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Quick Reference Guide

HP 8753E Network Analyzer
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Regulatory Information
The regulatory information is in the User’s Guide supplied with the analyzer.

Safety, Warranty, and Assistance
Refer to the User’s Guide for information on safety, warranty, and assistance.
HP 87533 Network Analyzer
Documentation Map

The Installation and Quick Start Guide familiarizes you with the HP 8763E/Option 011 network analyzer's front and rear panels, electrical and environmental operating requirements, as well as procedures for installing, configuring, and verifying the operation of the analyzer.

The User's Guide shows how to make measurements, explains commonly-used features, and tells you how to get the most performance from your analyzer.

The Quick Reference Guide provides a summary of selected user features.

The HP-IB Programming and Command Reference Guide provides programming information for operation of the network analyzer under HP-IB control.

The HP BASIC Programming Examples Guide provides a tutorial introduction using BASIC programming examples to demonstrate the remote operation of the network analyzer.

The System Verification and Test Guide provides the system verification and performance tests and the Performance Test Record for your HP 8753E/Option 011 network analyzer.
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HP 87533 Front and Rear Panel

Front Panel Features

**Caution**

Do not mistake the line switch for the disk eject button. See the figure below. If the line switch is mistakenly pushed, the instrument will be turned off, losing all settings and data that have not been saved.

![Figure 1-1. HP 87533 Front Panel](image)

Figure 1-1 shows the location of the following front panel features and key function blocks. These features are described in more detail later in this chapter.

1. **LINE switch.** This switch controls ac power to the analyzer. 1 is on, 0 is off.
2. **Display.** This shows the measurement data traces, measurement annotation, and *softkey* labels. The display is divided into specific information areas, illustrated in Figure 1-2.

3. **Disk drive.** This 3.5 inch drive allows you to store and recall instrument states and measurement results for later analysis.

4. **Disk eject button.**

5. **Softkeys.** These keys provide access to menus that are shown on the display.

6. **STIMULUS function block.** The keys in this block allow you to control the analyzer source’s frequency, power, and other stimulus functions.

7. **RESPONSE function block.** The keys in this block allow you to control the measurement and display functions of the active display channel.

8. **ACTIVE CHANNEL keys.** These keys activate one of the four measurement channels. Once activated, a channel can then be configured for making measurements.

   The analyzer has four display channels. (Chan 1) activates channel 1 or 3, and (Chan 2) activates channel 2 or 4. Refer to “Using Display Functions” in Chapter 2 for information on enabling channels 3 and 4 and making them active.

9. **The ENTRY block.** This block includes the knob, the step keys, and the number pad. These allow you to enter numerical data and control the markers.

   You can use the numeric keypad to select digits, decimal points, and a minus sign for numerical entries. You must also select a units terminator to complete value inputs.

   The backspace key has two independent functions:
   - Modifies entries and test sequences.
   - Turns off the *softkey* menu and, if more than one marker is active, the marker information is displayed in the *softkey* area.

   Refer to “Markers and the Backspace Key” in Chapter 2.
10. **INSTRUMENT STATE function block.** These keys allow you to control channel-independent system functions such as the following:

- copying, save/recall, and HP-IB controller mode
- limit testing
- external source mode
- tuned receiver mode
- frequency offset mode
- test sequence function
- harmonic measurements (Option 002)
- time domain transform (Option 010)

HP-IB STATUS indicators are also included in this block.

11. **Preset** key. This key returns the instrument to either a known factory preset state, or a user preset state that can be defined. Refer to the “Preset State and Memory Allocation” chapter for a complete listing of the instrument preset condition.

12. **PROBE POWER connector.** This connector (fused inside the instrument) supplies power to an active probe for in-circuit measurements of ac circuits.

13. **R CHANNEL connectors.** These connectors allow you to apply an input signal to the analyzer’s R channel, for frequency offset mode.

14. **PORT 1 and PORT 2.** These ports output a signal from the source and receive input signals from a device under test. PORT 1 allows you to measure $S_{12}$ and $S_{11}$, PORT 2 allows you to measure $S_{21}$ and $S_{22}$. 


Analyzer Display

Figure 1-2. Analyzer Display (Single Channel, Cartesian Format)

The analyzer display shows various measurement information:

- The grid where the analyzer plots the measurement data.
- The currently selected measurement parameters.
- The measurement data traces.

Figure 1-2 illustrates the locations of the different information labels described below. In addition to the single-channel display shown in Figure 1-2, multiple graticule and channel displays are available, as described in “Using Display Functions” in Chapter 2.

When multiple channels are superimposed or displayed in separate graticules, information is arranged as follows:

- Channel(s) displayed and measurement parameter(s) are at the top of each graticule.
- Stimulus frequency information is at the bottom of each graticule.
- Marker information (when selected) is on the right side of each graticule.
1. **Stimulus Start Value.** This value could be any one of the following:
   - The start frequency of the source in frequency domain measurements.
   - The start time in CW mode (0 seconds) or time domain measurements.
   - The lower power value in power sweep.

   When the stimulus is in center/span mode, the center stimulus value is shown in this space.

2. **Stimulus Stop Value.** This value could be any one of the following:
   - The stop frequency of the source in frequency domain measurements.
   - The stop time in time domain measurements or CW sweeps.
   - The upper limit of a power sweep.

   When the stimulus is in center/span mode, the span is shown in this space. The stimulus values can be blanked.

   (For CW time and power sweep measurements, the CW frequency is displayed centered between the start and stop times or power values.)

3. **Status Notations.** This area shows the current status of various functions for the active channel.

   The following notations are used:

   - **Avg** = Sweep-to-sweep averaging is on. The averaging count is shown immediately below.
   - **Cor** = Error correction is on. (For error-correction procedures, refer to Chapter 5, “Optimizing Measurement Results.”)
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C?</td>
<td>Stimulus parameters have changed from the error-corrected state, or interpolated error correction is on. (For error-correction procedures, refer to Chapter 5, “Optimizing Measurement Results.”)</td>
</tr>
<tr>
<td>C2</td>
<td>Full two-port error-correction is active and either the power range for each port is different (uncoupled), or the TESTS E T S W H O L D is activated. The annotation occurs because the analyzer does not switch between the test ports every sweep under these conditions. The measurement stays on the active port after an initial cycling between the ports. (The active port is determined by the selected measurement parameter.) You can update all the parameters by pressing MEASURE RESTART, or MEAS key.</td>
</tr>
<tr>
<td>Del</td>
<td>Electrical delay has been added or subtracted, or port extensions are active.</td>
</tr>
<tr>
<td>ext</td>
<td>Waiting for an external trigger.</td>
</tr>
<tr>
<td>Ofs</td>
<td>Frequency offset mode is on.</td>
</tr>
<tr>
<td>Of?</td>
<td>Frequency offset mode error, the IF frequency is not within 10 MHz of expected frequency. LO inaccuracy is the most likely cause.</td>
</tr>
<tr>
<td>Gat</td>
<td>Gating is on (tune domain Option 010 only). (For time domain measurement procedures, refer to Chapter 2, “Making Measurements.”)</td>
</tr>
<tr>
<td>H-2</td>
<td>Harmonic mode is on, and the second harmonic is being measured (harmonics Option 002 only). (See “Analyzer Options Available” later in this chapter.)</td>
</tr>
</tbody>
</table>
H-3 = Harmonic mode is on, and the third harmonic is being measured (harmonics Option 002 only). (See “Analyzer Options Available” later in this chapter.)

Hld = Hold sweep.

man = Waiting for manual trigger.

PC = Power meter calibration is on. (For power meter calibration procedures, refer to Chapter 5, “Optimizing Measurement Results.”)

PC? = The analyzer's source could not be set to the desired level, following a power meter calibration. (For power meter calibration procedures, refer to Chapter 5, “Optimizing Measurement Results.”)

P? = Source power is unleveled at start or stop of sweep. (Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting.)

P1 = Source power has been automatically set to minimum, due to receiver overload.

PRm = Power range is in manual mode.

Smo = Trace smoothing is on.

tsH = Indicates that the test set hold mode is engaged. That is, a mode of operation is selected which would cause repeated switching of the step attenuator. This hold mode may be overridden.

t = Fast sweep indicator. This symbol is displayed in the status notation block when sweep tune is less than 1.0 second. When sweep time is greater than 1.0 second, this symbol moves along the displayed trace.

* = Source parameters changed: measured data in doubt until a complete fresh sweep has been taken.

4. Active Entry Area. This displays the active function and its current value.

5. Message Area. This displays prompts or error messages.

6. Title. This is a descriptive alpha-numeric string title that you define and enter through an attached keyboard or as described in Chapter 4, “Printing, Plotting, and Saving Measurement Results.”
7. **Channel.** This is the channel selected with the (Chan1) and (Chan2) keys. For multiple, superimposed channel displays, more than one channel will be shown.

8. **Measured Input(s).** This shows the S-parameter, input, or ratio of inputs currently measured, as selected using the (Meas) key. Also indicated in this area is the current display memory status.

9. **Format.** This is the display format that you selected using the (Format) key.

10. **Scale/Div.** This is the scale that you selected using the (Scale Ref) key, in units appropriate to the current measurement.

11. **Reference Level.** This value is the reference line in Cartesian formats or the outer circle in polar formats, whichever you selected using the (Scale Ref) key. The reference level is also indicated by a small triangle adjacent to the graticule, at the left for channel 1 and at the right for channel 2 in Cartesian formats.

12. **Marker Values.** These are the values of the active marker, in units appropriate to the current measurement. (Refer to “Using Analyzer Display Markers” in Chapter 2, “Making Measurements.”)

13. **Marker Stats, Bandwidth.** These are statistical marker values that the analyzer calculates when you access the menus with the (Marker Fctn) key. (Refer to “Using Analyzer Display Markers” in Chapter 2, “Making Measurements.”)

14. **Softkey Labels.** These menu labels redefine the function of the softkeys that are located to the right of the analyzer display.

15. **Pass/Fail.** During limit testing, the result will be annunciated as PASS if the limits are not exceeded, and FAIL if any points exceed the limits.
Rear Panel Features and Connectors

Figure 1-3, HP 87533 Rear Panel

Figure 1-3 illustrates the features and connectors of the rear panel, described below. Requirements for input signals to the rear panel connectors are provided in Chapter 7 of the User's Guide.

1. **HP-IB** connector. This allows you to connect the analyzer to an external controller, compatible peripherals, and other instruments for an automated system.

2. **PARALLEL** interface. This connector allows the analyzer to output to a peripheral with a parallel input. Also included, is a general purpose input/output (GPIO) bus that can control eight output bits and read five input bits through test sequencing.

3. **RS-232** interface. This connector allows the analyzer to output to a peripheral with an RS-232 (serial) input.

