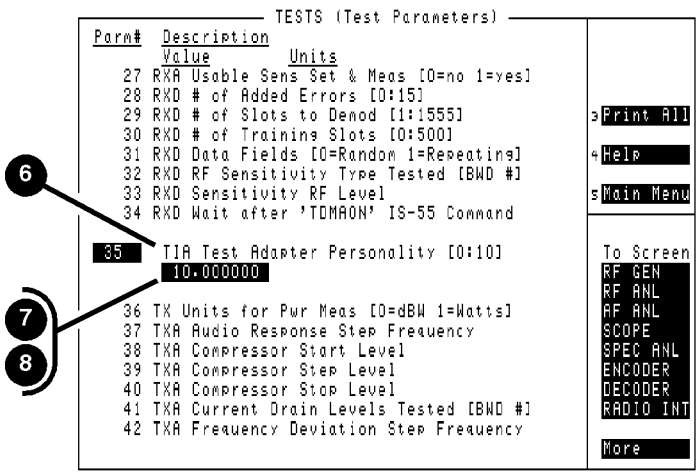
PARM4aa

Continue Setup and Run NAM Test



Next: Turn page to continue NAM testing

For Visual Reference Only

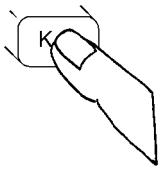


PARM4aaa

12 *If testing stops and message is displayed check 1-5 below, then press* **K1**.

1. Test System to Test Interface Adapter connection
2. Test Interface Adapter to Mobile connection
3. TIA Test Adater parameter
4. DC Power to Mobile
5. Recycle power to Mobile
6. Recycle power to HP 8920A, then go to step one.

K1 *resumes testing*



13 *When screen appears as shown below* **NAM** *testing is complete.*

```
IPCHP                          333
IPCHS                          737
ACCOLC                         7
MIN mark                       1
Group ID                       10
Lock digits                    0000
Phone number:  (111) 111-0111
Serial number: 928000C5

Test time= 17 secs.
```

Values for your mobile may be different

PARM3B

You have now completed the tasks associated with Getting Started. You have run two tests that confirm the functionality of the Test System, software and mobile unit. Proceed to **chapter 3, "Product Description," on page 55** for an introduction to the HP 11807A,E Option 008 Software and a guide to the organization of this manual.

2

Getting Started with FW Below Rev. A.14.00

What You Will Test

NOTE: The firmware revision A.14.00 in the HP 8920A, HP 8921A, HP 8920D, and HP 8921D had several enhancements, which are standard in the HP 8920B. This chapter applies to users with:

- **HP 8920A, HP 8921A, HP 8920D, and HP 8921D test sets with firmware revision below A.14.00**

The Test Set's firmware revision is displayed on the top right corner of the configuration screen.

- Press SHIFT CONFIG to display the configuration screen and read the firmware revision.

If you have an HP 8920B or an HP 8920A with firmware revision above A.14.00, refer to **chapter 1, "Getting Started with FW Above Rev. A.14.00"**. Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

Getting Started will quickly acquaint you with the operation of the Test Set and the HP 11807A Option 008 Software. You will setup and run the following two tests:

1. Registration test (TEST_02 - CPA Registration)
2. NAM test (TEST_01 - NAM Number Assignment Module Data)

Test Set or System is Defined As:

- HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
- HP 8921A, Option 500, Dual-Mode Cellular Test System
- HP8920D, Dual-Mode Cellular Mobile Test System
- HP 8921D, Dual-Mode Cell Site Test System

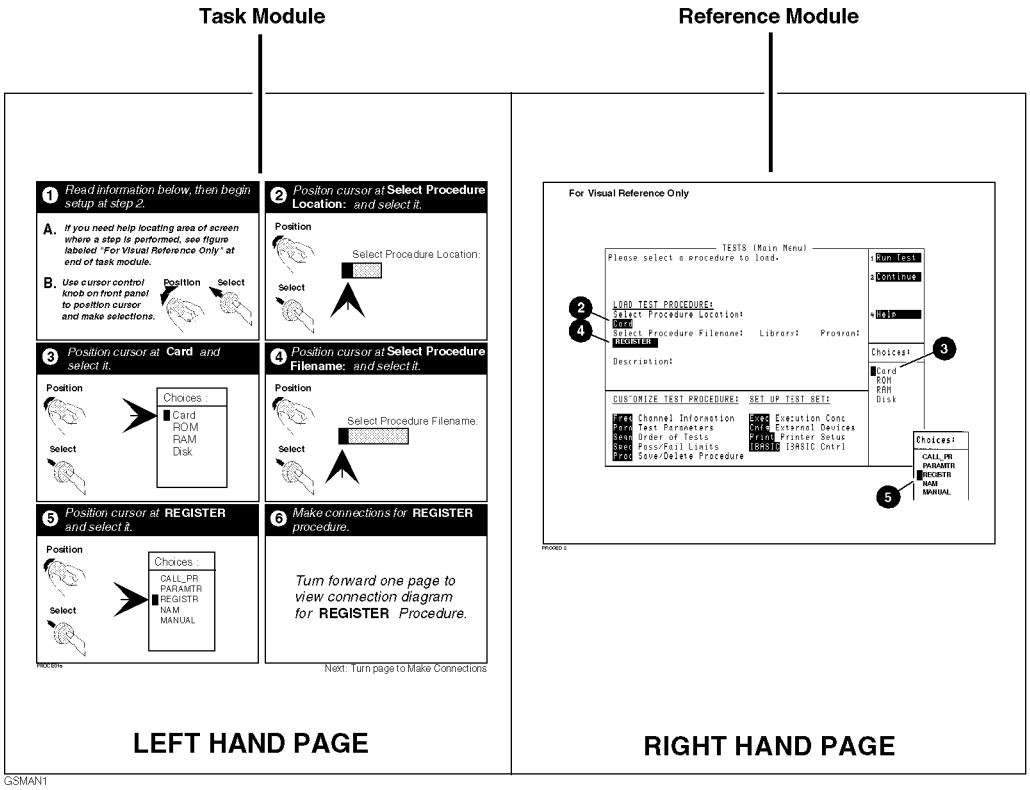
Equipment Needed to Get Started

You will need the following in order to complete the testing in Getting Started:

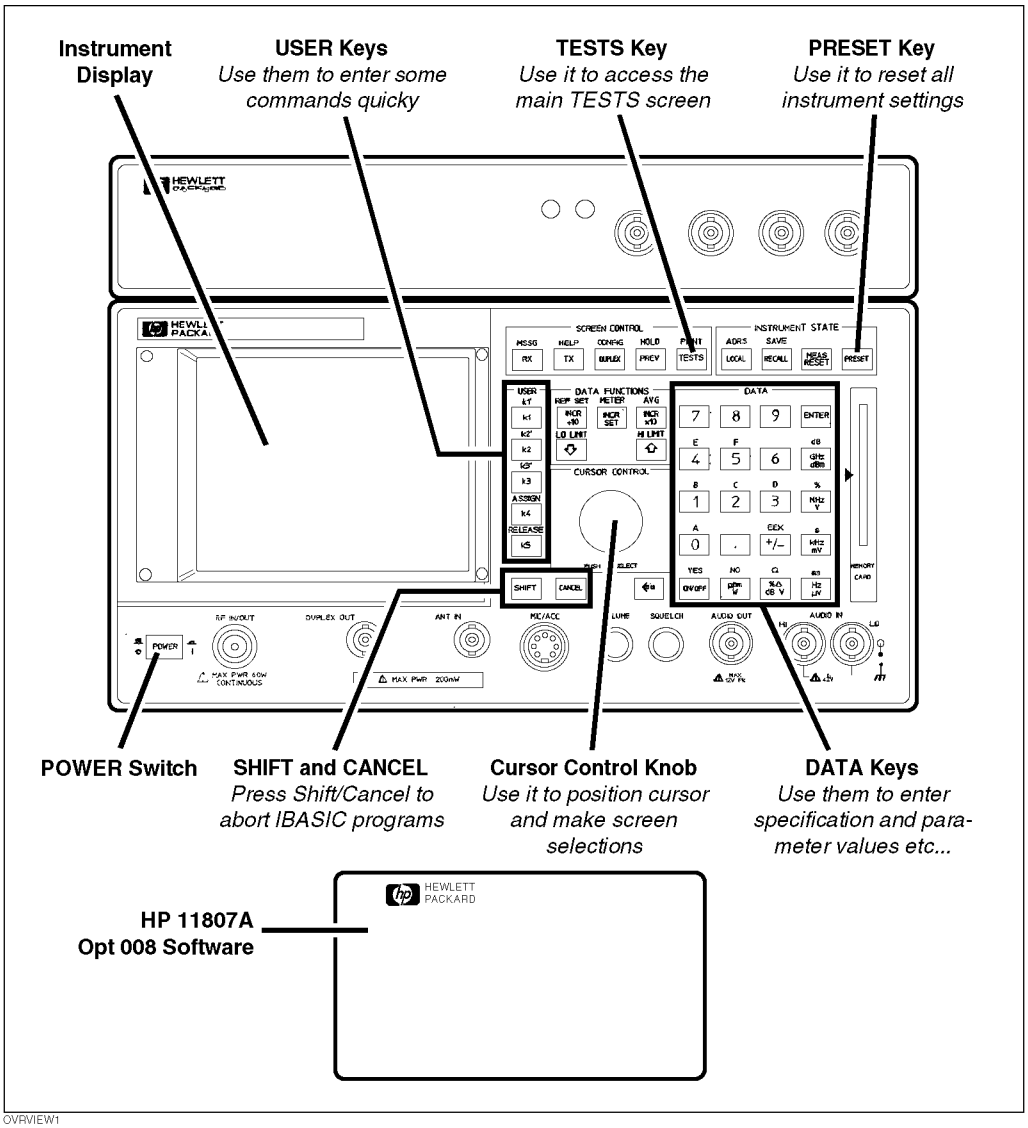
- HP 11807A Option 008 Software
- One of the following:
  - HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
  - HP 8921A, Option 500, Dual-Mode Cellular Test System
  - HP 8920D, Dual-Mode Cellular Mobile Test System
  - HP 8921D, Dual-Mode Cell Site Test System
- DC power supply (if the phone being tested requires an external power source) and appropriate cabling to the mobile
- A Test Interface Adapter specific to the mobile unit being tested. This adapter should be acquired from the mobile manufacturer.
- A NADC mobile unit with a handset
- Knowledge of the Control Channel of the mobile unit
- Type N (m) to BNC (f) adapter for mobile antenna connection to Test System RF IN/OUT
- BNC (f) to TNC (m) adapter for mobile antenna connection
- BNC (m) to BNC (m) cable, 4 to 6 feet for mobile antenna connection to Test System RF IN/OUT
- RJ-11 (m) to RJ-11 (m) cable, supplied with HP 11807A Option 008 Software for Test System to Test Interface Adapter connection (part number 08920-61015)
- RJ-11 (f) to DB-25 (m) adapter, supplied with HP 11807A Option 008 Software for Test System to Test Interface Adapter connection (part number 08920-61018)

How to Use This Getting Started

The instructions in this guide are presented as Task and Reference Modules. Use the Task Modules to perform the steps required to run testing and use the Reference Modules to locate where on the screen the steps are performed.



Test System Overview



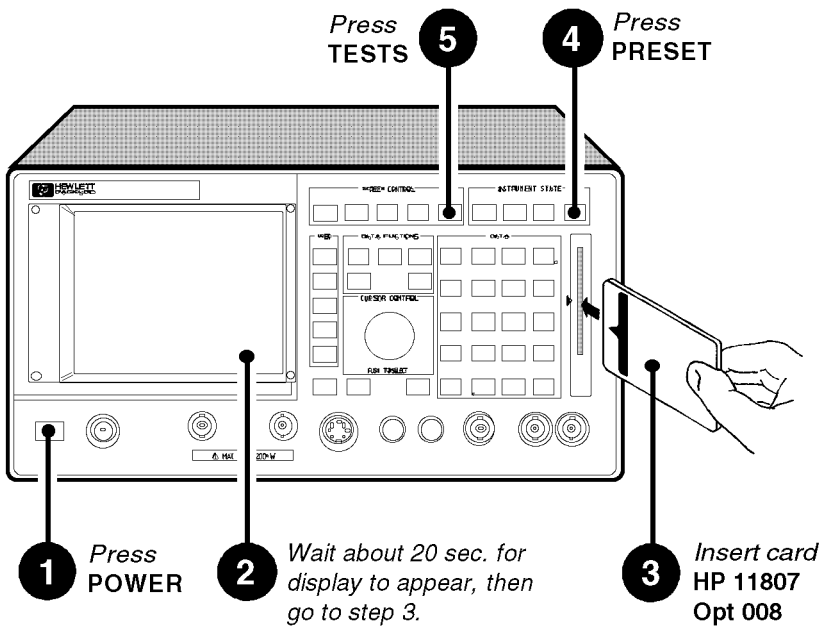
OVRVIEW1

Load the Software

Do steps 1-5 in numbered order.

(If after step 5 screen looks like figure on right, power-up is complete.)

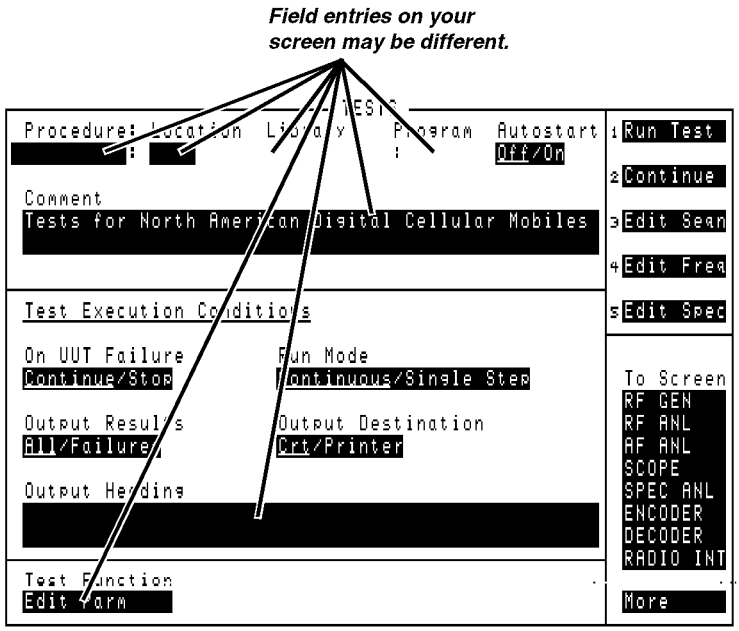
(PRESET is a reset that can be used at any time to re-start.)



LOAD1

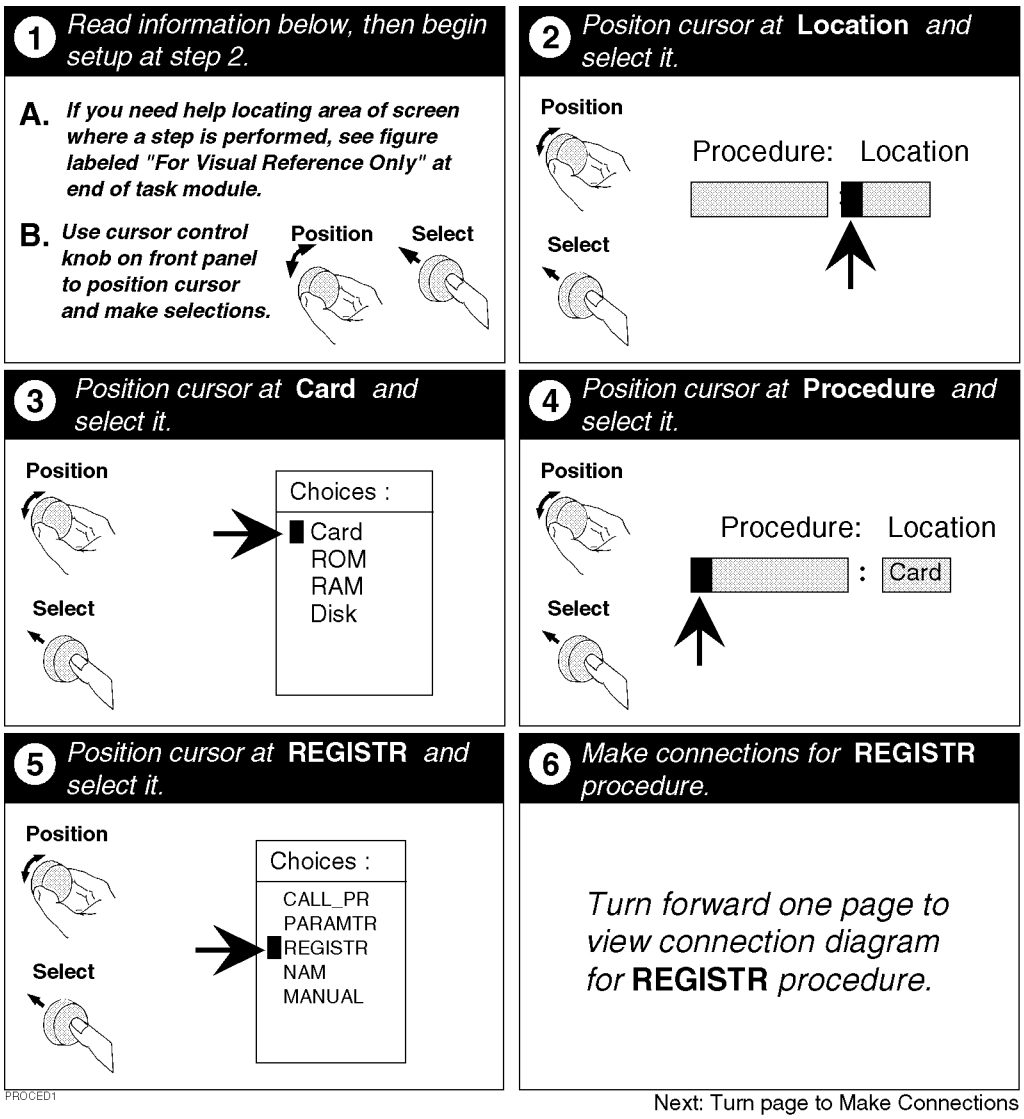
Next: Turn page to select REGISTER procedure

For Visual Reference Only



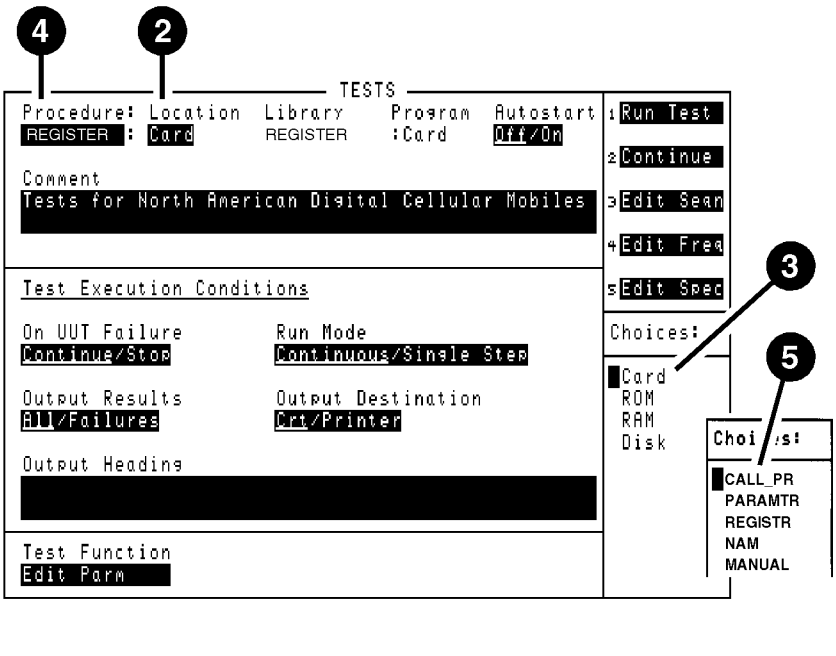
LOAD2

Begin Setup for Registration Test



Next: Turn page to Make Connections

For Visual Reference Only



PROCED2

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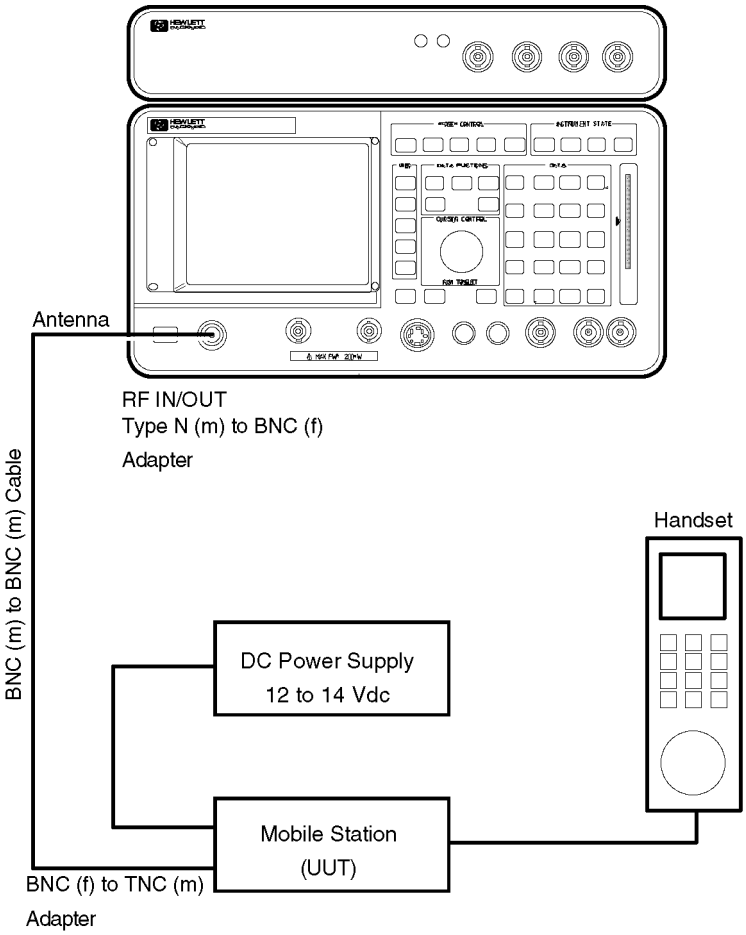
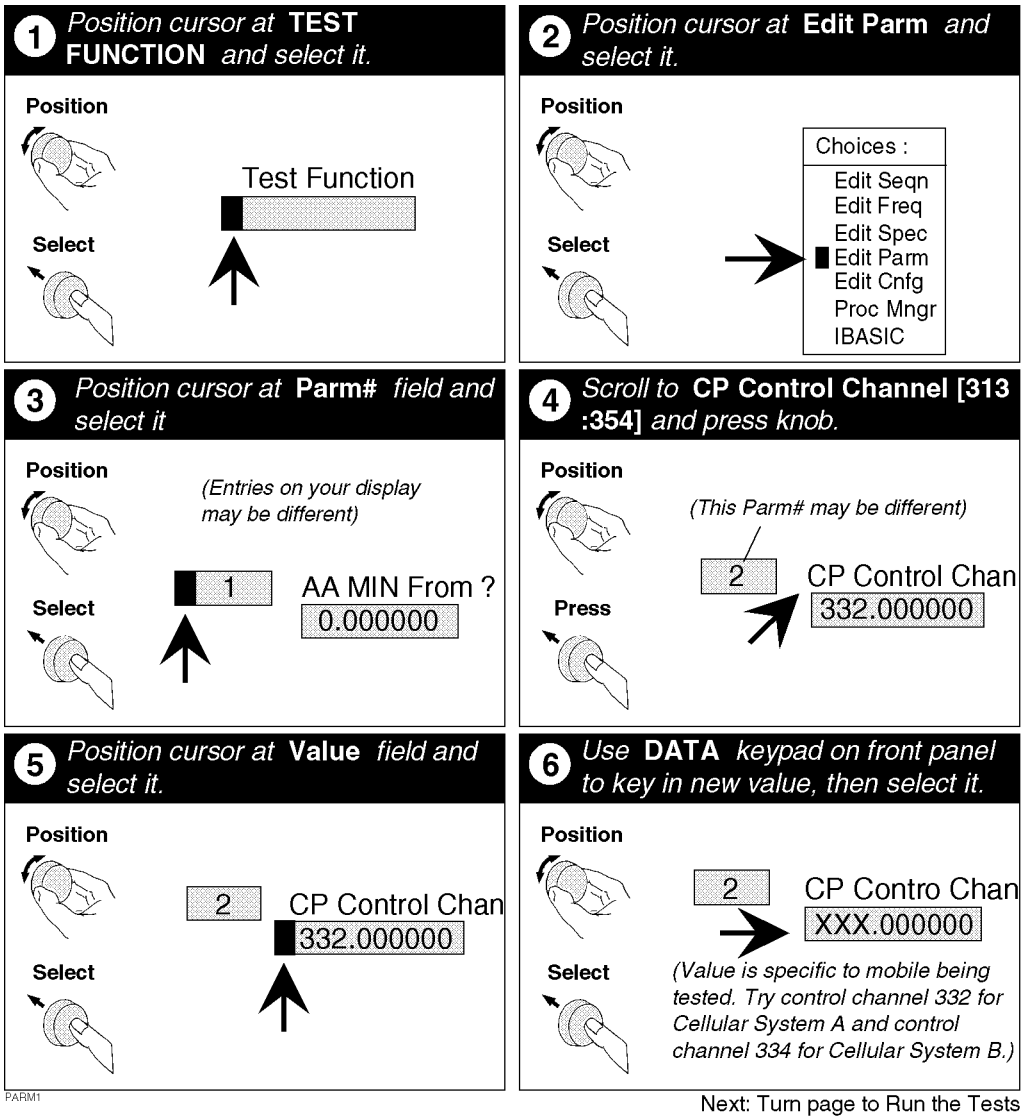
Make Connections for Registration Test

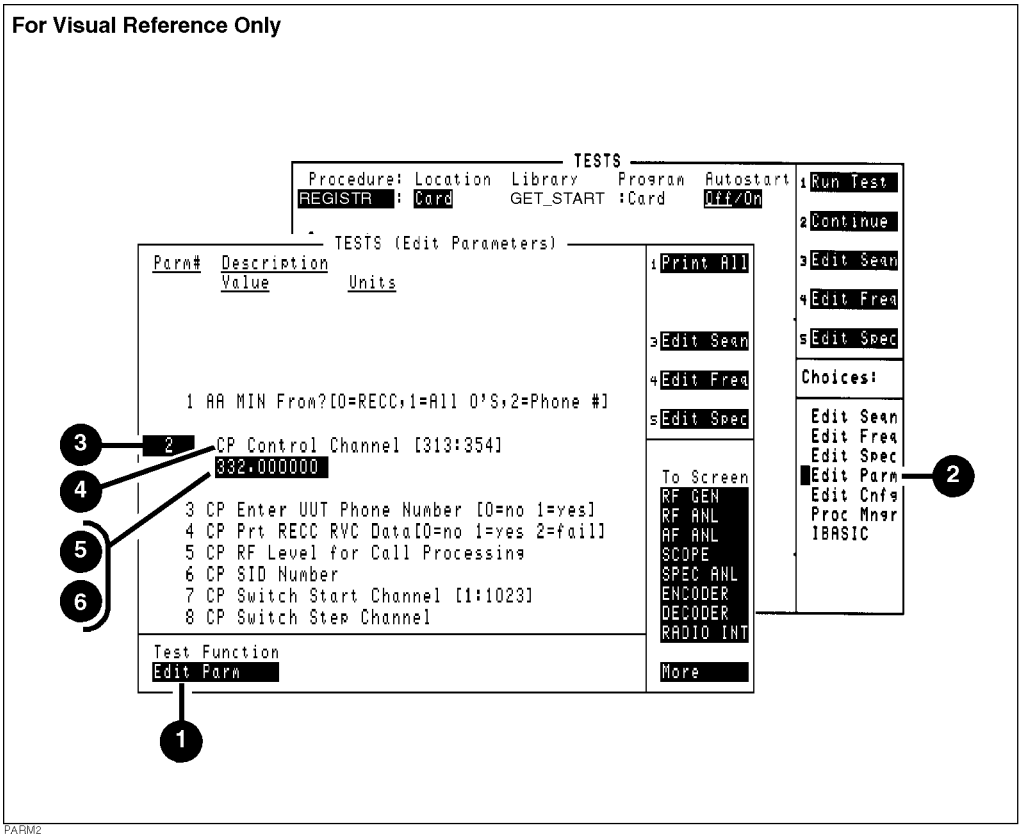


Continue Setup for Registration Test



Next: Turn page to Run the Tests

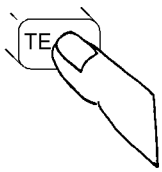
For Visual Reference Only



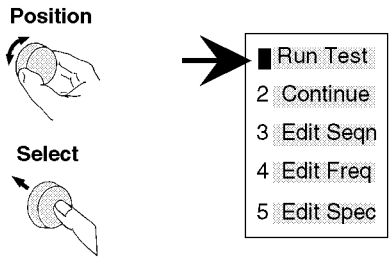
PARM2

Run the Registration Test

7 *Power on mobile, then press* **TESTS** *to return to* **TESTS** *screen.*



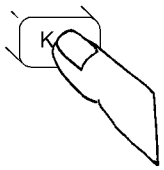
8 *Position cursor at* **Run Test** *and select it.*



9 *Disregard* ****WARNING**** *, it does not apply to* **REGISTER** *test. If test stops and error message is displayed, check 1-4 below, then press* **K1**.

1. RF IN/OUT to Antenna connection
2. Mobile is powered on
3. Handset is connected
4. Control Channel parameter

K1 *resumes testing*



11 *When screen appears as shown below, testing is complete.*

```
____Voice Ch=201: RX=876.03 MHz: TX=831.03 MHz____
Phone number:  (111) 111-0111
Serial number: 146-08388805
               928000C5 hex
Power Class:   Class I
Transmission:  Continuous
Bandwidth:     25 MHz

Test time= 26 secs.
```

(Values for your mobile may be different)

PARM1A

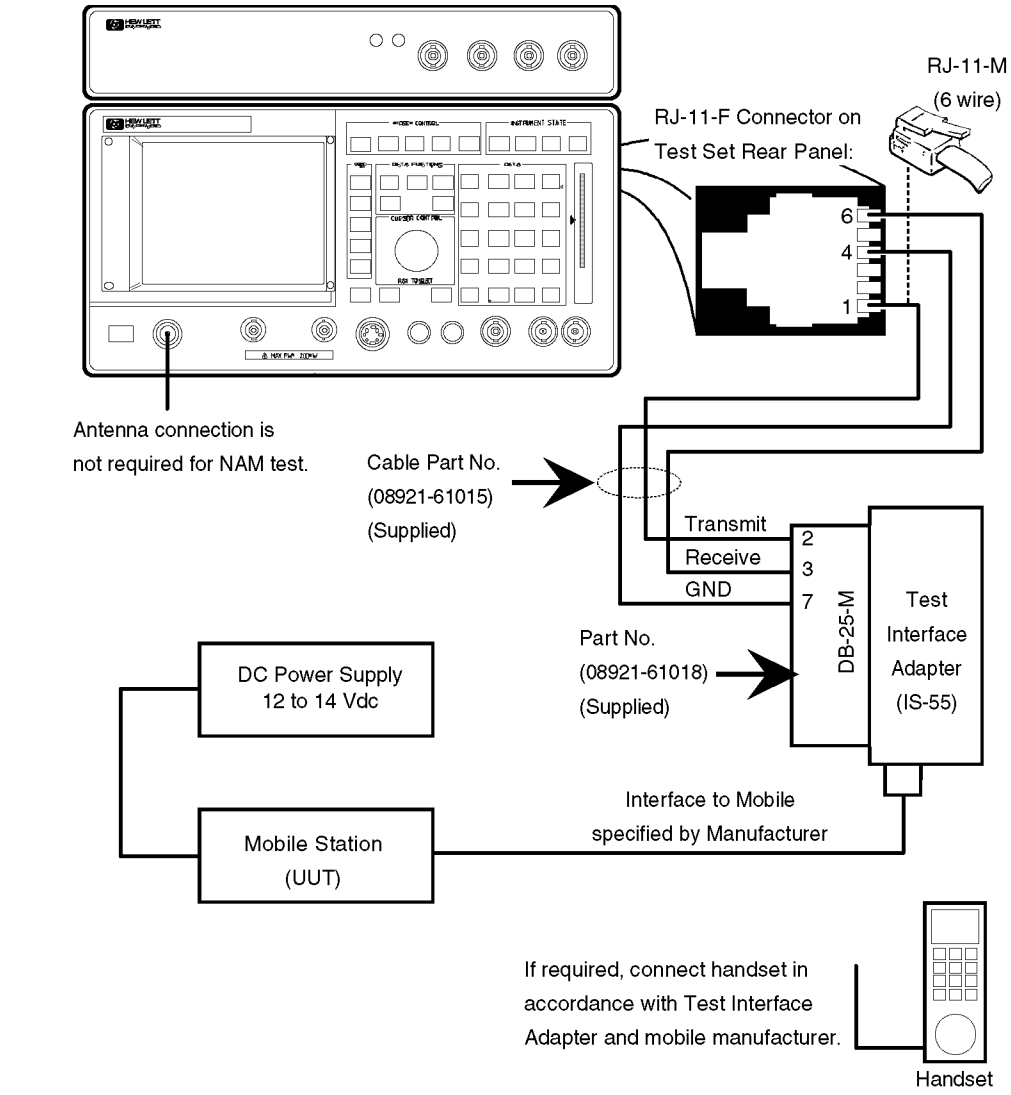
12 *Now make connections for NAM test procedure. (See next page)*

Note

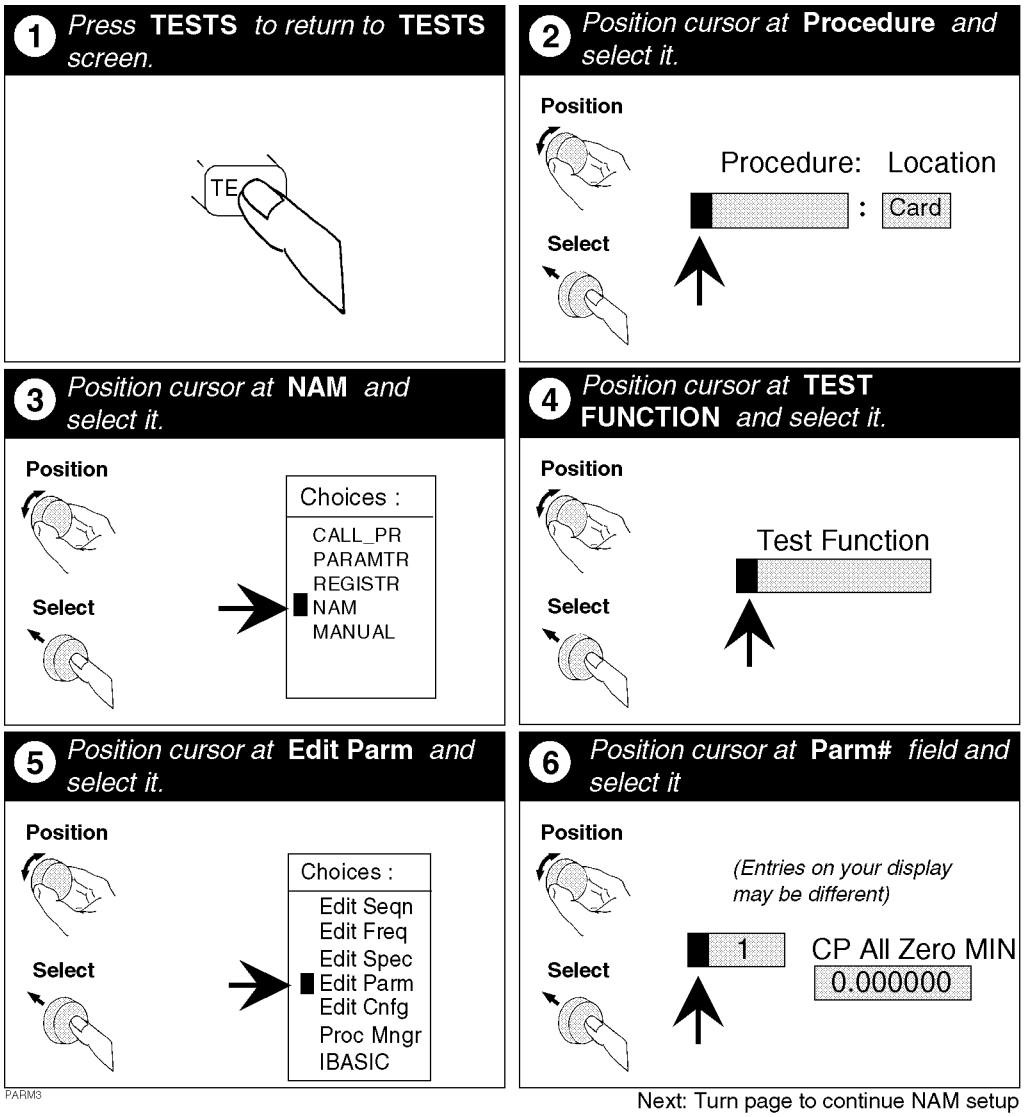
Connect handset, if required, in accordance with Test Interface Adapter and mobile manufacturer.

Next: Turn page to set up NAM procedure

Make Connections for NAM Test (Number Assignment Module data)

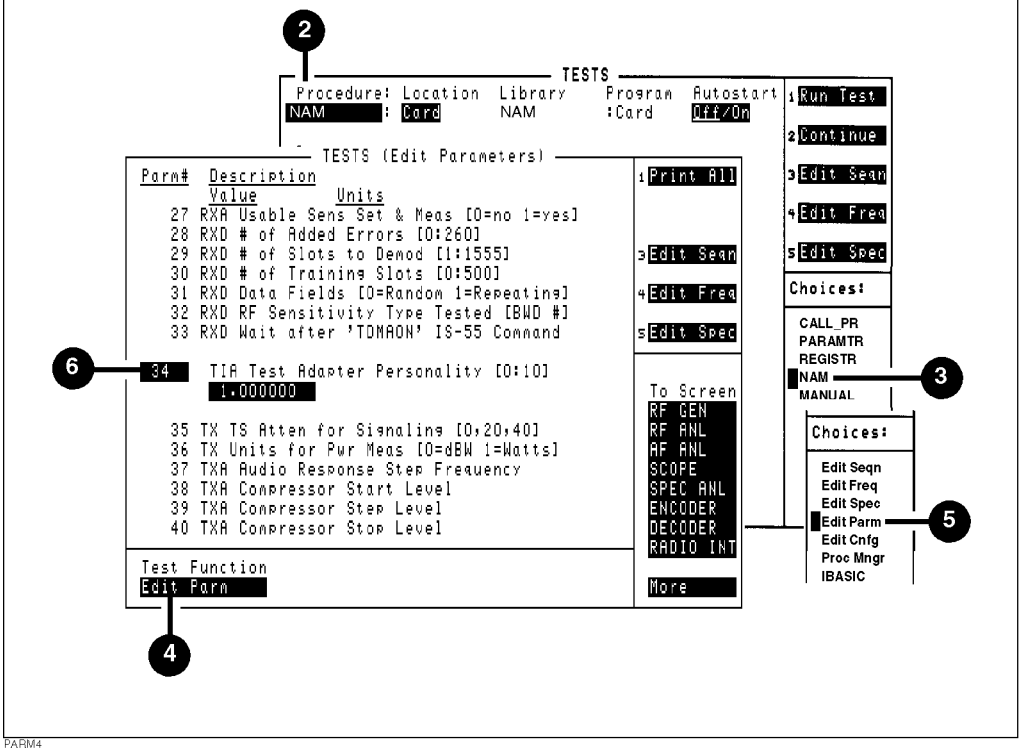


Setup for NAM



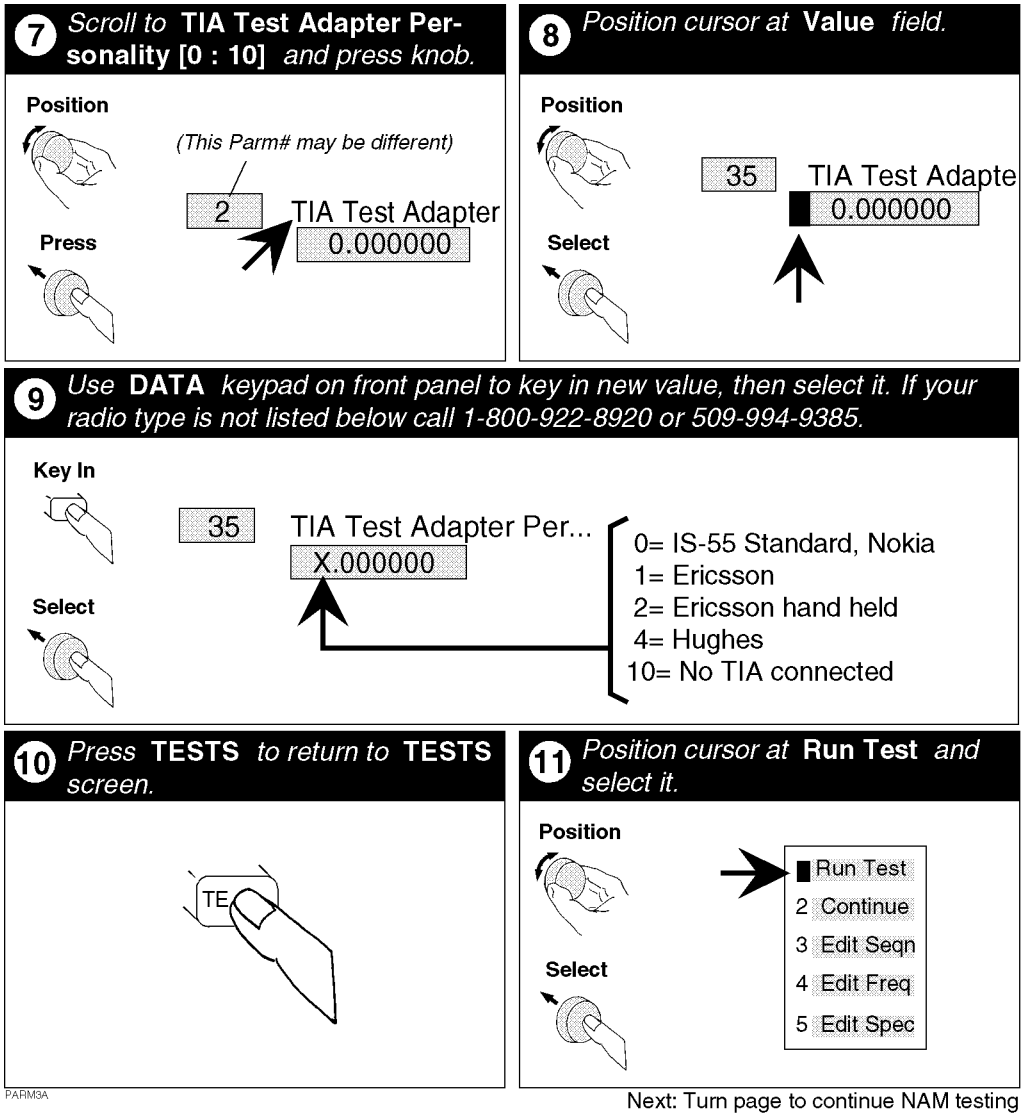
Next: Turn page to continue NAM setup

For Visual Reference Only



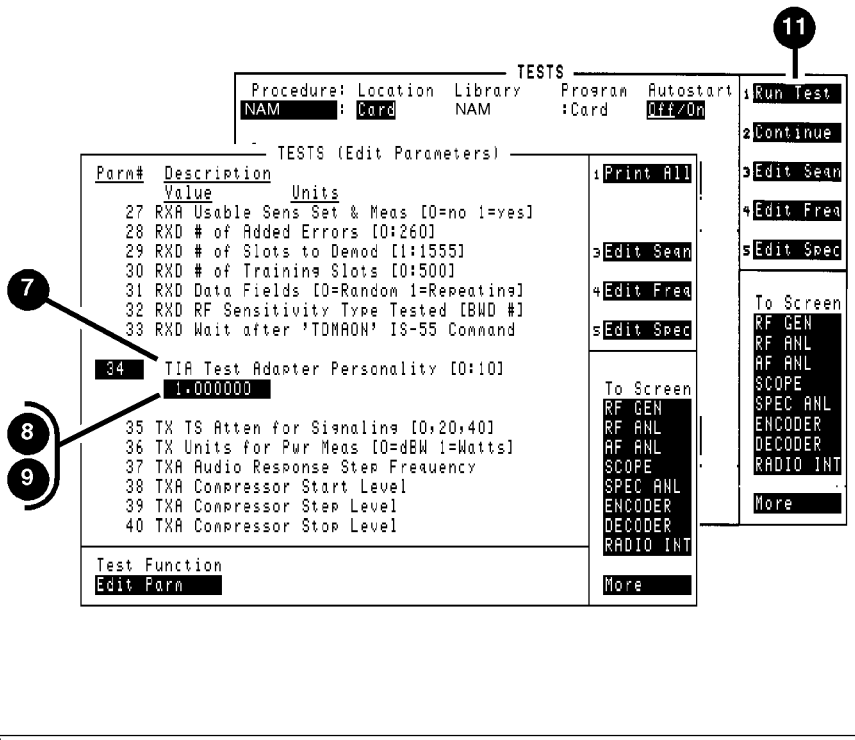
PARM4

Continue Setup and Run NAM Test



Next: Turn page to continue NAM testing

For Visual Reference Only

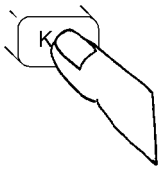


PARM4A

12 *If testing stops and message is displayed check 1-5 below, then press* **K1**.

