**This Software Is Used With the HP 8920B Opt. 500,**
**HP 8921A Option 500, HP 8920D, or HP 8921D**

# HP 11807A,E Option 009
# NA Dual-Mode Cellular Mobile Test Software
# *User's Guide*

**HP Part No. 11807-90124**
**Printed in U. S. A.**
**March 1996**

**Fourth Edition (Rev D)**

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# 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 the following Test Sets:

- **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 2, "Getting Started with FW Below Rev. A.14.00," on page 31*. 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 system and the HP 11807A,E Option 009 Software. You will setup and run the following:

1. The call processing origination test
2. The transmitter frequency error test
3. The call processing release test

These three tests will establish that the software has been loaded and verify that the mobile radio is functional.

## The Test Set or Test System is Defined As:

- 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

## Equipment Needed to Get Started

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

- HP 11807A,E Option 009 Software
- You will need 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
- A mobile unit
- A power supply with appropriate connections
- Knowledge of the mobile unit's control channel
- A BNC(f) to Type N(m) adapter
- A BNC(m) to BNC(m) 4 foot cable for transmitter output to test system RF IN/OUT connection
- A BNC(f) to TNC(m) or BNC(f) to mini-UHF(m) adapter for connection to the mobile's antenna

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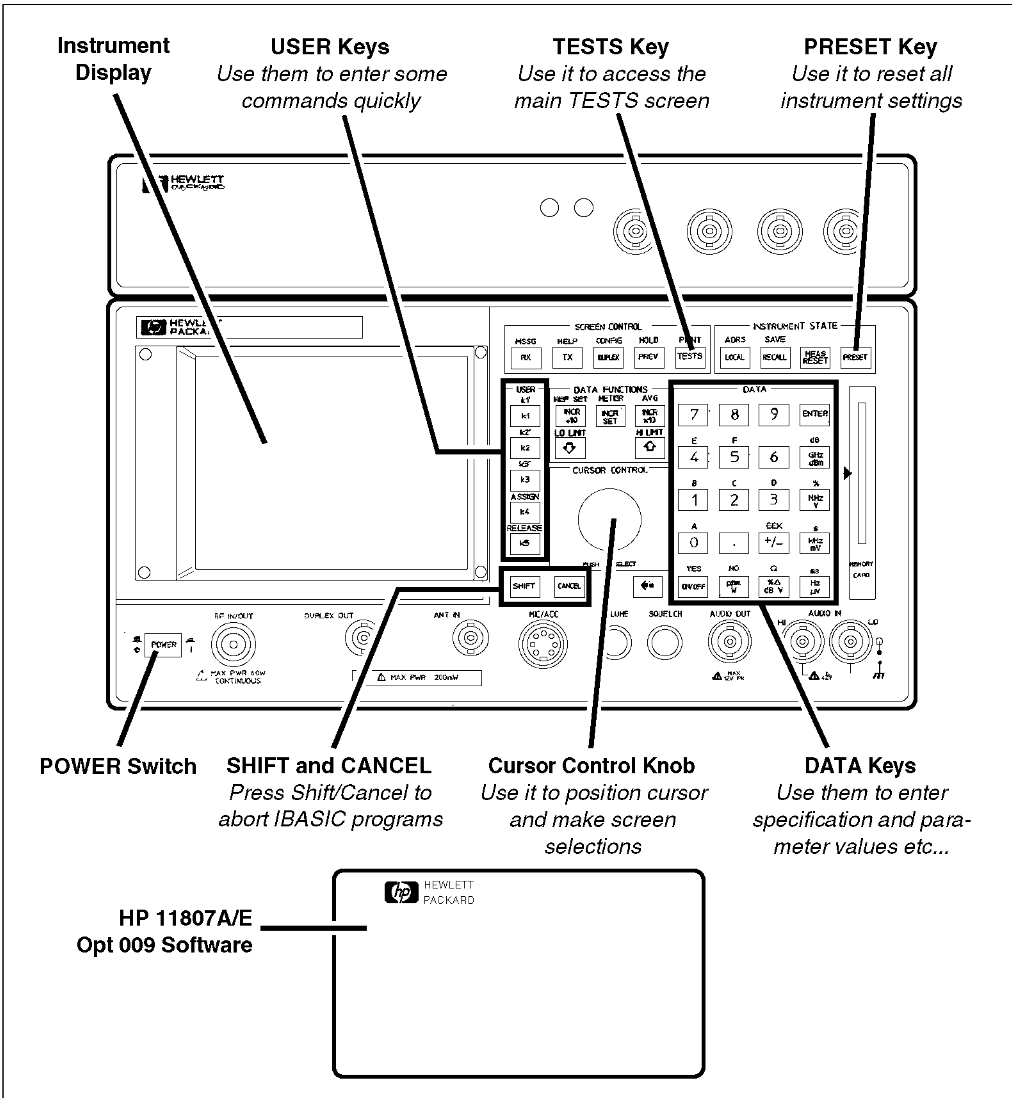
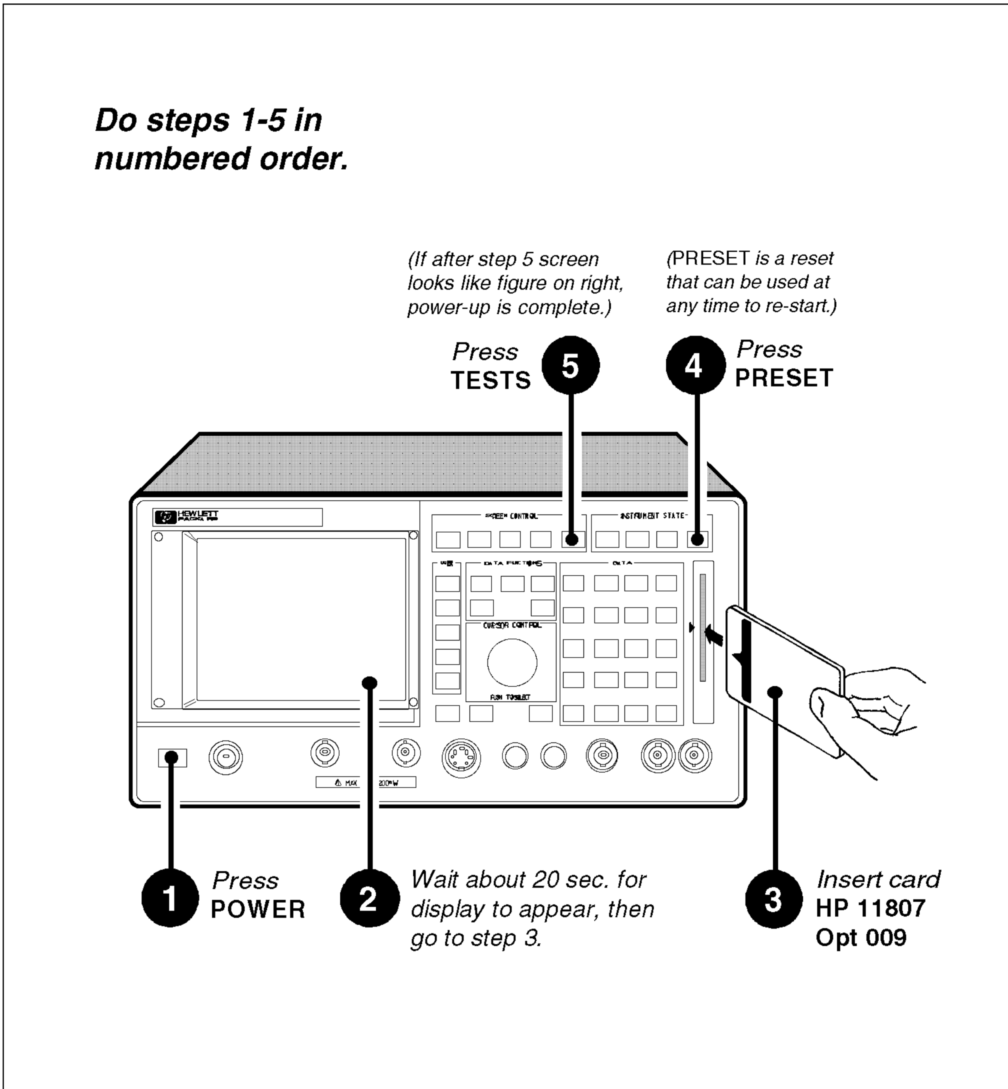
# Test System Overview




OVRVIE1a

Next: Turn page to Setup and Insert Software Card

# Setup and Insert Software Card

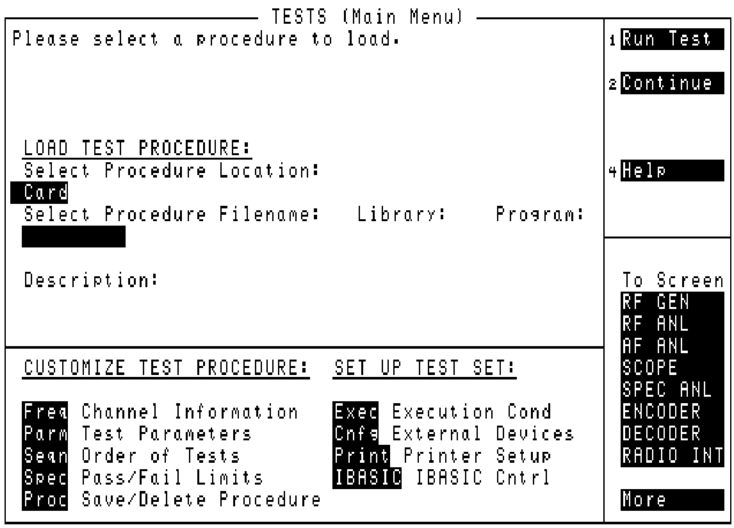



LOAD1

Next: Turn page to Select the Tests from the Card

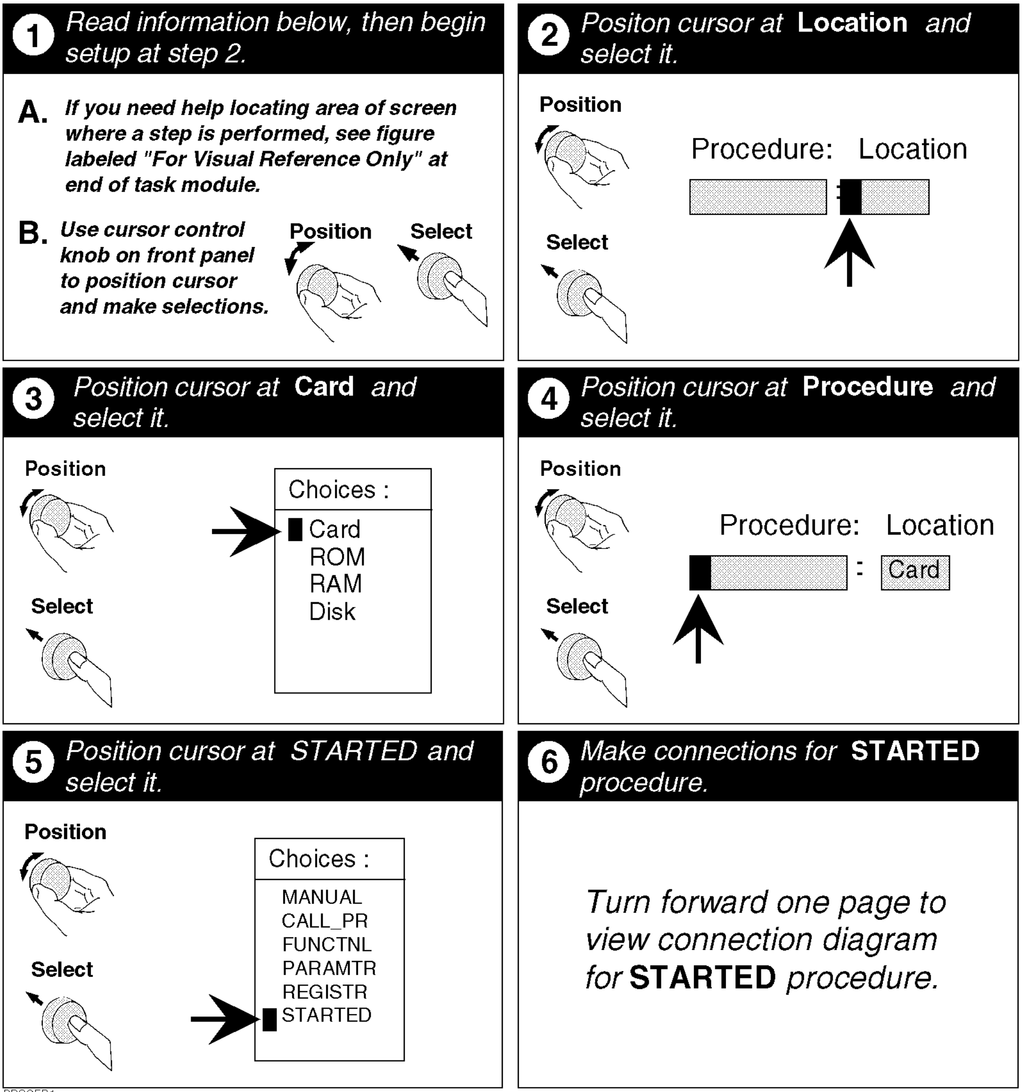
**For Visual Reference Only**

***Field entries on your screen may be different.***



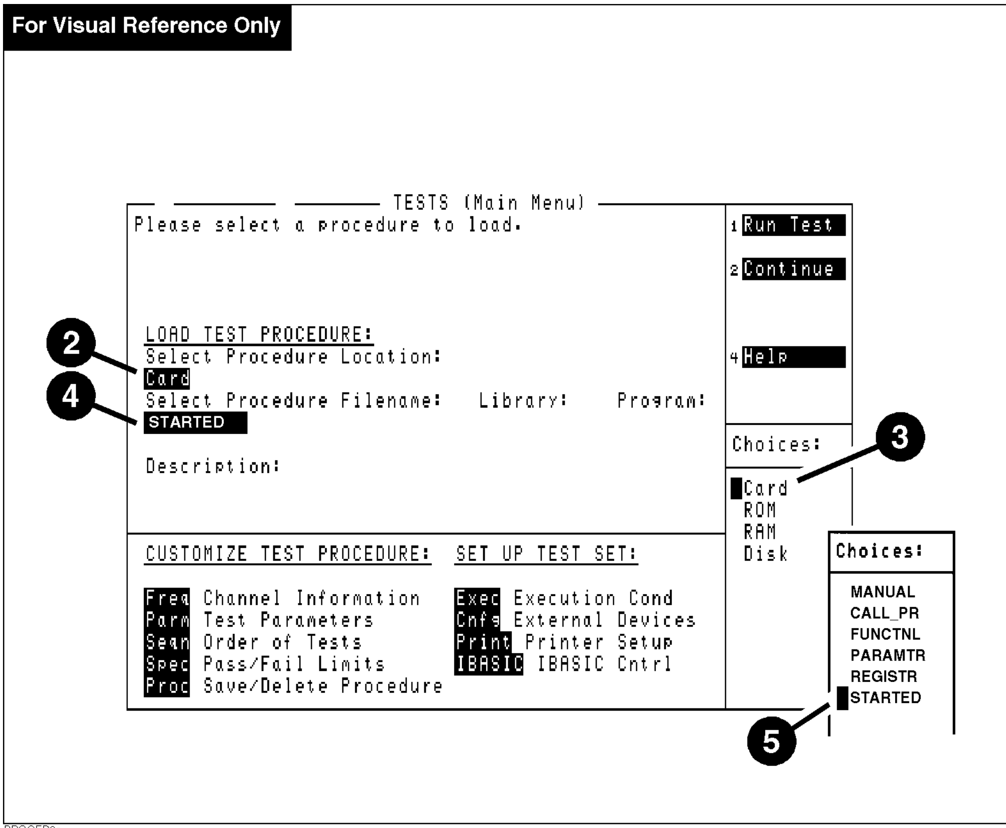

LOAD2a

# Select the Tests from the Card




PROCED1

Next: Turn page to Make Connections


For Visual Reference Only
TESTS (Main Menu)
Please select a procedure to load.
LOAD TEST PROCEDURE:
Select Procedure Location:
Card
Select Procedure Filename:
Library:
Program:
STARTED
Description:
CUSTOMIZE TEST PROCEDURE:
SET UP TEST SET:
Freq Channel Information
Parm Test Parameters
Seqn Order of Tests
Spec Pass/Fail Limits
Proc Save/Delete Procedure
Exec Execution Cond
Cnfg External Devices
Print Printer Setup
IBASIC IBASIC Cntrl
1 Run Test
2 Continue
4 Help
Choices:
Card
ROM
RAM
Disk
Choices:
MANUAL
CALL_PR
FUNCTNL
PARAMTR
REGISTR
STARTED
2
3
4
5
PROCED2a

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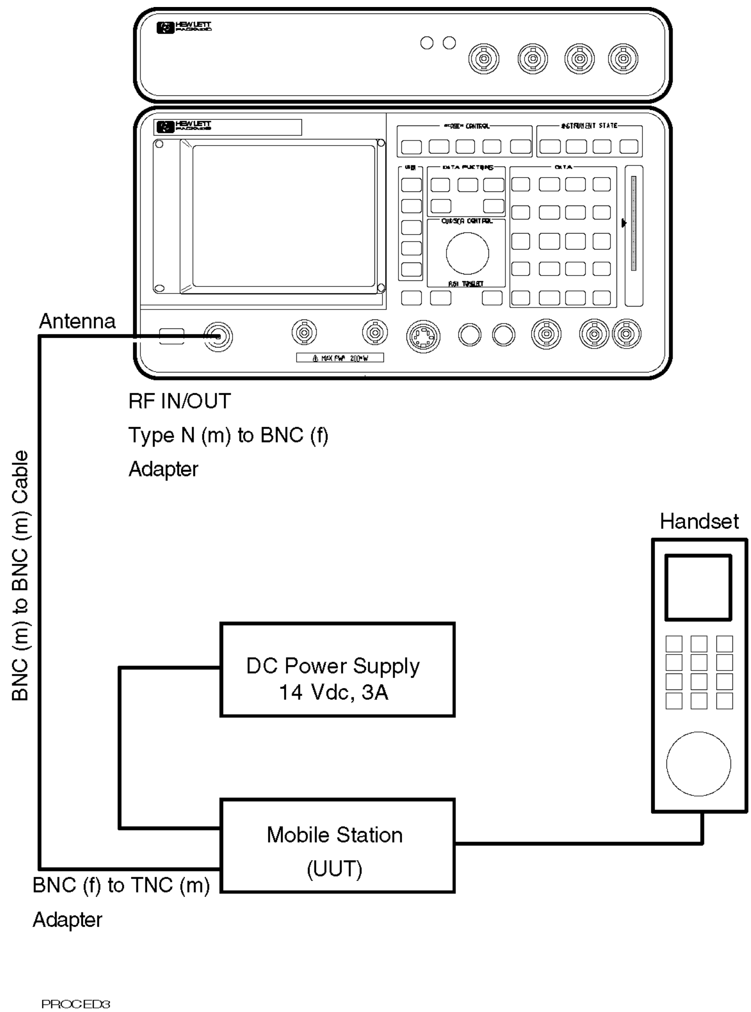
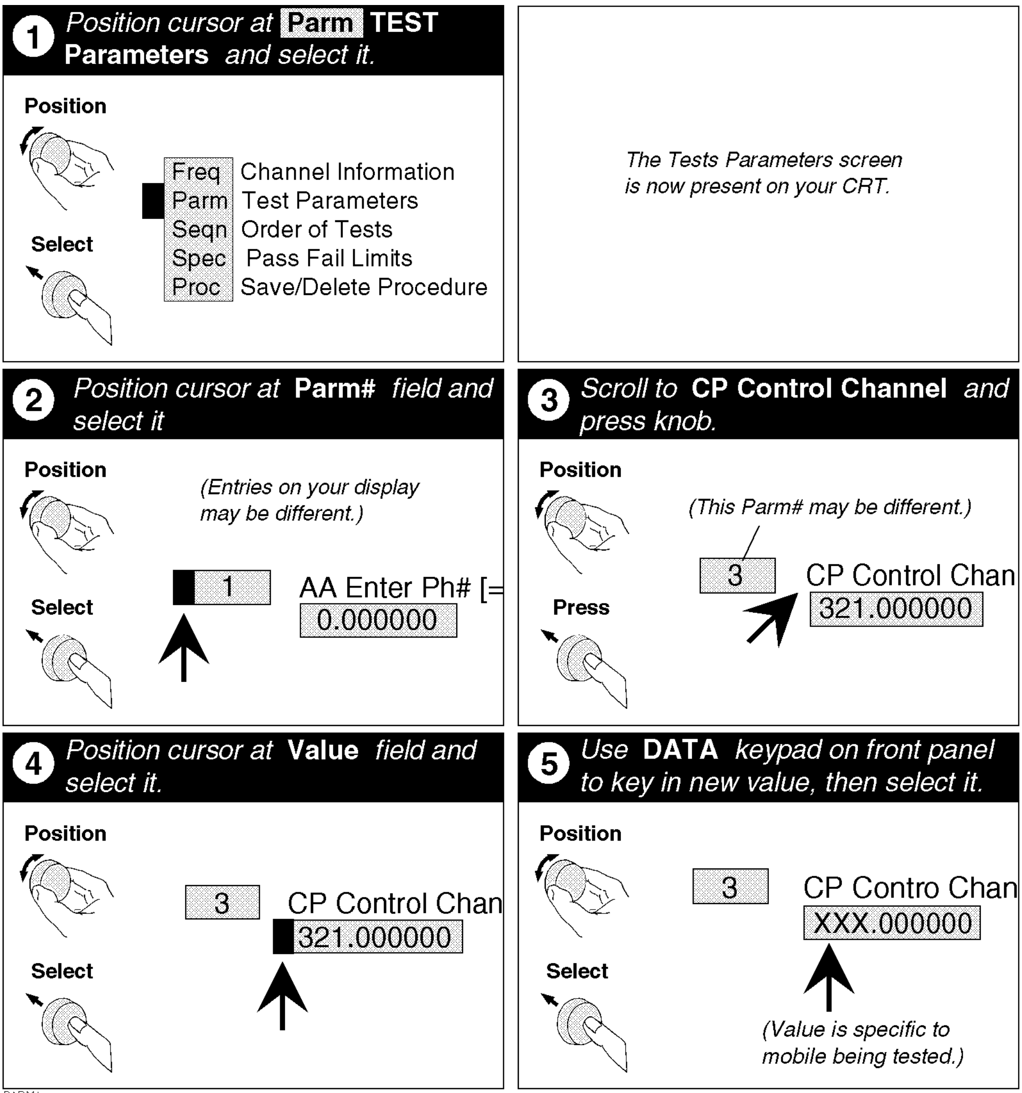
# Make Connections

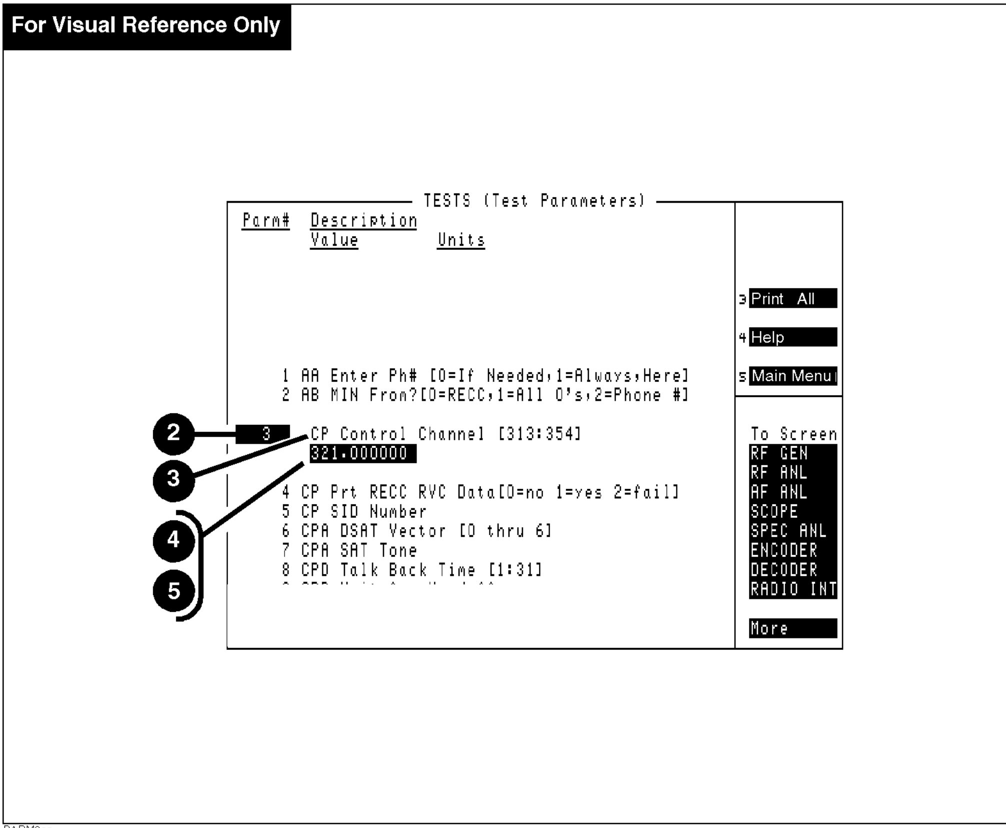



Next: Turn page to Enter Mobil Unit's Control Channel

# Enter Mobile Unit's Control Channel

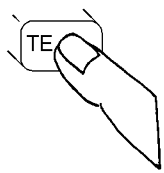



Next: Turn page to Run the Tests

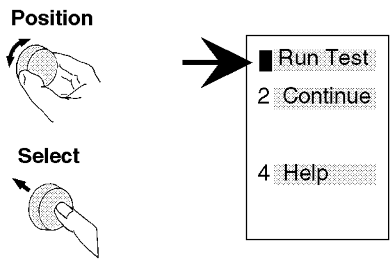

For Visual Reference Only
TESTS (Test Parameters)
Parm# Description
Value Units
3 Print All
4 Help
5 Main Menu
1 AA Enter Ph# [0=If Needed,1=Always,Here]
2 AB MIN From?[0=RECC,1=All 0's,2=Phone #]
3 CP Control Channel [313:354]
321.000000
4 CP Prt RECC RVC Data[0=no 1=yes 2=fail]
5 CP SID Number
6 CPA DSAT Vector [0 thru 6]
7 CPA SAT Tone
8 CPD Talk Back Time [1:31]
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More
2
3
4
5
PARM2aa

# Run the Tests

**6** *Press* **TESTS** *to return to* **TESTS (Main Menu)** *screen.*



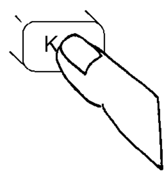

**7** *Position cursor at* **Run Test** *and select it.*




**8** *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 test results appear at bottom of screen, testing is complete.*

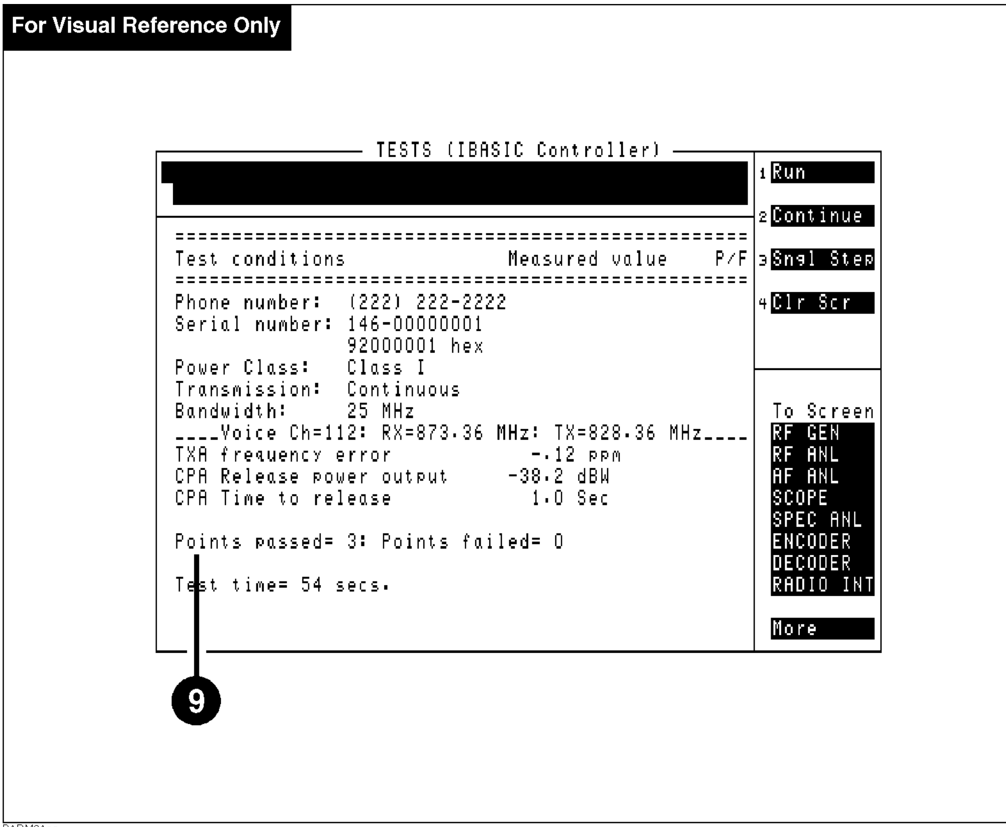
```
Phone number:  (222) 222-2222
Serial number: 146-00000001
               92000001 hex
Power Class:   Class I
Transmission:  Continuous
Bandwidth:     25 MHz
----Voice Ch=112: RX=873.36 MHz: TX=828.36 MHz----
TXA frequency error          -.11 ppm
CPA Release power output    -37.2 dBW
CPA Time to release           2.0 Sec

Points passed= 3: Points failed= 0

Test time= 54 secs.
```

***(Example)***

PARM1Aaa

**10** *You have now completed "Getting Started."*

*Proceed to Chapter 1a, "Product Introduction" for an introduction to the HP 11807A Option 009 Software and a guide to the organization of this manual.*


For Visual Reference Only
TESTS (IBASIC Controller)
1 Run
2 Continue
3 Sngl Step
4 Clr Scr
Test conditions Measured value P/F
Phone number: (222) 222-2222
Serial number: 146-00000001
92000001 hex
Power Class: Class I
Transmission: Continuous
Bandwidth: 25 MHz
----Voice Ch=112: RX=873.36 MHz: TX=828.36 MHz----
TXA frequency error -.12 ppm
CPA Release power output -38.2 dBW
CPA Time to release 1.0 Sec
Points passed= 3: Points failed= 0
Test time= 54 secs.
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More
9

PARM2Aaa

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, HP 8921A, HP 8920D, or HP 8921D with firmware revision above A.14.00, refer to *chapter 1, "Getting Started with FW Above Rev. A.14.00," on page 15*. 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 system and the HP 11807A,E Option 009 Software. You will setup and run the following:

**1.** The call processing origination test
**2.** The transmitter frequency error test
**3.** The call processing release test

These three tests will establish that the software has been loaded and verify that the mobile radio is functional.

