The HP 8920A RF Communications Test Set
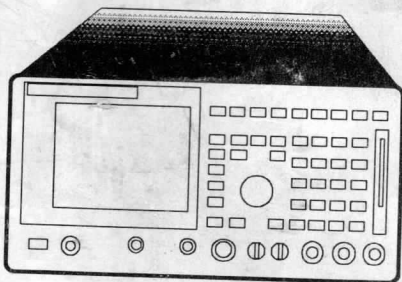
© Hewlett-Packard Company 1990

Use this key to perform a receiver test or to generate a modulated RF signal.

Use this key to perform a transmitter test or to monitor and measure an RF signal.

RX **TX** **PRESET**

SHIFT
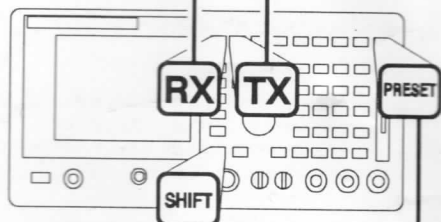
Use this key to activate the blue labeled functions. Press and release, then press the key below the blue label.

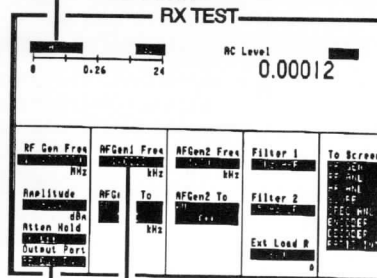Use this key to reset all instrument settings.

Set Up The Instrument Screen With The Cursor

| Moves Cursor | Selects Choice |
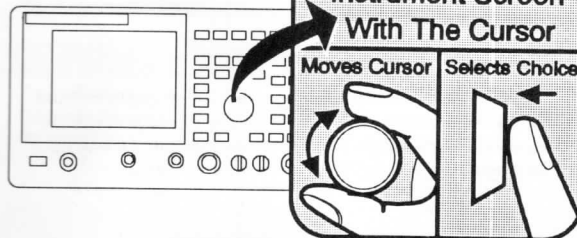
Some Of The Choices Made On The Screen

One-of-many:

Pushing the knob will display a list of choices in the lower-right corner of the screen. Turning the knob moves the cursor through the list. Pushing the knob again selects the choice adjacent to the cursor.

RX TEST

AC Level
0.00012

0   0.26   24

RF Gen Freq	AFGen1 Freq	AFGen2 Freq	Filter 1	To Screen
kHz	kHz	kHz		
Amplitude	AFG	To	AFGen2 To	Filter 2
dBm		kHz		
Atten Hold				Ext Load R
Output Port				0

Numeric Entry:

Pushing the knob will highlight the data. The highlighted data can be changed by turning the knob. Pushing the knob again enters the data.

Underlined:

Pushing the knob will move the underline below a choice. The underlined choice is active.

Table Of Contents

An Example Of How To
Make An FM Radio SINAD Check

Front Panel Set Up

1. Press
2. Press

RX   PRESET
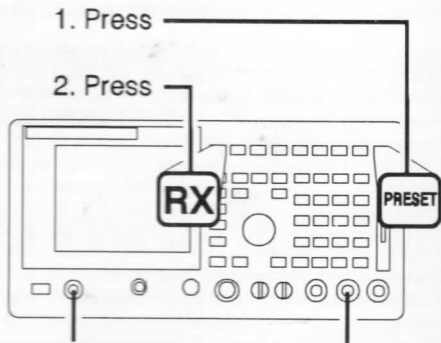
Connect to the
FM Transceiver's
Antenna Connector

Connect to the
FM Transceiver's
Speaker Output

Screen Set Up

Set Up The
Instrument Screen
With The Cursor

Moves Cursor   Selects Choice

RX TEST

AC Level
0.00012
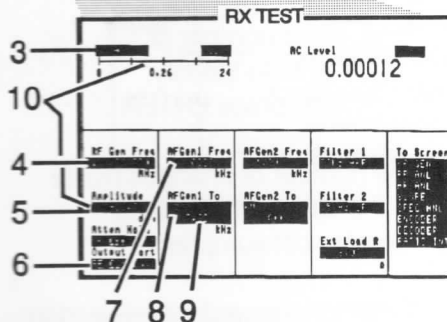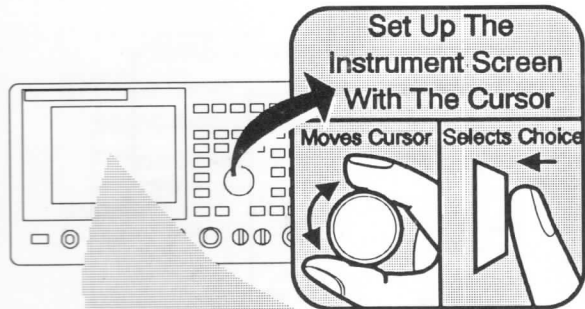
3. Verify that SINAD is displayed.

4. Enter the RF frequency.

5. Enter the RF amplitude.

6. Verify that RF Out is underlined.

7. Verify that the modulation frequency displayed is 1 kHz.

8. Verify that the modulation type displayed is FM.

9. Enter the deviation.

10. Adjust the RF amplitude for a SINAD reading of 12 dB.

To Save Instrument Settings

1. Set up the instrument as desired.

3. Press for SAVE ⌐

2. Press ——

4. Enter number or
   name to identify,
   then press ENTER
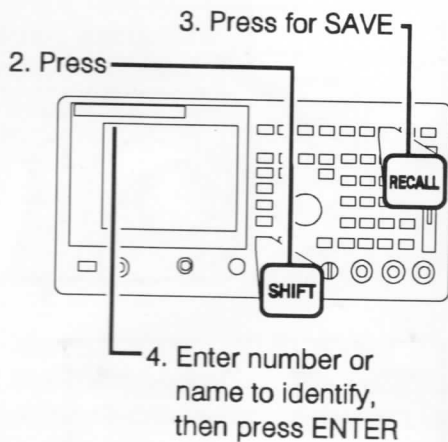
NOTE: The number of changes made
      to the screen determines
      memory consumption.