4. **KEYBOARD** input (mini-DIN). This connector allows you to connect an external keyboard. This provides a more convenient means to enter a title for storage files, as well as substitute for the analyzer's front panel keyboard.

5. **Power cord receptacle, with fuse.** For information on replacing the fuse, refer to the HP 8753E Network Analyzer Installation and Quick Start Guide or the HP 8753E Network Analyzer Service Guide.
6. Line voltage selector switch. For more information, refer to the HP 87533 Network Analyzer Installation and Quick Start Guide.

7. Fan. This fan provides forced-air cooling for the analyzer.

8. **10 MHz PRECISION REFERENCE OUTPUT.** (Option 1D5)

9. **10 MHz REFERENCE ADJUST.** (Option 1D5)

10. **EXTERNAL REFERENCE INPUT connector.** This allows for a frequency reference signal input that can phase lock the analyzer to an external frequency standard for increased frequency accuracy.

    The analyzer automatically enables the external frequency reference feature when a signal is **connected** to this input. When the signal is removed, the analyzer automatically switches back to its **internal** frequency reference.

11. **AUXILIARY INPUT connector.** This allows for a dc or ac voltage input from an external signal source, such as a detector or function generator, which you can then measure using the S-parameter menu. (You can also use this connector as an analog output in service routines, as described in the service manual.)

12. **EXTERNAL AM connector.** This allows for an external analog signal input that is applied to the ALC circuitry of the analyzer's source. This input analog signal amplitude modulates the RF output signal.

13. **EXTERNAL TRIGGER connector.** This allows connection of an external negative-going **TTL-compatible** signal that will trigger a measurement sweep. The trigger can be set to external through **softkey** functions.

14. **TEST SEQUENCE.** This outputs a TTL signal that can be programmed in a test sequence to be high or low, or pulse (10 µseconds) high or low at the end of a sweep for robotic part handler interface.

15. **LIMIT TEST.** This outputs a TTL signal of the limit test results as follows:

   - **Pass:** TTL high
   - **Fail:** TTL low

16. **MEASURE RESTART.** This allows the connection of an optional foot switch. Using the foot switch will duplicate the key sequence (Meas) MEASURE RESTART.
17. TEST SET INTERCONNECT. This allows you to connect an HP 87533 Option 011 analyzer to an HP 85046A/B or 85047A S-parameter test set using the interconnect cable supplied with the test set. The S-parameter test set is then fully controlled by the analyzer.

18. **BIAS INPUTS AND BUSSES.** These connectors bias devices connected to port 1 and port 2. The fuses (1 A, 125 V) protect the port 1 and port 2 bias lines.

19. Serial number plate. The serial number of the instrument is located on this plate.

20. EXTERNAL MONITOR: VGA. VGA output connector provides analog red, green, and blue video signals which can drive a VGA monitor.
## Making Measurements

<table>
<thead>
<tr>
<th>Table 2-1. Connector Care Quick Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handling and Storage</strong></td>
</tr>
<tr>
<td>Keep connectors clean</td>
</tr>
<tr>
<td>Extend sleeve or connector nut</td>
</tr>
<tr>
<td>Use plastic end-caps <strong>during</strong> storage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Visual Inspection</strong></th>
<th><strong>Do</strong></th>
<th><strong>Do Not</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect all connectors carefully</td>
<td></td>
<td>Use a damaged connector - ever</td>
</tr>
<tr>
<td>Look for particles, scratches, and dents</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Connector Cleaning</strong></th>
<th><strong>Do</strong></th>
<th><strong>Do Not</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Try compressed air first</td>
<td></td>
<td>Use any abrasives</td>
</tr>
<tr>
<td>Use isopropyl alcohol</td>
<td></td>
<td>Get <strong>liquid into</strong> plastic support beads</td>
</tr>
<tr>
<td>Clean connector threads</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Gaging Connectors</strong></th>
<th><strong>Do</strong></th>
<th><strong>Do Not</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean and zero the gage before use</td>
<td></td>
<td>Use an out-of-spec connector</td>
</tr>
<tr>
<td>Use the correct gage type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use correct end of calibration block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gage all connectors before first use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Making Connections</strong></th>
<th><strong>Do</strong></th>
<th><strong>Do Not</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Align connectors carefully</td>
<td></td>
<td>Apply bending force to connection</td>
</tr>
<tr>
<td>Make preliminary connection lightly</td>
<td></td>
<td>Over tighten preliminary connection</td>
</tr>
<tr>
<td>Turn only the connector nut</td>
<td></td>
<td>Twist or screw any connection</td>
</tr>
<tr>
<td>Use a torque wrench for <strong>final</strong> connect</td>
<td></td>
<td>Tighten wrench past “break” point</td>
</tr>
</tbody>
</table>
Basic Measurement Sequence and Example

Basic Measurement Sequence
There are five basic steps when you are making a measurement.
1. Connect the device under test and any required test equipment.
2. Choose the measurement parameters.
3. Perform and apply the appropriate error-correction.
4. Measure the device under test.
5. Output the measurement results.

Basic Measurement Example
In the following example, a magnitude and insertion phase response measurement is made.

Step 1. Connect the device under test and any required test equipment.
   1. Make the connections as shown in Figure 2-1.

Step 2. Choose the measurement parameters.
      Setting the Frequency Range
   3. Set the center frequency to 134 MHz, press:

   ![Network Analyzer Diagram]

   Figure 2-1. Basic Measurement Setup

2-2 Making Measurements
4. 'lb set the span to 30 MHz, press:
   (Span) 30 MHz
   Setting the Source Power
5. 'lb change the power level to -5 dBm, press:
   (Menu) POWER -5 dBm
   Setting the Measurement
6. 'lb change the number of measurement data points to 101, press:
   (Menu) NUMBER OF POINTS 101
7. 'lb select the transmission measurement, press:
   (Meas) TRANS: FWD  S21 (B/\%R)
8. 'lb view the data trace, press:
   (Scale Ref) AUTOSCALE

Step 3. Perform and apply the appropriate error-correction.
9. Refer to the “Optimizing Your Measurement Results” chapter.
10. 'lb save the instrument state and error-correction in the analyzer internal memory, press:
    (Save Recall) SELECT DISK INTERNAL MEMORY RETURN SAVE STATE

Step 4. Measure the device under test.
11. Replace any standard used for error-correction with the device under test.
12. 'lb measure the insertion loss of the bandpass filter, press:
    (Marker) 134 dBm

Step 5. Output the measurement results.
13. 'lb create a hardcopy of the measurement results, press:
    (Copy) PRINT (or PLOT)
Using the Display Functions

To View Four Channels Simultaneously

**Note**
A full two-port calibration must be active before enabling auxiliary channels 3 or 4. Refer to Chapter 5, “Optimizing Measurement Results” in the User’s *Guide* for a description of a full two-port error correction.

1. Press (Chan 1) Display) DUAL: QUAD P .
2. Put channel 1 in the upper graticule and channel 2 in the lower graticule:
   - Set DUAL CHAN on OFF to ON.
3. Enable auxiliary channel 3:
   - Set AUX CHAN on OFF to ON.
4. Enable auxiliary channel 4:
   - Press (Chan 2) and set AUX CHAN on OFF to ON.
5. Create a four-graticule display:
   - Set SPLIT DISP= 1X=2X-4X to 4X.

See Figure 2-2 for the resulting display. This is the default channel orientation, where channel 1 is the upper left graticule, channel 2 is the upper right graticule, channel 3 is the lower left graticule, and channel 4 is the lower right graticule.
Description of the Auxiliary Channels

- Channels 1 and 2 are the primary channels.
- Channel 3 is the auxiliary channel for channel 1.
- Channel 4 is the auxiliary channel for channel 2.
- The auxiliary channels can be independently configured from each other and the primary channels in all variables except stimulus; an auxiliary channel always has the same stimulus values as its primary channel.

The default measurement parameter for each channel is:

- Channel 1; S11
- Channel 2; S21
- Channel 3; S12
- Channel 4; S22

Figure 2-2. Four Parameter Display
Quick Four-Parameter Display

A quick way to set up a four-parameter display once a full two-port calibration is active is to use one of the options in the menu.

After a full two-port calibration has been performed or recalled from a previously saved instrument state:

1. Press Display.
2. Press DUAL QUAD SETUP.
3. Press 4 PARAM DISPLAYS.
4. Press SETUP A.

To Make an Auxiliary Channel Active:

 Chan 1 activates channels 1 and 3, and Chan 2 activates channels 2 and 4.

The following steps illustrate how the measurement channel LED indicators work. From step 5 in “lb View Four Channels Simultaneously”:

1. Press Chan 2.

The LED adjacent to Chan 2 is flashing. This indicates that channel 4 is active and may be configured.

2. Press Chan 1. The LED adjacent to Chan 1 is constantly lit. This indicates that channel 1 is active.

3. Press Chan 1 again. The LED is flashing, indicating that channel 3 is active and may be configured.

Once active, a channel’s markers, limit lines, format, and other variables can be applied and changed. Also, the active entry and stimulus values will change to the color of the active channel.
To Save a Data Trace to the Display Memory

Press Data-Memory.

To View the Measurement Data and Memory Trace

1. To view a data trace that you have already stored to the active channel memory, press:
   Display MEMORY

2. To view both the memory trace and the current measurement data trace, press:
   Display DATA and MEMORY
To Divide Measurement Data by the Memory Trace

1. You must have already stored a data trace to the active channel memory.
2. Press Display DATA/MEM.

To Subtract the Memory Trace from the Measurement Data Trace

1. You must have already stored a data trace to the active channel memory.
2. Press Display DATA/MEM.

To Ratio Measurements in Channel 1 and 2

1. Press [Menu] NUMBER OF NTs.
2. Press [Menu] NUMBER OF ENTER THE SAME value that you observed for the channel 1 setting.
3. Press Display MORE and set D2/D1 TO D2 on OFF to ON.

To Title the Active Channel Display

1. Press Display MORE TITLE to access the title menu.
2. Press ERASE I", I TITLE and enter the title you want for your measurement display. Use an external keyboard or the analyzer front panel.
Using Markers

**To Activate Display Markers**

Press \( \text{MARKER} \).

**Delta Markers and Statistics**

1. Press \( \text{REF} = 1 \) to make marker 1 a reference marker.
2. Move marker 1 to any point that you want to reference.
3. Press \( \text{MARKER} \) 2 and move marker 2 to any position that you want to measure in reference to marker 1.

![Image](image.png)

Figure 2-3. Marker 1 as the Reference Marker
4. Press (Marker) MKR MODE MENU STATS ON to calculate and display the statistics of the measurement data between the active marker and the delta reference marker.

Figure 2-4. Example Statistics of Measurement Data

Search for a Specific Amplitude

Searching for the Maximum Amplitude
1. Press SEARCH: MARKER
2. Press SEARCH: MAX.