1. Test System to Test Interface Adapter connection
2. Test Interface Adapter to Mobile connection
3. TIA Test Adater parameter
4. DC Power to Mobile
5. Recycle power to Mobile
6. Recycle power to HP 8920A, then go to step one.

K1 *resumes testing*



13 *When screen appears as shown below* **NAM** *testing is complete.*

```
IPCHP                          333
IPCHS                          737
ACCOLC                         7
MIN mark                       1
Group ID                       10
Lock digits                    0000
Phone number:  (111) 111-0111
Serial number: 928000C5

Test time= 17 secs.
```

Values for your mobile may be different

PARM3B

You have now completed the tasks associated with Getting Started. You have run two tests that confirm the functionality of the Test System, software and mobile unit. Proceed to **chapter 3, "Product Description," on page 55**, for an introduction to the HP 11807A Option 008 Software and a guide to the organization of this manual.

3

Product Description

HP 11807A,E Software

The HP 11807A,E Option 008 Software when used with a Test Set provides parametric test capability which is compliant with the EIA/TIA (Electronic Industry Association / Telecommunications Industry Association) IS-55 Minimum Performance Standards for 800 MHz Dual-Mode Mobile Stations. The EIA/TIA IS-55 Standard requires that a Test Interface Adapter be used for interfacing the mobile unit to the Test System.

HP 11807A,E Option 008 software can be used for the installation, maintenance, and/or repair of:

- Dual Mode (NADC) Mobile Phones
  - When used with a Test Interface Adapter that conforms to the EIA/TIA IS-55. See **"Test Set to Test Interface Adapter Connection" on page 65** for more information.

Items Included in the HP 11807A,E Option 008 Software

- HP 11807A Option 008 Test Software (part number 11807-10008) or HP 11807E Option 008 Test Software (part number 11807-10027)
- SRAM memory card (uninitialized), for saving your own test procedures and results.
  - For HP 11807A, 32 Kbytes SRAM (part number HP 85700A).
  - For HP 11807E, 64 Kbytes SRAM (part number HP 83230A).
- RJ-11 (m) to RJ-11 (m) cable for test system to test interface adapter connection (part number 08920-61015).
- RJ-11 (f) to DB-25 (m) adapter for test system to test interface adapter connection (part number 08920-61018).
- HP 11807A,E Option 008 Software Reference Guide (part number 11807-90123).

Software Functionality

- Automation of measurements
- Parametric verification to EIA/TIA IS-55 Minimum Performance Standards for 800 MHz Dual-Mode Mobile Stations
- In-depth call processing including call setup and handoffs

For a full list of Tests and descriptions, see **Chapter 7, "Test, Parameter, Pass/Fail Limit Descriptions," on page 133**.

Software Features

The following features simplify testing:

- Results of tests and pass/fail indications are displayed on the Test System CRT, and can be printed, or collected in a disk drive, memory card, PC, or HP Palmtop.
- Print test results.
- The software allows the operator to change TEST order, pass/fail limits, testing conditions and equipment configurations.
- RF path losses can be determined and corrected.

Equipment Needed

- HP Test Set (one of the following:)
  - HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
  - HP 8921A, Option 500, Dual-Mode Cellular Test System
  - HP 8920D, Dual-Mode Cellular Mobile Test system
  - HP 8921D, Dual-Mode Cell Site Test System

The Test Sets offer TDMA Dual-Mode Mobile test capability plus analog mobile test capability offered by the HP 8920A,B or HP 8921A.

- The HP 8920B Option 500 consists of:
  - HP 8920B RF Communication Test
  - HP 83201B, Option 003, TDMA Dual-Mode Cellular Adapter
- The HP 8921A, Option 500 consists of:
  - HP 8921A Cell Site Test Set
  - The HP 83204A, Option 001, Dual-Mode Cellular Adapter
- The HP 8920D consists of:
  - HP 8920A RF Communications Test Set with Options 003, 004, 005, 013, and 050.
  - HP 83201A Dual-Mode Cellular Adapter
- The HP 8921D consists of:
  - HP 8921A Cell Site Test Set
  - HP 83201A Dual-Mode Cellular Adapter

See the HP 8920 or HP 8921 manual for detailed operating instructions. Option 013 (C-Message Weighting Filter) on the HP 8920A,B is not required for the software to operate, however, not having the option will affect parametric measurement results in TEST_11, TXA Audio Distortion, Hum/Noise and Muting, TEST_20, RXA Audio Distortion, Hum/Noise and Muting, TEST_21, RXA Expandor, and TEST_22, RXA SINAD.

This software currently supports the HP 8920A, HP 8921A, and HP 8920B Options 007 and 008. This software does not support Option H08, a special version to support high-power-transmitter-measurement applications (Option H08 will change to Option 016 in early 1996).

The internal firmware of the HP 8920A and HP 8921A, must be equal to or greater than a specific revision for the software to work correctly. The software works correctly in all HP 8920B firmware revisions. In addition, the internal firmware of the HP 83201 must be equal to or greater than a specific revision for the software to work correctly. The software works correctly in all HP 83204A Option 001 firmware revisions.

The firmware revision of the HP 8920A,B or HP 8921A Test Set can be viewed in the following manner.

- Press SHIFT CONFIG on the HP 8920A,B, or HP 8921A.
- Read the firmware revision on the I/O CONFIGURE screen. This revision number must be **A.10.04** or greater.

The firmware revision of the HP 83201A Dual Mode Cellular Adapter can be viewed in the following manner.

- Press SHIFT CONFIG on the HP 8920A,B/HP 8921A.
- Rotate the knob until you locate **SERVICE** under **To Screen** and select it by pushing the knob.
- Rotate the knob to **Latch** and select it.
- Rotate the knob until you find **rx_dsp_revision** under **Choices**, and select it.
- Read the **rx_dsp_revision** number under **Value**. This revision number must be **19930909** or greater.
- Select **Latch** again and rotate the knob to **tx_dsp_revision** and select it.
- Read the **tx_dsp_revision** number under **Value**. This revision number must be **19930909** or greater.

If any of these revision numbers are not correct, contact Hewlett-Packard at 1-800-922-8920 or for details on upgrading your instrument.

- The Test Set has the ability to make tests at normal, high, and low supply voltages to the radio under test. If you want to perform the tests associated with these voltages a dc power supply is required that is variable from the low to high voltages and is capable of supplying the current required by the phone being tested. The software will prompt you when adjustment is necessary.

  If you desire to use an HP-IB power supply that is controlled by the software over HP-IB, a Hewlett-Packard dc power supply with appropriate voltage and current capabilities from the following series must be used:

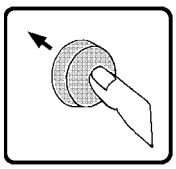
  - HP 664xA
  - HP 665xA
  - HP 667xA
  - HP 668xA

NOTE: HP 662xA and HP 663xA series dc power supplies are not supported.

- Connection arrangements, see **Chapter 4, "Making Connections," on page 63** for more details.
- Optional Accessories
  - SRAM (Static Random Access Memory) Card(s) for storing test setups and test results (see **"Memory Cards" on page 261** for part numbers).
  - Printer and cables to document results.
  - PC, disk drive, or HP Palmtop computer to store data.

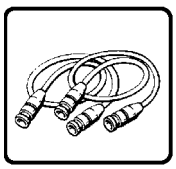
Finding the Information You Need

This manual describes the setup and use of the HP 11807A,E Software with the Test Set. The book is arranged in self contained chapters to meet the following objectives:



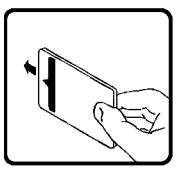
GETTING STARTED

- Fast paced, hands on tutorial.
- Basic test set/software operation.
- First time or occasional users.



CONNECTIONS-CHAPTER 4

- Instructions for cabling test set.



USING THE SOFTWARE-CHAPTER 5

- How to load
- How to run
- How to customize
- Conceptual overview

TEST DESCRIPTIONS-CHAPTER 7

Definitions, special conditions and restrictions for:

- Tests
- Specifications-Pass/fail limits
- Parameters-Test conditions

REFERENCE-CHAPTER 8

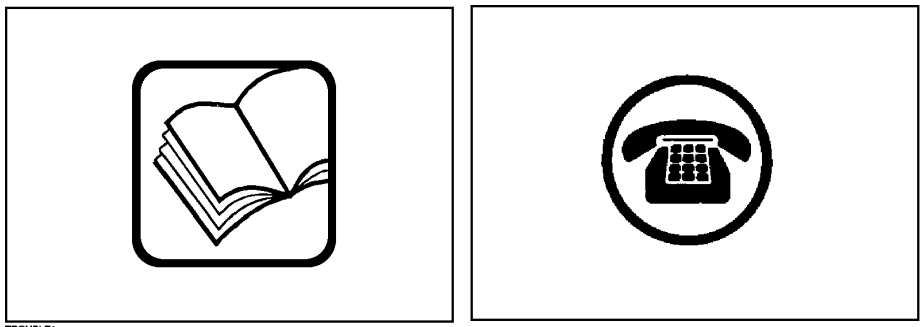
- Alphabetically listed
- Detailed descriptions of all the features and functions of the software.
- For the advanced level user.

PROBLEM SOLVING-CHAPTER 9

- Alphabetically listed
- Symptoms and possible corrections to frequent user problems.
- Error Messages

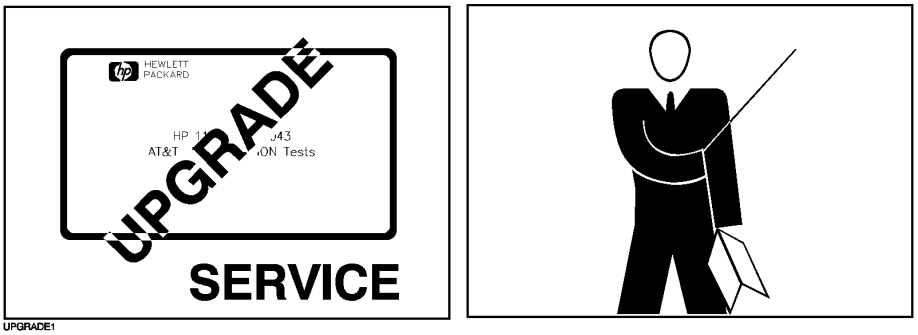
MANUAL1

Additional Services Available



TROUBLE1

Consult the HP 8920A,B Users Guide or call the HP 8920D/HP 8921A Option 500 Hotline 1-800-922-8920 (in the U.S.A. and Canada) and give your software model number.



UPGRADE1

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

4

Making Connections

Equipment Needed to Make Connections

Mobile Unit Equipment

- A Dual-mode (TDMA) Mobile Station
- A Test Interface Adapter (provided by the mobile manufacturer)

The Test Interface Adapter

The HP 11807A,E Option 008 Software when used with the Test Set provides parametric test capability which is compliant with the EIA/TIA (Electronic Industry Association / Telecommunications Industry Association) IS-55 Minimum Performance Standards for 800 MHz Dual-Mode Mobile Stations. The EIA/TIA IS-55 Standard requires that a Test Interface Adapter be used for interfacing the mobile unit to the Test System. The Test Interface Adapter provides:

- Connections between the Test System and the mobile unit
- Translation of Standard Bus Commands into the mobile manufacturer's protocol

The Test Interface Adapter is supplied by the mobile station manufacturer. Every manufacturer must be compliant with the IS-55 Standard but this does not guarantee that all Adapters will operate or connect to all mobile units or the Test System in a consistent manner.

In general, call processing tests may not be run with the parametric tests (TXA Output Power etc.) because of reconnections that must be made during testing.

NOTE: Run the call processing tests separately from the parametric tests. Group the call processing tests in one test plan (procedure) and the parametric tests in another test plan (procedure).

Equipment Connections

Mobile Unit to Test System Connection

Numerous cables and connectors are required to interface the radio to the Test System. The following provides necessary equipment for connection.

Damage to Equipment

CAUTION: The Test System 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. Connections to equipment must be chosen to reduce the risk of damage to the equipment.

Test Set to Test Interface Adapter Connection

An interface cable is supplied with the HP 11807A,E Option 008 Software. This interface cable is provided for the connection and communication of the Test System to the Test Interface Adapter. This interface cable and connector does not provide for the audio connections required on some Test Interface Adapters. For those Test Interface Adapters that require the audio connections you will have to construct your own interface cable. The following description and connection diagram will help you construct the cable needed.

Interface Cable Construction

- The Test System has a rear-panel RJ-11 connector for serial communication. Connections to Transmit B, Receive B and Ground are used for TIA interface control and messaging. Connections to the other Transmit, Receive and Ground on the Test Set can be used for communication with printers and other external peripherals.
- An interface cable is required between the TIA interface box and Transmit B, Receive B and Ground on the Test Set. It is possible to construct this cable with the information given below. The connections between the Test Systems' RJ-11 connector and the TIA interface box are described below:
  - Test System Receive B (RJ-11 Pin 1) to DB25 pin 2
  - Ground (RJ-11 Pin 4) to DB25 pin 7
  - Test Set Transmit B (RJ-11 Pin 6) to DB25 pin 3

See "Printing," in chapter 8, on page 272, for printer connections to the serial port.

Cables and Connectors

Table 1 Connection Cables/Adapters

Description	Purpose	Quantity	Part Number
BNC (f) to Type N (m) adapter	Adapt BNC cable to RF IN/OUT	1	HP 1250-0780
BNC (f) to TNC (m) adapter	Adapt BNC cable to antenna out	1	HP 1250-2441
BNC (m) to BNC (m) cable, 4ft	Antenna and audio	3	HP 10503A
BNC (m) to Banana (f) adapter	AUDIO IN, HI and LO	2	HP 1250-2164
Banana (m) to BNC (f) adapter	Test System AUDIO IN	3	HP 1251-2277
Test Interface Adapter	RX, TX audio and IS-55 Commands	1	Mobile Manufacturer specific
Test Interface Adapter bus cable	Mobile unit to Test Interface Adapter	1	Mobile Manufacturer specific
RJ-11 (m) to RJ-11 (m), 25ft (supplied with Option 008)	Test System to DB-25 adapter	1	HP 08921-61015
RJ-11 (f) to DB-25 (m) adapter (supplied with Option 008)	Test System to Test Interface Adapter	1	HP 08921-61018

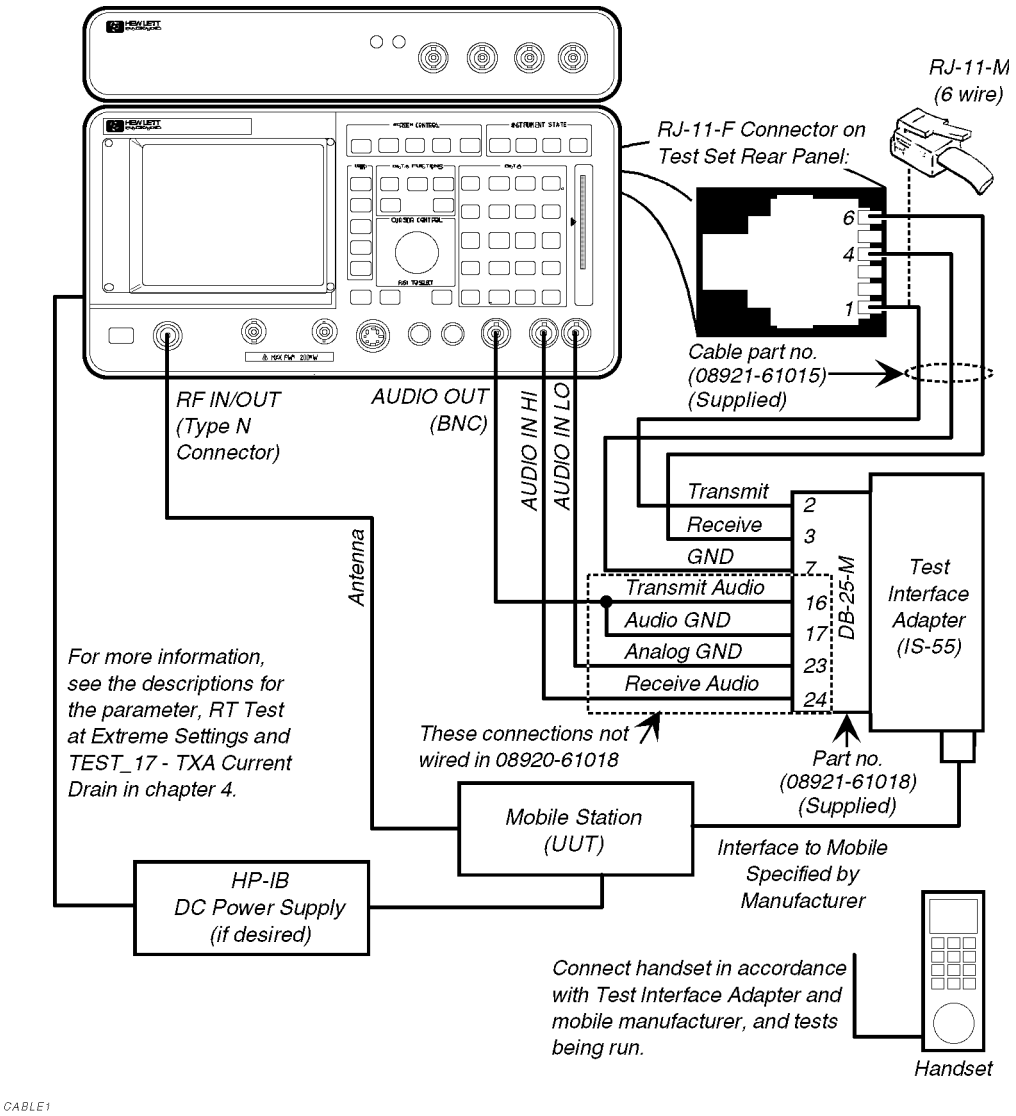


Figure 1 **Test System to Mobile Unit Connection**

Calibrating Cable Loss

Inaccuracies can occur in your measurements due to cable losses and impedance mismatches when making RF measurements. These inaccuracies can be calibrated out by running TEST_28 - TXD Calibrate RF Power (**see "Test Descriptions," in chapter 7, on page 141**) which produces calibration factors at different power levels and frequencies. Other RF tests will use these measured calibration factors when running tests. The test software will run with its own default calibration factors until you run TEST_28.

5

Using the Software/HP 8920B, or HP 8920A FW Above Rev. A.14.00

Firmware Revisions

NOTE: The firmware revision A.14.00 in the HP 8920A,D had several enhancements, which are standard in the HP 8920B. This chapter applies to users with:

- **HP 8920A, HP 8921A, HP 8920D, and HP 8921D test sets with firmware revision above A.14.00**
- **All HP 8920B test sets.**

The test set's firmware revision is displayed on the top right corner of the configuration screen.

- Press SHIFT CONFIG to display the configuration screen and read the firmware revision.

If you have an HP 8920A test set with firmware revision below A.14.00, refer to **Chapter 6, "Using the Software/HP 8920A FW Below Rev A.14.00," on page 101**. Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

Test Set or Test System is Defined As (One of the Following):

- HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
- HP 8921A, Option 500, Dual-Mode Cellular Test System
- HP 8920D, Dual-Mode Cellular Mobile Test System
- HP 8921D, Dual-Mode Cell Site Test System

The software can be run on the factory default settings or customized to your individual needs and specific requirements. This chapter provides detailed information on how to load, run, and customize the software.

The test set has two methods of accessing on-line help. In each of the screens in the test environment, k4 (**`Help`**) accesses specific information about how to set up/use the current screen. SHIFT HELP accesses the master help file, with an alphabetical listing of help topics.

Testing Overview

Pressing TESTS will display what is called the **`TESTS (Main Menu)`** screen. To begin testing, you must first load the software and make connections. From this screen you have the option to:

Begin running tests:

- The factory default settings are acceptable for your application or
- The software has already been customized and saved to a memory card

Customize the software:

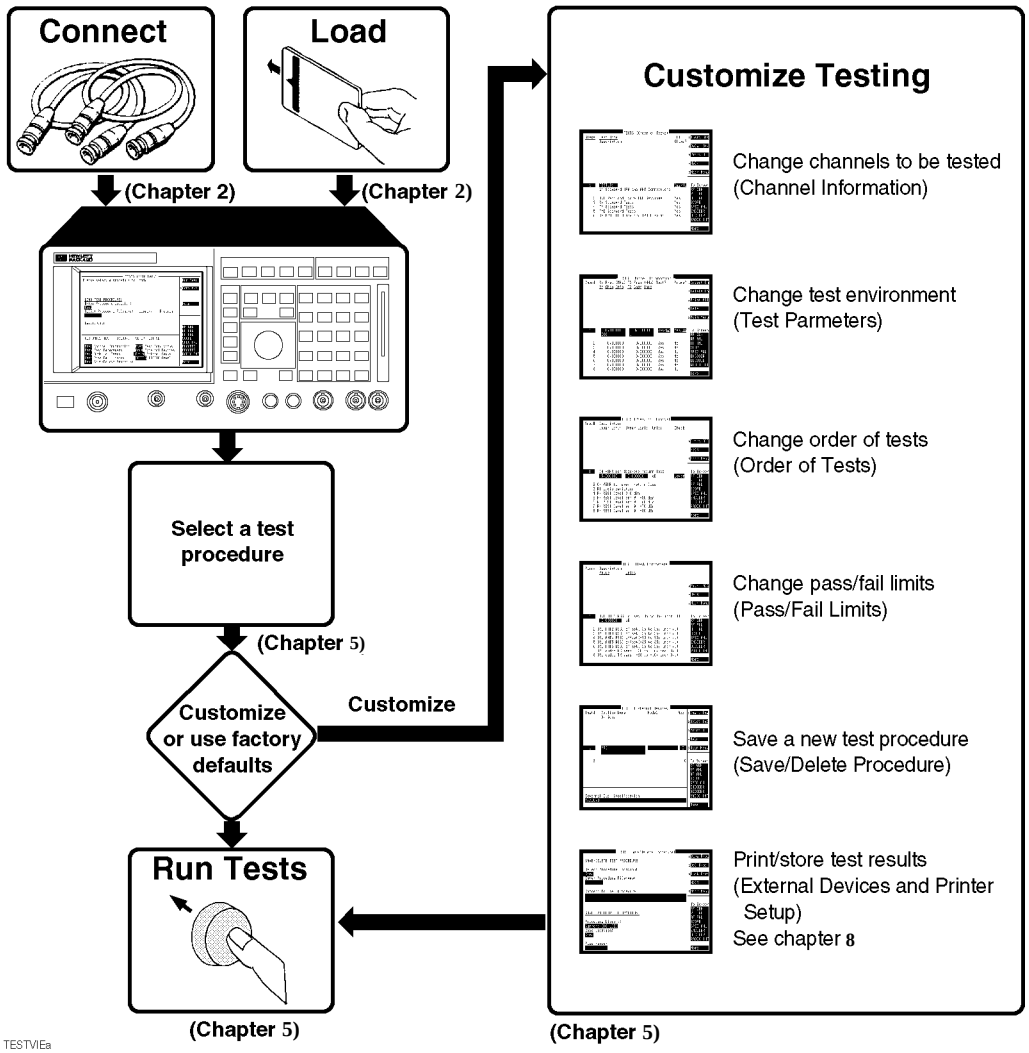
- Decide which tests you desire to run (Order of Tests)
  - you may want to run all, some, or just one of the tests.
- Specify which channels to test (Channel Information)
  - you may want to test one, some, or all of the channels on your radio.
- Change the pass/fail limits for specific measurements (Pass/Fail Limits)
  - you may want the pass/fail limits to have tighter or looser specifications than the default settings.
- Change the test environment and conditions (Test Parameters)
  - decide output format.
  - enter specific information about radio equipment and/or environment.
- Save any or all of the above customized changes to a memory card (Save/Delete Procedure)

Set Up Test Set:

- Print test results or certain screens.
- Decide when and where test results are displayed (**`Execution Conditions/ Printer Setup`**)

Running Tests Overview

To Run Tests



Before Running Tests

- Select a test procedure from the HP 11807A,E Option 009 software card. The software is shipped with the following preprogrammed test procedures on the program card

  MANUAL contains TEST_25 - CP Manual Flow Chart which allows real time control of the mobile unit's channel, SAT and power.
  CALL_PR contains call processing tests.
  FUNCTNL contains RF and call processing (no audio) tests.
  PARAMTR contains parametric tests including RF, audio and call processing.
  REGISTR contains one test, TEST_01 - CP Registration.
  STARTED contains three tests used in **chapter 1, "Getting Started with FW Above Rev. A.14.00"** or **chapter 2, "Getting Started with FW Below Rev. A.14.00"**.

- Before you begin testing, you should have made the appropriate hardware connections. See **chapter 4, "Making Connections," on page 63** if you have not done so already.

Selecting a Test Procedure

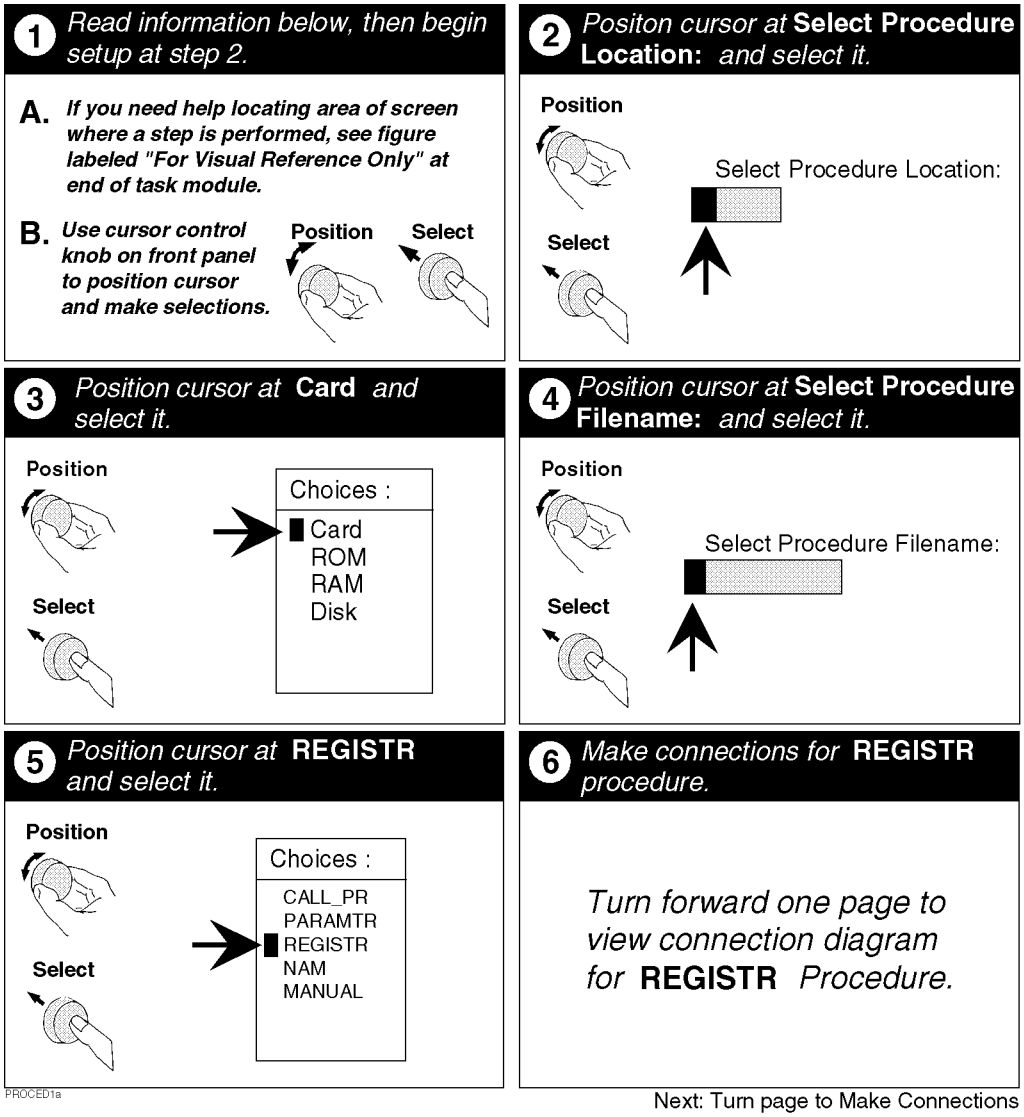
To load the software, you must first select the location to load from (in this case, it will be **Card**) and a procedure filename. Your card comes preprogrammed with at least one procedure. The actual software program does not get loaded into the test set's memory until k1 **(Run Test)** is selected. It will take approximately 15 seconds to load the software in an HP 8920B, and approximately two minutes in an HP 8920A,D.

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, unless it is manually deleted or a new program is loaded.

When tests begin to run, they are executed in the order in which they were entered into the Test Procedure.

Pressing CANCEL will pause the current test (press k2 to continue the test.)

Selecting A Test Procedure



Next: Turn page to Make Connections

Customizing Testing

Because of the diversity of individual testing needs, the software has been designed so that changes may be easily made from the test set's front panel. You may store these changes on a memory card so that you may skip these steps in the future. See **"How to Save a Test Procedure" on page 95**.

Because your needs change, the software allows changes to its default settings whenever you need to make them. For example, tests may be inserted or deleted, and later after running the tests you can change the pass/fail limits or decide to test different channels.

Most testing customization is accomplished through the customization screens. These customization screens are accessed from the main **`TESTS (Main Menu)`** screen as shown in the following figure. Customizing procedures is explained later in this chapter.

NOTE: External Devices, Printer Setup, and IBASIC will not be explained in this customizing section.

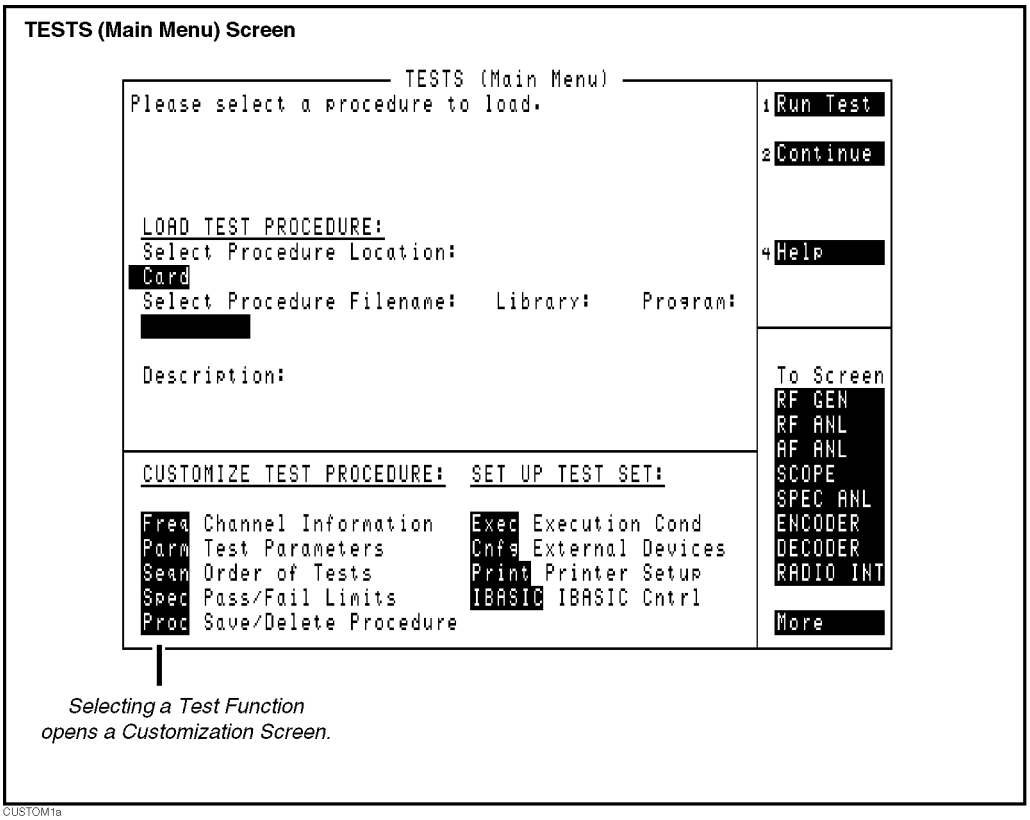
- External Devices and Printer Setup are used when setting up printers and external disk drives which is explained in *Disks* and *Printing* in chapter 5.
- IBASIC is used when writing your own programs and is not explained in this manual. If you need to write your own IBASIC programs you may acquire the following manuals:
  - HP 8920A,D
    - *HP Instrument Basic User's Handbook* HP part number E2083-90601.

HP 8920A Programming Manual HP part number 08920-90220.

  - HP 8920B
    - *HP Instrument Basic User's Handbook Version 2.0* HP part number E2083-90005.
    - *HP 8920B Programming Manual* HP part number 08920-90222.

How to Customize Testing

TESTS (Main Menu) Screen



Selecting a Test Function opens a Customization Screen.

CUSTOM1a

Changing the Order of Tests

You may define the order of tests to include all, some, or just one of the tests available. When the first test is finished, the next will run. The test sequence will remain in the test set's battery backed-up memory until another test sequence is loaded or set up. For information on saving a customized test sequence, see **"How to Save a Test Procedure" on page 95**.

Defining the order of tests is accomplished by inserting or deleting tests from the list of tests that come with the software package. See **"Test Descriptions" on page 141**, for descriptions of tests included in this package.

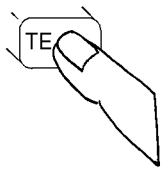
The **`All Chans?`** field allows the user to decide to run the test on all channels entered in the **`Channel Information`** table, or just the channels which are selected as **`Prime`** in the **`Channel Information`** screen. This feature allows the user the flexibility to use channels that are selected as **`Prime`** in all the tests in the sequence, and those indicated as non-prime in a subset of tests (those tests with a **`Yes`** response in **`All Chans`**). For more information, see **"Specifying Channel Information" on page 82**.

The following describes how to create a new test sequence and enter a response to the **`All Chans?`** field.

How to Change the Order of Tests

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

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



2 *Position cursor and select* **Seqn Order of Tests.**

Position

Select

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

The Order of Tests screen is now present on your CRT.

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

Position

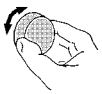
Select

Example

"1" "TEST_5"
"Test name"

4 *Rotate knob until* **Step #** *which precedes the insertion point of the new test you are adding is highlighted, then select it.*

Rotate



Select

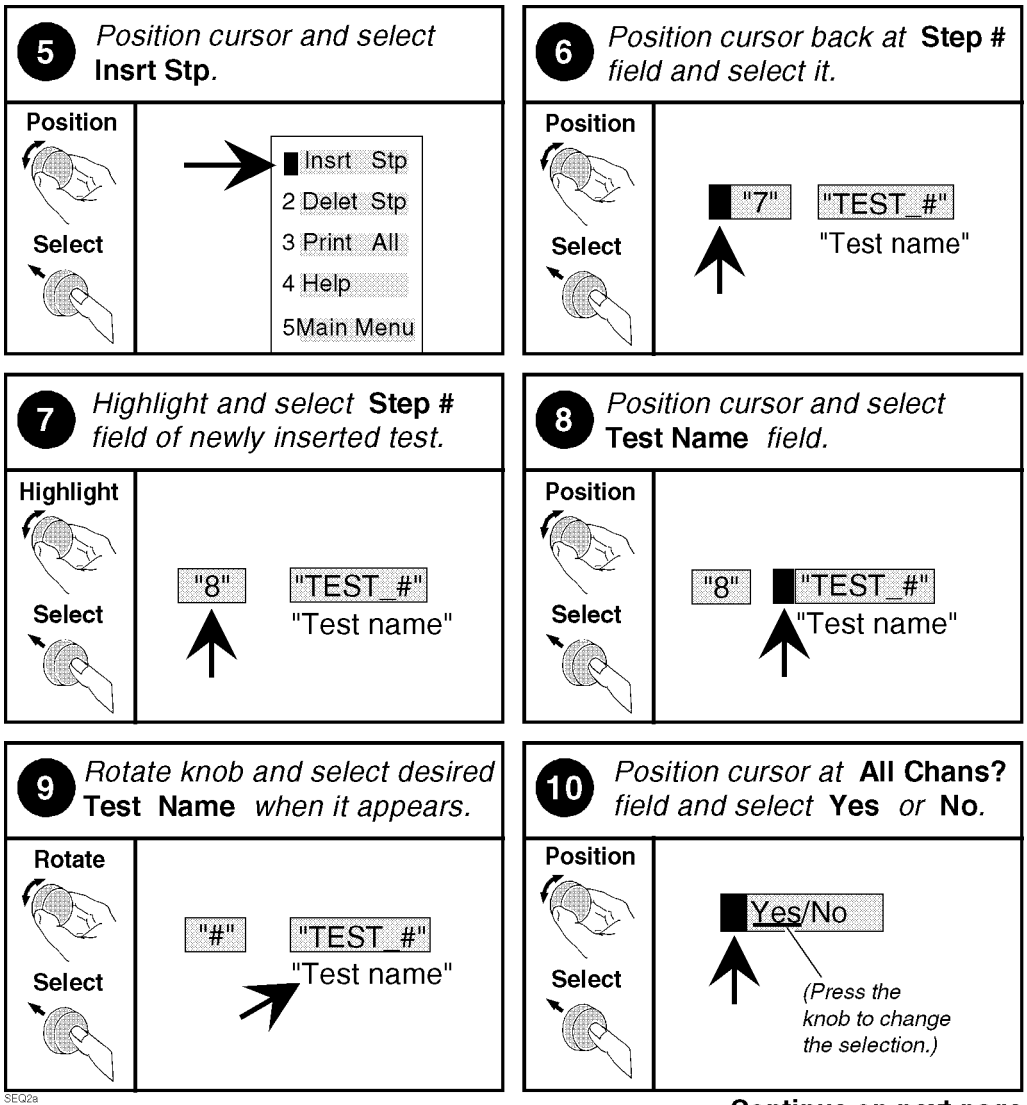
For example, select step 7 if you want to insert the new test as step 8.

"7" "TEST_#"
"Test name"

"8" "New test"

SEQ1a

Continue on next page



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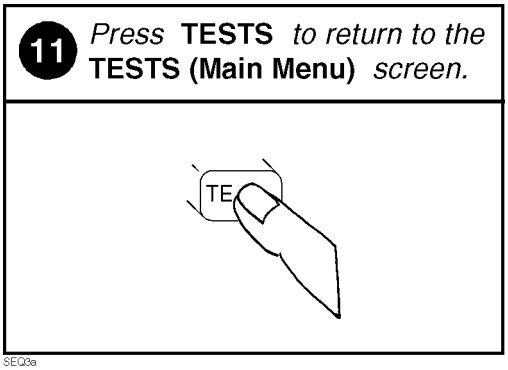

11
Press TESTS to return to the
TESTS (Main Menu) screen.
TE
SEQ3a

Specifying Channel Information

For each channel that you wish to specify, you must enter the following information into the **Channel Information** screen:

- Cellular Channel
  - Enter the cellular channel number.
- Options
  - For the last channel that you want tested in the **Channel Information** table, select **Options** and using the characters in the **Choices** menu enter **END**. This will speed up the testing time (so the software will not scan through the entries that are blank in the **Channel Information** screen).
- **Test?** (yes/no) specifies whether you want to test the UUT at this channel. If set to "No" then the UUT will not be tested at that channel, but you may retain the channel information in the table for later use. If set to "Yes" then the channel will be used as defined by settings of **Prime?** and **All Chans?** fields.
- **Prime?** (yes/no) specifies which channels are "prime". Select "Yes" if you want to test the UUT at this channel on all the tests in the procedure. Select **No** if you want to test the UUT at this channel on just a subset of tests, which are designated by selecting **Yes** in the **All Chans** field of the **Order of Tests** screen. See **All Chans?** in **"Changing the Order of Tests" on page 78** for more information.

For information on saving the channel information table, see **"Saving a Test Procedure" on page 94**.

The **All Chans** field in the **Order of Tests** screen interacts closely with the **Prime?** field on the **Channel Information** screen. When the software runs, it begins by retrieving the first channel entered into the **Channel Information** screen. It then checks the response in the **Test?** field to determine if the UUT should be tested at that channel at this time. If there is a **No** response in the **Test?** field, the software will go to the next channel in the table. If there is a **Yes** response in the **Test?** field, the software will check if the channel is **Prime**.

A **Yes** response in the **Prime?** field indicates to test the UUT at that channel on the entire sequence of tests in the procedure. A **No** response in the **Prime?** field indicates to test the UUT at that channel on a subset of tests in the procedure. The subset of tests is determined by a **Yes** response in the **All Chans?** field. Therefore, tests with a **No** response in the **All Chans?** field will be run on **prime** channels only.

Below is an example of how the software would run if you had a procedure set up as follows:

Chan #	Test?	Prime?
Chan 01	Yes	Yes
Chan 02	Yes	No
Chan 03	No	No

Test Number	All Chan? Setting
Test 01	No
Test 02	Yes
Test 03	Yes
Test 04	No

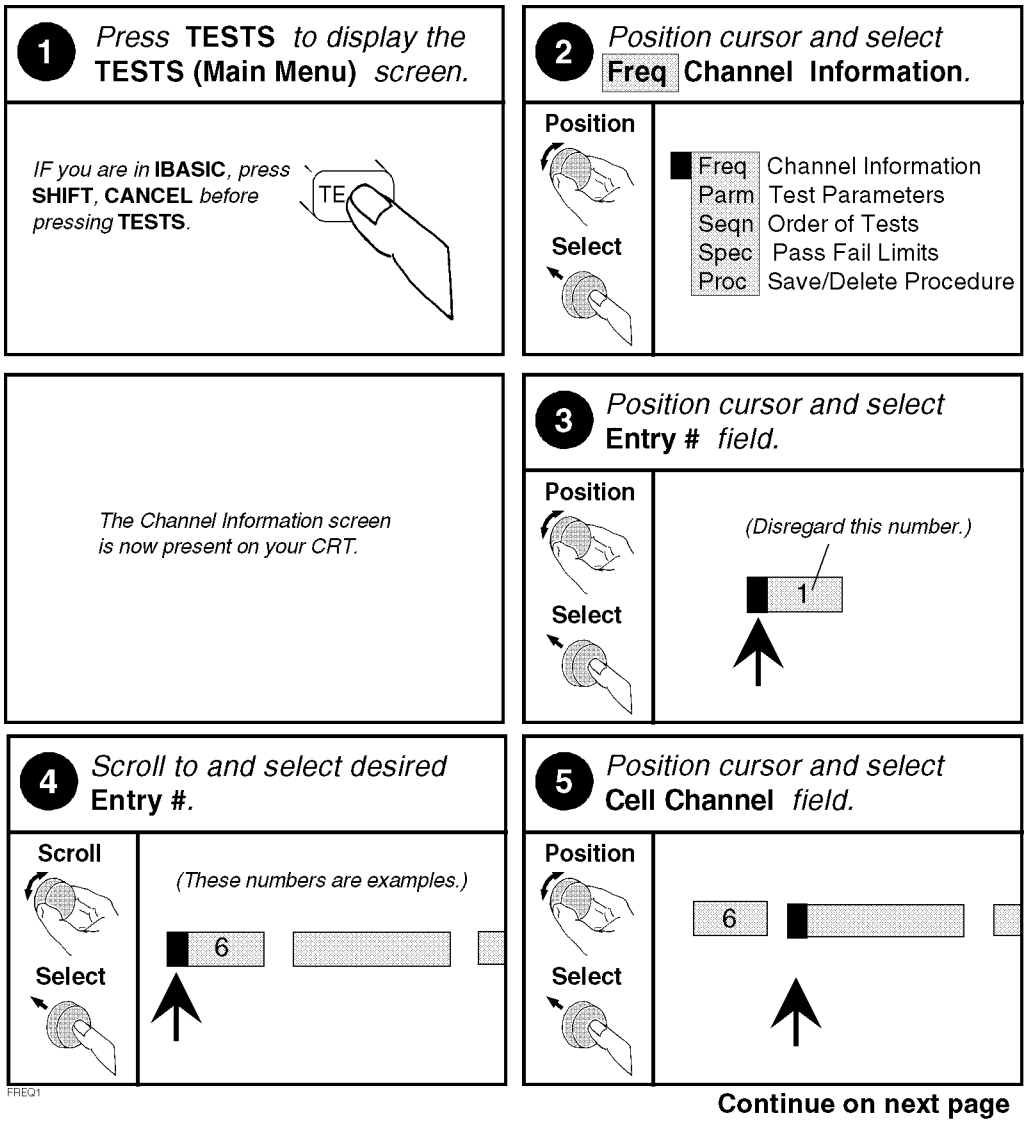
The result would be:

- Chan 01 is used in Test 01, Test 02, Test 03, and Test 04.
- Chan 02 is used in Test 02, and Test 03 only.
- Chan 03 is not used.