      If memory capacity is exceeded,
      you will get an error message.
      Refer to the User's Guide and
      Reference manual.

To Recall Instrument Settings

1. Press recall to list the
   saved settings ——

2. Use the Knob to
   choose the
   saved setting
   from list of choices.

Recall:
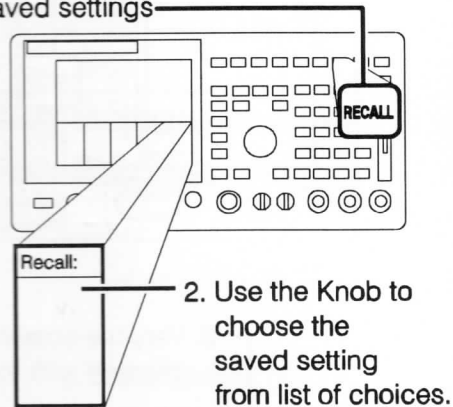
To Adjust The Screen Brightness

1. Press

2. Press for CONFIG
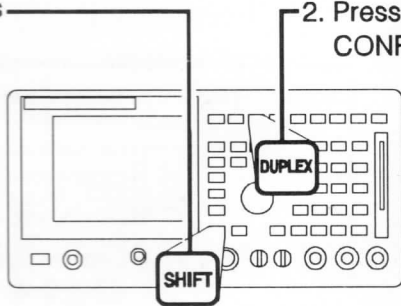
3. Vary the screen intensity with the knob

CONFIGURE

To Change The Unit Of Measure

1. Position the cursor at a unit to change

2. Press desired unit

To Run A Memory Card Program

1. Insert a memory card

2. Press

TESTS

3. List the choices

TESTS

Procedure: Location Library Program

Comment

Test Execution Conditions

On DUT Failure   Run Mode

Output Results   Output Destination

Output Heading

Test Function
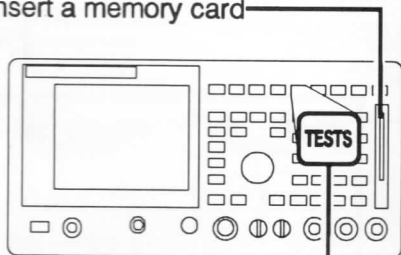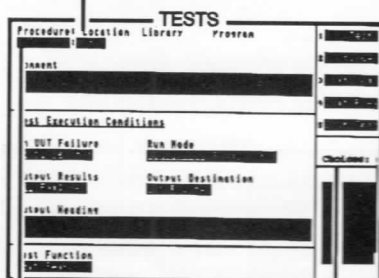
4. Choose Card
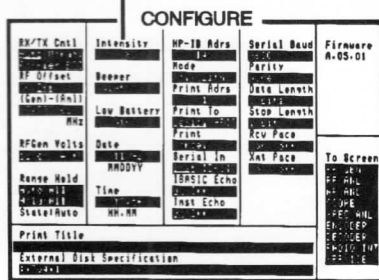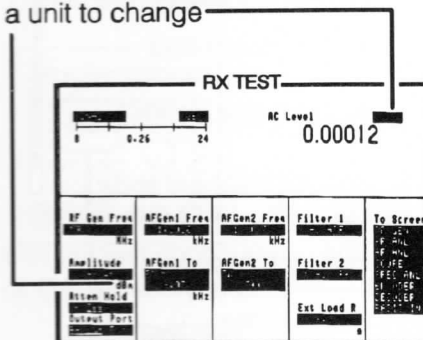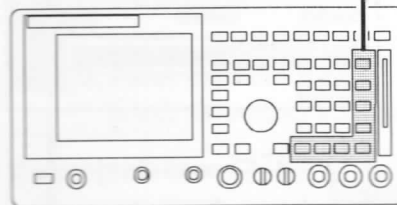
5. List the choices

6. Choose a program

7. Test Configuration

Edit the test specifications

Edit the test frequencies

Edit the test sequence

Edit the test configuration and/
or Edit the test parameters

TESTS

Procedure: Location Library Program

Comment

Test Execution Conditions

On DUT Failure   Run Mode

Output Results   Output Destination

Output Heading

Test Function
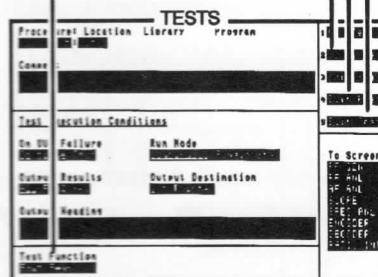
To Screen

NOTE: Press the TESTS key
to exit an editing screen.

8. Run the program

TESTS

Procedure: Location Library Program

Comment

Test Execution Conditions

On DUT Failure   Run Mode

Output Results   Output Destination

Output Heading

Test Function

To Screen
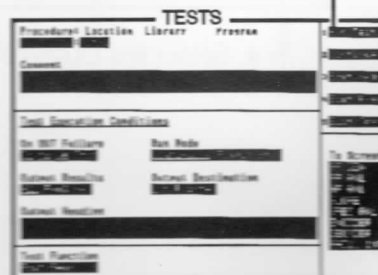
To Set Up
Single-Tone Modulation

1. Press

2. Enter the carrier frequency

3. Enter the carrier amplitude

RX TEST

AC Level 0.00012

4. Select the Output Port

5. Enter the modulation frequency

7. Choose the modulation type

RX TEST

AC Level 0.0001

6. List the modulation choices

8. Enter the depth or deviation

To Set Up Single-Tone Modulation With Signaling

1. Press

2. Enter the carrier frequency

3. Enter the carrier amplitude

4. Select the Output Port

5. Enter the modulation frequency

6. List the modulation choices

7. Choose the modulation type

8. Enter the depth or deviation

9. Refer to page 38 to set up the signaling then return to step 10

NOTE: The modulation type must be the same in AFGen 1 and AFGen 2.