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- 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

## Equipment Needed to Get Started

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

- HP 11807A,E Option 009 Software
- You will need 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
- A mobile unit
- A power supply with appropriate connections
- Knowledge of the mobile unit's control channel
- A BNC(f) to Type N(m) adapter
- A BNC(m) to BNC(m) 4 foot cable for transmitter output to test system RF IN/OUT connection
- A BNC(f) to TNC(m) or BNC(f) to mini-UHF(m) adapter for connection to the mobile's antenna

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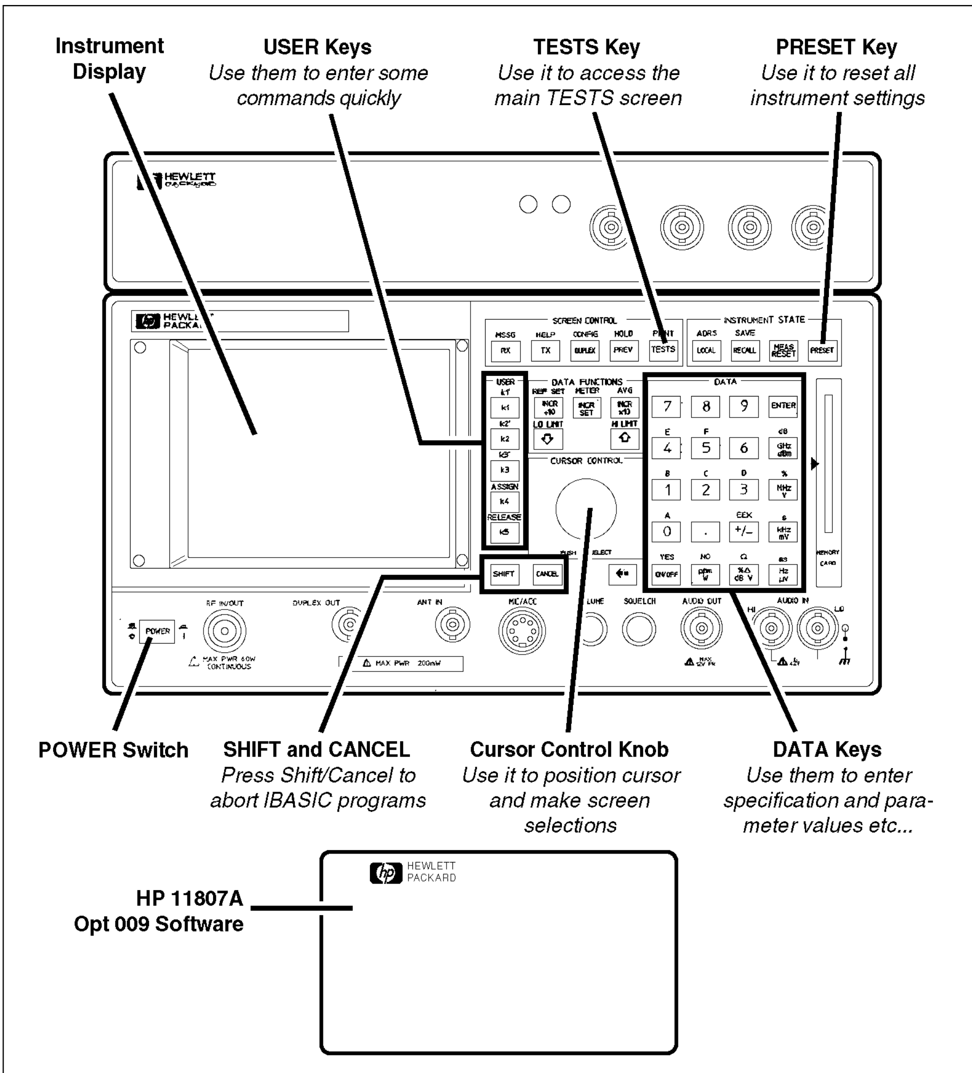
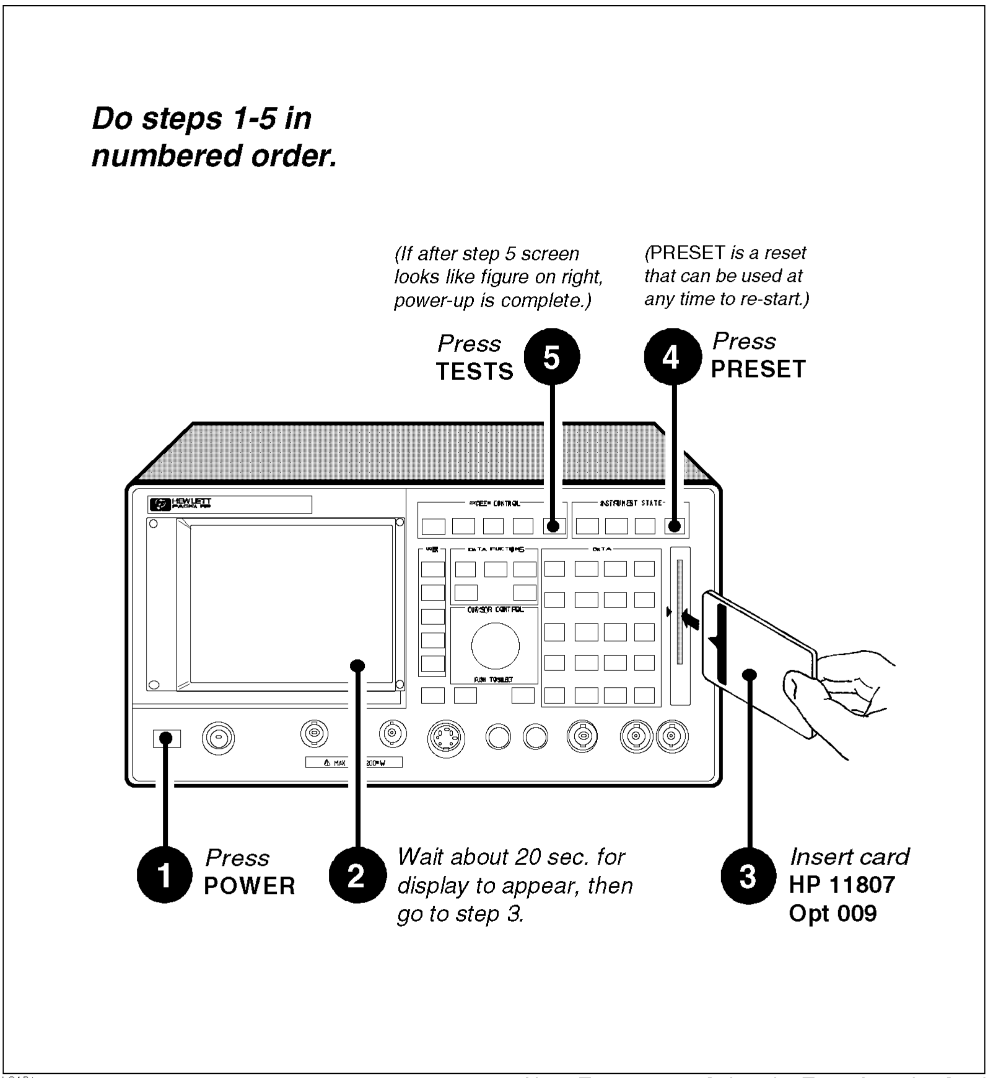
# Test System Overview



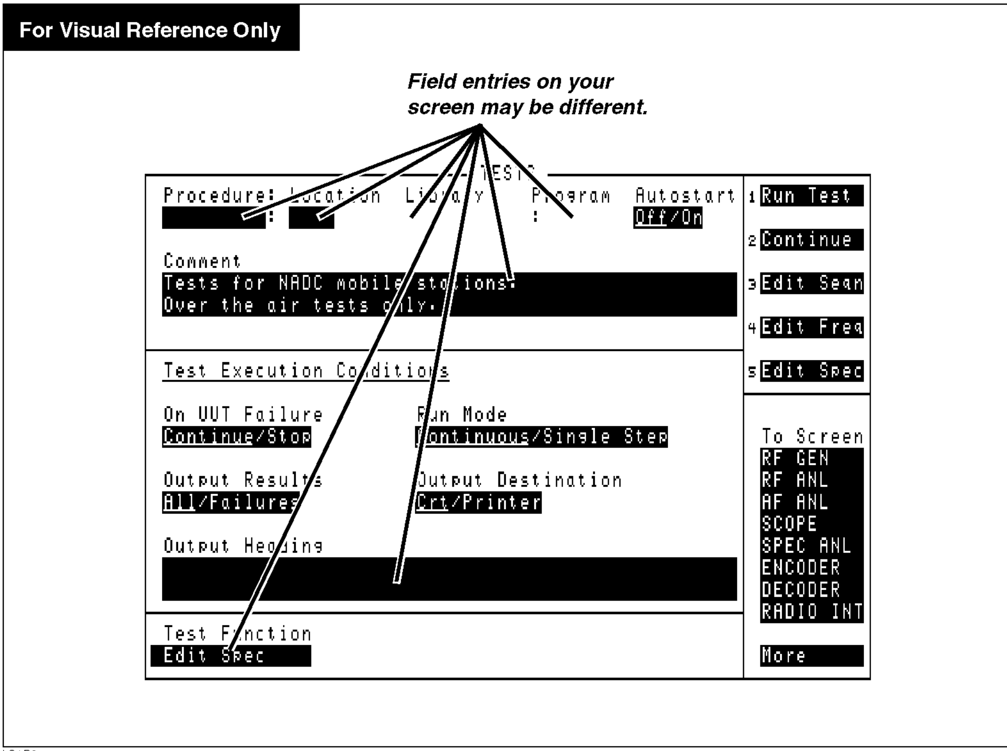

OVRVIEW1

Next: Turn page to Setup and Insert Software Card

# Setup and Insert Software Card

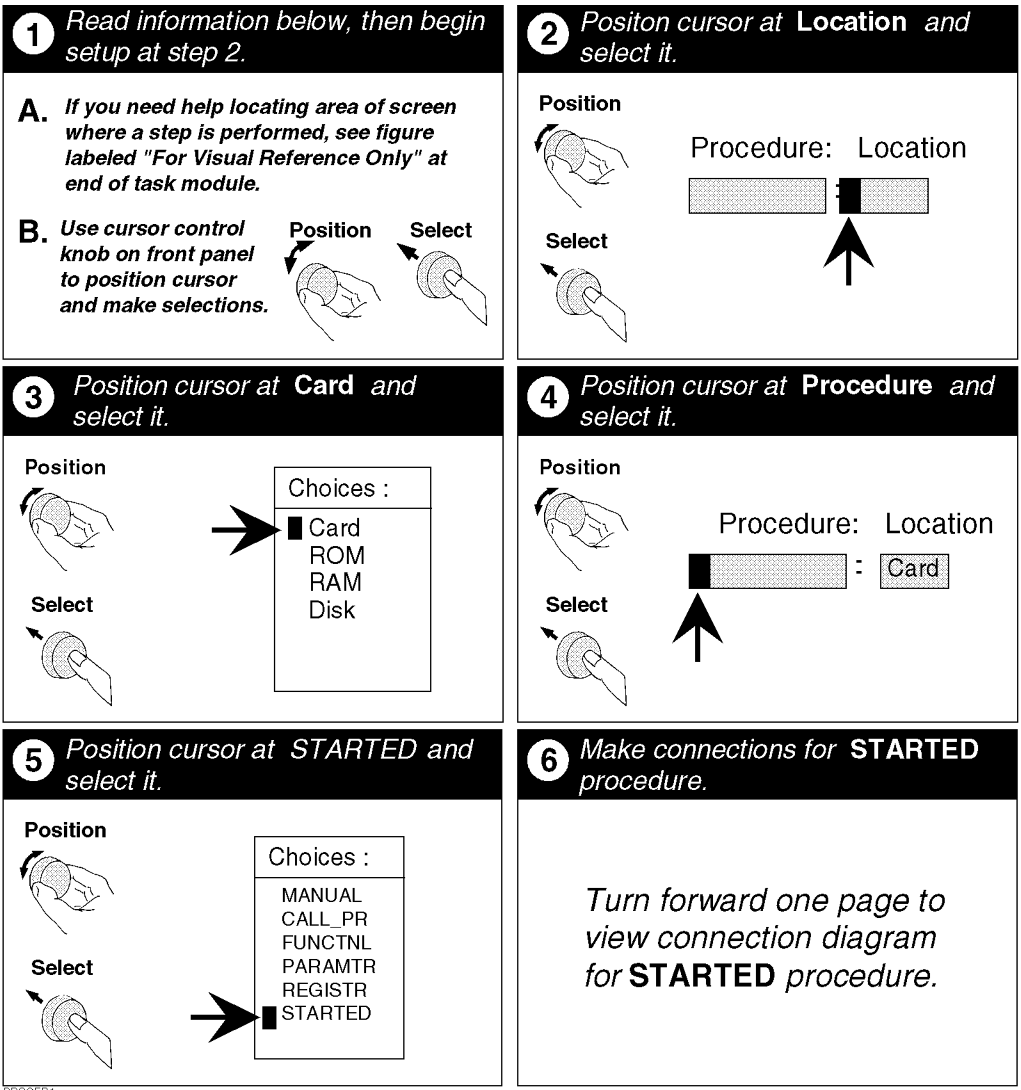



Next: Turn page to Select the Tests from the Card


For Visual Reference Only
Field entries on your screen may be different.
TESTS
Procedure: Location
Library
Program
Autostart
Off/On
Comment
Tests for NADC mobile stations.
Over the air tests only.
Test Execution Conditions
On UUT Failure
Continue/Stop
Run Mode
Continuous/Single Step
Output Results
All/Failures
Output Destination
Crt/Printer
Output Heading
Test Function
Edit Spec
1 Run Test
2 Continue
3 Edit Seqn
4 Edit Freq
5 Edit Spec
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More

LOAD2

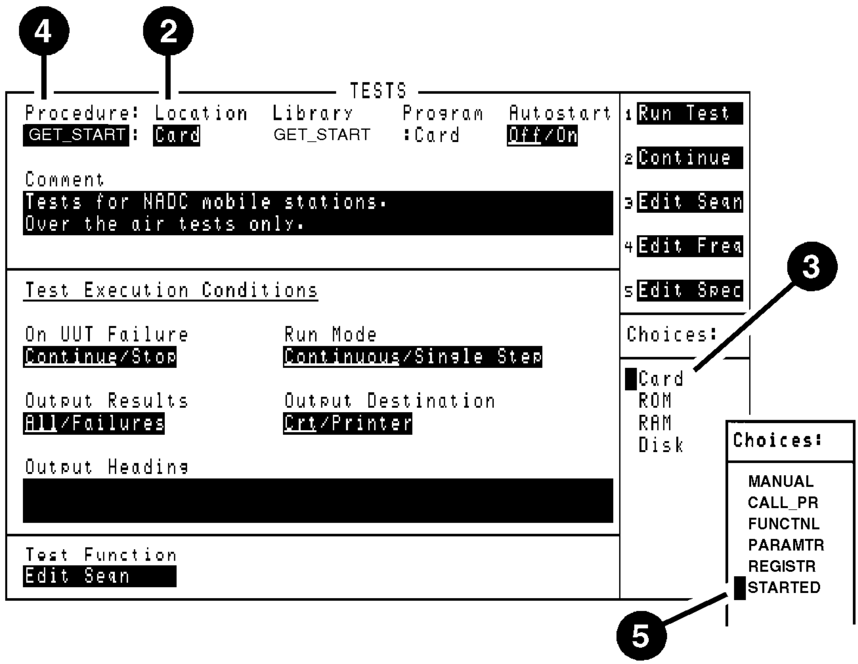
# Select the Tests from the Card




PROCED1

Next: Turn page to Make Connections

**For Visual Reference Only**




PROCED2

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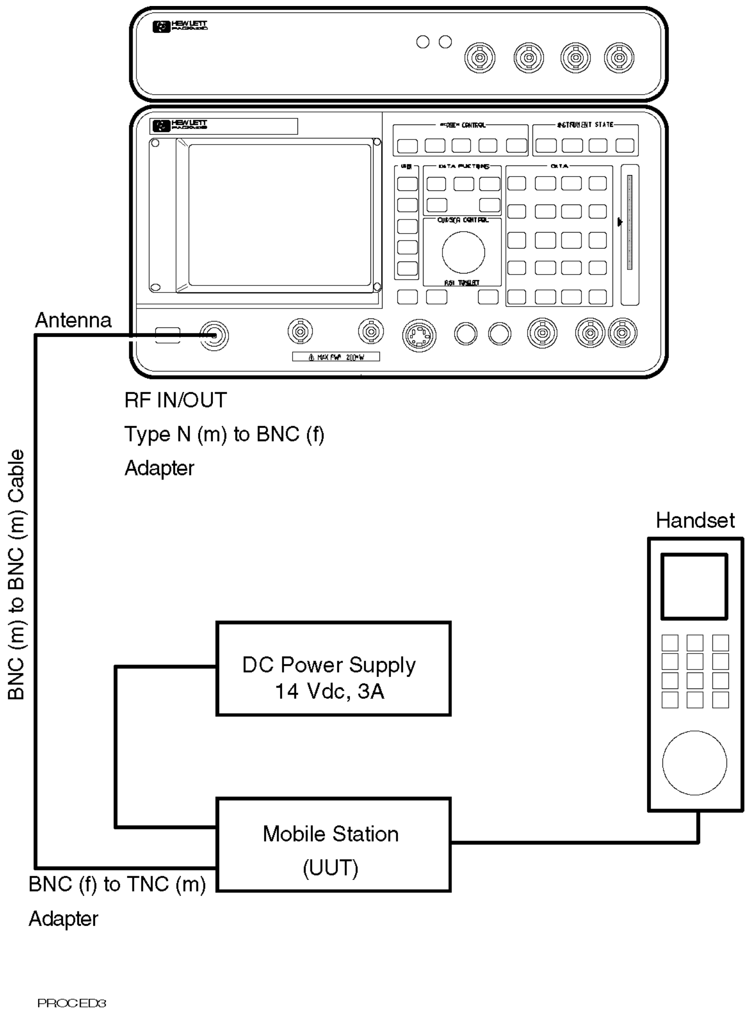
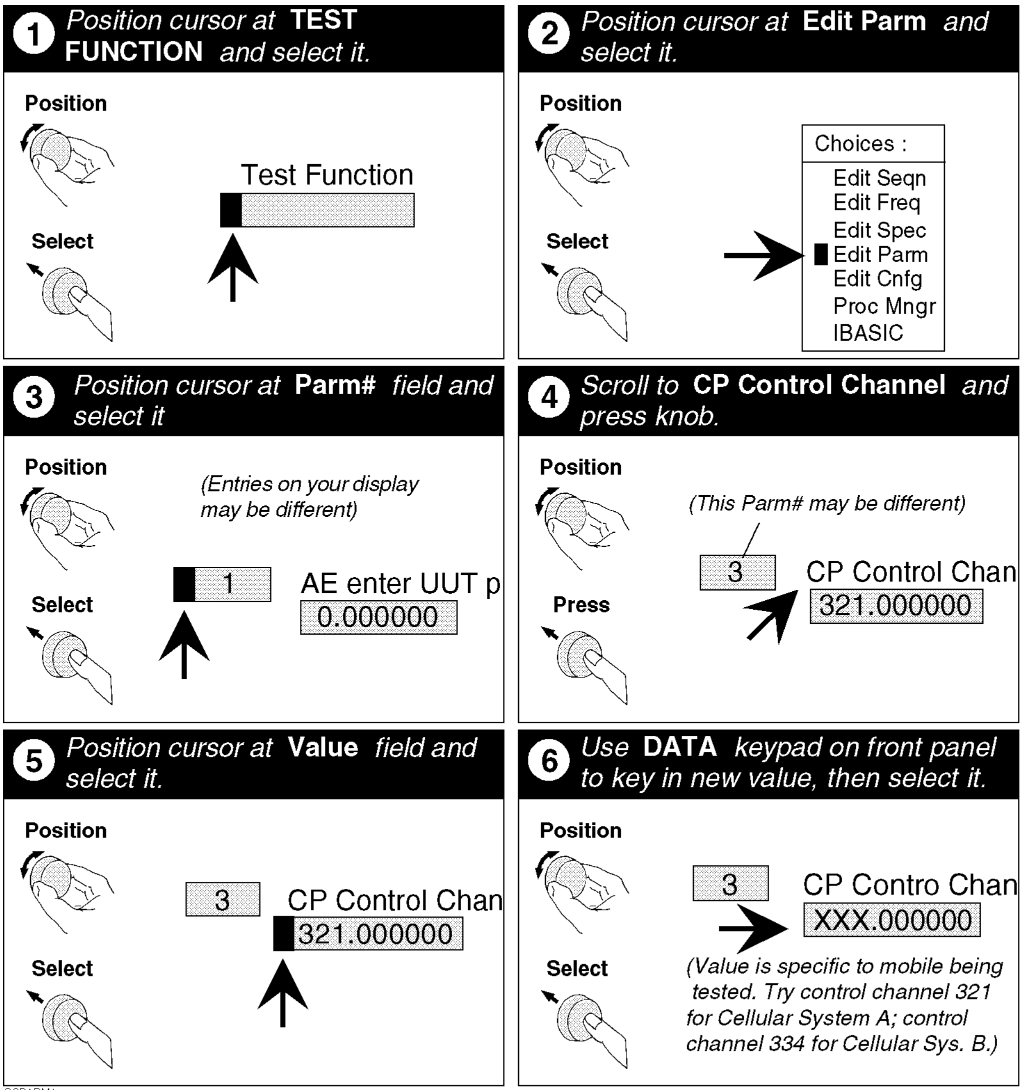
# Make Connections

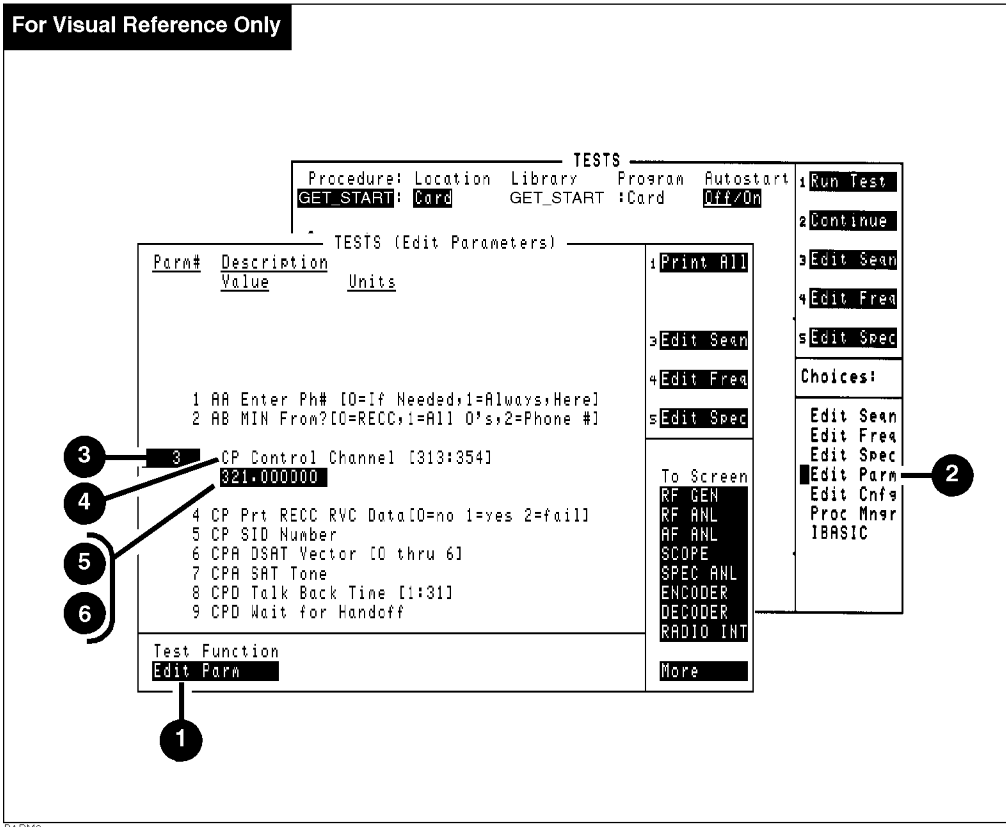



Next: Turn page to Enter Mobil Unit's Control Channel

# Enter Mobile Unit’s Control Channel



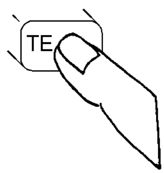

Next: Turn page to Run the Tests


For Visual Reference Only
TESTS
Procedure: Location Library Program Autostart
GET_START: Card GET_START :Card Off/On
Run Test
Continue
Edit Seqn
Edit Freq
Edit Spec
Choices:
Edit Seqn
Edit Freq
Edit Spec
Edit Parm
Edit Cnfg
Proc Mngr
IBASIC
TESTS (Edit Parameters)
Parm# Description
Value Units
Print All
Edit Seqn
Edit Freq
Edit Spec
1 AA Enter Ph# [0=If Needed,1=Always,Here]
2 AB MIN From?[0=RECC,1=All 0's,2=Phone #]
3 CP Control Channel [313:354]
321.000000
4 CP Prt RECC RVC Data[0=no 1=yes 2=fail]
5 CP SID Number
6 CPA DSAT Vector [0 thru 6]
7 CPA SAT Tone
8 CPD Talk Back Time [1:31]
9 CPD Wait for Handoff
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More
Test Function
Edit Parm
1
2
3
4
5
6

PARM2

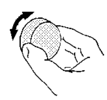
# Run the Tests

**7** *Press* **TESTS** *to return to* **TESTS** *screen.*

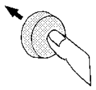



**8** *Position cursor at* **Run Test** *and select it.*

**Position**



**Select**

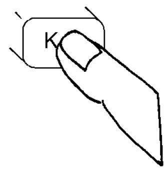


- Run Test
- 2 Continue
- 3 Edit Seqn
- 4 Edit Freq
- 5 Edit Spec

**9** *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 test results appear at bottom of screen, testing is complete.*

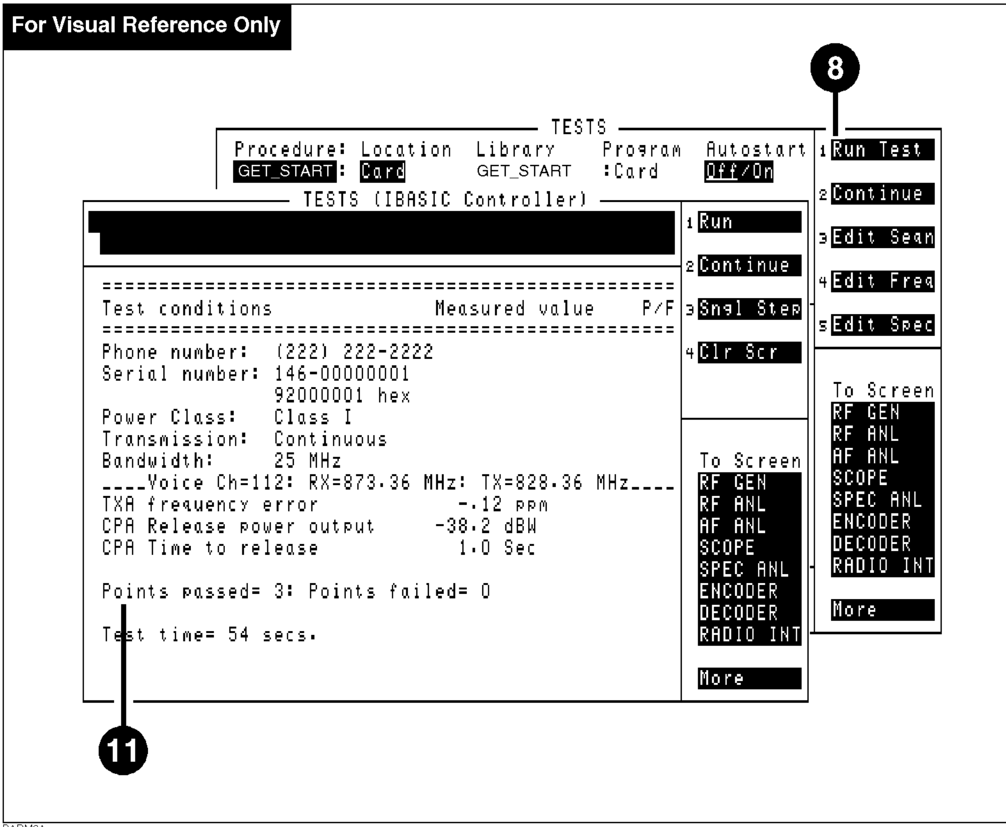
```
Phone number:  (222) 222-2222
Serial number: 146-00000001
               92000001 hex
Power Class:   Class I
Transmission:  Continuous
Bandwidth:     25 MHz
----Voice Ch=112: RX=873.36 MHz: TX=828.36 MHz----
TXA frequency error          -.11 ppm
CPA Release power output    -37.2 dBW
CPA Time to release           2.0 Sec

Points passed= 3: Points failed= 0

Test time= 54 secs.
```

***(Example)***

**12** *You have now completed "Getting Started."*

*Proceed to Chapter 1a, "Product Introduction" for an introduction to the HP 11807A Option 009 Software and a guide to the organization of this manual.*

PARM1A


For Visual Reference Only
8
TESTS
Procedure: Location Library Program Autostart
GET_START : Card GET_START :Card Off/On
1 Run Test
2 Continue
3 Edit Seqn
4 Edit Freq
5 Edit Spec
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More
TESTS (IBASIC Controller)
1 Run
2 Continue
3 Sngl Step
4 Clr Scr
To Screen
RF GEN
RF ANL
AF ANL
SCOPE
SPEC ANL
ENCODER
DECODER
RADIO INT
More
Test conditions Measured value P/F
Phone number: (222) 222-2222
Serial number: 146-00000001
92000001 hex
Power Class: Class I
Transmission: Continuous
Bandwidth: 25 MHz
____Voice Ch=112: RX=873.36 MHz: TX=828.36 MHz____
TXA frequency error -.12 ppm
CPA Release power output -38.2 dBW
CPA Time to release 1.0 Sec
Points passed= 3: Points failed= 0
Test time= 54 secs.
11

PARM2A

3

# Product Description

# HP 11807A,E Software

The HP 11807A,E Option 009 Software when used with the test system provides parametric test capability for 800 MHz Dual-Mode Mobile Stations.

HP 11807A,E Option 009 software can be used for the installation, maintenance, and/or repair of Dual Mode (NADC) Phones. For a complete list of Tests and their descriptions, see *"Test Descriptions" on page 133*.

## Items Included in the HP 11807A,E Option 009 Software

- HP 11807A Option 009 Test Software (part number 11807-10009) or HP 11807E Option 009 Test Software (part number 11807-10028).
- SRAM memory card (uninitialized), for saving your own test procedures and results.
    - For HP 11807A, 32 Kbyte SRAM (part number HP 85700A).
    - For HP 11807E, 64 Kbyte SRAM (part number HP 83230A).
- HP 11807A,E Option 009 Software Reference Guide (part number 11807-90124).
- HP software product license agreement.

## Software Function

- Automation of measurements
- Parametric verification for 800 MHz Dual-Mode Phones
- In-depth call processing, including call setup and handoffs

## Software Features

The following features simplify testing:

- Test results 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 computer.

- Test results can be printed.
- 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 consisting of 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 Set offers TDMA Dual-Mode Mobile test capability plus the analog mobile test capability offered by the HP 8920A,B or HP 8921A.

- The HP 8920B Option 500 consists of:
  - HP 8920B RF Communications Test Set
  - The 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, TDMA 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

In addition to the above hardware configurations, this software can be used with Test Sets that have Options 006, 007, or 008.

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 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 or 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 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 supply voltage 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:

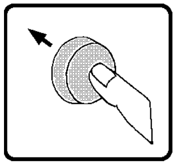
- HP 664xA
- HP 665xA
- HP 667xA
- HP 668xA

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

- Connection arrangements, see *chapter 4, "Making Connections," on page 55* for more detail
- Optional Accessories
    - SRAM (Static Random Access Memory) Card(s) for storing test setups and test results (see *Memory Cards* in chapter 5 for part numbers).
    - Printer and cables to document results.
    - PC, disk drive, or HP Palmtop computer to store data.

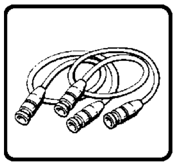
# Finding the Information You Need

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



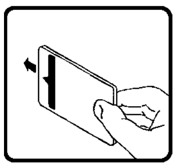
### GETTING STARTED

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



### MAKING CONNECTIONS-CHAPTER 4

- Instructions for cabling test set



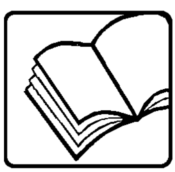
### USING THE SOFTWARE-CHAPTER 5 and 6

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

### TEST DESCRIPTIONS-CHAPTER 7

Definitions, special conditions and restrictions for:

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



### REFERENCE-CHAPTER 8

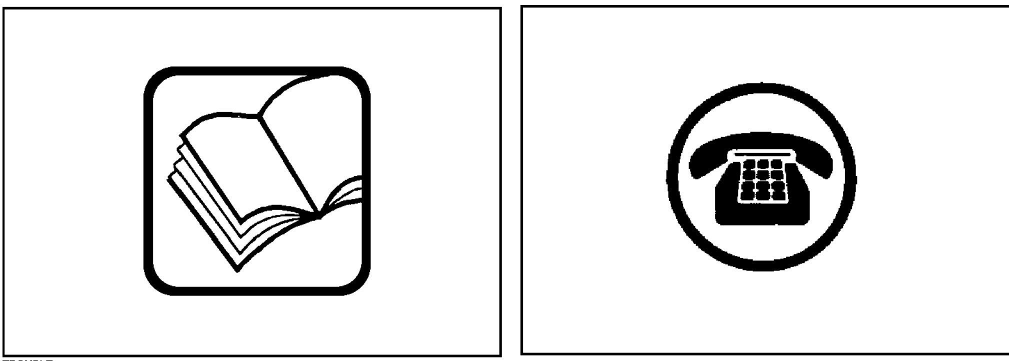
- Alphabetically listed
- Detailed descriptions of all the features and functions of the software
- For the advanced level user

MANUAL1

### PROBLEM SOLVING-CHAPTER 9

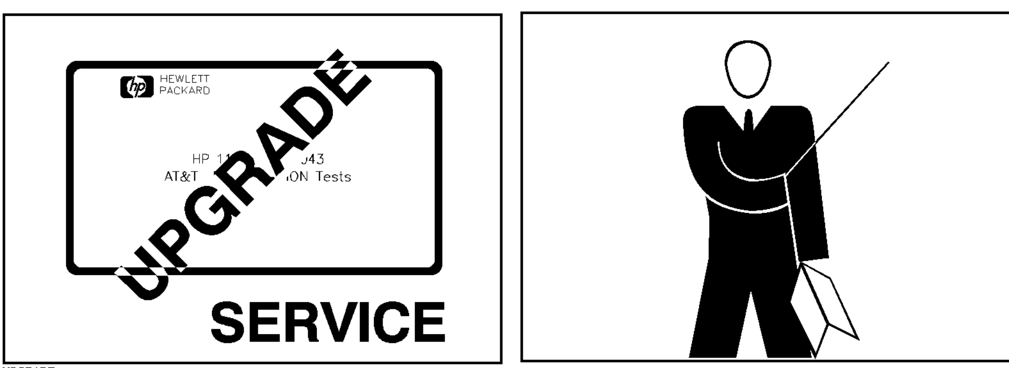
- Alphabetically listed
- Symptoms and possible corrections to frequent user problems.
- Error Messages

# Additional Services Available



TROUBLE1

Consult the HP 8920A Users Guide or call the HP 8920D/HP 8921D Hotline 1-800-922-8920 (In USA and Canada only) 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 Connections

## Mobile Unit to Test System Connection

Numerous cables and connectors are required to interface the radio to the test system. *Table 1 on page 57* lists the necessary equipment for connection.

## Damage to Equipment

***CAUTION:*** The Test Set can be damaged by transient RF power, continuous RF power, high voltage, and electrostatic discharge from cables and other sources.

*See "Printing," in chapter 8, on page 309*, for printer connections to the serial port.

## Audio Connections

Audio connections are only used for the following tests:

TEST_05 - TXA Modulation Deviation Limiting
TEST_06 - TXA Audio Frequency Response
TEST_07 - TXA Audio Distortion
TEST_09 - TXA Hum and Noise
TEST_12 - TXA Compressor Response
TEST_14 - RXA Expandor
TEST_15 - RXA Audio Frequency Response
TEST_16 - RXA Audio Distortion
TEST_17 - RXA Hum and Noise
TEST_18 - RXA SINAD
TEST_23 - TXA Quick General
TEST_24 - RXA Quick General

The method of the audio connections is dependent on the mobile unit being tested. Consult the mobile manufacturer for the correct method of audio connection. Some manufacturers provide a method for audio signal breakout while others require that the audio lines to the handset be tapped or an acoustic coupler be used on the handset.

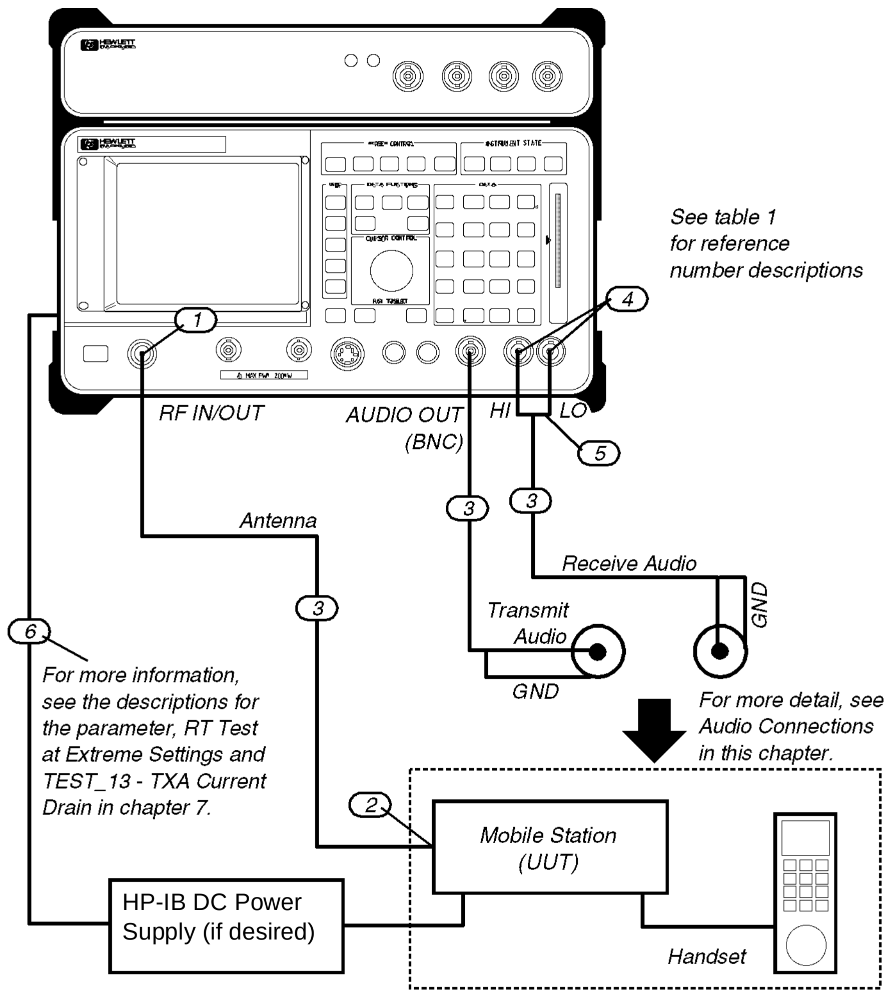
## Cables and Connectors

**Table 1 Cables and Connectors**

| Refer-ence # | Description | Purpose | Quantity Needed | Part Number |
|---|---|---|---|---|
| **1** | BNC(f) to Type N(m) adapter | Adapt BNC cable to RF IN/OUT | 1 | HP 1250-0780 |
| **2** | BNC(f) to TNC(m) adapter or BND(f) to mini-UHF(m) adapter depending on mobile unit | Adapt BNC cable to antenna out | 1 | HP 1250-2441 for TNC only or Tessco part #74720 |
| **3** | BNC(m) to BNC(m) cable, 4 ft. | Antenna and audio | 3 | HP 10503A |

**Table 1 Cables and Connectors**

| Reference # | Description | Purpose | Quantity Needed | Part Number |
|---|---|---|---|---|
| **4** | BNC(m) to Banana(f) adapter | AUDIO IN, HI and LO | 2 | HP 1250-2164 |
| **5** | Banana(m) to BNC(f) adapter | Test system AUDIO IN | 3 | HP 1251-2277 |
| **6** | HP-IB Interface cable 1 meter | Test system HP-IB to power supply HP-IB | 1 | HP 10833A |


See table 1
for reference
number descriptions
1
4
RF IN/OUT
AUDIO OUT
(BNC)
HI
LO
5
3
3
Antenna
3
Receive Audio
GND
Transmit
Audio
GND
6
For more information,
see the descriptions for
the parameter, RT Test
at Extreme Settings and
TEST_13 - TXA Current
Drain in chapter 7.
For more detail, see
Audio Connections
in this chapter.
2
Mobile Station
(UUT)
HP-IB DC Power
Supply (if desired)
Handset

CABLE1

## Printer Cables

**Table 2 Hewlett-Packard Printer Cables**

| Description | Purpose | Quantity | HP Model Number or Part Number |
|---|---|---|---|
| HP-IB (IEEE 488) Cable, 1 meter (3.3 feet) | Test Set to HP-IB Printer | 1 | 10833A |
| HP-IB (IEEE 488) Cable, 2 meter (6.6 feet) | Test Set to HP-IB Printer | 1 | 10833B |
| Parallel (IEEE 1284) Printer Cable, 2 meter (6.6 feet) | Test Set to Parallel (Centronics) Printer | 1 | C2950A |
| Parallel (IEEE 1284) Printer Cable, 3 meter (9.9 feet) | Test Set to Parallel (Centronics) Printer | 1 | C2951A |
| Serial Printer Cable, 4-pin RJ-11 (male) to 9-pin DB-9 (female), 2 meter (6.6 feet) | Test Set to Serial Printer (with 9-pin connector) | 1 | 08921-61038 |
| Serial Printer Cable, 4-pin RJ-11 (male) to 25-pin DB-25 (male), 3 meter (9.9 feet) | Test Set to Serial Printer (with 25-pin connector) | 1 | 08921-61039 |

# Calibrating Cable Loss

Inaccuracies can occur in your RF measurements due to cable losses and impedance mismatches. These inaccuracies can be calibrated out by running TEST_40 - TXD Calibrate RF Power (see *"Test Descriptions" on page 133*) 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_40.