The following table shows how to properly configure these settings according to your testing needs.

Testing Need	Necessary Field Settings		
	Test?	**Prime?**	**All Chan?**
Test channel on all tests in sequence	Yes	Yes	Don’t Care
Test channel on a subset of tests in sequence	Yes	No	Yes on tests you want included in the testing subset
Do not test this channel now, but retain information for later use	No	Don’t Care	Don’t Care

How to Specify Channel Information



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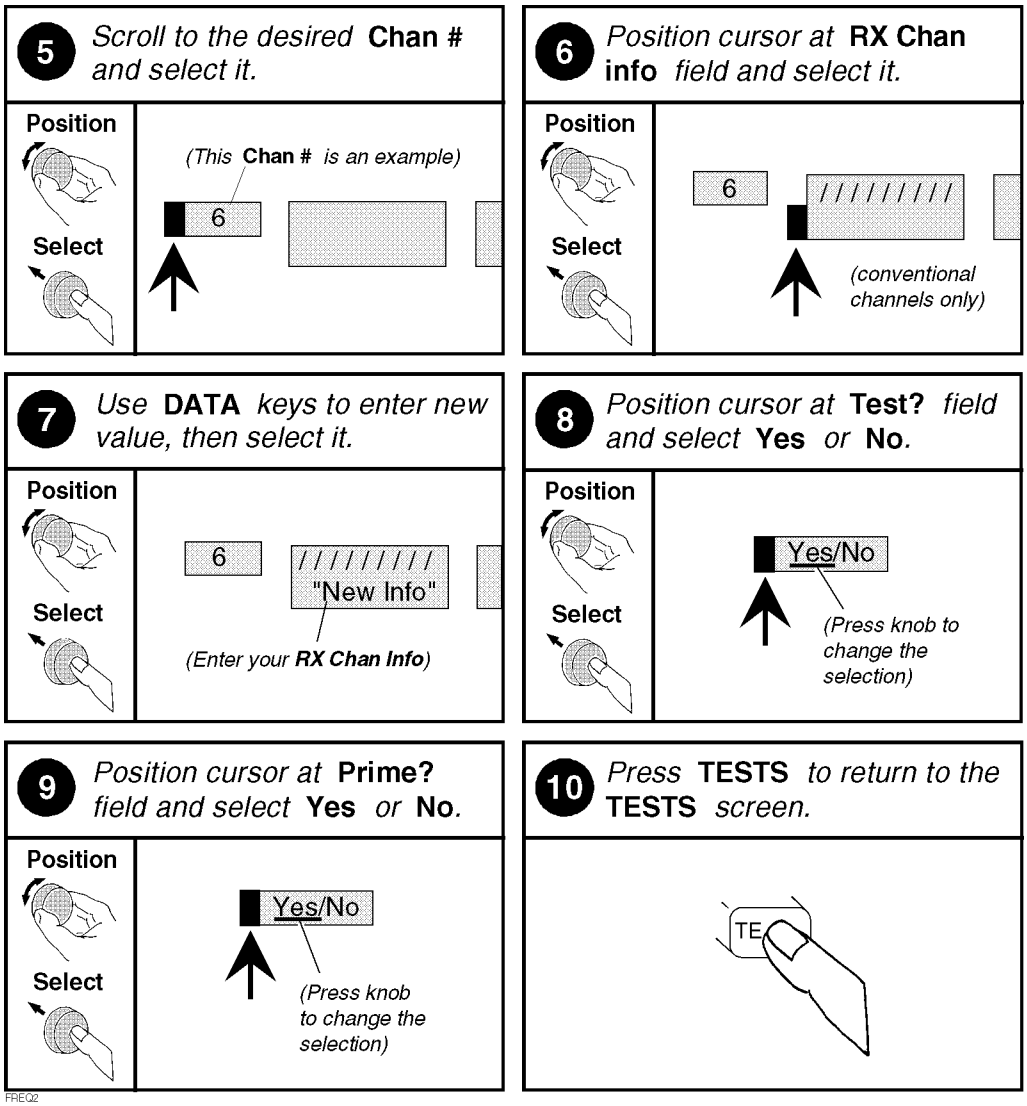
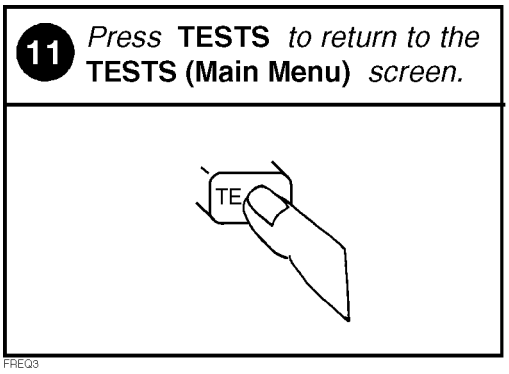

5 Scroll to the desired Chan # and select it.
Position
Select
(This Chan # is an example)
6
6 Position cursor at RX Chan info field and select it.
Position
Select
6
(conventional channels only)
7 Use DATA keys to enter new value, then select it.
Position
Select
6
"New Info"
(Enter your RX Chan Info)
8 Position cursor at Test? field and select Yes or No.
Position
Select
Yes/No
(Press knob to change the selection)
9 Position cursor at Prime? field and select Yes or No.
Position
Select
Yes/No
(Press knob to change the selection)
10 Press TESTS to return to the TESTS screen.
TE
FREQ2

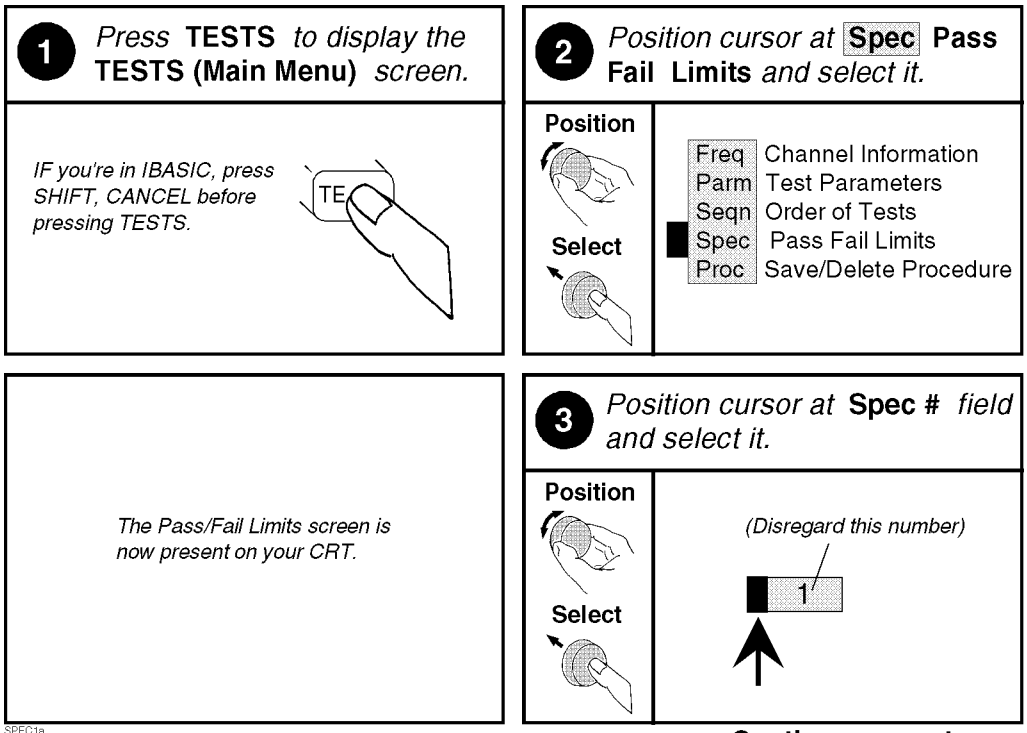

11
Press TESTS to return to the TESTS (Main Menu) screen.
TE
FREQ3

Changing Pass/Fail Limits

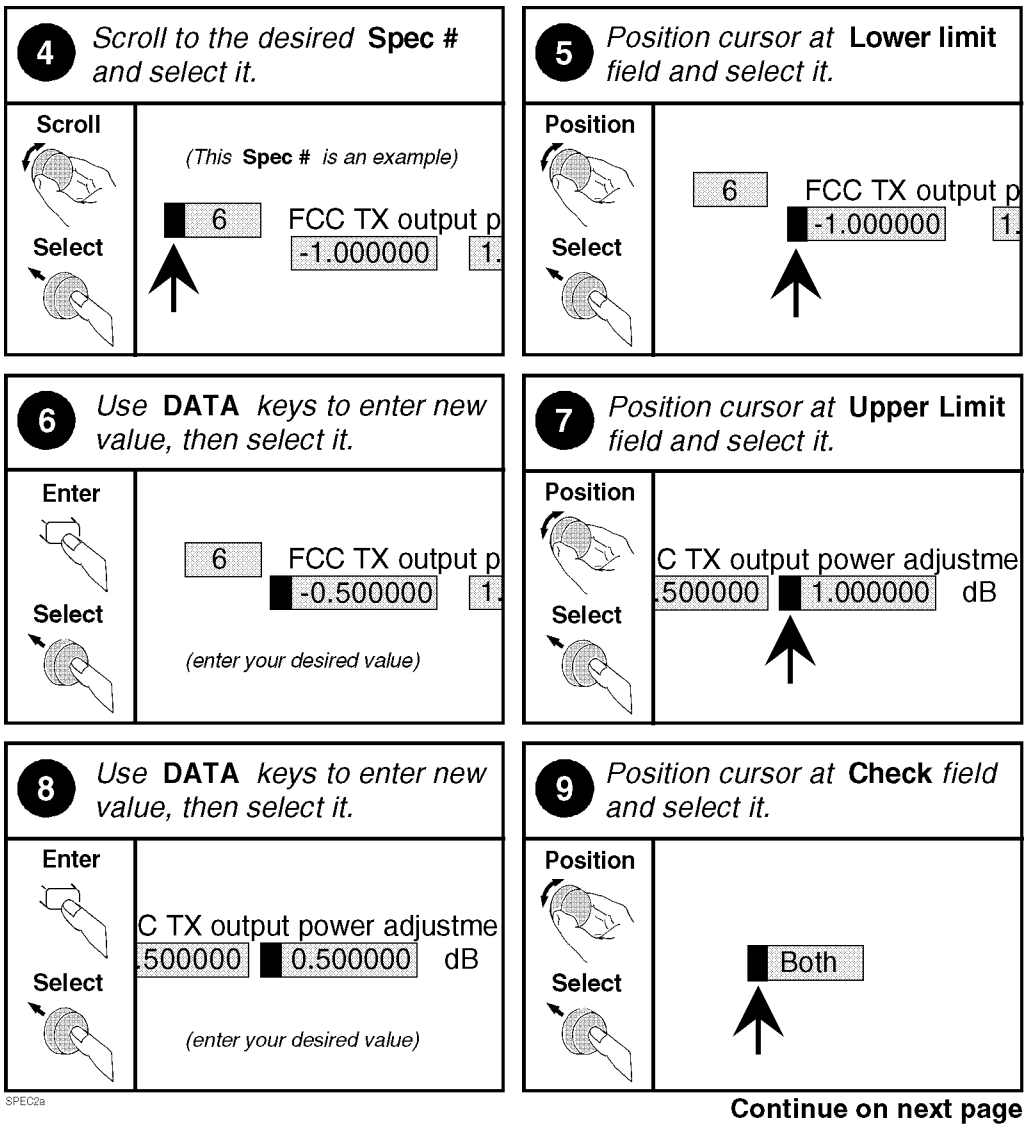
Pass/Fail limits define the values a measurement's result is compared against to determine if the UUT meets its specified standards. Default values are set in the test software. These default values may be changed to suit your particular requirements.

The following describes how to change the pass/fail (upper and lower) limits. See **"Changing Pass/Fail Limits" on page 89** for descriptions of each pass/fail limit. For information on saving customized pass/fail limits, see **"Saving a Test Procedure" on page 94**.

How to Change Pass/Fail Limits



Continue on next page



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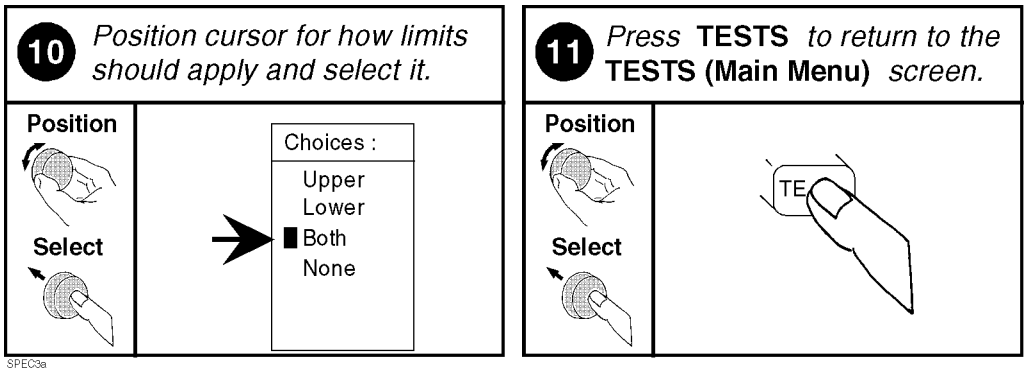
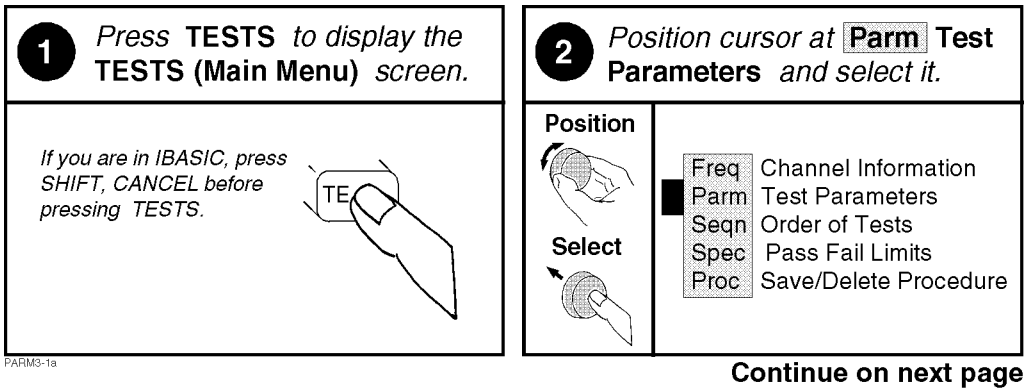

10
Position cursor for how limits should apply and select it.
Position
Select
Choices :
Upper
Lower
Both
None
11
Press TESTS to return to the TESTS (Main Menu) screen.
Position
Select
TE
SPEC3a

Changing the Test Parameters

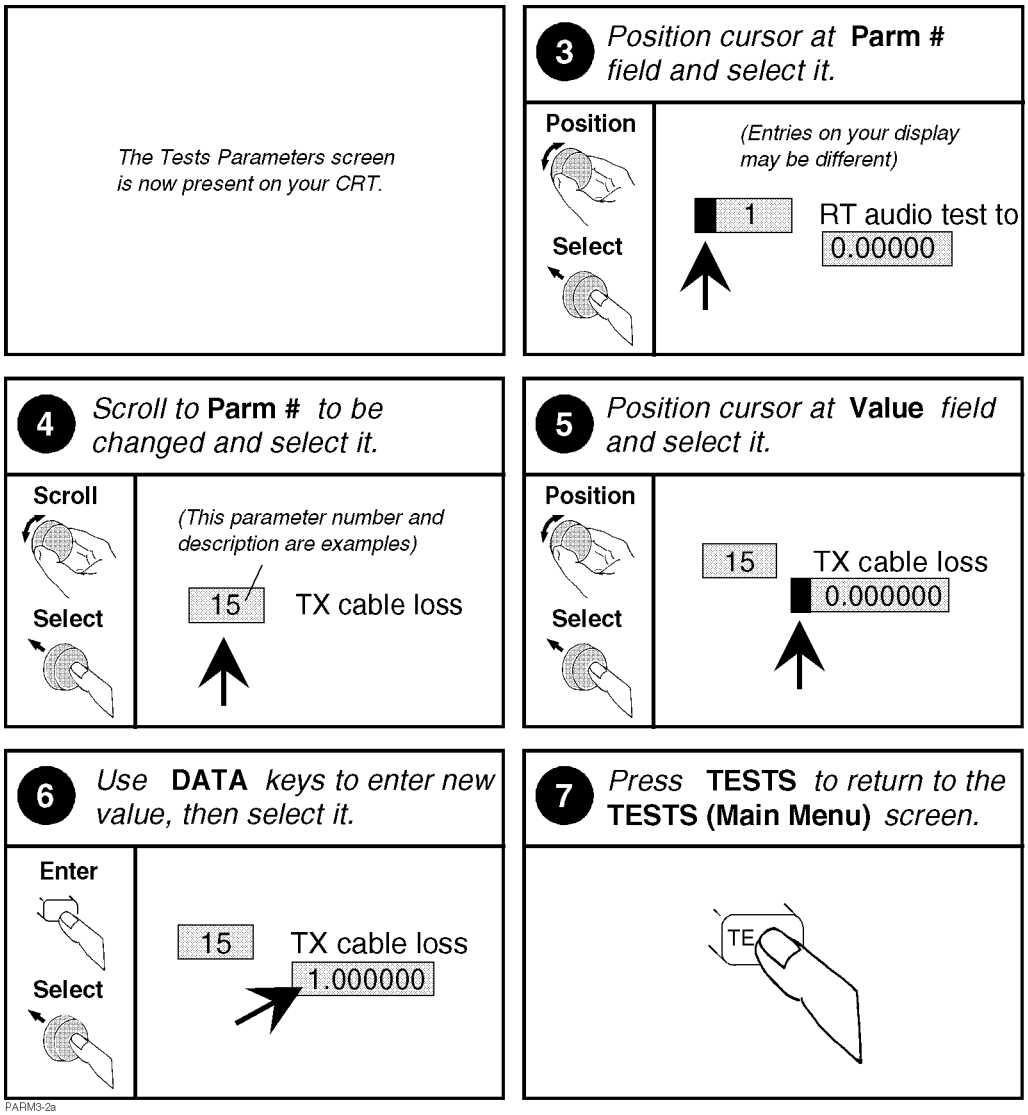
The software uses parameters to optimize the test environment and conditions for your testing situation. Many of the test parameters are determined by examining your test needs. The software comes with default settings for test parameters. Review the defaults for your particular needs. See **"Parameter Descriptions" on page 186** for descriptions of each test parameter. For information on saving customized test parameters, see **"Saving a Test Procedure" on page 94**.

The following describes how you can change test parameters through the Test Parameter screen to optimize your testing conditions.

How to Change the Test Environment and Conditions



Continue on next page


The Tests Parameters screen is now present on your CRT.
3 Position cursor at Parm # field and select it.
Position
Select
(Entries on your display may be different)
1
RT audio test to
0.00000
4 Scroll to Parm # to be changed and select it.
Scroll
Select
(This parameter number and description are examples)
15
TX cable loss
5 Position cursor at Value field and select it.
Position
Select
15
TX cable loss
0.000000
6 Use DATA keys to enter new value, then select it.
Enter
Select
15
TX cable loss
1.000000
7 Press TESTS to return to the TESTS (Main Menu) screen.
TE
PARM3-2a

Saving a Test Procedure

A Test Procedure is a collection of channel information, test parameters, testing order, and pass/fail limits saved in a file that customizes the test software to a specific application. You may save the file to a memory card or disk.

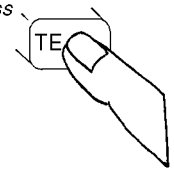
When you save a procedure you will be saving channel information, test parameters, pass/fail limits, and testing order, plus a library that contains the names of all test parameters, pass/fail limits, and tests that are resident in the software. The library file comes from the software and cannot be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

The following example shows how to save a new procedure to a memory card. For more information concerning procedures, **see "Procedures," in chapter 8, on page 287**.

How to Save a Test Procedure

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

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



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

Position

Select

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

The Save/Delete Procedure screen is now present on your CRT.

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

Position

Select

Select Procedure Location:

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

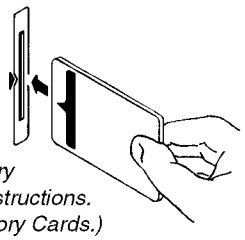
Position

Select

Choices :
Card
RAM
Disk

(You can also save procedures to an internal RAM disk or external disk drive. See chapter 5-Disks.)

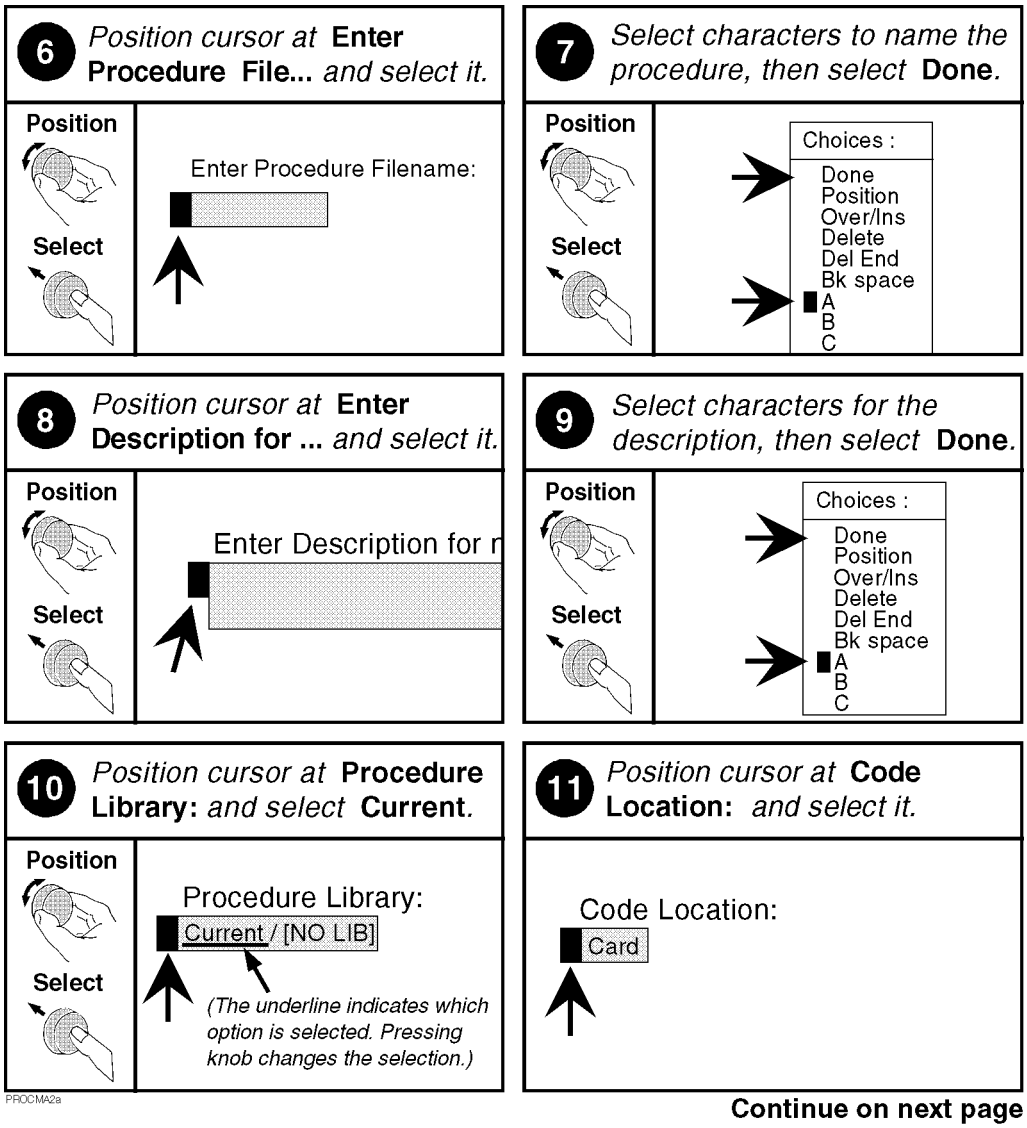
5 *Insert an initialized* **SRAM** *memory card.*



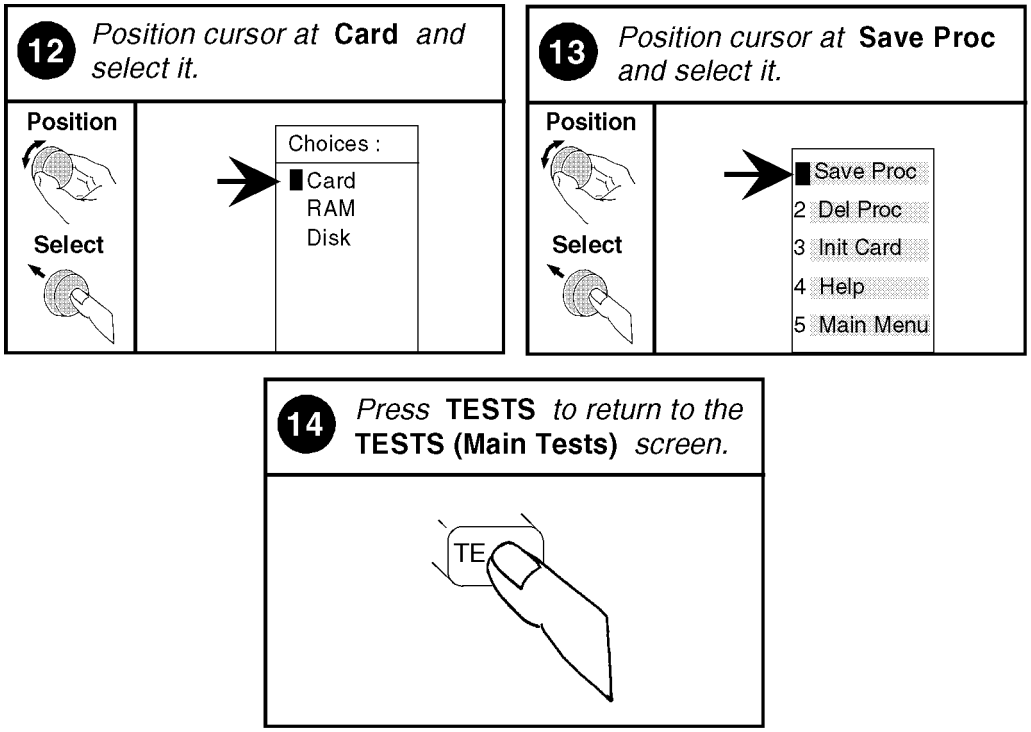
(For detailed memory card initialization instructions. see chapter 5-Memory Cards.)

PROCMA1a

Continue on next page



Continue on next page



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

1) Insert the RAM card with your saved procedure.
2) On the **TESTS (Main Menu)** *screen, a) position cursor and select* **Select Procedure Location:,** *then select* **Card,** *b) position cursor and select* **Select Procedure Filename:,** *then select your saved file name.)*
3) Remove your RAM card and insert the original HP 11807B ROM memory card.
4) Press **Run Test** *.*

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

PROCMA3a

Changing Test Execution Conditions

Test Execution Conditions define where and when test output occurs. You may decide to:

- Display output on CRT only, or display on CRT and print hardcopy (**Output Results To**).

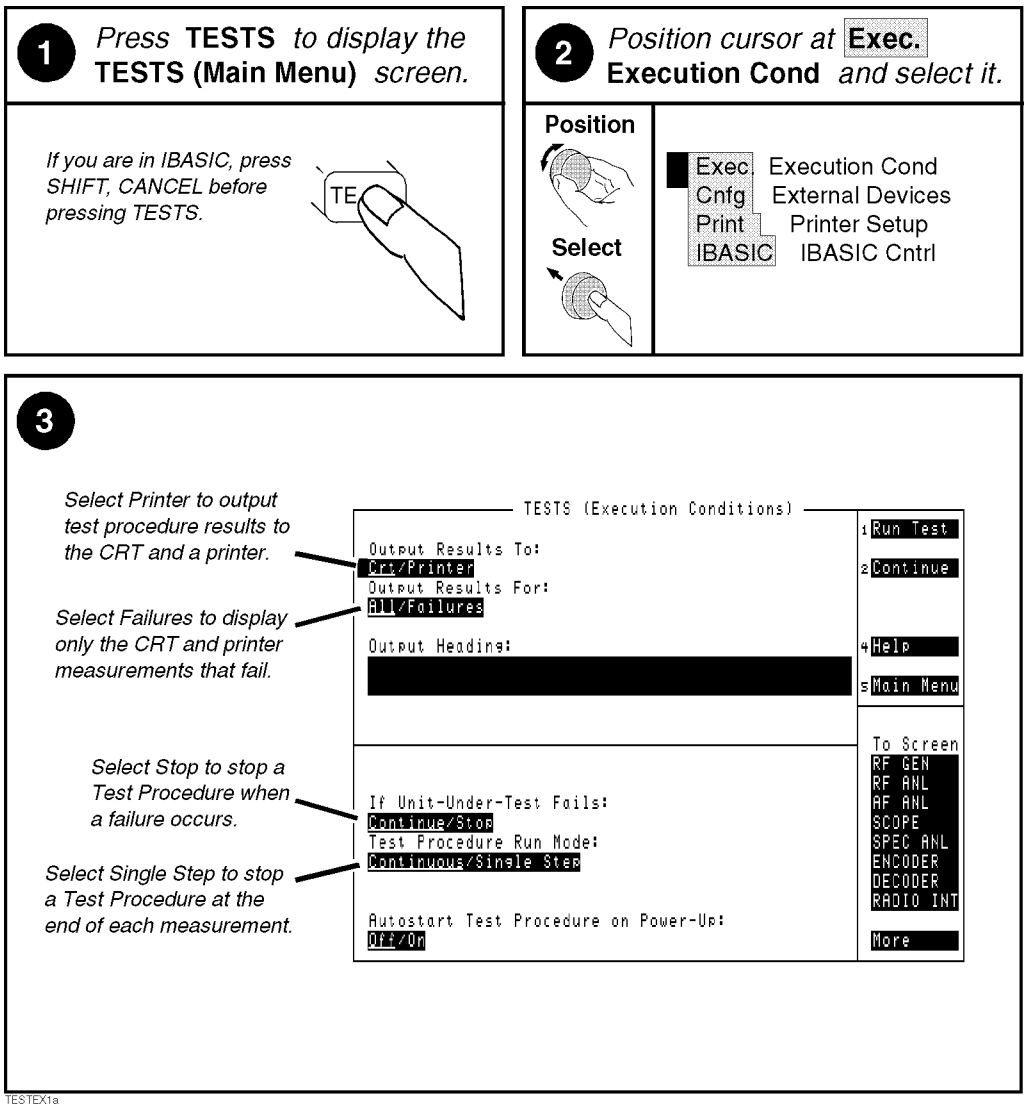
NOTE: If printing test results is desired, after selecting **Printer**, additional steps are necessary to connect and configure the printer. **See "Printing," in chapter 8, on page 272**.

- Display (or print) only measurements that fail, or display (or print) all measurements that pass or fail (**Output Results For**).
- Enter a title for an output heading for the displayed or printed results (**Output Heading**).
- Stop testing when a measurement fails or continue through all of the tests without stopping (**If Unit-Under-Test-Fails**).
- Pause between each measurement, or run through entire test (**Test Procedure Run Mode**).
- Start the program automatically when the Test System is powered on. (**Autostart Test Procedure on Power-up**)

Test Execution Conditions is accessed from the **SETUP TEST SET:** list. To change a default setting, position the cursor to the desired field. Pressing the knob (”selecting”) will toggle the underlined selection.

Test Execution Conditions settings are not retained after a power-down/ power-up cycle, and will return to their default settings.

How to Change Test Execution Conditions



Printing and Saving Test Results

Printing and saving test results are features of the software which require additional equipment and configuration. **See "Printing," in chapter 8, on page 272** for detailed descriptions and instructions for these features.

6

Using the Software/HP 8920A FW Below Rev A.14.00

Firmware Revisions

NOTE: The firmware revision A.14.00 in the HP 8920A,D had several enhancements, which are standard in the HP 8920B. This chapter applies to users with:

- **HP 8920A test sets with firmware revision below A.14.00**

The test set's firmware revision is displayed on the top right corner of the configuration screen.

- Press SHIFT CONFIG to display the configuration screen and read the firmware revision.

If you have an HP 8920B or an HP 8920A with firmware revision above A.14.00, refer to **chapter 5, "Using the Software/HP 8920B, or HP 8920A FW Above Rev. A.14.00," on page 69**. Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

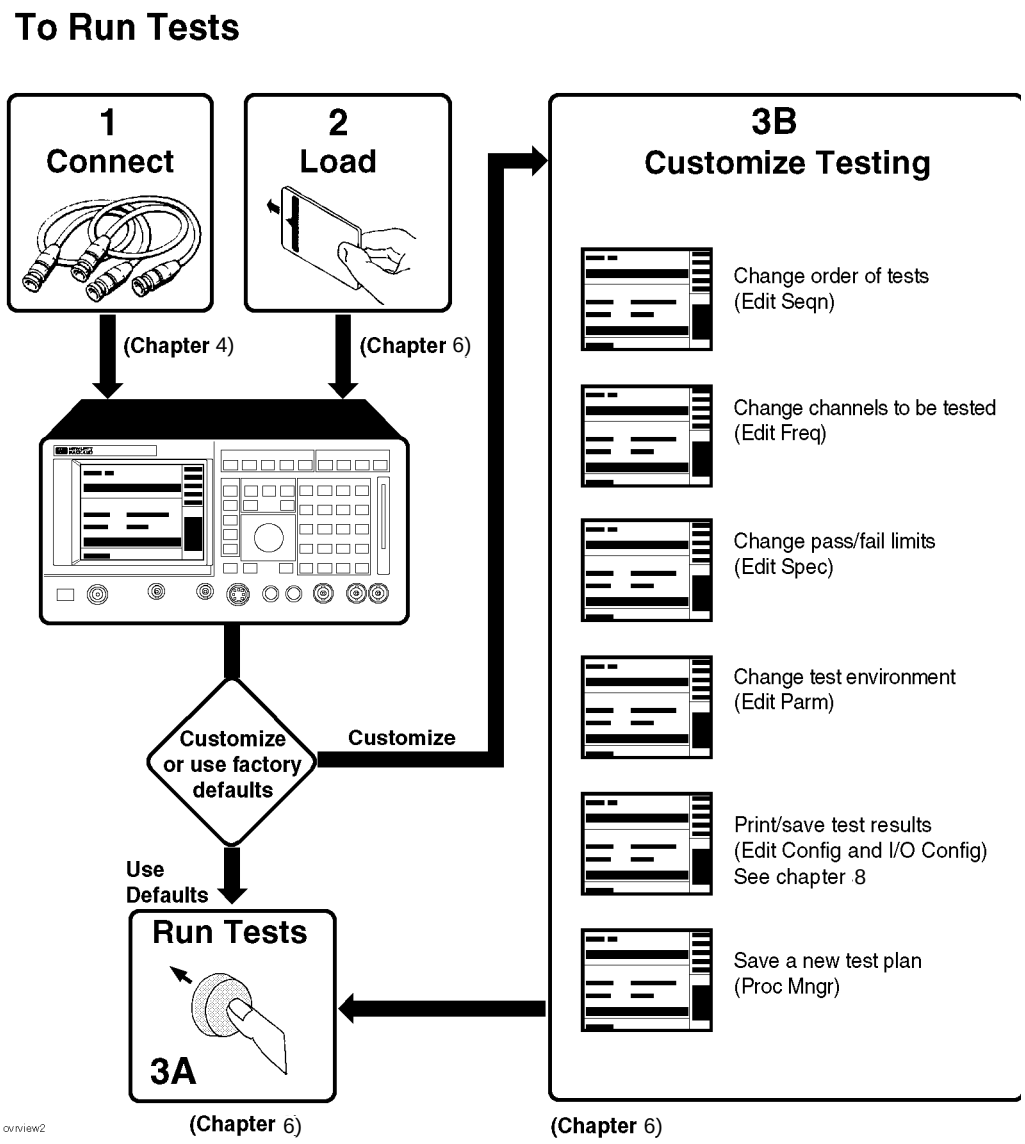
Test Set or System is Defined As:

- HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
- HP 8921A, Option 500, Dual-Mode Cellular Test System
- HP8920D, Dual-Mode Cellular Mobile Test System
- HP 8921D, Dual-Mode Cell Site Test System

Introduction

The HP 11807A Software can be run on the factory default settings or customized to your individual needs and the specific requirements.

This chapter provides detailed information on how to load, run, and customize the software.


To Run Tests
1
Connect
2
Load
(Chapter 4)
(Chapter 6)
3B
Customize Testing
Change order of tests
(Edit Seqn)
Change channels to be tested
(Edit Freq)
Change pass/fail limits
(Edit Spec)
Change test environment
(Edit Parm)
Print/save test results
(Edit Config and I/O Config)
See chapter 8
Save a new test plan
(Proc Mngr)
Customize
or use factory
defaults
Customize
Use
Defaults
Run Tests
3A
ovrview2
(Chapter 6)
(Chapter 6)

Testing Overview

Pressing TESTS will display what is called the TESTS screen. From this TESTS screen you have the option to:

Begin running tests:

- Select a factory defined test procedure (plan) from the HP 11807A Option 008 software card, or a procedure that has already been customized, and saved to an SRAM card. The software is shipped with the following preprogrammed test procedures on the program card:
  - **`CALL_PR`** contains call processing tests
  - **`PARAMTR`** contains parametric tests performed with the TIA adapter
  - **`REGISTR`** contains TEST_02 - CP Registration
  - **`NAM`** contains TEST_01 - NAM number assignment module data
  - **`MANUAL`** contains TEST_06 - CP Manual Flow Chart which allows real time control of the UUT's channel power level, SAT, as well as the capability to perform measurements on the analog voice or digital traffic channel.

or

Customize the software:

- Decide which tests you desire to run (see **"Changing a Sequence of Tests (Edit Sequence)" on page 112**.
  - you may want to run all, some, or just one of the tests
- Specify which channels to test (see **"Specifying Channel Information (Edit Frequency)" on page 116**.
  - you may want to test one, some, or all of the channels on your radio.
- Change the pass/fail limits for specific measurements (see **"Changing Pass/Fail Limits (Edit Specifications)" on page 122**.
  - you may want the pass/fail limits to have tighter or looser specifications than the default settings.
- Change the test environment and conditions (Edit Parameters)
  - decide output format.
  - enter specific information about radio equipment and/or environment.
- Save any or all of the above customized changes (to an SRAM card)
- Select options:
  - Print test results or certain screens.
  - Decide when and where test results are displayed (**`Test Execution Conditions`**)

Running Tests

Before you begin to load the software and run tests, you should have made the appropriate hardware connections. **See "Equipment Connections," in chapter 4, on page 65** if you have not done so already.

The HP 11807A Software may be run with its factory default settings, or it may be customized to your specific needs (**See "Customizing Testing" on page 110**).

When TESTs begin to run, they are executed in the order in which they were entered into the Test Procedure.

- Pressing CANCEL will pause the current test (press K2 (**`Continue)`** to continue the test).

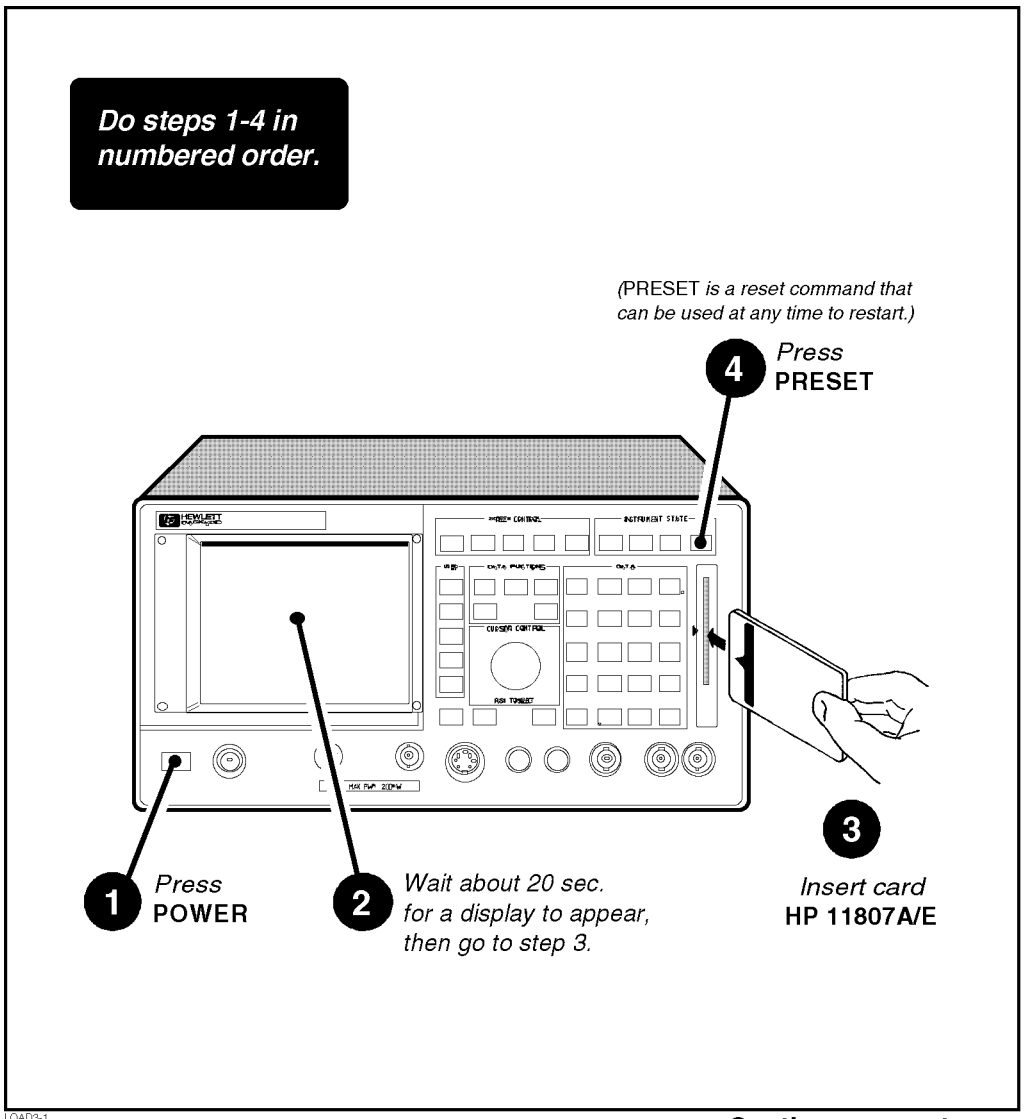
Loading the Software

The HP 11807A Software is normally supplied on a One Time Programmable (OTP) memory card. It may 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.

CAUTION: 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.