10. Press to return to the RX Test screen
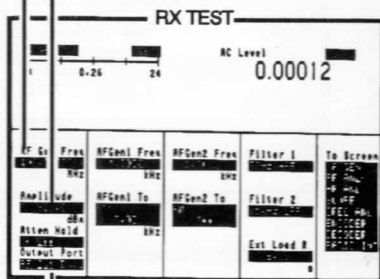

11. Turn signaling on/off
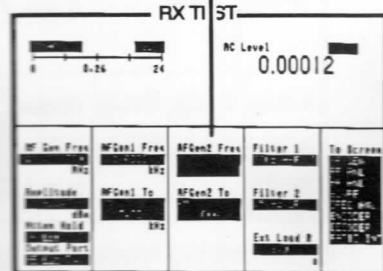
To Set Up
Two-Tone Modulation

1. Press
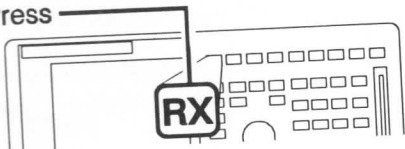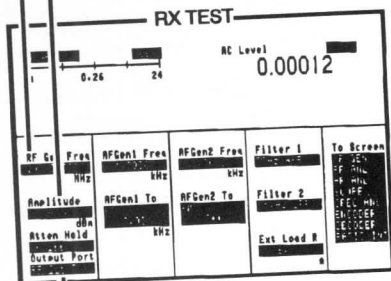
2. Enter the carrier frequency
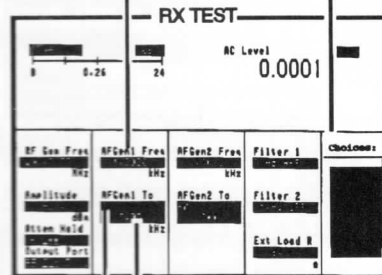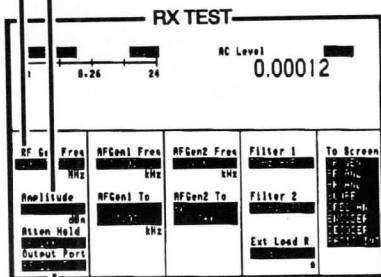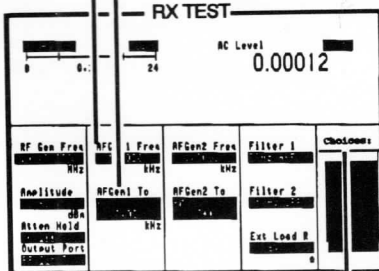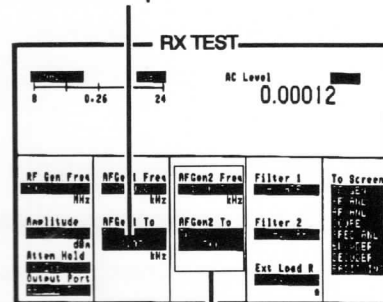
3. Enter the carrier amplitude

4. Select the Output Port

5. Enter the modulation frequency

6. List the modulation choices
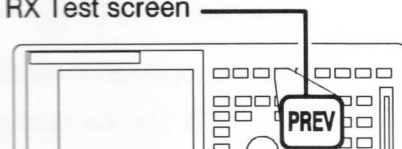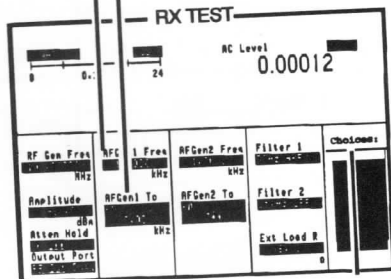

7. Choose the modulation type

8. Enter the depth or deviation
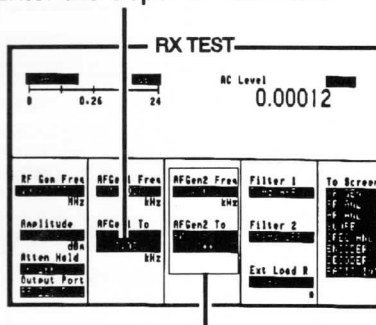
9. Repeat steps 2 thru 5 for AFGen 2

NOTE: The modulation type must be the same in AFGen 1 and AFGen 2.