Searching for the Minimum Amplitude
1. Press SEARCH: MARKER
2. Press SEARCH: MIN.

2-10 Making Measurements
Markers and the Backspace Key

Besides modifying entries and test sequences, the backspace key \( \leftarrow \) has a second function; it toggles the softkey display on and off and, if more than one marker is active, moves the marker information off of the graticules and into the softkey area. This function makes data traces and marker information easier to view.

To Move Marker Information off of the Graticules

1. Activate markers 1 through 5:

   Press \( \text{MARKER u g h MARKER 5} \)

The display will appear similar to Figure 2-5.

Figure 2-5. Markers before Pressing the Backspace Key
2. Press \[\text{←}\].

The display will appear similar to Figure 2-6. Notice that the marker information has moved off of channels’ 2 and 4 graticules and into the softkey display area.

![Figure 2-6. Markers after Pressing the Backspace Key](image)

To Move Marker Information back onto the Graticules

3. Press \[\text{←}\].

Notice that the marker information moves back onto the graticules and that the softkey menu is restored as shown in Figure 2-6. The softkey menu is also restored when a softkey or hardkey is pressed. The hardkey must be one which opens a menu, such as [Format] or [System].
Testing A Device with Limit Lines

Creating Flat Limit Lines

In this example procedure, the following flat limit line values are set:

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Power Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>127 MHz to 140 MHz</td>
<td>-27 dB to -21 dB</td>
</tr>
<tr>
<td>100 MHz to 123 MHz</td>
<td>-200 dB to -65 dB</td>
</tr>
<tr>
<td>146 MHz to 160 MHz</td>
<td>-200 dB to -65 dB</td>
</tr>
</tbody>
</table>

Note: The minimum value for measured data is -200 dB.

1. To access the limits menu and activate the limit lines, press:
   SET <System> LIMIT MENU LIMIT LINE ON EDIT LIMIT: LIMIT LINE CLEAR LIST YES

2. To create a new limit line, press:
   ADD
   The analyzer generates a new segment that appears on the center of the display.

3. To specify the limit's stimulus value, test limits (upper and lower), and the limit type, press:
   STIMULUS VALUE 127 M/μ
   UPPER LIMIT -21 x1
   LOWER LIMIT -27 x1
   DONE

Note: You could also set the upper and lower limits by using the MIDDLE VALUE and DELTA LIMITS keys. To use these keys for the entry, press:
   MIDDLE VALUE -24 x1
   DELTA LIMITS 3 x1
   This would correspond to a test specification of -24 ±3 dB.

4. To define the limit as a flat line, press:
   LIMIT TYPE FLAT LIMIT RE TURN

Making Measurements 2-13
5. To terminate the flat line segment by establishing a single point limit, press:

```
ADD
STIMULUS VALUE 140 M/µ
DONE
LIMIT TYPE SINGLE POINT RETURN
```

Figure 2-7 shows the flat limit lines that you have just created with the following parameters:

- Stimulus from 127 MHz to 140 MHz
- Upper limit of -21 dB
- Lower limit of -27 dB

![Figure 2-7. Example Flat Limit Line](image)

6. To create a limit line that tests the low side of the filter, press:

```
ADD
STIMULUS VALUE 100 M/µ
UPPER LIMIT -65 x1
LOWER LIMIT -200 x1
DONE
LIMIT TYPE FLAT LINE RETURN
ADD
STIMULUS VALUE 123 M/µ
DONE
LIMIT TYPE SINGLE POINT RETURN
```

2-14 Making Measurements
7. To create a limit line that tests the high side of the bandpass filter, press:

```
ADD
STIMULUS VALUE 146 M/µ
UPPER LIMIT -65 x1
LOWER LIMIT -200 x1
DONE
LIMIT TYPE FLAT LINE RETURN
ADD
STIMULUS VALUE 160 M/µ
DONE
LIMIT TYPE SINGLE POINT RETURN
```

Figure 2-8. Example Flat Limit Lines
Creating a Sloping Limit Line

This example procedure shows you how to make limits that test the shape factor of a SAW Elter. The following limits are set:

- Frequency Range: 123 MHz to 125 MHz
- Power Range: -65 dB to -26 dB
- Frequency Range: 144 MHz to 146 MHz
- Power Range: -26 dB to -65 dB

1. To access the limits menu and activate the limit lines, press:
   - LIMIT MENU
   - LIMIT LINE ON
   - CLEAR LIST
   - YES

2. To establish the start frequency and limits for a sloping limit line that tests the low side of the filter, press:
   - LIMIT TYPE
   - SLOPING L I HE RETURN
   - ADD
   - STIMULUS VALUE 123 (M/μ)
   - UPPER LIMIT -65 (x1)
   - LOWER LIMIT -200 (x1)
   - DONE

3. To terminate the lines and create a sloping limit line, press:
   - LIMIT TYPE
   - SINGLE POINT RETURN
4. To establish the start frequency and limits for a sloping limit line that tests the high side of the Elter, press:

```
ADD
STIMULUS VALUE 144 M/µ
UPPER LIMIT +26 x1
LOWER LIMIT -200 x1
DONE
LIMIT TYPE SLOPING LINE RETURN
```

5. To terminate the lines and create a sloping limit line, press:

```
ADD
STIMULUS VALUE 146 M/µ
UPPER LIMIT +65 x1
LOWER LIMIT -200 x1
DONE
LIMIT TYPE SINGLE POINT RETURN
```

You could use this type of limit to test the shape factor of a filter.

![Figure 2-9. Sloping Limit Lines](image-url)
Creating Single Point Limits

In this example procedure, the following limits are set:

- from -23 dB to -28.5 dB at 141 MHz
- from -23 dB to -28.5 dB at 126.5 MHz

1. To access the limits menu and activate the limit lines, press:

   LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE CLEAR LIST YES

2. To designate a single point limit line, as shown in Figure 2-10, you must define two pointers:

   - downward pointing, indicating the upper test limit
   - upward pointing, indicating the lower test limit

Press:

```
ADD STIMULUS VALUE 141 M/µ
UPPER LIMIT -23 (x1)
LOWER LIMIT -28.5 (x1)
DONE
LIMIT TYPE SINGLE POINT
RETURN
ADD STIMULUS VALUE 126.5 M/µ
UPPER LIMIT -23 (x1)
LOWER LIMIT -28.5 (x1)
DONE
LIMIT TYPE SINGLE POINT
RETURN
```
Figure 2-10. Example Single Point Limit Lines
Editing Limit Segments

This example shows you how to edit the upper limit of a limit line.

1. lb access the limits menu and activate the limit lines, press:
   ```
  ilater MENU LIMIT LINE ON EDIT LIMIT LINE
   ```

2. lb move the pointer symbol (>) on the analyzer display to the
   segment you wish to modify, press:
   ```
   SEGMENT ↑ or ↓ repeatedly
   OR
   SEGMENT and enter the segment number followed by x1.
   ```

3. To change the upper limit (for example, -20) of a limit line, press:
   ```
   EDIT UPPER LIMIT -20 x1 DONE
   ```

Deleting Limit Segments

1. lb access the limits menu and activate the limit lines, press:
   ```
   later MENU LIMIT LINE ON EDIT LIMIT LINE
   ```

2. lb move the pointer symbol (>) on the analyzer display to the
   segment you wish to delete, press:
   ```
   SEGMENT ↑ or ↓ repeatedly
   OR
   SEGMENT and enter the segment number followed by x1.
   ```

3. lb delete the segment that you have selected with the pointer
   symbol, press:
   ```
   DELETE
   ```

2-20 Making Measurements
Running a Limit Test

1. lb access the limits menu and activate the limit lines, press:

   System LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE

Reviewing the Limit Line Segments

The limit table data that you have previously entered is shown on the analyzer display.

2. lb verify that each segment in your limits table is correct, review the entries by pressing:

   SEGMENT 1 and 2

3. lb modify an incorrect entry, refer to the “Editing Limit Segments” procedure, located earlier in this section.

Activating the Limit Test

4. lb activate the limit test and the beep fail indicator, press:

   System LIMIT MENU LIMIT TEST ON BEEP FAIL

Note

Selecting the beep fail indicator BEEP FAIL ON is optional and will add approximately 50 ms of sweep cycle time. Because the limit test will still work if the limits lines are off, selecting LIMIT LINE ON is also optional.

The limit test results appear on the right side on the analyzer display. The analyzer indicates whether the filter passes or fails the defined limit test:

- The message FAIL will appear on the right side of the display if the limit test fails.
- The analyzer beeps if the limit test fails and if BEEP FAIL ON has been selected.
- The analyzer alternates a red trace where the measurement trace is out of limits.
- A TTL signal on the rear panel BNC connector “LIMIT TEST” provides a pass/fail (5 V/0 V) indication of the limit test results.
Measuring Gain Compression

Gain compression occurs when the input power of an amplifier is increased to a level that reduces the gain of the amplifier and causes a nonlinear increase in output power. The point at which the gain is reduced by 1 dB is called the 1 dB compression point. The gain compression will vary with frequency, so it is necessary to end the worst case point of gain compression in the frequency band.

Once that point is identified, you can perform a power sweep of that CW frequency to measure the input power at which the 1 dB compression occurs and the absolute power out (in dBm) at compression. The following steps provide detailed instruction on how to apply various features of the analyzer to accomplish these measurements.

Figure 2-11. Diagram of Gain Compression

1. Set up the stimulus and response parameters for your amplifier under test. In reduce the effect of noise on the trace, press:

   \[ \text{Avg IFBW 1000 } \]

2. Perform the desired error correction procedure. Refer to Chapter 5, “Optimizing Measurement Results,” for instructions on how to make a measurement correction.

3. Hook up the amplifier under test.

4. To produce a normalized trace that represents gain compression, perform either step 5 or step 6. (Step 5 uses trace math and step 6 uses uncoupled channels and the display function D1/D2 to D2 ON.)

5. Press (Display) DATA --MEMORY DATA/MEM to produce a normalized trace.
6. To produce a normalized trace, perform the following steps:

a. Press \texttt{SET \text{DUAL CHAN} ON \text{OFF}} to \texttt{ON} to view channels 1 and 2 simultaneously.

b. 'lb uncouple the channel stimulus so that the channel power will be uncoupled, press:

\texttt{Menu \text{COUPLED CH OFF}}

This will allow you to separately increase the power for channel 2 and channel 1, so that you can observe the gain compression on channel 2 while channel 1 remains unchanged.

c. 'lb display the ratio of channel 2 data to channel 1 data on the channel 2 display, press:

\texttt{Chan2 \text{DISPLAY} MORE} and set \texttt{D2/D1} to \texttt{D2 ON OFF} to \texttt{ON}. This produces a trace that represents gain compression only.