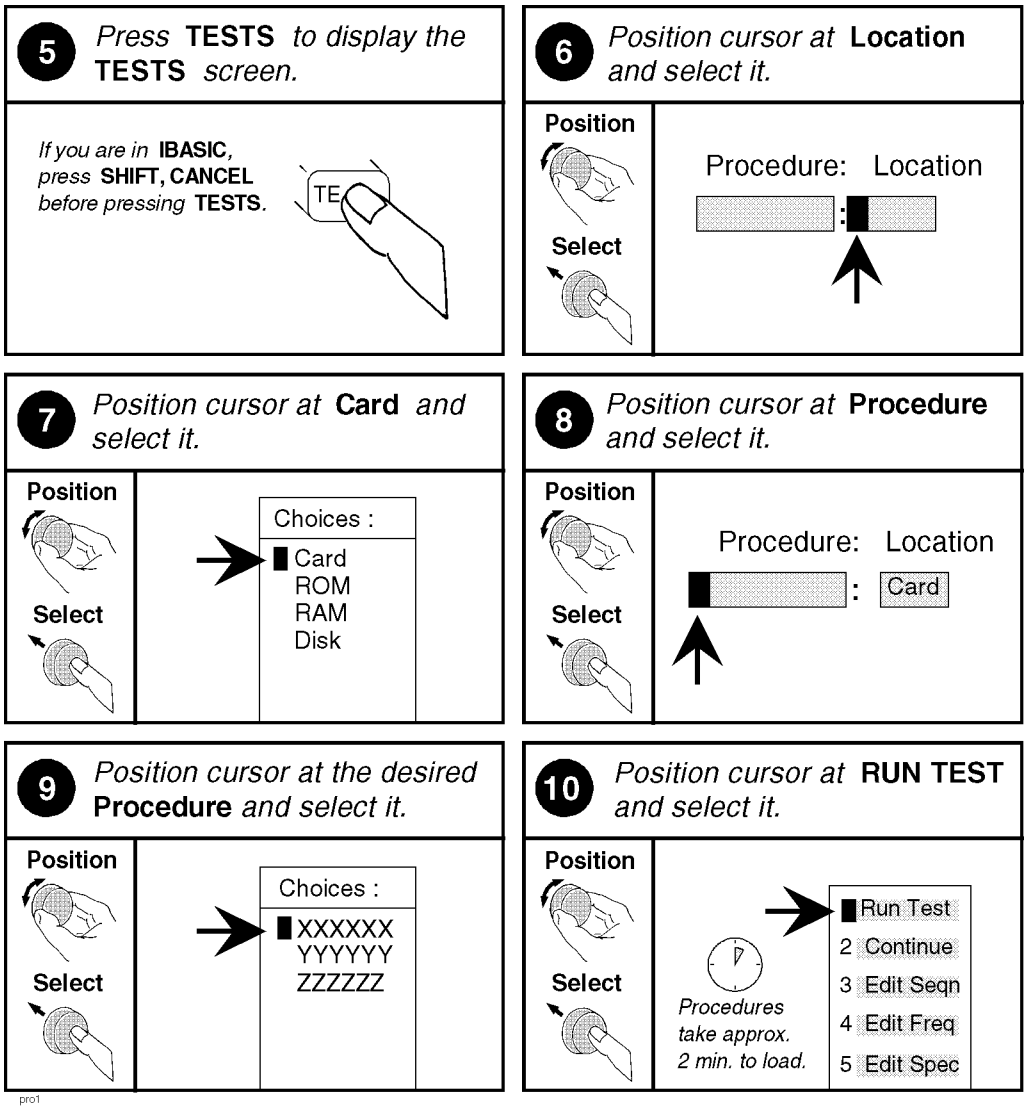
The software memory card can be removed after the program is loaded into the test set memory. The program will remain in memory after a power-down/power-up cycle, unless it is manually deleted or a new program is loaded.

Starting Up



LOAD3-1

Continue on next page


5 Press TESTS to display the TESTS screen.
If you are in IBASIC, press SHIFT, CANCEL before pressing TESTS.
TE
6 Position cursor at Location and select it.
Position
Select
Procedure: Location
7 Position cursor at Card and select it.
Position
Select
Choices :
Card
ROM
RAM
Disk
8 Position cursor at Procedure and select it.
Position
Select
Procedure: Location
Card
9 Position cursor at the desired Procedure and select it.
Position
Select
Choices :
XXXXXX
YYYYYY
ZZZZZZ
10 Position cursor at RUN TEST and select it.
Position
Select
Procedures take approx. 2 min. to load.
Run Test
2 Continue
3 Edit Seqn
4 Edit Freq
5 Edit Spec
pro1

Customizing Testing

The HP 11807A Software may need some customizing before it performs in a way that is necessary for your testing needs. Because of the diversity of individual testing needs, the HP 11807A Software has been designed so that changes may be easily made from the HP 8920D/HP 8921D front panel. You may store these changes on an SRAM card so that you may skip these steps in the future. **See "How to Save a Test Procedure" on page 128**.

You may customize your software at any time. Because your needs change, the software allows changes to its default settings when you need to make them and in any order that you choose. For example, tests may be inserted or deleted, and later after running the tests you can change the pass/fail limits or decide to test different channels.

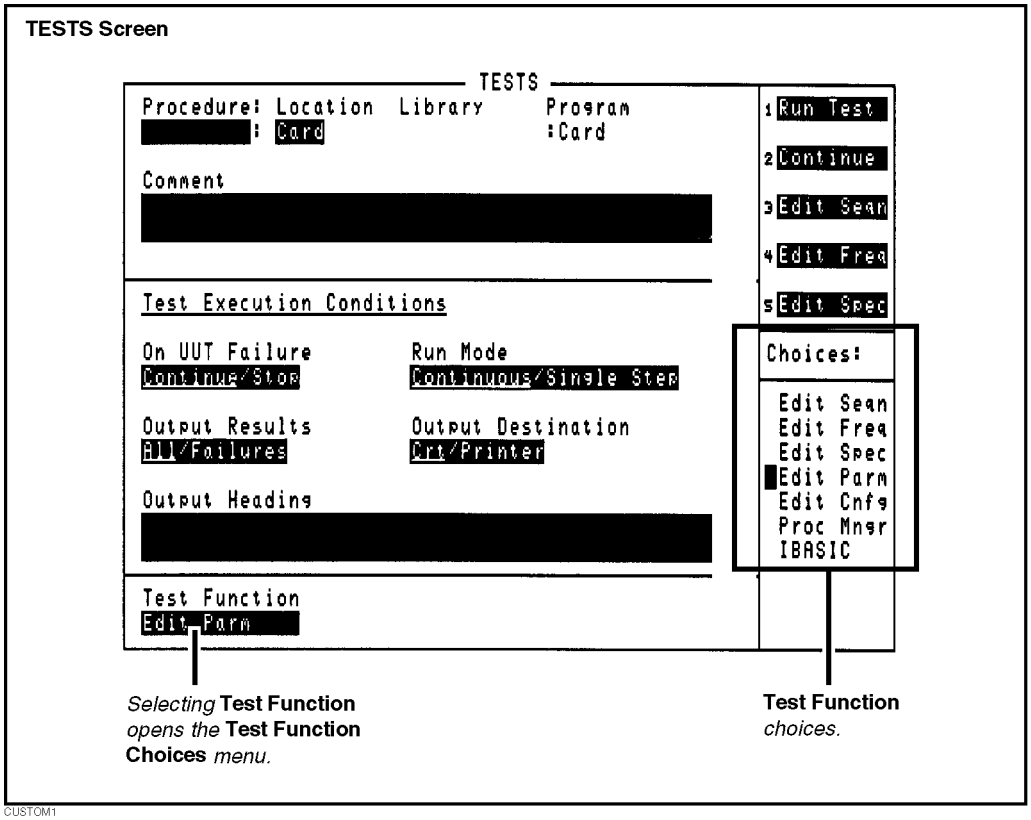
Most testing customization is accomplished through the HP 8920D/HP 8921D Test Function screens. These Test Function screens are accessed from the main **TESTS** screen as shown in the following figure. All Test Functions are explained in this chapter by function.

NOTE: Edit Configuration (Edit Cnfg) and IBASIC will not be explained in this customizing section.

- Edit Configuration is used when setting up printers and external disk drives which is explained in **"Disks" on page 256** and **"Printing" on page 272**.
- IBASIC is used when writing your own programs and is not explained in this manual. If you need to write your own IBASIC programs you may acquire the following manuals:
  - HP 8920A,D
    - *HP Instrument Basic User's Handbook* HP part number E2083-90000.
    - *HP 8920A Programming Manual* HP part number 08920-90220.
  - HP 8920B
    - *HP Instrument Basic User's Handbook Version 2.0* HP part number E2083-90005.
    - *HP 8920B Programming Manual* HP part number 08920-90222.

How to Customize Testing

TESTS Screen



Selecting **Test Function** *opens the* **Test Function Choices** *menu.*

Test Function *choices.*

CUSTOM1

Changing a Sequence of Tests (Edit Sequence)

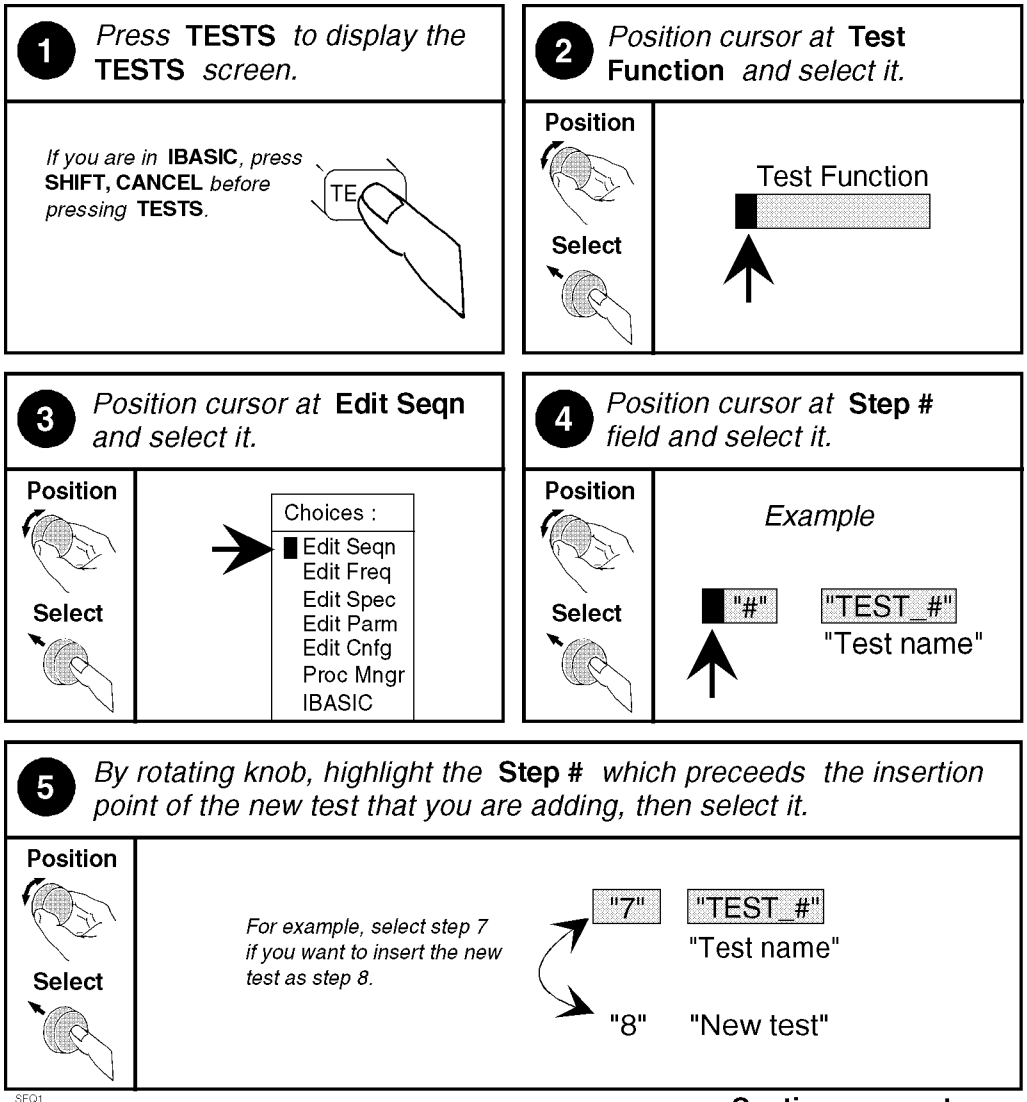
You may define a test sequence to include all, some, or just one of the tests available. When the first test is finished, the next will run. The test sequence will remain in the Test Systems' battery backed-up memory until another test sequence is loaded or set up. For information on saving a customized test sequence, **see "Saving a Test Procedure Using the Procedure Manager" on page 127**.

Creation of a test sequence is accomplished by inserting or deleting tests from the list of tests that come with the HP 11807A Software package. **see "Test Descriptions," in chapter 7, on page 141**.

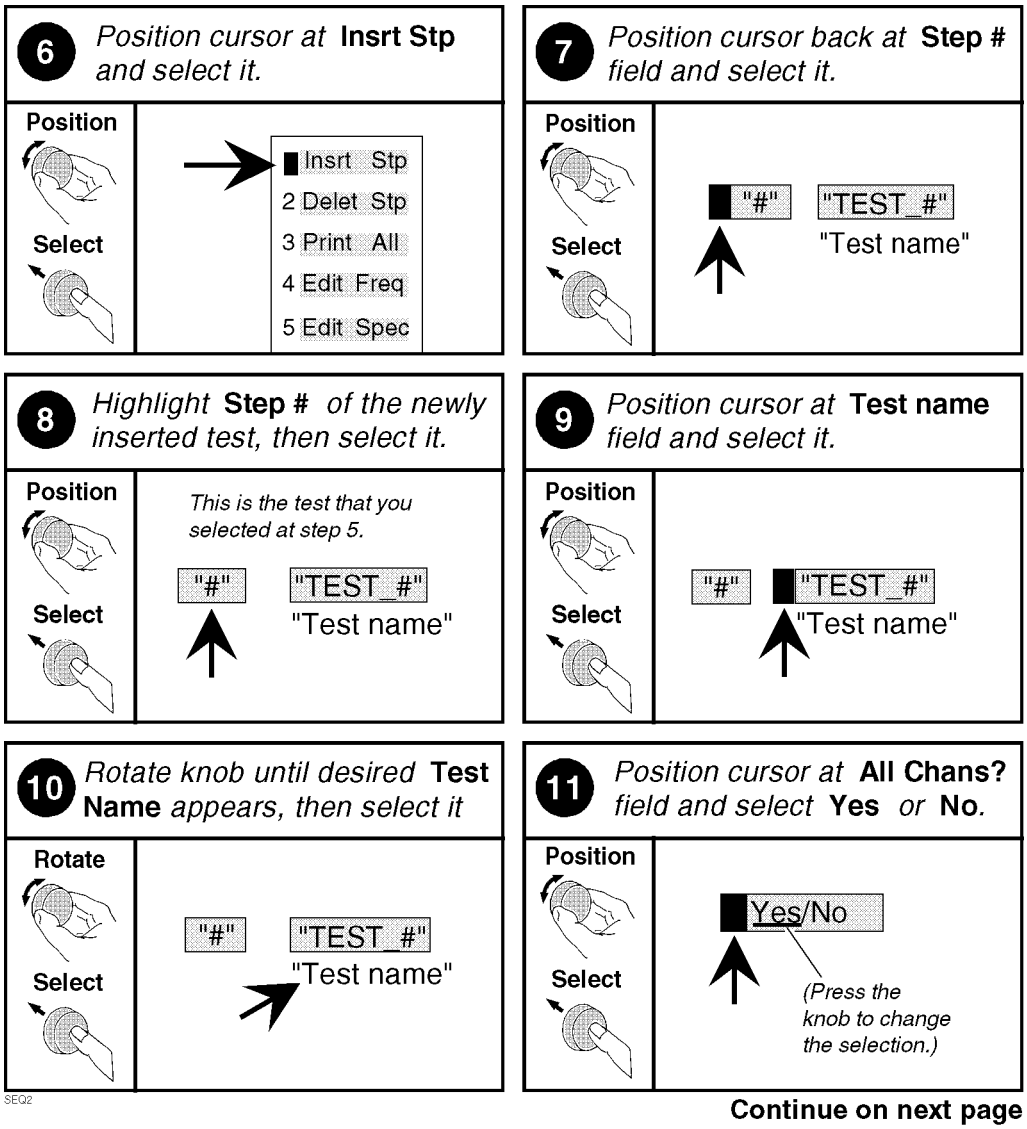
The **`All Chans?`** field allows the user to decide to run the test on all channels entered in the frequency table, or just the channels which are selected as **`Prime`** in the **`Edit Freq`** screen. This feature allows the user the flexibility to use channels that are selected as **`Prime`** in all the tests in the sequence, and those selected as non-prime in a subset of tests (those with a **`Yes`** response in **`All Chans`**). For more information, **see "Specifying Channel Information (Edit Frequency)" on page 116**.

The following describes how to create a new test sequence and enter a response to **`All Chans`**.

How to Change a Sequence of Tests



Continue on next page



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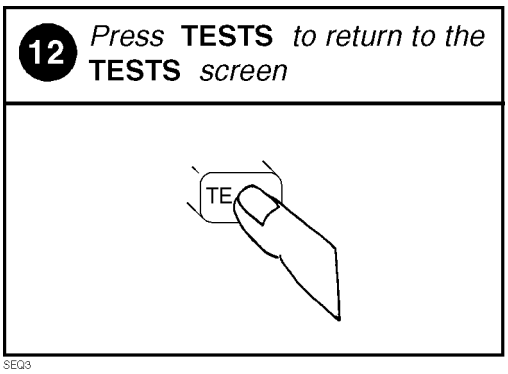

12
Press TESTS to return to the TESTS screen
TE
SEQ3

Specifying Channel Information (Edit Frequency)

For each channel that you wish to specify, you must enter the following information into the **`Edit Frequency`** screen:

- RX Chan Info
  - Enter the channel number of the voice channel to be tested.

NOTE: The RX Freq and TX Freq fields are not used for entering cellular channel frequencies.

NOTE: Enter a **`(minus)1`** in the RX or TX Frequency fields to have all subsequent channels ignored when testing is started.

- **`Test?`** (yes/no) specifies whether you want to test the UUT at this channel. If set to "No" then the UUT will not be tested at that channel, but you may retain the channel information in the table for later use. If set to "Yes" then the channel will be used as defined by settings of **`Prime?`** and **`All Chans?`** fields.
- **`Prime?`** (yes/no) specifies which channels are "prime". Select "Yes" if you want to test the UUT at this channel on all the tests in the procedure. Select **`No`** if you want to test the UUT at this channel on just a subset of tests, which are designated by selecting **`Yes`** in the **`All Chans`** field of the **`Edit Seqn`** screen. See **`All Chans?`** in **see "Changing a Sequence of Tests (Edit Sequence)" on page 112** for more information.

For information on saving the frequency table, **see "Saving a Test Procedure Using the Procedure Manager" on page 127**.

The **All Chans** field in the **Edit Seqn** screen interacts closely with the **Prime?** field on the **Edit Freq** screen. When the software runs, it begins by retrieving the first channel entered into the **Edit Freq** screen. It then checks the response in the **Test?** field to determine if the UUT should be tested at that channel at this time. If there is a **No** response in the **Test?** field, the software will go to the next channel in the table. If there is a **Yes** response in the **Test?** field, the software will check if the channel is **Prime**.

A **Yes** response in the **Prime?** field indicates to test the UUT at that channel on the entire sequence of tests in the procedure. A **No** response in the **Prime?** field indicates to test the UUT at that channel on a subset of tests in the procedure. The subset of tests is determined by a **Yes** response in the **All Chans?** field. Therefore, tests with a **No** response in the **All Chans?** field will be run on **prime** channels only.

Below is an example of how the software would run if you had a procedure set up as follows:

Chan #	Test?	Prime?
Chan 01	Yes	Yes
Chan 02	Yes	No
Chan 03	No	No

Test Number	All Chan? Setting
Test 01	No
Test 02	Yes
Test 03	Yes
Test 04	No

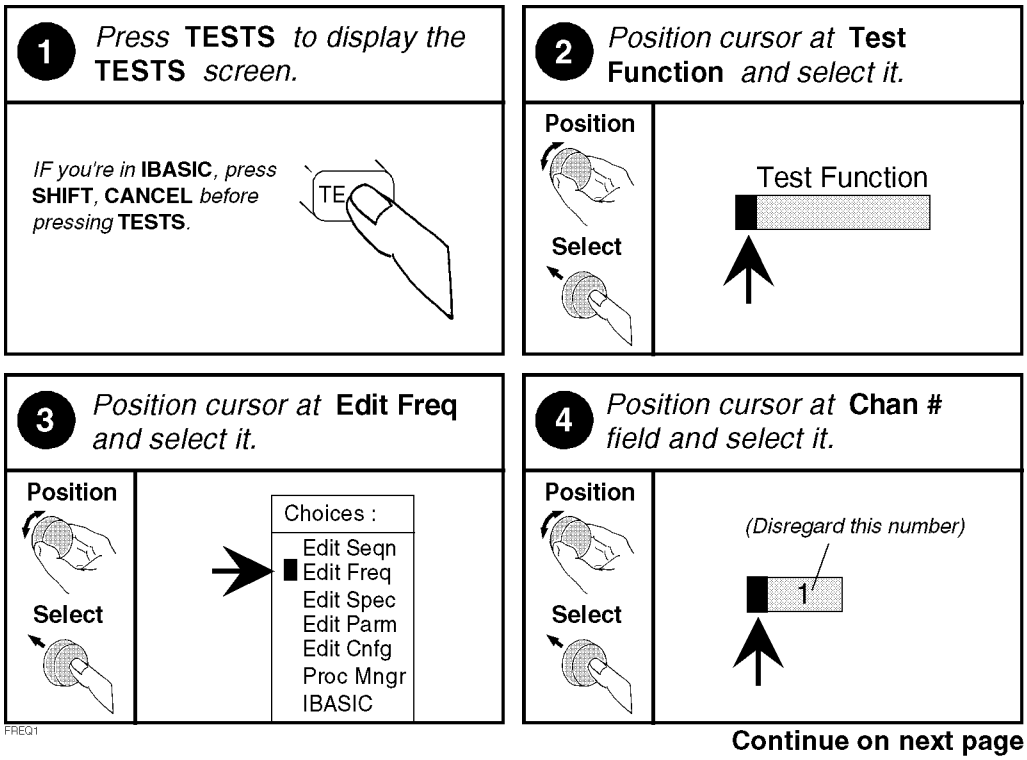
The result would be:

- Chan 01 is used in Test 01, Test 02, Test 03, and Test 04.
- Chan 02 is used in 02, and Test 03 only.
- Chan 03 is not used.

The following table shows how to properly configure these settings according to your testing needs.

Testing Need	Necessary Field Settings		
	Test?	**Prime?**	**All Chan?**
Test channel on all tests in sequence	Yes	Yes	Don't Care
Test channel on a subset of tests in sequence	Yes	No	Yes on tests you want included in the testing subset
Do not test this channel now, but retain information for later use	No	Don't Care	Don't Care

How to Specify Channel Information



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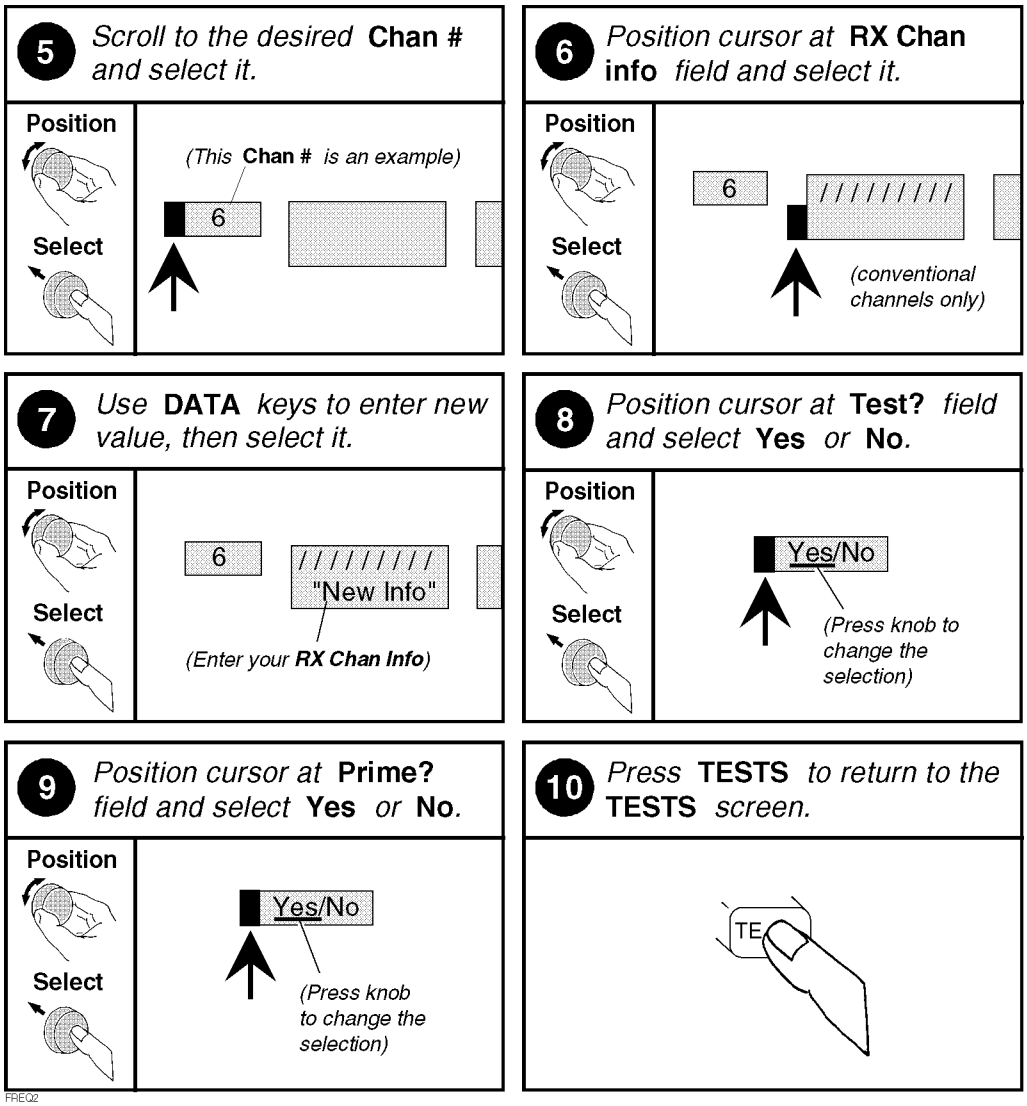
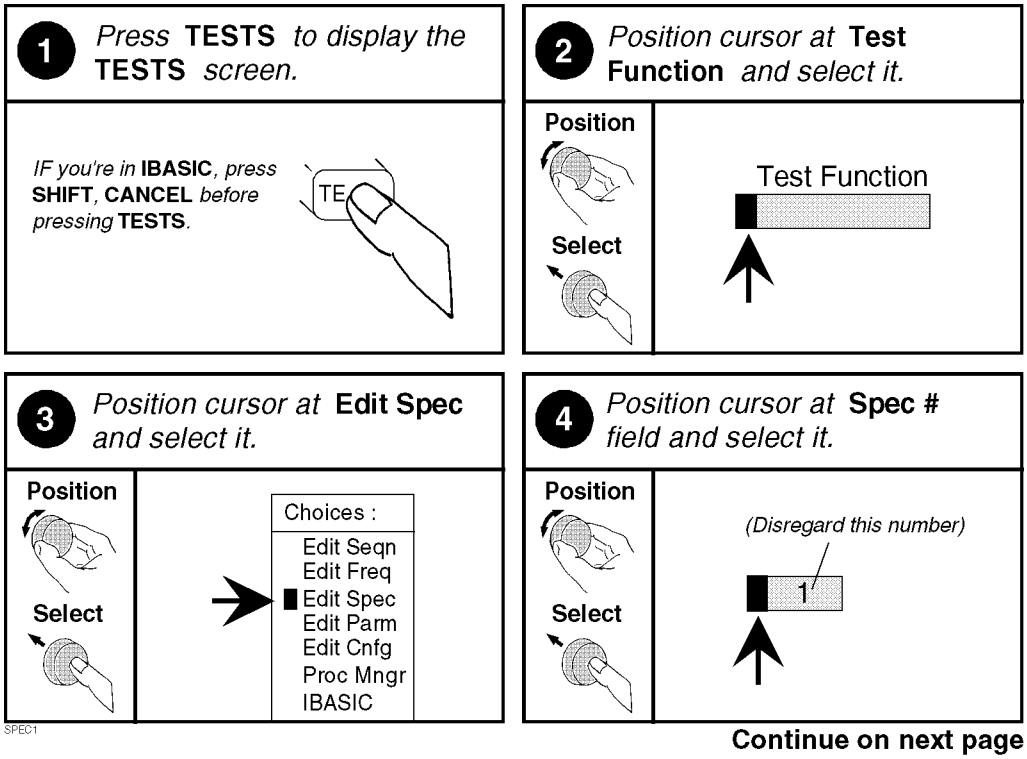

5 Scroll to the desired Chan # and select it.
Position
Select
(This Chan # is an example)
6
6 Position cursor at RX Chan info field and select it.
Position
Select
6
(conventional channels only)
7 Use DATA keys to enter new value, then select it.
Position
Select
6
"New Info"
(Enter your RX Chan Info)
8 Position cursor at Test? field and select Yes or No.
Position
Select
Yes/No
(Press knob to change the selection)
9 Position cursor at Prime? field and select Yes or No.
Position
Select
Yes/No
(Press knob to change the selection)
10 Press TESTS to return to the TESTS screen.
TE
FREQ2

Changing Pass/Fail Limits (Edit Specifications)

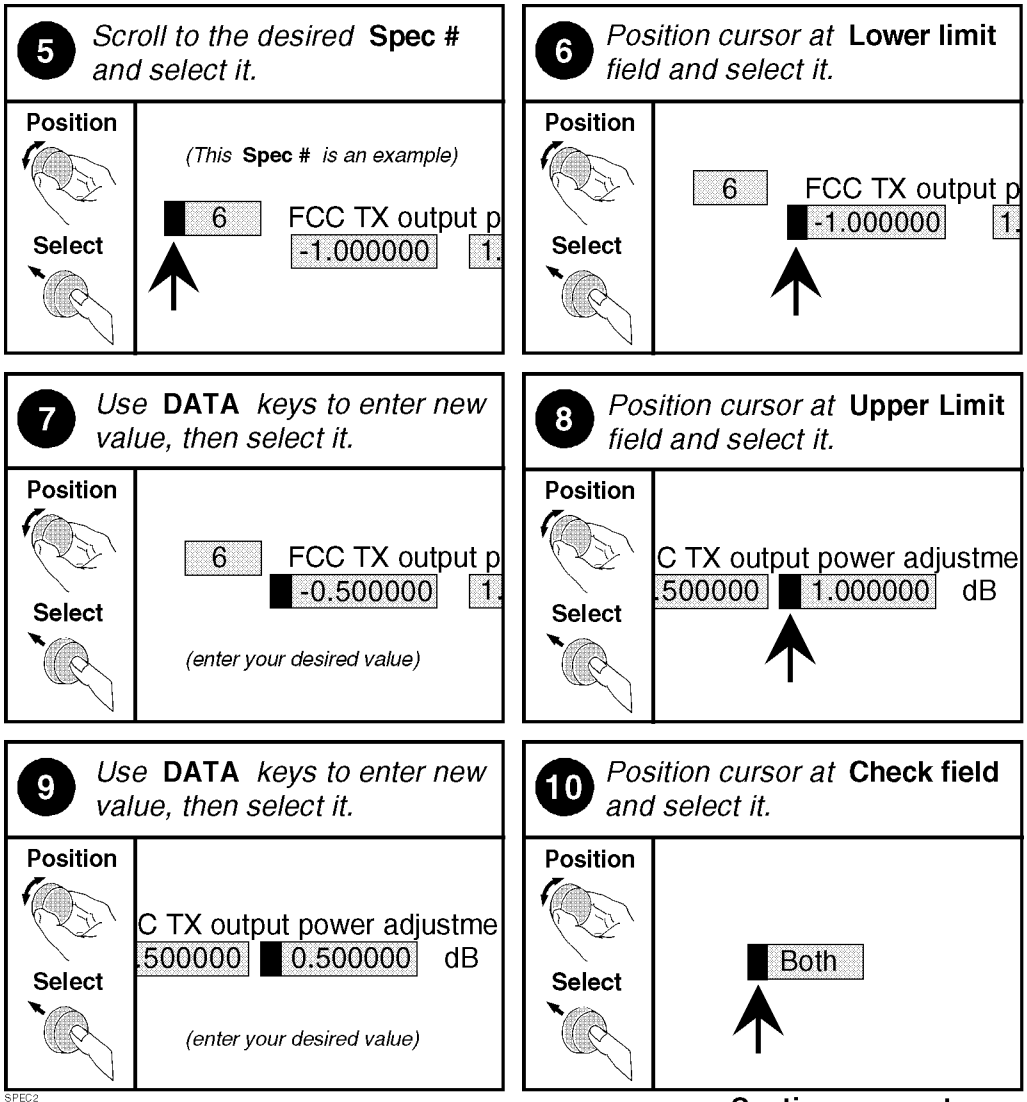
Specifications are values that set pass/fail limits for tests. Default values are available in the test software. These default values may be changed to suit your particular requirements.

The following describes how to change the pass/fail (upper and lower) limits in the HP 8920D/HP 8921D “Edit Specification” screen. **See "Pass/fail limit Descriptions" on page 213** for descriptions and default values for each specification. For information on saving customized specifications, **see "Saving a Test Procedure Using the Procedure Manager" on page 127**.

How to Change Pass/Fail Limits

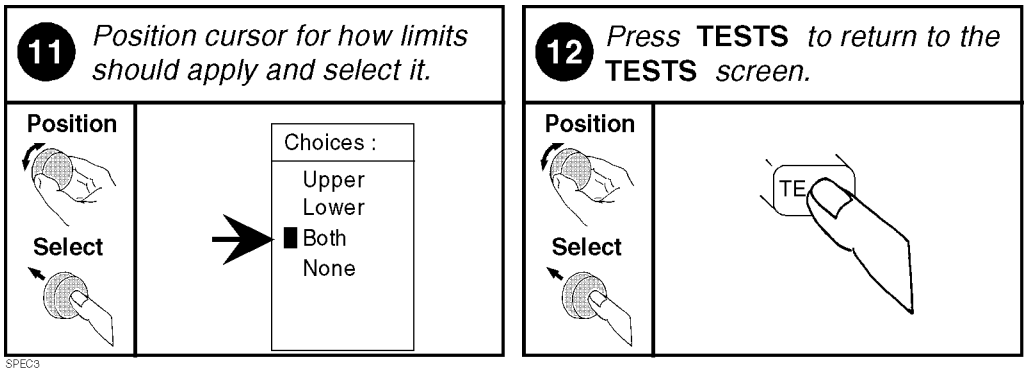


Continue on next page



SPEC2

Continue on next page

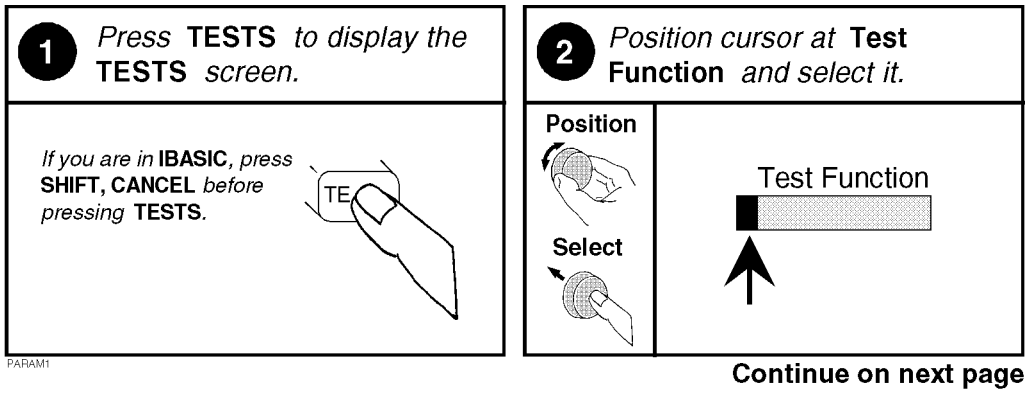

11
Position cursor for how limits should apply and select it.
Position
Select
Choices :
Upper
Lower
Both
None
12
Press TESTS to return to the TESTS screen.
Position
Select
TE
SPEC3

Changing the Test Environment and Conditions (Edit Parameters)

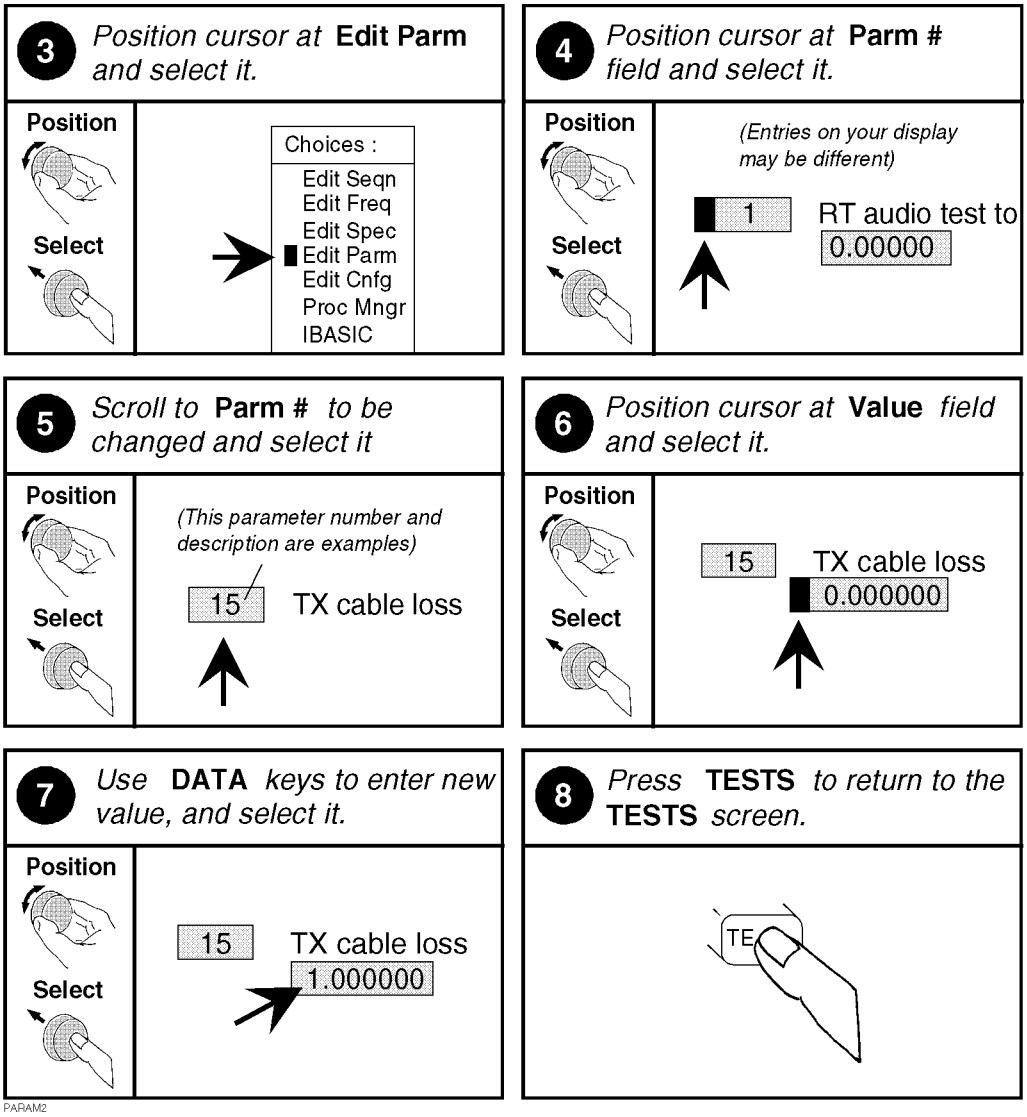
The software uses parameters to optimize the test environment and conditions for your testing situation. Many of the parameters are determined by examining your test needs. Other parameters are determined by performing measurements to calibrate items in your system. Examples of parameters include cable losses, rated system deviation, and what audio test tone frequency your system requires. The HP 11807A Software comes with default settings for parameters. The defaults should be reviewed for your particular needs. **See "Parameter Descriptions" on page 186** for descriptions and default values for each parameter. For information on saving customized parameters, **see "Saving a Test Procedure Using the Procedure Manager" on page 127**.

The following describes how you can change parameters through the Edit Parameter screen to optimize your testing conditions.

How to Change the Test Environment and Conditions



Continue on next page


3
Position cursor at Edit Parm and select it.
Position
Select
Choices :
Edit Seqn
Edit Freq
Edit Spec
Edit Parm
Edit Cnfg
Proc Mngr
IBASIC
4
Position cursor at Parm # field and select it.
Position
Select
(Entries on your display may be different)
1
RT audio test to
0.00000
5
Scroll to Parm # to be changed and select it
Position
Select
(This parameter number and description are examples)
15
TX cable loss
6
Position cursor at Value field and select it.
Position
Select
15
TX cable loss
0.000000
7
Use DATA keys to enter new value, and select it.
Position
Select
15
TX cable loss
1.000000
8
Press TESTS to return to the TESTS screen.
TE
PARAM2

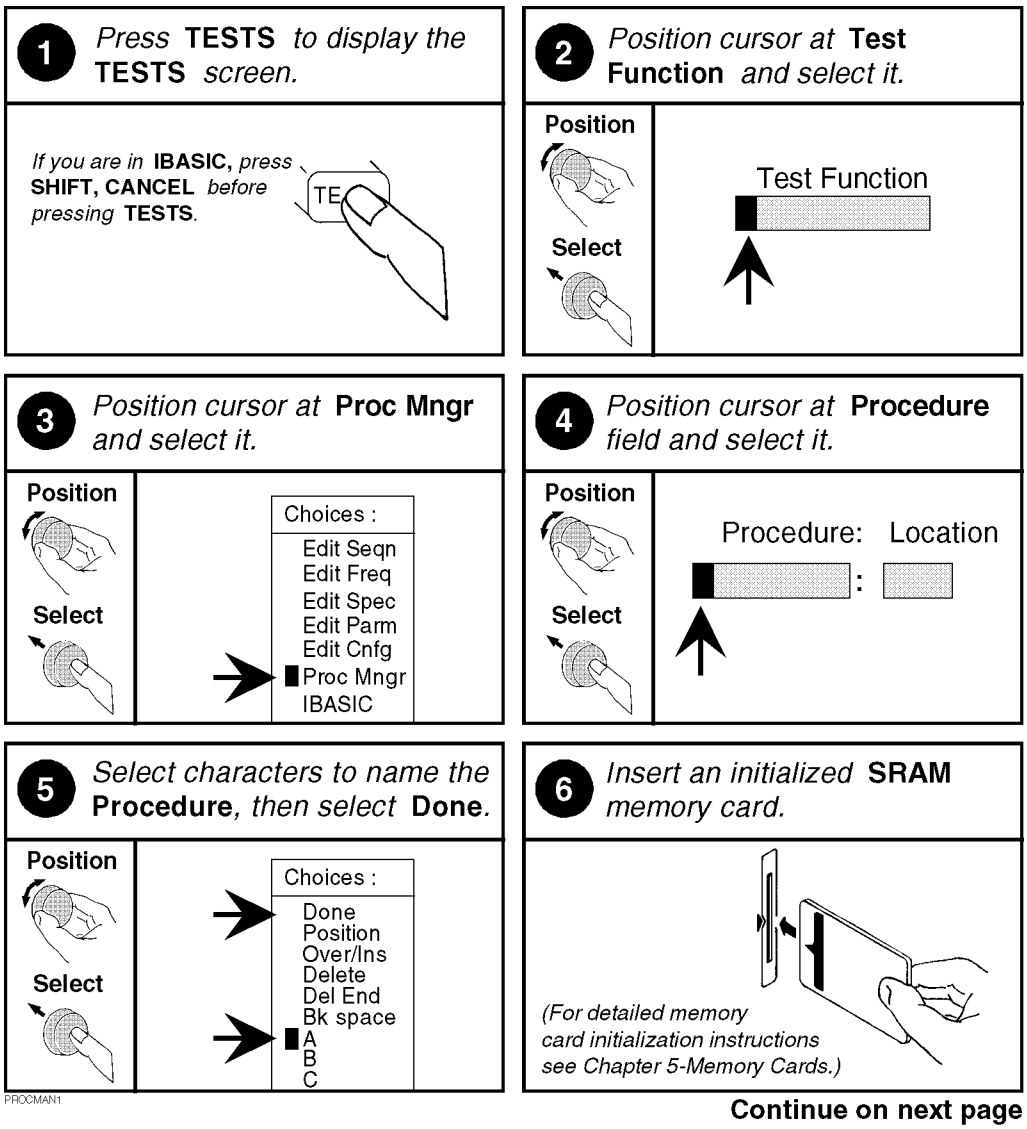
Saving a Test Procedure Using the Procedure Manager

A Test Procedure is a collection of pass/fail limits (specifications), the test environment and conditions (parameters), and a TEST sequence, saved in a file that customizes the test software to a specific application. You may save the file to a memory card or disk.