To Choose An RF Output Port

1. Press
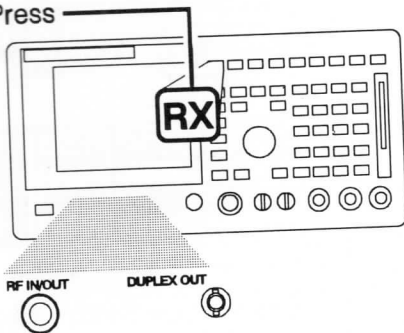
2. Underline RF Out
   or Dupl

RF IN/OUT   DUPLEX OUT

RX TEST

AC Level
0.00012
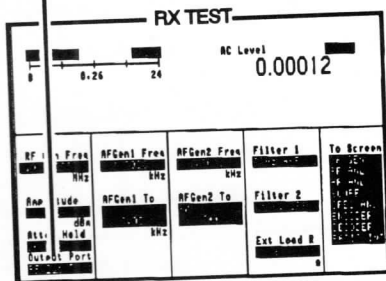
To Measure Modulation

1. Press

TX
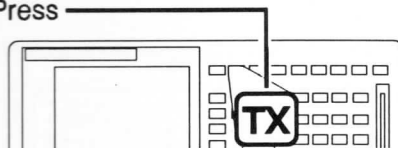
2. Select the Tune Mode

2a. Enter the Tune Freq if
     Manual Tune Mode is used

TX TEST

Frequency
149.978076

FM Deviation
80.81
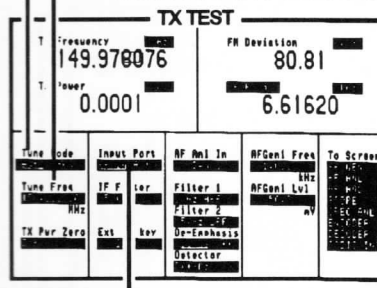
Power
0.0001

6.61620

3. Select the Input Port

4. List the demodulation
   choices

5. Choose the
   demodulation
   type

TX TEST

TX Frequency
149.978076

FM Deviation
80.81

TX Power
0.0001
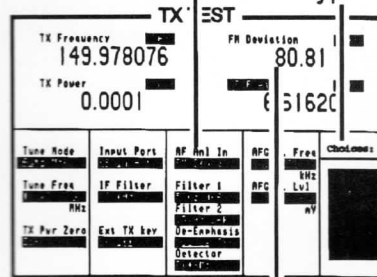
6.61620

6. Read

To Measure RF Frequency

1. Press
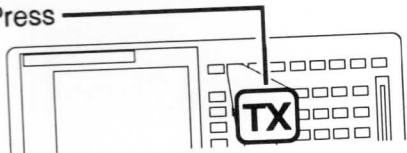
2. Underline Auto

3. Read


```
————— TX TEST —————
Frequency   ▪  ▪
 149.978076        FM Deviation
                      80.81
Power      ▪           F ◂▸       I▸
   0.0001            6.61620

Tune Mode   Input Port   AF Aml In   AFGenl Freq   To Screen
                                         kHz
Tune Freq   IF Filter    Filter 1    AFGenl Lvl
   MHz                   Filter 2                     mV

TX Pwr Zero Ext TX key   De-Emphasis
                         Detector
```

To Measure RF Frequency Error

1. Press
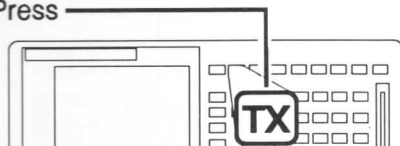
2. Underline Manual

3. Enter the Tune Freq

4. Select the Input Port


```
————— TX TEST —————
T▪ Error                 FM Deviation
 149.978 076               80.81
T▪ ower       ▪            F ◂▸    I▸
   0 )00(                 6.61620

Tune Mode   Input Port   AF Aml In   AFGenl Freq   To Screen
                                        kHz
Tune Freq   F Filter     Filter 1    AFGenl Lvl
   MHz                   Filter 2                    mV

TX Pwr Zero xt TX key    De-Emphasis
                         Detector
```

5. Read

To Choose An RF Input Port

1. Press

RF IN/OUT   ANT IN
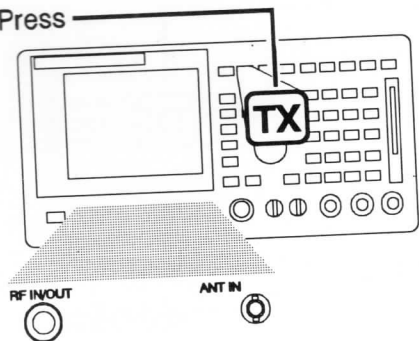
2. Underline RF In or Ant

— TX TEST —

TX Frequency
149.97 076

FM Deviation
80.81

TX Power
0.00 1

6.61620

Tune Mode	Input Port	RF Aml In	AFGenl Freq	To Screen
			kHz	
Tune Freq	IF Filter	Filter 1	AFGenl Lvl	
MHz		Filter 2		
TX Pwr Zero	Ext TX key	De-Emphasis		
		Detector		

To Output An AF Sine Wave

1. Press
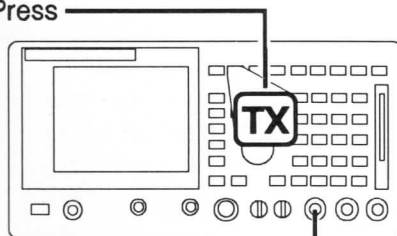
2. Connect to AUDIO OUT

3. Enter the audio level

4. Enter the audio frequency

— TX TEST —

TX Frequency
149.978076

FM D iatic
8 81

TX Power
0.0001

6.6 620

Tune Mode	Input Port	RF Aml In	AFGenl	es	To Screen
				Hz	
Tune Freq	IF Filter	Filter 1	AFGenl Lvl		
		Filter 2		mV	
TX Pwr Zero	Ext TX key	De-Emphasis			
		Detector			

To Output A Sine, Square, Triangle, Or Sawtooth Waveform*

*Requires Option 004

1. Choose ENCODER from the To Screen
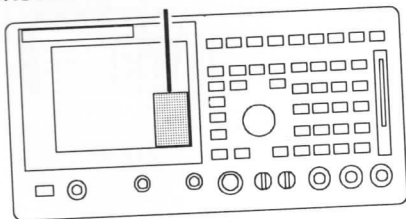
2. Set the Mode to Func Gen
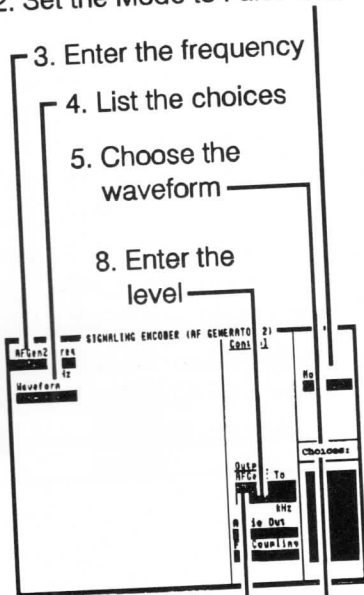
3. Enter the frequency

4. List the choices

5. Choose the waveform

8. Enter the level

SIGNALLING ENCODER (AF GENERATOR 2)