7. Press \texttt{MARKER} on the marker at approximately mid-span.

8. Press \texttt{Scale Ref \text{SCALE/DIV} 1 \times 1} to change the scale to 1 dB per division.

9. Press \texttt{Menu \text{POWER}}.

10. Increase the power until you observe approximately 1 dB of compression on channel 2, using the step keys or the front panel knob.

11. 'lb locate the worst case point on the trace, press:

\texttt{Marker Fctn MKR \text{SEARCH:MIN}}
12. If `COUPL ED CH OFF` was selected, recouple the channel stimulus by pressing:

    (Menu) COUPL ED CH ON

13. To place the marker `exactly` on a measurement point, press:

    Marker Fctn MARKER NODE MENU MARKERS: DISCRETE

14. To set the CW frequency before going into the power sweep mode, press:

    (Sect) SPECIAL FUNCTIONS MARKER → CW

15. Press (Menu) SWEEP TYPE MENU POWER SWEEP.

16. Enter the start and stop power levels for the sweep.

    Now channel 1 is displaying a gain compression curve. (Do not pay attention to channel 2 at this time.)

---

Figure 2-12.
Gain Compression using Linear Sweep and D2/D 1 t o D 2 O N

2-24 Making Measurements
17. To maintain the calibration for the CW frequency, press:

```
Cal INTERPOL ON CORRECTION ON
```

18. Press SETUP Display DUAL: QUAD setup DUAL CHAN on OFF to ON.

19. If D2/D1 to D2 ON was selected, press MORE D2/D1 to D2 OFF.

20. Press Meas INPUT PORTS B.

Now channel 2 displays absolute output power (in dBm) as a function of power input.

21. Press Scale Ref SCALE/DIV 10 (x1) to change the scale of channel 2 to 10 dB per division.

22. Press Chan1 1 (x1) to change the scale of channel 1 to 1 dB per division.

**Note**

A receiver calibration will improve the accuracy of this measurement. Refer to Chapter 5, “Optimizing Measurement Results.”

23. Press (Marker) MARKER MODE MENU MARKERS: COUPLED.

24. To find the 1 dB compression point on channel 1, press:

```
Marker Fctn MKR SEARCH SEARCH MAX
Marker Fctn MKR ZERO
Marker Fctn MKR SEARCH SEARCH TARGET -1 (x1)
```

Notice that the marker on channel 2 tracked the marker on channel 1.

25. Press (Marker) MKR MODE MARKERS: UNCOUPLED.

26. To take the channel 2 marker out of the A mode so that it reads the absolute output power of the amplifier (in dBm), press:

```
Marker A MODE FL EU A MODE F
```
Figure 2-13. Gain Compression using Power Sweep
Measurements using the Swept List Mode

**Stepped List Mode**
In this mode, the source steps to each defined frequency point, stopping while data is taken. This mode eliminates IF delay and allows frequency segments to overlap. However, the sweep time can be substantially slower than for a continuous sweep with the same number of points.

**Swept List Mode**
This mode takes data while sweeping through the defined frequency segments, increasing throughput by up to 6 times over a stepped sweep. In addition, this mode allows the test port power and IF bandwidth to be set independently for each segment that is defined. The frequency segments in this mode cannot overlap.

The ability to completely customize the frequency sweep while using swept list mode is useful when setting up a measurement for a device with high dynamic range, like a Elter. The following measurement of a filter illustrates the advantages of using the swept list mode.

**Note**
Primary channels 1 and 2 can be set up independently from each other with different frequency lists (stepped or swept). Press **Menu** and set **COUPLED CH ON off f to OFF** to uncouple the primary channels from each other. You can then create an independent frequency list for each primary channel.

Due to the permanent stimulus coupling between primary and auxiliary channels, channel 3 and 4 will have the same frequency lists as channels 1 and 2 respectively.
Connect the Device Under Test

1. Connect the equipment as shown in the following illustration:

![Figure 2-14. Swept List Measurement Setup](image)

2. Set the following measurement parameters:

<table>
<thead>
<tr>
<th>Meas</th>
<th>Trans FWD S21 (B/R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center</td>
<td>900 M/µ</td>
</tr>
<tr>
<td>Span</td>
<td>500 M/µ</td>
</tr>
</tbody>
</table>
Observe the Characteristics of the Filter

Figure 2-15. Characteristics of a Filter

- Generally, the pass band of a filter exhibits low loss. A relatively low incident power may be needed to avoid overdriving the next stage of the DUT (if that stage contains an amplifier) or the network analyzer receiver.

- Conversely, the stop band of a filter generally exhibits high isolation. To measure this characteristic, the dynamic range of the system will have to be maximized. This can be done by increasing the incident power and narrowing the IF bandwidth.
Choose the Measurement Parameters

1. Decide the frequency ranges of the segments that will cover the stop bands and pass band of the filter. For this example, the following ranges will be used:
   - Lower stop band: 650 to 880 MHz
   - Pass band: 880 to 920 MHz
   - Upper stop band: 920 to 1150 MHz

2. To set up the swept list measurement, press
   
   (Menu) SWEEP TYPE MENU EDIT LIST

Set Up the Lower Stop Band Parameters

3. To set up the segment for the lower stop band, press
   
   ADD
   START (650) MHz
   STOP (880) MHz
   NUMBER of POINTS (51) x1

4. To maximize the dynamic range in the stop band (increasing the incident power and narrowing the IF bandwidth), press
   
   MORE
   LIST POWER ON
   SEGMENT POWER (10) x1
   LIST IF BW ON
   SEGMENT IF BW (1000) x1
   RETURN DONE

Set Up the Pass Band Parameters

5. To set up the segment for the pass band, press
   
   ADD
   CENTER (900) MHz
   SPAN (40) MHz
   STEP SIZE (2) MHz

6. To specify a lower power level for the pass band, press
   
   MORE
   SEGMENT POWER (-10) x1
   SEGMENT IF BW (5000) x1
   RETURN DONE

2.30 Making Measurements
Set Up the Upper Stop Band Parameters

7. 'lb set up the segment for the upper stop band, press

```
ADD
START 920 (M/μ)
STOP 1150 (M/μ)
NUMBER of POINTS 51 x 1
```

8. 'lb maximize the dynamic range in the stop band (increasing the incident power and narrowing the IF bandwidth), press

```
MORE
SEGMENT POWER 10 x 1
SEGMENT IF BW 300 x 1
RETURN DONE
```

9. Press DONE LIST FREQ [SWEPT].

Calibrate and Measure

1. Remove the DUT and connect a thru between the test ports.

2. Perform a full two-port calibration. Refer to Chapter 5, “Optimizing Measurement Results.”

3. With the thru connected, set the scale to autoscale to observe the benefits of using swept list mode.

   - The segments used to measure the stop bands have less noise, thus maximizing dynamic range within the stop band frequencies.
   - The segment used to measure the pass band has been set up for faster sweep speed with more measurement points.
4. Reconnect the filter and adjust the scale to compare results with the first filter measurement that used a linear sweep.

- In Figure 2-18, notice that the noise level has decreased over 10 dB, confirming that the noise reduction techniques in the stop bands were successful.

- In Figure 2-18, notice that the stop band noise in the third segment is slightly lower than in the first segment. This is due to the narrower IF bandwidth of the third segment (300 Hz).
Figure 2-17.
Filter Measurement using Linear Sweep
(Power: 0 dBm/IF BW: 3700 Hz)
Figure 2-18. Filter Measurement using Swept List Mode
Making Mixer Measurements

Measurement Considerations

To ensure successful mixer measurements, the following measurement challenges must be taken into consideration:

- **Mixer Considerations**
  - Minimizing Source and Load Mismatches
  - Reducing the Effect of Spurious Responses
  - Eliminating Unwanted Mixing and Leakage Signals

- **Analyzer Operation**
  - How RF and IF Are Defined
  - Frequency Offset Mode Operation
  - Differences Between Internal and External R Channel Inputs
  - Power Meter Calibration

### Minimizing Source and Load Mismatches

When characterizing linear devices, you can use vector accuracy enhancement to mathematically remove all systematic errors, including source and load mismatches, from your measurement. This is not possible when the device you are characterizing is a mixer operating over multiple frequency ranges. Therefore, source and load mismatches are not corrected for and will add to overall measurement uncertainty.

You should place attenuators at all of the test ports to reduce the measurement errors associated with the interaction between mixer port matches and system port matches. To avoid overdriving the receiver, you should give extra care to selecting the attenuator located at the mixer's IF port. For best results, you should choose the attenuator value so that the power incident on the analyzer R channel input is less than -10 dBm and greater than -35 dBm.
Reducing the Effect of Spurious Responses

By choosing test frequencies (frequency list mode), you can reduce the effect of spurious responses on measurements by avoiding frequencies that produce IF signal path distortion.

Eliminating Unwanted Mixing and Leakage Signals

By placing filters between the mixer’s IF port and the receiver’s input port, you can eliminate unwanted mixing and leakage signals from entering the analyzer’s receiver. Filtering is required in both fixed and broadband measurements. Therefore, when configuring broadband (swept) measurements, you may need to trade some measurement bandwidth for the ability to more selectively filter signals entering the analyzer receiver.

How RF and IF Are Defined

In standard mixer measurements, the input of the mixer is always connected to the analyzer’s RF source, and the output of the mixer always produces the IF frequencies that are received by the analyzer’s receiver.

However, the ports labeled RF and IF on most mixers are not consistently connected to the analyzer’s source and receiver ports, respectively. These mixer ports are switched, depending on whether a down converter or an up converter measurement is being performed.

It is important to keep in mind that in the setup diagrams of the frequency offset mode, the analyzer’s source and receiver ports are labeled according to the mixer port that they are connected to.

- In a down converter measurement where the Down Converter softkey is selected, the notation on the analyzer’s setup diagram indicates that the analyzer’s source frequency is labeled RF, connecting to the mixer RF port, and the analyzer’s receiver frequency is labeled IF, connecting to the mixer IF port.

Because the RF frequency can be greater or less than the set LO frequency in this type of measurement, you can select either $\text{RF} > \text{LO}$ or $\text{RF} < \text{LO}$.
In an up converter measurement where the UP CONVERTER softkey is selected, the notation on the setup diagram indicates that the analyzer's source frequency is labeled IF, connecting to the mixer IF port, and the analyzer's receiver frequency is labeled RF, connecting to the mixer RF port.

Because the RF frequency will always be greater than the set LO frequency in this type of measurement, you must select only $RF \geq LO$.