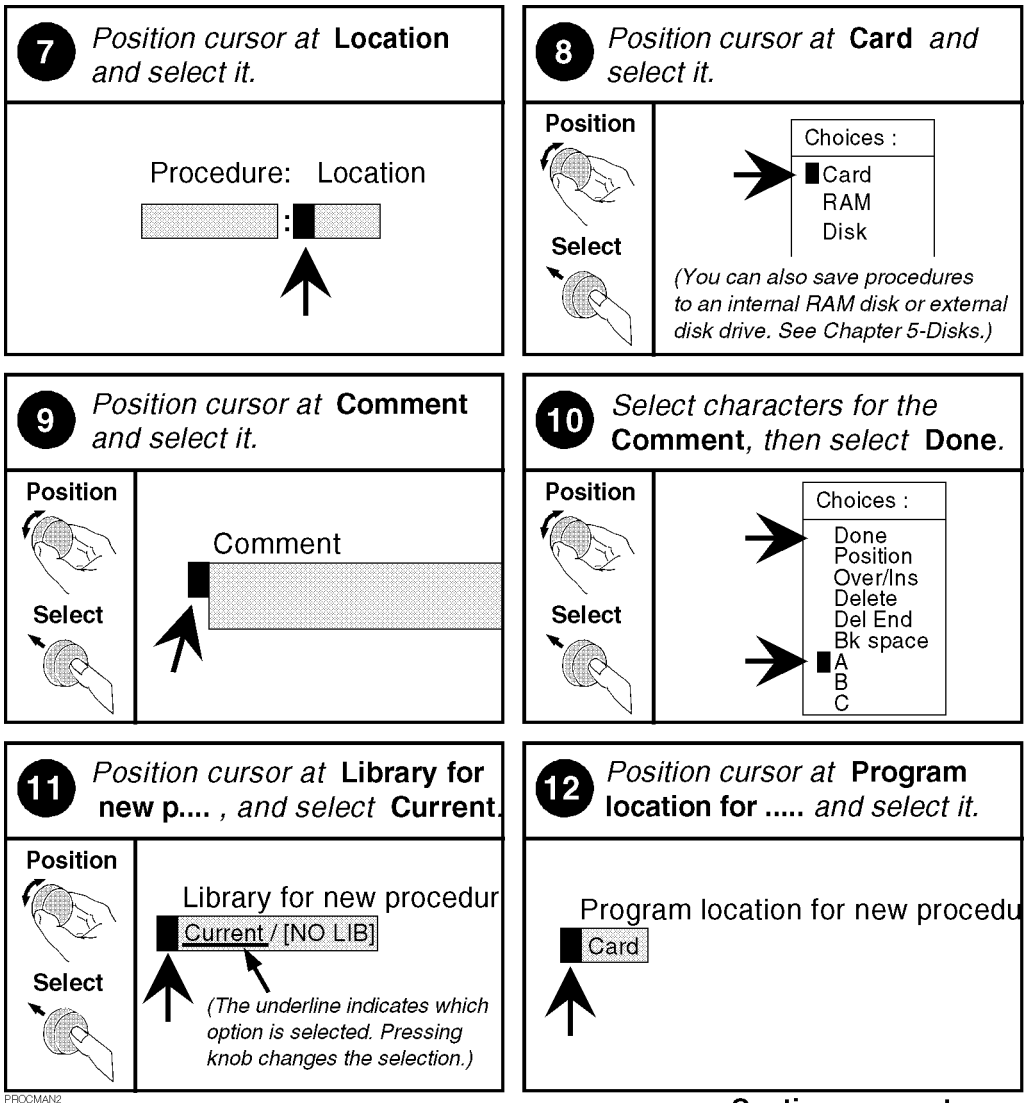
When you save a Procedure you will be saving parameters, specifications, and a test sequence, plus a library that contains the names of all parameters, specifications, and tests that are resident in the HP 11807A Software. The library file comes from the HP 11807A Software and cannot be modified. The library file will be automatically saved on the card or disk that is being used to store the new test procedure.

The following example shows how to save a new procedure to a memory card. For more information concerning procedures, **see "Procedures" on page 287**.

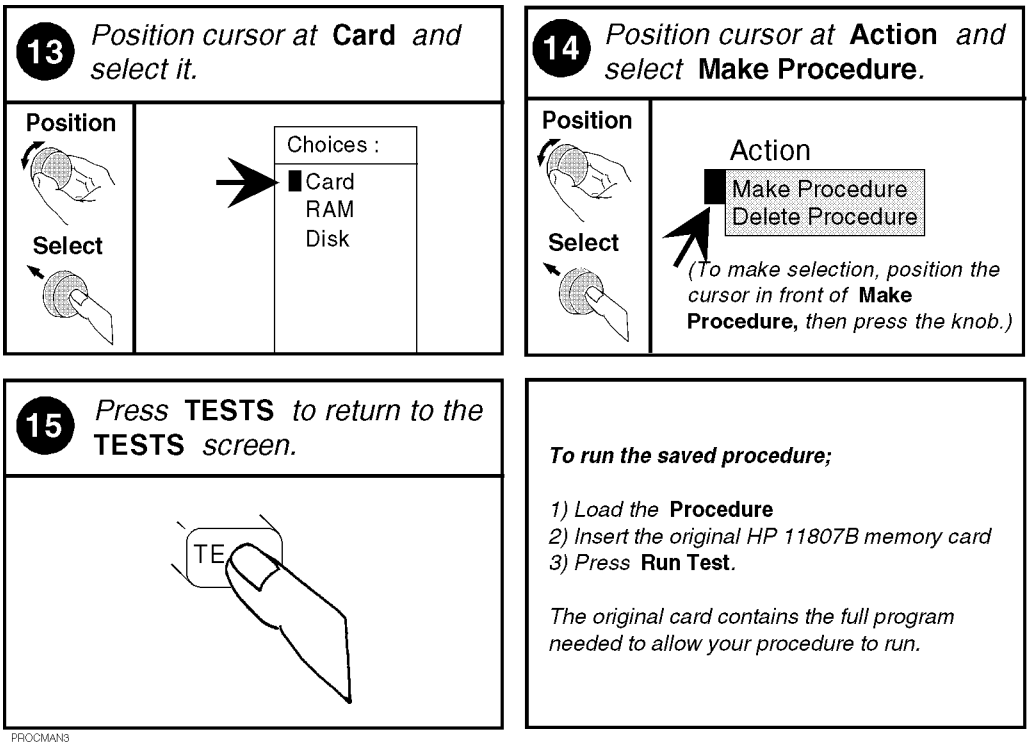
How to Save a Test Procedure



Continue on next page



Continue on next page


13 Position cursor at Card and select it.
Position
Select
Choices :
Card
RAM
Disk
14 Position cursor at Action and select Make Procedure.
Position
Select
Action
Make Procedure
Delete Procedure
(To make selection, position the cursor in front of Make Procedure, then press the knob.)
15 Press TESTS to return to the TESTS screen.
TE
To run the saved procedure;
1) Load the Procedure
2) Insert the original HP 11807B memory card
3) Press Run Test.
The original card contains the full program needed to allow your procedure to run.
PROCMAN3

Changing Test Execution Conditions

Test Execution Conditions define how your testing program starts and where and when test output occurs. You may decide to:

- Start the program automatically when the Test System is powered on. (**Autostart**)
- Stop testing when a measurement fails or continue through all of the tests without stopping. (**On UUT Failure**)
- Display (or print) only measurements that fail, or display (or print) all measurements that pass or fail. (**Output Results**)
- Pause between each measurement, or run through the entire test sequence. (**Run Mode**)
- Display output on CRT only, or display on CRT and print hardcopy . (**Output Destination**)

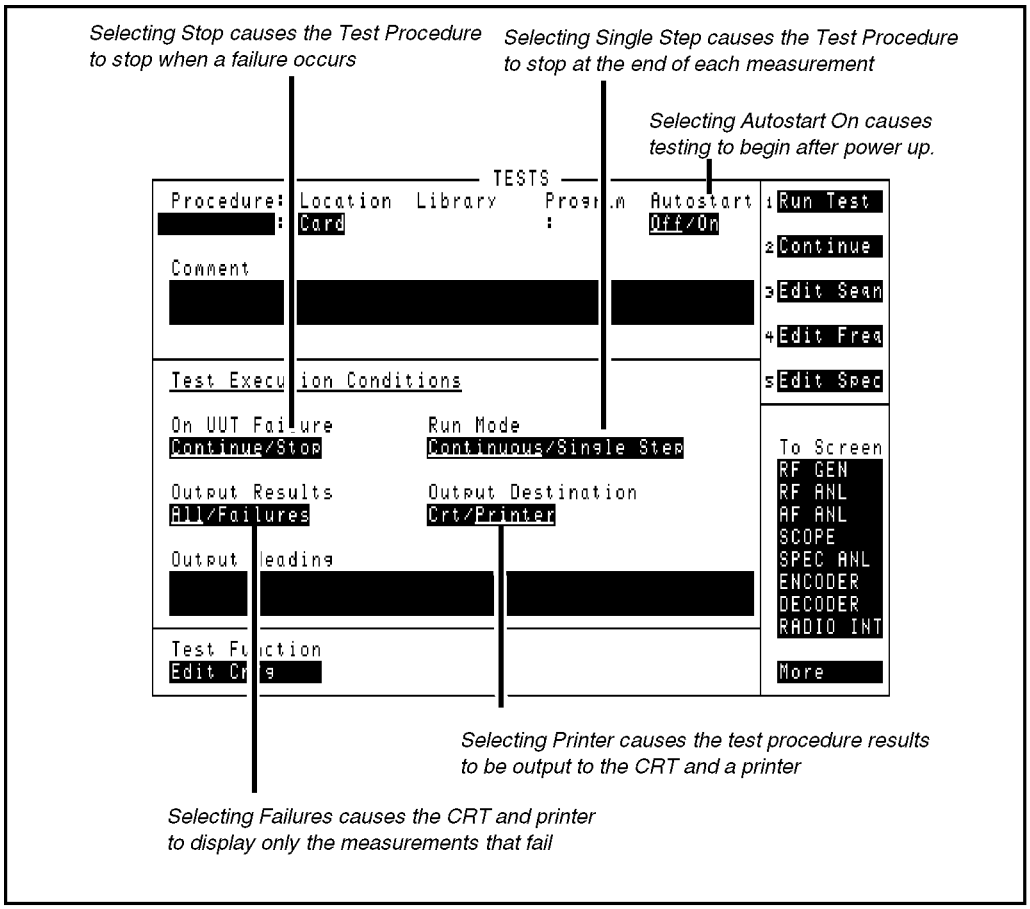
NOTE: If printing test results is desired, after selecting **Printer** additional steps are necessary to connect and configure the printer. **See "Printing" on page 272**.

- Enter a title for an output heading for the displayed or printed results. (**Output Heading**) Select the field with the knob and enter the output heading by selecting the appropriate letters and the select **Done**. Quotes are not allowed in the output heading.

Test Execution Conditions is located on the TESTS screen. Press TESTS to display them. To change a default setting, position the cursor to the desired field. Pressing the knob (”selecting”) will toggle the underlined selection.

Test Execution Conditions settings are not retained after a power-down/ power-up cycle, and will return to their default settings.

How to Change Test Execution Conditions



TESTEXE1

Printing and Saving Test Results

Printing and saving test results are features of the HP 11807A software which require additional equipment and configuration. **See "Printing" on page 272** for detailed descriptions and instructions for these features.

7

Test, Parameter, Pass/Fail Limit Descriptions

Testing Overview/Strategy

The HP 11807A,E Option 008 Software contains tests that are organized by the function they test.

- CP - Call Processing, Analog or Digital
- CPA - Call Processing, Analog tests
- CPD - Call Processing, Digital tests
- NAM - Number Assignment test
- OTA - Other Tests Analog
- RXA - Receiver, Analog tests
- RXD - Receiver, Digital tests
- TXA - Transmitter, Analog tests
- TXD - Transmitter, Digital tests

All tests, except CP, CPA and CPD require the use of the Test Interface Adapter. The following shows which tests do or do not require the adapter. Test Interface Adapters that do not allow simultaneous handset and Adapter connection to the mobile unit require that call processing tests be run separately from the other tests. Refer to the Test Interface Adapter documentation supplied by the mobile manufacturer.

Tests that do not Require the Test Interface Adapter

(Call Processing, CPA, CPD)

- **TEST_02 - CP Registration**
- **TEST_03 - CPA Page**
- **TEST_04 - CPA Origination**
- **TEST_05 - CPA Release**
- **TEST_06 - CP Manual Flow Chart**
- **TEST_30 - CPD Page**
- **TEST_31 - CPD Quick Digital**
- **TEST_32 - CPD Switch Channels**
- **TEST_33 - CPA Switch Channels**
- **TEST_34 - CPD Talk Back**
- **TEST_35 - CPD Origination**
- **TEST_36 - CPD Release**
- **TEST_37 - TXD Time Alignment**

Tests that Require the Test Interface Adapter

(NAM, RXA, RXD, TXA, TXD)

TEST_01 - NAM Number Assignment Module Data
TEST_07 - TXA Frequency Error
TEST_08 - TXA RF Power Output
TEST_09 - TXA Modulation Deviation Limiting
TEST_10 - TXA Audio Frequency Response
TEST_11 - TXA Audio Dist. Hum/Noise & Muting
TEST_12 - TXA Signaling Tone
TEST_13 - TXA SAT Frequency Error & Deviation
TEST_14 - TXA Wideband Data Deviation
TEST_15 - TXA Compressor Response
TEST_16 - TXA DTMF Frequency Error
TEST_17 - TXA Current Drain
TEST_18 - TXA Quick General
TEST_19 - RXA Audio Frequency Response
TEST_20 - RXA Audio Dist. Hum/Noise & Muting
TEST_21 - RXA Expandor
TEST_22 - RXA SINAD
TEST_23 - RXA Quick General
TEST_24 - OTA No Audio Functional
TEST_25 - RXD Receiver Sensitivity
TEST_26 - TXD Modulation Accuracy
TEST_27 - TXD RF Power Output
TEST_28 - TXD Calibrate RF Power
TEST_29 - TXD Adjacent Channel Power

A Testing Strategy

Tests may be run in any order that you may choose, but consideration should be given to the Test Interface Adapter being used.

- Some adapters allow call processing tests to be run with other tests while some adapters require that call processing tests be run separately. Refer to the Test Interface Adapter documentation supplied by the mobile manufacturer.

For example, running the call processing tests first can verify the mobile units functionality before running tests that find a parametric problem such as distorted audio. The following strategy is a suggested testing organization.

1. Make Connections as described in **chapter 4, "Making Connections," on page 63**. You will have to connect and use the handset for the call processing tests later in this strategy.
2. Load the 11807A,E Option 008 Software from the card into the Test System. **See "Load the Software," in chapter 1, on page 20** or **see "Load the Software," in chapter 2, on page 40**. Load the Procedure named 'CALL_PR' from the card.
3. Run analog call processing (CPA) tests first for verification that the mobile unit is functional. Also, these tests only use the mobile units' antenna to Test Systems' RF IN/OUT connection. You may also load and run the digital call processing (CPD) tests if you wish.
   a. Access the **`Order of Tests`** (or **`Edit Sequence`**) screen as described in **"Changing the Order of Tests" on page 78** or **"Changing a Sequence of Tests (Edit Sequence)" on page 112**.
   b. Follow the procedure to edit, create or view the test sequence with the following tests in the order presented:

Table 2

Test Name	Purpose
TEST_02 - CP Registration	Verify that mobile is functioning (only RF and dc power connections required) and returns the units phone number, serial number and power class
TEST_03 - CPA Page	Simulates an analog call to the mobile unit
TEST_05 - CPA Release	Releases the mobile unit
TEST_04 - CPA Origination	Simulates an analog call from the mobile unit
TEST_ 30 - CPD Page	Simulates a digital call to the mobile unit
TEST_36 - CPD Release	Releases the mobile unit
TEST_35 - CPD Origination	Simulates a digital call from the mobile unit

c. Establish whether the mobile unit uses A control channels (channels 313 to 333), B control channels (channels 334 to 354) or both A and B control channels.

d. Check and update, the CPA Control Channel number and the Test Interface Adapter personality number that are required by the mobile unit. **See "How to Change the Test Environment and Conditions," in chapter 5, on page 92**.

i. Select the parameter **`CPA Control Channel`** and enter the correct control channel if necessary.

ii. Select the parameter **`TIA Test Interface Personality`** and enter the correct personality number. See the description for this parameter in **"Parameter Descriptions" on page 186**.

e. The handset must be connected. For call processing testing, the handset Transmit Receive Unit (TRU) connection can be made one of two ways;

i. Directly connected to TRU

ii. To the TRU through the Test Interface Adapter

Refer to the documentation supplied with the Test Interface Adapter for the mobile station under test.

f. Press TESTS to access the TESTS screen and then press **`Run Test`**. You are now running the tests in the sequence entered earlier. As the results are reported on the CRT of the Test System you will be able to better isolate and determine the cause of any problems. Save this group of call processing tests as a test procedure, **see "Saving a Test Procedure," in chapter 5, on page 94** or **see "Saving a Test Procedure Using the Procedure Manager," in chapter 6, on page 127**. You may also want to add the digital call processing tests to this test procedure.

4. Create another test procedure that contains transmitter and receiver tests that you desire to run, through the **`Order of Tests`** (or **`Edit Sequence`**) function. You may save this test procedure, see **see "Saving a Test Procedure," in chapter 5, on page 94** or **see "Saving a Test Procedure Using the Procedure Manager," in chapter 6, on page 127**.

5. The handset should not be controlling the mobile unit for these tests. Make sure that the Test Interface Adapter is setup to control the mobile unit.

The following tests are an example starter list:

Table 3

Test Name	Purpose
TEST_01 - NAM Number Assignment Module Data	Verify Test Interface Adapter connection to Test System
TEST_08 - TXA RF Power Output	Verify analog transmitter
TEST_11 - TXA Audio Dist. Hum/Noise & Muting	Verify transmitter audio connection
TEST_22 - RXA SINAD	Verify analog receiver and receiver audio connection

If you are running call processing tests, TEST_02 CP Registration, TEST_04 CPA Origination, or TEST_35 CPD Origination should be the first test in your test procedure. These tests obtain the mobile identification number (MIN) of the UUT. The test set requires a MIN to page the UUT. Once a MIN is obtained from a UUT, it is retained by the test set until a new MIN is obtained. Therefore, the Registration or Origination test needs to be performed only once on each UUT. Subsequent test procedures do not need to start with TEST_02 CP Registration, TEST_04 CPA Origination, or TEST_35 CPD Origination.

If the first test in a test procedure sequence is not TEST_02 CP Registration, TEST_04 CPA Origination, TEST_35 CPD Origination, or TEST_06 CP Manual Flow Chart, and the MIN from the UUT has not been previously obtained by the test set, then the test set will prompt the user for the UUT phone number. The test set will then create the MIN from the phone number (see also descriptions for Parameter **"01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]" on page 187**, parameter **"03. CP Enter Ph#[0=If Needed,1=Always,Here]" on page 189**, and Parameter **"01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]" on page 187**.

Test Descriptions

Tests are a series of measurements. One or more tests make up a *Procedure (***see chapter 5** *or* **see chapter 6***)*. While you may change the tests that make up a Procedure, you may not change the measurements the test will perform. The order in which the tests are run is only important when mixing CPA, CPD tests with other parametric tests. See the discussion earlier in this chapter.

Run TEST_01 NAM Number Assignment Module Data, TEST_02 Registration, TEST_04 CPA Origination, or TEST_35 CPD Origination before other call processing tests to register each new mobile with the test system. Once a mobile has been registered with the test system, TEST_02, TEST_04, or TEST_35 does not need to be performed before other tests.

Standards Used

The tests contained in this Test Package are derived from the EIA/TIA IS-54 Cellular System Dual-Mode Mobile Station — Base Station Compatibility Standard and the EIA/TIA IS-55 Recommended Minimum Performance Standards for 800 MHz Dual-Mode Mobile Stations.

Test Nomenclature

- CP - Call Processing, Analog or Digital
- CPA - Call Processing, Analog tests
- CPD - Call Processing, Digital tests
- NAM - Number Assignment test
- OTA - Other Tests, Analog
- RXA - Receiver, Analog tests
- RXD - Receiver, Digital tests
- TXA - Transmitter, Analog tests
- TXD - Transmitter, Digital tests

TEST_01 - NAM Number Assignment Module Data

Reads the UUT's number assignment module (NAM) data and outputs the mobiles' telephone number and other related class-of-service information to the output device (CRT or printer). The number assignment module data includes the following:

- Mobile ID Area
- Mobile ID Prefix
- Mobile ID Suffix
- Home System Identification Number
- Station Class Mark
- Local Use
- Initial Paging Channel
- Secondary Paging Channel
- Access Overload Class (ACCOLC)
- MIN Mark
- Group ID
- Lock Digits
- Phone Number
- Serial Number

TEST_02 - CP Registration

This test reads and decodes the phone's RVCC pager response message and outputs the following registration information:

Phone number.
Serial number.
Power class.
Transmission (continuous or discontinuous).
Bandwidth (20 MHz or 25 MHz).

The test works as follows:

- The Test System transmits the Registration ID message repeatedly, with the value of the REGID field set alternately to 0 and 500. This induces the phone to register with the Test System.
- If an error occurs in this test, all testing is stopped.

A CPA registration test, CPA origination test, CPD origination test, or NAM test must be run before any call processing tests can be run. Otherwise the operator is prompted to enter the UUT phone number during testing, or enter the UUT phone number using parameters. After the CP registration, CPA origination, or CPD origination test is run once it does not need to be run again for the test system to be able to perform other tests. The registration data is remembered unless it is erased by loading new test software, registering a different radio, or executing a **`SCRATCH C`** command in IBASIC.

Pass/fail limits Used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
03. CP Enter Ph#[0=If Needed,1=Always,Here]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
10. CPA SAT Tone [5970,6000,6030]

TEST_03 - CPA Page

Initiates a call to the mobile station from the base station. Specifically, this test does the following:

1. Performs a page to the UUT.
2. Performs 3 of 5 majority voting on the Reverse Control Message.
3. Performs BCH error detection and correction of the Reverse Control Message.
4. Tests each section of the page response, bit by bit.
5. Sends an Initial-Voice-Channel-Designation order to the UUT, directing it to tune to a voice channel obtained from the Channel Information (or Edit Freq) table.
6. Sends an ALERT order to the UUT by way of the Forward Voice Channel (FVC).
7. Makes a power measurement on the initial voice channel to verify that the voice channel was obtained. The power measurement result is not displayed in this test.

Pass/fail limits used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
03. CP Enter Ph#[0=If Needed,1=Always,Here]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
10. CPA SAT Tone [5970,6000,6030]

TEST_04 - CPA Origination

Simulates a call from the mobile station to the base station by putting the mobile in service and having the operator originate a call from the handset. Specifically, this test performs the following:

1. The Test System simulates a control channel.
2. The operator is instructed to dial 123 123 4567 after the UUT has service. (Service is indicated by the NO SERVICE light going off or the SERVICE light illuminating on the UUT.)
3. Performs 3 of 5 majority voting on the Reverse Control Message.
4. Performs BCH error detection and correction of the Reverse Control Message, Wideband data.
5. Tests each section of the origination message, bit by bit.
6. Sends an Initial-Voice-Channel-Designation order to the UUT directing it to tune to a voice channel obtained from the Channel Information (or Edit Freq) table.
7. Makes a power measurement on the initial voice channel to verify that the voice channel was obtained. The power measurement result is not displayed in this test.

It is not necessary to register the phone with the test set by running TEST_01 CP Registration before running this test. TEST_21 CPA Origination will read the UUT's Mobile Identification Number (MIN) and the test set will retain it for use in performing other tests.

Pass/fail limits used

None

Parameters used

02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
10. CPA SAT Tone [5970,6000,6030]

TEST_05 - CPA Release

Provides the necessary commands to release the mobile unit.

The test works as follows:

- Sets mobile unit onto a voice channel if not already on a voice channel.
- A release message is sent from the Test System.
- Power is monitored continuously until the power drops below –25 dBW or until 6 seconds has passed, which ever occurs first.
- The test fails if the 6 second limit is reached.

Pass/fail limits used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
10. CPA SAT Tone [5970,6000,6030]

TEST_06 - CP Manual Flow Chart

This test displays a flowchart representing a cellular phone as it gains access to a system. It operates with AMPS and NADC dual-mode phones. Once you have established a voice channel using the flow chart for AMPS phones, you can test cellular-radio functions including handoffs, power level changes, SAT changes, hook flashes, and clear the system. At each stage, reverse-channel data is displayed for analysis, along with measurements of power, frequency error, and deviation.

For NADC dual-mode phones, you can establish either a voice channel (analog) or traffic channel (digital), handoff between analog and digital channels, and change power levels. The system can measure digital phone parameters including EVM, power, frequency error, and channel quality.

CAUTION: For accurate power measurements of an NADC dual-mode phone in “digital” mode, run the TXD Calibrate RF Power test prior to running CP Flow Chart.

Calibration data is retained as long as the test procedure being run is present in memory. If you change the test software in the Test System you should rerun this calibration. You should also rerun this calibration if you change the test setup or environment (temperature) that you are using.

Running the MANUAL test procedure

- At the beginning of this test, the test system simulates a control channel. The cellular phone must tune to this control channel and decode the data stream in order to obtain service. When the phone succeeds at obtaining service, the NO SERVICE indicator on the phone will turnoff or the SERVICE light will illuminate. If NO SERVICE continues, try changing the control channel to the other band by selecting the **`Cntl Chan`** field and entering the appropriate channel number.
- When the cellular phone first obtains service, you may originate a call by dialing a phone number and pressing SEND, or you may perform a registration by pressing the softkey on the test set corresponding to register. You must originate a call, or perform a registration before paging the phone. The origination and registration provide the phone number of the UUT to the test set.
  - To register the phone, select the **`Register`** field.
  - To originate a call from an AMPS or NAMPS phone, dial a phone number and press the phone’s SEND.

- You can perform a page after you register the phone or you have previously performed an origination and the phone indicates service. You can page or originate onto an analog voice channel, or digital traffic channel provided you are testing an NADC phone.

  If you attempt a digital page or digital origination on a non-NADC phone, a message will be displayed indicating that you cannot page or originate a non-NADC phone to a digital traffic channel.

  After a page or origination is attempted, the digital capability of the phone is determined by the software. If the phone is determined to not have digital capability, the software will no longer present the operator with the option of performing a digital page or digital origination. This will remain true until a registration is performed, or a call is originated with an NADC phone.

  - To page an AMPS or NAMPS phone, select the **`Anl Page`** field.
  - To page an NADC dual-mode phone and establish an analog voice channel, select the **`Anl Page`** field.
  - To page an NADC dual-mode phone and establish a digital traffic channel, select the **`Anlg/Dig`** field followed by the **`Dig Page`** field.
  - To originate an AMPS or NAMPS phone, dial a number and press the phone's SEND key.
  - To originate an NADC phone and establish an analog voice channel, dial a number and press the phone's SEND key.
  - To originate an NADC dual-mode phone and establish a digital traffic channel, select the **`Anlg/Dig`** field so that **`dig orig`** is displayed on the flow chart, then, dial a number and press the phone's SEND key.
- Once you establish either a voice or traffic channel, refer to the flowchart on the screen and the associated fields to the right of the screen for operating functions.

Analog and Digital functions

- **`chng chan`** allows you to change cellular phone channels. For NADC dual-mode phones, you can handoff analog-to-analog, analog-to-digital, digital-to-digital, and digital-to-analog channels.
- **`chng pwr`** allows you to change cellular phone transmit power.
- **`clear ls`** allows you to clear the land station (ls). This terminates the connection from the land station.
- **`clear ms`** allows you to clear the mobile station (ms). This terminates the connection from the mobile station.
- **`Quit`** allows you to exit the test.

Analog operation only functions:

- **chng sat** allows you to change the Supervisory Audio Tone (SAT).
- **DTMF** allows you to measure the frequency error of the high and low tones from the DTMF generator in the phone.
- **maintnce** allows you to run a maintenance check of the phone's signaling tone frequency and deviation.
- **Hook FLSH** allows you to transmit a hook flash number from the phone, receive it, and display it on the test system. Hook flash numbers up to 32 digits can be entered.

Digital (NADC dual-mode) only functions:

- **chan qual** allows you to measure the channel quality of the phone. This measurement returns the BER interval and RSSI of the current channel as reported by the phone. The operator is prompted for the power level transmitted to the phone for this test. The default value is defined by the Parameter RXA RF Level for Signaling found in the parameter list.
- **Talk Back** allows you to test the operation of a digital transmit and receive channel. This test requires you to speak into the phones' microphone and listen to what you said.
- **Talk Time** allows you to enter the desired Talk Back duration.
- **EVM 1** allows you to change the EVM measurement result field from ten-burst EVM to single-burst EVM measurements.
- **EVM 10** allows you to change the EVM measurement result field from single-burst EVM to ten-burst EVM measurements.

Pass/fail limits used

None (since this test only monitors there are no pass/fail limits applied to the results).

Parameters used

CP all zero MIN number
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
10. CPA SAT Tone [5970,6000,6030]
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
13. CPD Talk Back Time [1:31]
14. CPD Wait for Handoff
15. RT External Pad and Cable Loss
20. RTD Analyzer Trigger Delay [0:971]
33. RXD Sensitivity RF Level
36. TX Units for Power Meas [0=dBW 1=Watts]

TEST_07 - TXA Frequency Error

Measures the difference between the unmodulated carrier frequency and the assigned carrier frequency. The frequency error is expressed in ppm.

Pass/fail limits used

31. TXA Frequency Error

Parameters used

NOTE: High and low supply voltages are measured only if an external power supply has been configured to be used over HP-IB by the test system and if Parameter 19, RT Test at Extreme Settings is set to test at extremes (1=yes). **See "TEST_17 - TXA Current Drain" on page 163** for details on configuring an HP-IB power supply.

16. RT High Supply Voltage
17. RT Low Supply Voltage
18. RT Nominal Supply Voltage
19. RT Test at Extreme Settings [0=no 1=yes]
35. TIA Test Adapter Personality [0:10]

TEST_08 - TXA RF Power Output

Measures the power at the output terminals of the transmitter when the output terminals are connected to a 50 Ω load. This test is performed at the nominal supply voltage and can also be performed with high and low supply voltages for extreme measurements. This test requires a programmable power supply when the high-supply and low-supply power measurements are performed. Output power is expressed in dBW or W by appropriately setting the Parameter TXA units for power meas.

Pass/fail limits used

11. TX Output Power at Level 0
12. TX Output Power at Level 1
13. TX Output Power at Level 2
14. TX Output Power at Level 3
15. TX Output Power at Level 4
16. TX Output Power at Level 5
17. TX Output Power at Level 6
18. TX Output Power at Level 7

Parameters used

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
15. RT External Pad and Cable Loss
16. RT High Supply Voltage
17. RT Low Supply Voltage
18. RT Nominal Supply Voltage
19. RT Test at Extreme Settings [0=no 1=yes]
35. TIA Test Adapter Personality [0:10]
36. TX Units for Power Meas [0=dBW 1=Watts]
44. TXA Output Power Levels Tested [BWD #]
45. TXA Voltage for Compressor Zero Crossing

TEST_09 - TXA Modulation Deviation Limiting

Measures the ability of the transmitter circuits to prevent the transmitter from producing deviations in excess of rated system deviation. This test measures the Peak+ and the Peak– values of the instantaneous (INST) and steady state (SS) modulation and indicates whether or not the modulation is symmetrical. Symmetry is based upon the difference between positive and negative swings of the carrier at any level of modulation. Modulation limiting is expressed in kHz; modulation symmetry is expressed in a percent difference between positive and negative swings of the carrier.

Pass/fail limits used

32. TXA Modulation Limiting

Parameters used

16. RT High Supply Voltage
17. RT Low Supply Voltage
18. RT Nominal Supply Voltage
19. RT Test at Extreme Settings [0=no 1=yes]
35. TIA Test Adapter Personality [0:10]
42. TXA Frequency Deviation Step Frequency
43. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]
45. TXA Voltage for Compressor Zero Crossing

TEST_10 - TXA Audio Frequency Response

Measures how closely the frequency deviation of the transmitter follows a 6 dB/octave pre-emphasis slope over a given frequency range. The test results indicate the flatness of the audio output as frequency is varied. Audio frequency response is expressed in dB error from the 6 dB/octave pre-emphasis slope.

Pass/fail limits used

21. TXA Audio Response Dev From 6 dB/oct
22. TXA Audio Response Roll >2.5 kHz

Parameters used

35. TIA Test Adapter Personality [0:10]
37. TXA Audio Response Step Frequency
45. TXA Voltage for Compressor Zero Crossing

TEST_11 - TXA Audio Dist. Hum/Noise & Muting

1. Measures the level of the demodulated carrier's audio distortion, expressed in percentage.
2. Measures the ratio, expressed in dB, of the residual frequency modulation to the standard test modulation.

CAUTION: An open microphone on your UUT can affect the results of this test. If your UUT has an open microphone, this test must be performed in a quiet environment.

3. Measures the ability of the UUT's audio-mute circuit, expressed in dB, to attenuate audio signal transmission in the audio voice path.

Pass/fail limits used

19. TXA Audio Distortion
20. TXA Audio Muting
30. TXA FM Hum and Noise

Parameters used

35. TIA Test Adapter Personality [0:10]
45. TXA Voltage for Compressor Zero Crossing

TEST_12 - TXA Signaling Tone

Measures the signaling tone's Peak+ and Peak– deviation of the carrier, and the signaling tone's distortion and frequency. Signaling tone deviation is expressed in kHz, distortion in dB and frequency in Hz.

Background

The signaling tone (ST) is a 10 kHz tone that is generated by the UUT on a voice channel and is transmitted to the cell site for confirming orders (Alert, Audit, Change Power, etc.), and for signaling flash and release requests.

Pass/fail limits used

35. TXA Signaling Tone Deviation
36. TXA Signaling Tone Frequency

Parameters used

35. TIA Test Adapter Personality [0:10]
45. TXA Voltage for Compressor Zero Crossing

TEST_13 - TXA SAT Frequency Error & Deviation

Measures the frequency error and Peak+ and Peak– deviation of each SAT tone. SAT frequency error is expressed in Hz and deviation is expressed in kHz.

Background

The supervisory audio tones are out-of-voice-band audio tones used for signaling. Three frequencies have been assigned: 5970, 6000, and 6030 Hz. One of the three tones is added to the voice transmission by a cell site. The UUT then detects the tone and modulates the transmitted voice channel carrier with a constant (relative) phase tone which is filtered or regenerated from the received tone to establish a closed loop between the mobile (UUT) and the cell site. Transmission of the SAT by a UUT is suspended during transmission of wideband data on the reverse voice channel, but is not suspended when the signaling tone (ST) is sent.

Pass/fail limits used

33. TXA SAT Deviation
34. TXA SAT Frequency Error

Parameters used

35. TIA Test Adapter Personality [0:10]
45. TXA Voltage for Compressor Zero Crossing

TEST_14 - TXA Wideband Data Deviation

Measures the Peak+ and Peak– frequency deviation, expressed in kHz, of the wideband data to ensure that it is within the limits of the TXA wideband data deviation pass/fail limit.

Background

Wideband data is 10-kilobit/second Manchester-encoded data that is used for cellular system signaling and control. Manchester encoding is accomplished by transforming each NRZ (non-return to zero) binary one to a zero-to-one transition and each NRZ binary zero to a one-to-zero transition. The wideband data stream is then used to modulate the transmitter carrier using direct binary frequency shift keying (FSK). A one (high state) into the modulator corresponds to a peak frequency deviation above the carrier frequency, and a zero (low state) into the modulator corresponds to a peak frequency deviation below the carrier frequency. Wideband data is used on the paging and access channels and on the voice channels for vertical services and for handoff and other subscriber-unit control functions. All other modulation sources to the transmitter are inhibited when wideband data is being transmitted.

NOTE: Hewlett-Packard Company has found that some cellular telephones fail this test because the telephones produce a carrier frequency transient at the beginning of the wideband data transmission. This causes the peak frequency deviation to exceed the maximum specification of ±8 kHz ±10% (or a total of ±8.8 kHz) specified in the IS-55 Standard. This transient typically occurs during the first 10 milliseconds of the wideband data transmission from the telephone. The HP 11807A,E Option 008 software measures the FM peak deviation during the entire period while the telephone transmits its data and holds and displays only the highest positive and negative peaks detected. The HP test set has a fast peak detector which captures the peak deviation that occurs over the entire period, including the deviation that occurs in the first 10 milliseconds. The measurement method conforms to the IS-55 Standard.

Pass/fail limits used

37. TXA Wideband Data Deviation

Parameters used

35. TIA Test Adapter Personality [0:10]
45. TXA Voltage for Compressor Zero Crossing

TEST_15 - TXA Compressor Response

This test measures the compressor's zero reference deviation and operating range. For every 2 dB change in input level, there should be a nominal output level change of 1 dB. *Audio connections from the radio to the test system are required for this test.*

Compressor response is expressed in kHz for the zero reference deviation, and in dB of tracking error over the indicated operating range.

- Compressor response to different input levels is measured.
- The "zero crossing" deviation is first measured by applying a 1 kHz rate input voltage to the UUT at a level specified by the Parameter 45, TXA Voltage for Compressor Zero Crossing. The deviation is displayed as "TXA cmp dev @ user ref volt".
- The deviation is then set to 2.9 kHz and a reference is taken with the rms detector. The voltage used to achieve 2.9 kHz deviation is displayed as "TXA cmp volt for 2.9 kHz dev".
- The input is varied from the level specified by Parameter 38, TXA Compressor Start Level, to the level specified by Parameter 40, TXA Compressor Stop Level. The increments are specified by Parameter 39, TXA Compressor Step Level. The rms deviation is measured and the compressor response relative to the reference is calculated. The compressor typically limits relative inputs ≥17.6 dB; therefore, the Pass/fail limit 23, TXA Compressor Min Out @>17.6 dB input, is used to specify the lower limit for relative output deviation when the relative input deviation is >17.6 dB.

Background

A compressor is used in the phone's voice input circuitry to decrease the variability of the modulation due to volume changes from the talker. In combination with an expandor in the cell site receiver, this provides improved signal-to-noise-ratio in the demodulated audio.

Pass/fail limits used

23. TXA Compressor Min Out @>17.6 dB In
24. TXA Compressor Track Error <0 dB
25. TXA Compressor Track Error >0 dB
26. TXA Compressor Zero Reference Deviation

Parameters used

35. TIA Test Adapter Personality [0:10]
38. TXA Compressor Start Level
39. TXA Compressor Step Level
40. TXA Compressor Stop Level
45. TXA Voltage for Compressor Zero Crossing

TEST_16 - TXA DTMF Frequency Error

Measures the frequency error of the DTMF tone generator in the UUT. The low tone (LT) and high tone (HT) DTMF frequencies, for each selected dialing key, are checked to make sure that the frequencies are within the DTMF Frequency Error limits. DTMF frequency error is expressed in percent (%).

Background

There are two groups of sinusoidal high and low frequencies consisting of 1209, 1336, and 1477 Hz in one group, and 609, 770, 852, and 941 Hz in the other group. A DTMF signal is generated when a key is pressed on the keyboard. Each dialing key makes use of one assigned frequency from each group. The DTMF signal is ultimately encoded and transmitted for control purposes.

Pass/fail limits used

29. TXA DTMF Frequency Error

Parameters used

35. TIA Test Adapter Personality [0:10]
45. TXA Voltage for Compressor Zero Crossing

TEST_17 - TXA Current Drain

Measures the average power supply current drawn by the UUT when it is operating. The transmitter's current drain is expressed in amps. This test can measure current drain using two methods. The test software first looks to see if an HP-IB power supply has been configured in the External Devices (or Edit Config) screen. If one has been configured the current drain will be measured via the programmable power supply over HP-IB, see the procedure for Configuring an HP-IB Power Supply that follows. If an HP-IB power supply is not available, (HP-IB power supply not configured in External Devices or Edit Config screen) the software measures current drain through the rear panel DC Current Measurement capability of the Test System, see the procedure Configuring the Rear Panel DC Current Measurement that follows.

This test is not specified by EIA/TIA standards.

Configuring an HP-IB Power Supply

A Hewlett-Packard programmable dc power supply is required for this test if an HP-IB power supply is to be configured. A power supply with sufficient voltage and current capabilities from the following series must be used:

- HP 664xA
- HP 665xA
- HP 667xA
- HP 668xA

The following must be done to setup the power supply through the HP-IB on the Test System:

1. Connect the power supply's HP-IB interface to the Test System's HP-IB interface with an appropriate length HP-IB cable.
2. Press the TESTS key on the front panel.
3. Select **`External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
4. Position the cursor to the **`Inst#`** field and select it.
5. Rotate knob until an empty **`Calling Name`** field appears, and select it.
6. Using the list of characters in the **`Choices`** menu , enter the words **`Power Supply`** in the **`Calling Name`** field. Select **`Done`** when complete.
7. Position the cursor to the **`Model`** field and select it (optional).
8. Using the DATA keypad and list of characters in the **`Choices`** menu, enter the Model # and press ENTER.
9. Position the cursor to the **`Addr`** (address) field and select it.

10. Using the DATA keypad, enter **7XX** (X = 1 thru 30) for the HP-IB address and press ENTER.
11. From the **To Screen** menu, select **More**.
12. From the **Choices** menu, select **IO CONFIG**.
13. Position the cursor to the **Mode** field and select it.
14. From the **Choices** menu, select **Control**.
15. Press TESTS to return to TESTS screen. The power supply is now ready to be controlled by the Test System when the current drain test is run.

Configuring the Rear Panel dc-Current Measurement

1. The dc-current measurement must be zeroed before the measurement. Access the test system's TESTS screen by pushing the TESTS key on the front panel.
2. Position the cursor to the **AF ANL** field under To Screen and select it.
3. Position the cursor to the dc-current field and select it (this should be done before any current is applied to the test system's measurement terminals). The dc-current measurement is now zeroed.
4. Use a power supply that provides the appropriate voltage and current for your UUT.
5. Connect the positive lead of the power supply to the positive terminal (banana) of the DC Current Measurement connector on the lower left rear panel of the Test System.
6. Connect the negative terminal (banana) of the DC Current Measurement connector to the positive terminal of the mobile units' supply input.
7. Connect the negative terminal of the power supply directly to the negative terminal of the mobile units' supply input.
8. The software will automatically measure the current passing through the rear panel connection. Be sure that there is no HP-IB power supply configured in the External Devices (or Edit Cnfg) screen of the Test System, see the procedure above for Configuring an HP-IB Power Supply.

Pass/fail limits used

27. TXA Current Drain @Levels 0-3
28. TXA Current Drain @Levels 4-7

Parameters used

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
35. TIA Test Adapter Personality [0:10]
41. TXA Current Drain Levels Tested [BWD #]
45. TXA Voltage for Compressor Zero Crossing

TEST_18 - TXA Quick General

Contains a collection of tests designed to provide a quick evaluation of the UUT. The following tests are included:

TEST_07 - TXA Frequency Error
TEST_08 - TXA RF Power Output
TEST_09 - TXA Modulation Deviation Limiting
TEST_10 - TXA Audio Frequency Response
TEST_11 - TXA Audio Dist. Hum/Noise & Muting
TEST_12 - TXA Signaling Tone
TEST_13 - TXA SAT Frequency Error & Deviation
TEST_14 - TXA Wideband Data Deviation
TEST_15 - TXA Compressor Response

See the individual tests for descriptions.

Pass/fail limits used

See the individual tests for pass/fail limits used.

Parameters used

See the individual tests for parameters used.

TEST_19 - RXA Audio Frequency Response

Measures the ability of the receiver's audio output circuitry to follow a 6 dB/ octave de-emphasis curve, as well as to follow an audio bandpass response while the standard RF level is applied with a constant audio frequency response deviation over the given audio frequency response frequency range. Audio frequency response is expressed in dB error from a 6 dB/octave curve.

Pass/fail limits used

03. RXA AUDIO RESPONSE DEV FROM -6 dB/oct R1
04. RXA AUDIO RESPONSE DEV FROM -6 dB/oct R2

Parameters used

15. RT External Pad and Cable Loss
21. RXA Audio Response Step Frequency
35. TIA Test Adapter Personality [0:10]

TEST_20 - RXA Audio Dist. Hum/Noise & Muting

This test is composed of the following measurements:

1. Audio distortion of the receiver when a standard test tone is applied to the UUT.
2. Hum and noise, expressed in dB, which is the ratio of the residual audio output in the absence of modulation, to the rated audio output produced by standard modulation (both are measured at standard RF input levels).
3. Audio muting, expressed in dB, which is the ability of the UUT's audio-mute circuit to attenuate the audio output level that is produced when an RF signal is applied to the receiver's antenna input terminal.