6. List the choices

7. Choose Audio Out

26

To Measure Audio Distortion

1. Press

2. List the choices

3. Choose Distn

TX TEST

TX Frequency	FM Deviation
149.978076	80.81
TX Power	
0.0001	6.61620
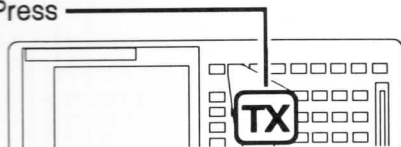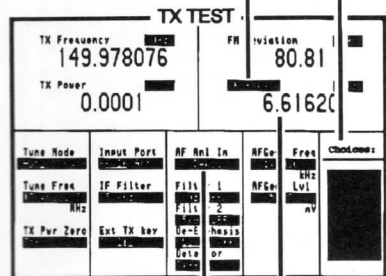
4. Read

NOTE: Measures the distortion on a 1 kHz tone using the input displayed here.

27

To Measure Audio Frequency

1. Press ——

2. List the choices

3. Choose AF Freq ——

TX TEST

TX Frequency
149.978076

TX Power
0.0001

FM eviation
80.81

6.61620

Tune Mode	Input Port	AF Aml In	AFGe	Freq kHz
Tune Freq kHz	IF Filter	Filt 1 Filt 2	AFGe	Lvl aV
TX Pwr Zero	Ext TX key	De-E hesis Dete or		
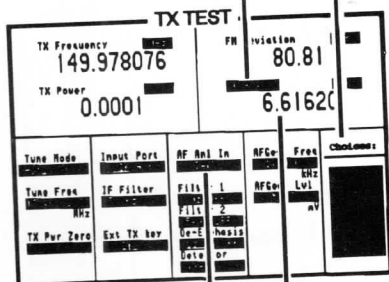
4. Read

NOTE: Measures the frequency of the input displayed here.

To Measure Audio Voltage
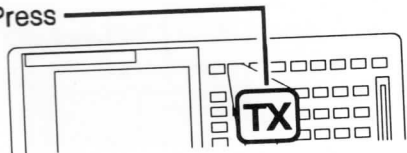
1. Press ——
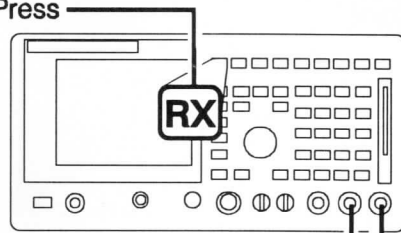
2. Connect to AUDIO IN ——

3. Read

RX TEST

AC Level
0.00012

0   0.26   24

RF Gen Freq kHz	AFGen1 Freq kHz	AFGen2 Freq kHz	Filter 1	To Screen
Amplitude dBm	AFGen1 To kHz	AFGen2 To	Filter 2	
Atten Hold Output Port			Ext Load R Ω	
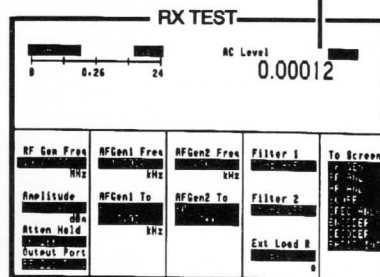
To Change The Scope Input

1. Verify which input is selected
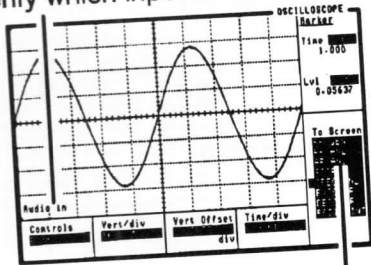
2. Select AF Anl from To Screen:

3. List the choices

4. Choose the input
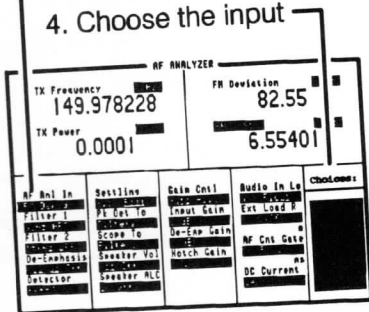
5. Press PREV to return to the scope
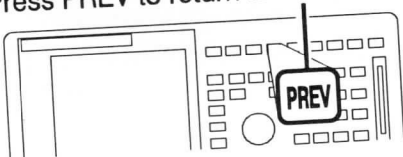
To Change The Scope Veritical Units Per Division
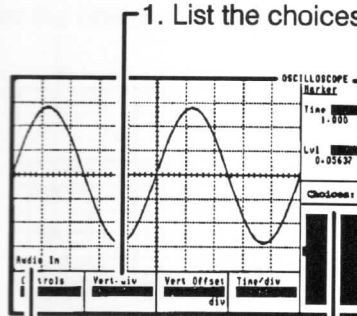
1. List the choices

2. Choose a vertical units per division

Scope Input Determines Unit of Measure

Scope Input	Unit of Measure
Audio In	V
FM	kHz
AM	%
SSB	mV

NOTE: To change the scope input see page 30.