# 5

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

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

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:**

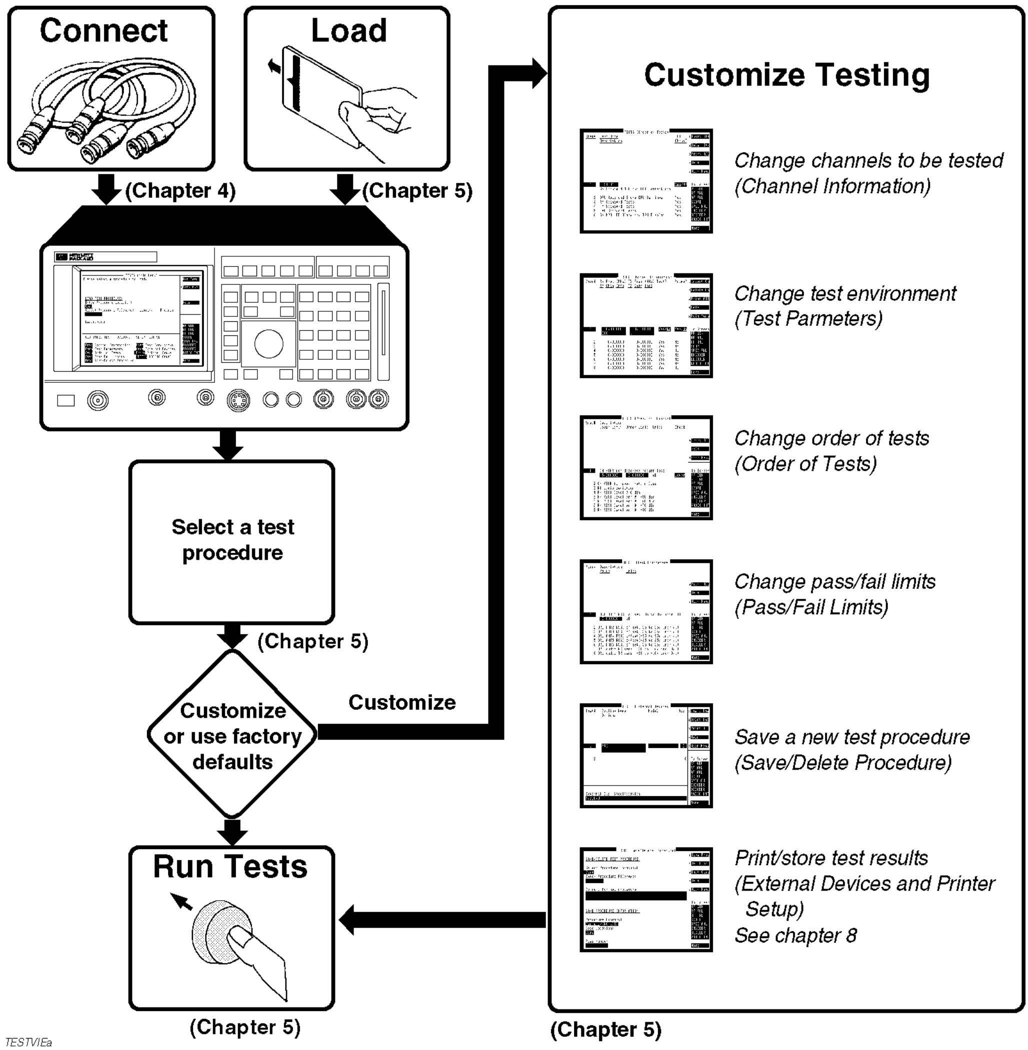
- Decide which tests you desire to run (Order of Tests)
  - you may want to run all, some, or just one of the tests.
- Specify which channels to test (Channel Information)
  - you may want to test one, some, or all of the channels on your radio.
- Change the pass/fail limits for specific measurements (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*.

- Before you begin testing, you should have made the appropriate hardware connections. See *chapter 1, "Getting Started with FW Above Rev. A.14.00," on page 15* or chapter 2, "Getting Started with FW Below Rev. A.14.00," on page 31. See chapter 4, "Making Connections," on page 55 if you have not done so already.

## Selecting a Test Procedure

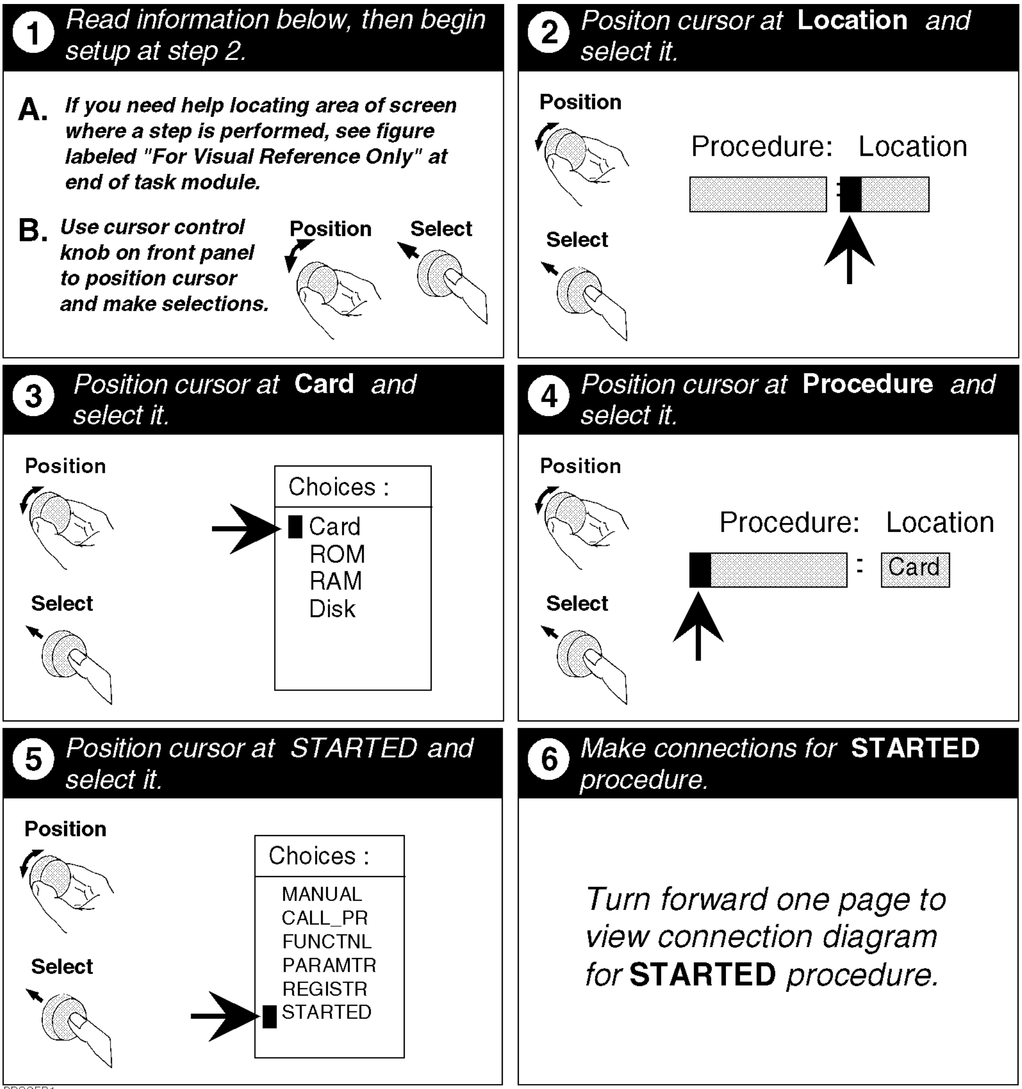
To load the software, you must first select the location to load from (in this case, it will be **`Card`**) and a procedure filename. Your card comes pre-programmed with at least one procedure. The actual software program does not get loaded into the Test Set's memory until k1 **`(Run Test)`** is selected. 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 *"Saving a Test Procedure" on page 89*.

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.

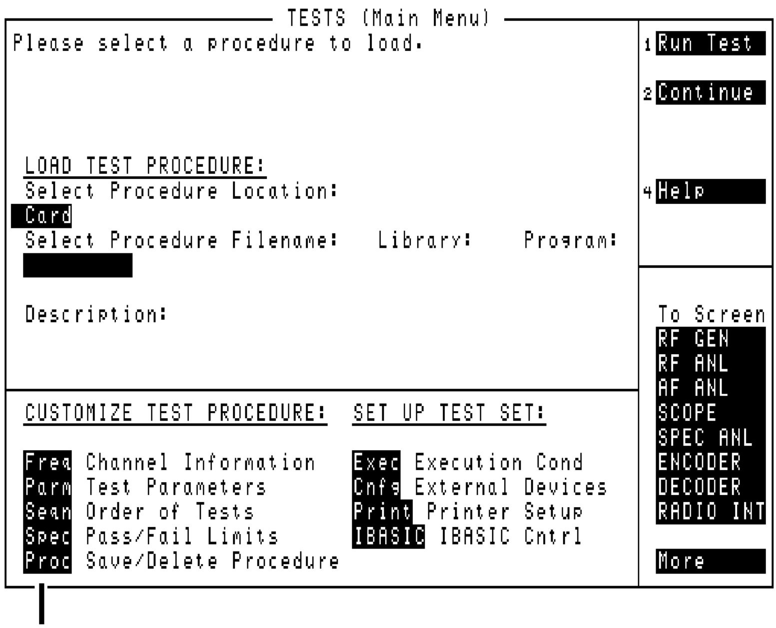
Most testing customization is accomplished through the customization screens. These customization screens are accessed from the main TESTS (Main Menu) screen as shown in the following figure. Customizing procedures is explained later in this chapter.

***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" on page 292* and *"Printing" on page 309*.
- 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 8920 Programming Manual* HP part number 08920-90204.
  - HP 8920B
    - *HP Instrument Basic User's Handbook Version 2.0* HP part number E2083-90005.
    - *HP 8920 Programming Manual* HP part number 08920-90204.

## How to Customize Testing

**TESTS (Main Menu) Screen**




*Selecting a Test Function opens a Customization Screen.*

CUSTOM1a

## Changing the Order of Tests

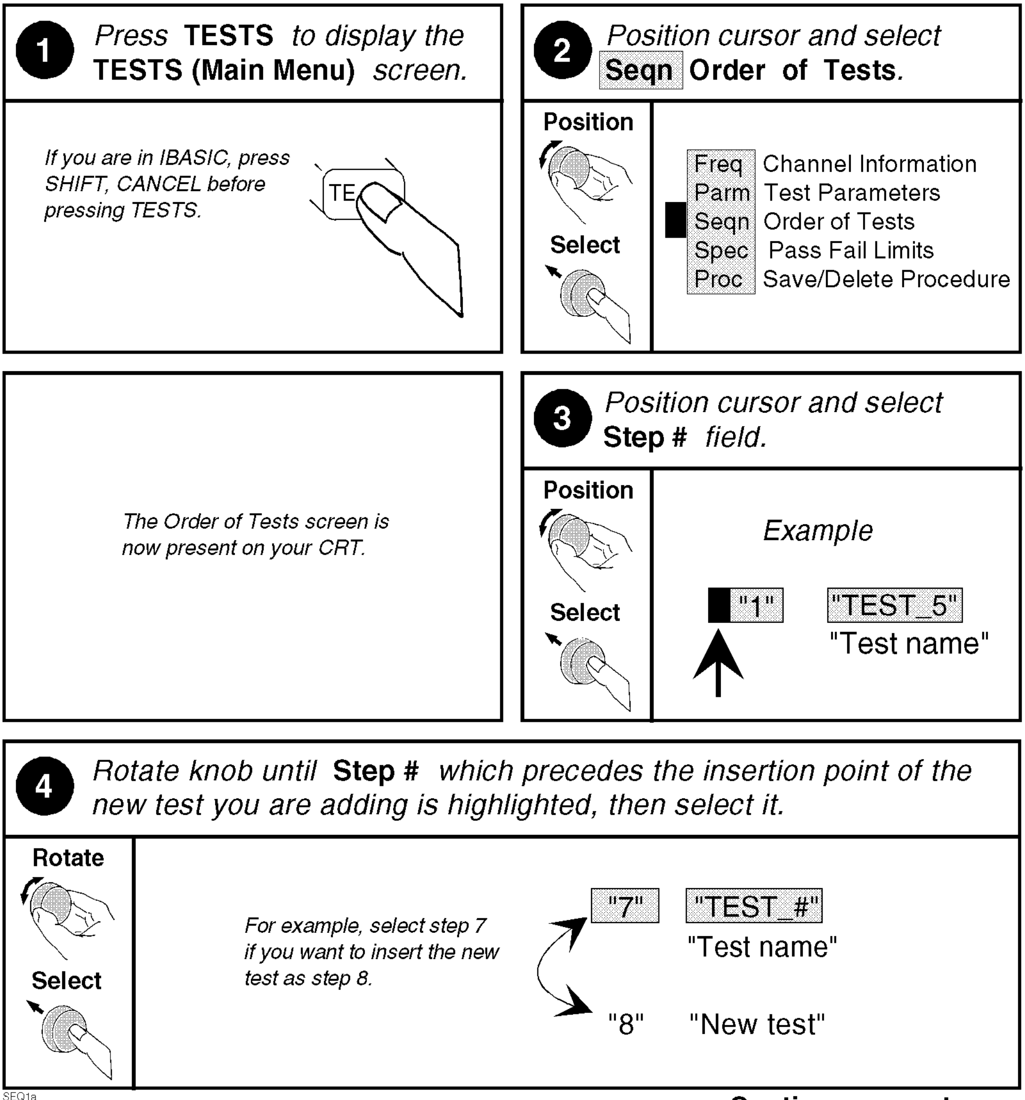
You may define the order of tests to include all, some, or just one of the tests available. When the first test is finished, the next will run. The test sequence will remain in the Test Set’s battery backed-up memory until another test sequence is loaded or set up. For information on saving a customized test sequence, see *"Saving a Test Procedure" on page 89*.

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 133*, 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 76.*

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

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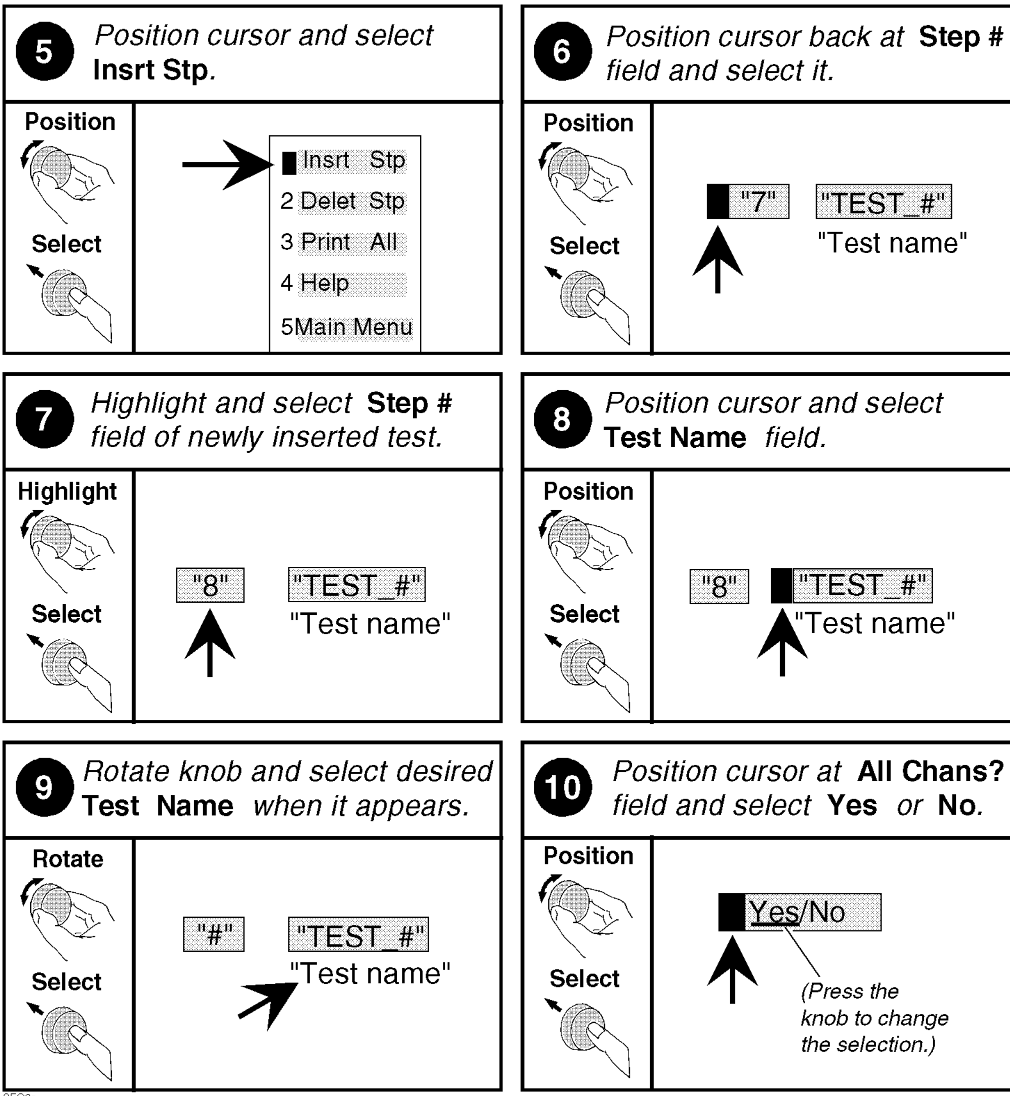


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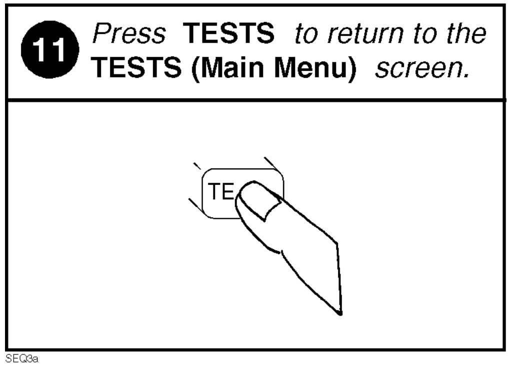



## Specifying Channel Information

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

- Cell Channel
  - Enter the cellular channel number.
  - For narrow channels (NAMPS only), specify lower, middle, or upper channel by appending an “L”, “M”, or “U” after the channel number. Example: For narrow lower channel 156 enter 156L in the channel information screen.
- 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* for more information.

For information on saving the channel information table, see *"Saving a Test Procedure" on page 89*.

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 |

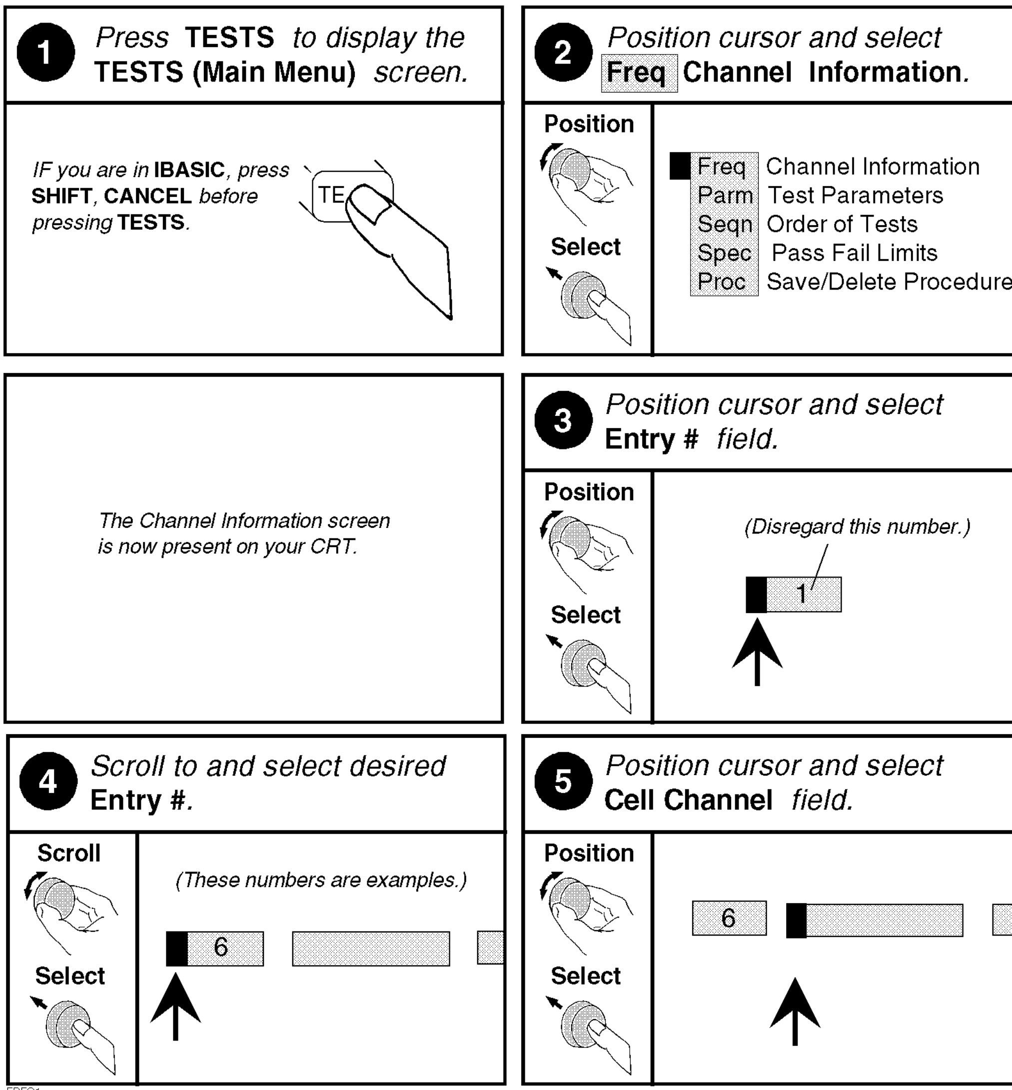
The result would be:

- 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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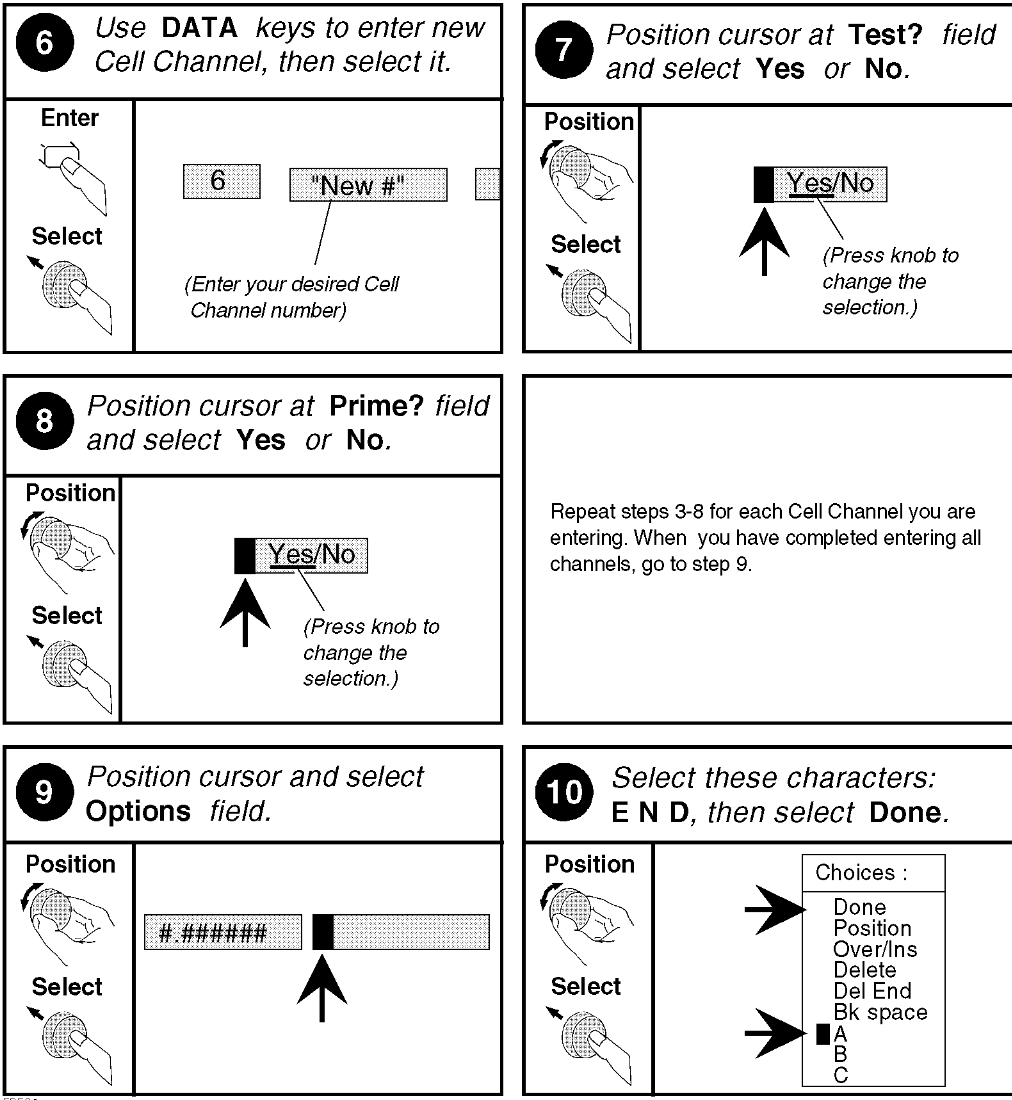

FREQ2

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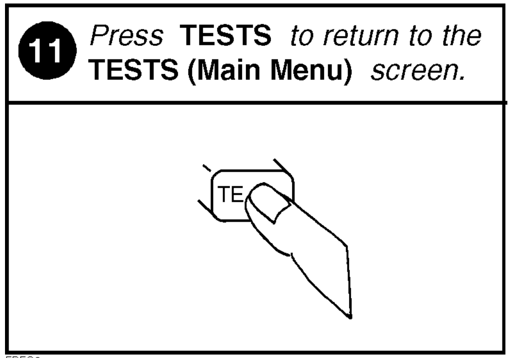


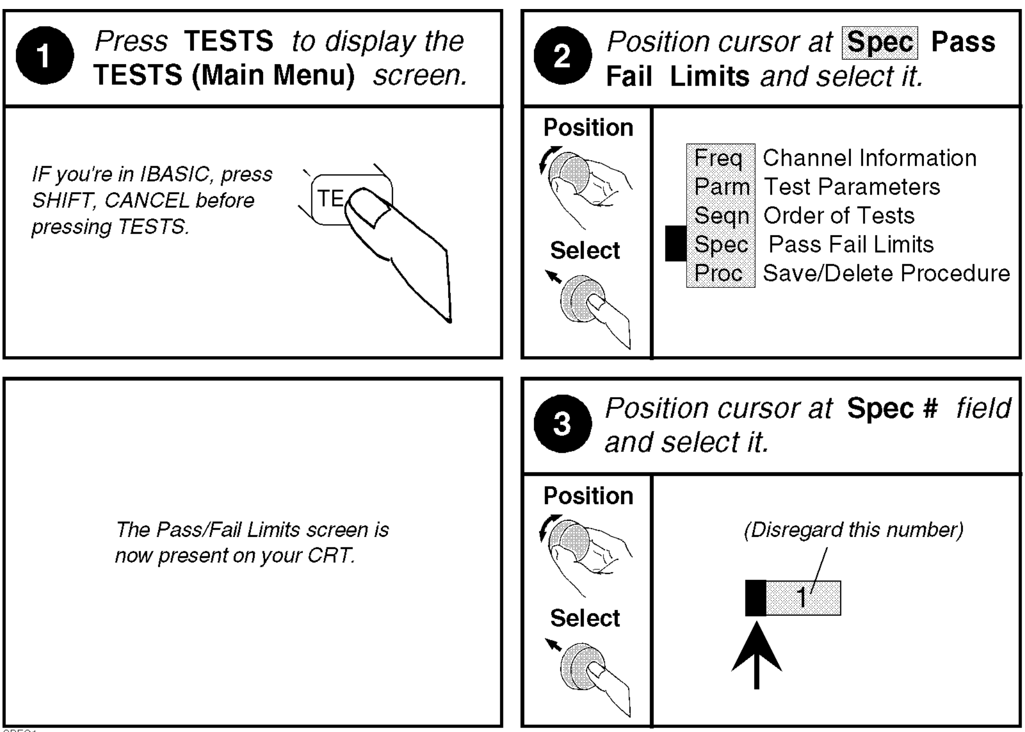

FREQ3

## 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 *"Pass/Fail Limit (Specification) Descriptions" on page 224*. for descriptions of each pass/fail limit. For information on saving customized pass/fail limits, see *"Saving a Test Procedure" on page 89*.