Pass/fail limits used

01. RXA AUDIO DISTORTION
08. RXA Hum and Noise
02. RXA AUDIO MUTING

Parameters used

15. RT External Pad and Cable Loss
35. TIA Test Adapter Personality [0:10]

TEST_21 - RXA Expandor

Measures the expandor's zero reference level and operating range. For every 1 dB change in input level, there should be a nominal output level change of 2 dB. Expandor response is expressed in dBv for the zero reference level, and in dB for the tracking error over the indicated operating range.

- The expandor response is measured at a 1 kHz rate and an RF input level of –50 dBm.
- A 2.9 kHz deviation is applied and the "zero crossing" of the receiver is measured. This value is retained as the reference level.
- For NADC phones, the input is varied from a high level of +10.6 dB above the measured reference level to a level of –21 dB below the measured reference level in steps set by Parameter 23, RXA Expandor Step Level. For AMPS phones the input is varied from a high level of +12 dB above the measured reference level to a level of –21 dB below the measured reference level. The rms deviation is measured and the expandor response relative to the reference is calculated.
- Deviation is then varied over the desired range and the expandor response relative to the "zero crossing" point is calculated.
- The sweep will go from high values to low values if the sign of Parameter 23, RXA Expandor Step Level is negative, and will go from low to high values if the sign of Parameter 23 is positive.

Background

An expandor is used to provide the complement of the cell site transmitter compressor predistortion, this circuit also provides receiver quieting.

Pass/fail limits used

05. RXA Expandor Track Error <0
06. RXA Expandor Track Error >0
07. RXA Expandor Zero Reference Level

Parameters used

15. RT External Pad and Cable Loss
22. RXA Expandor Start Level
23. RXA Expandor Step Level
24. RXA Expandor Stop Level
35. TIA Test Adapter Personality [0:10]

TEST_22 - RXA SINAD

The RXA SINAD or RF usability sensitivity test does the following:

1. Measures the RF level to the mobile unit that produces a 12 dB SINAD
2. Can make the measurement in two ways;
   a. Set the RF level supplied to the mobile unit from the Test System and measure the SINAD level
   b. Measure the RF level needed to produce a 12 dB SINAD level
3. The test if first made with the UUT transmitter on, and then with the transmitter off.

See Parameter **"27. RXA Usable Sens Set & Meas [0=no 1=yes]" on page 197**.

Background

Usable sensitivity is the ability to achieve or exceed 12 dB SINAD when the RF SINAD (RF level to produce 12 dB SINAD) parameter is applied to the receiver antenna input terminal.

Pass/fail limits used

09. RXA Usable Sensitivity

Parameters used

15. RT External Pad and Cable Loss
19. RT Test at Extreme Settings [0=no 1=yes]
26. RXA SINAD
25. RXA RF Level for SINAD at Extremes (used only if extreme settings=yes)
27. RXA Usable Sens Set & Meas [0=no 1=yes]
35. TIA Test Adapter Personality [0:10]

TEST_23 - RXA Quick General

Contains a collection of tests designed to provide a quick evaluation of the UUT. The following tests are included:

TEST_19 - RXA Audio Frequency Response
TEST_20 - RXA Audio Dist. Hum/Noise & Muting
TEST_21 - RXA Expandor
TEST_22 - RXA SINAD

See the individual tests for descriptions.

Pass/fail limits used

See the individual tests for pass/fail limits used.

Parameters used

See the individual tests for parameters used.

TEST_24 - OTA No Audio Functional

Contains a collection of tests designed to provide a quick evaluation of the UUT without having the audio lines from the UUT connected to the Test System. The following tests are included:

TEST_07 - TXA Frequency Error
TEST_08 - TXA RF Power Output
TEST_12 - TXA Signaling Tone
TEST_13 - TXA SAT Frequency Error & Deviation

See the individual tests for descriptions.

Pass/fail limits used

See the individual tests for pass/fail limits used.

Parameters used

See the individual tests for parameters used.

TEST_25 - RXD Receiver Sensitivity

A modulated ¶/4 shifted DQPSK test signal is applied to the antenna terminal. The mobile station transponds the data via the TDMAON command.

Background Digital RF Sensitivity is a measure of the ability of a mobile station to process and receive digital data at a BER of 3% or less under static and faded conditions. This test only measures the static condition. Raw bit-error-rate (BER) can be measured or word-error-rate (WER) on speech, FACCH, or SACCH words as set by the Parameter **"32. RXD RF Sensitivity Type Tested [BWD #]" on page 203**. RF sensitivity is expressed in % BER or WER.

Pass/fail limits used

10. RXD RF Sensitivity

Parameters used

15. RT External Pad and Cable Loss
19. RT Test at Extreme Settings [0=no 1=yes]
28. RXD # of Added Errors [0:15]
29. RXD # of Slots to Demod [1:1555]
30. RXD # of Training Slots [0:500]
31. RXD Data Fields [0=Random 1=Repeating]
32. RXD RF Sensitivity Type Tested [BWD #]
33. RXD Sensitivity RF Level
35. TIA Test Adapter Personality [0:10]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_26 - TXD Modulation Accuracy

Measures the quality of the ¶/4 DQPSK modulation of the transmitter. Measurements that result from this test are: carrier frequency error, origin offset (carrier feedthrough), amplitude droop, rms magnitude error, rms phase error and rms error vector magnitude. The quality measure is called error vector magnitude.

Background

The Test System captures one transmitted burst of 162 symbols. It then predicts an ideal I/Q trajectory of the burst. The phase and magnitude of the I/Q vector and its error is calculated at each detection decision point and the rms error vector magnitude is calculated. In addition, the normalized error vector magnitude during the first 10 symbols of 10 bursts following each ramp-up is measured and reported.

Pass/fail limits used

38. TXD Amplitude Droop
39. TXD Error Vector Magnitude
40. TXD Error Vector Magnitude Ten Burst
41. TXD Frequency Error
42. TXD Magnitude Error
43. TXD Origin Offset
47. TXD Phase Error

Parameters used

11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
19. RT Test at Extreme Settings [0=no 1=yes]
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command
35. TIA Test Adapter Personality [0:10]

TEST_27 - TXD RF Power Output

Measures the mobile stations transmitted power over one burst when connected to a 50 Ω load. The mobile station is placed in a loopback mode, transponding pseudo random data. This test checks to see if only the default calibration data is present and asks the operator if they would like to run the TXD RF power calibration test (TEST_28). The operator must select **yes** or **no** before the test will continue. When the high-supply and low-supply power measurements are performed, this test requires a programmable power supply. RF Output power is expressed in dBW or W.

Pass/fail limits used

11. TX Output Power at Level 0
12. TX Output Power at Level 1
13. TX Output Power at Level 2
14. TX Output Power at Level 3
15. TX Output Power at Level 4
16. TX Output Power at Level 5
17. TX Output Power at Level 6
18. TX Output Power at Level 7
45. TXD Output Power at Level 8
46. TXD Output Power at Level 9
44. TXD output power at level 10
37. TXA Wideband Data Deviation

Parameters used

11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
13. CPD Talk Back Time [1:31]
15. RT External Pad and Cable Loss
19. RT Test at Extreme Settings [0=no 1=yes]
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command
35. TIA Test Adapter Personality [0:10]
36. TX Units for Power Meas [0=dBW 1=Watts]
46. TXD Output Power Levels Tested [BWD #]

TEST_28 - TXD Calibrate RF Power

This test calibrates the Test Systems' digital power measurement circuitry. This is done by putting the mobile unit into an analog transmit mode and measuring its transmitted power with both the power meter and the Digital Analyzer (RF sine wave, no modulation). To ensure that the Test System will be calibrated for all power levels, the Test System is calibrated at all A/D gain settings (0, 6, 12 and 18 dB). The calibration is also done across the entire cellular band so that all channels will be calibrated.

Calibration data is retained as long as the test procedure being run is present in memory. If you change the test software in the Test System you should rerun this calibration. You should also rerun this calibration if you change the test setup or environment (temperature) that you are using.

Pass/fail limits used

None

Parameters used

15. RT External Pad and Cable Loss
35. TIA Test Adapter Personality [0:10]

TEST_29 - TXD Adjacent Channel Power

Measures the absolute and relative adjacent, first alternate, and second alternate channel power at the output terminals of the transmitter. Only the relative, and not the absolute, measurement is displayed.

Pass/fail limits used

48. TXD Relative Adjacent Channel Power
49. TXD Relative Alternate Channel Power

Parameters used

11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
15. RT External Pad and Cable Loss
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command
35. TIA Test Adapter Personality [0:10]

TEST_30 - CPD Page

Simulates a call to the mobile station from the base station. Specifically, this test does the following:

1. Performs a page to the UUT.
2. Performs 3 of 5 majority voting on the Reverse Control Message.
3. Performs BCH error detection and correction of the Reverse Control Message.
4. Tests each section of the page response, bit by bit.
5. Sends an Initial Traffic Channel Designation order to the mobile unit, directing it to tune to a traffic channel obtained from the Channel Information (or Edit Frequency) table information.
6. Sends a physical layer control FACCH message to the mobile unit by the way of the forward digital traffic channel (FDTC).
7. Sends an ALERT order to the mobile unit by way of FDTC.
8. Sends Connect ACK messages to the mobile unit because the test system is not able to respond quickly enough to an RDTC connect message (call answer) from the mobile unit
9. Makes an EVM measurement on the initial traffic channel to verify that the traffic channel was obtained. The EVM result is not displayed in this test.

Pass/fail limits used

None

Parameters used

02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_31 - CPD Quick Digital

This test contains a collection of digital processing activities and transmitter tests designed to provide a quick evaluation of the UUT. This test does not require the use of the Test Interface Adapter. The following is included:

1. Perform an analog page.
2. Assign the mobile station to an analog voice channel.
3. Perform an analog to digital channel handoff.
4. Perform modulation accuracy test:

   TXD Amplitude Droop
   TXD Frequency Error
   TXD Origin Offset
   TXD Magnitude Error
   TXD Phase Error
   TXD Error Vector Magnitude
   TXD Lower Adjacent Channel Power
   TXD Upper Adjacent Channel Power
   TXD Lower 1st Adjacent Channel Power
   TXD Upper 1st Adjacent Channel Power
   TXD Lower 2nd Adjacent Channel Power
   TXD Upper 2nd Adjacent Channel Power
5. Perform a digital-to-digital channel handoff.
6. Perform modulation accuracy and adjacent channel transmitter tests: as in the analog-to-digital handoff.
7. Perform a digital to analog channel handoff.
8. Test SAT frequency error
9. Releases the call.

Pass/fail limits used

34. TXA SAT Frequency Error
38. TXD Amplitude Droop
39. TXD Error Vector Magnitude
40. TXD Error Vector Magnitude Ten Burst
41. TXD Frequency Error
42. TXD Magnitude Error
43. TXD Origin Offset
47. TXD Phase Error
48. TXD Relative Adjacent Channel Power
49. TXD Relative Alternate Channel Power

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
07. CP Switch Channels Start Channel
08. CP Switch Channels Step Channel
09. CP Switch Channels Stop Channel
10. CPA SAT Tone [5970,6000,6030]
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_32 - CPD Switch Channels

This test verifies operation of digital channels that are selected through the CP switch channel parameters. This test does not require the use of the Test Interface Adapter. The following is included:

1. Perform a digital page (user must respond by pressing send).
2. Assign the mobile station to a digital traffic channel as designated by the Channel Information (or Edit Frequency) table information.
3. Perform a TXD Frequency Error test, TXD Error Vector Magnitude test, and a TXD RF Power Output test with the power level set to 0.
4. Perform a digital-to-digital channel handoff and assign the mobile station to the digital traffic channel set by Parameter 7, CP Switch Channels Start Channel, increment the DVCC, slot #, and power level for each new traffic channel assignment.
5. Perform a TXD Frequency Error test, TXD Error Vector Magnitude test and a TXD RF Power Output test on the traffic channel.
6. Repeat steps 4 and 5 by performing digital-to-digital channel handoffs to the channel set by adding Parameter 8, CP Switch Channels Step Channel to Parameter 7, CP Switch Channels Start Channel, until the value of Parameter 9, CP Switch Channels Stop Channel is reached.
7. End the test leaving the mobile unit on the last traffic channel designated by Parameter 9, CP Switch Channels Stop Channel.

Pass/fail limits used

41. TXD Frequency Error
39. TXD Error Vector Magnitude
40. TXD Error Vector Magnitude Ten Burst

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
07. CP Switch Channels Start Channel
08. CP Switch Channels Step Channel
09. CP Switch Channels Stop Channel
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_33 - CPA Switch Channels

This test verifies operation of analog channels that are selected through the CP switch channel parameters. This test does not require the use of the Test Interface Adapter. The following is included:

1. Perform an analog page (user must respond by answering the phone).
2. Assign the mobile station to an analog voice channel set by Parameter 7, CP Switch Channels Start Channel, with the power level of the mobile station set to **0**.
3. Perform a TXA Frequency Error measurement, TXA Power Level measurement, and TXA SAT Frequency Error measurement.
4. Perform an analog-to-analog channel handoff and assign the mobile station to the analog voice channel set by adding Parameter 8, CP Switch Channels Step Channel to the current channel number. Increment the SAT tone for each new voice channel.
5. Repeat steps 3 and 4, incrementing the channel number by Parameter 8, CP Switch Channels Step Channel until Parameter 9, CP Switch Channels Stop Channel is reached.
6. Once the CP Switch Channels Stop Channel is reached, perform the measurement in step 3, and leave the mobile station on the analog voice channel.

Pass/fail limits used

11. TX Output Power at Level 0
31. TXA Frequency Error
34. TXA SAT Frequency Error

Parameters used

02. CP Control Channel [313:354]
05. CP RF Level for Call Processing
07. CP Switch Channels Start Channel
08. CP Switch Channels Step Channel
09. CP Switch Channels Stop Channel
10. CPA SAT Tone [5970,6000,6030]
36. TX Units for Power Meas [0=dBW 1=Watts]

TEST_34 - CPD Talk Back

This test verifies operation of a digital transmit and receive channel. This test does not require the use of the Test Interface Adapter. The following is included:

1. Perform a digital page (user must respond by pressing send).
2. Assign the mobile station to a digital traffic channel.
3. The user is instructed to talk into the phone for the time set in Parameter 13, CPD Talk Back Time. The user must release the handset from the cradle while talking.
4. The user will now listen to the recorded and retransmitted voice message. The user is instructed to press **`Continue`** on the Test System.

This test does not have pass/fail limits, nor does it prompt the user to make a pass/fail determination.

Pass/fail limits used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
05. CP RF Level for Call Processing
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
13. CPD Talk Back Time [1:31]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_35 - CPD Origination

This test simulates a call from the mobile station to the base station by putting the mobile in service and having the operator originate a call from the handset. Specifically, this test performs the following:

1. The Test System simulates a control channel.
2. The operator is instructed to dial 123 123 4567 after the UUT has service. (Service is indicated by the NO SERVICE light going off or the SERVICE light illuminating on the mobile unit.)
3. Performs 3 of 5 majority voting on the Reverse Control Message.
4. Performs BCH error detection and correction of the Reverse Control Message, Wideband data.
5. Tests each section of the origination message, bit by bit.
6. Sends an Initial-Voice-Channel-Designation order to the UUT directing it to tune to a voice channel obtained from the Channel Information (or **`Edit Freq`**) table.
7. Makes an EVM measurement on the initial traffic channel to verify the traffic channel was obtained. The EVM result is not displayed in this test.

Pass/fail limits used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_36 - CPD Release

This test provides the necessary commands to release the mobile unit.

The test works as follows:

- Sets mobile unit onto a digital traffic channel if not already on a digital traffic channel.
- A release message is sent from the Test System.
- Power is monitored continuously until the power drops below –30 dBW or until 6 seconds has passed, which ever occurs first.
- The test fails if the 6 second limit is reached.

Pass/fail limits used

None

Parameters used

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]
02. CP Control Channel [313:354]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
05. CP RF Level for Call Processing
11. CPD Active Slot [1:3]
12. CPD DVCC [1:255]
14. CPD Wait for Handoff
20. RTD Analyzer Trigger Delay [0:971]
34. RXD Wait after 'TDMAON' IS-55 Command

TEST_37 - TXD Time Alignment

This test measures the UUT's ability to respond correctly to time alignment commands from the base station. The UUT is commanded to go to various time alignments by being issued physical layer FACCH messages from the test set. The first data bit in the reverse traffic channel is located and referenced to the start of the corresponding forward channel data sent by the test set. From this information, the transmit offset (end of the reverse channel slot to the beginning of the corresponding forward channel slot) is calculated and the absolute time offset is displayed as the result. The UUT is commanded to go to time alignments of 5, 9, 16, 19, 24, 30, 25, 18, 11, 4 and 0. The measured time offset for each of these is displayed. The measurement is made only at power level 0.

Pass/fail limits used

50. TXD Time Alignment

Parameters used

14. CPD Wait for Handoff
15. RT External Pad and Cable Loss

Parameter Descriptions

Parameters are values you enter that optimize test environment or conditions of the software. Many of the parameters are determined by examining your test needs. Other parameters are determined by performing measurements to calibrate items in your system. Default values are set into the software. Some of these are derived from standard methods of measurement and some are derived from the standards that are applicable.

For information on editing parameters, see **chapter 5, "Using the Software/HP 8920B, or HP 8920A FW Above Rev. A.14.00," on page 69** or **chapter 6, "Using the Software/HP 8920A FW Below Rev A.14.00," on page 101**.

Parameters remain in battery-backed-up memory until you select a Procedure to run. If you wish to prevent them from being lost when a new Procedure is selected, you will have to save them in a Procedure. **See "Saving a Test Procedure" on page 94** *or* **see "Saving a Test Procedure Using the Procedure Manager" on page 127**.

To print the parameters list, **see "Printing" on page 272**.

The first few capital letters in the title of each parameter indicate what the parameter refers to:

AX = Additional Parameters
CP = Call Processing, Analog and Digital
CPA = Call Processing, Analog
CPD = Call Processing, Digital
RT = Receiver and Transmitter, Analog and Digital
RTD = Receiver and Transmitter, Digital
RX = Receiver, Analog and Digital
RXA = Receiver, Analog
RXD = Receiver, Digital
TIA = Test Interface Adapter
TX = Transmitter, Analog and Digital
TXA = Transmitter, Analog
TXD = Transmitter, Digital

01. AA MIN From?[0=RECC,1=All 0's,2=Phone#] [0=no 1=yes]

This parameter specifies from where the test set will get the Mobile Identification Number (MIN) of the UUT.

Setting Parameter 01 to **0=RECC** causes the test set to get the MIN from the Reverse Control Channel (RECC) Data. The RECC Data (data sent on the control channel from the UUT to the test set) sent during a registration or an origination is read by the test set to obtain the MIN.

Setting Parameter 01 to **1=All 0's** causes the test set to use a MIN consisting of all zeros. An all zero MIN is an invalid MIN according to the IS-54 standard. Because some phones initially have an all zero MIN after being manufactured or serviced, this parameter (when set to **1=All 0's**) allows the test set to page phones with an all zero MIN.

NOTE: An all zero MIN can also be entered into the test set by setting Parameter 01 to **0=RECC** and getting the MIN from the RECC Data from a UUT that has an all zero MIN.

NOTE: If Parameter 01 is set to **1=All 0's**, then Parameter 03 **CP Enter Ph#?** is not used.

Setting Parameter 01 to **2=Phone #** causes the test set to derive the MIN from the phone number, depending on the entry in Parameter 03 **CP Enter Ph#?** described below:

- If Parameter 03 contains a phone number, the phone number in Parameter 03 is used to derive a MIN.
- If Parameter 03 is set to **0=If Needed** or **1=Always**, the user will be prompted for a phone number if needed. This phone number will be used to derive the MIN.

NOTE: If a registration or an origination test is performed that causes a new MIN to be entered into the test set, this new MIN will then be used instead of the MIN obtained as specified by Parameter 01.

Used in Tests

All tests (when a system initialization is done by the software).

02. CP Control Channel [313:354]

This parameter is used to identify the control channel used by the UUT. Primary control channels for System A are numbered from 313 to 333. Primary control channels for System B are numbered from 334 to 354. Some cellular phones are designed to work only on System A or only on System B. For these phones, the control channel specified by this parameter must correspond to the correct system in order to allow the phone to obtain service.

Example

If you desire to use control channel 333 to set up a call with the UUT, enter 333 as the value.

03. CP Enter Ph#[0=If Needed,1=Always,Here]

This parameter specifies from where the test will get the phone number of the UUT. You may enter one of three options:

- **0**
- **1**
- the 10 digit phone number of the UUT

Setting Parameter 03 **AA Enter Ph#?** to **0=If Needed** tells the test set to prompt the user for the phone number of the UUT if:

- The phone number is needed to perform the first test in a test sequence, AND
- A MIN was not obtained by the test set running a previous test procedure.

Setting Parameter 03 to **1=Always** tells the test set to prompt the user for the phone number of the UUT each time the test procedure is run. (Note that if Parameter 01 **AA MIN From?** is set to **1=All 0's** indicating an all zero MIN, the user is not prompted for a phone number). Setting Parameter 03 to anything other than **0=If Needed** or **1=Always** will cause the test set to use the number entered as a ten digit phone number for paging the UUT if one of the following conditions are also true:

- Parameter 01 **AA MIN From?** is set to **2=Phone #**, indicating to the test set to get the MIN from the phone number.
- Parameter 01 is set to **0=RECC** and a MIN has not been previously entered into the test set by running a previous test procedure.

Example

If Parameter 03 is set to **1231234567** and Parameter 01 is set to **2=Phone#**, the test set will use a MIN corresponding to phone number 123-123-4567 to page the UUT.

NOTE: If a registration or an origination is performed that causes a new MIN to be entered into the test, this new MIN will then be used instead of the MIN derived from the entered phone number.

Used in Tests

All tests (when a system initialization is done by the software).

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]

For call processing (CP) tests this parameter allows the user to determine if all five repeats of each reverse control channel word (RECC) and the reverse voice channel (RVC) data should not be printed, printed always or printed only on a test failure. A “no” response will result in CP tests only printing the 3 of 5 majority voted result of the 5 repeats of each RECC word. Setting this parameter to print data can provide a good troubleshooting tool.

05. CP RF Level for Call Processing

This parameter sets the RF signal level used in all call processing tests. The standard level required for call processing tests is –100 dBm. The value must be entered in dBm with a range from **`-120`** to **`-30`**.

06. CP SID Number

Specifies the system ID to be used for control channel call processing commands.

Example

This parameter should be equal to the UUT home system ID to perform testing in a non-roaming environment. Use an ID different than the UUT to test in a roaming environment.

Enter any number from 0 to 32767.

07. CP Switch Channels Start Channel

This parameter sets the start channel used in TEST_32 - CPD Switch Channels, TEST_33 - CPA Switch Channels and in TEST_31 - Quick Digital, for the first analog to digital handoff channel. The start channel may be any channel in the range from 1 to 1023.

08. CP Switch Channels Step Channel

This parameter sets the number of channels (step size) to increment between the start and stop channels. This parameter is used in TEST_32 - CPD Switch Channels, TEST_33 - CPA Switch Channels and in TEST_31 - Quick Digital, for the second analog to digital handoff channel. This step size may be any integer bounded by Parameter 7, CP Switch Channels Start Channel and Parameter 9, CP Switch Channels Stop Channel.

09. CP Switch Channels Stop Channel

This parameter sets the stop channel used in TEST_32 - CPD Switch Channels, TEST_33 - CPA Switch Channels, and in TEST_31 - Quick Digital, for the final analog to digital handoff channel. The stop channel may be any channel in the range from 1 to 1023.

10. CPA SAT Tone [5970,6000,6030]

This parameter sets the frequency of the SAT (supervisory audio tone) that will be used on all analog voice channels. The supervisory audio tones are out-of-voice-band audio tones used for cell site identification. One of three frequencies may be assigned: 5970, 6000, and 6030 Hz. One of the three tones is added to the voice transmission of all call within an individual cell. The UUT then detects the tone and modulates the transmitted voice channel carrier with a constant (relative) phase tone which is filtered or regenerated from the received tone to establish a closed loop between the mobile (UUT) and the cell site. Transmission of the SAT by a UUT is suspended during transmission of wideband data on the reverse voice channel, but is not suspended when the signaling tone (ST) is sent.

11. CPD Active Slot [1:3]

This parameter sets the timeslot assignment number that is sent to the UUT in the 'DIGTS' IS-55 command. This parameter also sets the **Sync Word** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **To Screen More** area.

Example

If you wish the UUT to be active on timeslots 2 and 4, enter the decimal number **2**.

12. CPD DVCC [1:255]

This parameter identifies the Digital Verification Color Code number that is sent to the UUT in the 'TDMAON' IS-55 command. This parameter also sets the **DVCC** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **To Screen More** area. A decimal number from "1" to "255" is allowed (0 is not used).

Example

If you desire a DVCC of 101 to be used during testing, enter **101** as the parameter.

13. CPD Talk Back Time [1:31]

This parameter sets the amount of time, in seconds, that the Test System collects speech data before sending the speech data back to the UUT for user listening. 31 seconds is the maximum time allowed due to the maximum number of slots (1555) that can be demodulated by the Test Systems' Digital Analyzer.

Example

Assume that you would like to have an extended message used for TEST_34 - CPD Talk Back that lasts for 19 seconds. Enter the value **19**.

14. CPD Wait for Handoff

This parameter sets the time to wait between sending a handoff message to the UUT and the Test Systems' Digital Analyzer attempting to make a measurement at the new channel. The value must be entered is seconds.

Example

Assume that you would like to start making measurements within 2 seconds after a handoff message has been sent, enter the value **2**.

15. RT External Pad and Cable Loss

This parameter sets the amount of loss from any external cabling or pads used to connect the RF IN/OUT of the Test System to the antenna in/out of the UUT.

Example

If the cable loss between the phone's antenna and the Test System's RF IN/OUT is 4.0 dB, enter "4.0" as the value.

16. RT High Supply Voltage

This parameter is used to set the UUT to the highest voltage rating that it is specified to operate at under extreme conditions. The value must be entered in Vdc with a range from “0” to “60”. Parameter 19, RT Test at Extreme Settings must be set to “yes” for Parameter 16, RT High Supply Voltage to be activated.

Example

If you desire the power supply voltage set to operate the UUT at +20% of the normal (Nominal) supply voltage, and the Nominal Supply Voltage is 13.2 V, enter **`15.8`** as the value.

17. RT Low Supply Voltage

This parameter is used to set the UUT to the lowest voltage rating that it is specified to operate at under extreme conditions. The value must be entered in Vdc with a range from “0” to “60”. Parameter 19, RT Test at Extreme Settings must be set to “yes” for Parameter 17, RT Low Supply Voltage to be activated.

Example

If you desire the power supply voltage to operate the UUT at –20% of the normal (Nominal) supply voltage, and the Nominal Supply Voltage is 13.2 V, enter **`10.6`** as the parameter value.

18. RT Nominal Supply Voltage

This parameter is used to set the UUT to its nominal voltage rating that it is specified to operate at under normal conditions. The value must be entered in Vdc with a range from “0” to “60”.

Example

If you desire the power supply voltage to operate the UUT at 13.2 Vdc, enter a nominal **`13.2`** as the value.

19. RT Test at Extreme Settings [0=no 1=yes]

This parameter is used to activate all of the parameters that set extreme testing conditions for the UUT. If this parameter is set to **1** (yes) the following parameters will be used:

16. RT High Supply Voltage
17. RT Low Supply Voltage
25. RXA RF Level for SINAD at Extremes

Background

The software offers the capability to run certain tests at extreme supply voltage conditions. Extreme supply voltage conditions are high and low supply voltages that are used while testing is conducted. In order to use the extreme testing conditions an HP-IB programmable power supply must be used. This power supply must be interfaced to the test system through an HP-IB interface cable. For more information on the types of power supplies supported by the software and how to configure the test system to control the power supply, see *Configuring an HP-IB Power Supply* located in the description of **"TEST_17 - TXA Current Drain" on page 163**.

The following tests can be run at extreme testing conditions.

Used in Tests

TEST_07 - TXA Frequency Error
TEST_08 - TXA RF Power Output
TEST_09 - TXA Modulation Deviation Limiting
TEST_18 - TXA Quick General
TEST_22 - RXA SINAD
TEST_24 - OTA No Audio Functional
TEST_25 - RXD Receiver Sensitivity
TEST_26 - TXD Modulation Accuracy
TEST_27 - TXD RF Power Output

20. RTD Analyzer Trigger Delay [0:971]

This parameter sets the number of bit clock cycles that the Test Systems' Digital Analyzer waits before starting a measurement. The default trigger delay time is equal to two time slots minus the Standard Reference Offset of 45 symbols (90 bits) (162 symbols/slot × 2 bits/symbol × 2 slots – 90 bits = 558). The Test System waits this many clock cycles before making a measurement after the Test System (base station) starts transmitting. When testing to IS-55 compliance, this parameter should be set to the default value of 558.

Example

Assume that the measurement should be started as close to synchronization of slots as possible but that waiting 3 more bit clock cycles ensures that the measurement does not start early, enter the value of **`561`** (558 + 3).

21. RXA Audio Response Step Frequency

This parameter is the step-size used to vary the audio input signal frequency in TEST_19 - RXA Audio Frequency Response. The values must be entered in kHz.

Example

To step in 500 Hz increments enter 0.5.

22. RXA Expandor Start Level

This parameter is the lowest relative input level to the expandor that is used in TEST_21 - RXA Expandor.

This parameter is used to set the relative start level to the Expandor circuitry for checking the output voltage level changes for each input deviation. The value must be entered in dB.

Example

If you desire to start testing the Expandor at –10 dB below the reference 0 dB input level, enter –10.

23. RXA Expandor Step Level

This parameter is the step-size used to vary the input level to the expandor in TEST_21 - RXA Expandor. The value must be entered in dB.

Example

If you desire to step the relative input level in 5 dB steps, enter 5.

24. RXA Expandor Stop Level

This parameter is the highest relative input level to the expandor that is used in TEST_21 - RXA Expandor.

This parameter is used to set the relative stop level input to the expandor circuitry for checking the output voltage level changes for each input deviation. The value must be entered in dB.

Example

If you desire to stop testing the Expandor at 5 dB above the reference 0 dB input level, enter 5.

25. RXA RF Level for SINAD at Extremes

This parameter sets the RF signal level needed in TEST_22 - RXA SINAD at extreme conditions. The value must be entered in dBm with a range from “–150” to “–15”. The Parameter 19, RT Test at Extreme Settings must be set to “yes” for Parameter 25, RXA RF Level for SINAD at Extremes to be activated.

Example

If you desire the RF signal level to be at –116 dBm, enter –**116** as the value.

26. RXA SINAD

This parameter sets the desired SINAD level used in TEST_22 - RXA SINAD. The value must be entered in dB with a range from 3 to 18.

Example

Assume that you would like to use the standard SINAD level of 12 dB, enter the value [12].

27. RXA Usable Sens Set & Meas [0=no 1=yes]

This parameter sets the measurement method used in TEST_22 - RXA SINAD. When **`yes`** is selected, the Test System outputs an RF level to the mobile unit set by Pass/fail limit 9, **`RXA Usable Sensitivity`** and the resultant SINAD is measured and displayed. When **`no`** is selected, the Test System adjusts the RF level to the mobile unit until the SINAD level set in Parameter 26, **`RXA SINAD`** is achieved.

28. RXD # of Added Errors [0:15]

This parameter sets the **Added Errors** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **To Screen More** area.

This parameter specifies how many errors will be added to the random data in each timeslot used for RAW BER measurements (see Parameter **"29. RXD # of Slots to Demod [1:1555]" on page 199**). The number of specified errors is randomly distributed across the data fields in the timeslot. The default value is 0. When testing to IS-55 compliance this parameter must be set to 0. This parameter only applies to random data (see Parameter **"31. RXD Data Fields [0=Random 1=Repeating]" on page 202**). Errors cannot be added to repeating data (see Parameter **"31. RXD Data Fields [0=Random 1=Repeating]" on page 202**) or to FAACH WER, SAACH WER or SPEECH WER data fields (see Parameter **"32. RXD RF Sensitivity Type Tested [BWD #]" on page 203**). This parameter is only used in the RAW BER test in TEST_25 RXD - Receiver Sensitivity.

Errors should only be added when troubleshooting UUT problems or when verifying Test System operation. If troubleshooting UUT problems the UUT must be configured for TDMA RAW BER in loopback mode and the RF power at the UUT antenna terminal should be above the Digital RF Sensitivity level of the UUT.

This parameter determines how many errors are added to the Raw BER data fields (errors can not be added to WER data fields FACCH, SACCH and Speech). This parameter is only used for TEST_25 - RXD Receiver Sensitivity, when random data is used for testing Raw BER.

29. RXD # of Slots to Demod [1:1555]

This parameter sets the **Num Slots** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **To Screen More** area.

This parameter specifies the total number of timeslots of measurement data that the Digital Analyzer will analyze for WER/BER measurements. The default value is 300 timeslots. This parameter is only used in TEST_25 - RXD Receiver Sensitivity. All other digital tests build one timeslots worth of data, transmit that data repetitively, then demodulate and analyze only one timeslot.

For BER/WER measurements the total number of timeslots built by the Test System is equal to the sum of the values set by:

RXD # of Training Slots + RXD # of Slots to Demod + Buffer Slots

When the Digital Generator has output all of the timeslots built by the Test System it 'wraps around' and starts sending the same set of timeslots again. 50 additional timeslots are built and added to the end of the measurement data timeslots to ensure that sufficient data exists to demodulate the specified number of slots in the parameter, RXD # of Slots to Demod before the 'wrap around' occurs. These 'Buffer Slots' prevent the possibility of Training Slots being included in the measured data due to 'wrap around'.

The Digital Analyzer will demodulate a number of timeslots equal to the sum of the values set by the following parameters:

RXD # of Training Slots + RXD # of Slots to Demod

The Digital Analyzer will only make measurements on the number set by Parameter 29, RXD # of Slots to Demod'.

The Digital Generator 'Num Slots' field in the Test Systems' TDMA TEST screen is set to Parameter 29, RXD # of Slots to Demod plus 50.

See Parameter **"30. RXD # of Training Slots [0:500]" on page 200** for explanation and use of Num Training Slots.

Example

If you want to measure RXD Receiver Sensitivity over a larger number of timeslots for more repeatable results, enter a larger value. If you want to decrease measurement time for faster less repeatable results, enter a smaller number.

30. RXD # of Training Slots [0:500]

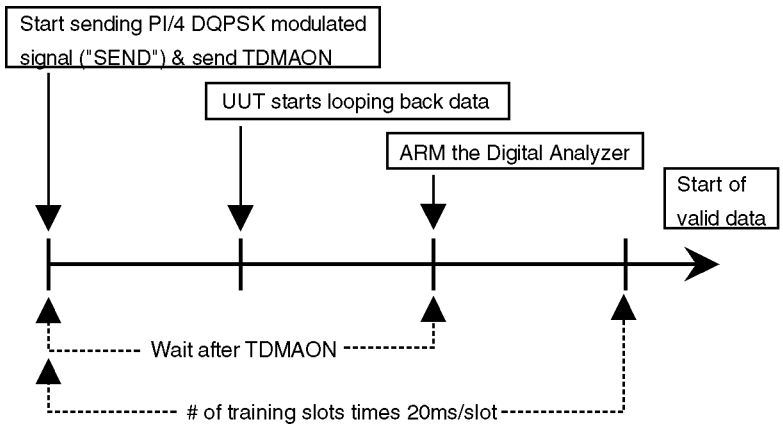
This parameter sets the **`Train Slots`** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **`To Screen More`** area.

This parameter sets the number of timeslots which are output before outputting the measurement timeslots used for BER/WER calculations (see Parameter **"29. RXD # of Slots to Demod [1:1555]" on page 199**). Training timeslots allow the Digital Analyzer to identify the beginning of the timeslots which contain the data to be used in the BER/WER measurements. The training timeslots contain a known data pattern. By looking for the known data pattern and detecting when it has stopped the Digital Analyzer can identify the start of valid data. It is necessary to identify the first timeslot of valid data because there is a time delay between when the data is sent to the UUT and when it is received by the Digital Analyzer. Identifying the first timeslot of valid data allows the Digital Analyzer to align the timeslots sent from the Test System to the UUT with the timeslots looped back to the Test System from the UUT.

This parameter is only used in TEST_25 - RXD Receiver Sensitivity. Make sure that Parameter 30, RXD # of Training Slots value multiplied by 0.02 is greater than Parameter 34, RXD Wait after 'TDMAON' IS-55 Command value (see Parameter **"34. RXD Wait after 'TDMAON' IS-55 Command" on page 204**).

Parameter 30, RXD # of Training Slots is used in conjunction with the RXD Data Fields [0=random 1=repeating] parameter and the RXD RF Sensitivity Type Tested [BWD #] parameter. If RAW BER is selected in RXD RF Sensitivity Type Tested and random data is selected in Parameter 31, RXD Data Fields, then the number of training slots set in Parameter 30, RXD # of Training Slots are output.

If RAW BER is selected in RXD RF Sensitivity Type Tested and repeating data is selected in RXD Data Fields then no training slots are output. See Parameter **"31. RXD Data Fields [0=Random 1=Repeating]" on page 202**. FAACH WER, SAACH WER and SPEECH WER always use random data and training slots.



Example

A sufficient number of training slots should be specified to allow the mobile radio to lockup and start transmitting valid loopback data. Assume that the Parameter, RXD Wait after 'TDMAON' IS-55 Command is set to 1.0 second and that the mobile phone can start loopback well within this 1.0 second of time. Set the # of Training Slots value to at least 60 (1.0 second divided by 20 ms plus 10).

31. RXD Data Fields [0=Random 1=Repeating]

This parameter sets the **`Data Fields`** field in the Test Systems' TDMA Test screen. This screen may be accessed by pressing TESTS and then selecting the TDMA Test screen through the **`To Screen More`** area.

This parameter specifies whether random data or repeating data is to be used for the RAW BER test in TEST_25 RXD Receiver Sensitivity (see Parameter **"32. RXD RF Sensitivity Type Tested [BWD #]" on page 203**). When testing to IS-55 compliance this parameter should always be set to random. If random data is selected than pseudo random data is put into the data fields in all of the timeslots used for RAW BER measurements (see Parameter **"29. RXD # of Slots to Demod [1:1555]" on page 199**). If repeating data is selected then the same data pattern is put into the data fields in all of the timeslots used for RAW BER measurements (see Parameter **"29. RXD # of Slots to Demod [1:1555]" on page 199**). Repeating data is used when troubleshooting UUT problems or when verifying Test System operation. This parameter is only used in the RAW BER test in TEST_25 RXD - Receiver Sensitivity. FAACH WER, SAACH WER and SPEECH WER always use random data.

Example

Assume that Parameter 32, RXD RF Sensitivity Type Tested [BWD #] is set to a value of 8 (Raw BER) and you wish to use repeating data, enter 1 for the value.

32. RXD RF Sensitivity Type Tested [BWD #]

This parameter determines which BER/WER tests will be done in TEST_25 - RXD Receiver Sensitivity. This parameters' range is based upon a Binary Weighted Decimal (BWD) as shown in the table below. You may choose any or all BER/WER tests. The value must be entered as a BWD with a range from "1" to "15".

Table 4

Test Type	FACCH	SACCH	Speech	Raw BER
Weighted Value	1	2	4	8

Example

Assume that you would like to test FACCH and Speech, enter 5 as the value.

33. RXD Sensitivity RF Level

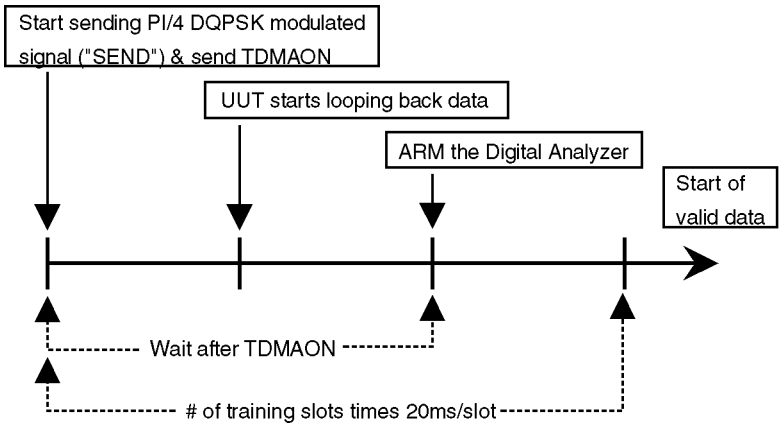
This parameter sets the RF signal level that is used in TEST_25 - RXD Receiver Sensitivity. The value must be entered in dBm with a range from "–120" to "–30".

Example

If you desire to apply a –110 dBm signal, enter –**`110`** as the value.

34. RXD Wait after ’TDMAON’ IS-55 Command

This parameter sets the time to wait after the TDMAON command has been sent to the UUT and before the Test Systems’ Digital Analyzer is armed (looking for data). The Digital Generator is told to SEND right before the TDMAON command is sent. This parameter must be less than the value of the parameter, RXD # of Training Slots, times 20 ms/slot or the training slots will be missed and data synchronization can not occur.



Example

Assume that the value for Parameter 30, RXD # of Training Slots has been set to 60. The value for RXD Wait after ’TDMAON’ IS-55 Command must be less than Parameter 30, RXD # of Training Slots times 20 ms/slot or in this example, 60 × 20 ms = 1.2 seconds. Set the value for RXD Wait after ’TDMAON’ IS-55 Command to 1.0 seconds.

35. TIA Test Adapter Personality [0:10]

This parameter allows you to modify the usage of the Test Interface Adapter to your application. The IS54/55 Standards define a Test Interface Adapter for connecting the Test System to the UUT. The implementation of this adapter is manufacturer dependent. In order to accommodate the adapters from the various NADC radio manufacturers the Test System utilizes a configurable RS-232 serial interface which is automatically configured for the various manufacturers protocols. The configuration of the serial port in the Test System is controlled by the value of the set in Parameter 35, TIA Test Adapter Personality. The choices are any number from “0” to “10”, with the following assignments:

0 = IS-55 Standard and Nokia
1 = Ericsson
2 = Ericsson hand held
3 = Not assigned
4 = Hughes
5-9 = Not assigned
10 = No Test Interface Adapter connected (use for call processing tests)

Example

To test an Ericsson mobile unit via the Ericsson Test Interface Adapter, set this parameter to **1**.

36. TX Units for Power Meas [0=dBW 1=Watts]

This parameter sets the measurement units (dBW or Watts) that will be used in transmitter tests. Selecting one type of unit over the other is for user convenience.

37. TXA Audio Response Step Frequency

This parameter is the step-size used to vary the input signal frequency in TEST_10 - TXA Audio Frequency Response. The values must be entered in kHz.

Example

If you desire the modulation frequency to be varied from 300 Hz to 3000 Hz in 500 Hz steps, enter **.5** as the value.

38. TXA Compressor Start Level

This parameter is the lowest relative input level to the expandor that is used in TEST_15 - Compressor Response. The values must be entered in dB.

This parameter is used to set the start relative input level to the Compressor circuitry for checking the output deviation for each input voltage level. (Refer to the EIA/TIA Standard for the Compressor response curve.)

Example

If you desire to start testing the compressor at –10 dB below the reference 0 dB input level, enter –10.

39. TXA Compressor Step Level

This parameter is the step-size used to vary the input level to the expandor in TEST_15 - Compressor Response. The values must be entered as dB.

This parameter is used to set the step relative input level to the Compressor circuitry for checking the output deviation for each input level voltage level. (Refer to the EIA/TIA Standard for the Compressor response curve.)

Example

If you desire to step the relative input level in 5 dB steps, enter 5.

40. TXA Compressor Stop Level

This parameter is the highest relative input level to the expandor that is used in TEST_15 - Compressor Response. The values must be entered as dB.

This parameter is used to set the stop relative input level to the Compressor circuitry for checking the output deviation for each input level voltage level. (Refer to the EIA/TIA Standard for the Compressor response curve.)

Example

If you desire to stop testing the compressor at 5 dB above the reference 0 dB input level, enter 5.

41. TXA Current Drain Levels Tested [BWD #]

The parameter allows you to measure current drain at any or all of the power levels listed in the table below.

Example

This parameter's range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, you chose the Power Levels that will be measured for current drain and add their weighted values.

If you desire to measure the transmitter current drain on the UUT when it is at Power Levels 1 and 4, enter **18** as the value, as follows:

The value must be entered as a BWD with a range from "1" to "255".

Table 5

Power Level	0	1	2	3	4	5	6	7
Weighted Value	1	2	4	8	16	32	64	128

NOTE: Power levels are defined by the IS-55 Standard.

Example

If you desire to measure the analog transmitter power on the UUT when it is at Power Levels 1 and 4, enter **18** (2 + 16) as the value.

42. TXA Frequency Deviation Step Frequency

This parameter is the step-size used to vary the input signal frequency in TEST_09 - Modulation Deviation Limiting. This value must be entered in kHz.