To Change The Scope
Horizontal Units Per Division
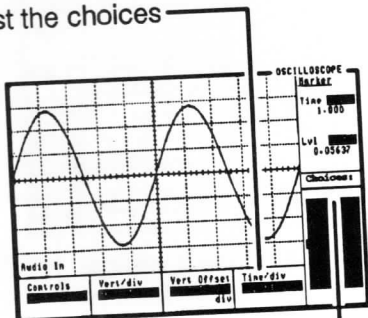
1. List the choices

2. Choose a time

To Use The Scope Marker

1. List the choices   4. Read the
                          marker position
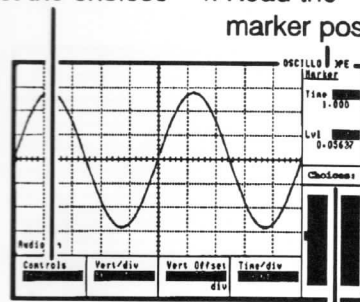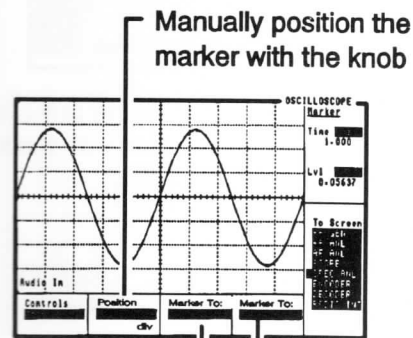
2. Choose Marker

3. Marker position

Manually position the
marker with the knob

Push the knob to
move the marker
to the peak of
the signal

Push the knob to
change the center
frequency or ref
level to marker's
position

To Display A Scope Waveform Before The Trigger Point

1. List the choices

2. Choose Trigger

3. Adjust the pre-Trigger position with the knob

Pre-trigger cursor

To Use The Spectrum Analyzer Marker

1. List the choices   4. Read the marker position
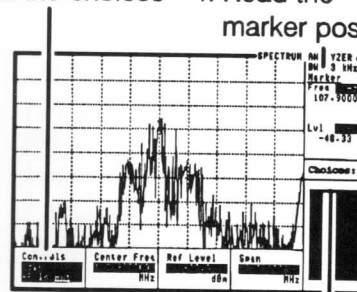
2. Choose Marker

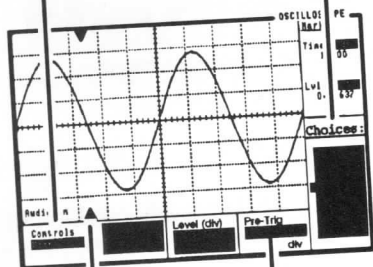3. Marker position

Manually position the marker with the knob
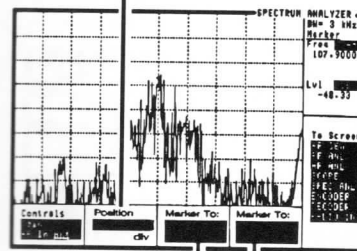
Push the knob to move the marker to the peak of the signal

Push the knob to change the center frequency or ref level to marker's position

To Set Up The Spectrum Analyzer Tracking Generator

1. List the choices
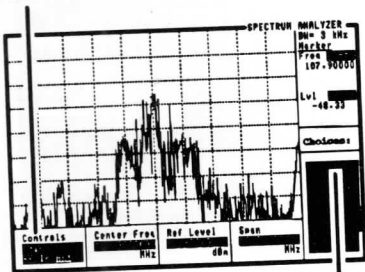
2. Choose RF Gen

3. Underline Track
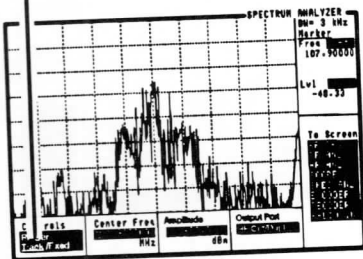
4. Adjust the offset frequency using the Knob
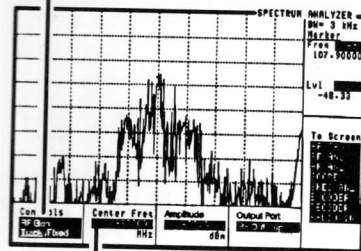
5. Enter the amplitude

To Output
Tone Sequential Signaling*

*Requires Option 004

1. Choose ENCODER from the To Screen
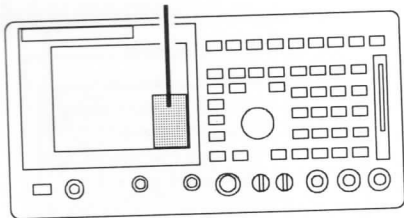
2. List the signaling mode choices
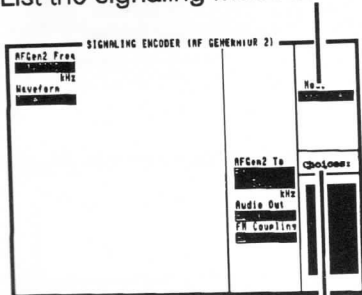
3. Choose Tone Seq

4. List the standard choices
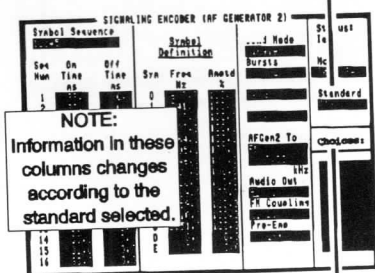
> **NOTE:**
> Information in these columns changes according to the standard selected.

5. Choose a standard

6. Enter a tone sequence using the symbols 0-9, A-E, and space
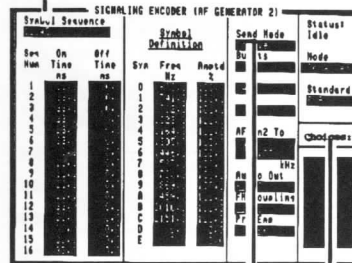
7. List the Send Mode choices

8. Choose the mode

9. List the output choices

10. Choose the output
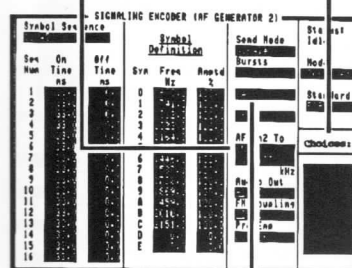
11. Select Send

To Output A DTMF Sequence

1. Choose ENCODER from the To Screen
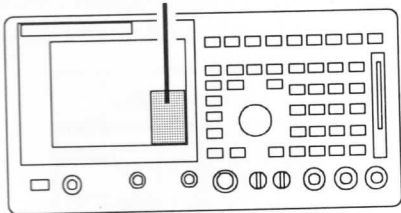
2. List the signaling mode choices
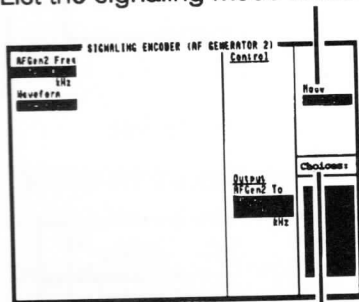
3. Choose DTMF