**Figure 3-1. Down Converter Port Connections**

**Figure 3-2. Up Converter Port Connections**
**Frequency Offset Mode Operation**

Frequency offset measurements do not begin until all of the frequency offset mode parameters are set. These include the following:

- Start and Stop IF Frequencies
- LO frequency
- Up Converter / Down Converter
- RF > LO / RF < LO

The LO frequency for frequency offset mode must be set to the same value as the external LO source. The offset frequency between the analyzer source and receiver will be set to this value.

When frequency offset mode operation begins, the receiver locks onto the entered IF signal frequencies and then offsets the source frequency required to produce the IF. Therefore, since it is the analyzer receiver that controls the source, it is only necessary to set the start and stop frequencies from the receiver.

**Differences Between Internal and External R Channel Inputs**

Due to internal losses in the analyzer’s test set, the power measured internally at the R channel is 16 dB lower than that of the source. To compensate for these losses, the traces associated with the R channel have been offset 16 dB higher. As a result, power measured directly at the R channel via the R CHANNEL IN port will appear to be 16 dB higher than its actual value. If power meter calibration is not used, this offset in power must be accounted for with a receiver calibration before performing measurements.
Power Meter Calibration

Mixer transmission measurements are generally configured as follows:

- measured output power (Watts) / set input power (Watts)

OR

- measured output power (dBm) - set input power (dBm)

For this reason, the set input power must be accurately controlled in order to ensure measurement accuracy.

Higher measurement accuracy may be obtained through the use of power meter calibration. You can use power meter calibration to correct for power offsets, losses, and flatness variations occurring between the analyzer source and the input to the mixer under test.
Conversion Loss using the Frequency Offset Mode

Conversion loss is the measure of efficiency of a mixer. It is the ratio of side-band IF power to RF signal power, and is usually expressed in dB. (Express ratio values in dB amounts to a subtraction of the dB power in the denominator from the dB power in the numerator.) The mixer translates the incoming signal, (RF), to a replica, (IF), displaced in frequency by the local oscillator, (LO). Frequency translation is characterized by a loss in signal amplitude and the generation of additional sidebands. For a given translation, two equal output signals are expected, a lower sideband and an upper sideband.

![Figure 3-3](image_url)

An Example Spectrum of RF, LO, and IF Signals Present in a Conversion Loss Measurement

The analyzer allows you to make a swept RF/IF conversion loss measurement holding the LO frequency fixed. You can make this measurement by using the analyzer’s frequency offset measurement mode. This mode of operation allows you to offset the analyzer’s source by a fixed value, above or below the analyzer’s receiver. That is, this allows you to use a device input frequency range that is different from the receiver input frequency range.

The following procedure describes the swept IF frequency conversion loss measurement of a broadband component mixer:

1. Set the LO source to the desired CW frequency and power level.
   
   ```
   CW frequency = 1000 MHz  
   Power = 13 dBm 
   ```

3-6 Making Mixer Measurements
2. Set the desired source power to the value which will provide -10 dBm or less to the R channel input. Press:

\[
\text{Menu} \quad \text{POWER} \quad \text{PWR \ RANGE \ MAN \ 0 \ x1}
\]

3. Calibrate and zero the power meter.

4. Connect the measurement equipment as shown in Figure 3-4.

**Caution**  'lb prevent connector damage, use an adapter (BP part number 1250-1462) as a connector saver for R CHANNEL IN.

![Figure 3-4](image)

**Figure 3-4. Connections for R Channel and Source Calibration**

5. From the front panel of the BP 87533, set the desired receiver frequency and source output power by pressing:

\[
\text{System} \quad \text{INSTRUMENT \ MODE \ FREQ \ OFFS \ MENU}
\]

\[
\text{Start} \quad 100 \quad \text{M/Hz}
\]

\[
\text{Stop} \quad 350 \quad \text{M/Hz}
\]

\[
\text{FREQ \ OFFS \ ON}
\]

\[
\text{Menu} \quad \text{POWER} \quad 0 \quad x1
\]

6. 'lb view the measurement trace, press:

\[
\text{Menu} \quad \text{INPUT \ PORTS}
\]

7. Select the BP 87533 as the system controller:
8. Set the power meter’s address:

```
SET ADDRESSES
ADDRESS: P MTR/HP IB #1
```

9. Select the appropriate power meter by pressing

```
POWER MTR E 1 until the correct model number is displayed
(HP 436A or HP 438A/437).
```

10. Press

```
[Cal] PWRMTR CAL LOSS/SENSR LIST
CAL FACTOR SENSOR A and enter the correction factors as
listed on the power sensor. Press
```

```
ADD REQUENCY XX M/H
CAL FACTOR (XX) x1 DONE
```

for each correction factor. When

```
finished, press DONE.
```

11. To perform a one sweep power meter calibration over the IF

```
frequency range at 0 dBm, press:
```

```
[Cal]
PWRMTR CAL
ONE SWEEP
0 x1
TAKE CAL SWEEP
```

12. To calibrate the R channel over the IF range, press:

```
[Cal] RECEIVER CAL
TAKE RCVR CAL SWEEP
```

Once completed, the display should read 0 dBm.

3-8 Making Mixer Measurements
13. Make the connections as shown in Figure 3-5 for the one-sweep power meter calibration over the RF range.

![Connections for a One-Sweep Power Meter Calibration for Mixer Measurements](image)

14. Set the frequency offset mode LO frequency from the analyzer, press:

- System
- INSTRUMENT MODE
- FREQ OFFS MENU
- LO MENU FREQUENCY: CW 1000 M/µ

15. To select the converter type and a high-side LO measurement configuration, press:

- RETURN
- DOWN: CONVERTER
- RF<LO
16. To view the measurement trace, press:

"VIEW MEASURE"

17. To perform a one-sweep power meter calibration over the RF frequency range, press:

`Cal PWRMTR CAL ONE SWEEP 0 X1 TAKE CAL SWEEP`

**Note**  
_Do not_ reduce the number of points to perform this power meter calibration. Reducing the number of points will turn off the receiver calibration.

The analyzer is now displaying the conversion loss of the mixer calibrated with power meter accuracy.
18. To view the conversion loss in the best vertical resolution, press:

![Scale Ref] AUTOSCALE

Figure 3-7. Conversion Loss Example Measurement

**Conversion loss/gain** = output power − input power
High Dynamic Range Swept RF/IF Conversion Loss

The analyzer has a 35 dB dynamic range limitation on measurements made directly with its R (phaselock) channel. For this reason, the measurement of high dynamic range mixing devices (such as mixers with built in amplification and filtering) with greater than 35 dB dynamic range must be made on either the analyzer’s A or B channel, with a reference mixer providing input to the analyzer’s R-channel for phaselock.

This example describes the swept IF conversion loss measurement of a mixer and filter. The output filtering demonstrates the analyzer’s ability to make high dynamic range measurements.

To avoid the complexity of performing a separate power meter calibration over the RF frequency range while the mixer under test and reference mixer are operating, a broad band power meter calibration is used. The broad band calibration covers the entire range of IF and RF frequencies.

1. Set the following analyzer parameters:

   ![Analyzer Parameters](image)

2. Calibrate and zero the power meter.

3. Connect the measurement equipment as shown in Figure 3-8.

---

**Caution**

To prevent connector damage, use an adapter (HP part number 1250-1462) as a connector saver for R CHANNEL IN.
4. Connect the measurement equipment as shown in Figure 3-9.

5. Set the following analyzer parameters:

![Figure 3-8. Connections for Broad Band Power Meter Calibration](image)

![Figure 3-9. Connections for Receiver Calibration](image)

Making Mixer Measurements 3-13
6. lb calibrate the B channel over the IF range, press: 

![Image](image.png)

Once completed, the analyzer should display 0 dBm.

7. Make the connections shown in Figure 3-10.

8. Set the LO source to the desired CW frequency and power level. For this example the values are as follows:
   - CW frequency = 1500 MHz
   - source power = 13 dBm

Figure 3-10.
Connections for a High Dynamic Range Swept IF Conversion Loss Measurement
9. 'lb set the frequency offset mode LO frequency, press:

```
SYSTEM | INSTRUMENT MODE FREQ OFFS MENU
       | LO MENU FREQUENCY: CW (1500 MHz)
```

10. 'lb select the converter type and low-side LO measurement configuration, press:

```
RETURN
DOWN CONVERTER RF→LO FREQ→OFFS→ON
```

In this low-side LO, down converter measurement, the analyzer's source frequency range will be offset higher than the receiver frequency range. The source frequency range can be determined from the following equation:

receiver frequency range (100 to 1000 MHz) + LO frequency (1500 MHz) = 1.6-2.5 GHz

11. 'lb view the conversion loss in the best vertical resolution, press:

```
VIEW MEASURE
```

Figure 3-11. Example of Swept IF Conversion Loss Measurement
Conversion Compression using the Frequency Offset Mode

Conversion compression is a measure of the maximum RF input signal level, where the mixer provides linear operation. The conversion loss is the ratio of the IF output level to the RF input level. This value remains constant over a specified input power range. When the input power level exceeds a certain maximum, the constant ratio between IF and RF power levels will begin to change. The point at which the ratio has decreased 1 dB is called the 1 dB compression point. See Figure 3-12.

Figure 3-12.
Conversion Loss and Output Power as a Function of Input Power Level Example

Notice that the IF output power increases linearly with the increasing RF signal, until mixer compression begins and the mixer saturates.

The following example uses a ratio of mixer output to input power and a marker search function to locate a mixer's 1 dB compression point.

1. Set the LO source to the desired CW frequency and power level.
   
   CW frequency = 600 MHz
   Rower = 13 dBm

2. Initialize the analyzer by pressing (Preset).
3. To set the desired CW frequency and power sweep range, press:

```
Menu
SWEEP TYPE MENU POWER SWEEP RETURN
CW FREQ
800 M/Hz
POWER PWR RANGE MAN
POWER RANGES RANGE 0
Start -10 x1
Stop 10 x1
```

4. Make the connections, as shown in Figure 3-13.

**Caution**

To prevent connector damage, use an adapter (HP part number 1250-1462) as a connector saver for R CHANNEL IN.

![Figure 3-13. Connections for the First Portion of Conversion Compression Measurement](image)

5. To view the absolute input power to the analyzer's R-channel, press:

```
Menu
INPUT PORTS R
```

Making Mixer Measurements 3-17
6. 'lb store a trace of the receiver power versus the source power into memory and view data/memory, press:

```
Display
DATA → MEMORY
DATA/MEM
```

This removes the loss between the output of the mixer and the input to the receiver, and provides a linear power sweep for use in subsequent measurements.

7. Make the connections as shown in Figure 3-14.

---

**Caution** 'lb prevent connector damage, use an adapter (HP part number 1250-1462) as a connector saver for R CHANNEL IN.