Example

If you desire the modulation frequency to be varied from 300 Hz to 3000 Hz in 500 Hz steps, enter **.5** as the value.

43. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]

This parameter activates a 50 Hz HPF in TEST_09 - Modulation Deviation Limiting. The HPF is set to <20 Hz in TEST_09 if this parameter is set to 0 (off). The HPF is set to 50 Hz in TEST_09 if this parameter is set to 1 (on).

44. TXA Output Power Levels Tested [BWD #]

This parameter selects which output power levels will be tested in TEST_08 - TXA RF Power Output. This parameters' range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, choose the Power Levels that will be measured and add their weighted values. The value must be entered as a BWD with a range from "1" to "255".

Table 6

Power Level	0	1	2	3	4	5	6	7
Weighted Value	1	2	4	8	16	32	64	128

NOTE: Power levels are defined by the IS-55 Standard.

Example

If you desire to measure the analog transmitter power on the UUT when it is at Power Levels 1 and 4, enter **18** (2 + 16) as the value.

45. TXA Voltage for Compressor Zero Crossing

This parameter sets the audio voltage that is used to produce the reference 0 dB crossing (2.9 kHz peak deviation at 1 kHz rate). The value must be entered in Vrms with a range from ’0’ to ’1’. This parameter is UUT dependent.

Example

If the UUT produces 2.9 kHz of deviation when a 0.1 Vrms, 1 kHz tone is applied to the transmitter microphone input, enter **.1** as the value.

46. TXD Output Power Levels Tested [BWD #]

This parameter selects which output power levels will be tested in TEST_27 - TXD RF Power Output. This parameter’s range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, choose the Power Levels that will be measured and add their weighted values. The value must be entered as a BWD with a range from “1” to “2047”.

Table 7

Power Level	0	1	2	3	4	5	6	7	8	9	10
Weighted Value	1	2	4	8	16	32	64	128	256	512	1024

NOTE: Power levels are defined by the IS-55 Standard.

Example

If you desire to measure the digital transmitter power on the UUT when it is at Power Levels 1 and 4, enter **18** (2 + 16) as the value.

47. TXD Pwr Levels At Which ACP Tested [BWD]

This parameter selects the power levels at which adjacent channel power will be tested in TEST_29 - TXD Adjacent Channel Power. This parameter range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, choose the power levels that will be measured and add their weighted values. The value must be entered as a BWD with a range from “0” to “2047”.

Table 8

Power Level	0	1	2	3	4	5	6	7	8	9	10
Weighted Value	1	2	4	8	16	32	64	128	256	512	1024

NOTE: Entering a value of “0” will cause the adjacent channel power to be measured while the UUT is at power level 0.

NOTE: Power levels are defined by the IS-55 Standard.

Example

If you desire to measure adjacent channel power on the UUT when it is at Power Levels 1 and 4, enter 18 (2 + 16) as the value.

48. TXD Pwr Level At Which Mod Acc Tested

This parameter selects the power levels at which modulation accuracy will be tested in TEST_26 - TXD Modulation Accuracy. This parameter's range is based upon a Binary Weighted Decimal (BWD). As shown in the table below, choose the power levels that will be measured and add their weighted values. The value must be entered as a BWD with a range of "0" to "2047".

NOTE: Entering a value of "0" will cause the modulation accuracy to be measured while the UUT is at power level 0.

NOTE: Power levels are defined by the IS-55 Standard.

Example

If you desire to measure the modulation accuracy on the UUT when it is at lower Levels 1 and 4, enter 18 (2 + 16) as the value.

Pass/fail limit Descriptions

Pass/fail limits are values you enter that set pass/fail limits for tests. Default values are available in the test software. They have been derived from standard methods of measurement. Pass/fail limits remain in the Test Set's battery-backed-up memory until you select a new Procedure to run.

These are your pass/fail limits. They should be set according to the standards to which you want to test your UUT.

To print the pass/fail limits list, see **"To print TESTS screens:" on page 281**.

The first few capital letters in the title of each pass/fail limit indicate what the pass/fail limit refers to:

RXA = Receiver, Analog

RXD = Receiver, Digital

TX = Transmitter, Analog or Digital

TXA = Transmitter, Analog

TXD = Transmitter, Digital

01. RXA AUDIO DISTORTION

This sets the pass/fail limits used in TEST_20 - RXA Audio Dist. Hum/Noise & Muting and TEST_23 - RXA Quick General when the receiver's audio distortion is measured while receiving the Standard RF Level. Only the upper limit is used which must be entered in %.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Audio Harmonic Distortion

Example

If you desire that the audio distortion should not exceed 5% at a normal audio output, enter **5** as the Upper Limit.

02. RXA AUDIO MUTING

This sets the pass/fail limits used in TEST_20 - RXA Audio Dist. Hum/Noise & Muting and TEST_23 - RXA Quick General when the receiver's audio output circuitry is muted. Only the upper limit is used which must be entered in %.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Audio Muting

Example

If you desire that the audio level should be muted by at least 40 dB, enter **40** as the Upper Limit.

03. RXA AUDIO RESPONSE DEV FROM –6 dB/oct R1

This sets the pass/fail limits used in TEST_19 Audio Frequency Response for the receiver's audio output circuitry, when its audio response is tested against the standard 6 dB/octave de-emphasis curve. The audio response should not deviate beyond the pass/fail limits over the frequency range of 400 to 2400 Hz. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Voice Audio Frequency Response

Example

If your receivers are normally used with a handset or a line, and the audio response should not deviate more than +1 to –3 dB over the frequency range of 400 to 2400 Hz, enter –**3** as the Lower Limit and **1** as the Upper Limit.

04. RXA AUDIO RESPONSE DEV FROM –6 dB/oct R2

This sets the pass/fail limits used in TEST_19 Audio Frequency Response for the receiver's audio output circuitry, when its audio response is tested against the standard 6 dB/octave de-emphasis curve. The audio response should not deviate beyond the pass/fail limits in the regions of 300 to 400 Hz and 2400 to 3000 Hz. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Voice Audio Frequency Response

Example

If your receivers are normally used with a handset or a line, and the audio response should not deviate more than +1 to –6 dB over the frequency range of 300 to 400 Hz and 2400 to 3000 Hz, enter –**6** as the Lower Limit and **1** as the Upper Limit.

05. RXA Expandor Track Error <0

This sets the pass/fail limits used in TEST_21 - RXA Expandor when the expandor output level is measured at input levels below the 0 dB reference level. The output voltage tolerance should be within the specification limits. Lower and Upper Limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Expandor

Example

If you desire the output voltage tolerance below the 0 dB reference level to be ±2 dB, enter –**2** as the Lower Limit and **2** as the Upper Limit.

06. RXA Expandor Track Error >0

This sets the pass/fail limits used in TEST_21 - RXA Expandor when the expandor output level is measured at input levels above the 0 dB reference level. The output voltage tolerance should be within the pass/fail limits. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard, such as:

- EIA/TIA Standard: Expandor

Example

If you desire the output voltage tolerance above the 0 dB reference level to be ±1 dB, enter –**1** as the Lower Limit and **1** as the Upper Limit.

07. RXA Expandor Zero Reference Level

This sets the pass/fail limits used in TEST_21 - RXA Expandor when the expandors' output voltage at the 0 dB reference level is measured. Upper and lower limits must be entered in dBV rms.

Pass/fail limits are determined by using any applicable standard, such as:

- UUT specifications

RXA Expandor Zero Reference Level is not specified in the EIA/TIA Standard for NADC phones. The test is performed and pass/fail limits are available so that the operator can measure the RXA Expandor Zero Reference Level and compare the result to pass/fail limits that meet his or her needs.

If the operator does not wish to compare the measurement results to pass/fail limits, the "check" setting in the pass/fail limit table for RXA Expandor Zero Reference Level can be set to "none". See **"Changing Pass/Fail Limits" on page 89** *or* **"Changing Pass/Fail Limits (Edit Specifications)" on page 122**.

Example

If you desire the output voltage from the receiver to be –20 dBV rms ±1 dB, enter –**21** as the Lower Limit and –**19** as the Upper Limit.

08. RXA Hum and Noise

This sets the pass/fail limits used in TEST_20 - RXA Audio Dist. Hum/Noise & Muting and TEST_23 - RXA Quick General for the hum and noise level of the receiver. Only the upper limit is used which must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Hum and Noise

Example

If you desire the hum and noise level of the receiver to be at least 32 dB below the audio output for a 1 kHz modulated RF carrier at –50 dBm having a ±8 kHz peak frequency deviation, enter –**32** as the Upper Limit.

09. RXA Usable Sensitivity

This pass/fail limit sets the pass/fail limit used in TEST_22 - RXA SINAD and TEST_23 RXA Quick General for the RF level that represents the sensitivity level of the receiver for analog operation. Only the upper limit is used and represents the highest allowed RF level. This upper limit value is entered in dBm.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Hum and Noise

Example

If you desire the usable sensitivity of the receiver to be at least -116 dBm, enter –**116** as the Upper Limit.

10. RXD RF Sensitivity

This pass/fail limit sets the bit-error-rate pass/fail limits used in TEST_25 - RXD Receiver Sensitivity. Only the upper limit is used which must be entered in % BER (bit-error-rate).

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: RF Sensitivity (static), Digital

Example

To enter 3% as the RF Sensitivity BER (bit-error-rate), enter 3 as the Upper Limit.

11. TX Output Power at Level 0

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value 4.8 dBW over a specified temperature range, enter **`0.8`** as the Lower Limit and **`6.8`** as the Upper Limit.

12. TX Output Power at Level 1

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -.8 dBW over a specified temperature range, enter –**`3.2`** as the Lower Limit and **`2.8`** as the Upper Limit.

13. TX Output Power at Level 2

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -3.2 dBW over a specified temperature range, enter –**7.2** as the Lower Limit and –**1.2** as the Upper Limit.

14. TX Output Power at Level 3

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -7.2 dBW over a specified temperature range, enter –**11.2** as the Lower Limit and –**5.2** as the Upper Limit.

15. TX Output Power at Level 4

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -11.2 dBW over a specified temperature range, enter –**15.2** as the Lower Limit and –**9.2** as the Upper Limit.

16. TX Output Power at Level 5

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -15.2 dBW over a specified temperature range, enter –**19.2** as the Lower Limit and –**13.2** as the Upper Limit.

17. TX Output Power at Level 6

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -19.2 dBW over a specified temperature range, enter –**23.2** as the Lower Limit and –**17.2** as the upper limit.

18. TX Output Power at Level 7

This sets the pass/fail limits for the output power levels (analog and/or digital tests) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -23.2 dBW over a specified temperature range, enter –**27.2** as the Lower Limit and –**21.2** as the Upper Limit.

19. TXA Audio Distortion

This sets the pass/fail limits used in TEST_11 - TXA Audio Dist. Hum/Noise & Muting and TEST_18 - TXA Quick General for the audio distortion that is acceptable in the transmitter. Only the upper limit is used which must be entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Distortion and Noise

Example

If you desire that the transmitter distortion should not exceed 5%, enter **5** as the Upper Limit.

20. TXA Audio Muting

This sets the pass/fail limits used in TEST_11 - TXA Audio Dist. Hum/Noise & Muting and TEST_18 - TXA Quick General for the amount of audio path muting that is necessary during wideband data transmission. Only the upper limit is used which must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Audio Voice-Path Muting

Example

If you desire that the audio voice path muting should be capable of reducing the demodulated level by at least 40 dB, enter **40** as the Lower limit.

21. TXA Audio Response Dev From 6 dB/oct

This sets the pass/fail limits used in TEST_10 - TXA Audio Frequency Response for the degree of closeness with which the frequency deviation of the transmitter follows the prescribed 6 dB/octave pre-emphasis characteristic curve. Upper and lower limits must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmit-Audio Response

Example

If you desire that from 300 to 3000 Hz the audio frequency response should not vary more than ±2 dB from a true 6 dB/octave pre-emphasis curve, enter –**2** as the Lower Limit and **2** as the Upper Limit.

22. TXA Audio Response Roll >2.5 kHz

This sets the pass/fail limits of the audio frequency response roll-off that is acceptable when the audio input is greater than 2.5 kHz. Enter this limit as an upper limit in dB (dB/octave).

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmit-Audio Response

Example

If you desire that an audio frequency roll-off of 6 dB/octave is permissible at audio input frequencies greater than 2.5 kHz, enter **6** as the Upper Limit.

23. TXA Compressor Min Out @>17.6 dB In

This sets the pass/fail limits for the compressor's output deviation when the relative input voltage is >17.6 dB above the 0 dB reference level.

Pass/fail limits are determined by using any applicable standard such as:

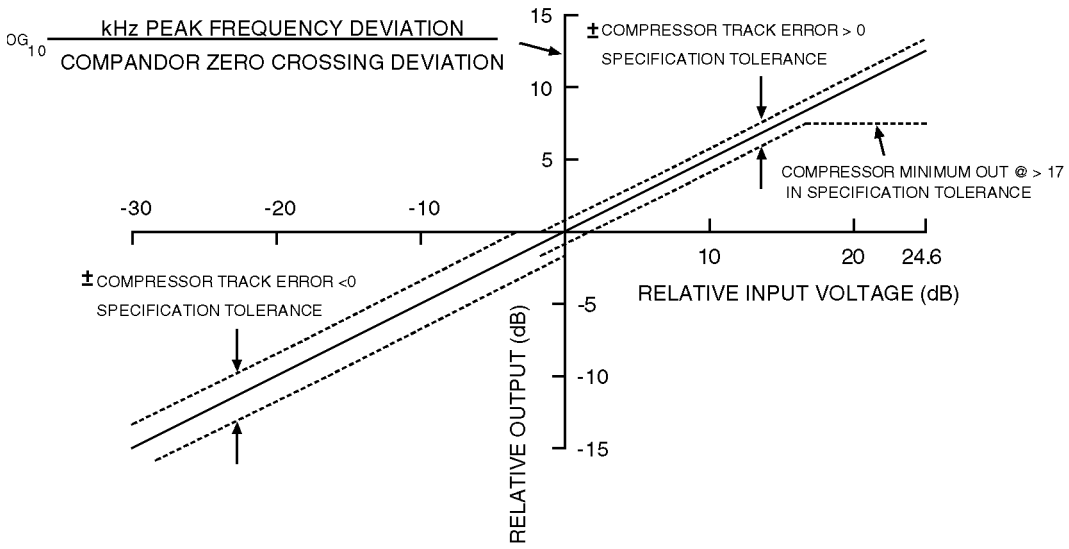
- EIA/TIA Standard: Compressor

Example

If you desire the lower limit for the relative output deviation to be above 8.3 dB when the relative input deviation is >17.6 dB as shown in the Compressor curve below, enter **8.3** as the Lower Limit.

Used in Tests

TEST_15 - TXA Compressor Response
TEST_18 - TXA Quick General



NOTE: The lower limit (LL) used in the TXA Compressor Response Test when the relative input level is >17.6 dB is calculated using the following formula:

$$LL = -\left(\frac{RelativeInputVoltage}{2} - \text{TXA Compressor Min Out @> 17.6 dB Input}\right)$$

Example for lower limit specification when the relative input level is 20 dB:

$$\text{Lower Limit} = -\left(\frac{20}{2} - 8.3\right) = -1.7$$

24. TXA Compressor Track Error <0 dB

This sets the pass/fail limits used in TEST_15 - Compressor Response and TEST_18 TXA Quick General when the compressor circuits are measured with the reference input levels below 0 dB; in this condition, the compressor's relative output deviation tolerance should be within the Compressor Track Error Limits. Upper and lower limits must be entered in dB. See Pass/Fail Limit **"23. TXA Compressor Min Out @>17.6 dB In" on page 225**.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Compressor

Example

If you desire the output voltage tolerance to be ±1 dB from the Compressor curve shown below, enter **–1** as the Lower Limit and **1** as the Upper Limit.

25. TXA Compressor Track Error >0 dB

This sets the pass/fail limits used in TEST_15 - Compressor Response and TEST_18 TXA Quick General that are used when the compressor circuits are measured with the reference input levels above 0 dB; in this condition, the compressor's relative output deviation tolerance should be within the Compressor Track Error limits. Upper and lower limits must be entered in dB. See the Pass/fail Limit **"23. TXA Compressor Min Out @>17.6 dB In" on page 225** for a graphical explanation.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Compressor

Example

If you desire the output voltage tolerance to be ±0.5 dB from the Compressor curve shown below, you would enter –**`0.5`** as the Lower Limit and **`0.5`** as the Upper Limit.

26. TXA Compressor Zero Reference Deviation

This sets the pass/fail limits used in TEST_15 - TXA Compressor Response and TEST_18 TXA Quick General when the compressor's 0 dB reference deviation is measured. The 0 dB reference deviation is found when a voltage input (the Voltage at Compressor Zero Crossing condition) to the transmitter produces an output at the transmitter equal to the specified peak frequency deviation. Upper and lower limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- UUT specification

TXA Compressor Zero Reference Deviation is not specified in the EIA/TIA Standard for NADC phones. The test is performed and pass/fail limits are available so that the operator can measure the TXA Compressor Zero Reference Deviation and compare the result to pass/fail limits that meet his or her needs.

If the operator does not wish to compare the measurement results to pass/fail limits, the "check" setting in the pass/fail limit table for TXA Compressor Zero Reference Deviation can be set to "none". See **"Changing Pass/Fail Limits" on page 89** *or* **"Changing Pass/Fail Limits (Edit Specifications)" on page 122**.

Example

If your standard states that the voltage input to the transmitter is –20 dBV rms 1 kHz tone which produces a peak frequency deviation of the carrier at the output of the transmitter of 2.9 kHz ±0.17 kHz, enter **`2.73`** as the Lower Limit and **`3.07`** as the Upper Limit.

27. TXA Current Drain @Levels 0-3

This sets the pass/fail limits for current consumption used in TEST_17 - Current Drain, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional at RF output power levels 0-3. Upper and lower limits must be entered in amps.

Pass/fail limits are determined by using any applicable standard such as:

- UUT Specification: Current Consumption, Transmit

Example

If you desire your transmitter's current consumption to be 3.0 amps ±0.5 amps for RF output power levels 0-3, enter **`2.5`** as the Lower Limit and **`3.5`** as the Upper Limit.

28. TXA Current Drain @Levels 4-7

This sets the pass/fail limits for current consumption used in TEST_17 - TXA Current Drain, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional at RF output power levels 4-7. Upper and lower limits must be entered in amps.

Pass/fail limits are determined by using any applicable standard such as:

- UUT Specification: Current Consumption, Transmit

Example

If your UUT specification defines the transmitter's current consumption to be 2.5 amps ±0.5 amps for RF output power levels 4-7, enter **`2.0`** as the Lower Limit and **`3.0`** as the Upper Limit.

29. TXA DTMF Frequency Error

This sets the pass/fail limits for the DTMF tone frequency error used in TEST_16 - TXA DTMF Frequency Error. Upper and lower limits must be entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Dual Tone Multifrequency (DTMF) Signaling, Transmitted Pulse Characteristics

Example

If you desire that the seven tone frequencies in the high and low group DTMF signals should be within ±1.5% of their nominal values, enter –**1.5** as the Lower Limit and **1.5** as the Upper Limit.

30. TXA FM Hum and Noise

This sets the pass/fail limits for the transmitters' hum and noise used in TEST_11 - TXA Audio Dist. Hum/Noise & Muting and TEST_18 - TXA Quick General. Only the upper limit is used which must be entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: FM Hum and Noise

Example

If you desire that FM hum and noise should be at least 32 dB below the level of a 1 kHz tone at ±8 kHz deviation, enter –**32** as the Upper Limit.

31. TXA Frequency Error

This sets the pass/fail limits for the transmitters' carrier frequency error used in TEST_07 - Frequency Error, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional. Upper and lower limits must be entered in ppm (parts per million).

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Frequency Requirements, Frequency Stability

Example

If you desire that the carrier frequency should be maintained within ±2.5 parts per million (ppm) of any assigned channel frequency, enter –**2.5** as the Lower Limit and **2.5** as the Upper Limit.

32. TXA Modulation Limiting

This sets the pass/fail limits for the transmitters' peak frequency deviation used in TEST_09 - Modulation Deviation Limiting and TEST_18 - TXA Quick General. Only the upper limit is used which is entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Deviation Limiting

Example

If you desire that the instantaneous peak and steady-state deviations of the transmitter should not exceed the rated system peak frequency deviation of ±12 kHz, you would enter **12** as the Upper Limit.

33. TXA SAT Deviation

This sets the pass/fail limits for the SAT tones' peak frequency deviation used in TEST_13 - TXA SAT Frequency Error & Deviation, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional. Upper and lower limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Supervisory Audio Tone (SAT)

Example

If you desire that the peak frequency deviation of each transponded SAT should be 2 kHz ±0.2 kHz, you would enter **1.8** as the Lower Limit and **2.2** as the Upper Limit.

34. TXA SAT Frequency Error

This sets the pass/fail limits for the SAT tones' frequency accuracy used in TEST_13 - TXA SAT Frequency Error & Deviation, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Supervisory Audio Tone (SAT)

Example

If you desire that any one of the three SAT tones should not vary in frequency more than ±1 Hz, you would enter **–1** as the lower limit and **1** as the upper limit.

35. TXA Signaling Tone Deviation

This sets the pass/fail limits for the signaling tones' peak frequency deviation used in TEST_12 - TXA Signaling Tone. Upper and lower limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Signaling Tone (ST)

Example

If you desire that the nominal peak frequency deviation of the carrier produced by the Signaling Tone should be ±8 kHz, enter **`7.2`** as the Lower LImit and **`8.8`** as the Upper Limit.

36. TXA Signaling Tone Frequency

This sets the pass/fail limits for the signaling tones' frequency accuracy which are used in TEST_12 - TXA Signaling Tone. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Signaling Tone (ST)

Example

If you desire that the Signaling Tone frequency should be 10 kHz ±1 Hz, enter **`9999`** as the Lower Limit and **`10001`** as the Upper Limit.

37. TXA Wideband Data Deviation

This sets the pass/fail limits for wideband data deviation used in TEST_14 - TXA Wideband Data Deviation, TEST_18 - TXA Quick General and TEST_24 - OTA No Audio Functional. Lower and Upper Limits must be entered in kHz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Wideband Data

Example

If you desire that the Wideband Data frequency deviation should be ±8 kHz with a ±10% tolerance, you would enter **7.2** as the Lower Limit and **8.8** as the Upper Limit.

38. TXD Amplitude Droop

This sets the pass/fail limits for the burst amplitude droop rate used in TEST_26 - TXD Modulation Accuracy.

Burst amplitude droop rate is the average rate of decay of the magnitude of the signal at the detection decision points across the measured burst. Burst amplitude droop rate is expressed in dB/symbol. Only the upper limit is used and is entered in dB/symbol.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

If you desire that the average rate of decay in the magnitude of the measured signal be ≤1 dB/symbol, enter 1.

39. TXD Error Vector Magnitude

This sets the pass/fail limits for the rms value of the error vector magnitudes measured over one burst, used in TEST_26 - TXD Modulation Accuracy.

Error vector magnitude is the magnitude of the vector which connects the ideal signal phasor on the unity circle to the measured signal phasor (after root Nyquist filtering, I/Q origin offset removal, burst amplitude droop removal and carrier frequency error removal) at the detection decision points. The magnitude of this vector represents the “error” between the ideal signal and the measured signal. The rms value is obtained by taking the square root of the sum of the squares of the individual values at each detection decision point over the measured burst. The two components which contribute to the magnitude of the error vector are the magnitude error and the phase error. Only the upper limit is used and is entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

If you desire the rms error vector magnitude, measured over one burst, to be ≤12.5%, enter 12.5.

40. TXD Error Vector Magnitude Ten Burst

This sets the pass/fail limits for the normalized error vector magnitude during the first ten symbols, following ramp up, of ten bursts measured within a one minute interval. This pass/fail limit is used in TEST_26 - Modulation Accuracy. Only the upper limit is used which is entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

Example

If you desire the normalized error vector magnitude of the first ten symbols following ramp up of ten bursts, measured within a one minute interval to be ≤25%, enter 25.

41. TXD Frequency Error

This sets the pass/fail limits for the frequency stability of the UUT used in TEST_26 - TXD Modulation Accuracy. Frequency error is measured over one burst. Upper and lower limits must be entered in Hz.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Frequency Tolerance For Digital Mode Operation

Example

If you desire that the carrier frequency should be maintained within ±200 Hz of any assigned channel frequency, enter –**200** as the Lower Limit and **200** as the Upper Limit.

42. TXD Magnitude Error

This sets the pass/fail limits for the rms value of the magnitude error components of the error vectors measured over one burst, used in TEST_26 - TXD Modulation Accuracy.

The magnitude error component is the difference in amplitude, at the detection decision points, between the measured signal (after root Nyquist filtering, I/Q origin offset removal, burst amplitude droop removal and carrier frequency error removal) and the ideal signal generated from the same data pattern. The rms value is obtained by taking the square root of the sum of the squares of the individual values at each detection decision point over the measured burst. Magnitude error is an indicator of the quality of the amplitude component of the ¶/4 DQPSK signal and is one of the components which contribute to the error vector magnitude. Only the upper limit is used and is entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

Example

If you desire the rms magnitude error to be ≤10%, enter 10.

43. TXD Origin Offset

This sets the pass/fail limits for the I/Q origin offset, measured over one burst, used in TEST_26 - TXD Modulation Accuracy.

I/Q origin offset is a measure of the magnitude of the carrier feedthrough signal relative to the magnitude of the modulated signal at the detection decision points, and is reported in dBc. Carrier feedthrough is an indication of the balance of the I/Q modulator used to generate the ¶/4 DQPSK signal. If the modulator is balanced the carrier is nulled in the RF spectrum. Imbalance in the I/Q modulator will result in carrier feedthrough and will appear as a DC offset on the demodulated I and Q signals. Only the upper limit is used and is entered in dBc.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

Example

If you desire the I/Q origin offset, measured over one burst, to be ≤–20 dBc, enter -20.

44. TXD output power at level 10

This sets the pass/fail limits for the output power levels (digital tests only) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -23.2 dBW over a specified temperature range, enter –**`27.2`** as the Lower Limit and –**`21.2`** as the Upper Limit.

45. TXD Output Power at Level 8

This sets the pass/fail limits for the output power levels (digital tests only) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value -23.2 dBW over a specified temperature range, enter –**`27.2`** as the Lower Limit and –**`21.2`** as the Upper Limit.

46. TXD Output Power at Level 9

This sets the pass/fail limits for the output power levels (digital tests only) measured at the transmitter's output terminal. Units for this pass/fail limit are set by Parameter 36, TX Units for Power Meas [0=dBW 1=Watts].

All ten power levels are separate conditions and each can be set as desired.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Transmitter Output Power

Example

If you are testing Power Class 1 radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal value - 23.2 dBW over a specified temperature range, enter –**27.2** as the Lower Limit and –**21.2** as the Upper Limit.

47. TXD Phase Error

This sets the pass/fail limits for the rms value of the phase error components of the error vectors measured over one burst, used in TEST_26 - TXD Modulation Accuracy.

The phase error component is the difference in phase, at the detection decision points, between the measured signal (after root Nyquist filtering, I/Q origin offset removal, burst amplitude droop removal and carrier frequency error removal) and the ideal signal generated from the same data pattern. The rms value is obtained by taking the square root of the sum of the squares of the individual values at each detection decision point over the measured burst. Phase error is an indicator of the quality of the phase component of the ¶/4 DQPSK signal and is one of the components which contribute to the error vector magnitude. Only the upper limit is used and is entered in %.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Modulation Accuracy

Example

If you desire the rms phase error to be ≤10%, enter 10.

48. TXD Relative Adjacent Channel Power

This sets the pass/fail limits for the upper and lower adjacent channel power used in Test_29 - TXD Adjacent Channel Power.

Adjacent channel power is measured at frequency offsets of ± 30 kHz relative to the mean, in-channel output power of the transmitter. Only the upper limit is used and is entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Adjacent and Alternate Channel Power due to Modulation

Example

If you desire the average power in either the upper or lower adjacent channel to be 26 dB below the mean, in-channel power of the transmitter, enter -26.

49. TXD Relative Alternate Channel Power

This sets the pass/fail limits for the first and second alternate channel power used in Test_29 - TXD Adjacent Channel Power.

Alternate channel power is measured at frequency offsets of ±60 kHz (first alternate) and ±90 kHz (second alternate) relative to the mean, in-channel output power of the transmitter. Only the upper limit is used and is entered in dB.

Pass/fail limits are determined by using any applicable standard such as:

- EIA/TIA Standard: Adjacent and Alternate Channel Power due to Modulation

Example

If you desire the average power in either the first or second alternate channel to be 45 dB below the mean, in-channel power of the transmitter, enter -45.

50. TXD Time Alignment

This sets the pass/fail limits for the TXD Time Alignment error. Enter a positive value for the upper limit, and a negative value for the lower limit. The software measures the actual transmit offset at time alignments of 5, 9, 16, 19, 24, 30, 25, 18, 11, 4, and 0, and uses these pass/fail limits to set the upper and lower error tolerance. Realize that the time alignment parameter is in bits (or half symbols).

Example

While measuring the UUT at each time alignment (TA), if an acceptable transmit offset range for your UUT is 45 + 0.5(TA) ± 0.25 symbols, enter –0.25 and +0.25 (symbols) for the upper and lower limits.

8

Reference (Alphabetical)

This chapter provides detailed descriptions of the features and functions of the HP 11807A,E software. Topics are arranged alphabetically for quick, easy reference.

Conventions Used

Special presentations of text in this manual reflect the appearance of the item being referred to.

Examples of these special presentations are:

TESTS

A key on the test set.

Procedure:

Characters displayed on the CRT display.

k1 **(Run Test)**

A USER key, in the key column next to the CRT. **Run Test** *is displayed on the CRT.*

0.000000

A field on the CRT where entries can be made.

Titles of documentation are printed in italics.

The term Test Set refers to the:

- HP 8920B, Option 500, Dual-Mode Cellular Mobile Test System
- HP 8921A, Option 500, Dual-Mode Cellular Test System
- HP 8920D, Dual-Mode Cellular Mobile Test System
- HP 8921D, Dual-Mode Cell Site Test System

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

- **select** refers to pressing the knob after positioning the cursor in front of the appropriate field (**`inverse video`** area).
- **choose** means to position the cursor in front of an item in the **`Choices:`** or **`To Screen`** menu in the lower right corner of the CRT display, and then press the knob.
- **enter** means to use the numeric keypad, and the ENTER key or measurement units keys to make entries to fields. In some procedures, **enter** is used to describe the action of entering characters into a field.

Copying Files

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, press TESTS. Select IBASIC Cntrl from the SET UP TEST SET list (or IBASIC from the Test Function field). Position the cursor to the IBASIC command line and select it. Using the character list that appears in the Choices menu, enter the following command:

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

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 a list of file names on a memory card, enter the following:

```
CAT “:INTERNAL” or CAT
```

The mass storage powers-up to memory card as a default. If you did not change this setting, then ":INTERNAL" is optional. If you are entering many characters into the IBASIC command line, you may want to connect a terminal to the test set. See **"Serial Port" on page 297**. You will also want to use a terminal if you have many files to list because file names displayed with the CAT IBASIC command scroll past the top of the test set's CRT display and cannot be scrolled down.

IBASIC is used when writing your own programs and is not explained in this manual. If you need to write your own IBASIC programs you may acquire the following manuals:

- HP 8920A,D
  - HP Instrument Basic User's Handbook HP part number E2083-90000.
  - HP 8920A Programming Manual HP part number 08920-90220.
- HP 8920B
  - HP Instrument BASIC User's Handbook Version 2.0 HP part number E2083-90005.
  - HP 8920 Programming Manual HP part number 08920-90222.

See also: **"Data Collection (Saving and Retrieving Test Results)" on page 246** and**"Initializing a Memory Card" on page 265**.

Data Collection (Saving and Retrieving Test Results)

The software has the capability to save test results to an SRAM memory card, to a disk drive, or to a PC.

Collection to a Memory Card or Disk

You will have to make entries into the External Devices (Edit Config) screen to describe the type of data collection you are using.

To configure External Devices entries:

1. Press TESTS
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 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 a number into Addr, depending on the type of storage media you will be using (press ENTER when complete):

If you are using a memory card, enter 1 into the Addr:

```
1   DATA C     1
```

If you are using a disk drive, enter the HP-IB disk address. For example, if the drive you are using is set to 700, then the display needs to look like:

```
1   DATA C                700
```

Calling names can be entered in any order.

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

You will be specifying the file type with the entry you make into the Options field immediately below DATA C. If no file type is entered, and the disk format is LIF, the software will select an HP-UX file type. If no file type is entered, and the disk format is DOS, the software will select a DOS file type. For example, if you are using a DOS file and you are not using an extension on the file name, the entry on this screen will look like:

```
1     DATA C                700
```

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 space.

See **"Initializing a Disk" on page 256** if using a new disk. See **"Initializing a Memory Card" on page 265** if using a new memory card. The file types under LIF can be used by the Test Set's IBASIC controller and some HP workstations. The DOS format is required if you wish to use the disk with a PC.

Table 9 Data Collection (Saving/Retrieving Tests) Configuration Summary

Inst#	Calling Name Options	Model	Addr	Description
first unused #	*data c*ollection		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 c*ollection		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 c*ollection		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.

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

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:

```
1   DATA C                  700
    ASCII REC=200
```

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 is a program to transfer 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 **"Configuration for Terminal or PC Operation" on page 254**.

To enter the data retrieval program:

1. Press TESTS.
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 GO TO 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 USER (Run) key, assigned as a default key on the TESTS (IBASIC Controller) screen, will start an IBASIC program that is resident in the test set's memory. The USER (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.

Collection to a PC

Test results can be output through the serial port. A variety of devices can receive the data. An HP Palmtop computer, PC, laptop, or terminal can be used. A terminal emulator can log the test results to a file. Examples of terminal emulator programs are HP AdvanceLink and ProComm, a product of DataStorm Technologies, Inc.

For 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 10 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 11 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	Copy	Fields
SPOW(B)	NO	Type Ahead	NO
InhEolWrp(C)	NO	ROW Size	80
Line/Page(D)	LINE	Host Prmpt Char	D1
InhHndShk(G)	NO	Horiz. Scroll. Incr.	08
Inh DC2(H)	NO	Large [+] Key	+

Table 12 **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

To set up for data collection to a PC:

1. Press TESTS.
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
7. Calling names can be entered in any order.

Configuration for Terminal or PC Operation

It is preferable to enter long strings of characters into fields using a terminal. The characteristics of the serial port, when used for instrument control from a terminal or terminal emulator, are determined by settings on the test set's I/O CONFIGURE screen.

Set the following:

- Serial In to Inst
- IBASIC Echo to On
- Inst Echo to On

Set the remaining configuration entries to match the settings of your terminal or PC program.

Equivalent Front-Panel Control Characters

The following **table 13** lists the terminal/computer keystrokes that equate to front-panel controls.

NOTE: Each equivalent character must be preceded by the Escape key.

For example, to remotely access the CONFIGURE screen, you type Esc, C on your terminal/computer. (Be sure to use uppercase C for this example.)

Alternate sequences for 5 commonly-used functions are also available. 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 13 Equivalent Front-Panel Control Characters

Function	Equiv. ESC Char.	Function	Equiv. ESC Char.	Function	Equiv. ESC Char.
CANCEL	!	SAVE	G	PRESET	i
PERCENT MHZ_V	(	REF_SET	J	INCR_DIV_10	j
S_KHZ_MV	)	METER	K	INCR_SET	k
BACKSPACE	-	AVG	L	INCR_TIMES_10	l
ENTER	.	LO_LIMIT	M	DOWN	m
RELEASE	0	HI_LIMIT	N	UP	n
K1	1	E	R	SEVEN	o
K2	2	F	S	EIGHT	p
K3	3	B	U	NINE	q
K4	4	C	V	FOUR	r
K5	5	D	W	FIVE	s
K1_PRIME	6	A	X	SIX	t
K2_PRIME	7	EEX	Z	ONE	u
K3_PRIME	8	YES_ON_OFF	[	TWO	v
ASSIGN	9	NO_PPM_W	]	THREE	w
KNOB_TURN_CCW	<	RX	a	ZERO	x
KNOB_TURN_CW	>	TX	b	POINT	y
MSSG	A	DUPLEX	c	PLUS_MINUS	z
HELP	B	PREV	d	OHM_PCT_DEL_DBUV	{
CONFIG	C	TESTS_MAIN	e	DB_GHZ_DBM	|
HOLD	D	LOCAL	f	MS_HZ_UV	}
PRINT	E	RECALL	g		
ADRS	F	MEAS_RESET	h		

Disks

Initializing a Disk

If you are starting with a blank disk, you will have to initialize it to the format you have chosen. Disk drives require specific commands to perform initialization. The test set's IBASIC commands to initialize some disks are described here. You should verify that the drive you are using can be controlled by the test set and that you are initializing a disk using a drive or PC that has a compatible format.

To initialize a disk to LIF in an HP-IB disk drive:

1. Verify that the test set Mode on the I/O CONFIGURE screen is set to Control:
2. Press TESTS.
3. Select IBASIC Cntrl from the SET UP TEST SET list (or IBASIC from the Test Function field).
4. Position the cursor to the IBASIC command field and select it.
5. With the list of characters in the Choices menu, enter the following:

```
INITIALIZE ":,7xx,y"
where:
xx = the HP-IB address of the disk drive, and
y = the unit number of the drive.
```

To initialize a disk to DOS in an HP-IB drive:

Follow the procedure for the LIF format, replacing the INITIALIZE statement with INITIALIZE "DOS:,7xx,y".

Retrieving Data from a Disk

One way to retrieve the test results from a disk is to run an IBASIC program. A program to transfer data from a disk to a terminal emulator is given below. You can type it into the IBASIC command line from the terminal emulator.

Be sure your program is saved, because it will be deleted from programmable memory. The file name for this example is “RES”. The disk address is 700, and the drive number is 0. The entire file name is RES:,700,0.

To enter the data retrieval program:

1. Press TESTS.
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:,700,0"
```

Opens a path to the file called "RES" (for results).

```
30 ON ERROR GO TO 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.

Exiting a Program

Do not press RX or TX to exit the program. Selecting the RX TEST or TX TEST screen causes signal paths internal to the test set to be modified. If you exit the program to a screen other than RX TEST or TX TEST, the settings necessary to resume testing will be retained.

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 CANCEL.
2. Press DUPLEX.
3. Press SHIFT SAVE.
4. Using list of characters in the Choices menu, enter a register name or number.
5. Select Done.
6. Operate the test set manually.
7. Press RECALL.
8. Choose the name of the saved setup.
9. Press TESTS.
10. Press k2 (Continue).

HP-IB Control Annunciators

The words, letters, and symbols at the top right corner of the CRT display indicate these conditions:

- R indicates remote operation from an external controller or IBASIC program in the test set. This letter will be displayed while the software is running.
- L indicates that the test set is listening, and is ready to receive a manual or remote command.
- T indicates that the test set is talking to another HP-IB device.
- S indicates that a service request has been generated.
- C indicates that the test set is currently an active controller. Control mode is set on the I/O CONFIGURE screen. The test set must be a controller if HP-IB peripherals are to be controlled.
- * indicates that an IBASIC program is running, or that the IBASIC controller is executing a command.
- ? indicates that 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. (Press SHIFT again to clear).

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 the test set's front panel indicate the direction and orientation of card insertion.

Memory cards are used to store or retrieve the following:

- Software code
- An HP-supplied Procedure, containing:
  - A default TEST sequence
  - Default test parameter values
  - Default pass/fail limit values
- A Library file
- Procedures you make, optimized for your application
- Data collection files
- Channel Information
- User defined keys

Three types of memory cards are available:

- Static Random Access Memory (SRAM)
  - SRAM cards have read and write capability. SRAM cards can be programmed and read with the test set.
- One-Time Programmable (OTP)
  - Once programmed with a suitable card programmer, OTP cards have read-only capability. OTP cards can be read with the test set, but cannot be programmed with the test set.

- Flash Memory
  - Flash cards have read and write capability. They can only be written to, or programmed with a suitable card reader/programmer. Flash memory cards cannot be written to, or programmed with a test set. Flash memory cards can be read by the test set.

NOTE: Hewlett-Packard-supplied software code and Hewlett-Packard procedure and library files are typically supplied on either OTP cards or flash cards. Flash cards can be distinguished from OTP cards by a small write protect (WP) switch in the end of the flash cards. SRAM cards also have a write protect or safe switch in the end of the card, but they also use a battery. Software and procedure/library files stored on a flash card cannot be overwritten by a test set regardless of the position of the write protect (WP) switch.

The software memory card can be removed after the program is loaded into the test set memory. The program will remain in memory after a power-down/power-up cycle, until a new program is loaded. Loading a new program will replace the existing program.

SRAM Memory Cards

A Static Random Access Memory (SRAM) Card can be used to store test results and procedures you make. The following parts can be used.

Table 14 SRAM Memory Card Products for HP 8920A,D

Memory	Product
32 kilobytes	HP 85700A
128 kilobytes	HP 85702A
256 kilobytes	HP 85704A
512 kilobytes	HP 85705A

Table 15 PCMCIA SRAM Memory Card Products for HP 8920B

Memory	Product
64 kilobytes	HP 83230A
256 kilobytes	HP 83233A
1 megabyte	HP 83231A

SRAM memory cards use a lithium battery (For HP 11807A: part number CR 2016 or HP part number 1420-0383. For HP 11807E: part number CR 2025 or HP part number 1420-0509). 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 programs, it should be replaced annually. See the HP 8920 User's Guide. The write-protect switch on an SRAM memory card will write protect the card when it is set toward the outside of the card.

Memory Card Storage Space

Procedures use 12-16 records each. A Library uses 20-35 records. A single library must be included on the card. A record is 256 bytes. Approximately 11 kilobytes of overhead is required on each card.

Use the following formula to estimate the storage space needed:

Storage Space(in kilobytes) = (Number of Procedures × 4.1) + 20

For example, if you want to save ten different procedures, you will need 61 kilobytes of memory. The 64 kilobyte or 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

Initializing HP 11807A cards (Smart Cards) using the TESTS Save/Delete Procedure screen automatically defaults to LIF format. Initializing HP 11807E cards (PCMCIA) using the TESTS Save/Delete Procedure screen automatically defaults to DOS format. However, initializing cards from the Save/Delete Procedure screen is only available on HP 8920B or HP 8920A,D test sets with firmware above revision A.14.00. If these settings do not match your needs, or you have firmware below revision A.14.00, there is another method described below in which you may select the format.

- Press TESTS.
- Select Save/Delete Procedure from the CUSTOMIZE TEST PROCEDURE list.
- 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).
- Press k3 (Init Card).
- Press Yes if you want to continue.

There are two ways to initialize a memory card to select the format. If you have a terminal emulator attached to the test set, you can type a 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 TESTS.
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 card using RAM_MNG

1. Press TESTS.
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.

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 is program to transfer 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 **"Configuration for Terminal or PC Operation" on page 254**.

To enter the data retrieval program:

1. Press TESTS.
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 USER (Run) key, assigned as a default key on the TESTS (IBASIC Controller) screen, will start an IBASIC program that is resident in the test set's memory. The USER (Run Test) key, assigned as a default key on the other 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.

Parameters

Parameters are values you enter that optimize your use of the test software. Many of the parameters are determined by examining your test needs.

Default values are set into the software. Some of these values are derived from standard methods of measurement and some are derived from the industry standard requirements. Load a Procedure and select the Test Parameters screen from the CUSTOMIZE TEST PROCEDURE list, to see the default values.

You should verify that parameters are properly set after you select the tests to be placed in your procedure.

Parameters remain in battery-backed-up memory until you select a procedure to run. If you wish to prevent them from being lost when a new procedure is selected, you will have to save them in a procedure. See **"Saving a Procedure" on page 288**.

To print the parameters list, see **"To print TESTS screens:" on page 281**.

To edit a parameter value:

1. Press TESTS.
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 knob to the desired parameter number and select it.
5. Position the cursor to the Value field and select it.
6. Enter the desired value using the DATA keypad and press ENTER.
   a. Use the ⇐ key to backspace.
   b. Press CANCEL to cancel entries and retain the old value.
7. Press k5 (Main Menu) (or TESTS) to return to the TESTS screen.

Pass/Fail Limits (specifications)

Pass/Fail Limits are values you enter that set passing limits for tests. Default values are available in the test software. They have been derived from standard methods of measurement.

Pass/Fail Limits do not have to be changed when you select a test or change the tests in your procedure. Each test has pass/fail limits that apply to it.

You should verify that pass/fail limits are properly set after you select the tests to be placed in your procedure. Lists of the pass/fail limits used by each of the tests are contained in the test descriptions in **chapter 7, "Test, Parameter, Pass/Fail Limit Descriptions," on page 133**. A lock is provided to prevent access to the pass/fail limits. See **"Securing a Procedure" on page 292**.