4. Enter the sequence
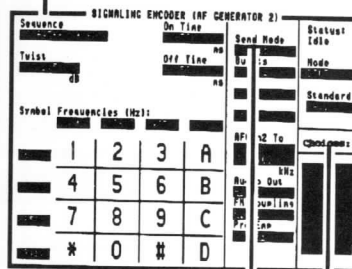
5. List the Send Mode choices

6. Choose the mode

7. List the output choices

8. Choose the output
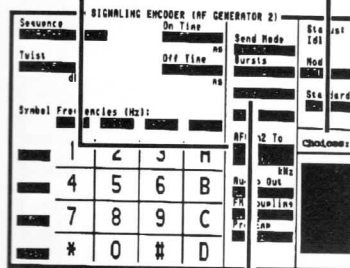
9. Select Send

To Decode A
Signaling Sequence

1. Choose DECODER from the To Screen
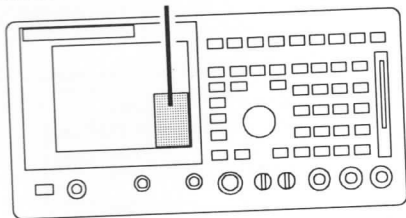
2. List the signaling mode choices
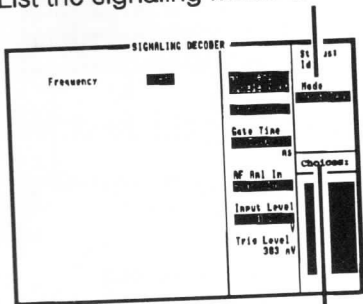
3. Choose the signaling mode

4. List the standard choices
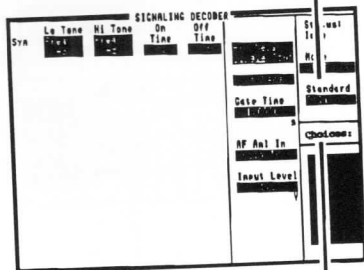
5. Choose a standard

6. List the choices of inputs

7. Choose the input

NOTE:
Signal information is displayed in these columns
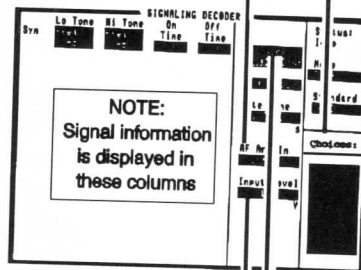
8. Enter the estimated level of the input signal (after de-emphasis if used)

9. Push knob to arm the decoder for a measurement

Instrument Terms And Abbreviations

Refer to the HP 8920 User's Guide
if more information is needed.

AF Anl- Audio Frequency Analyzer.

AF Anl In- Audio Frequency Analyzer
Input.

AF Cnt Gate- Audio Frequency Counter
Gate Time.

AF Gen1- Audio Frequency Generator 1.

AF Gen2- Audio Frequency Generator 2.
Also used as the signaling
Encoder.

Ant- Antenna.

ANT IN- Antenna Input. An alternate input connector for the RF Analyzer and Spectrum Analyzer for low level measurements. RF power CANNOT be measured from this connector.

ASSIGN. The key used to assign USER keys to instrument settings. To assign a USER key, position the cursor adjacent to the setting, press SHIFT, ASSIGN, and then one of the user keys k1-k5 or k1'-k3'.

Atten Hold - Attenuator Hold. A setting that prevents the RF Generator output attenuator from changing ranges, limiting the amplitude adjustment range.

AUDIO IN (HI). External input connector for audio measurements.

AUDIO IN (LO). External input connector for floating measurements. To ground or float the connector use the Audio In Lo field on the AF ANL screen.

AUDIO OUT. External output connector for AF Gen1 and/or AFGen2 (Encoder).

AVG- Average. The key used to do measurement averaging. When used it smooths out the measurement of rapidly fluctuating signals. To activate averaging, positon the cursor adjacent to the unit of measure of the measurement. Then press SHIFT, AVG, ENTER. To cancel averaging, press SHIFT, AVG,ON/OFF.

CONFIG- Configure. The key used to access the CONFIGURE screen to change the HP-IB address, define the printer type, setup serial communications, and several other instrument settings.

DC FM Zero. This function removes DC offset when using DC-coupled FM.

DECODER. Signaling decoder.

Dupl- Duplex.

DUPLEX. The key used to access the DUPLEX TEST screen for simultaneous transmitter/receiver testing.

DUPLEX OUT. An alternate output connector for the RF Generator and Spectrum Analyzer Tracking Generator.

ENCODER. Signaling encoder.

Ext Load R- External Load Resistance. This function is used to specify the impedance of the device connected to the AUDIO IN connector for calibrated audio power measurements.

Ext TX Key- External Transmitter Key. This function keys a transmitter through the MIC/ACC connector.

Filter 1. The AF Analyzer high-pass and optional filters.

Filter 2. The AF Analyzer low-pass and optional filters.

Gain Cntl- Gain Control. This function selects the automatic or manual AF Analyzer input, De-Emp, and Notch gains. Auto is normally used.

HI LIMIT/LO LIMIT. The keys used to set high and low measurement limits. To enter the limits, position the cursor adjacent to the unit-of-measure of the measurement, then press SHIFT, LO or HI LIMIT, a value, ENTER. To cancel limits, press SHIFT, LO or HI LIMIT, ON/OFF.