## How to Change Pass/Fail Limits

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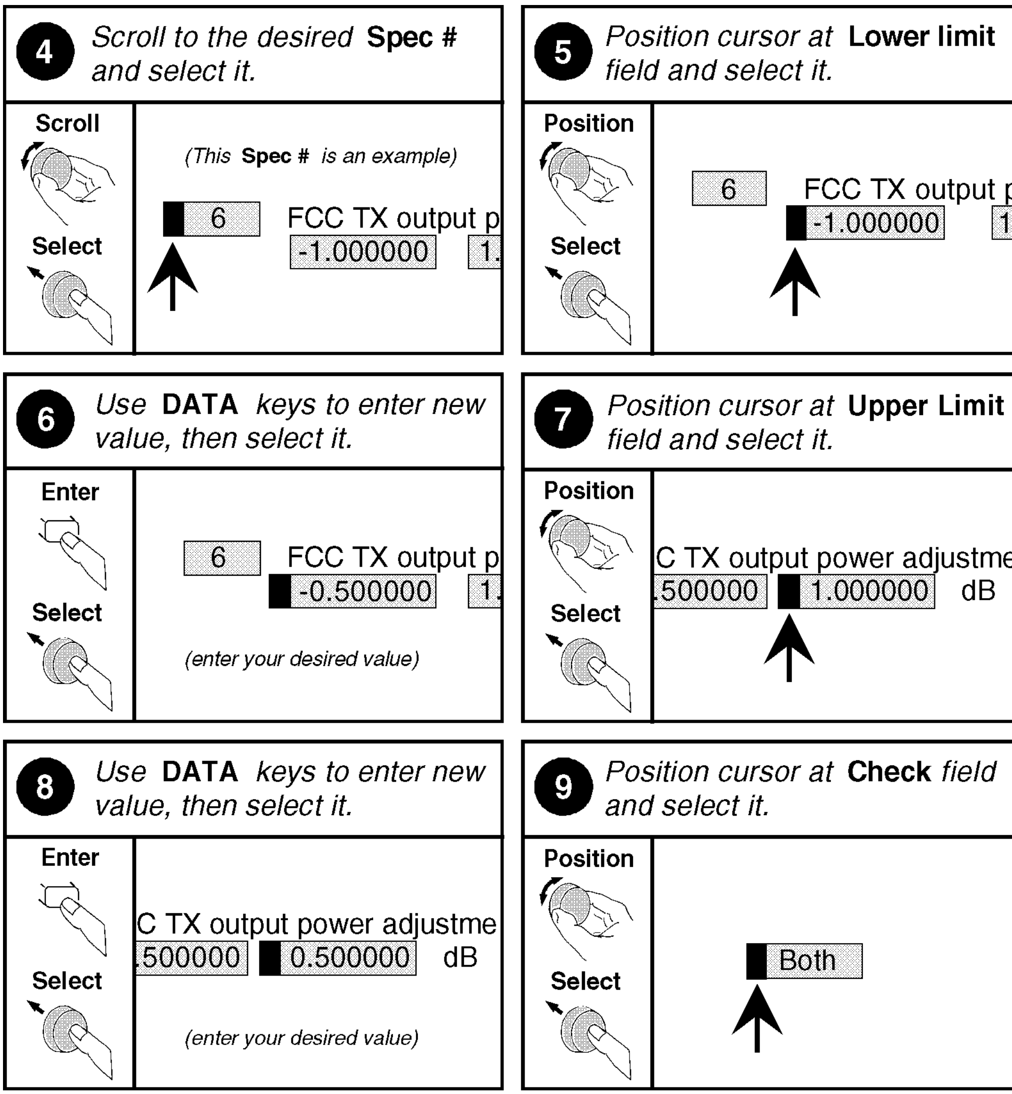


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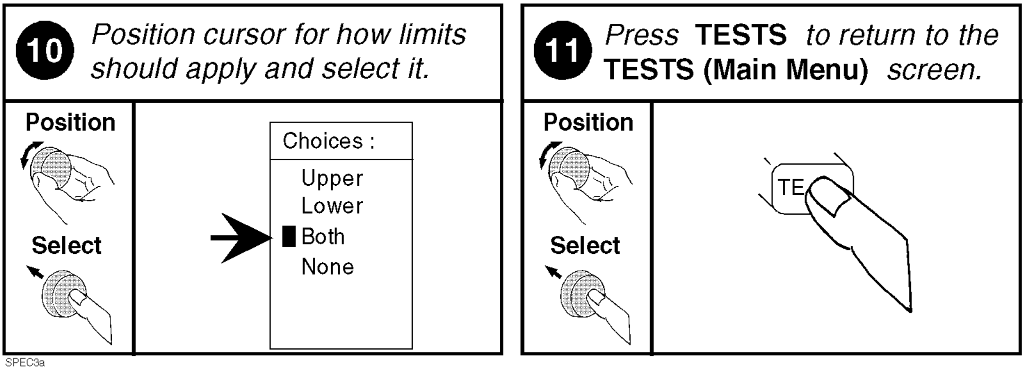
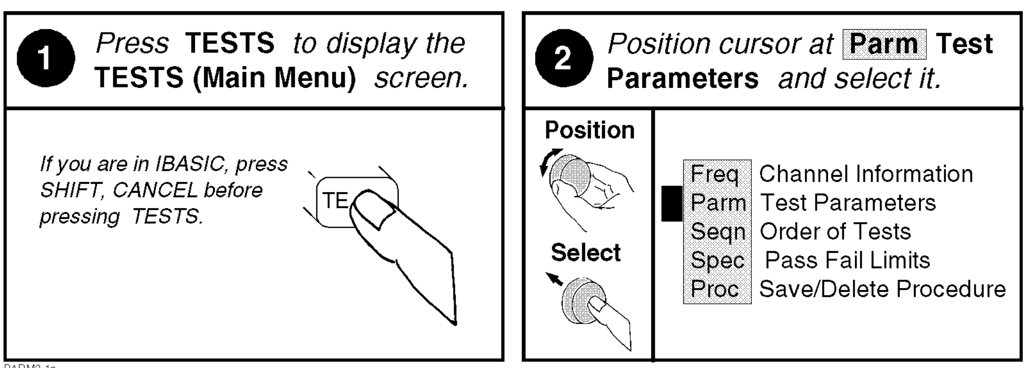

10
Position cursor for how limits should apply and select it.
Position
Select
Choices :
Upper
Lower
Both
None
SPEC3a
11
Press TESTS to return to the TESTS (Main Menu) screen.
Position
Select
TE

## 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 182 for descriptions of each test parameter. For information on saving customized test parameters, see "Saving a Test Procedure" on page 89.*

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

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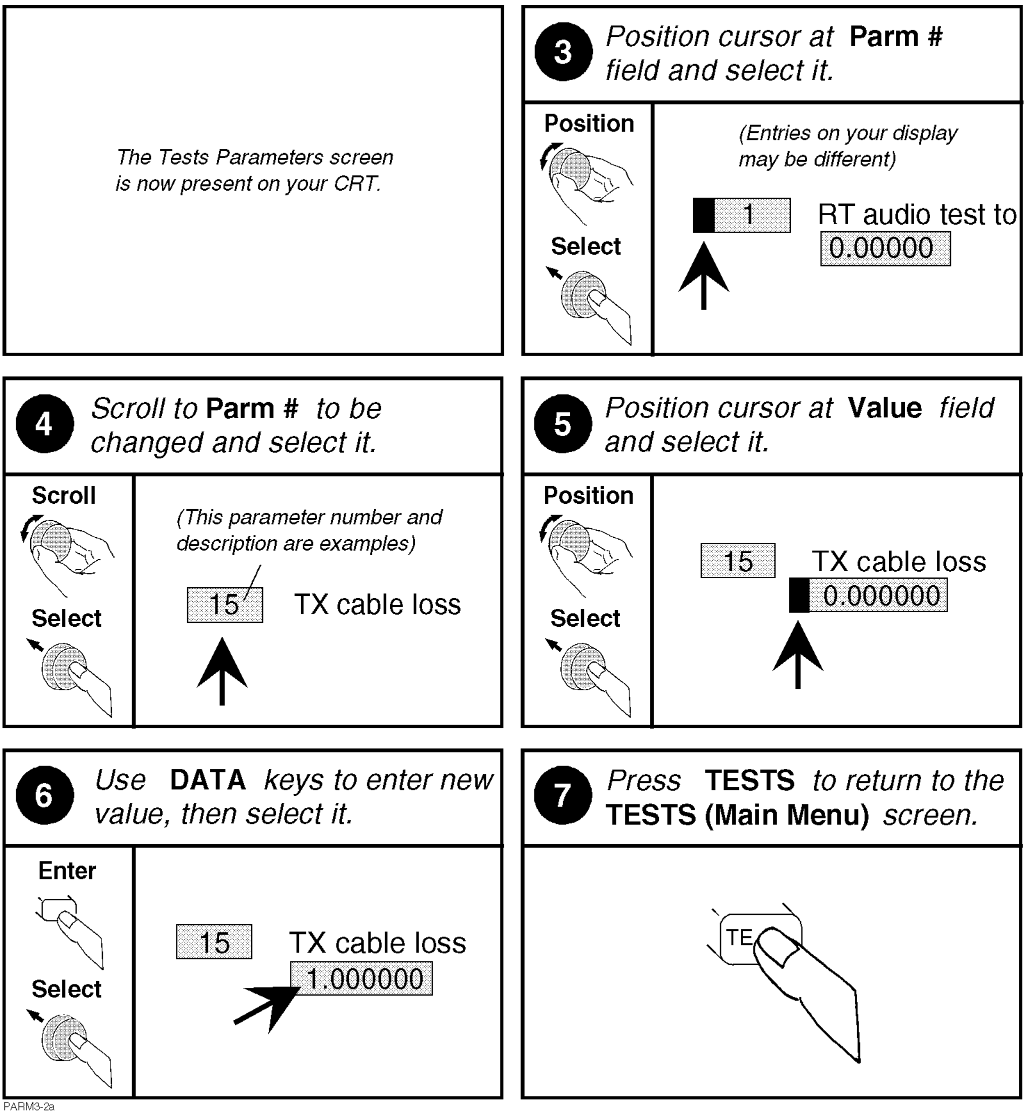

The Tests Parameters screen
is now present on your CRT.
3
Position cursor at Parm # field and select it.
Position
Select
(Entries on your display
may be different)
1
RT audio test to
0.00000
4
Scroll to Parm # to be changed and select it.
Scroll
Select
(This parameter number and
description are examples)
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

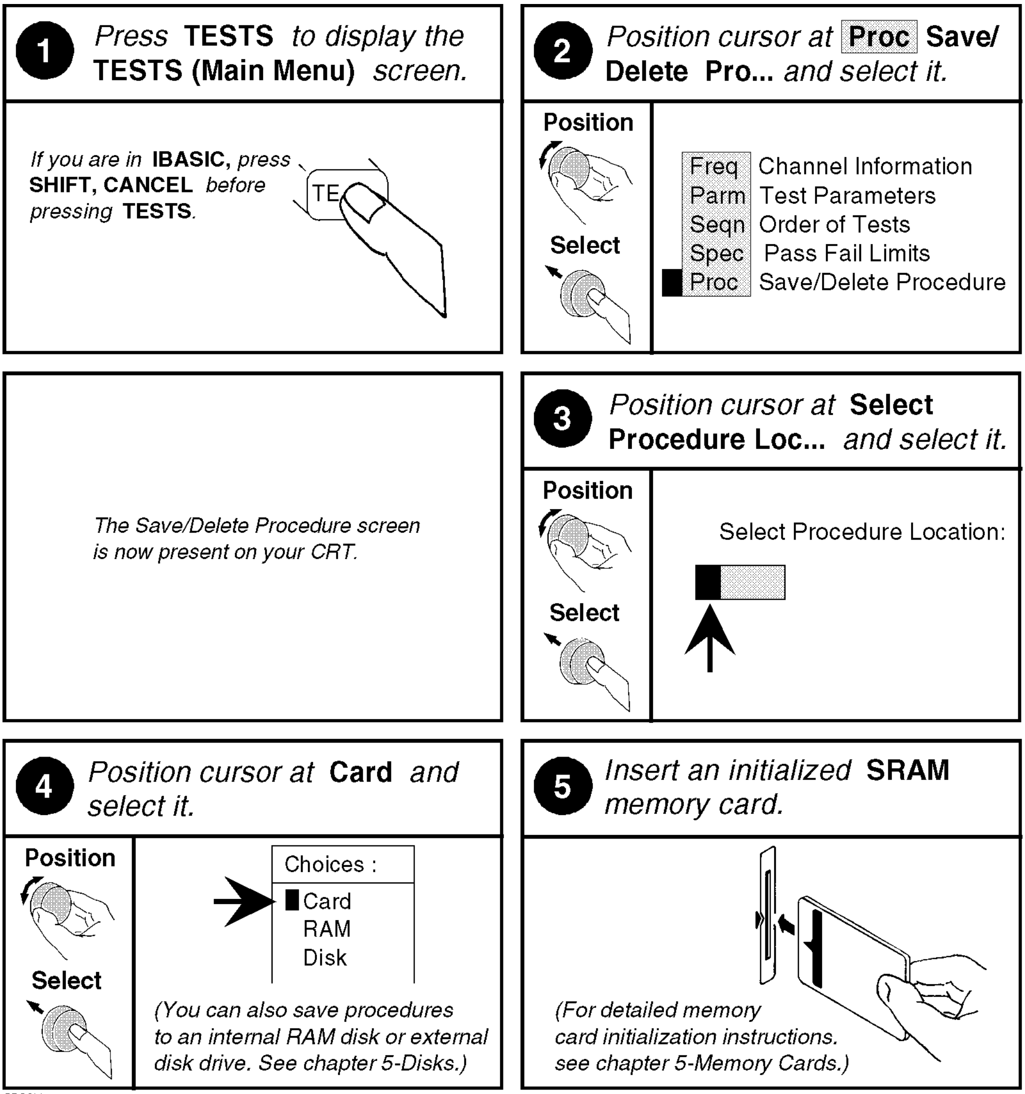
## Saving a Test Procedure

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" on page 323*.

## How to Save a Test Procedure

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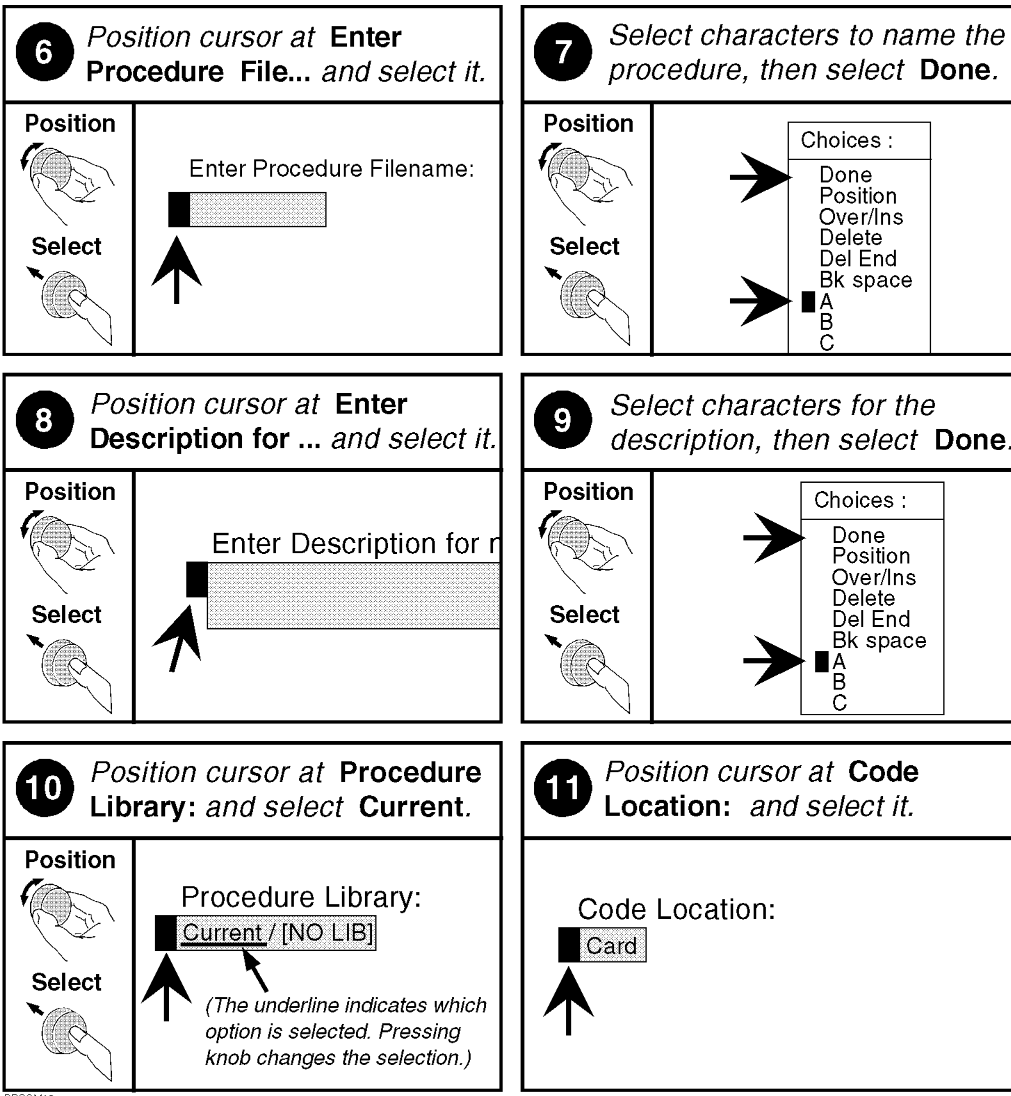


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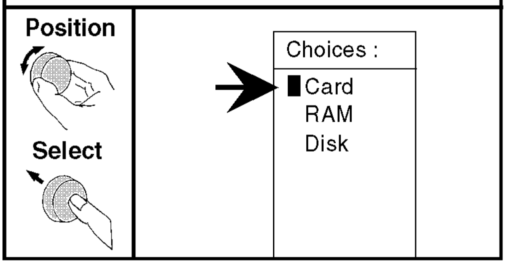
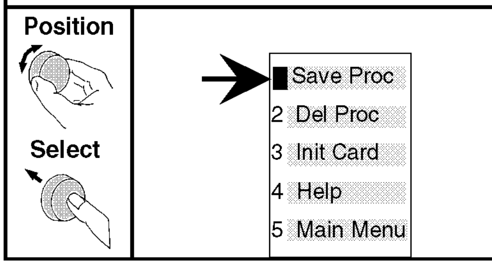
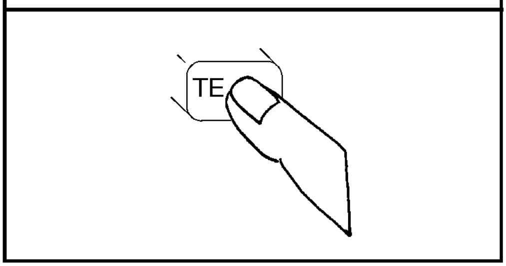
**12** *Position cursor at* **Card** *and select it.*




**13** *Position cursor at* **Save Proc** *and select it.*




**14** *Press* **TESTS** *to return to the* **TESTS (Main Tests)** *screen.*




**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`**).

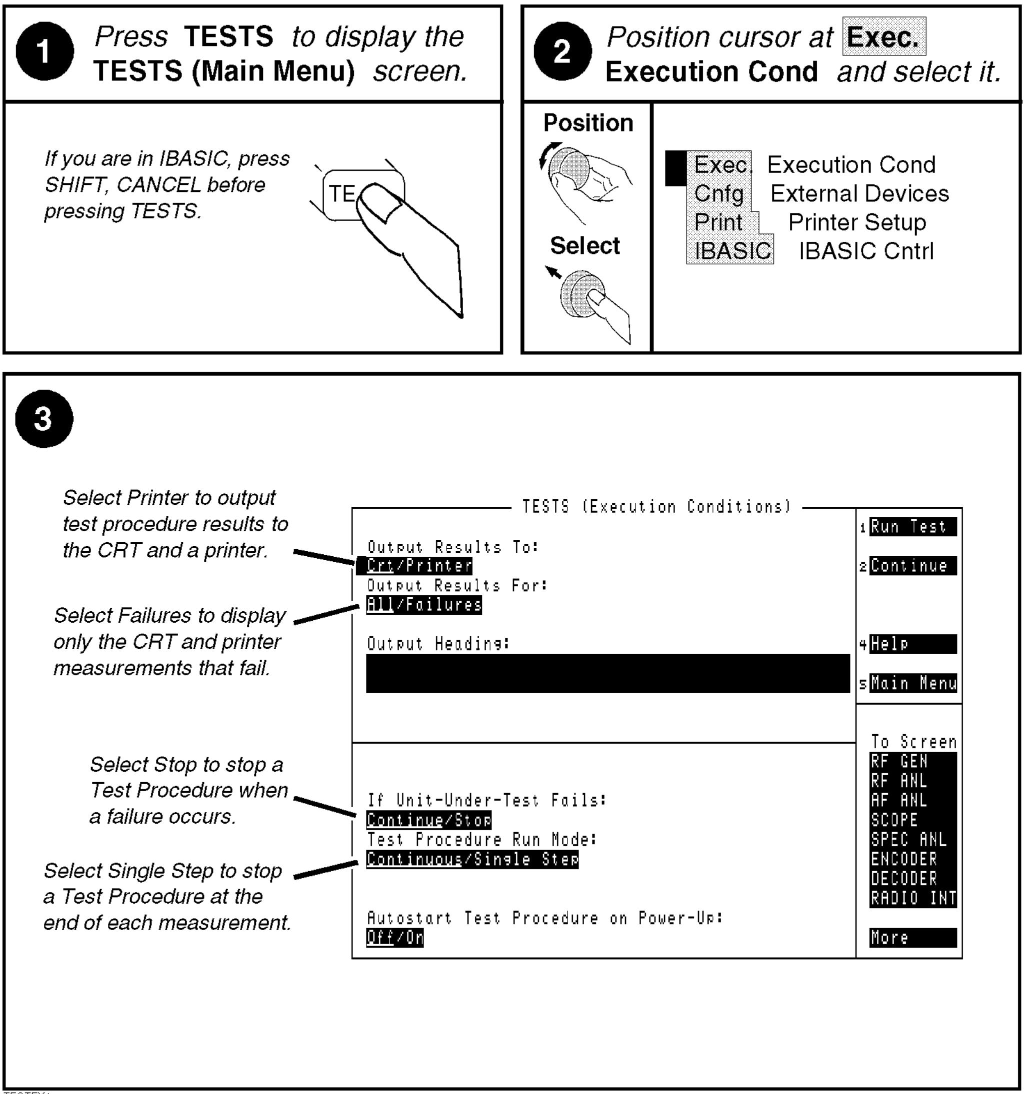
*NOTE:* If printing test results is desired, after selecting **`Printer`**, additional steps are necessary to connect and configure the printer. See *"Printing" on page 309.*

- 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



TESTEX1a

## Printing and Saving Test Results

Printing and saving test results are features of the software which require additional equipment and configuration. See *"Printing" on page 309* for detailed descriptions and instructions for these features.

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

***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 below A.14.00**

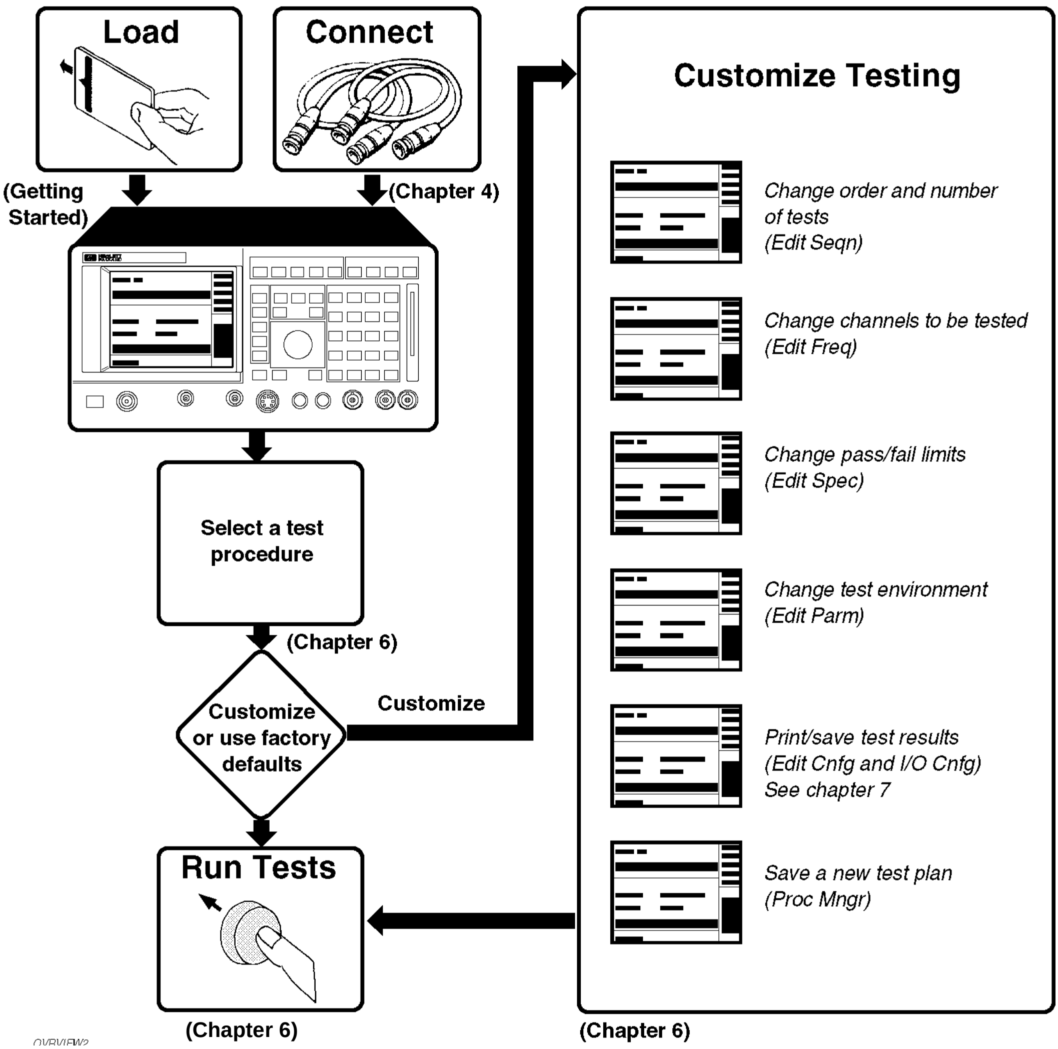
The Test Set's firmware revision is displayed on the top right corner of the configuration screen.

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

If you have an HP 8920B or an HP 8920A, HP 8921A, HP 8920D, or HP 8921D 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 63*. Contact Hewlett-Packard at 1-800-922-8920 for details on upgrading your firmware if desired.

The HP 11807A,E 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.

# Running Tests Overview



## 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*.

- Before you begin testing, you should have made the appropriate hardware connections. See *chapter 4, "Making Connections," on page 55* if you have not done so already.

## Running Tests

- 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 **Continue** to continue the test).

- When the **Run Test** softkey is pressed, the Test Set will check to see if the program is already resident in RAM memory. If it is not, it will be loaded from the memory card, a process which takes about two minutes.

### 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**

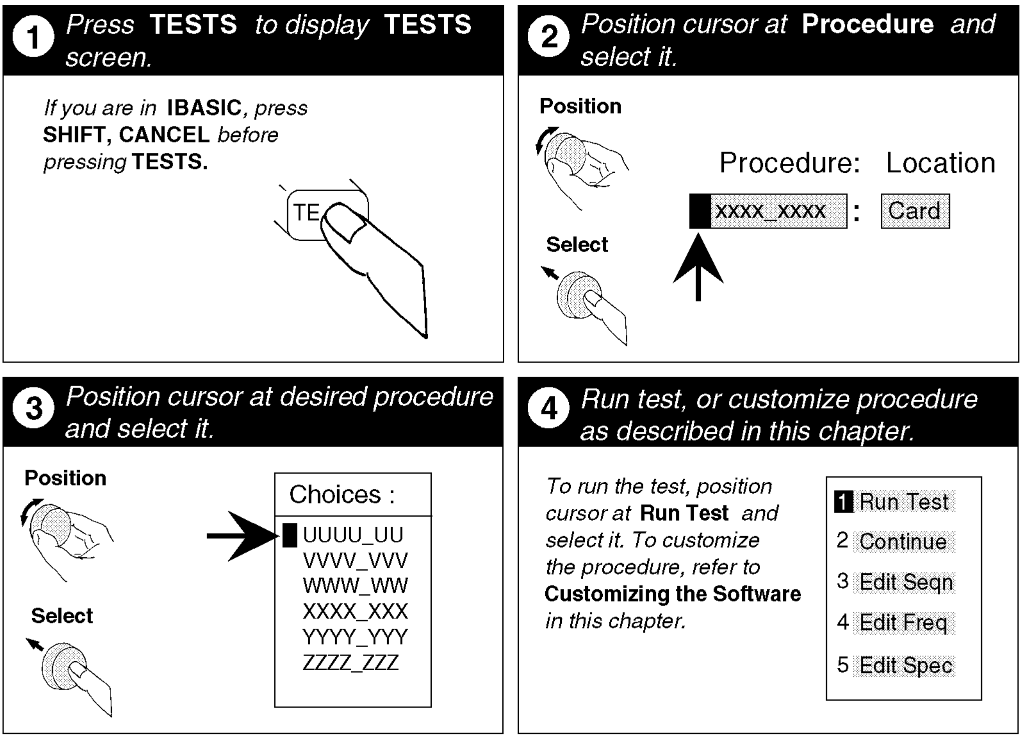
**can be used for this purpose.**

**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.

# Selecting a Test Procedure



PROC1

## Customizing the Software

The HP 11807A,E software may need some customizing before it performs in a way that is specific to your testing needs. 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 an SRAM card so that you may skip these steps in the future. See *"Saving a Test Procedure Using the Procedure Manager" on page 122*.

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 Test Set’s 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.

- Decide which tests you need to run edit sequence (**`Edit Seqn`**).
  - You may want to run all, some, or just one of the tests.
- Change the pass/fail limits for specific measurements (edit specifications (**`Edit Spec`**)).
  - 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 (**`Edit Parm`**)).
  - Enter specific information about radio equipment and/or environment.
- Save any or all of the above customized changes (to an SRAM card)
- Select options from the **`TESTS`** screen.
  - Print test results.
  - Stop after each test, stop on failure or always continue.
  - Display all test results or only those that fail.

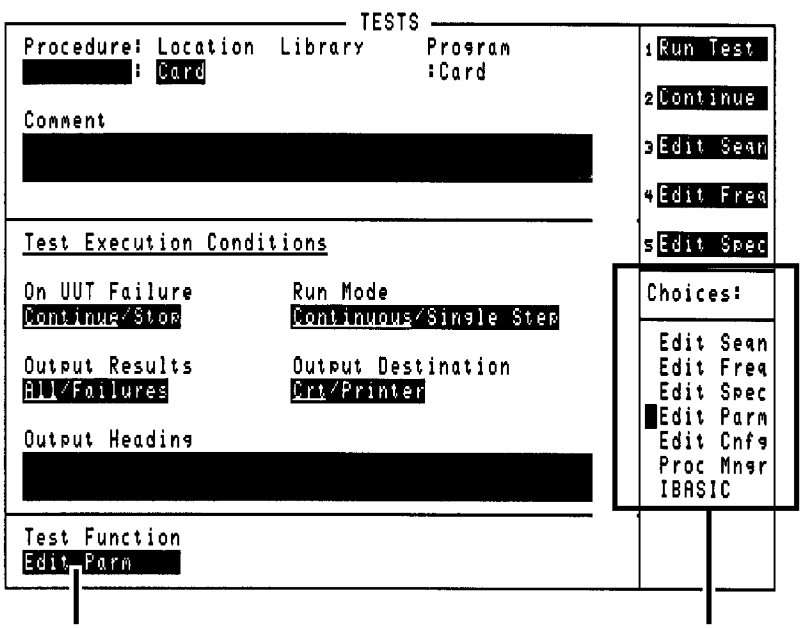
***NOTE:*** Edit Configuration (**`Edit Cnfg`**) and IBASIC will not be explained in this customizing section.

- Edit Configuration (**`Edit Cnfg`**) is 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 *HP 8920/8921 Progammer's Guide,* HP part number 08920-90204.

### Beginning Software Customization

All software customization begins by accessing the **TESTS** screen first and then selecting the **Test Function** which will open the **Choices** menu. To access the **TESTS** screen, press TESTS on the front panel of the Test Set.

**TESTS Screen**




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

**Test Function** *choices.*

CUSTOM1

## Changing the Order of Tests (Edit Sequence)

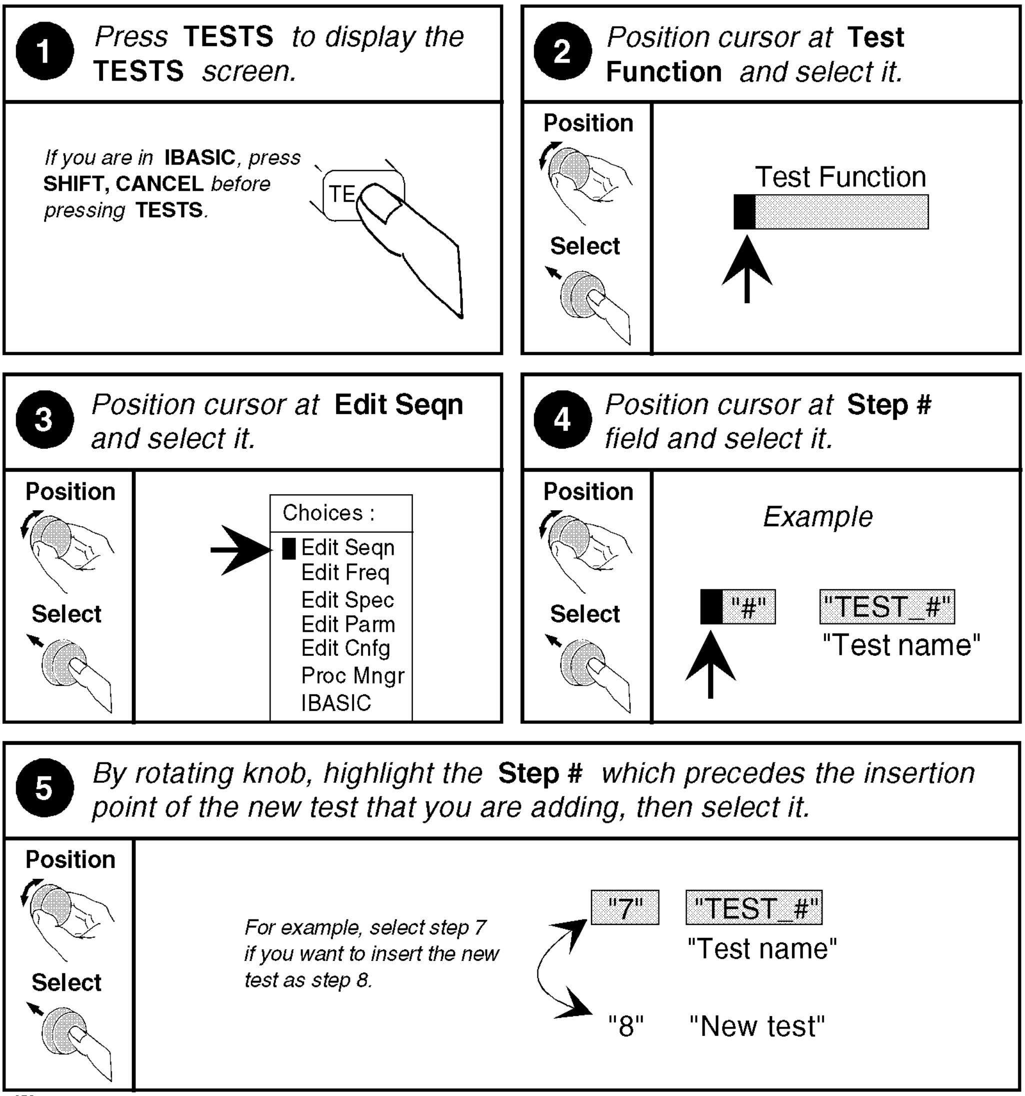
You may define a test sequence to include all, some, or just one of the tests available. When the first test is finished, the next will run. The test sequence will remain in the Test System’s battery backed-up memory until another test sequence is loaded or set up. For information on saving a customized test sequence, see *"How to Save a Test Procedure" on page 123*.

Creation of a test sequence is accomplished by inserting or deleting tests from the list of tests that come with the HP 11807A,E software package. See *Test Descriptions* in chapter 4, for test descriptions.

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 *"How to Specify Channel Information" on page 115*.

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

### How to Change a Sequence of Tests

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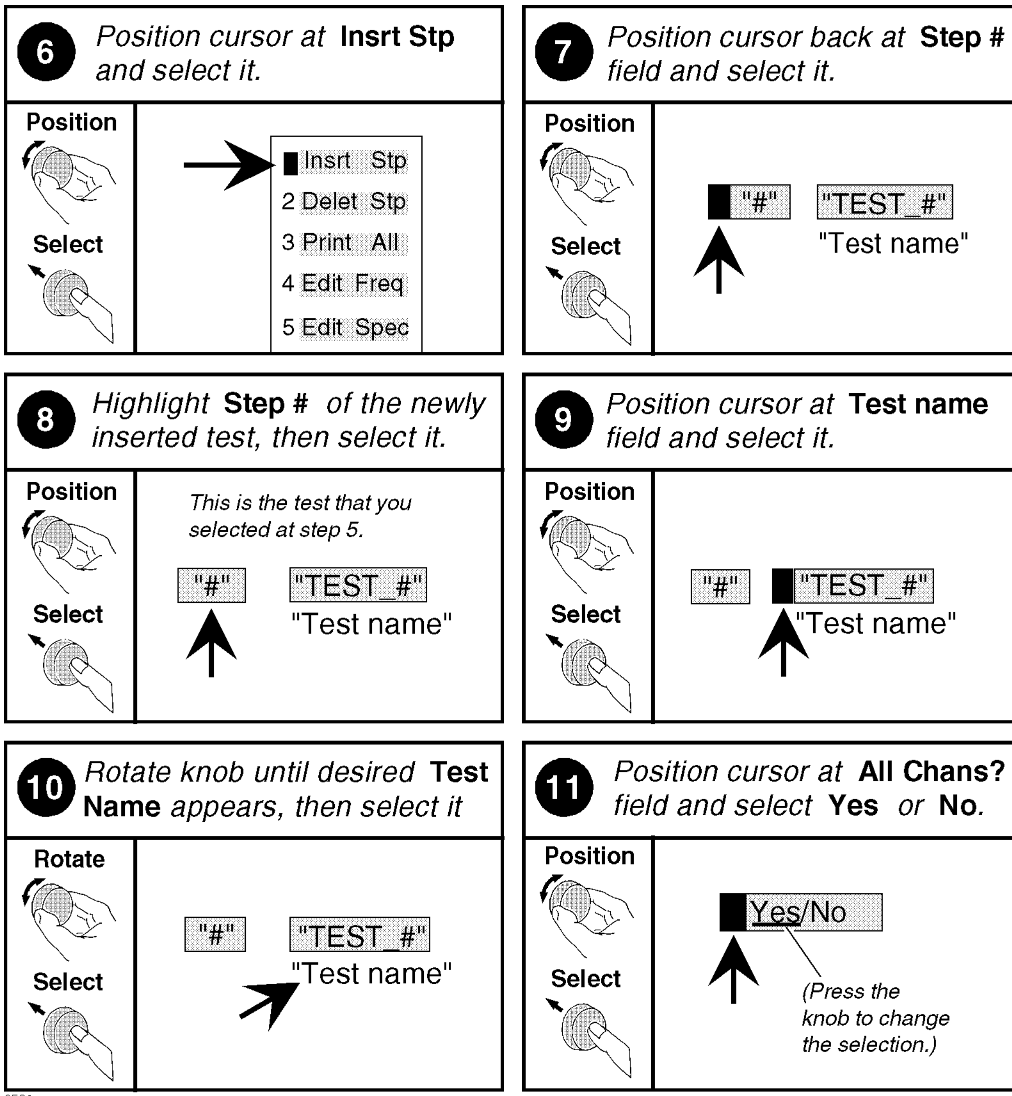


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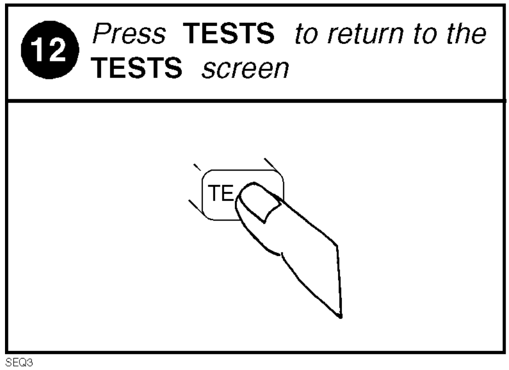



## Specifying Channel Information (Edit Frequency)

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. narrow|
  - For narrow channels (NAMPS only), specify lower, middle, or upper channel by appending an “L”, “M”, or “U” after the channel number. Example: for narrow lower channel 156 enter 156L in the edit frequency screen

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

***NOTE:*** Enter a –**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 "How to Change a Sequence of Tests" on page 108 for more information.