Pass/fail limits remain in the test set's battery-backed-up memory until you select a procedure to run. If you wish to prevent pass/fail limits from being lost when a new procedure is selected, you will have to save them in a procedure. See **"Saving a Procedure" on page 288**.

To print the pass/fail limits list, see **"To print TESTS screens:" on page 281**.

To edit a pass/fail limit value:

1. Press TESTS.
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.
   a. Use the ⇐ key to backspace.
   b. 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.

Pausing or Stopping a TEST

1. To pause the program, press CANCEL.
2. To stop the program, press SHIFT then CANCEL. This performs an IBASIC RESET operation.

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 a Program" on page 259**.

To continue a paused program:

1. Press TESTS.
2. Press k1 (Continue). The test time is displayed when the test is completed. This time includes the time that the program is paused and the time that it is waiting for connection and inputs to be made. If you are testing through midnight, the test time will not display properly.

Printing

You can print any of the following:

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

How to Print (task list)

There are five basic steps to printing listed below. A detailed description of each of these steps is at the end of this section.

1. Check to see if your printer is supported by the test set (see **"Supported Printers" on page 273**).
2. Determine if your printer requires serial, parallel, or HP-IB connection. Connect the printer to the appropriate port on the test set (see **"Printer Connection" on page 273**).
3. Configure the test set for your printer and its interface (see **"Configuring the Test Set for Printing" on page 276**).
4. Instruct the test set what to print (see **"To print test results" on page 283**).

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.

Printer Connection

HP-IB Connection

An HP-IB printer can be connected to the test set's rear-panel HP-IB connector with an HP-IB cable.

Serial Connection

A serial printer can be attached to the serial port. See **figure 2** . Use the following RJ-11 pins for this connection.

- RJ-11 Pin 2 - test set Receive Data
- RJ-11 Pin 4 - Ground
- RJ-11 Pin 5 - test set Transmit Data

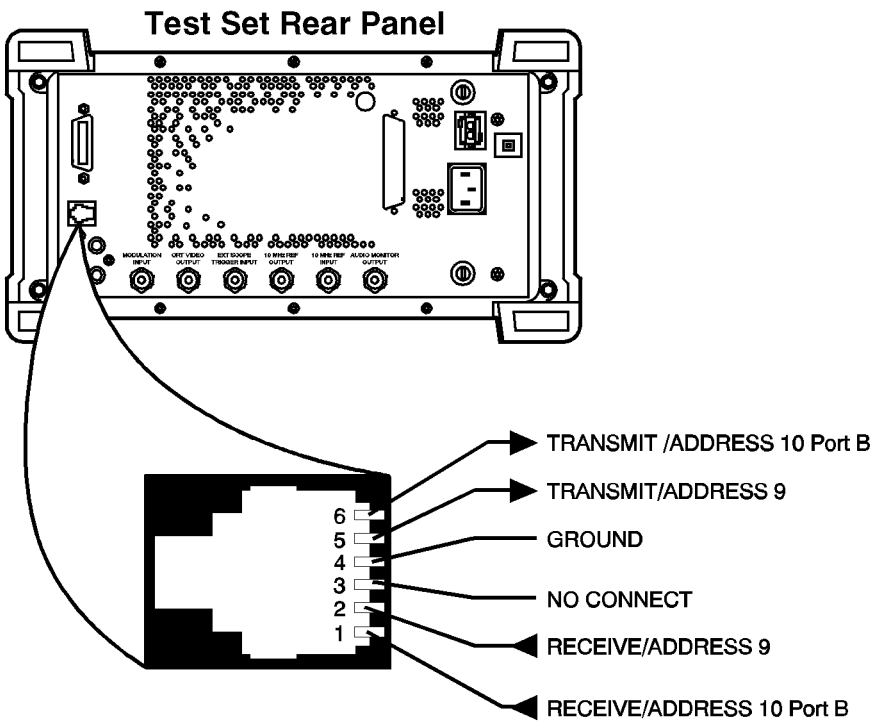


Figure 2 **Test Set RJ-11 Serial Port Connections**

Parallel Connection

A parallel printer can be attached to the parallel port. Use the following **figure 3** for pin information.

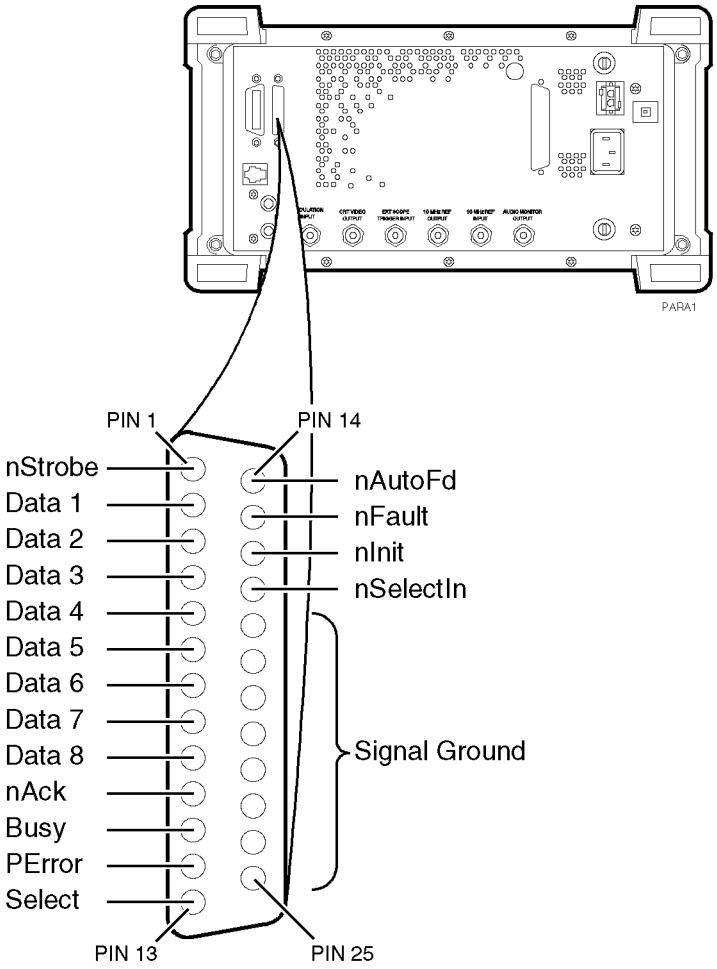


Figure 3 **Test Set Parallel Port Connections**

Configuring the Test Set for Printing

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). Serial port connections are shown earlier in this section.

PRINTER SETUP DIFFERENCES

The HP 8920A,D had several firmware enhancements, which are standard in the HP 8920B. The following Setup Printer section applies to users with:

- HP 8920A,D test sets with firmware above revision A.14.00.
- All HP 8920B test sets.

The test set's firmware revision is displayed on the top right corner of the configuration screen.

- Press SHIFT CONFIG to display the configuration screen and read the firmware revision.

If you have an HP 8920A with firmware revision below A.14.00, refer to the next section, titled **"To Setup Printer Using HP 8920A FW Below Rev A.14.00" on page 282**. Contact Hewlett-Packard at 1-800-922-8920 or for details on upgrading your firmware if desired.

EXCEPTION: If you are using A.xx.xx revision software, you can not use the Printer Setup screen regardless of your firmware revision. Refer to the instructions for firmware below A.14.00.

To Setup Printer Using Any HP 8920B Or HP 8920A FW Above Rev A.14.00

1. Press TESTS
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. (If HP-IB only) Position the cursor to Printer Adrs and enter the HP-IB address for your printer (0-30).
6. Set the following options if desired:
   a. Lines/Page (controls the number of lines, 20-120, printed on a page before a form feed is sent to the printer)
   b. FF at Start (to cause a form feed at the start of a test sequence)
   c. 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.
   a. For Serial Printing, set the Serial Baud field and other serial communications fields listed under it to correspond to your printer's configuration.
   b. For HP-IB Printing, set the Mode field to Control.
9. Press TESTS to return to the TESTS (Main Menu) screen.

To print test results:

1. Press TESTS
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.

To send Escape Sequences to the printer

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. 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). This function is not available with revision A.xx.xx software.

The software already has an implied escape character for the first sequence, you need only to enter the escape sequence following the escape character. However, 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.

How to send an Escape Sequence:

1. Press TESTS.
2. Select External Devices from the SET UP TEST SET list.
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.

Table 16 Escape Sequence Definitions for HP Printers

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

To print TESTS screens:

TESTS screens include:

- ”External Devices”
- ”Order of Tests”
- ”Channel Information”
- ”Pass/Fail Limits”
- ”Test Parameters”

The same general process is used to print the information for all of the above TESTS screens.

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

To Setup Printer Using HP 8920A FW Below Rev A.14.00

1. Press TESTS
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.
6. Using the list of characters in the Choices menu, enter the word Printer. Select Done when complete.
7. Position the cursor to the Model field and select it (optional).
8. Using the DATA keypad, enter the Model # and press ENTER.
9. Position the cursor to the Addr (address) field and select it.
10. Using the DATA keypad, enter 9 for serial printers, 15 for parallel printers, or 70X for HP-IB printers, then press ENTER.
11. Position the cursor to the Options field (directly under Calling Name) and select it.
12. 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)
    - LN equals the number of printed lines per page.
    - START causes a form feed at the start of each printout.
    - END causes a form feed at the end of each printout.
13. From the To Screen menu, select More.
14. From the Choices menu, select IO CONFIG.
15. For Serial Printers:
    a. Set the Serial Baud field and other serial communications fields listed under it to correspond to your printer's configuration.
16. For HP-IB Printers:
    a. Position the cursor to the Mode field and select it.
    b. From the Choices menu, select Control.
    c. Position the cursor to the Print Adrs field and select it.
    d. Rotate the knob and select the HP-IB address of your printer.
    e. Position the cursor to the Print To field. Pressing knob will toggle the underlined selection. Select to underline HP-IB.
17. Press TESTS to return to the TESTS screen.

To print test results

1. Make sure that your printer is properly connected and configured as explained earlier in this section.
2. Press TESTS.
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.

To send Escape Sequences to the printer

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. You may enter sequences which are compatible with your printer (use your printer's user's manual for the available print features and corresponding escape sequences). This function is not available with revision A.xx.xx software.

The software already has an implied escape character for the first sequence, you need only to enter the escape sequence following the escape character. However, 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.

How to send an Escape Sequence:

1. Press TESTS.
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.
6. Enter ESCAPE SEQ using the characters in the Choices menu. Select Done when you are finished.
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 sequence using the list of characters below the choices.

Table 17 Examples of Common Escape Sequences

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

To print TESTS screens

TESTS screens include:

- ”Edit Cnfg”
- ”Edit Seqn”
- ”Edit Freq”
- ”Edit Spec”
- ”Edit Parm”

The same general process is used to print the information for all of the above TESTS screens.

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

Procedures

A procedure is a collection of test parameters, pass/fail limits and a testing order, saved in a file that customizes the test software to a specific application. You may save the file on a memory card or disk.

You do not have to save a test sequence in a procedure. Each test can be stand-alone if desired. After you choose a procedure, you can choose which of the tests you want to run.

When you save a procedure you will only be saving test parameters, pass/fail limits and a testing order. The memory card or disk must also contain a library file. A library file contains the names of all of the test parameters, pass/fail limits and tests that are in the test software. The library you use will be the library that is supplied with your software. When you save your procedure, the library will be automatically saved on the same card or disk.

The procedure(s) supplied with your software will be listed in the Choices: column when you select the Select Procedure Filename: (or Procedure) field. Procedures will be displayed if your software memory card is plugged in.

Saving a Procedure

After you have set up the test software you can save the setup to an SRAM memory card, disk, or internal RAM memory by doing the following.

The memory card or disk you use must be initialized before its first use. See **"Initializing a Memory Card" on page 265** or **"Initializing a Disk" on page 256**. If you are using a disk drive, you may have to enter the External Disk Specification into the TESTS External Devices screen (or Edit Cnfg screen). It will be used when the Select Procedure Location: field on the TESTS screen is Disk.

To save a procedure:

1. Press TESTS.
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 desired location. The media must be initialized before a file can be saved. To initialize an SRAM card (HP 8920B or HP 8920A,D firmware above revision A.14.00 only, otherwise see **"Initializing a Memory Card" on page 265**):
   a. Insert card in the slot on the test set's front panel.
   b. Press k3 (Init Card)
   c. Press Yes. Note: this will delete any procedures or programs from memory.

   To initialize a RAM disk, see "Memory Cards/Mass Storage" in the HP8920Programmer'sGuide.
5. Position the cursor to the Enter Procedure Filename (or Procedure) field and select it.
6. From the list of characters in the Choices menu, enter a filename. Filename must be nine characters or less. When filename is complete, position cursor to Done and select it. Procedure filenames that already exist on the card will appear at the top of the list of characters.
7. If you selected Card, insert an initialized memory card into the slot on the test set's front-panel.
8. Verify that the card or other media is not write-protected. See **"Memory Cards" on page 261**.
9. Position the cursor to the Enter Description for New Procedure (or Comment for new procedure) field and select it. From the list of characters in the Choices menu, enter comments. When the comments are complete, position the cursor to Done and select it.
10. Position the cursor to the Procedure Library (or Library for new procedure) field and select Current (Current underlined). The name of the Library is displayed on the TESTS screen.
11. Position the cursor to the Code Location (or Program location for new procedure) field and select it.

    From the Choices menu, choose memory Card, ROM, RAM or Disk. When a procedure is run, the test system will look in this location for a code file if it is not resident in the Test Set's battery-backed-up memory. This location will usually be the software memory card.
12. Press k1 (Save Proc) (or position the cursor to the Action field and select Make Procedure). A procedure will be saved at the location you chose.

Loading a Procedure

A procedure can be loaded from storage media into the test set's battery-backed-up memory by doing the following.

To load a procedure:

1. Press TESTS.
2. Position the cursor to the Select Procedure Location (or Location) field and select it.
3. From the Choices menu, choose the desired location where the procedure is stored and select: Card, ROM, RAM or Disk.
4. Position the cursor to the Select Procedure Filename (or Procedure) field and select it.
5. From the Choices menu, choose the procedure file that you want to load.
6. Read the Description (or Comment) field to ensure that the loaded procedure file is the one you want.

Loading a Software Upgrade, FW below rev A.12.04 only

If you have purchased a software upgrade from the factory and are loading it for the first time, you must clear the old revision software from the test set memory before running the new revision software. If you do not, the new revision will not be loaded, and the old revision will be used. This is for FW below revision A.12.04 only. For firmware revision A.12.04 and above, the test set will check for differences in the code, and automatically load the most updated version.

The easiest way to clear the old revision software is to load a different software program. The LIST_OPTS program that is stored in internal ROM can be used for this purpose.

To Load the LIST_OPTS Program:

1. Press TESTS.
2. Position the cursor to Select Procedure Location and select it.
3. From the Choices menu, select ROM.
4. Position the cursor to Select Procedure Filename and select it.
5. From the Choices menu, select LIST_OPS.
6. Press k1 (Run Test).

The new revision software can now be loaded.

Deleting a Procedure

Procedures can be removed from an SRAM memory card, disk or RAM by doing the following.

To delete a Procedure:

1. Press TESTS.
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 desired location.
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. Press Yes if you wish to continue.

Securing a Procedure

After you have set up your test software with a testing order, channel information, test parameters, and pass/fail limits, you may wish to secure it. This operation will prevent the viewing and changing of those functions. You can select the items you wish to secure or un-secure. An IBASIC ROM program is stored in the Test Set's firmware to do this.

You can secure the procedure that is supplied with the test software. It is shipped un-secured.

After you make a procedure, you can secure it.

To secure a Procedure:

1. Press TESTS.
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. Before selecting RAM, you must initialize the RAM as a disk. See **"Initializing RAM Disks" on page 295**.

8. Proceed with the on-line instructions. You may wish to secure only one of the items, such as pass/fail limits.
9. When you are prompted to enter the pass number, enter any sequence of numerals 0 through 9 using the DATA keypad. Enter 9 digits or less.

To un-secure a procedure:

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

1. Press TESTS.
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 un-secure: k1(memory card) or k2(RAM).
8. Enter the name of the procedure you wish to un-secure.
9. If the procedure has any item 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.

RAM

RAM disk is a section of internal memory that acts much like a flexible disk. Programs can be stored, restored, 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 and loaded from the three screens mentioned at the beginning of this section. Volumes 1, 2, and 3 can only be accessed from the IBASIC Controller.

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. Volume 0 can be initialized using the RAM_MNG procedure stored on the internal ROM's IB_UTIL menu. Volumes 1, 2, and 3 must be initialized from the IBASIC Cntrl screen.

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

Follow these steps to initialize volumes 1, 2, or 3:

1. Press TESTS.
2. Select IBASIC Cntrl from the SET UP TEST SET list.
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
```

Saving Tests Results

See **"Data Collection (Saving and Retrieving Test Results)" on page 246**.

Serial Port

This 6-pin, RJ-11 serial port is used to input and output serial data. Serial data is used for entering programs, printing, and for sending test results to a connected controller, disk drive, or terminal.

Operating Considerations

The serial communications settings are defined on the I/O CONFIGURE screen. Ground is used with both IBASIC and all other serial connections. Transmit B and Receive B are exclusively used with IBASIC programs. Transmit and Receive are used with all other serial connections (see **figure 4**).

The IBASIC Controller sends data to and receives data from the serial ports using address 9 for the primary port, and address 10 for Port B.

Use an RJ-11/25-pin RS-232 adapter (HP P/N 98642-66508) and RJ-11 cable (HP P/N 98642-66505) to connect the HP 8920A,B,D to a serial printer or terminal/ computer.

RJ-11 CONNECTORS RJ-11 cables and adapters can be wired several ways. If you buy a cable or adapter other than the HP parts listed, verify the connections for the pins indicated in the following **table 18** before connecting cables to the instruments.

The following **table 18** lists connections for Transmit, Receive, and Ground pins (address 9).

Table 18 Examples of Common Escape Sequences

HP 8920A/D RJ-11 Serial Port		Terminal/PC 25-Pin RS-232		Terminal/PC 9-Pin RS-232
Pin 2 (RX)	to	pin 2 (TX)	or	pin 3 (TX)
Pin 5 (TX)	to	pin 3 (RX)	or	pin 2 (RX)
Pin 4 (GND)	to	pin 7 (GND)	or	pin 5 (GND)

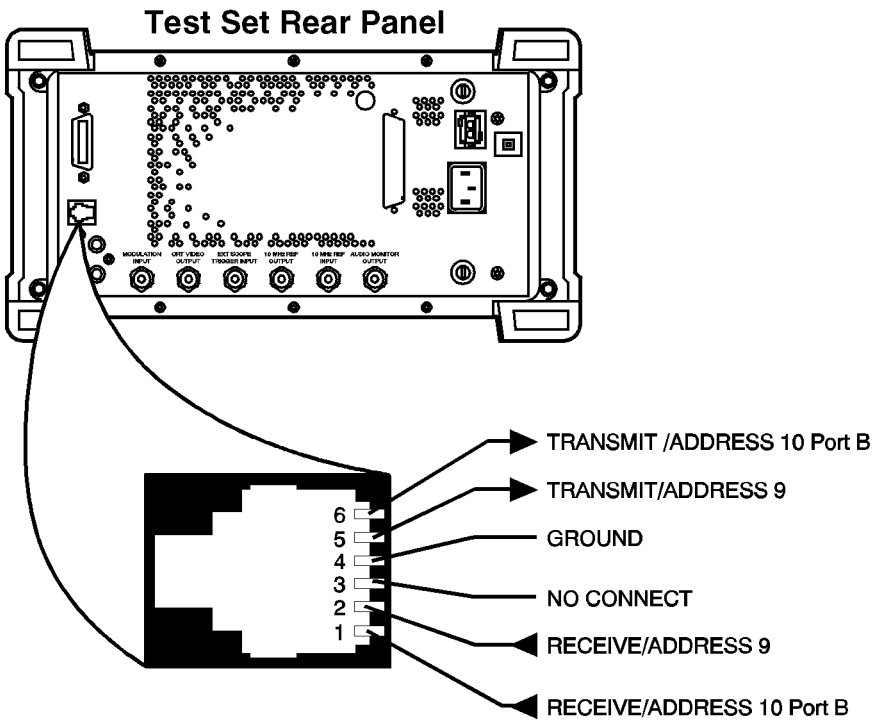


Figure 4 **Test Set RJ-11 Serial Port Connections**

Test Execution Conditions

In some situations, you may wish to change the way the software works when a test result is obtained. Test Execution Conditions allow you to do this.

Test Execution Conditions are accessed from the SET UP TEST SET list on the TESTS (Main Menu) screen. Press TESTS, then select Execution Cond to display them. (They are displayed directly on the main TESTS screen in firmware below revision A.14.00).

Test Execution Conditions are not retained after a power-down/power-up cycle.

The following Test Execution Conditions can be set as needed:

Output Results To: (Output Destination)

You can select either: Crt or Printer
Default:Crt

You can specify where test results are to be placed. If you select Crt, results will be displayed on the test set's CRT. If you select Printer, test results will be sent to the CRT and to a printer. You must connect and configure a printer if you select Printer. See **"Printing" on page 272**.

Output Results For: (Output Results)

You can select either: All or Failures
Default:All

You can specify if you want only the failed results to be displayed or printed. This will be useful if you generally do not print test results, and want to ensure that failed results are displayed or printed.

Output Heading

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

Select the Output Heading field. Use the knob to choose and enter the characters that you want to appear in the heading.

Choose Done when you are finished.

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

You can select either: Continue or Stop
Default:Continue

If you set this to Stop, and a pass/fail result is F, the program will stop.

Test Procedure Run Mode (Run Mode)

You can select either: Continuous or Single Step Default:Continuous

You can make tests pause at certain times. If you set this to Single Step, the program will pause after a comparison is made between a test determination and the expected result. For example, tests will pause after the program compares the results to a specification. You can continue from the paused state by pressing k2 (Continue).

Autostart Test Procedure on Power-Up

You can select either: On or Off
Default: Off

You can set up the test set so that if the procedure was previously loaded, the procedure will be immediately executed when the test set is powered on.

USER Keys

When you are using the test set, you will see the following USER keys assigned appear at times in the top right corner of the display. These keys are assigned to the hard keys k1 through k5. In many cases, these keys can be used as "shortcuts" instead of positioning the cursor and selecting. USER keys are sometimes referred to as softkeys.

Clr Scr clears the test set's CRT display.

Continue continues the program after it has been paused.

Delet Stp is used to the edit items in a test sequence. When you press this key, the test in the displayed sequence that has its **Step #** highlighted (inverse video) will be deleted. The tests that follow in the sequence will be scrolled up by one step.

Del Proc is used to delete the selected procedure. When you press this key, you will be prompted to verify the command by pressing **Yes**.

Press **Done** 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.

Help provides information on how to use the current TEST screen.

Init Card is used to initialize a memory card. Before you press this key, verify that the card is inserted correctly and not in the write-protected position.

Insrt Stp is used to enter 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. Choose a test before using this key to insert another.

Main Menu is used to return to the main TESTS screen. The same result is achieved by pressing TESTS.

Page Up\Page Down are used to quickly display items in the list when some of the items won't fit on the screen.

Run starts an IBASIC program that has been loaded into the test set's memory.

Run Test loads and runs the program that is called from the procedure that has been entered into the TESTS screen **Select Procedure Filename:** entry. If the program is already loaded into the test set's memory, it will be started.

Save Proc is used to save the specified procedure.

Sngl Step steps the IBASIC program one line at a time. This is different from **Continuous/Single Step** run mode. See **"Test Execution Conditions" on page 299**.

Stop Test pauses the test software.

Take It causes the program to accept the setting of an adjustment, and proceed with the program. The test, determining if the adjustment is within limits, is ceased.

Yes\No are pressed when answering questions displayed on the test set's CRT display.

9

Problem Solving

This chapter contains problem modules and error messages. Problem modules 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. The error messages section is located at the end of the chapter and provides a brief description of the message as well as possible corrective actions.

If a problem persists, call the HP Factory Hotline from anywhere in the USA (1-800-922-8920, 8:30 am - 5:00 pm Pacific time; in the USA and Canada only).

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.

Data-Collection Function Does Not Work

❒ Check that you have **DATA C** entered in the **External Devices** (or **Edit Cnfg**) menu.

1. Press TESTS.
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 external computer through the test set's RS-232 serial port (if available), enter "**9**" into the **Addr** field.
2. If data is to be stored on an SRAM memory card, enter "**1**" 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 CONFIGURE 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"**

Memory Space Problems

The program uses a substantial amount of the test set 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 USER **`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 setups 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**.

Mobile Control Difficulties

The following message may be encountered if there are communication problems with the mobile station.

- Warning, TIA adapter is not responding
- No or bad data received from SEND NAM

❒ Check the serial connection from the RJ-11 connector on the Test System to the Test Interface Adapters' DB-25 connector. See **chapter 4, "Making Connections"**.

❒ Verify all equipment is powered on.

Power supply
Mobile unit
HP 83201A Adapter
Printer (if connected)

❒ Verify that the RJ-11 cable has six wires and that the proper pins are used, see **chapter 4, "Making Connections"**.

❒ Check that the correct Test Interface Adapter Personality has been selected in the parameter, **`TIA Adapter Personality`**. See the **"Parameter Descriptions" on page 186**.

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.

  If have firmware below revision A.14.00 OR you are using software with Revision A.xx.xx

  1. Press TESTS.
  2. Check that **`Printer`** was selected as the **`Output Destination`** in the **`Test Execution Conditions`**.
  3. Check that the test set is correctly configured for HP-IB, parallel, or serial printing:

     For a HP-IB printer:

     - ❒ Check that the printer's **`Calling Name`** is "PRINTER" and its address is correctly set up in the **`External Devices`** (or **`Edit Cnfg`**) screen.
     - ❒ Check that the I/O CONFIGURE screen has been set up correctly:
       - Mode=Control
       - Print To=HP-IB
       - Print Adrs=address of your printer

     For a parallel printer:

     - ❒ Check that the printer's **`Calling Name`** is **`PRINTER`** and its address is set to **`15`** in the **`External Devices`** (or **`Edit Cnfg`**) screen.

     For a serial printer:

     - ❒ Check that the printer's **`Calling Name`** is **`PRINTER`** and its address is set to **`9`** in the **`External Devices`** (or **`Edit Cnfg`**) screen.
     - ❒ Check that the I/O CONFIGURE screen has been set up correctly for the printer's baud rate, parity, and so forth.

  Refer to the test set's *User's Guide* for details about configuring the printer.

If you have an HP 8920B or HP 8920A,D with firmware above revision A.14.00 AND you are using software with Revision B.xx.xx

1. Press TESTS.
2. Select **`Printer Setup`** from the **`SET UP TEST SET`** list.
3. Check that **`Printer`** was selected in the **`Output Results To:`**.
4. Check that the test set is correctly configured for HP-IB or serial printing:
   a. Select **`Model`** and choose the most compatible printer model from the **`Choices`** menu.
   b. Select **`Printer Port`** and choose which printer port you are using.
   c. If the HP-IB port was selected, check that the correct **`Printer Adrs`** was entered.
   d. If the Serial port was selected, check that the I/O CONFIGURE screen has been set up correctly for the printer's baud rate, parity, and so forth.

Refer to the test set's *User's Guide* for details about configuring the printer.

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 TESTS.
2. Select **`Execution Cond`** from the **`SET UP TEST SET`** list (HP 8920B and HP 8920A,D fw above rev A.14.00 only).
3. Position the cursor to the **`Run Mode`** field (in Test Execution Conditions) 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 tests 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 reconfigure 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*.

Error Messages

Many error messages are coded into the test set's firmware and test software. If the problem is related to test set operation, access the MESSAGE screen to see any messages that have occurred since the instrument was turned on. To do this, press the SHIFT then RX.

Many of the error messages are listed on the following pages, alphabetically, with a description of the problem and possible corrections. If you see a message that is not described here, press CANCEL, and then the MSSG key. Other related error messages may be displayed.

For a listing of additional error messages, see

- *The Test Set User's Guide, HP part number 08920-90219, 08920-90221 or 08921-90022*
- *The Test Set Programmer's Guide, HP part number 08920-90220, 08920-90222, or 08921-90031*
- *The Test Set Assembly Level Repair Manual, HP part number 08921-90168*

If you see an error message that contains a program line number, and it is not listed in this section, please write down the message with the line number and call the factory at 1-800-922-8920 (in the USA and Canada only).

Error Message Reference

ADC underdriven. Absolute value of the peak sample is less than 30 dB below FS of the ADC.

The analog-to-digital converter in the HP 83201A or HP 83204A Dual- Mode Cellular Adapter must have sufficient level applied.

❒ Check the level of the RF signal being applied to the test set.

1. Press DUPLEX.
2. Read the value on the power meter.
3. Compare this value with the output power setting of the mobile station.

The test will continue with this error present and the results will be displayed. However, performance may be degraded.

ADC overdriven. Absolute value of the peak sample is at the ADC full scale.

The analog-to-digital converter in the HP 83201A or HP 83204A Dual- Mode Cellular Adapter must not be overdriven. This message may be displayed if the transmitter is not being set to the correct power levels.

❒ Check the level of the RF signal being applied to the test set.

1. Press DUPLEX.
2. Read the value on the power meter.
3. Compare this value with the power setting of the mobile station.

The test will continue with this error present and the results will be displayed. However, performance may be degraded.

An error free sync word was not found. The SyncLoc result is not valid.

The test set was unable to use the synchronization word sent.

- The digital mode of the mobile station equipment may not be functioning properly.

1. Run the test on another mobile unit and see if this message occurs again.
2. If the message does not occur, it is likely that the mobile station is not functioning properly.
3. If the message does occur again, check with factory for a solution. Call the factory (1-800-922-8920; in the USA and Canada only).

- The level of the RF signal into the test set may be too low.

1. Press DUPLEX.
2. Read the value on the power meter.
3. Compare this value with the power setting of the mobile station.

Channel error. Range is 1 to 799 and 991 to 1023. Change channel number in the TESTS Edit Frequencies screen.

Channel entries must be in this specified range.

- Enter channel numbers into the **`Cell Channel`** field on the Channel Information screen (or **`RX Chan Info`** field on the Edit Frequencies screen). screen.
- The last **`RX Freq`** entry must be **`-1`** to terminate the channel list.

Data collection address cannot be set to 10. Program stopped.

The second serial port in the test set has an address of 10. It is used for mobile control. The Serial port, having an address of 9, can be used for data collection. If you are collecting data to an HP-IB device, you have to enter all three digits of the address. For additional information, see **"Data Collection (Saving and Retrieving Test Results)" on page 246**.

Duplicate file. Overwrite old file?

A file name can only be used once. The entered file name has the same name as one that is already stored on the storage media. If you answer **`Yes`** to Overwrite old file?, the old file will be overwritten. Once a file is overwritten, it is unretrievable. There is no backup.

Error 80 during Procedure catalog. Catalog aborted.

This message is displayed when the test set is unable to load a procedure from a memory card.

- Check that the card is properly inserted and has procedures saved on it.

ERROR 80 in (line number). Medium changed or not in drive Re-try?

This message is displayed when the test set is unable to access valid files from a memory card.

- Check that the card is properly inserted and has procedures saved on it.

Error in channel. Re-enter in RX Chan Info field.

The channels that are tested must be entered into the Cell Channel (or RX Chan Info) field on the Channel Information (or Edit Frequencies) screen. This field is the lower field in the second column on the screen. Entry range is 1 to 799 and 991 to 1023.

Error in data collection information on cnfg screen.

This message is displayed if the file type or record number is not properly entered into the **`External Devices`** (or Edit Configuration) screen.

To access the **`External Devices`** screen:

1. Press TESTS.
2. Select **`External Devices`** from the **`SET UP TEST SET`** list (or **`Edit Cnfg`** from the **`Test Function`** field).
3. Verify that the entries are correct.

For additional information, see **"Data Collection (Saving and Retrieving Test Results)" on page 246**.

HP-IB Command not accepted. Option not installed.

This message may be displayed when the software tries to control a nonexistent Radio Interface Card or nonexistent other Test Set option.

- ❒ Check the Test Set rear panel for the Radio Interface connector.
  - ❒ If no Radio Interface connector is present, your test set does not have this option installed.
  - ❒ If a Radio Interface connector is present, check the LIST_OPTS program to verify that it is working properly.
  - ❒ If RADIO INTERFACE is not listed on the screen, the radio interface board may not be working properly.
  - ❒ If RADIO INTERFACE is listed on the screen and this error occurs, there may be an error in the software or firmware. Call the factory at 1-800-922-8920.

To check which options are installed in the Test Set:

CAUTION: Loading this program into the Test Set memory will erase any other programs and Procedures you have loaded. If you have not already done so, save your setups to a Procedure on an SRAM memory card before loading the “LIST_OPTS” program. See **"Procedures" on page 287**.

1. Press TESTS.
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 **`Filename`**) field and select it.
5. From the **`Choices`** menu, select **`LIST_OPTS`**.
6. Press k1 (**`Run Test)`** to display the installed options.
7. Check if RADIO INTERFACE is listed.

No trigger or clock is present.

The test set was unable to find the data clock and use it in subsequent data recovery. The digital mode of the mobile station equipment may not be functioning properly. The level into the test set may be too low, or no trigger was received by the digital analyzer from the **`Trig Type`** field in the TDMA screen (should be 2X Frame for NADC).

Parameter estimator did not converge.

The test set was unable to successfully demodulate the signal captured by the digital analyzer. Test results are not displayed.

- The digital mode of the mobile station equipment may not be working properly.
- The level of the signal applied to the test set may be too low.
- The frequency or other characteristic of the digital mode signal may be out of specification.

Printer address cannot be set to 10.

The second test set serial port, Serial B, has an address of 10. The serial port, having an address of 9, can be used for printing. If you are using an HP-IB printer, you need to enter all three digits of the printer address. See **"Printing" on page 272**.

Status = (Status) returned by the DSP

This message is displayed when the software cannot recognize a status message sent from the HP 83201A or HP 83204A Dual-Mode Cellular Adapter to the test set. If you suspect that the status message is a symptom of a problem you are having, please record the status displayed in the message and call the factory (1-800-922- 8920; in the USA or Canada only).

Sync word began on the 2nd bit of the symbol.

The synchronization word in the captured signal was not properly timed when it was transmitted by the mobile station equipment.

- Verify that the mobile unit is functioning properly.

The test will continue with this error present and results will be displayed. However, the performance may be degraded.

Sync word contained errors or was not found.

The synchronization word in the transmitted signal did not have the correct bits in it when it was measured by the test set.

- Verify that the level into the test set is not too low.
- Verify that the mobile unit is functioning properly.

The test will continue with this error present and results will be displayed. However, performance may be degraded.

Sync word was too soon in the burst.

There was not enough data ahead of the synchronization word in the captured time record to reconstruct an entire TDMA timeslot.

- Verify that the parameter, RTD Analyzer Trigger Delay is set correctly. See parameter **"20. RTD Analyzer Trigger Delay [0:971]" on page 195**. Increase the delay until this error message is corrected. For optimal delay continue to increase the delay until the error message, Sync word was too late in the burst appears and then set the parameter, RTD Analyzer Trigger Delay halfway in between this delay and the delay that corrected the error message (Sync word was to soon in the burst).

Test results are not displayed.

Sync word was too late in the burst.

There was not enough data after the synchronization word in the captured time record to reconstruct an entire TDMA timeslot.

- Verify that the parameter, RTD Analyzer Trigger Delay is set correctly. See parameter **"20. RTD Analyzer Trigger Delay [0:971]" on page 195**. See the previous error message, Sync word was to soon in the burst.

Test results are not displayed.

Synchronization to received data did not occur.

The test set was unable to use the synchronization word to recover the data sent.

- Verify that the parameter, RTD Analyzer Trigger Delay is set correctly. See parameter **"20. RTD Analyzer Trigger Delay [0:971]" on page 195**.
- Check the level into the test set (it may be too low).

The Test Set must be configured in Control Mode. No other controllers may be on the HP-IB bus. Do you want to put the Test Set in Control Mode? Select desired softkey.

The test set can be set to operate in the HP-IB **`Control`** mode or can be set to operate in the **`Talk&Lstn`** mode. This selection is made on the test set's I/O CONFIGURE screen. If the TESTS **`(Edit Configuration)`** screen has entries that require the test set to operate as a controller, the software will verify that the test set is configured properly. Answer the question **`Yes`** if you wish to have the entry on the I/O CONFIGURE screen changed.

The memory of the RX DSP board was exceeded.

The test set was unable to terminate the entry of a signal into the digital analyzer. Test results are not displayed.

- Check the level of the signal applied to the test set (it may be too low).

The user selected incompatible pass parameters in the analyzer fields.

The TDMA test screen contains values that the HP 83201A cannot recognize. A test is not performed. You may get this message if you exited the program and changed values on that screen. If this message appears as you are running the software and you had not exited the program, please call the factory (1800-922-8920; in the USA and Canada only).

This software will not run with firmware revision (FW rev. #) **presently installed in the test set. Consult software users manual for correct firmware revision.**

The test set must have a firmware revision **`A.10.02`** or higher. To determine the revision of the firmware:

- Press CANCEL or shift CANCEL to pause the program.
- Press SHIFT CONFIG to display the CONFIGURE screen.
- View the revision number of the firmware in the upper right corner of the display.

Contact the factory (1-800-922-8920; in the USA and Canada only) if you do not have the necessary revision. Firmware is installed in the test set by removing the instrument cover and replacing the EPROMS in the controller section, and in some cases, the EPROM on the signaling board.

Timeout error from an external instrument.

This message will be displayed if the test set tries to control a device on the HP-IB bus and is unable to do so for 5 seconds.

- ❒ Check cables.
- ❒ Verify that the HP-IB address and other setup conditions of your device are set properly.
- ❒ Verify entries made to the **`External Devices`** (or **`Edit Configuration`**) screen.

Timeout from printer at address (printer address). Retry?

- ❒ Check the cable and the connections.

Weak clock. Difficult to find data clock phase.

The test set was unable to recover the data clock and use it in subsequent data recovery.

- ❒ Check the level into the test set (it may be too low).

The test will continue with this error present and the results will be displayed. However, the performance may be degraded.

Glossary

BPF Band Pass Filter. A filter that increasingly rejects signals as their frequency increases and decreases outside of certain cutoff frequencies. In the Test Set, audio band pass filters are used to reduce the level of out-of-band signals during certain measurements.

CANCEL A key used to pause (stop) the IBASIC program running in the Test Set.

card Refers to the memory card containing the procedures for testing the base station.

`Choices` Refers to a field in the lower right of the Test Set screen that displays several possible functions for selection.

`Continue` Proceed with the IBASIC software program if it has been stopped (paused).

cursor Refers to the brightened region of the Test Set screen used to indicate the field/function currently being accessed.

`Del Step` A function to delete a step in the procedure.

Disp Loc A menu function which presents an assembly diagram that displays location of the adjustable component.

`Edit Cnfg` (configuration) Title of an Test Set screen that allows you to set up (configure) printers, PCs, disks…

`Edit Freq` (frequency) Function which allows you to edit the values of the test frequencies.

`Edit Parm` (parameters) Function which allows you to edit the values of the test parameters. See also “parameters”.

`Edit Seqn` (sequence) Function which allows you to select a single test and run it or to create your own sequence of tests.

`Edit Spec` (specifications) Function which allows you to edit the limits of the test specifications. See also “specifications”.

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 (**`example`**) where entries can be made.

function Refers to a particular field, feature, or operation of the Test Set.

GN Abbreviation for General. GN appears in some titles in the software and indicates that it relates to the general system, as opposed to a transmitter (TX) or receiver (RX).

HELP A feature providing additional Test Set information accessed by pressing SHIFT, then TX (HELP) keys.

highlight Refers to the brightened region (cursor) of the Test Set screen used to indicate the field/function currently being accessed.

HPF High Pass Filter. A filter that increasingly passes signals as their frequency increases towards, and then is greater than, a certain cutoff frequency. In the Test Set, audio high pass filters are used to reduce the level of low frequency signals during certain measurements.

IBASIC Instrument BASIC is the computer language (code or software) used by the Test Sets' built-in controller. The IBASIC software is downloaded from the CARD into the Test Sets' RAM.

initialize The process of formatting a card or disk prior to storing data.

key (USER keys) Keys refer to any of the push buttons on the front panel. The USER keys are a specific grouping of keys labeled k1 to k5 which perform the associated numbered function in the action field located in the upper right or the screen. The USER keys are user programmable.

knob The large tuning dial for cursor control located in the center of the Test Sets' front panel. This knob is rotated to position the cursor on the screen and then pressed to select the particular field or function.

library A collection of the names of all of the parameters, specifications, and tests in the test software. The test software and the Test Set's 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.

`Location` Where to retrieve or save a particular testing procedure e.g., disk, CARD, RAM, PC, etc.

LPF Low Pass Filter. A filter that increasingly rejects signals as their frequency increases towards, and then is greater than, a certain cutoff frequency. In the Test Set, audio low pass filters are used to reduce the level of high frequency signals during certain measurements.

measurement A series of calculations on data measured by the Test Set providing a value to be compared against specification HI/LO limit values.

menu The Test Set screen displays various tasks to be selected with the cursor control knob or the USER keys; this display is the menu.

message The upper portion of the Test Set screen is reserved for messages and prompts. Messages give an indication of the status of the Test Set, e.g. **System initialization**.

OTP One Time Programmable (OTP) refers to a memory card on which code or data may only be stored once; similar to ROM.

parameters Entries you make for calibration data, mobile characteristics, or test customization. They give you flexibility in the way you use the software. Default values for parameters are entered into the software.

Glossary

pause Using the CANCEL key pauses the running of IBASIC software and allows access to the keyboard functions. CONTINUE allows the software to proceed.

peak+/- max A detector in the Test Set that measures and computes the maximum of the absolute value of the positive and negative excursions of the measurement. For example, when an FM waveform with a +10 kHz and -9 kHz deviation is applied, 10 kHz will be displayed.

PRESET Sets the Test Set to its initial power-up state.

procedure A shortened label for test procedure. A procedure is a collection of channels, parameters, specifications, and a test sequence, saved in a file, that customizes the test software to a specific application. Procedures are made by editing existing channels, parameters, specifications, and sequence, and saving the resulting files to a memory card, disk or internal Test Set RAM. Procedure Manager (**`Proc Mngr`** Test Function) is used when making procedures. The field titled **`Procedure`** contains the name of the test procedure currently running in the Test Set.

prompts The upper portion of the Test Set (inverse video field) is reserved for prompts and messages. The prompt directs the user to take some action. Messages give an indication of the status of the Test Set.

RAM Random Access Memory - The memory in the Test Set that is used to store program code and data. The Test Set RAM is battery-backed-up, retaining data and program code when the power is turned off.

ROM Read Only Memory

`Run Test` Directs the Test Set to load the program from the current procedure and begin testing (may take up to two minutes).

SAT Supervisory Audio Tone - A 5970 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.

screen Refers to the video display of the Test Set.

select To choose a particular field or function. Rotate the CURSOR CONTROL knob and position the highlighted cursor on the chosen field or function, then press the knob. An alternative method is to press the numbered USER key having the same number as displayed alongside the desired function.

sequence The method used in the Test Set to run one or more TESTs in a desired order. A sequence is entered using the TESTS **`(Edit Sequence)`** screen.

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 keys next to the CRT display that can be assigned to certain special actions or fields. The keys are also called USER keys.

specifications Specifications are the names of criteria verifying the performance of the base station. The specification value may be changed by using the **`Edit Spec`** function. Usually the associated measurement value must fall within the HI/LO limits of specification values to verify performance of the base station. Default values in the test software have been derived from standard methods of measurements.

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.

Step# Orders the sequence of tests, e.g. Step #1 may be Test_5, and Step #2 may be Test_26, etc.

`Test Function` A field, in the lower left corner of the tests screen that provides access to the editing features: **`Edit_Seqn`**, **`Edit_Freq`**, **`Edit_Parm`**, **`Edit_Cnfg`**, **`Proc_Mgr`**, and **`IBASIC`**.

tests Tests are a collection of measurements (or a series of other tests) which verify a particular specification value or operation of the UUT. A sequence of tests are contained in a test procedure.

TESTS Screen The screen accessed by pressing the TESTS key. It is used to setup and perform all UUT testing.

USER keys A group of keys located immediately to the right of the Test Set screen that allow the user to more rapidly select certain functions without rotating and pressing the knob. These key assignments are displayed in the upper right portion of the Test Set screen. The number on the left of the function corresponds to the number on the user key k1 to k5.

values The scaler quantities or numbers entered in the inverse video fields of the specifications or parameters. Units of measure (dB, inches, volts, watts, etc.) are contained in the specifications and parameters.

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