HOLD. The key used to freeze information displayed on the screen. Select HOLD again to release the display.

IF Filter- Intermediate Frequency Filter. A field that selects the RF Analyzer IF bandwidth.

Input Atten- Input Attenuator.

k1,k2,k3,k4,k5. Local USER keys are for accessing a user-assigned field on the currently displayed screen. Pressing a local user key moves the cursor adjacent to the key's assigned field.

k1',k2',k3'. Global USER keys are for accessing a user-assigned field on another screen. Pressing the global user key displays the assigned field at the top of the currently displayed screen.

MEAS RESET- Measurement Reset.

METER. The key used to display the analog meter. To set up the meter, position the cursor adjacent to the unit of measure of the measurement to display, then press SHIFT, METER.

MIC/ACC- Microphone/Accessory. A connector that is used to key a transmitter and/or modulate a carrier with a microphone.

Mic Pre-Emp (Auto)- Microphone Pre-Emphasis. This function automatically switches in and out the pre-emphasis network (750us).

Mic Pre-Emp (Hold)- Microphone Pre-Emphasis. This function allows manual switching in and out of the pre-emphasis network when FM modulation is used.

Mod In To- Modulation In To. This function selects the RF Generator's modulation type when using the Modulation Input and MIC/ACC connectors for external modulation.

Normalize (A-B). A Spectrum Analyzer entry to display the difference between the current screen and a previously saved screen.

Normalize (A Only). A Spectrum Analyzer entry to select a normal display

Normalize (Save B). A Spectrum Analyzer entry to save the current display.

Pk Det To (De-Emp)- Peak Detector To (De-Emphasis). This function sets up the AF Analyzer to measure the peak voltage after the de-emphasis network.

Pk Det To (Filters)- Peak Detector To (Filters). This function sets up the AF Analyzer to measure the peak voltage after audio filters 1 and 2 and before the de-emphasis network.

PREV- Previous screen. The key used to toggle between the currently displayed screen and the previously accessed screen.

PRESET. The key used to reset the HP 8920A's settings to the factory-defined default states.

PRINT. The key used to print the currently displayed screen if a printer is connected to the rear-panel's SERIAL PORT or the HP-IB connector. To set up the instrument for printing, press SHIFT, CONFIG to access the CONFIGURE screen. On the screen select the printer port in the Print To field. For HP-IB printers enter the printers address in the Print Adrs field. This is a graphic pixel dump that requires an HP graphic-compatable printer.

Range Hold. This function selects the automatic or manual control of all AF Analyzer and RF Analyzer gain, and tuning adjustments.

RECALL. The key used to recall previously saved settings.

REF SET- Reference Set. The key used enter a measurement reference level. To enter a reference level, position the cursor adjacent to the unit of measure of the measurement. Then press SHIFT, REF SET, enter the ref level*, and complete the entry by pressing ENTER. To cancel ref set, press SHIFT, REF SET, ON/OFF.

*The currently displayed measurement value is used as the reference if you do not enter a specific value.

RELEASE. The key used to clear a user key's assignment.

RF Anl- Radio Frequency Analyzer.

RF Cnt Gate- Radio Frequency Counter Gate Time.

RF Gen- Radio Frequency Generator.

RF Offset (Gen-Anl)- Radio Frequency Offset (Generator-Analyzer). An entry that sets up the difference between the RF Generator and RF Analyzer frequencies. Automatically offsets the RF Analyzer tune frequency from the RF Generator frequency.

Instrument Terms And Abbreviations

RX- Receiver Test. The key used to access the RX TEST screen for performing tests on a radio receiver.

RX/TX Cntl (Auto)- RX TEST/TX TEST screen Control (Auto). This function enables automatic switching between the RX TEST and TX TEST screens.

RX/TX Cntl (Carrier)- Receiver/Transmitter Control (Carrier). This function automatically switches RX TEST and TX TEST screens when a signal is detected at the RF IN/OUT or ANT IN connector and Auto is selected in the RX/TX Cntl field.

RX/TX Cntl (Manual)- RX TEST and TX TEST screen Control (Manual). This function disables automatic switching between the RX TEST and TX TEST screens.

RX/TX Cntl (ptt)- Receiver/Transmitter Control (push to talk).This function switches the instrument to the RX TEST screen when a microphone connected to the MIC/ACC connector is keyed, and Auto is selected in the RX/TX Cntl field.

SAVE. The key used to save settings displayed on the screen. The number of settings that can be saved depends on the number of entries made since the default settings.

SCOPE- Oscilloscope. This selection accesses the OSCILLOSCOPE screen.

Sensitivity. A field that sets up the RF Analyzer's input sensitivity at the ANT IN connector. Measurements may not be as accurate when using High sensitivity.

Settling (Fast). This function sets up the AF Analyzer for fast settling. Use for measurements above 200 Hz.

Settling (Slow). This function sets up the AF Analyzer for slow settling. Use for measurements below 200 Hz.

SPEC ANL- Spectrum Analyzer. This selection accesses the SPECTRUM ANALZER screen.

Squelch (Fixed). The instrument is set to the factory defined squelch level.

Squelch (Open). The instrument is set for no squelch.

Squelch (Pot). The instrument is set to manually adjust the squelch with the knob.

TESTS. The key used to access the
TESTS screen for running
IBASIC programs.

Tune Mode (Auto). This function sets
up the RF Analyzer to tune to the
input signal and displays the
signal's frequency.

Tune Mode (Manual). This function
sets up the RF Analyzer to tune
to the manually-entered frequency
and displays the difference be-
tween the input signal and the
manually entered frequency.

TX- Transmitter Test. The key used to ac-
cess the TX TEST screen for per-
forming tests on a radio trans-
mitter.

TX Pwr Meas- Transmitter Power Mea-
surement Zero. This function zeros
the RF power meter.

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