For information on saving the frequency table, see *"How to Save a Test Procedure" on page 123*.

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 |

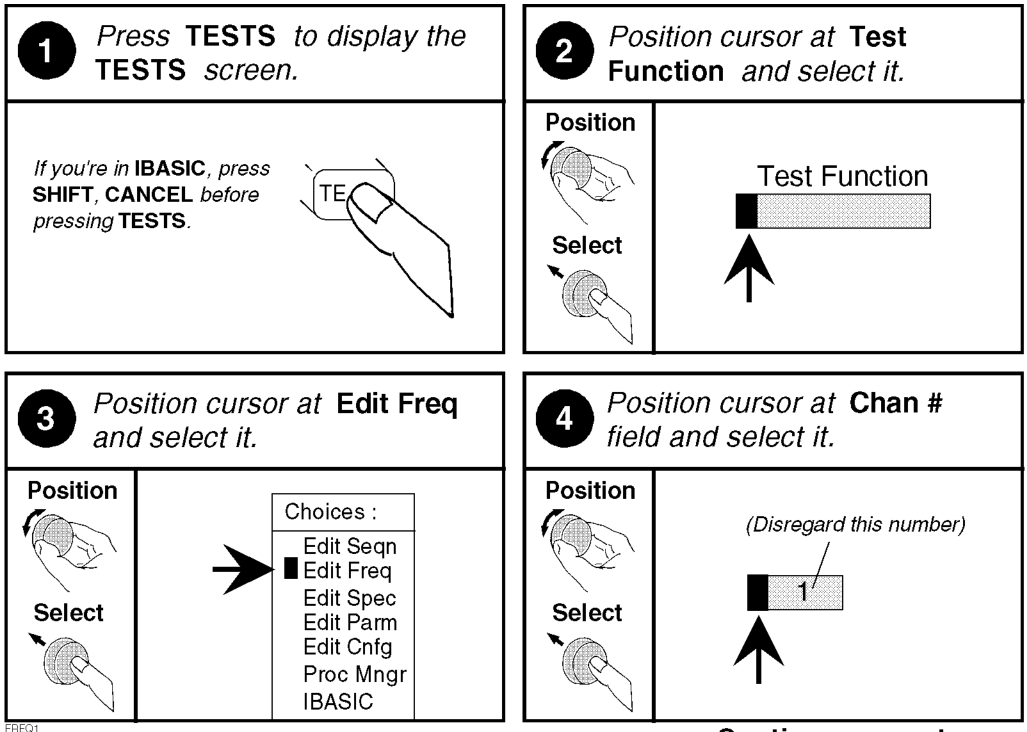
The result would be:

- 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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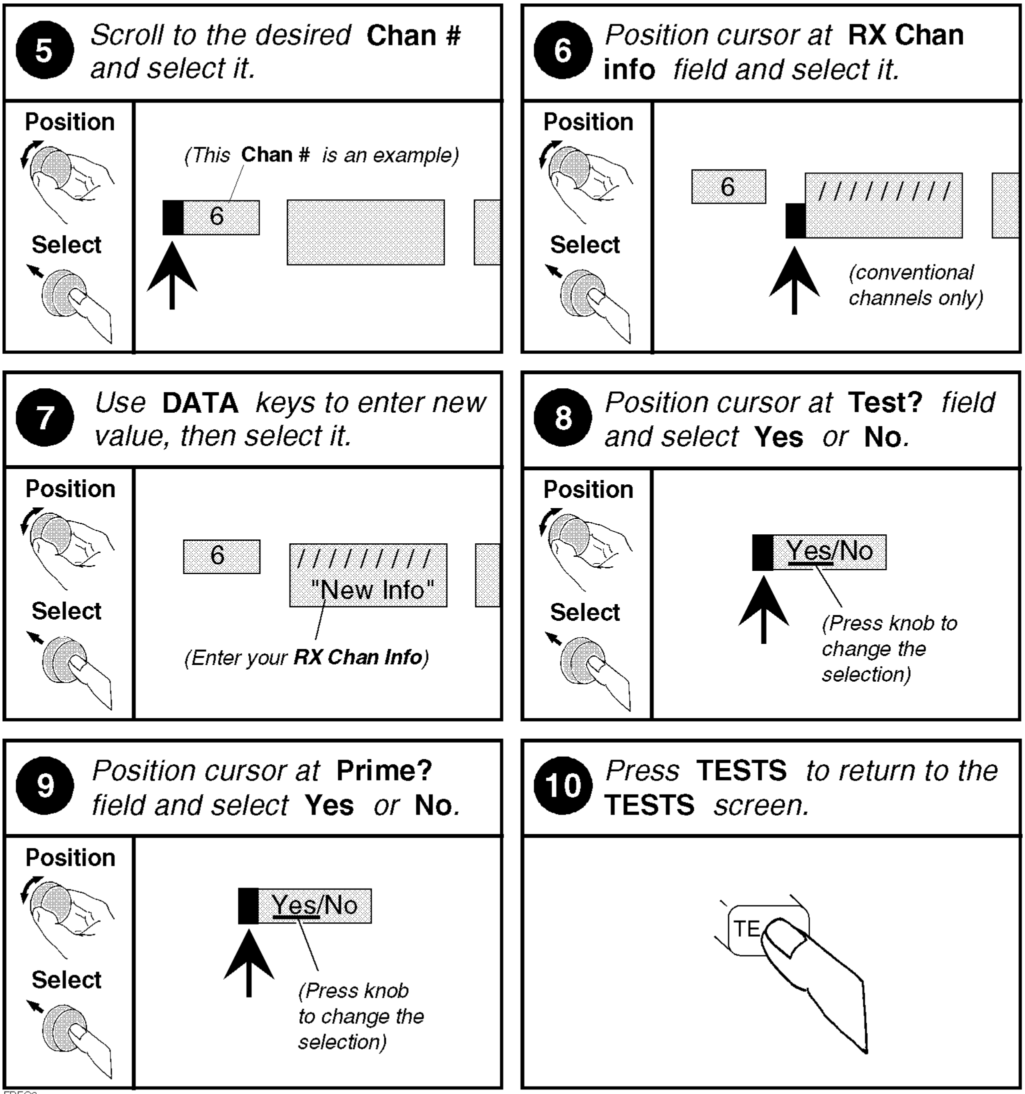
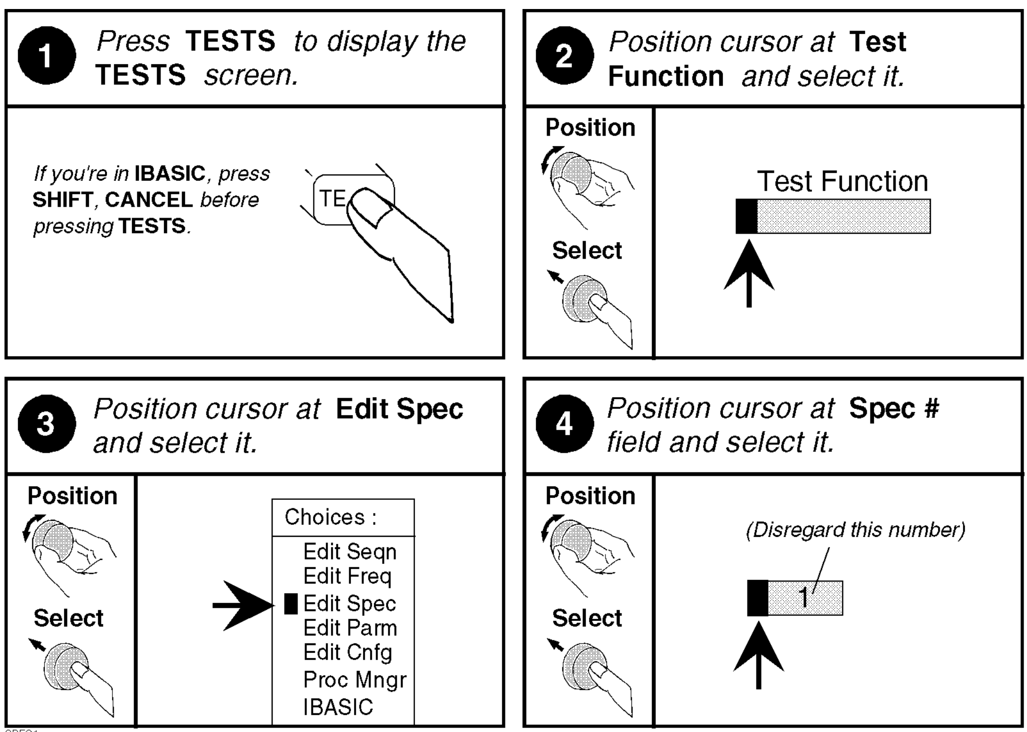

5
Scroll to the desired Chan # and select it.
Position
Select
(This Chan # is an example)
6
6
Position cursor at RX Chan info field and select it.
Position
Select
6
/ / / / / / / / /
(conventional channels only)
7
Use DATA keys to enter new value, then select it.
Position
Select
6
/ / / / / / / / /
"New 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 *Specifications* in chapter 4 for descriptions and default values for each specification. For information on saving customized specifications, see *"How to Save a Test Procedure" on page 123*.

### How to Change Pass/Fail Limits

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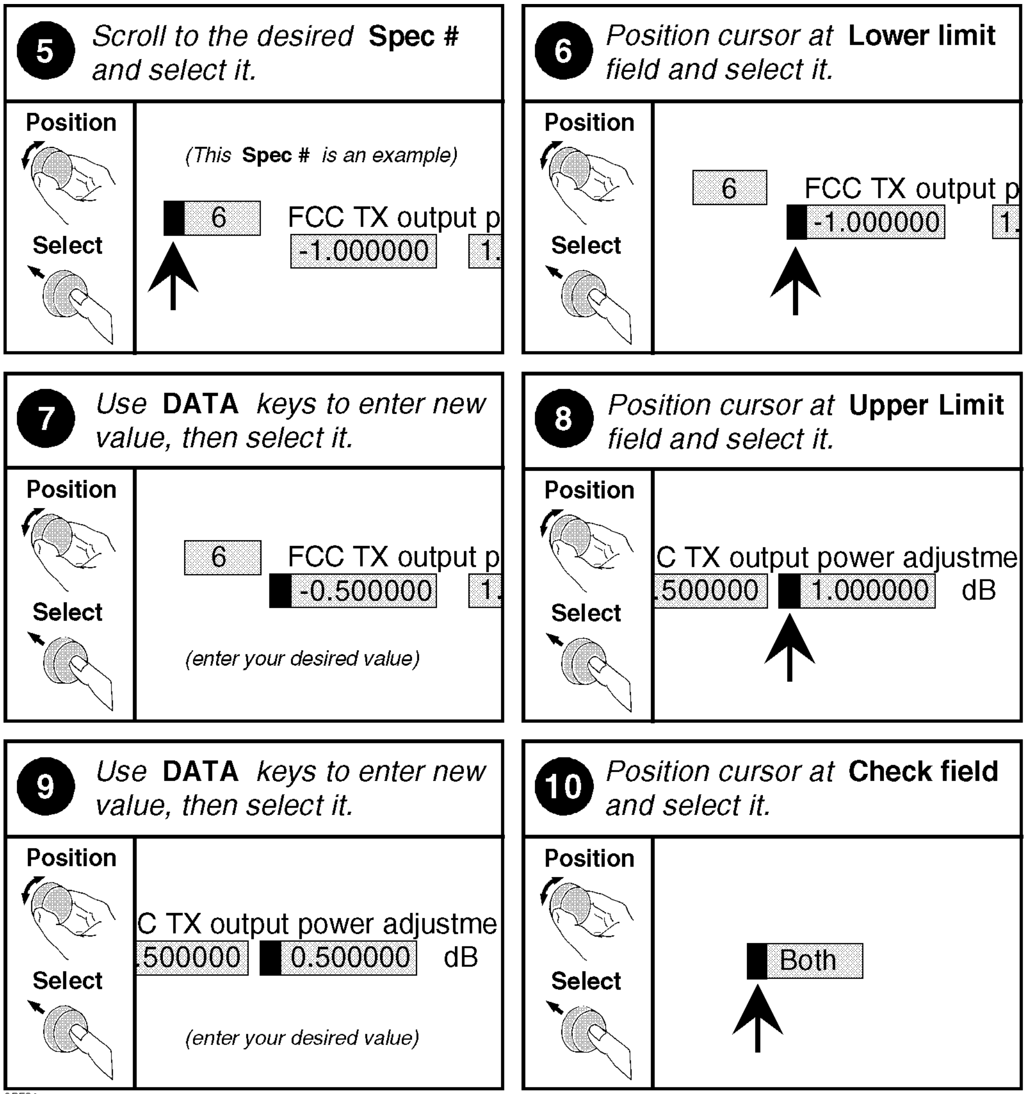


SPEC2

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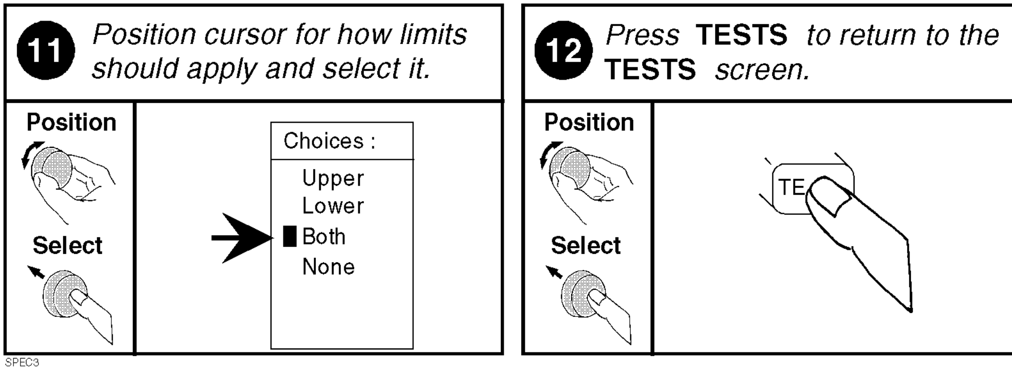
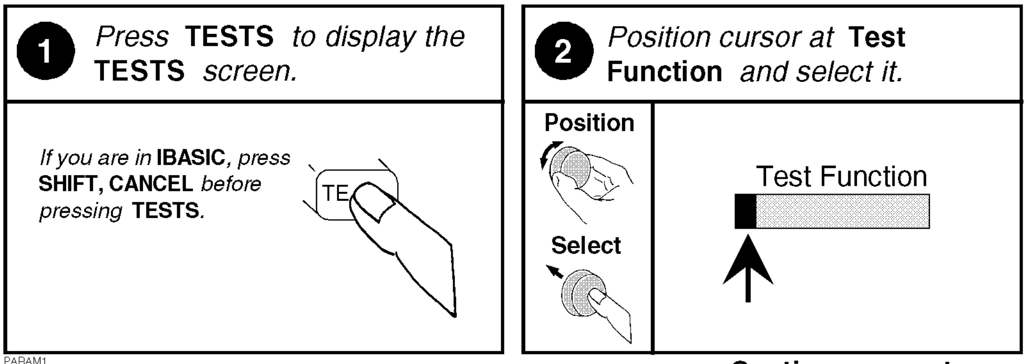



## Changing the Test Environment and Conditions (Edit Parameters)

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 the audio test tone frequency your system requires. The HP 11807A,E software comes with default settings for parameters. The defaults should be reviewed for your particular needs. See *Parameters* in chapter 4 for descriptions and default values for each parameter. For information on saving customized parameters, see *"How to Save a Test Procedure" on page 123*.

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

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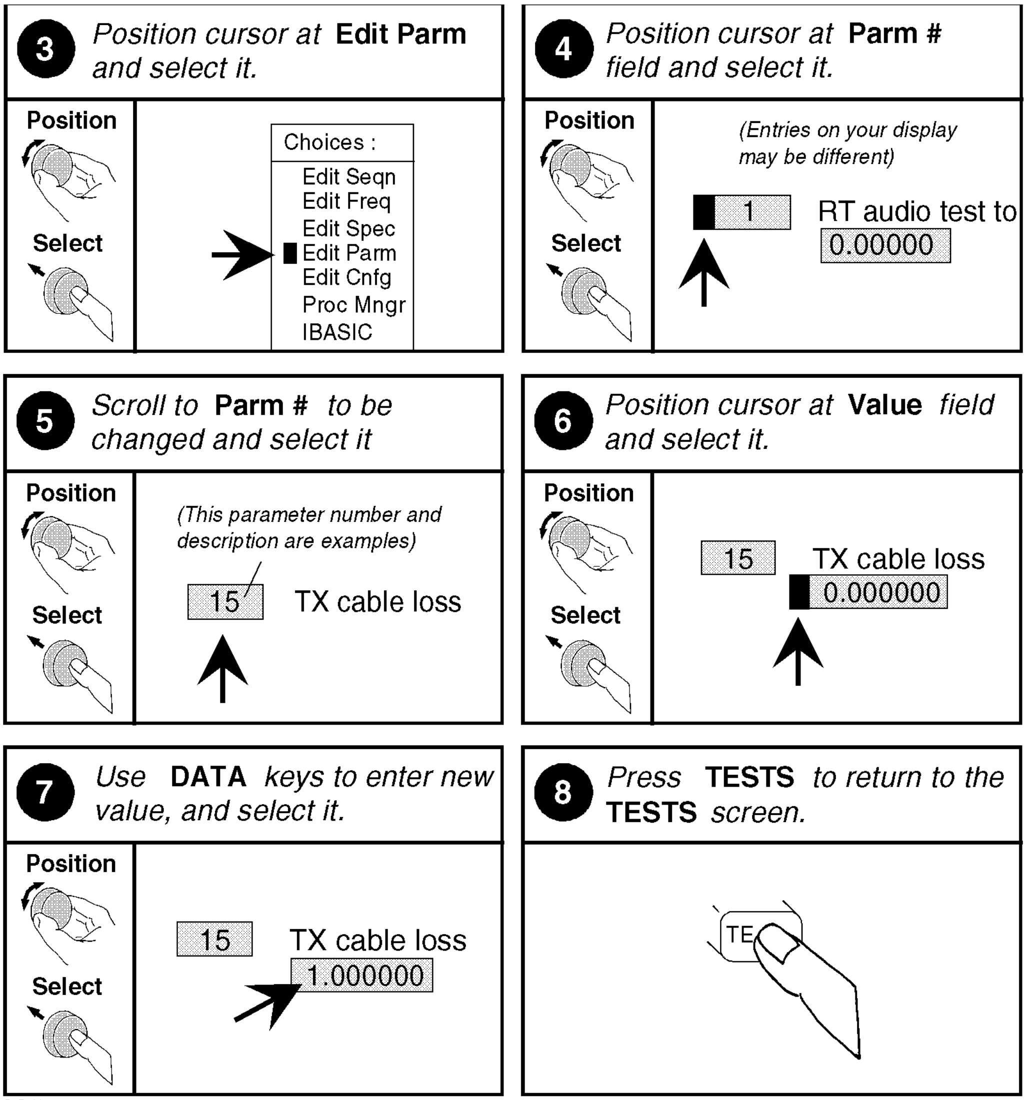

3
Position cursor at **Edit Parm** and select it.
Position
Select
Choices :
Edit Seqn
Edit Freq
Edit Spec
Edit Parm
Edit Cnfg
Proc Mngr
IBASIC
4
Position cursor at **Parm #** field and select it.
Position
Select
(Entries on your display may be different)
1
RT audio test to
0.00000
5
Scroll to **Parm #** 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

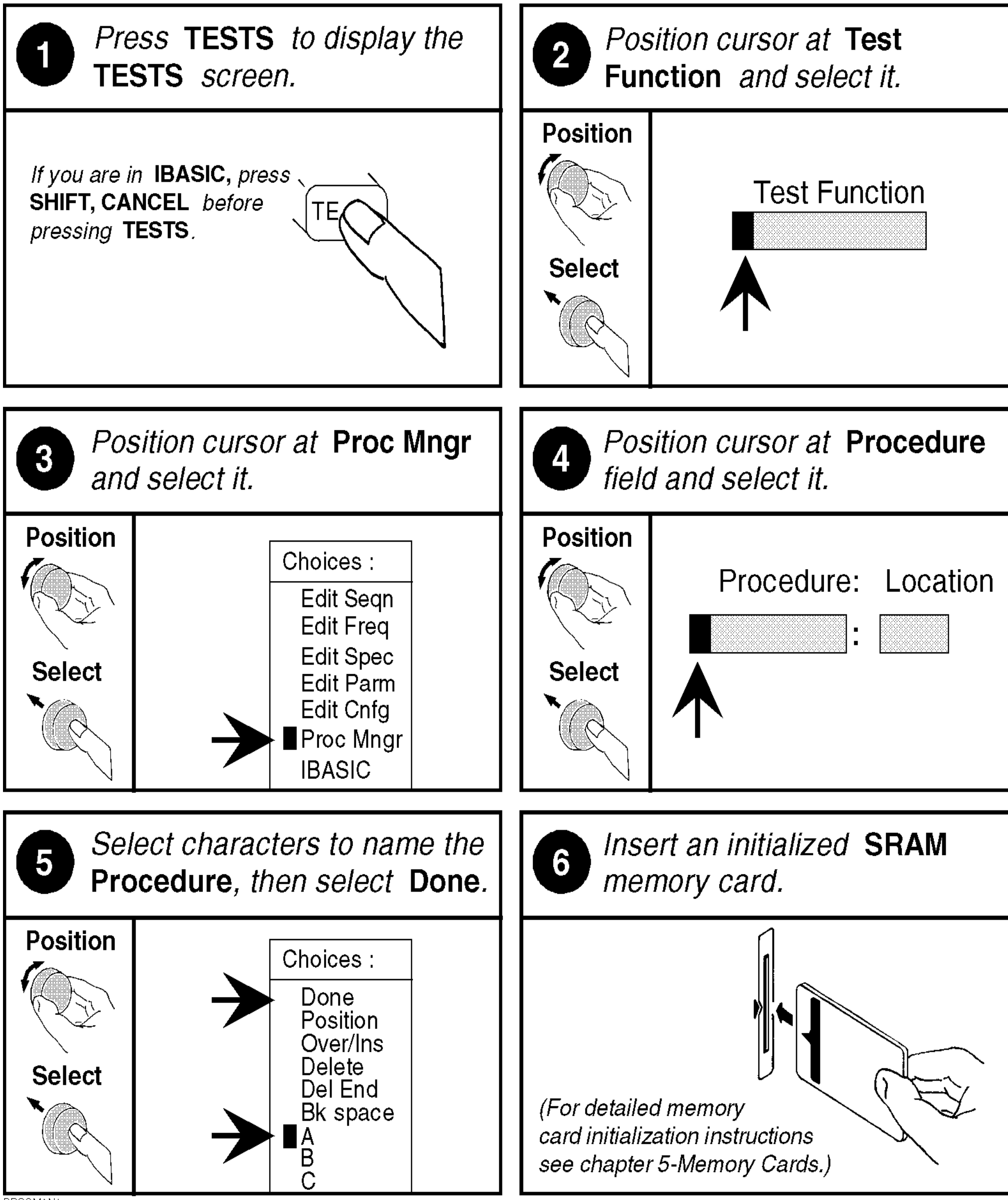
### Saving a Test Procedure Using the Procedure Manager

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,E software. The library file comes from the HP 11807A,E 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 323*.

### How to Save a Test Procedure

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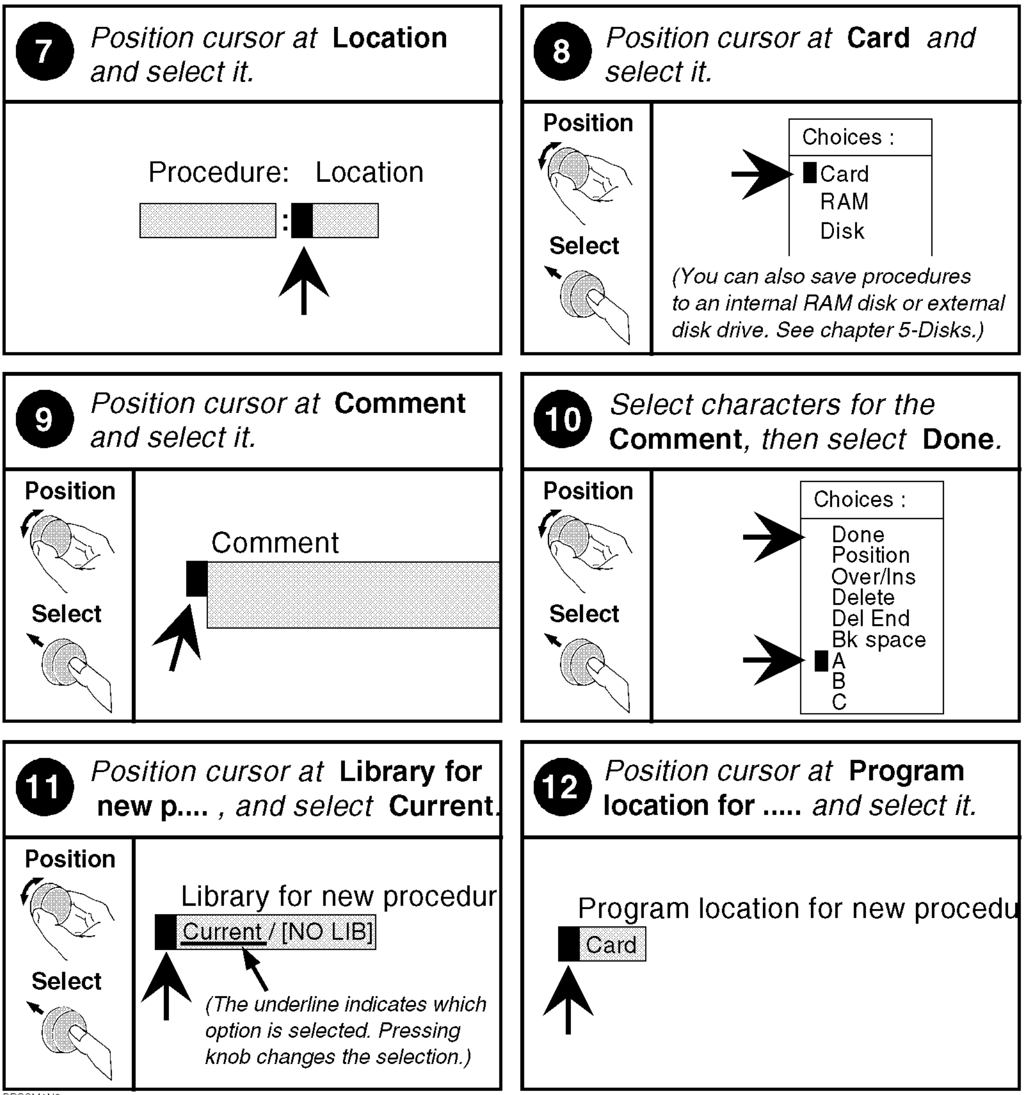


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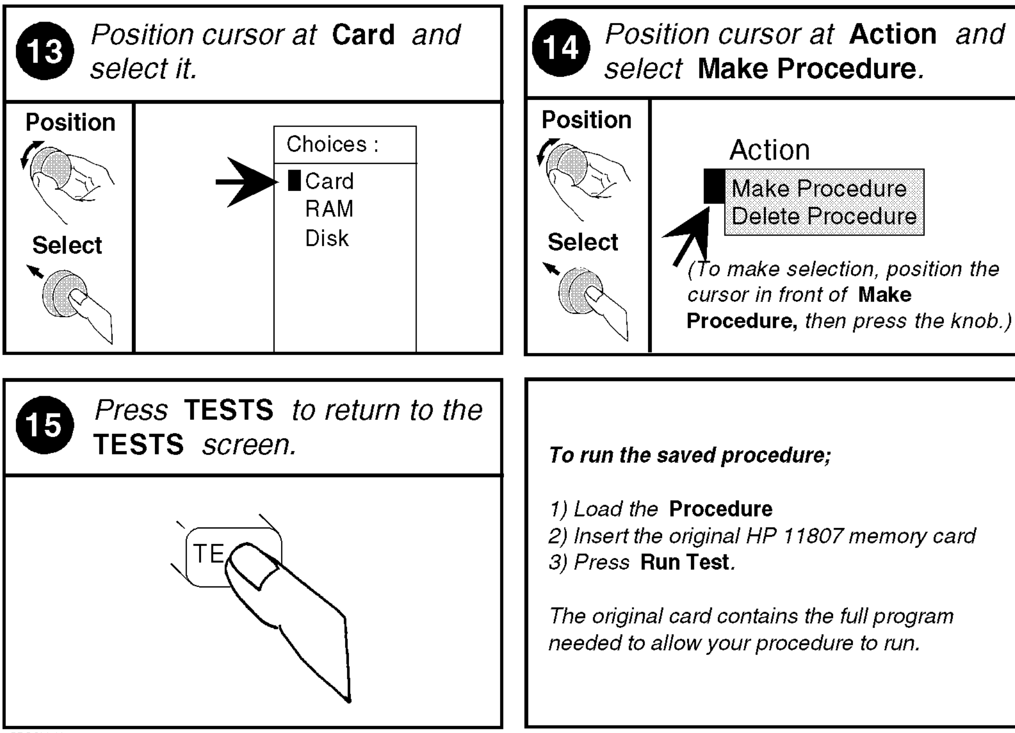


PROCMAN3

## 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 309*.

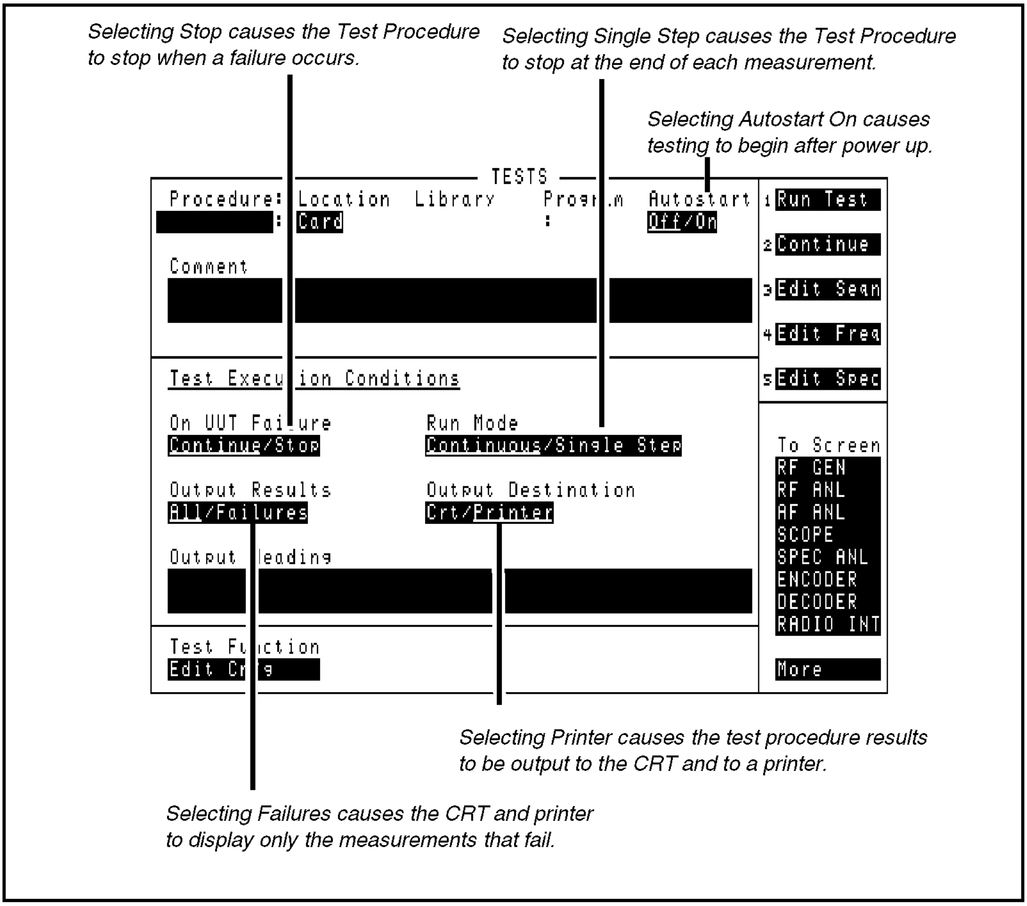
- Enter a title for an output heading for the displayed or printed results. (**Output Heading**). Select the field with the knob and enter the output heading by selecting the appropriate letters and the select **Done**.

**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 (except for **Autostart**) are not retained after a power-down/ power-up cycle, and will return to their default settings. They are not stored on the memory card when a test procedure is saved.

### How to Change Test Execution Conditions




TESTEXE1

### Printing and Saving Test Results

Printing and saving test results are features of the HP 11807A,E software which require additional equipment and configuration. See *"Printing" on page 309* for detailed descriptions and instructions for these features.

# 7



# Test, Parameter, and Pass/Fail Limit (Specification) Descriptions

# Testing Strategy

Running the call processing tests first will verify the mobile unit's 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 2. You will have to connect and use the handset for the call processing tests later in this strategy.
2. Load the HP 11807A Option 009 Software from the card into the test system. See *chapter 1, "Getting Started with FW Above Rev. A.14.00," on page 15 or chapter 2, "Getting Started with FW Below Rev. A.14.00," on page 31*. Load the Procedure named 'CALL_PR' from the card.
3. Run the test procedure. TEST_01 CP Registration, TEST_21 CPA Origination, or TEST_35 CPD Origination should be the first test in your test procedure sequence because 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_01 CP Registration, TEST_21 CPA Origination, or TEST_35 CPD Origination.

   If the first test in a test procedure sequence is not TEST_01 CP Registration, TEST_21 CPA Origination, TEST_35 CPD Origination, or TEST_25 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 1 **`AA Enter Ph# [0=If Needed,1=Always,Here]`**, and Parameter 2 **`AB MIN From [0=RECC, 1=All 0's, 2=Phone #]`**.

   Run analog call processing (CPA) tests for verification that the mobile unit is functional. Also, these tests only use the mobile unit's antenna to test system's RF IN/OUT connection (no audio connections are required). You may also select the digital call processing (CPD) tests if you wish.

**a** Access the Order of Tests (or Edit Seqn) screen as described in *Changing the Order of Tests (Edit Sequence)* in chapter 3.