---

Figure 3-14.
Connections for the Second Portion of Conversion Compression Measurement

8. 'lb set the frequency offset mode LO frequency, press:

```
System
INSTRUMENT MODE FREQ OFFS MENU
LO MENU FREQUENCY: CH (600) M/μ
```

3-18 Making Mixer Measurements
9. To select the converter type, press:

```
RETURN
UP CONVERTER
```

10. lb select a low-side LO measurement configuration, press:

```
RF\rightarrow LO
FREQ OFFS ON
```

In this low-side LO, up converter measurement, the analyzer source frequency is offset lower than the receiver frequency. The analyzer source frequency can be determined from the following equation:

receiver frequency (800 MHz) – LO frequency (600 MHz) = 200 MHz

The measurements setup diagram is shown in Figure 3-15.

![Measurement Setup Diagram Shown on Analyzer Display](image)

Figure 3-15.
Measurement Setup Diagram Shown on Analyzer Display

11. lb view the mixer’s output power as a function of its input power, press:

```
VIEW MEASURE
```

12. lb set up an active marker to search for the 1 dB compression point of the mixer, press:

```
Scale Ref
AUTO SCALE
(Marker Fctn) MKR SEARCH ON SEARCH MAX
```

Making Mixer Measurements 3-19
13. Press:

The measurement results show the mixer's 1 dB compression point. By changing the target value, you can easily locate other compression points (for example, 0.5 dB, 3 dB). See Figure 3-16.

14. Read the compressed power on by turning marker A off.

Figure 3-16.
Example Swept Power Conversion Compression Measurement

3-20 Making Mixer Measurements
Isolation Example Measurements

Figure 3-17. Signal Flow in a Mixer Example
LO to IF Isolation

Figure 3-18. Connections for a Mixer Isolation Measurement

Figure 3-19.
Example Mixer LO to RF Isolation Measurement

3-22 Making Mixer Measurements
RF Feedthrough

You can measure the IF to RF isolation in a similar manner, but with the following modifications:

- Use the analyzer source as the IF signal drive.
- View the leakage signal at the RF port.

Making Mixer Measurements 3-23
Configuring a Print Function

1. Connect the printer to the analyzer interface port.

2. Press \texttt{(Local) SET ADDRESSES PRINTER PORT PRINTERTYPE 1} until the correct printer choice appears.

3. Select one of the following printer interfaces:

   - Choose \texttt{PRINTER PORT HP-IB} if your printer has an HP-IB interface.
     - Enter the HP-IB address of the printer, followed by \texttt{PA1}.

   - Press \texttt{(Local) SYSTEM CONTROLLER or USE PASS CONTROL}.

   - Choose \texttt{PARALLEL COPY1} if your printer has a parallel (centronics) interface.

   - Choose \texttt{SERIAL} if your printer has a serial (RS-232) interface, and then configure the print function as follows:
     - Press \texttt{PRINTER BAUD RATE} and enter the printer’s baud rate, followed by \texttt{PA1}.

     - Select the transmission control method that is compatible with your printer, press \texttt{XMIT CNTRL} (transmit control-handshaking protocol) until the correct method appears.
Defining a Print Function

**Note**

The print definition is set to default values whenever the power is cycled. However, you can save the print definition by saving the instrument state.

1. Press **DEFINE PRINT**.
2. Press **PRINT: MONOCHROME** or **PRINT: COLOR**.
3. Press **AUTO-FEED** until the correct choice (ON or OFF) is highlighted.
   - Choose **HUT ON** if you want to print one measurement per page.
   - Choose **UT FF** if you want to print multiple measurements per page.

**Note**

Laser printers and some DeskJet printers do not begin to print until a full page, or a partial page and a form feed, have been received.

If You Are Using a Color Printer

1. Press **PRINT COLORS**.
2. If you want to modify the print colors, select the print element and then choose an available color.

**Note**

You can set all the print elements to black to create a hardcopy in black and white.

Since the media color is white or clear, you could set a print element to white if you do not want that element to appear on your hardcopy.

To Reset the Printing Parameters to Default Values

1. Press **DEFINE PRINT DEFAULT PRINT SETUP**.

4-2  Printing, Plotting, and Saving Measurement Results
Configuring a Plot Function

If You Are Plotting to an HPGL/2 Compatible Printer

2. Press [Local] SET ADDRESSES PRINTER PORT and then press PRNTR TYPE until the correct printer choice appears.

3. Configure the analyzer for one of the following printer interfaces:
   - Choose PRNTR PORT HP I B if your printer has an HP-IB interface.
     - Enter the HP-IB address of the printer, followed by (x1).
     - Press [Local] SYSTEM CONTROLLER or USE PASS CONTROL.
   - Choose PARALLEL COP Y 1 if your printer has a parallel (centronics) interface.
   - Choose SERIAL COP Y 1 if your printer has a serial (RS-232) interface, and then configure the print function as follows:
     a. Press PRINTER BAUD RATE and enter the printer’s baud rate, followed by (x1).
     b. ‘lb select the transmission control method that is compatible with your printer, press XMT CTRL (transmit control - handshaking protocol) until the correct method appears.

4. Press [Local] SET ADDRESSES PLOTTER PORT and then PLTR TYPE until PLTR TYPE CHPGL PRT] appears.
If You Are Plotting to a Pen Plotter

1. Press (Local) SET ADDRESSES PLOTTER PORT and then PLTR TYPE until PLTR TYPE [PLOTTER] appears.

2. Configure the analyzer for one of the following plotter interfaces:
   - Choose PLTR PORT HP IB if your plotter has an HP-IB interface.
     a. Enter the HP-IB address of the plotter, followed by \( \times 1 \).
     b. Press (Local) SYSTEM CONTROLLER or USE PASS CONTROL.
   - Choose PIIIIEEL C COPY 1 if your plotter has a parallel (centronics) interface.
   - Choose SER 1 AL if your plotter has a serial (RS-232) interface, and then configure the print function as follows:
     a. Press PRINTER BAUD RATE and enter the plotter's baud rate, followed by \( \times 1 \).
     b. In select the transmission control method that is compatible with your plotter, press XM I T CNTRL (transmit control - handshaking protocol) until the correct method appears.
If You Are Plotting to a Disk Drive

1. press **Local** SET ADDRESSES PLOTTER PORT DISK.

2. Press **[Save/Recall]** SELECT the disk drive that you will plot to.
   - Choose **INTERNAL DISK** if you will plot to the analyzer internal disk drive.
   - Choose **EXTERNAL DISK** if you will plot to a disk drive that is external to the analyzer.
Defining a Plot Function

**Note**  The plot definition is set to default values whenever the power is cycled. However, you can save the plot definition by saving the instrument state.

1. Press **DEFINE PLOT**.

Choosing Display Elements

2. Choose which of the following measurement display elements that you want to appear on your plot:

![Plot Components Available through Definition](image)

**Figure 4-1.** Plot Components Available through Definition

Selecting Auto-Feed

3. Press **HUT FEED** until the correct choice is highlighted.

- Choose **HUT FEED H** if you want a “page eject” sent to the plotter or HPGL compatible printer after each time you press **PLOT**.
- Choose **HUT FEED F F** if you want multiple plots on the same sheet of paper.

**Note**  The peripheral ignores **HUT FEED N** when you are plotting to a quadrant.
Selecting Pen Numbers and Colors

4. Press \texttt{MORE} and select the plot element where you want to change the pen number. For example, press \texttt{PEN NUM DATA} and then modify the pen number. The pen number selects the color if you are plotting to an HPGL/2 compatible color printer.

Press (xl) after each modification.

Table 4-1.
Default Pen Numbers and Corresponding Colors

<table>
<thead>
<tr>
<th>Pen Number</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>white</td>
</tr>
<tr>
<td>1</td>
<td>cyan</td>
</tr>
<tr>
<td>2</td>
<td>magenta</td>
</tr>
<tr>
<td>3</td>
<td>blue</td>
</tr>
<tr>
<td>4</td>
<td>yellow</td>
</tr>
<tr>
<td>5</td>
<td>green</td>
</tr>
<tr>
<td>6</td>
<td>red</td>
</tr>
<tr>
<td>7</td>
<td>black</td>
</tr>
</tbody>
</table>

Table 4-2. Default Pen Numbers for Plot Elements

<table>
<thead>
<tr>
<th>Corresponding Key</th>
<th>Plot Element</th>
<th>Channel 1 Channel 3 Pen Numbers</th>
<th>Channel 2 Channel 4 Pen Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEN NUM DATA</td>
<td>Measurement Data Trace</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PEN NUM MEMORY</td>
<td>Displayed Memory Trace</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>PEN NUM GRATICULE</td>
<td>Graticule and Reference Line</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PEN NUM TEXT</td>
<td>Displayed Text</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>PEN NUM MARKER</td>
<td>Displayed Markers and Values</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Printing, Plotting, and Saving Measurement Results 4-7
Note: You can set all the pen numbers to black for a plot in black and white. You must define the pen numbers for each measurement channel (channel A/channel 3 and channel B/channel 4).

Selecting Line Types

5. Press MORE and select each plot element line type that you want to modify.

Table 4-3. Default Line Types for Plot Elements

<table>
<thead>
<tr>
<th>Plot Elements</th>
<th>Channel 1 and 3</th>
<th>Channel 2 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Line Type Numbers</td>
<td>Line Type Numbers</td>
</tr>
<tr>
<td>Data Trace</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Memory Trace</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure 4-2. Line Types Available
Choosing Scale

6. Press **SCALE PLOT** until the selection appears that you want.
   - **SCALE PLOT [FULL]**
   - **SCALE PLOT [GRAT]**

![Figure 4-3. Locations of P1 and P2 in SCALE PLOT [GRAT] Mode](image)

Choosing Plot Speed

7. Press **PLOT SPEED** until the plot speed appears that you want.
   - Choose **PLOT SPEED [FAST]** 1 for normal plotting.
   - Choose **PLOT SPEED [SLOW]** for plotting directly on transparencies. (The slower speed provides a more consistent line width.)

To Reset the Plotting Parameters to Default Values

Press **COPY DEFINE PLOTMOREMOREDEFAULT PLOTSETUP**.

If You Are Plotting to an HPGL Compatible Printer

1. Configure and define the plot, as explained in “Configuring a Plot Function” and “Defining a Plot Function” located earlier in this chapter.

2. Press **COPY PLOT PLOTTER FORM FEED** to print the data the printer has received.
To Save Measurement Results

**Note**
You can only save measurement data to a disk. The analyzer internal memory can only store instrument states and memory traces.

The analyzer stores data in arrays along the processing flow of numerical data, from IF detection to display. These arrays are points in the flow path where data is accessible, usually via HP-IB. You can choose from three different arrays which vary in modification flexibility when they're recalled.