**b** Follow the procedure to edit the sequence and create or view the test sequence with the following tests in the order presented:

| Test Name | Purpose |
|---|---|
| TEST_01 - 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_02 - CPA Page | Simulates an analog call to the mobile unit |
| TEST_20 - CPA Release | Releases the mobile unit |
| TEST_21 - 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 that is required by the mobile unit. See *"Changing the Test Parameters" on page 87*.

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

**e** The handset is connected.

**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" on page 89*. You may also want to add the digital call processing tests to this test procedure.

**4.** Add transmitter and receiver tests to your test procedure, through the **`Order of Tests`** function. You may save the test procedure, see *"Saving a Test Procedure" on page 89*. Some of these tests require audio connections. Be sure to make the appropriate audio connections specific to your radio.

You may want to add the following tests to your test procedure:

| Test Name | Purpose |
|---|---|
| TEST_04 - TXA RF Power Output | Verify analog transmitter |
| TEST_07 - TXA Audio Distortion | Verify transmitter audio connection |
| TEST_18 - RXA SINAD | Verify analog receiver and receiver audio connection |

# Test Descriptions

Tests are a series of measurements. One or more tests make up a *Procedure (see "Procedures" on page 323)*. While you may change the tests that make up a Procedure, you may not change the measurements the test will perform. Be sure and run TEST_01 - CP Registration, TEST_21 CPA Origination, or TEST_35 CPD Origination, before other tests to register each UUT unit with the test system. Once a UUT has been registered with the test system, TEST_01, TEST_21, 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, EIA/TIA IS-55 Recommended Minimum Performance Standards for 800 MHz Dual-Mode Mobile Stations and the EIA/TIA IS-90 Recommended Minimum Standard for 800 MHz Dual-Mode Narrowband Analog Cellular Subsriber Units.

## Test Nomenclature

- CP - Call Processing, Analog and Digital tests
- CPA - Call Processing, Analog tests
- CPD - Call Processing, Digital tests
- OTA - Other Tests, Analog
- RXA - Receiver, Analog tests
- RXD - Receiver, Digital tests
- TXA - Transmitter, Analog tests
- TXD - Transmitter, Digital tests

## TEST_01 - CP Registration

This test reads and decodes the phone's Reverse Control Channel (RECC) data and outputs the following registration information:

Phone number.
Serial number in both decimal and hex format.
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 CP registration, CPA origination, or CPD origination test must be run at least once before any call processing tests can be run, otherwise the operator is prompted to enter the UUT phone number during testing. 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 Enter Ph#[0=If Needed,1=Always,Here]
02. AB MIN From?[0=RECC, 1=All 0's, 2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
28. RXA RF Level for Signaling

## TEST_02 - 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 (Bose-Chaudhuri-Hocquenghem) 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. If the channel number from the table has an L, M, or U suffix, the phone will be directed to a narrow voice channel. If the channel number has no suffix, the phone will be directed to a wide voice channel.
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 Enter Ph#[0=If Needed,1=Always,Here]
02. AB MIN From?[0=RECC,1=All 0’s,2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
28. RXA RF Level for Signaling
07. CPA SAT Tone
06. CPA DSAT Vector (for NAMPS narrow channel)

## TEST_03 - TXA Frequency Error

This test measures the difference between the unmodulated carrier frequency and the assigned carrier frequency. TX frequency error is measured on a voice channel with voice modulation off, and SAT modulation on.

The frequency error is expressed in parts-per-million (ppm).

### Pass/fail limits used

28. TXA Frequency Error

### Parameters used

*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 the Parameter, 15. RT Test at Extreme Settings is set to test at extremes (1=yes). See "TEST_13 - TXA Current Drain" on page 149 for details on configuring an HP-IB power supply*.

12. RT High Supply Voltage
13. RT Low Supply Voltage
14. RT Nominal Supply Voltage
15. RT Test at Extreme Settings [0=no 1=yes]

## TEST_04 - TXA RF Power Output

This test measures the power at the output terminals of the transmitter when the output terminals are connected to a 50[ohm ] load. This test is performed at the nominal supply voltage and can also be performed with high and low supply voltages for extreme measurements if a power supply is configured to the test system.

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 watts by appropriately setting the Parameter 41, TX Units for Pwr Meas.

### Pass/fail limits used

*Normally , all power levels are tested; however, the Parameter 47, TXA Output Power Levels Tested [BWD #] allows you to select only the levels you want tested.*

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

*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 the Parameter 15, RT Test at Extreme Settings is set to test at extremes (1=yes). See "TEST_13 - TXA Current Drain" on page 149 for details on configuring an HP-IB power supply.*

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
11. RT External Path Loss
12. RT High Supply Voltage
13. RT Low Supply Voltage
14. RT Nominal Supply Voltage
15. RT Test at Extreme Settings [0=no 1=yes]
16. RT Use DUPLEX OUT & ANT IN  [0=no 1=yes]
41. TX Units for Power Meas [0=dBW 1=Watts]
47. TXA Output Power Levels Tested [BWD  #]

## TEST_05 - TXA Modulation Deviation Limiting

This test 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.

**1.** The audio generator’s frequency is set to 1 kHz.

**2.** The audio generator’s level is set to produce 8 kHz deviation by the UUT (3 kHz deviation for narrow analog operation).

**3.** The audio generator’s level is increased by 20 dB.

**4.** Steps 2 and 3 are repeated 3 times, and the maximum peak frequency deviation is held and reported.

**5.** The audio generator’s frequency is stepped from 300 Hz to 3 kHz while the audio generator’s level is maintained at the 20 dB overdrive. The size of the frequency steps is obtained from the Parameter 45, TXA Frequency Deviation Step Frequency. If this parameter is set to 0, then the test will run at 1 kHz only. Peak frequency deviation is repeated at each step.

*Audio connections from the radio to the test system are required for this test.*

### Pass/fail limits used

29. TXA Modulation Limiting
34. TXA NAMPS Modulation Limiting

### Parameters used

*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 the Parameter 15, RT Test at Extreme Settings is set to test at extremes (1=yes). See "TEST_13 - TXA Current Drain" on page 149 for details on configuring an HP-IB power supply.*

12. RT High Supply Voltage
13. RT Low Supply Voltage
14. RT Nominal Supply Voltage
15. RT Test at Extreme Settings [0=no 1=yes]
45. TXA Frequency Deviation Step Frequency
46. TXA Mod Dev Limit 50 Hz HPF [0=off 1=on]

## TEST_06 - TXA Audio Frequency Response

This test measures how closely the frequency deviation of the transmitter follows a 6 dB/octave pre-emphasis slope over a given frequency range. (This test is intended to be used between the audio response frequencies of 300 Hz and 3 kHz only.) *Audio connections from the radio to the test system are required for this test.*

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.

### Background

- Audio frequency response is measured at 2.9 kHz peak deviation for wide voice channels and 1.5 kHz peak deviation for narrow voice channels.
- The frequency response measurement is made with the rms detector and is made with respect to a 1 kHz reference rate.

### Pass/fail limits used

20. TXA Audio Frequency Dev from 6 dB/oct
21. TXA Audio Response Roll >2.5 kHz

### Parameters used

42. TXA Audio Response Step Frequency

## TEST_07 - TXA Audio Distortion

This test measures the level of the demodulated carrier’s audio distortion. *Audio connections from the radio to the test system are required for this test.*

The test system does not have expandor circuitry. If your testing conditions require correction for this situation, you must change the limits set in the Pass/fail limit 19, TXA Audio Distortion, as required.

Transmitter audio distortion is expressed in percent.

Also, this test uses the C-Message audio filter or the CCITT audio filter, if it is installed in the test system.

### Pass/fail limits used

19. TXA Audio Distortion

### Parameters used

None

## TEST_08 - TXA Signaling Tone/DST

If the channel is a wide voice channel, this test measures the signaling tone’s frequency and peak deviation. Since the SAT tone is always on in this test, deviation is measured with the rms detector, with and without the signaling tone on. The peak deviation of the signaling tone is calculated from the two readings. Therefore, test results indicate peak deviation, not peak+ or peak–.

If the channel is a narrow voice channel, the peak deviation of the digital signaling tone (DST) is measured and the DST sequence is decoded and reported in hexadecimal.

Since this test is run in the “maintenance mode” where the base station is waiting for an answer, the operator must press the send key on the handset to exit the test.

### Background

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

The digital signaling tone (DST) performs the same function on the narrow voice channel that ST performs on the wide voice channel. The DST is a 24-bit digital sequence transmitted continuously at 200 NRZ bits/second and produces an average peak deviation of 700 Hz. Each DST sequence is the logical inverse of a corresponding digital supervisory audio tone (DSAT) sequence.

***CAUTION:*** If the channel is a narrow voice channel, 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.

### Pass/fail limits used

32. TXA NAMPS DSAT Deviation
37. TXA Signaling Tone Deviation
38. TXA Signaling Tone Frequency

### Parameters used

None

## TEST_09 - TXA FM Hum and Noise

This test measures the ratio of residual frequency modulation to the standard test modulation. *Audio connections from the radio to the test system are required for this test.*

The test system does not have expandor circuitry. If your testing conditions require correction for this situation, you must change the limits set in the Pass/fail limit 27, TXA FM Hum and Noise, as required.

FM hum and noise is expressed in dB, from the formula:

$-20 \times \mathrm{Log}(\text{Reference Deviation} \div \text{Present Deviation})$

***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.

### Pass/fail limits used

27. TXA FM Hum and Noise

### Parameters used

None

## TEST_10 - TXA SAT/DSAT

If the channel is a wide voice channel, this test measures the frequency error and peak deviation of the three SAT tones. The rms detector is used for measuring SAT deviation. The SAT deviation is then converted to a peak reading.

Also, this test uses the 6 kHz BPF, Option 014 if it is installed. (If there is no filter and the UUT has an open microphone, the readings may be affected by background noise. In this case, mute the handset.)

If the channel is a narrow voice channel, the test system transmits DSAT sequence #3=25AD4D in hexadecimal. The peak deviation of the DSAT returned by the phone is measured and reported. An eye-pattern test is performed on the DSAT and the closure and phase jitter are measured and reported.

### Background

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

The digital supervisory tone (DSAT) performs the same function on the narrow voice channel that the SAT performs on the wide voice channel. The DSAT is a 24-bit digital sequence transmitted continuously at 200 NRZ bits/second and produces an average peak deviation of 700 Hz. Seven different sequences are defined.

***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.

### Pass/fail limits used

31. TXA NAMPS DSAT Closure
32. TXA NAMPS DSAT Deviation
33. TXA NAMPS DSAT Phase Jitter
35. TXA SAT Deviation
36. TXA SAT Frequency Error

### Parameters used

06. CPA DSAT Vector

## TEST_11 - TXA RVC Data Deviation

This test provides three possible modes of operation, determined by parameter 50 *TXT trnsient/ss data [0=tran 1=bth 2=ss]*.

The first method, selected by setting parameter 50 to 0=tran, measures the Peak+ and Peak– frequency deviation of the data in the entire Reverse Voice Channel (RVC) burst to ensure that it is within the specified limits.

The entire burst is tested by sending the FVC message 5 times while the peak+ hold detector is on, and another 5 times while the peak– hold detector is on.

The second method, selected by setting parameter 50 to 1=bth, first performs the test on just the steady state portion of the RVC data signal, followed by a test of the entire signal (described above).

The steady state portion of the test is performed by measuring the RVC data signal between 20 msec and 50 msec following the beginning of the data burst. The peak + and – results are compared to values in pass/fail limit 39 *TX wideband data deviation*. The results of the transient portion of the test are compared to values in the pass/fail limit 50 *TX wideband data deviation transient*.

The third method, selected by setting parameter 50 to 2=ss, performs the test on just the steady state portion of the RVC data signal (as described above).

***NOTE:*** In all three methods, the UUT should blank the SAT tone before sending the RVC message; therefore, SAT deviation should not be included in the deviation measurement. If the UUT has an open microphone, the readings may be affected by background noise. In this case, mute the handset.

***NOTE:*** The second and third test methods use trigger delay capabilities and can only be performed on an HP 8920B. If you are using an HP 8920A with HP 11807A, the software will ignore the setting of parameter 50 and perform the test using the first method only.

Using the first method, Hewlett-Packard Company has found that some cellular telephones fail this test because the telephones produce a carrier frequency transient at the beginning of 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 EIA/TIA IS-55 Standard. This transient typically occurs during the first 10 milliseconds of the wideband data transmission from the telephone. The HP 11807A Option 009 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 EIA/TIA IS-55 Standard.

**Applications:**

RVC data is 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 data stream is then used to modulate the transmitter carrier using direct, binary, frequency-shift keying (FSK).

On the wide voice channels, the data rate is 10 kilobits/second and the nominal peak transmitted deviation is 8 kHz. All other modulation sources to the transmitter are inhibited when the data is transmitted ("blank and burst").

On the narrow voice channels, the data rate is 100 bits/second and the nominal peak transmitter deviation is 700 Hz. The data words are inserted into the DSAT data stream. The transmitter is modulated simultaneously by voice audio and the data stream.

### Pass/Fail Limits Used

32 TX NAMPS DSAT deviation

39 TX wideband data deviation

50 TXT wideband data deviation transient

### Test Parameters Used

50 TXT trnsient/ss data [0=tran 1=bth 2=ss]

### TEST_12 - 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 dB of tracking error over the indicated operating range.

- The deviation is then set to 2.9 kHz (1.5 kHz for narrow analog) 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”.
- If Parameter 43, TXA Compressor Step Level, is greater than 0, the point at which the phone starts to limit is determined. This limiting point is displayed as “TXA compression point” and the result is displayed in dB relative to the reference level. The input is then varied from a level of –30 dB below the reference level up to the compression point level in steps set by Parameter 43, TXA Compressor Step Level. The RMS deviation is measured and the compressor response relative to the reference is calculated.
- If Parameter 43, TXA Compressor Step Level, is less than 0, then the input is varied from a high level of +25 dB above the measured reference level to a level of –30 dB below the measured reference level in steps set by the Parameter 43, 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 22, 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.

Also, this test uses the C-Message audio filter or the CCITT audio filter, if it is installed in the test system.

### 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

22. TXA Compressor Min Out @>17.6 dB input

### Parameters used

43. TXA Compressor Step Level

## TEST_13 - TXA Current Drain

This test 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.

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

### Configuring an HP-IB Power Supply

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. Access the test system's TESTS screen by pushing 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 through 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 unit's supply input.
7. Connect the negative terminal of the power supply directly to the negative terminal of the mobile unit's 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 Config) screen of the test system, see the procedure above for *Configuring an HP-IB Power Supply*.

### Pass/fail limits used

24. TXA Current Drain @levels 0-3
25. TXA Current Drain @levels 4-7

### Parameters used

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
44. TXA Current Drain Levels Tested [BWD #]

## TEST_14 - RXA Expandor

This test 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. *Audio connections from the radio to the test system are required for this test.*

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 (1.5 kHz for narrow analog operation) 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 the Parameter 21, RXA Expandor Step Level. For AMPS and NAMPS 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 varied over the range and the expandor response relative to the "zero crossing" point is calculated.
- The sweep will go from a high level (+10.6 dB for NADC phones) to a low level (–21 dB) if the sign of the step level set by Parameter 21, RXA Expandor Step Level is negative. The sweep will go from a low to high level if the sign of Parameter 21 is positive.

### Background

An expandor is used to provide the complement of the compressor in the cell site transmitter. Together, the compressor and expandor provide improved signal-to-noise-ratio in the demodulated audio.

**Pass/fail limits used**

04. RXA Expandor Track Error <0
05. RXA Expandor Track Error >0
06. RXA Expandor Zero Reference Level
08. RXA NAMPS Expandor Zero Reference Level

### Parameters used

21. RXA Expandor Step Level

## TEST_15 - RXA Audio Frequency Response

This test 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. The Parameter 28, RXA RF Level for Signaling is applied with a constant deviation. The modulation rate is swept over the audio frequency-response range in steps determined by the Parameter 20, RXA Audio Response Step Frequency.

*Audio connections from the radio to the test system are required for this test.* Receiver audio frequency response is expressed in dB error from a 6 dB/octave curve.

- A –50 dBm RF signal is applied to the receiver’s antenna.
- The –50 dBm RF signal is modulated to deviate to 2.9 kHz at a 1 kHz rate with a SAT tone present and a reference reading is made.
- The frequency rate is then swept over the desired range and the response measured.
- If the compandor is always on, a 2:1 correction is applied to the measured results.
- Narrow analog operation uses 1.5 kHz deviation and DSAT.

### Pass/fail limits used

02. RXA Audio Response Dev from –6 dB/oct R1
03. RXA Audio Response Dev from –6 dB/oct R2

### Parameters used

10. RC Compandor is Always On [0=no 1=yes]
20. RXA Audio Response Step Frequency

## TEST_16 - RXA Audio Distortion

This test measures the distortion from the receiver when a standard test tone is applied to the radio. *Audio connections from the radio to the test system are required for this test.*

Also, this test uses the C-Message audio filter or the CCITT audio filter if it is installed in the test system.

- A –50 dBm RF signal is applied to the receiver's antenna.
- The –50 dBm RF signal is modulated to deviate to 8 kHz at a 1 kHz rate with a 6000 Hz SAT tone present.
- Narrow analog operation uses 3 kHz deviation and DSAT.

### Pass/fail limits used

01. RXA Audio Distortion

### Parameters used

None

## TEST_17 - RXA Hum and Noise

This test measures the ratio, expressed in dB, of:

❒ The residual audio output in the absence of modulation,
❒ To the rated audio output.

*Audio connections from the radio to the test system are required for this test.*

Also, this test uses the C-Message audio filter or the CCITT audio filter, if it is installed in the test system.

- A –50 dBm RF signal is applied to the receiver's antenna.
- The –50 dBm RF signal is modulated to deviate to 8 kHz at a 1 kHz rate with a SAT tone present.
- The SAT tone is always on during this test.
- Narrow analog operation uses 3 kHz deviation and DSAT.

### Pass/fail limits used

07. RXA Hum and Noise

### Parameters used

None

## TEST_18 - RXA SINAD

This test sets and measures the ratio, expressed in dB, of:

- Signal + Noise + Distortion,
- to Noise + Distortion.

The receiver’s SINAD is measured at the RF level specified by the Parameter, 29, RXA RF Level for SINAD. *Audio connections from the radio to the test system are required for this test.*

Receiver SINAD is measured at the receiver’s audio output. This measurement differs from a distortion measurement in that it is conducted at low RF input levels where the noise contribution is significant.

This test is intended to measure receiver sensitivity. Receivers are typically required to provide at least 12 dB SINAD (less than 25% noise and distortion) for RF input levels below 1 microvolt.

- The RF signal (level set by the Parameter 29, RXA RF Level for SINAD) is modulated to deviate to 8 kHz at a 1 kHz rate with a SAT tone present.
- The measurement is repeated at high and low supply voltages if the Parameter 15, RT Test at Extreme Settings, is set to 1.
- Narrow analog operation uses 3 kHz deviation and DSAT.

### Pass/fail limits used

10. RXA SINAD

### Parameters used

*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 the Parameter 15, RT Test at Extreme Settings is set to test at extremes (1=yes). See "TEST_13 - TXA Current Drain" on page 149 for details on configuring an HP-IB power supply.*

12. RT High Supply Voltage
13. RT Low Supply Voltage
14. RT Nominal Supply Voltage
15. RT Test at Extreme Settings [0=no 1=yes]
26. RXA NAMPS RF Level for SINAD
27. RXA NAMPS RF Level for SINAD at Extremes
29. RXA RF Level for SINAD
30. RXA RF Level for SINAD at Extremes (used only if extreme settings = yes)

## TEST_19 - RXA FVC Order Message Error Rate

This test simulates a Forward Voice Channel (FVC) order message being sent from a cell site to the cellular radio and measures the Order Message Error Rate.

The test works as follows:

- A Forward Voice Channel (FVC) audit message is sent 100 times and the number of acknowledgments from the UUT is counted.
- The RF level is set by the Parameter 22, RXA FVC Message Error Rate RF Level.
- If the UUT misses 10 acknowledgments in a row the test terminates.

FVC order message error rate is expressed in %.

### Pass/fail limits used

09. RXA Order Message Error Rate (OMER)

### Parameters used

22. RXA FVC Message Error Rate RF Level

## TEST_20 - CPA Release

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

The test works as follows:

- The mobile unit is set 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, whichever occurs first.
- The test fails if the 6 second limit is reached.

### Pass/fail limits used

None

### Parameters used

16. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]
41. TX Units for Pwr Meas [0=dBW 1=Watts]

## TEST_21 - CPA Origination

This test simulates a call from the cellular phone to the base station (cell site) by putting the phone 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 level 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.

If the channel number from the table has an L, M, or U suffix, the phone will be directed to a narrow voice channel. If the channel number has no suffix, the phone will be directed to a wide voice channel.

### Pass/fail limits used

None

### Parameters used

03. CP Control Channel
04. CP Prt RECC RVD Data
28. RXA RF Level for Signaling
07. CPA SAT Tone
06. CPA DSAT Vector (for NAMPS narrow channel)

## TEST_22 - OTA No Audio Functional

This test contains a collection of tests designed to provide a quick evaluation of the UUT without the need to make audio connections from the UUT to the test system. The following tests are included:

TEST_21 - CPA Origination
TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_08 - TXA Signaling Tone/DST
TEST_10 - TXA SAT/DSAT
TEST_11 - TXA RVC Data Deviation
TEST_27 - CPA Hook Flash
RXA Tones Functional
RXA SINAD Functional
TXA Microphone Functional

The first seven tests in the above list are described individually in this chapter. The final three tests are available only as part of this test and they work as follows:

- When prompted, the operator is required to listen for tones from the receiver and then select whether the test passed or failed. The pass/fail decision is qualitative, and is usually based on whether the tones are heard clearly.
- When prompted, the operator is required to listen to a 1 kHz tone that is modulated on a low power level carrier signal. The power level of the carrier signal is set by Parameter 29, RXA RF Level for SINAD. The operator must select whether the test passed or failed. The pass/fail decision is qualitative and is usually based on whether the 1 kHz tone could be heard adequately among the static.
- The operator is required to whistle into the transmitter, to observe the deviation on the test system, and then select whether the test passed or failed. The pass/fail decision is qualitative, and is usually based on whether the change in deviation corresponds with the amplitude of the whistle into the transmitter.

### Pass/fail limits used

See the individual tests for pass/fail limits used.

### Parameters used

26. RXA NAMPS RF Level for SINAD
28. RXA RF Level for Signaling
29. RXA RF Level for SINAD

See the individual tests for parameters used.

## TEST_23 - TXA Quick General

These tests are designed to provide you with a quick evaluation of the cellular radio's transmitter's capabilities. *Audio connections from the radio to the test system are required for this test.* The following tests are included:

TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_05 - TXA Modulation Deviation Limiting
TEST_06 - TXA Audio Frequency Response
TEST_07 - TXA Audio Distortion
TEST_08 - TXA Signaling Tone/DST
TEST_09 - TXA FM Hum and Noise
TEST_10 - TXA SAT/DSAT
TEST_11 - TXA RVC Data Deviation
TEST_12 - 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_24 - RXA Quick General

These tests are designed to provide you with a quick evaluation of the cellular radio’s receiver’s capabilities. *Audio connections from the radio to the test system are required for this test.* The following tests are performed:

TEST_14 - RXA Expandor
TEST_15 - RXA Audio Frequency Response
TEST_16 - RXA Audio Distortion
TEST_17 - RXA Hum and Noise
TEST_18 - RXA SINAD

See the individual tests for descriptions.

### Pass/fail limits used

See the individual tests for pass/fail limits used.

### Parameters used

28. RXA RF Level for Signaling
See the individual tests for parameters used.

## TEST_25 - CP Manual Flow Chart

This test displays a flow-chart representing a cellular phone as it gains access to a system. It operates with AMPS, NAMPS, and NADC dual-mode phones. Once you have established a voice channel using the flow chart for AMPS and NAMPS phones, you can test cellular-radio functions including hand-offs, power level changes, SAT\DSAT 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), hand-off between analog and digital channels, and change power levels. The system can measure digital phone parameters including EVM, power, frequency error, and channel quality.

***IMPORTANT NOTE***

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 (test hardware or cables) or the ambient temperature by more than 5° F.

The calibration is done across the entire cellular band so that all channels will be calibrated.

If the digital power measurement is not calibrated, the digital power measurement accuracy is degraded by as much as 1 dB.

### 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 turn-off 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 flow-chart 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 hand-off 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).
- **`chng dsat`** allows you to change the digital supervisory audio tone (DSAT) for NAMPS phones.
- **`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.

## 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 28, 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

02. AB MIN From?[0=RECC,1=All 0's,2=Phone#]
03. CP control channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
06. CPA DSAT vector [0 thru 6]
07. CPA SAT Tone
08. CPD Talkback time [1:31]
09. CPD wait for hand-off
11. RT External Path Loss
16. RT Use DUPLEX OUT & ANT IN [0=no 1=yes]
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling
33. RXD Number of Slots to Demod [1:1555]
36. RXD Sensitivity RF Level
41. TX Units for Power Meas

## TEST_26 - TXA Switch Channels

This test measures transmitter's frequency error, power, and SAT frequency error over a range of channels defined by Parameter 37, TX Switch Channels Start Channel, Parameter 38, TX Switch Channels Step Channel, and Parameter 39, TX Switch Channels Stop Channel.

The test works as follows:

- The UUT's channel number is changed over the desired range indicated by above parameters.
- The channels will all be wide voice channels or they will all be narrow voice channels as determined by the currently active entry in the **`Channel Information`** (or **`Edit Freq`**) table.
- For each wide channel, the TX output power (at power level 0 only), RF frequency error, and SAT frequency error is measured.
- For each narrow channel, the TX output power and RF frequency error are measured and the DSAT sequence coming from the phone is decoded and displayed.
- Each time the channel is changed, the SAT frequency is changed to the next valid SAT tone or DSAT value.

### Pass/fail limits used

11. TX Output Power at Level 0
28. TXA Frequency Error
36. TXA SAT Frequency Error

### Parameters used

06. CPA DSAT Vector [0 thru 6]
07. CPA SAT Tone
16. RT Use DUPLEX OUT & ANT IN
37. TX Switch Channels Start Channel
38. TX Switch Channels Step Channel
39. TX Switch Channels Stop Channel
41. TX Units for Pwr Meas [0=dBW 1=Watts]

## TEST_27 - CPA Hook Flash

This test verifies that the correct hook-flash number (3 digits) is correctly sent by the cellular radio.

The test works as follows:

1. A voice channel is established.
2. The operator is prompted to dial a 3-digit number and press the SEND key on the UUT.
3. If the channel is a wide voice channel, the test detects the resulting signaling tone from the UUT and sends a "send-called-address" order to the UUT on the Forward Voice Channel (FVC). This step does not occur on narrow voice channels.
4. The test receives the hook-flash number from the UUT on the Reverse Voice Channel and displays it. (The number is not compared to a specific value or number.)

### Pass/fail limits used

None

### Parameters used

None

## TEST_28 - TXA DTMF Frequency Error

This test measures the transmitter’s Dual-Tone Multifrequency (DTMF) frequency error for the phone’s key pad. The low tone (LT) and high tone (HT) DTMF frequencies for each selected key are checked to make sure that the frequencies are within the DTMF frequency error limits for their nominal values.

DTMF frequency error is expressed in %.

### Background

There are two groups of sinusoidal high and low frequencies consisting of 1209, 1336, and 1477 Hz (HT’s) in one group, and 609, 770, and 941 Hz (LT’s) in the other group.

A DTMF signal is generated when a key is pressed on the handset. Each dialing key makes use of one assigned frequency from each group. The DTMF signal is encoded and transmitted for control purposes when dialing an origination from the phone.

### Pass/fail limits used

26. TXA DTMF Frequency Error

### Parameters used

None

## TEST_29 - RXA MRI

This test sweeps the level of the RF carrier generated by the test system or a forward voice channel. The RF level is stepped from a higher level to a lower level where the start level, stop level, and step size are set by the user via the parameter table. At each level step, the MRI Parameter Message is sent to the UUT with the RSSI and BER threshold fields set to zero. This induces the UUT to report the current status of its RSSI and BER measurements via the reverse voice channel. These RSSI and BER values are then displayed.

### Background

MRI stands for Mobile Reported Interference, RSSI stands for Received Signal Strength Indicator, and BER stands for Bit Error Rate. NAMPS phones are able to report RSSI and BER values to the base station on command. The BER pertains to the signaling used on narrow voice channels. This test can only be run on a narrow voice channel or an NAMPS mobile unit.

### Pass/fail limits used

None

### Parameters used

23. RXA MRI Start Level
24. RXA MRI Step Level
25. RXA MRI Stop Level
28. RXA RF Level for Signaling

## TEST_30 - CPD Page

This test 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 the FDTC
8. Sends a 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 the traffic channel was obtained. The EVM result is not displayed in this test.

### Pass/fail limits used

None

### Parameters used

01. AA Enter Ph#[0=If Needed,1=Always,Here]
02. AB MIN From?[0=RECC,1=All 0's,2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
09. CPD Wait for Handoff
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]

## 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. 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 EVM Ten Burst

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

36. TXA SAT Frequency Error
40. TXD Amplitude Droop
41. TXD Frequency Error
42. TXD Magnitude Error
46. TXD Phase Error
47. TXD Relative Adjacent Channel Power
48. TXD Relative Alternate Channel Power

### Parameters used

02. AB MIN From?[0=RECC,1=All 0's,2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
07. CPA SAT Tone
09. CPD Wait for Handoff
17. RTD Active Slot [1:37]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling
37. TX Switch Channels Start Channel
38. TX Switch Channels Step Channel
39. TX Switch Channels Stop Channel

## TEST_32 - TXD Switch Channels

This test verifies operation of digital channels that are selected through the TX switch channel parameters. 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 37, TX 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 38, TX Switch Channels Step Channel to Parameter 37, TX Switch Channels Start Channel, until the value of Parameter 39, TX Switch Channels Stop Channel is reached.
7. End the test leaving the mobile unit on the last traffic channel designated by the Parameter 39, TX Switch Stop Channel.

### Pass/fail limits used

41. TXD Frequency Error
42. TXD Magnitude Error

### Parameters used

02. AB MIN From?[0=RECC,1=All 0's,2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
09. CPD Wait for Handoff
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling
37. TX Switch Channels Start Channel
38. TX Switch Channels Step Channel
39. TX Switch Channels Stop Channel

## TEST_33 - RXD Receiver Sensitivity (Ch Qual)

This test measures the receiver's sensitivity by performing a channel quality measurement (Ch Qual) on the current forward traffic channel at an RF signal set by the Parameter 36, RXD Sensitivity RF Level. The mobile reports the bit-error-rate (BER) to the test system. The received signal strength indicator (RSSI) is also reported and checked for accuracy.

### 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.

### Pass/fail limits used

None

### Parameters used

11. RT External Path Loss
15. RT Test at Extreme Settings [0=no 1=yes]
33. RXD Number of Slots to Demod [1.1555]
34. RXD Number of Training Slots [0:500]
35. RXD RF Sensitivity Type Tested [BWD #]
36. RXD Sensitivity RF Level

## TEST_34 - CPD Talk Back

This test verifies operation of a digital transmit and receive channel. 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 the Parameter 8, 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 when done listening.

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

### Pass/fail limits used

None

### Parameters used

02. AB MIN From?[0=RECC,1=All 0's,2=Phone#]
03. CP Control Channel [1:799] or [991:1023]
08. CPD Talk Back Time [1:31]
09. CPD Wait for Handoff
17. RTD Active Slot [1:31]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling

## 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-Traffic-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.

It is not necessary to register the phone with the Test Set by running TEST_01 CP Registration before running this test. TEST_35 CPD 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

03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
07. CPA SAT Tone
09. CPD Wait for Handoff
17. RTD Active Slot [1.3]
18. RTD Analyzer Trigger Delay [1:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling

## TEST_36 - CPD Release

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

The test works as follows:

- The mobile unit is set 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 –25 dBW or until 6 seconds has passed, whichever occurs first.
- The test fails if the 6 second limit is reached.

### Pass/fail limits used

None

### Parameters used

02. AB MIN From?[0=RECC,1=All 0’s,2=Phone #]
03. CP Control Channel [1:799] or [991:1023]
04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
07. CPA SAT Tone
09. CPD Wait for Handoff
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
28. RXA RF Level for Signaling
41. TX Units for Pwr Meas [0=dBW 1=Watts]

## TEST_37 - 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 which must be better than 12.5% to pass the test.

### 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 and must be better than 25% to pass.

### Pass/fail limits used

40. TXD Amplitude Droop
41. TXD Frequency Error
42. TXD Magnitude Error
46. TXD Phase Error

### Parameters used

15. RT Test at Extreme Settings [0=no 1=yes]
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
49. TXD Output Power Levels Tested [BWD #]

## TEST_38 - TXD RF Power Output

Measures the mobile station's transmitted power while on a digital traffic channel. This test checks to see if digital power measurement has been calibrated. If it has not been calibrated, the operator is asked if they would like to run the TXD Calibrate RF Power test (TEST_40). The operator must select **yes** or **no** before the test will continue. If the operator selects **no**, default digital power measurement calibration factors are used. If the default calibration factors are used, the digital power measurement accuracy is reduced by as much as 1 dB. Digital power measurement calibration needs to be performed only once, unless the HP 8320XN Dual-Mode Cellular Adapter and/or connecting cables are changed, or the ambient temperature changes by more than 5° F, or the software is cleared from memory and reloaded into the Test Set. If parameter 15 RT Test at Extreme Settings is set to **1**, so that digital power measurements are made at high supply voltage and low supply voltage, this test requires a programmable power supply.

Output power is expressed in dBW or watts by appropriately setting the Parameter 41, TX Units for Pwr 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
43. TXD Output Power at Level 10
44. TXD Output Power at Level 8
45. TXD Output Power at Level 9

### Parameters used

08. CPD Talk Back
11. RT External Path Loss
15. RT Test at Extreme Settings [0=no 1=yes]
17. RTD Active Slot [1:3]
18. RTD Analyzer Trigger Delay [0:971]
19. RTD DVCC [1:255]
41. TX Units for Power Meas [0=dBW 1=Watts]
48. TXD Output Power Levels Tested [BWD #]

## TEST_39 - TXD Adjacent Channel Power

Measures the 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

47. TXD relative adjacent channel power
48. TXD relative alternate channel power

### Parameters used

11. RT External Pad and Cable Loss
17. RTD Active Slot
18. RTD Analyzer Trigger Delay
19. RTD DVCC
49. TXD Output Power Levels Tested [BWD #]

## TEST_40 - TXD Calibrate RF Power

This test calibrates the test system's 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).

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 (test hardware or cables) or ambient temperature by more than 5° F.

The calibration is done across the entire cellular band so that all channels will be calibrated.

### Pass/fail limits used

None

### Parameters used

04. CP Prt RECC RVC Data [0=no 1=yes 2=fail]
11. RT External Path Loss

## TEST_41 - RXD Receiver Sensitivity (loopback)

This test measures the receiver's sensitivity by putting the mobile unit into loopback mode and measuring the mobile's ability to receive a base station signal at low RF levels set by the parameter, RXD RF Sensitivity Level. The user is required to manually put the mobile unit into loopback through the handset. The process for manually putting the mobile unit into loopback is mobile-unit-dependent and must be obtained from the mobile unit manufacturer.

### Background

RXD receiver 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.