<table>
<thead>
<tr>
<th>Define Save</th>
<th>Modification Flexibility During Recall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Data Array</td>
<td>Most</td>
</tr>
<tr>
<td>Data Array</td>
<td>Medium</td>
</tr>
<tr>
<td>Format Array</td>
<td>Least</td>
</tr>
</tbody>
</table>

You can also save data-only. A data-only file is saved to disk with default filenames DATA00D1 to DATA31D1 for channel 1, DATA00D2 to DATA31D2 for channel 2, DATA00D3 to DATA31D3 for channel 3, and DATA00D4 to DATA31D4 for channel 4. However, these files are not instrument states and cannot be recalled.
1. Press SAVE RECALL SELECT DISK.

2. Choose one of the following disk drives:
   - INTERNAL DISK
   - EXTERNAL DISK

3. Press SAVE RECALL DEFINE DISK=SAVE.

4. Define the save by selecting one of the following choices:
   - DATA ARRAY ON
   - RAW ARRAY ON
   - FORMAT ARRAY ON
   - GRAPHICS ON
   - DATA ONLY ON (When ON, the other choices are ignored.)

Note: If you select DATA ONLY ON, you cannot recall and display the file contents on the analyzer. This type of data is intended for computer manipulation. DATA ONLY ON always saves corrected data.
5. Choose the type of format you want:

- Choose **SAVE USING BINARY** for all applications except CITIFILE, S2P, or CAE applications.
- Choose **SAVE USING ASCI1** for CITIFILE, S2P, and CAE applications or when you want to import the information into a spreadsheet format.

6. Press **RETURN SAVE STATE**.

---

**Recalling an Instrument State**

1. Press **SAVE RECALL** SELECT DISK.

2. Choose from the following storage devices:

   - **INTERNAL MEMORY**
   - **INTERNAL DISK**
   - **EXTERNAL DISK**

3. Press the **EDIT** repeatedly until the name of the Ele that you want to recall is highlighted.

4. Press **RETURN RECALL STATE**.
Optimizing Measurement Results

Increasing Measurement Accuracy

Connector Repeatability
- Inspect the connectors.
- Clean the connectors.
- Gauge the connectors.
- Use correct connection techniques.

Interconnecting Cables
- Inspect for lossy cables.
- Inspect for damaged cable connectors.
- Practice good connector care techniques.
- Minimize cable position changes between error-correction and measurements.

Temperature Drift
- Use a temperature-controlled environment.
- Ensure the temperature stability of the calibration devices.
- Avoid handling the calibration devices unnecessarily during calibration.
- Ensure the ambient temperature is ±1° of measurement calibration temperature.
**Frequency Drift**

- Override the internal crystal with a high-stability external source, frequency standard, or use the internal frequency standard.

**Performance Verification**

- Perform a measurement verification at least once per year

**Reference Plane and Port Extensions**

Use the port extension feature to compensate for the phase shift of an extended measurement reference plane, due to such additions as cables, adapters, and Extures, after completing an error-correction procedure (or when there is no active correction).

**Press Cal MORE PORT EXTENSIONS EXTENSIONS ON.** Then enter the delay to the reference plane.
Clarifying Type-N Connector Sex

When you are performing error-correction for a system that has type-N test port connectors, the softkey menus label the sex of the test port connector — not the calibration standard connector. For example, the label $H_{O}E_{T}C_{F}^{1}$ refers to the short that will be connected to the female test port.

Response Error-Correction for Reflection Measurements

1. Select the type of measurement you want to make.
2. In select a response correction, press:
   CALIBRATE  MENU RESPONSE

   ![NETWORK ANALYZER](image)

   **Figure 5-1.**
   Standard Connections for a Response Error-Correction for Reflection Measurement

3. In measure the standard when the displayed trace has settled, press:
   SHORT or OPEN

Optimizing Measurement Results 5-3
Response Error-Correction for Transmission Measurements

1. Select the type of measurement you want to make.
2. Press [CAL] CALIBRATE MENU RESPONSE

Figure 5-2. Standard Connections for Response Error-Correction for Transmission Measurements

3. Measure the standard, press:
   
   **THRU**

Response and Isolation Error-Correction for Transmission Measurements

This procedure is intended for measurements that have a measurement range of greater than 90 dB.

1. Select the type of measurement you want to make.
2. Press [CAL] CALIBRATE MENU RESPONSE & I S O L ' N RESPONSE

3. Make a “thru” connection between the points where you will connect your device under test.
4. Measure the standard, when the displayed trace has settled, press:
   
   **THRU**

5-4 Optimizing Measurement Results
5. Connect impedance-matched loads to PORT 1 and PORT 2, as shown in Figure 5-3. Include the adapters that you would include for your device measurement.

![Figure 5-3. Standard Connections for a Response and Isolation Error-Correction for Transmission Measurements](image)

6. To help remove crosstalk noise, set the analyzer as follows:
   a. Press \( \text{Avg \ AVERAGING \ ON \ AVERAGING FACTOR} \) and enter at least four times more averages than desired during the device measurement.
   b. Press \( \text{Cal \ MORE \ ALTERNATE \ A \ and \ B} \) to eliminate one crosstalk path.

7. To measure the calibration standard, press:
   \( \text{Cal \ RESUME \ CAL \ SEQUENCE \ I \ SOL \ 'N \ STD} \)

8. Return the averaging to the original state of the measurement. For example, reduce the averaging factor by at least four times or turn averaging off.

9. To compute the isolation error coefficients, press:
   \( \text{Cal \ RESUME \ CAL \ SEQUENCE \ DONE \ RESP \ I \ SOL \ 'N \ CAL} \)

Optimizing Measurement Results 5-5
One-Port Reflection Error-Correction

1. Select the type of measurement you want to make.

2. To select the correction type, press:

   **CALIBRATE MENU** and select the correction type.

   - If you want to make a reflection measurement at PORT 1, press:
     
     \[ S11 \rightarrow \text{PORT} \]

   - If you want to make a reflection measurement at PORT 2, press:
     
     \[ S22 \rightarrow \text{PORT} \]

   ![Network Analyzer Diagram]

   **Figure 5-4. Standard Connections for a One-Port Reflection Error-Correction**

   - To measure the standards in sequence, press:
     
     OPEN
     SHORT
     LOAD

   - To compute the error coefficients, press:
     
     DONE: 1-PORT CAL

5-6 Optimizing Measurement Results
Full Two-Port Error-Correction

1. Set any measurement parameters that you want for the device measurement: power, format, number of points, or IF bandwidth.

2. 
   - Press: [ Cal ] [ CAL I BRATE MENU FULL 2-PORT REFLECTION ]

3. 
   - Measure the standards in sequence, press:
     - **FORWARD**: OPEN
     - **FORWARD**: SHORT
     - **FORWARD**: LOAD

4. Repeat the open-short-load measurements described above, but connect the devices in turn to PORT 2, and use the **REVERSE**: OPEN, **REVERSE**: SHORT, and **REVERSE**: LOAD softkeys.

5. 
   - Compute the reflection correction coefficients, press:
     - **STANDARDS DONE**

6. 
   - Start the transmission portion of the correction, press:
     - **TRANSMISSION**

7. Make a “thru” connection between the points where you will connect your device under test as shown in Figure 5-5.

**Figure 5-5.**
Standard Connections for Full Two-Port Error-Correction
8. ‘lb measure the standard, when the trace has settled, press:
   \texttt{DO BOTH FWD+REV}

9. Press \texttt{ISOLATION} and select from the following two options:

   \begin{itemize}
   \item If you will be measuring devices with a dynamic range less than 90 dB, press:
       \texttt{OMIT ISOLATION}
   \item If you will be measuring devices with a dynamic range greater than 90 dB, follow these steps:
       \begin{enumerate}
       \item Connect impedance-matched loads to PORT 1 and PORT 2. Include the adapters that you would include for your device measurement.
       \item Activate at least four times more averages than desired during the device measurement.
       \item Press \texttt{RESUME CAL SEQUENCE}
       \texttt{ISOLATION FWD ISOL'N ISOL'N STD REV ISOL'N ISOL'N STD ISOLATION DONE}.
       \item Return the averaging to the original state of the measurement, and press \texttt{RESUME CAL SEQUENCE}.
   \end{enumerate}
   \end{itemize}

10. ‘lb compute the error coefficients, press:
   \texttt{DONE 2-PORT CAL}

\textbf{5-8 Optimizing Measurement Results}
Power Meter Measurement Calibration

You can use the power meter to monitor and correct the analyzer source power to achieve calibrated absolute power at the test port. You can also use this calibration to set a reference power for receiver power calibration, and mixer measurement calibration.

**Note**  
Loss of Power Calibration Data

If your instrument state has not been saved after a power meter calibration, the power correction data will be lost if any of the following circumstances exists:

- if you switch off the analyzer ac power and you haven’t saved the correction in an internal register.
- if you press [Preset] and you haven’t saved the correction in an internal register.
- if you change the sweep type (linear, log, list, CW, power) when the power meter correction is activated.
- if you change the frequency when the sweep type is in log or list mode.

**Entering the Power Sensor Calibration Data**

Entering the power sensor calibration data compensates for the frequency response of the power sensor, thus ensuring the accuracy of power meter calibration.

1. Make sure that your analyzer and power meter are configured.

2. Press [Cal] PWRMTR CALLOSS/SENSR LISTS CAL FACTOR SENS0R A.

**Compensating for Directional Coupler Response**

If you use a directional coupler to sample power in your measurement configuration, you should enter the coupled arm power loss value into the power loss table, using the following procedure.

1. Press [Cal] PWRMTR CAL LOSS/SENSR LISTS POWER LOSS.
Using Sample-and-Sweep Correction Mode

Figure 5-6. Sample-and-Sweep Mode for Power Meter Calibration

1. Calibrate and zero the power meter.
2. Connect the equipment as shown in Figure 5-6.
3. Select the HP 87533 as the system controller:
   ```
   SET ADDRESS: P MTR/HP#1B #H x1
   ```
4. Set the power meter’s address:
5. Select the appropriate power meter by pressing
   ```
   POWER MTR [ ] until the correct model number is displayed
   (HP 436A or HP 438A/437).
   ```
6. Set test port power to the approximate desired corrected power.
7. Press [CAL] PWR MTR CAL and enter the test port power level that you want at the input to your test device. For example, if you enter `-10` (xl), the display will read CAL POWER -10.
8. If you want the analyzer to make more than one power measurement at each frequency data point, press:
   ```
   NUMBER OF READINGS n x1
   ```
   (where n = the number of desired iterations).
   
   If you increase the number of readings, the power meter correction time will substantially increase.

5-10 Optimizing Measurement Results
9. Press \texttt{Cal PWRMR CAL} ONE SWEEP TAKE CAL SWEEP.