### Pass/fail limits used

None

### Parameters used

11. RT External Path Loss
15. RT Test at Extreme Settings [0=no 1=yes]
33. RXD Number of Slots to Demod [1:1555]
34. RXD Number of Training Slots [0:500]
35. RXD RF Sensitivity Type Tested [BWD #]
36. RXD Sensitivity RF Level

## TEST_42 - 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

49. TXD Time Alignment

### Parameters used

09. CPD Wait for Handoff
11. RT External Path 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 values are derived from standard methods of measurement and some are derived from the radio test 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 63* or *chapter 6, "Using the Software HP 8920A FW Below Rev A.14.00," on page 97*.

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 323*.

To print the parameters list, see *"To print TESTS screens:" on page 317*.

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
RC = Running Conditions
RT = Receiver and Transmitter, Analog and Digital
RTD = Receiver and Transmitter, Digital
RX = Receiver, Analog and Digital
RXA = Receiver, Analog
RXD = Receiver, Digital
TX = Transmitter, Analog and Digital
TXA = Transmitter, Analog
TXD = Transmitter, Digital

## 01. AA 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 01 **`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 01 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 02 **`AB 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 01 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 02 **AB MIN From?** is set to **2=Phone #**, indicating to the Test Set to get the MIN from the phone number.
- Parameter 02 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 01 is set to **1231234567** and Parameter 02 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).

## 02. AB MIN From? [0=RECC,1=All 0's,2=Phone #]

**This parameter specifies from where the Test Set will get the Mobile Identification Number (MIN) of the UUT.**

Setting Parameter 02 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 02 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 02 to **`0=RECC`** and getting the MIN from the RECC Data from a UUT that has an all zero MIN.

***NOTE:*** If Parameter 02 is set to **`1=All 0’s`**, then Parameter 01 **`AA Enter Ph#?`** is not used.

Setting Parameter 02 to **`2=Phone #`** causes the Test Set to derive the MIN from the phone number, depending on the entry in Parameter 01 **`AA Enter Ph#?`** described below:

- If Parameter 01 contains a phone number, the phone number in Parameter 01 is used to derive a MIN.
- If Parameter 01 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 02.

### Used in Tests

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

## 03. CP Control Channel [1:799] or [991:1023]

**This parameter is used to identify the control channel used by the UUT. Primary control channels for System A are numbered from 1 to 333. Primary control channels for System B are numbered from 334 to 366. Secondary control channels for System A are numbered from 667 to 716 and 991 to 1023. Secondary control channels for System B are numbered from 717 to 799. 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.

### Used in Tests

All tests that obtain a forward control channel.

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

**This parameter allows you to print the Reverse Control Channel (RECC) and Reverse Voice Channel (RVC) messages to the display or printer.**

The RECC message is a wideband data stream sent from the mobile station to the land station, and can consist of up to five words. The types of messages that can be transmitted over the RECC are:

- Page Response Message
- Origination Message
- Order Confirmation Message
- Order Message

The RVC message is a wideband data stream sent from the mobile station to the land station, and can consist of one or two words. The types of messages that can be transmitted over the RVC are:

- Order Confirmation Message
- Called-Address Message

### Used in Tests

All tests whenever the RECC or RVC messages are analyzed during testing.

## 05. CP SID Number

**This parameter identifies the mobile station's System Identification (SID) number. The SID is stored as a 15-bit binary number in the mobile station's permanent security and identification memory.**

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.

### Example

If your UUT's SID number is decimal 11111, you would enter **`11111`** as the value.

### Used in Tests

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

## 06. CPA DSAT Vector

### This parameter allows you to set the Digital Supervisory Audio Tone (DSAT) sequence to be used on narrow voice channels:

The seven valid sequences are as follows:

#0 = 2556CB

#1 = 255B2B

#2 = 256A9B

#3 = 25AD4D

#4 = 26AB2B

#5 = 26B2AD

#6 = 2969AB

#### Example

If you want the first sequence shown above, you would enter a **`0`** as the value.

#### Used in Tests

All tests that obtain a narrow voice channel.

## 07. 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.**

### Example

If you want the SAT to be at 6000 Hz, you would enter **`6000`** as the value. All values are entered in Hz.

### Used in Tests

All tests that obtain a wide voice channel.

## 08. 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 system's 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**.

### Used in Tests

TEST_34 - CPD Talk Back

## 09. CPD Wait for Handoff

**This parameter sets the time to wait between sending a hand-off message to the UUT and the test system's Digital Analyzer attempting to make a measurement at the new channel. The value must be entered in 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**.

### Used in Tests

This parameter will be used in any test that is preceded by a digital test in your test sequence.

TEST_30 - CPD Page
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels
TEST_34 - CPD Talk Back
TEST_35 - CPD Origination
TEST_36 - CPD Release
TEST_42 _ TXD Time Alignment

## 10. RC Compandor is Always On

### This parameter allows you to indicate whether or not the compandor is always on.

If this parameter is set to **1** (Yes), the program assumes that the UUT's compressor circuitry is located before the pre-emphasis circuitry on the transmitter, and behind the de-emphasis circuitry in the receiver.

With the compandor always "ON" (set to **1**), the effects of an "ideal expandor" are removed from the test results. TEST_15 - RXA Audio Frequency Response results are reduced in half. Also, the test operator is not prompted to turn the compandor "ON" and "OFF".

If this parameter is set to **0** (No), then the test operator will be prompted to "turn the Radio compandor ON" during testing. Some manual control of the phone's compandor state is required.

#### Example

If you do not want the compandor always on, you would enter **0** as the value. The value must be either a **0** for no, or a **1** for yes.

#### Used in Tests

TEST_05 TXA Modulation Deviation Limiting
TEST_06 TXA Audio Frequency Response
TEST_07 TXA Audio Distortion
TEST_09 TXA FM Hum and Noise
TEST_12 TXA Compressor Response
TEST_23 TXA Quick General
TEST_24 RXA Quick General

## 11. RT External Path Loss

This parameter allows you to set the amount of loss for any external cables or pads (attenuators) connected to the test system. Also use this parameter to compensate for path loss when the RF link between the cellular phone and the test system is accomplished via antennas. This loss is compensated for in power measurements and in signal generator level settings on the test system. *Also see Parameter "16. RT Use DUPLEX OUT & ANT IN" on page 199.*

### 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.

### Used in Tests

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

## 12. High Supply Voltage

**This parameter is used to set the UUT to its highest specified voltage ratings. The value must be entered in Vdc with a range from “0” to “60”. The Parameter 15, RT Test at Extreme Settings must be set to “yes” for 12. RT High Supply Voltage to be activated.**

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See *Parameter "15. RT Test at Extreme Settings [0=no 1=yes]" on page 198* for more information.

### 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.

### Used in Tests

TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_05 - TXA Modulation Deviation Limiting
TEST_18 - RXA SINAD

## 13. RT Low Supply Voltage

**This parameter is used to set the UUT to its lowest specified voltage rating. The value must be entered in Vdc with a range from "0" to "60". The Parameter 15, RT Test at Extreme Settings must be set to "yes" for 13. RT Low Supply Voltage to be activated.**

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See the Parameter *"15. RT Test at Extreme Settings [0=no 1=yes]" on page 198* for more information.

### 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.

### Used in Tests

TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_05 - TXA Modulation Deviation Limiting
TEST_18 - RXA SINAD

## 14. RT Nominal Supply Voltage

**This parameter is used to set the mobile unit to its nominal specified voltage rating under normal conditions. The value must be entered in Vdc with a range from “0” to “60”.**

The software requires that an HP-IB programmable power supply be used in order to adjust the voltage to the desired value. See *Parameter "15. RT Test at Extreme Settings [0=no 1=yes]" on page 198* for more information.

### Example

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

### Used in Tests

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

## 15. 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:

12. RT High Supply Voltage
13. RT Low Supply Voltage
30. RXA RF Level for SINAD at Extremes

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_13 - TXA Current Drain" on page 149*.

The following tests can be run at extreme testing conditions.

### Used in Tests

TEST_03 - TXA Frequency Error
TEST_04 - TXA RF Power Output
TEST_05 - TXA Modulation Deviation Limiting
TEST_18 - RXA SINAD
TEST_22 - OTA No Audio Functional
TEST_23 - TXA Quick General
TEST_24 - TXA Quick General
TEST_33 - RXD Receiver Sensitivity (MAHO)
TEST_37 - TXD Modulation Accuracy
TEST_38 - TXD RF Power Output
TEST_41 - RXD Receiver Sensitivity (loopback)

## 16. RT Use DUPLEX OUT & ANT IN

This parameter allows you to select which RF ports on the test system will be used for cellular phone tests. A value of 0 causes the RF IN/OUT port to be used for both forward and reverse channels. A value of 1 causes the DUPLEX OUT port to be used for the forward channel and the ANT IN port to be used for the reverse channel.

Use of the DUPLEX OUT and ANT IN ports allows the RF link between the test system and the cellular phone to be established via antennas instead of coaxial cable. In either case, the Parameter 11, RT External Path Loss should be used to compensate for the path loss.

***NOTE:*** If the RF link is accomplished via antennas, it must be done inside a shielded environment to avoid interference with local cellular telephone service.

ANT IN cannot be used for TEST_32 - TXD Switch Channels and TEST_38 - TXD RF Power Output because of the maximum power handling capability of the ANT IN port.

### Used in Tests

TEST_04 - TXA RF Power Output
TEST_20 - CPA Release
TEST_25 - CP Manual Flow Chart
TEST_26 - TXA Switch Channels
TEST_36 - CPD Release

## 17. RTD Active Slot [1:3]

This parameter sets the timeslot assignment number that is sent to the UUT. This parameter also sets the **`Sync Word`** field in the test system's TDMA TESTS screen. This screen may be accessed by pressing TESTS and then selecting the TDMA TESTS 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`**.

### Used in Tests

TEST_30 - CPD Page
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels
TEST_33 - RXD Receiver Sensitivity (Ch Qual)
TEST_34 - CPD Talk Back
TEST_35 - CPD Origination
TEST_36 - CPD Release
TEST_37 - TXD Modulation Accuracy
TEST_38 - TXD RF Power Output
TEST_39 - TXD Adjacent Channel Power
TEST_41 - RXD Receiver Sensitivity (loopback)

## 18. RTD Analyzer Trigger Delay [0:971]

This parameter sets the number of bit clock cycles that the test system's 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. You may get an error message if there is not enough or too much trigger delay. See the error messages **Sync word was too soon in the burst** or **Sync word was too late in the burst** in chapter 6 *Problem Solving-Error Messages*.

**Example**

Assume that the measurement should be started as close to the synchronization of the 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).

**Used in Tests**

TEST_30 - CPD Page
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels
TEST_33 - RXD Receiver Sensitivity (Ch Qual)
TEST_34 - CPD Talk Back
TEST_35 - CPD Origination
TEST_36 - CPD Release
TEST_37 - TXD Modulation Accuracy
TEST_38 - TXD RF Power Output
TEST_39 - TXD Adjacent Channel Power
TEST_41 - RXD Receiver Sensitivity (loopback)

## 19. RTD DVCC [1:255]

This parameter identifies the Digital Verification Color Code number that is sent to the UUT. This parameter also sets the **`DVCC`** field in the test system's TDMA TESTS screen. This screen may be accessed by pressing TESTS and then selecting the TDMA TESTS screen through the **`To Screen More`** area. A decimal number from "1" to "255" is allowed.

**Example**

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

### Used in Tests

TEST_30 - CPD Page
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels
TEST_33 - RXD Receiver Sensitivity (Ch Qual)
TEST_34 - CPD Talk Back
TEST_35 - CPD Origination
TEST_36 - CPD Release
TEST_37 - TXD Modulation Accuracy
TEST_38 - TXD RF Power Output
TEST_39 - TXD Adjacent Channel Power
TEST_41 - RXD Receiver Sensitivity (loopback)

## 20. RXA Audio Response Step Frequency

**This parameter is the step-size used between 300 Hz and 3 kHz to vary the audio input signal frequency in TEST_15-RXA Audio Frequency Response. The values must be entered in kHz.**

**Example**

To step in 500 Hz increments enter 0.5.

**Used in Test**

TEST_15 - RXA Audio Frequency Response

## 21. RXA Expandor Step Level

This parameter is the step-size used to vary the input level to the expandor that is used in TEST_14 - RXA Expandor. The value must be entered in dB.

**Example**

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

**Used in Test**

TEST_14 - RXA Expandor

## 22. RXA FVC Message Error Rate RF Level

**This parameter sets the RF level for testing the Forward Voice Control (FVC) order message error rate.**

**Example**

If you want the RF level for testing the FVC order message error rate to be at –110 dBm, you would enter –**110** as the value.

**Used in Test**

TEST_19 - RXA FVC Order Message Error Rate

## 23. RXA MRI Start Level

The parameter is the starting level of the RF carrier that is output by the test system at the beginning of TEST_29 - RXA MRI. The level will be decremented during the test, so this level is the highest one used.

**Example**

If you want the RF level to start at –75 dBm, enter –**75**.

**Used in Test**

TEST_29 - RXA MRI

## 24. RXA MRI Step Level

This parameter sets the step size used by the test system to vary the level of the RF carrier output during TEST_29 - RXA MRI. The level is decremented.

**Example**

If you want the RF level to be stepped in 5 dB steps, enter –**5** as the RXA MRI step level.

**Used in Test**

TEST_29 - RXA MRI

## 25. RXA MRI Stop Level

This parameter sets the level that is the final (lowest) level of RF carrier output by the test system during TEST_29 - RXA MRI.

### Example

If you want the RF level to be stopped at –105 dBm, enter –**`105`** as the RXA MRI stop level.

### Used in Test

TEST_29 - RXA MRI

## 26. RXA NAMPS RF Level for SINAD

This parameter sets the RF signal level for measuring SINAD on narrow voice channels at the nominal power supply voltage. The value must be entered in dBm.

### Example

If you want the RF signal level to be at –118 dBm for SINAD measurements, you would enter –**`118`** as the value.

### Used in Test

TEST_18 - RXA SINAD
TEST_22 - OTA No Audio Functional

## 27. RXA NAMPS RF Level for SINAD at Extremes

**This parameter sets the RF signal level for measuring SINAD on narrow voice channels at the power supply voltage extremes. The value must be entered in dBm. The Parameter 15, RT Test at Extreme Settings must be set to “yes” for Parameter 30, RXA RF Level for SINAD at Extremes to be activated.**

**Example**

If you want the RF signal level to be at –115 dBm for SINAD measurements, you would enter –**`115`** as the value.

**Used in Test**

TEST_18 - RXA SINAD

## 28. RXA RF Level for Signaling

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`**.

**Example**

If you desire an RF level of –50 dBm, enter –**`50`**.

**Used in Tests**

All tests

## 29. RXA RF Level for SINAD

**This parameter sets the RF signal level for measuring SINAD on wide voice channels at the nominal power supply voltage. The value must be entered in dBm.**

### Example

If you want the RF signal level to be at –116 dBm for SINAD measurements, you would enter –**`116`** as the value.

### Used in Tests

TEST_18 - RXA SINAD
TEST_22 - OTA No Audio Functional

## 30. RXA RF Level for SINAD at Extremes

This parameter sets the RF signal level needed at extreme conditions. The value must be entered in dBm with a range from "–150" to "–15". The Parameter 15, RT Test at Extreme Settings must be set to "yes" for Parameter 30, 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.

### Used in Tests

TEST_18 - RXA SINAD
TEST_22 - OTA No Audio Functional

## 31. RXA Set Audio Lvl

**This parameter determines whether or not screen prompts are displayed to help the operator set the volume control during all of the receiver tests.**

To use this parameter, the test operator must have control or have access to the audio power (volume control) from the UUT's transceiver unit.

### Example

If your radio is to be tested at 50% of rated audio power, enter the audio level in volts, for example **`0.2`** for 200 mV. The test operator is prompted to adjust to the correct volume level during testing. (The test system displays an "analog meter". Correct adjustment is made when the meter needle is set in between the two longer lines on the meter.)

The value must be either a **`0`** for no, or a value for audio level in volts.

### Used in Tests

TEST_14 - RXA Expandor
TEST_15 - RXA Audio Frequency Response
TEST_16 - RXA Audio Distortion
TEST_17 - RXA Hum and Noise
TEST_18 - RXA SINAD
TEST_24 - RXA Quick General

## 32. RXA Tolerance for Setting Audio Level

**This parameter is used as the value of the maximum percentage of error that you are allowed for setting the UUT volume.**

The value sets the tolerance window in the “analog meter” screen that is used to manually set the UUT’s volume during testing; the meter needle must be within the tolerance window (shown by two longer lines on the meter) before the program will accept the manually set UUT volume. The tolerance should be as accurate as the volume control will allow.

***NOTE:*** This parameter is only active when parameter (RX Set Audio Lvl) is set to accept audio level in volts.

### Example

Enter the value as a percentage of the desired audio level. For example, if the UUT’s maximum audio power is 10 watts, and the tolerance for setting volume is set to 5%, the window will be 1 watt (which is ±5% of 10 watts, the tolerance allows settings above and below the point determined by the audio level value converted from volts to watts).

### Used in Tests

TEST_14 - RXA Expandor
TEST_15 - RXA Audio Frequency Response
TEST_16 - RXA Audio Distortion
TEST_17 - RXA Hum and Noise
TEST_18 - RXA SINAD
TEST_24 - RXA Quick General

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

This parameter sets the **`Num Slots`** field in the test system’s TDMA TESTS screen. This screen may be accessed by pressing TESTS and then selecting the TDMA TESTS 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_41 - RXD Receiver Sensitivity (loopback). All other digital tests build one timeslot 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 Number of Training Slots + RXD Number 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 33, RXD Number of Slots to Demod before the “wraps 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 Number of Training Slots + RXD Number of Slots to Demod

The digital analyzer will only look at the number of training slots (set in the Parameter 34, RXD Number of Training Slots) plus one frame of data to synchronize to the received data before giving up and generating a status error message.

The digital analyzer will only make measurements on the number set by the Parameter 33, RXD Number of Slots to Demod.

The digital generator **`Num Slots`** field in the test system’s TDMA TESTS screen is set to the value in the Parameter 33, RXD Number of Slots to Demod, plus 50.

See *Parameter "34. RXD Number of Training Slots [0:500]" on page 211* for explanation and use of Training Slots.

***NOTE:*** Some mobile units may not work properly with a large number of demodulated slots due to the fact that the test system’s digital generator must rebuild the slots after the mobile unit is put into loopback while TEST_41 - RXD Receiver Sensitivity (loopback) is continued. At approximately 3.3 ms/slot build time, the mobile may not react favorably to a several second gap in pseudo-random data (all zeros sent) while the generator rebuilds the transmit modulation.

### 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.

### Used in Test

TEST_25 - CP Manual Flow Chart
TEST_41 - RXD Receiver Sensitivity (loopback)

## 34. RXD Number of Training Slots [0:500]

This parameter sets the **`Train Slots`** field in the test system’s 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 "34. RXD Number of Training Slots [0:500]" on page*

*211*). 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_41 - RXD Receiver Sensitivity (loopback). This test reports the number of training slots found by the analyzer. If the number is zero, this parameter should be increased until the analyzer is able to find training slots for all types of sensitivity tested (Raw BER or WER).

Parameter 34, RXD Number of Training Slots parameter is used in conjunction with the Parameter 35, RXD RF Sensitivity Type Tested [BWD #]. Be sure and select the types of sensitivity to be tested through Parameter 35, RF Sensitivity Type Tested [BWD #]. **Example**

A sufficient number of training slots should be specified to allow the test system to resynchronize once the **`Continue`** key is pressed. Set the Number of Training Slots value to at least 100.

**Used in Test**

TEST_41 - RXD Receiver Sensitivity (loopback)

## 35. RXD RF Sensitivity Type Tested [BWD #]

This parameter determines which BER/WER tests will be done in TEST_41 - RXD Receiver Sensitivity (loopback). This parameter's 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”.

| **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.

### Used in Test

TEST_41 - RXD Receiver Sensitivity (loopback)

## 36. RXD Sensitivity RF Level

This parameter sets the RF signal level that is used in the digital sensitivity tests. 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.

### Used in Test

TEST_33 - RXD Receiver Sensitivity (Ch Qual)
TEST_41 - RXD Receiver Sensitivity (loopback)

## 37. TX Switch Start Channel [1:1023]

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

### Example

If you want to set the start channel to channel 300, enter **`300`**.

### Used in Tests

TEST_26 - TXA Switch Channels
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels

## 38. TX Switch 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_31 - CPA Quick Digital, TEST_32 - TXD Switch Channels, and in TEST_26 - TXA Switch Channels for the second analog-to-digital handoff channel. This step size may be any integer bounded by Parameter 37, TX Switch Start Channel and Parameter 39, TX Switch Stop Channel.

### Example

If you want to set the step channel size to 10 channels, enter **`10`**.

### Used in Tests

TEST_26 - TXA Switch Channels
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels

## 39. TX Switch Stop Channel [1:1023]

This parameter sets the stop channel used in TEST_31 - CPA Quick Digital, TEST_32 - TXD Switch Channels, and in TEST_26 - TXA Switch Channels for the final analog-to-digital handoff channel. The stop channel may be any channel in the range from 1 to 1023.

### Example

If you want to set the stop channel to channel 600, enter **`600`**.

### Used in Tests

TEST_26 - TXA Switch Channels
TEST_31 - CPD Quick Digital
TEST_32 - TXD Switch Channels

## 40. TX TS Atten for Signaling [0, 20, 40]

This parameter sets the input attenuation in the test system's RF Analyzer to attenuate the signal which is input to the test system. Values are entered as 0, 20, or 40 dB.

Set this parameter for 20 dB attenuation if you have an HP 8920D without Option 008, or an HP 8921D.
Set this parameter for 40 dB attenuation if you have an HP 8920D/HP 8921D with Option 008.

### Example

If you have an HP 8920D/HP 8921D without option 008 you will need 20 dB input attenuation to the test system, enter **`20`** as the value.

### Used in Tests

All Tests (whenever signaling is done).

## 41. 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. Select the type of unit required for your application. This parameter affects the pass/fail limits, TX Output Power @ Level 0 through 7 and TXD Output Power @ Level 8 through 10. See the descriptions for these pass/fail limits in this chapter.

### Used in Tests

TEST_04 - TXA RF Power Output
TEST_20 - CPA Release
TEST_23 - TXA Quick General
TEST_25 - CP Manual Flow Chart
TEST_26 - TXA Switch Channels
TEST_36 - CPD Release
TEST_38 - TXD RF Power Output

## 42. TXA Audio Response Step Frequency

This parameter is the step size used to vary the input signal frequency in TEST_06 - 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.

### Used in Test

TEST_06 - TXA Audio Frequency Response

## 43. TXA Compressor Step Level

**This parameter is the step size used to vary the input level to the expandor in TEST_12- TXA Compressor Response. The values must be entered as dB.**

### Example

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

### Used in Test

TEST_12 - TXA Compressor Response

## 44. TXA Current Drain Levels Tested [BWD #]

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

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

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

| **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.

### Used in Test

TEST_13 - TXA Current Drain

## 45. TXA Frequency Deviation Step Frequency

**This parameter is the step size used to vary the input signal frequency in TEST_05 - TXA 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.

### Used in Test

TEST_05 - TXA Modulation Deviation Limiting

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

This parameter activates a 50 Hz HPF in TEST_05 - TXA Modulation Deviation Limiting for wide voice channel testing only. The HPF is set to <20 Hz in TEST_05 if this parameter is set to **`0`** (off). The HPF is set to 50 Hz in TEST_05 if this parameter is set to 1 (on).

### Example

If you want to turn the 50 HPF on in lieu of the <20 Hz HPF, enter **`1`**.

### Used in Test

TEST_05 - TXA Modulation Deviation Limiting

## 47. TXA Output Power Levels Tested [BWD #]

**This parameter selects which output power levels will be tested in TEST_04 - TXA 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 "255".**

| **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.

### Used in Test

TEST_04 - TXA RF Power Output

## 48. TXA XXX Not Used

**This parameter is not used in software revision B.01.03 and later revisions. In previous revisions, this parameter set 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’s microphone input, enter **`.1`** as the value.

### Used in Test

TEST_12 - TXA Compressor Response

## 49. TXD Output Power Levels Tested [BWD #]

**This parameter selects which output power levels will be tested in TEST_38 - 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".**

| **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.

### Used in Test

TEST_37 - TXD Modulation Accuracy
TEST_38 - TXD RF Power Output
TEST_39 - TXD Adjacent Channel Power

## 50. TXT Trnsient/SS Data

This parameter requires trigger delay capabilities only available on the HP 8920B. HP 11807A software will ignore this parameter.

For HP 11807E software, this parameter allows the user to select between three modes of operation for the execution of TEST_11 TXA RVC Data Deviation.

- Select 0=tran (transient) to perform the test on the entire RVC data signal returned from the UUT.
- Select 1=bth (both) to perform the test on just the steady state portion of the RVC data signal followed by a test of the entire signal. This option uses trigger delay capabilities and can only be performed on an HP 8920B.
- Select 2=ss (steady state) to test only the steady state portion of the signal. This option uses trigger delay capabilities and can only be performed on an HP 8920B.

### It’s Used in the Following Test:

TEST_11 TXA RVC Data Deviation

# Pass/Fail Limit (Specification) 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 system’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 317*.

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

RXA = Receiver, Analog

TX = Transmitter, Analog or Digital

TXA = Transmitter, Analog

TXD = Transmitter, Digital

## 01. RXA Audio Distortion

**This sets the pass/fail limits used 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.

### Used in Tests

TEST_16 - RXA Audio Distortion
TEST_24 - RXA Quick General

## 02. RXA Audio Response Dev From –6 dB/oct R1

This sets the pass/fail limits used in TEST_15 - RXA 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 specification 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.

### Used in Test

TEST_15 - RXA Audio Frequency Response

## 03. RXA Audio Response Dev from –6 dB/oct R2

This sets the pass/fail limits used in TEST_15 - RXA 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.

### Used in Test

TEST_15 - RXA Audio Frequency Response

## 04. RXA Expandor Track Error <0

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

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

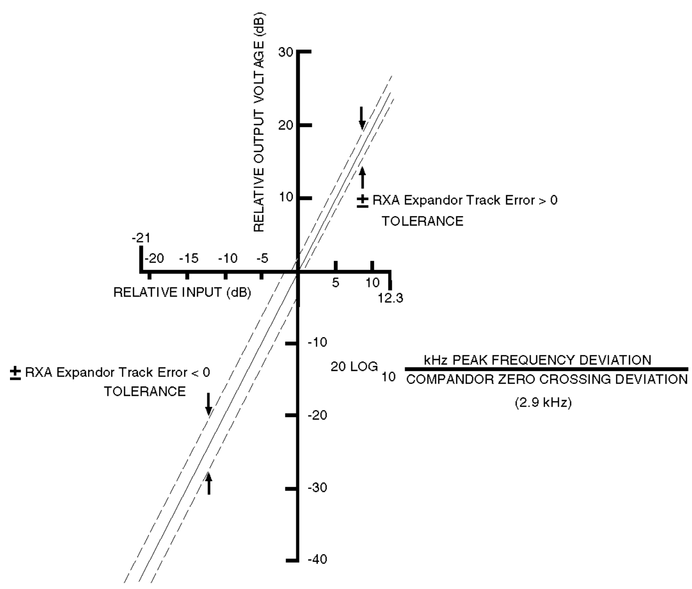
- EIA/TIA Standard: Expandor

### 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.

### Used in Test

TEST_14 - RXA Expandor



## 05. RXA Expandor Track Error >0

This sets the pass/fail limits used when the expandor's 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:

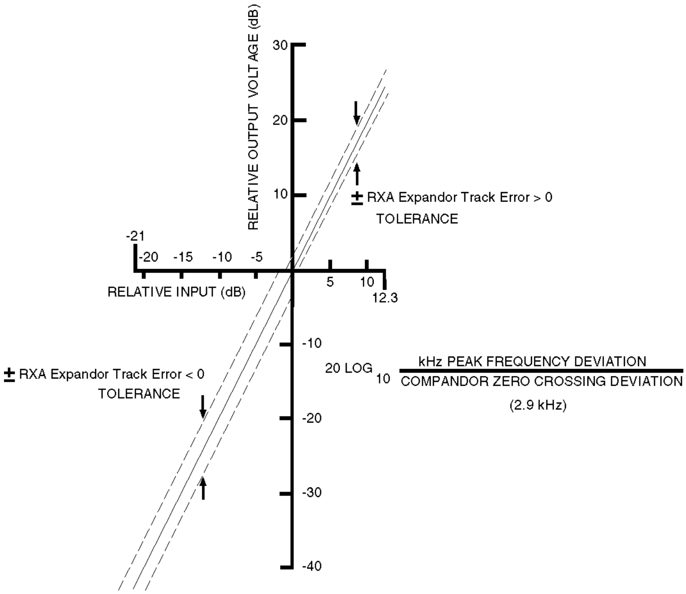
- EIA/TIA Standard: Expandor

### 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.

### Used in Test

TEST_14 - RXA Expandor



## 06. RXA Expandor Zero Reference Level

This sets the pass/fail limits used when the expandor's 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 Specification

RXA Expandor Zero Reference Level is not specified in the EIA/TIA standard for NADC phones or NAMPS 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 specifications that meet his or her needs.

If the operator does not wish to compare the measurement results to specifications, 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 83* or *"Changing Pass/Fail Limits (Edit Specifications)" on page 117*.

### 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.

### Used in Test

TEST_14 - RXA Expandor

## 07. RXA Hum and Noise

**This sets the pass/fail limits used in TEST_16 - RXA Audio Distortion and TEST_24 - 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.

### Used in Tests

TEST_17 - RXA Hum and Noise
TEST_24 - RXA Quick General

## 08. RXA NAMPS Expandor Zero Reference Level

**This sets the pass/fail limits that are used when the expandor's 0 dB reference level is measured on narrow voice channels. Lower and Upper Limits must be entered in dBV rms.**

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

- UUT Specification

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

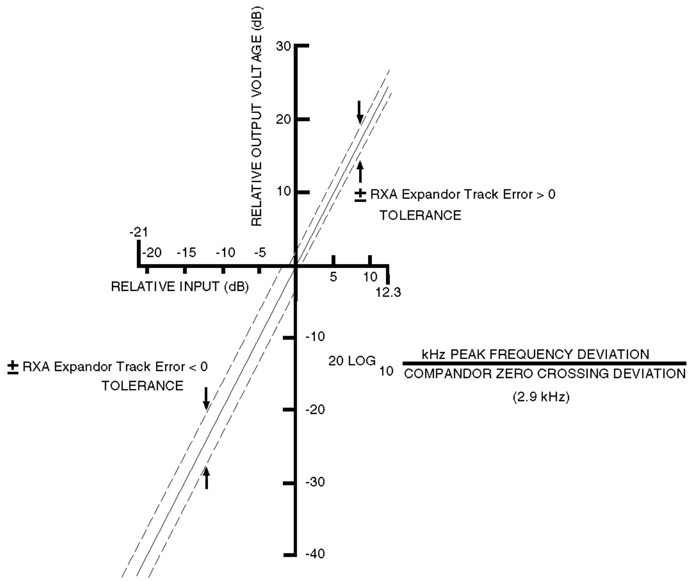
If the operator does not wish to compare the measurement results to pass/fail limits, the “check” setting in the pass/fail limit table for TXA Compressor Zero Reference Deviation can be set to “none”. See *"Changing Pass/Fail Limits" on page 83* or *"Changing Pass/Fail Limits (Edit Specifications)" on page 117*.

### Example

If your standard states that the output voltage from the receiver should be –20 dBV rms ±1 dB for a given frequency deviation (to produce the 0 dB reference level as shown in the following figure), you would enter –**21** as the Lower Limit and –**19** as the Upper Limit. (Check both limits.)

### Used in Test

TEST_14 - RX Expandor




# 09. RXA Order Message Error Rate (OMER)

**This pass/fail limit sets the limits for testing the receiver as it processes the Forward Voice Control (FVC) order message.**

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

- EIA Standard: FVC Order Message

**For Example:**

If your standard states that the order-message error rate should not exceed 5%, you would enter **5** as the Upper Limit. (Check upper limits.)

**Used in Test**

TEST_19 - RXA FVC Order Message Error Rate

## 10. RXA SINAD

This sets the pass/fail limits used when SINAD is measured at the audio output of the receiver. Limits must be entered in dB.

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

- EIA Standard: RF Sensitivity

**Example**

If your standard defines the usable sensitivity measurement that results in 12 dB SINAD at the audio output of the receiver, you would enter **12** as the Lower Limit.

**Used in Test**

TEST_18 - RXA SINAD

## 11-18. TX Output Power at Level 0 through 7

These pass/fail limits set the pass/fail limits for output power levels 0 through 7 measured in both analog and/or digital tests at the transmitter's output terminal. Units for this pass/fail limit are set by the Parameter 41, TX Units for Power Meas [0=dBW 1=Watts].

All power level limits are separate pass/fail limits 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

***NOTE:*** Values for power levels in the standard are for effective radiated power (ERP) and not as measured directly from the mobile unit. Power levels will be higher when measured directly from the mobile unit.

### Example

If you are testing Power Class I radios and you desire that the output power levels should be maintained within the range of +2 dB and –4 dB of the nominal values over a specified temperature range, enter the values in the following table for the Lower Limit and the Upper Limit for power levels of 0 through 7.

| Power Level | Nominal Value (dBW) | Lower Limit (dBW) | Upper Limit (dBW) |
|---|---|---|---|
| Level 0 | 6 | 2 | 8 |
| Level 1 | 2 | -2 | 4 |
| Level 2 | -2 | -6 | 0 |
| Level 3 | -6 | -10 | -4 |
| Level 4 | -10 | -14 | -8 |
| Level 5 | -14 | -18 | -12 |
| Level 6 | -18 | -22 | -16 |
| Level 7 | -22 | -26 | -20 |

### Used in Tests

TEST_04 - TXA RF Output Power
TEST_26 - TXA Switch Channels
TEST_32 - TXD Switch Channels
TEST_38 - TXD RF Power Output

## 19. TXA Audio Distortion

**This sets the pass/fail limits used when measuring 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.

**Used in Tests**

TEST_07 - TXA Audio Distortion
TEST_23 - TXA Quick General

## 20. TXA Audio Response Dev from 6 dB/oct

This sets the pass/fail limits used in TEST_06 - 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 -1 dB and +3 dB from a true 6 dB/octave pre-emphasis curve, enter –**1** as the Lower Limit and **3** as the Upper Limit.

**Used in Test**

TEST_06 - TXA Audio Frequency Response

## 21. TXA Audio Response Roll >2.5 kHz

This sets the pass/fail limits of the transmitter's 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 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.

### Used in Test

TEST_06 - TXA Audio Frequency Response

## 22. TXA Compressor Min Out @>17.6 dB Input

**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:

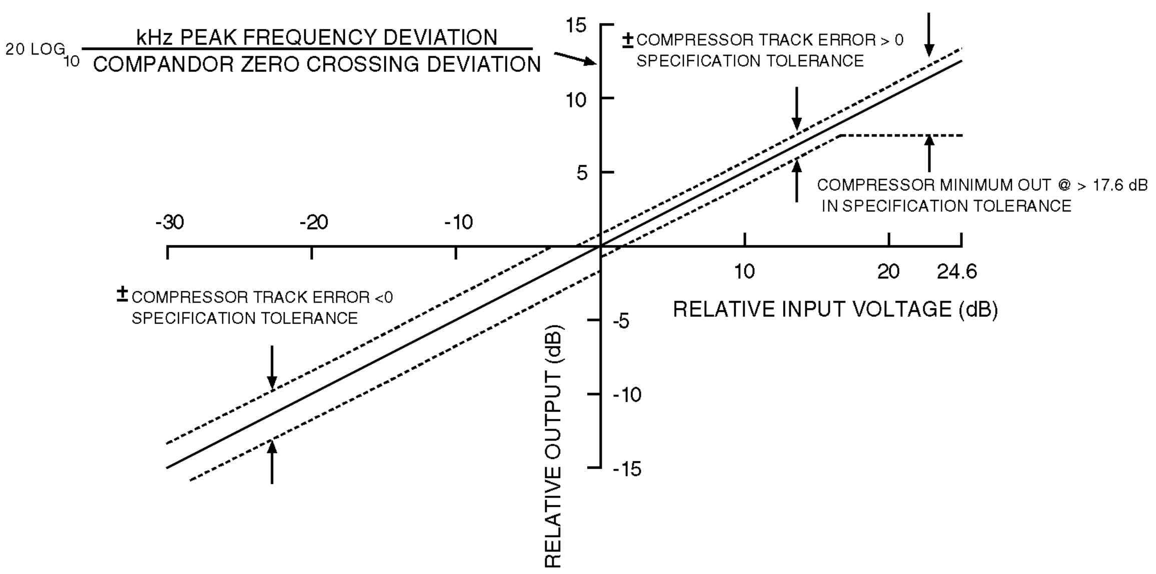
- EIA/TIA Standard: Compressor

### 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_12 - TXA Compressor Response
TEST_23 - TXA Quick General




compress.drw

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:

$$= -\left(\frac{RelativeInputVoltage}{2} - TXACompressorMinOut@ > 17.6\text{ dB Input}\right)$$

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

$$LowerLimit = -\left(\frac{20}{2} - 8.3\right) = -1.7$$

## 23. TXA Compressor Zero Ref Dev Not Used

**This pass/fail limit is not used in software revisions B.01.03 and later. In previous revisions, this set the pass/fail limits used in transmitter compressor tests 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 or NAMPS 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 specifications 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 83* or *"Changing Pass/Fail Limits (Edit Specifications)" on page 117*.

### Example

If your standard states that the voltage input to the transmitter is a –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.

### Used in Tests

TEST_12 - TXA Compressor Response
TEST_23 - TXA Quick General

## 24. TXA Current Drain @Levels 0-3

This sets the pass/fail limits for current consumption used in transmitter tests 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.

### Used in Tests

TEST_13- Current Drain
TEST_23 - TXA Quick General
TEST_22 - OTA No Audio Functional

## 25. TXA Current Drain @Levels 4-7

**This sets the pass/fail limits for current consumption used in transmitter tests 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.

### Used in Tests

TEST_13- Current Drain
TEST_23 - TXA Quick General
TEST_22 - OTA No Audio Functional

## 26. TXA DTMF Frequency Error

**This sets the pass/fail limits for the amount of frequency error allowed for the DTMF (Dual-Tone Multi-Frequency) signals. 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.

### Used in Test

TEST_28 - TXA DTMF Frequency Error

## 27. TXA FM Hum and Noise

This sets the pass/fail limits for the transmitter’s residual FM hum and noise. 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.

### Used in Tests

TEST_07 - TXA Audio Distortion
TEST_23 - TXA Quick General

## 28. TXA Frequency Error

This sets the pass/fail limits for the transmitter's carrier frequency error. 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.

### Used in Tests

TEST_03 - TXA Frequency Error
TEST_22 - OTA No Audio Functional
TEST_23 - TXA Quick General

## 29. TXA Modulation Limiting

This sets the pass/fail limits for the transmitter's peak frequency deviation. 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 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.

### Used in Tests

TEST_05 - Modulation Deviation Limiting
TEST_23 - TXA Quick General

## 30. TXA NAMPS Comp Zero Ref Dev Not Used

This pass/fail limit is not used in softwware revision B.01.03 and later. In previous revisions, this set the pass/fail limits that are used when the compressor's 0 dB reference deviation is measured on narrow voice channels. The 0 dB reference deviation is found when a voltage input (the parameter, TXA Voltage for Compressor Zero Crossing) to the transmitter produces an output at the transmitter equal to the specified peak frequency deviation. Lower and Upper Limits must be entered in kHz.

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

- EIA Standard: Expandor

### Example

If your standard states that the voltage input to the transmitter is a –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, you would enter **`2.73`** as the Lower Limit and **`3.07`** as the Upper Limit.

### Used in Test

TEST_12 - TXA Compressor Response

## 31. TXA NAMPS DSAT Closure

**This sets the pass/fail limits that are used when closure of the eye pattern is measured for the DSAT transmitted by the UUT on a narrow voice channel.**

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

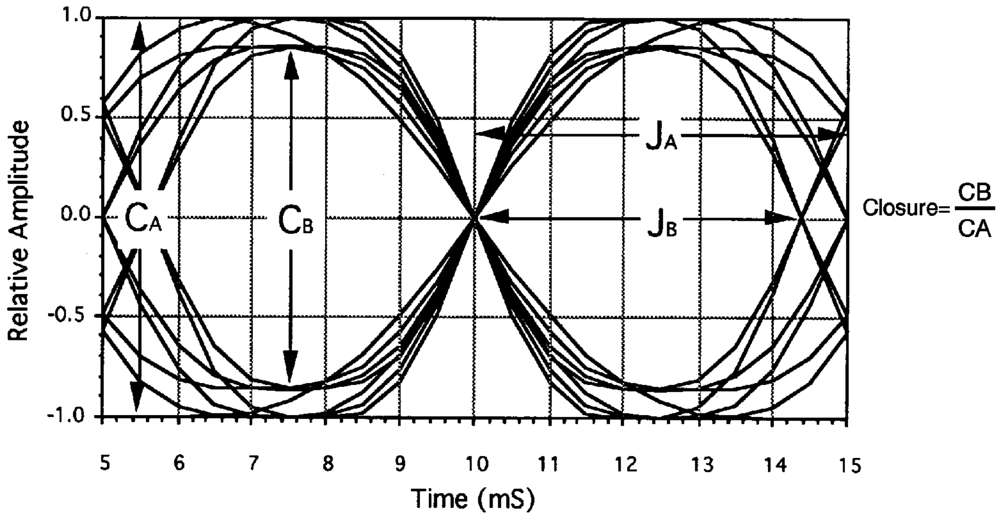
- TIA Standard: Sub-Audible Data

### For Example:

If your standard states that the eye pattern closure must be greater than .65, you would enter **`.65`** as the lower limit and **`1`** as the upper limit.

### Used in Test

TEST_10 - TXA SAT/DSAT




Transmit Data Eye Pattern

## 32. TXA NAMPS DSAT Deviation

This sets the pass/fail limits that are used for peak frequency deviation measurements of the DSAT sequence transmitted by the UUT on a narrow voice channel.

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

- TIA Standard: Sub-Audible Data

### Example

If your standard states that the peak frequency deviation for the DSAT sequence shall be ±700 Hz with a ±10 % tolerance, you would enter **`630`** as the lower limit and **`770`** as the upper limit.

### Used in Tests

TEST_10 - TXA SAT/DSAT
TEST_11 - TXA RVC Data Deviation

## 33. TXA NAMPS DSAT Phase Jitter

**This sets the pass/fail limits that are used when phase jitter of the eye pattern is measured for the DSAT transmitted by the UUT on a narrow voice channel.**

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

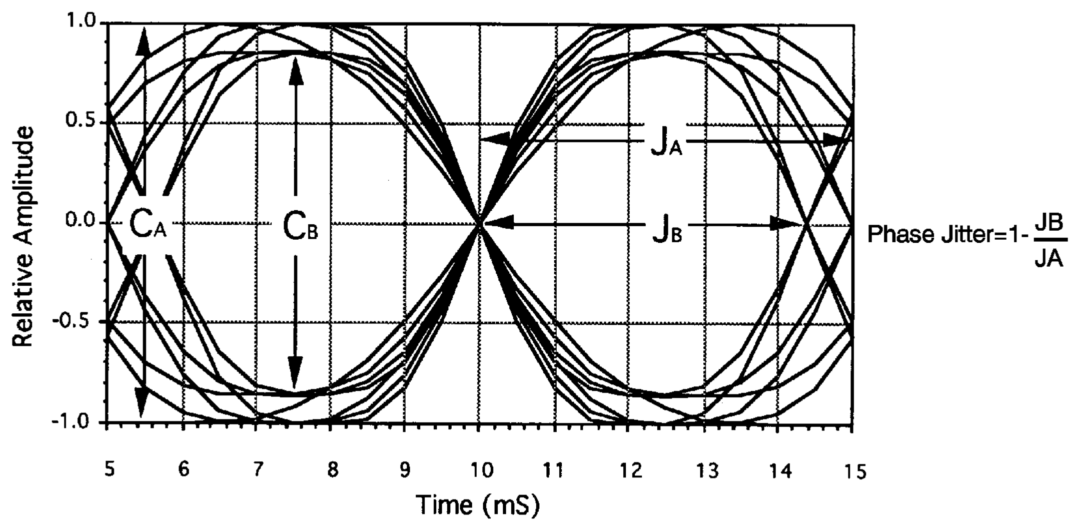
- TIA Standard: Sub-Audible Data

### Example

If your standard states that the phase jitter of the eye pattern must be less than .15, you would enter **`.15`** as the upper limit and **`0`** as the lower limit.

### Used in Test

TEST_10 - TXA SAT/DSAT




Transmit Data Eye Pattern

## 34. TXA NAMPS Modulation Limiting

This sets the pass/fail limits when the transmitter circuits are tested for their ability to prevent the transmitter from producing deviation in excess of the rated system deviation for narrow voice channels. Limits must be entered in kHz.

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

- EIA Standard: Modulation Deviation Limiting

### Example

If your standard states 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.

### Used in Test

TEST_05 - TXA Modulation Deviation Limiting

## 35. TXA SAT Deviation

This sets the pass/fail limits for the SAT tone’s peak frequency deviation. 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.

### Used in Tests

TEST_10 - TXA SAT/DSAT
TEST_22 - OTA No Audio Functional
TEST_23 - TXA Quick General

## 36. TXA SAT Frequency Error

This sets the pass/fail limits for the SAT tone's frequency accuracy. 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.

### Used in Tests

TEST_10 - TXA SAT/DSAT
TEST_22 - OTA No Audio Functional
TEST_23 - TXA Quick General

## 37. TXA Signaling Tone Deviation

This sets the pass/fail limits for the signaling tone's peak frequency deviation. 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 with a ±10% tolerance, enter **7.2** as the Lower Limit and **8.8** as the Upper Limit.

### Used in Test

TEST_08 - TXA Signaling Tone/DST

## 38. TXA Signaling Tone Frequency

This sets the pass/fail limits for the signaling tone's frequency accuracy. 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.

### Used in Test

TEST_08 - TXA Signaling Tone/DST

## 39. TXA Wideband Data Deviation

This sets the pass/fail limits for the Wideband Data deviation.

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

- EIA Standard: Wideband Data

### For Example:

If your standard states 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.

Lower and Upper Limits must be entered in kHz.

### It's Used in the Following Test:

TEST_11. TX RVC Data Deviation

## 40. TXD Amplitude Droop

### This sets the pass/fail limits for the burst amplitude droop rate.

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

#### Example

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

#### Used in Test

TEST_37 - TXD Modulation Accuracy

## 41. TXD Frequency Error

This sets the pass/fail limits for the frequency stability of the UUT. 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.

#### Used in Test

TEST_37 - TXD Modulation Accuracy

## 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.

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.

### Used in Test

TEST_37 - TXD Modulation Accuracy

## 43-45. TXD Output Power at Level 8 through 10

**These pass/fail limits set the pass/fail limits for output power levels 8 through 10 (measured in digital only tests) at the transmitter's output terminal. Units for this pass/fail limit are set by the Parameter 41, TX Units for Power Meas [0=dBW 1=Watts].**

All power level limits are separate pass/fail limits 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

***NOTE:*** Values for power levels in the standard are for effective radiated power (ERP) and not as measured directly from the mobile unit. Power levels will be higher when measured directly from the mobile unit.

### Example

If you are testing Power Class IV radios and you desire that the output power levels should be maintained within the range of ±3 dB for power level 8, ±6 dB for power level 9, and ±9 dB for power level 10 of the nominal values over a specified temperature range, enter the following as the Lower Limit and the Upper Limit.

| Power Level | Nominal Value (dBW) | Lower Limit (dBW) | Upper Limit (dBW) |
|---|---|---|---|
| Level 8 | -26 | -29 | -23 |
| Level 9 | -30 | -36 | -24 |
| Level 10 | -34 | -43 | -25 |

### Used in Tests

TEST_32 - TXD Switch Channels
TEST_38 - TXD RF Power Output

## 46. 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.**

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.

### Used in Test

TEST_37 - TXD Modulation Accuracy

## 47. TXD Relative Adjacent Channel Power

**This sets the pass/fail limits for the upper and lower 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.

### Used in Test

TEST_39 - TXD Adjacent Channel Power

## 48. TXD Relative Alternate Channel Power

### This sets the pass/fail limits for the first and second alternate 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.

#### Used in Test

TEST_39 - TXD Adjacent Channel Power

## 49. TXD Time Alignment (Symbols)

**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.

**Used in Test**

TEST_42 - TXD Time Alignment

## 50. TXT Wideband Data Deviation Transient

This sets the pass/fail limits for the transient portion of the RVC wideband data deviation measurement (TEST_11). This specification is only used if parameter 50 *TXT trnsient/ss data [0=tran 1=bth 2=ss]* is set to 1=bth (both), which causes the software to separately report the transient and steady state portions of the measurement.

**Used in Test**

TEST_11. TXA RVC Data Deviation

# 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 8920A,B,D.

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. 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 Connection" on page 310*. 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 8920 Programming Manual* HP part number 08920-90204.
- HP 8920B
    - *HP Instrument Basic User's Handbook Version 2.0* HP part number E2083-90005.
    - *HP 8920 Programming Manual* HP part number 08920-90204.

*See "Collection to a Memory Card or Disk" on page 279* and *"Initializing a Disk" on page 292*.

# 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
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
```

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 ($80 \times 256$). 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
```

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

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

*See "Initializing a Disk" on page 292* if using a new disk. *See "Initializing a Memory Card" on page 300*, 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 3** **Data Collection (Saving/Retrieving Tests) Configuration Summary**

| Inst# | Calling Name Options | Model | Addr | Description |
|---|---|---|---|---|
| 1 | DATA Collection | don't care | 7xx[1] | To HP-IB disk drive |
| 1 | DATA Collection | don't care | 1 | To memory card |
| Options[2] | File types of ASCII,<br>or BDAT,<br>or (EXT),[3]<br>or blank,[4]<br>REC=xxxxx,<br>(number of records) | don't care | 7xx[1] | LIF format<br>LIF format<br>DOS file type[4]<br>DOS or HP-UX file type<br>Number of records |
| 1 | DATA Collection | don't care | 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

## 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 288* in this chapter.

**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.

***NOTE:*** **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 4 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 5** **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 6 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**

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 lists the terminal/computer keystrokes that equate to front-panel controls. *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 upper-case 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 7 Equivalent Front-Panel Control Characters**

| Function | Equiv. ESC Char. | Function | Equiv. ESC Char. |
|---|---|---|---|
| CANCEL | ! | k5 | 5 |
| PERCENT MHZ_V | ( | K1_PRIME | 6 |
| S_KHZ_MV | ) | K2_PRIME | 7 |
| BACKSPACE | - | K3_PRIME | 8 |
| ENTER | . | ASSIGN | 9 |
| RELEASE | 0 | KNOB_TURN_CCW | < |
| K1 | 1 | KNOB_TURN_CW | > |
| K2 | 2 | MSSG | A |
| K3 | 3 | HELP | B |
| K4 | 4 | CONFIG | C |
| HOLD | D | RX | a |
| PRINT | E | TX | b |
| ADRS | F | DUPLEX | c |
| SAVE | G | PREV | d |
| REF_SET | J | TESTS_MAIN | e |
| METER | K | LOCAL | f |
| AVG | L | RECALL | g |
| LO_LIMIT | M | MEAS_RESET | h |
| HI_LIMIT | N | PRESET | i |
| E | R | INCR_DIV_10 | j |

Table 7 Equivalent Front-Panel Control Characters

| Function | Equiv. ESC Char. | Function | Equiv. ESC Char. |
|---|---|---|---|
| F | S | INCR_SET | k |
| B | U | INCR_TIMES_10 | l |
| C | V | DOWN | m |
| D | W | UP | n |
| A | X | SEVEN | o |
| EEX | Z | EIGHT | p |
| YES_ON_OFF | [ | NINE | q |
| NO_PPM_W | ] | FOUR | r |
| RX | a | FIVE | s |
| SIX | t | POINT | y |
| ONE | u | PLUS_MINUS | z |
| TWO | v | OHM_PCT_DEL_DBUV | { |
| THREE | w | DB_GHZ_DBM | \| |
| ZERO | x | MS_HZ_UV | } |

# 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**:
   - 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 field and select it.
   - 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 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.

# 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.

***NOTE:*** 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 8** **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 9** **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 288* in this chapter.

**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.

*NOTE:*

**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 323*.

To print the parameters list, *See "To print TESTS screens:" on page 317*..

## 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.
   - Use the [k.back] key to backspace.
   - 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 3 of this manual. A lock is provided to prevent access to the pass/fail limits. *See "Securing a Procedure" on page 328.*

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 323*.

To print the pass/fail limits list, *see "To print TESTS screens:" on page 317*.

### 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.
   - Use the [k.back] key to backspace.
   - Press CANCEL to cancel entries and retain the old value.
7. Position the cursor to the **`Check`** field and select it.
8. From the **`Choices`** menu, select the combination of upper and lower limits to be checked.

# Pausing or Stopping a TEST

To pause the program, press CANCEL.

To stop the program, press SHIFT then CANCEL. This performs an IBASIC RESET operation.

***NOTE:*** **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 295*.

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 310*).
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 310*).
3. Configure the Test Set for your printer and its interface (see *"Configuring the Test Set for Printing" on page 313*).
4. Instruct the Test Set what to print (see *"To print test results:" on page 314*).

## 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 1 on page 311*. 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

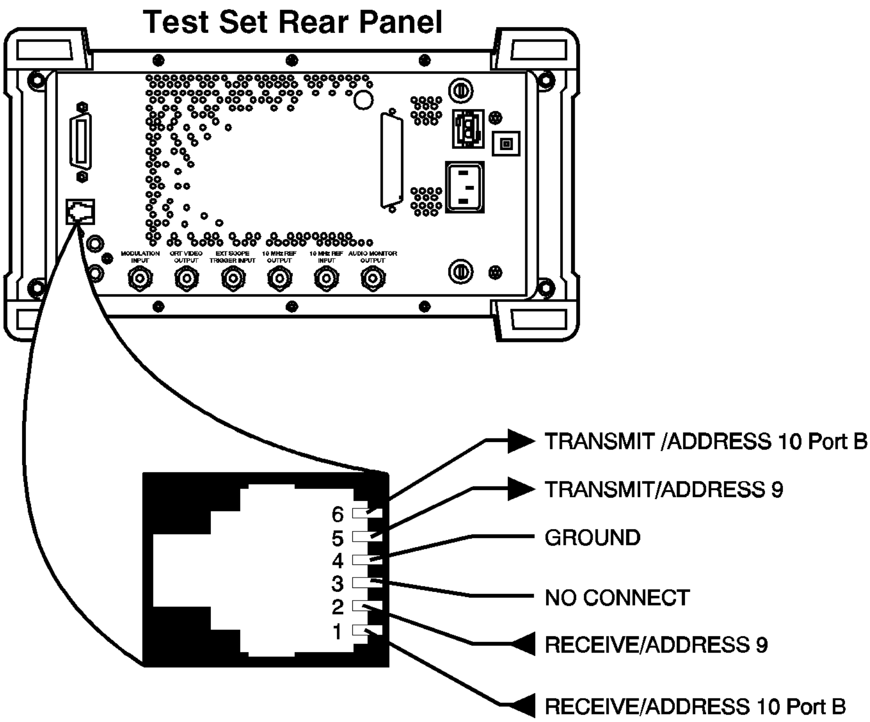



**Figure 1** **Serial Port Configuration**

## Parallel Connection

**A parallel printer can be attached to the parallel port. Use the following figure for pin information.**

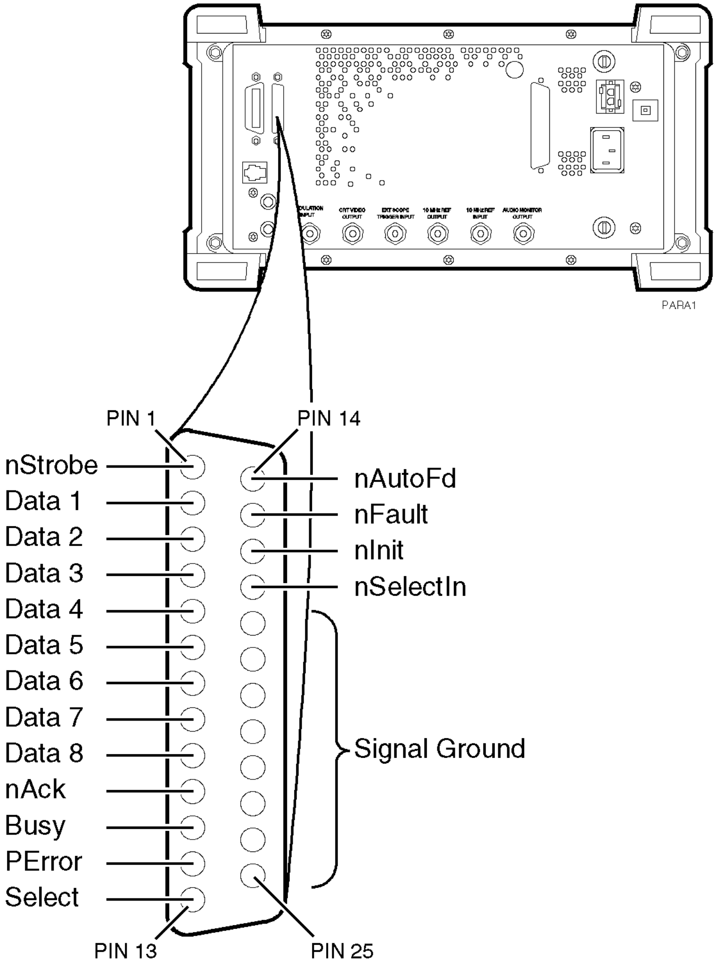



**Figure 2** **Parallel Printer Connections**

## 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.

***NOTE:*** **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". Contact Hewlett-Packard at 1-800-922-8920 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:
   - Lines/Page (controls the number of lines, 20-120, printed on a page before a form feed is sent to the printer)
   - FF at Start (to cause a form feed at the start of a test sequence)
   - FF at End (to cause a form feed at the end of a test sequence)
7. From the **`To Screen`** menu, select **`More`**.
8. From the **`Choices`** menu, select **`IO CONFIG`**.
   - For Serial Printing, set the **`Serial Baud`** field and other serial communications fields listed under it to correspond to your printer's configuration.
   - For HP-IB Printing, set the **`Mode`** field to **`Control`**.
9. Press 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 pre-defined 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 **`7XX`** 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 10 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:

- 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:

- Position the cursor to the **`Mode`** field and select it.
- From the **`Choices`** menu, select **`Control`**.
- Position the cursor to the **`Print Adrs`** field and select it.
- Rotate the knob and select the HP-IB address of your printer.
- Position the cursor to the **`Print To`** field. Pressing knob will toggle the underlined selection. Select to underline **`HP-IB`**.

**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 11 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 300* or *"Initializing a Disk" on page 292*. 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 300):*
   - Insert card in the slot on the Test Set’s front panel.
   - Press k3 **(Init Card**)
   - 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’s Guide*.
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 file names 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 297.*

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 331* in this chapter.

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 Disk

RAM disk is a section of internal memory that acts much like a flexible disk. Programs can be stored, re-stored, erased, and retrieved.

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

The four RAM disk volumes are designated **:MEMORY,0,0** to **:MEMORY,0,3**. For example, to catalogue the contents of RAM disk volume ‘0’ from the **`IBASIC Cntrl`** screen, enter

**`CAT “:MEMORY,0,0”`**

Volume 0’s contents can be viewed.

ram disk erasure

Any existing programs or formatting on RAM is erased if you use the RAM_MNG or COPY_PL ROM programs, or the SERVICE screen’s RAM Initialize function. Therefore, you should only use RAM disks for short-term storage of files.

## Initializing RAM Disks

Each RAM disk volume must be initialized before it can be used.

***NOTE:*** If you are using a RAM disk to store a test procedure, you must initialize the RAM disk volume 0. When the software saves a procedure to the Test Set’s RAM, it automatically stores the procedure into the memory location volume 0. This is not changeable.

**To initialize RAM disk Volume 0:**

Volume 0 can be initialized using the **RAM_MNG** procedure stored on the internal ROM's **IB_UTIL** menu.

1 Press the TESTS key.

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

3. From the list in the **Choices:** menu, select **ROM**.

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

5. From the list in the Choices menu, select **RAM_MNG**.

   **RAM_MNG** is the RAM manager program.

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

   The program will begin execution.

7. Read the precautions provided on the Test Set's screen and then press the k1 (**Yes**) key to continue.

8. Press the k3 (**Int RAM**) key.

   This selects the Test Set's internal RAM as the location to be initialized.

9. Enter the number of records you wish to initialize using the data key pad and then press the ENTER key.

   50 records should be sufficient for saving a procedure.

10. Press the k1 (**Yes**) key to verify the number of records was entered correctly.

    The internal RAM :MEMORY,0,0 is initialized.

**To initialize RAM volumes 1, 2, or 3:**

Volumes 1, 2, and 3 must be initialized from the **`IBASIC Cntrl`** screen.

**1** Press the TESTS key.

**2.** Select **`IBASIC Cntrl`** from the **`SET UP TEST SET`** list (or the Test Function field).

**3.** Position the cursor to the data entry field and select it.

**4.** Using the list of characters from the **`Choices`**: menu, enter the following command:

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

`or`

**`INITIALIZE ":MEMORY,0,1",50`**

The optional 'volume size' in the command lets you specify the memory area set aside for each disk in 256-byte blocks.

# Saving Tests Results

See *"Data Collection (Saving and Retrieving Test Results)" on page 279*.

# 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 3 on page 337*).

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.

***NOTE:*** **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 before connecting cables to the instruments.

The following table lists connections for Transmit, Receive, and Ground pins (address 9).

**Table 12**

| 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) |

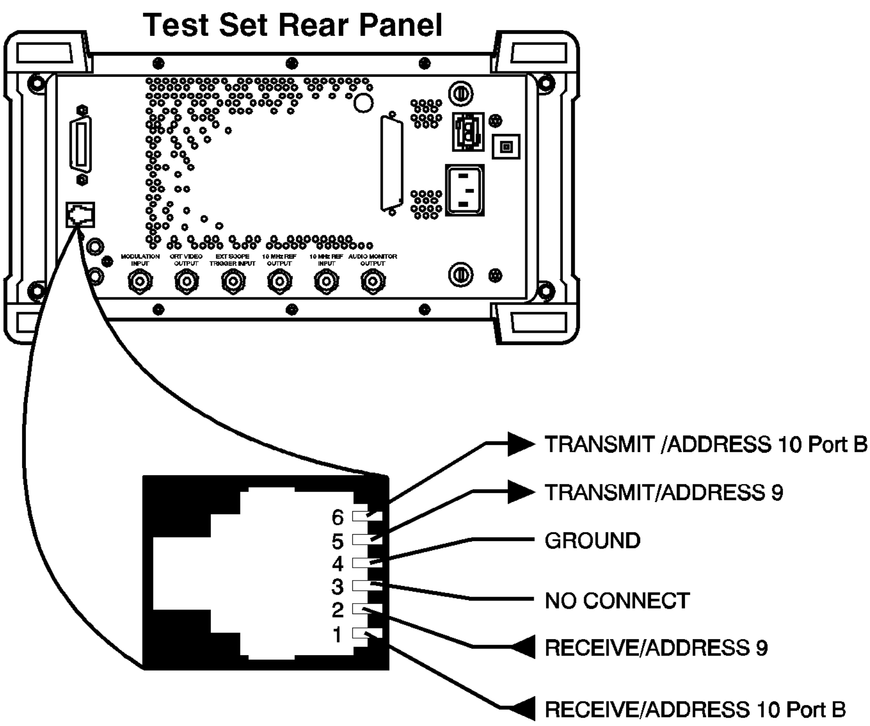



**Figure 3** **Serial Port Configuration**

# 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 309* in this chapter.

## 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 338.*

**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 SRAM memory card, enter “**1**” into the **Addr** field.
2. If data is to be stored on an external computer through the Test Set’s RS-232 serial port (if available), enter “**9**” into the **Addr** field.
3. If data is to be stored on an external disk drive over HP-IB, enter an address of “**700**” or greater into the **Addr** field.

❒ Check the **Options** field to make sure it is correctly set up:

1. **For an external disk drive (LIF format) or an SRAM memory card:**
   a. Enter **ASCII** for saving data as an ASCII file.
   b. Enter **BDAT** for saving data as a Binary-Data file.
   c. As an option, you may enter **REC=xxx**, where “**xxx**” is the number of records for each file. (*The software defaults to 80 records. However, if too small a record size is used, you’ll get an* “**End of file error**” *when the test is run.*)

**2. For a DOS disk drive, you may keep the `Options` field empty, or you may enter any of the following key words:**

**a.** Enter **`ASCII`** for saving data as an ASCII file.
**b.** Enter **`BDAT`** for saving data as a Binary-Data file.
**c.** Enter **`REC=xxx`** for the file's record size, where "**`xxx`**" is the number of records for each file. (*The software defaults to 80 records. However, DOS systems automatically change record size if it's too small.*)
**d.** Enter a **`(dot extension)`** of 3 characters or less for the file name. For example, all model ABCD radio's tested may be organized to have a ".ABC" file extension.

❐ Check the Test Set to make sure it's in the controller mode *if you are using an external disk drive*.

**1.** Access the I/O 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 set-ups to SAVE registers.

If you do not have sufficient memory space available, you may need to delete unnecessary save registers.

### To delete save_recall registers:

1. Press DUPLEX.
2. Press RECALL.
3. Press ON/OFF to clear register.
4. Press the ON/OFF button again to answer **YES**.

# Printing Problems

❒ Check that the printer is turned on.

❒ Check that the HP-IB, parallel, or serial cable from the Test Set to the printer is connected.

**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:**

**a.** Check that the printer's **`Calling Name`** is "PRINTER" and its address is correctly set up in the External Devices (or Edit Cnfg) screen.

**b.** Check that the I/O CONFIGURE screen has been set up correctly:

**i.** Mode=Control

**ii.** Print To=HP-IB

**iii.** Print Adrs=address of your printer

**For a parallel printer:**

**c.** Check that the printer's **`Calling Name`** is **`PRINTER`** and its address is set to **`9`** in the External Devices (or Edit Cnfg) screen.

**d.** Check that the I/O CONFIGURE screen has been set up correctly for the printer's baud rate, parity, and so forth.

**For a serial printer:**

**e.** Check that the printer's **`Calling Name`** is **`PRINTER`** and its address is set to **`15`** in the External Devices (or Edit Cnfg) screen.

**f.** 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 re-configure the settings when continue is executed. You can alter settings to experiment with the measurement, but they must be returned to their initial settings before leaving the instrument screen.

6. Press k2 (**`Continue`** ) to return to the IBASIC controller.
7. Press k2 (**`Continue`** ) to continue the program.

# Test Set Doesn’t Power Up

Check the AC or DC power connection and the setting of the AC/DC switch on the rear panel. See the Test Set’s *User’s Guide*.

# 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’s *User’s Guide* and the *Programmer’s Guide*.

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).

For additional information, see *"Data Collection (Saving and Retrieving Test Results)" on page 279*.

## 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 the 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 the 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).
- 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 279*.

### Duplicate file. Over-write 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 Over-write old file?, the old file will be over-written. Once a file is over-written, it is unretrievable. There is no back-up.

### 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.

**HP-IB Command not accepted. Option not installed.**

This message may be displayed when the software tries to control a non-existent Radio Interface Card or non-existent 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 as 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 323*.

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 309*.

### Status = (Status) returned by the DSP

This message is displayed when the software cannot recognize a status message sent from the HP 83201A or the 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 parameter,*"18. RTD Analyzer Trigger Delay [0:971]" on page 200* is set correctly. 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 parameter, *"18. RTD Analyzer Trigger Delay [0:971]" on page 200* is set correctly. 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, *"18. RTD Analyzer Trigger Delay [0:971]" on page 200* is set correctly.
- 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 or HP 83204A 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.10.04`** 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 unit-under-test.

**`Choices`** Refers to a field in the lower right of the 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 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 *"parameters" on page 367*.

**`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 *"specifications" on page 369.*

**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 specific information about how to use the current screen in the TESTS environment. This feature is accessed by pressing k4 (**`Help`**) from any TEST screen. Note: only available in the HP 8920B and HP 8920A,D firmware above revision A.14.00.

**HELP** A feature providing additional Test Set information accessed by pressing SHIFT, then TX (HELP) keys. Help topics are listed in alphabetical order.

**highlight** Refers to the brightened region (cursor) of the 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 Set's built-in controller. The IBASIC software is downloaded from the OTP CARD into the Test Set's RAM. This software is then used to control the Test Set during autotesting the unit-under-test.

**initialize** A card or disk must be formatted prior to storing data. This may be done by pressing k3(**`Init Card`** ) on the TESTS (**`Save/ Delete Procedure`**) screen. The default for PCMCIA cards (HP 11807E) is DOS format, and for Epson Cards (HP 11807A,B) is LIF format. See *"Memory Cards" on page 297* for information on changing these default settings.

**key (USER keys)** Keys refer to any of the push buttons on the front panel of the Test Set. 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 of the screen. The USER keys are user programmable.

**knob** The large tuning dial for cursor control located in the center of the Test Set front panel. This knob is rotated to position the cursor on the screen and then pressed to select the particular field or function.

**library** A collection of the names of all of the parameters, pass/fail limits, 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, for example, to a disk, card, RAM, or PC.

**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. These calculations provide a value to be compared against pass/fail limit values that verify the performance of the unit-under-test.

**Main Menu** The screen accessed by pressing the TESTS key, or k5 Main Menu. It is used to customize and execute (run) automated testing.

Also referred to as the "TESTS" screen.

**menu** The Test Set's 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's screen is reserved for messages and prompts. Messages give an indication of the status of the Test Set, for example, **System initialization**.

**OTP** One Time Programmable (OTP) refers to a CARD on which code or date may only be stored once; similar to ROM. The HP 11807A/E software is shipped on an OTP memory card.

**parameters** Entries you make for calibration data, phone characteristics, or test customization. They give you flexibility in the way you use the software. Default values for parameters are present in the software.

**pass/fail limits** Pass/fail limits are the names of criteria verifying the performance of the unit-under-test. Usually, the associated measurement value must fall within the HI/LO limits of pass/fail values to verify performance of the unit-under-test. Default values in the test software have been derived from standard methods of measurement or from the unit-under-test requirements.

**pause** Using the CANCEL key pauses the running of IBASIC software in the Test Set 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, pass/fail limits, and testing order, saved in a file, that customizes the test software to a specific application. Procedures are made by editing existing channels, parameters, pass/fail limits, and testing order, and saving the resulting files to a memory card, disk or internal Test Set RAM.

**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's RAM is battery-backed-up, retaining data and program codes 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.

**save** Save and store are used synonymously and refer to putting data or software on some memory device, such as, card or RAM.

**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 and so on.

**store** Store and save are used synonymously and refer to putting data or software on some memory device, such as card, RAM.

**`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 customize and execute (run) all automated testing. Also referred to as the “Main Menu”.

**USER keys** A group of keys located immediately to the right of the Test Set’s 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’s screen. The number on the left of the function corresponds to the number on the user key k1 to k5.

**values** The scalar quantities or numbers inserted in the inverse video fields of the pass/fail limits or parameters. Units of measure (dB, inches, volts, watts, etc.) are contained in the pass/fail limits and test parameters.

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