### Using Continuous Correction Mode

![Figure 5-7: Continuous Correction Mode for Power Meter Calibration](image)

1. Connect a power splitter or directional coupler to the port supplying RF power to your test device, as shown in Figure 5-7.
2. Set test port power to approximate desired leveled power.
3. Press \texttt{Cal PWRMR CAL} and enter the test port power level that you want the analyzer to maintain at the input to your test device. Compensate for the power loss of the power splitter or directional coupler in the setup.
4. If you want the analyzer to make more than one power measurement at each frequency data point, press \texttt{NUMBER OF READINGS} (where \( n \) = the number of desired iterations).
   If you increase the number of readings, the power meter correction time will substantially increase.
5. Press \texttt{Cal PWRMR CAL EACH SWEEP TAKE CAL SWEEP} to activate the power meter correction.
Increasing Sweep Speed

To Use Swept List Mode

Selectable IF bandwidths can increase the throughput of the measurement by allowing the user to specify narrow bandwidths only where needed.

1. lb set up a swept list measurement, press (Menu)
   SWEEP TYPE MENU EDIT LIST ADD.

2. The frequency segments can be defined in any of the following terms:
   - start/stop/number of points/power/IFBW
   - start/stop/step/power/IFBW
   - center/span/number of points/power/IFBW
   - center/span/step/power/IFBW

To Decrease the Frequency Span

Modify the frequency span to eliminate as many band switches as possible while maintaining measurement integrity. Refer to the following table to identify the analyzer’s band switch points:

<table>
<thead>
<tr>
<th>Baud</th>
<th>Frequency Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.01 MHz to 0.3 MHz</td>
</tr>
<tr>
<td>1</td>
<td>0.3 MHz to 3.3 MHz</td>
</tr>
<tr>
<td>2</td>
<td>3.3 MHz to 16 MHz</td>
</tr>
<tr>
<td>3</td>
<td>16 MHz to 31 MHz</td>
</tr>
<tr>
<td>4</td>
<td>31 MHz to 61 MHz</td>
</tr>
<tr>
<td>5</td>
<td>61 MHz to 121 MHz</td>
</tr>
<tr>
<td>6</td>
<td>121 MHz to 296 MHz</td>
</tr>
<tr>
<td>7</td>
<td>178 MHz to 296 MHz</td>
</tr>
<tr>
<td>8</td>
<td>296 MHz to 536 MHz</td>
</tr>
<tr>
<td>9</td>
<td>536 MHz to 893 MHz</td>
</tr>
<tr>
<td>10</td>
<td>893 MHz to 1.607 GHz</td>
</tr>
<tr>
<td>11</td>
<td>1.607 GHz to 3 GHz</td>
</tr>
<tr>
<td>12</td>
<td>3 GHz to 4.95 GHz</td>
</tr>
<tr>
<td>13</td>
<td>4.95 GHz to 6 GHz</td>
</tr>
</tbody>
</table>

To Set the Auto Sweep Time Mode

Press (Menu) SWEEP† I ME 6 (x1) to re-enter the auto mode.
To Widen the System Bandwidth

1. Press \texttt{(Avg) IF BW}.
2. Set the IF bandwidth to change the sweep time.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|}
\hline
\textbf{IF BW} & \textbf{Sweep Time (secs)} \\
\hline
6000 & 0.077 \\
3700 & 0.102 \\
3000 & 0.128 \\
1000 & 0.254 \\
300 & 0.707 \\
100 & 2.010 \\
30 & 6.980 \\
10 & 21.40 \\
\hline
\end{tabular}
\caption{Sweep Time for Different IF Bandwidths}
\end{table}

1 Preset condition,
CF= 1GHz, Span= 100MHz;
includes retrace time.

To Reduce the Averaging Factor

1. Press \texttt{(Avg) AVG FACTOR}.
2. Enter an averaging factor that is less than the value displayed on the analyzer screen and press (xl).
To Reduce the Number of Measurement Points

1. Press [Menu] \textit{NUMBER OF POINTS}.
2. Enter a number of points that is less than the value displayed on the analyzer screen and press [xl].

The analyzer sweep time does not change proportionally with the number of points, but as indicated below.

<table>
<thead>
<tr>
<th>Number of Points</th>
<th>Sweep Time (secs)$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>0.062</td>
</tr>
<tr>
<td>101</td>
<td>0.086</td>
</tr>
<tr>
<td>201</td>
<td>0.106</td>
</tr>
<tr>
<td>401</td>
<td>0.181</td>
</tr>
<tr>
<td>801</td>
<td>0.330</td>
</tr>
<tr>
<td>1601</td>
<td>0.633</td>
</tr>
</tbody>
</table>

$^1$ Preset condition: CF = 1GHz, Span = 100MHz, Correction off; includes retrace time. Measurement speed can be improved by selecting the widest IF BW setting of 6000 Hz.

To Set the Sweep Type

1. Press [Menu] \textit{SWEEP TYPE MENU}.
2. Select the sweep type.
To Activate Chop Sweep Mode

- Press **Calc** MORE CHOP **A** and **B**.

To Use Fast 2-Port Calibration

With the 2-port calibration on, faster measurements may be made by not measuring the reverse path for every forward sweep. This is controlled by the test set switch command.

1. lb access the test set switch functions, press:

   ![Calc MORE TEST SET SW](image)

2. lb activate the hold mode, press:

   ![0 x1](image)

   The analyzer will then display **TEST SET SW HOLD**.

3. lb enter the number of sweeps mode, press:

   ![X x1](image)

   The analyzer will then display **TEST SET SW X SWEEPS**.
Increasing Dynamic Range

**Increase the Test Port Input Power**
Press (Menu) POWER and enter the new source power level, followed by (x1).

**Caution** TEST PORT INPUT DAMAGE LEVEL: + 26 dBm

---

**Reduce the Receiver Noise Floor**

**Change System Bandwidth**
Each tenfold reduction in IF (receiver) bandwidth lowers the noise floor by 10 dB.

1. Press \textit{Avg} IF BW.
2. Enter the bandwidth value that you want, followed by (x1).

**Change Measurement Averaging**
1. Press \textit{Avg} AVERAGINGFACTOR.
2. Enter a value followed by (x1).
3. Press AVERAGING ON.
Reducing Trace Noise

**Activate Averaging**

1. Press **(Avg) AVERAGING FACTOR.**
2. Enter a value followed by **(x1).**
3. Press **AVERAGING ON.**

**Change System Bandwidth**

1. Press **(Avg) IF BW.**
2. Enter the IF bandwidth value that you want, followed by (x1).

Reducing Receiver Crosstalk

Set the alternate sweep, press **(Cal) MORE ALTERNATE A AND B.**
Softkey Locations

The following table lists the softkey functions alphabetically, and the corresponding front-panel access key. Full-page menu maps are available in the HP 8753E Network Analyzer User’s Guide.
### Table 6-1. Softkey Locations

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>△ MODE: MENU</td>
<td>Marker</td>
</tr>
<tr>
<td>△ MODE: OFF</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = 1</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = 2</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = 3</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = 4</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = 5</td>
<td>Marker</td>
</tr>
<tr>
<td>△ REF = △ FIXED: MKR</td>
<td>Marker</td>
</tr>
<tr>
<td>1/5S</td>
<td>Meas</td>
</tr>
<tr>
<td>2X: [1&amp;2]/[3&amp;4]</td>
<td>Display</td>
</tr>
<tr>
<td>2X: [1&amp;3]/[2&amp;4]</td>
<td>Display</td>
</tr>
<tr>
<td>4X: [1&amp;2]/[3&amp;4]</td>
<td>Display</td>
</tr>
<tr>
<td>4X: [1&amp;3]/[2&amp;4]</td>
<td>Display</td>
</tr>
<tr>
<td>4: PARAM DISPLAYS</td>
<td>Display</td>
</tr>
<tr>
<td>A</td>
<td>Meas</td>
</tr>
<tr>
<td>A/B</td>
<td>Meas</td>
</tr>
<tr>
<td>A/R</td>
<td>Meas</td>
</tr>
<tr>
<td>ACTIVE ENTRY</td>
<td>Display</td>
</tr>
<tr>
<td>ACTIVE MRK MAGNITUDE</td>
<td>Display</td>
</tr>
<tr>
<td>ADAPTER: COAX</td>
<td>Cal</td>
</tr>
<tr>
<td>ADAPTER: WAVEGUIDE</td>
<td>Cal</td>
</tr>
<tr>
<td>ADAPTER: DELAY</td>
<td>Cal</td>
</tr>
</tbody>
</table>
### Table 6-1. Softkey Locations (continued)

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADAPTER REMOVAL</td>
<td>Cal</td>
</tr>
<tr>
<td>ADDRESS: 8753</td>
<td>Local</td>
</tr>
<tr>
<td>ADDRESS: CONTROLLER</td>
<td>Local</td>
</tr>
<tr>
<td>ADDRESS: DISK</td>
<td>Local</td>
</tr>
<tr>
<td>ADDRESS: DISK</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>ADDRESS: P MTR/HP IB</td>
<td>Local</td>
</tr>
<tr>
<td>ADJUST DISPLAY</td>
<td>Display</td>
</tr>
<tr>
<td>ALL OFF</td>
<td>Marker</td>
</tr>
<tr>
<td>ALL SEGS SWEEP</td>
<td>Menu</td>
</tr>
<tr>
<td>ALTERNATE A and B</td>
<td>Cal</td>
</tr>
<tr>
<td>AMPLITUDE</td>
<td>System</td>
</tr>
<tr>
<td>AMPLITUDE OFFSET</td>
<td>System</td>
</tr>
<tr>
<td>ANALOG IN Aux Input</td>
<td>Meas</td>
</tr>
<tr>
<td>ARBITRARY IMPEDANCE</td>
<td>Cal</td>
</tr>
<tr>
<td>ASSERT SRC</td>
<td>Seq</td>
</tr>
<tr>
<td>AUTO FEED on OFF</td>
<td>Copy</td>
</tr>
<tr>
<td>AUTO SCALE</td>
<td>Scale Ref</td>
</tr>
<tr>
<td>AUX CHAN on/off</td>
<td>Display</td>
</tr>
<tr>
<td>AVERAGING FACTOR</td>
<td>Avg</td>
</tr>
<tr>
<td>AVERAGING on/off</td>
<td>Avg</td>
</tr>
<tr>
<td>AVERAGING RESTART</td>
<td>Avg</td>
</tr>
<tr>
<td>B</td>
<td>Meas</td>
</tr>
<tr>
<td>B/R</td>
<td>Meas</td>
</tr>
<tr>
<td>BACKGROUND INTENSITY</td>
<td>Display</td>
</tr>
<tr>
<td>BANDPASS</td>
<td>System</td>
</tr>
<tr>
<td>BEEP DONE on/off</td>
<td>Display</td>
</tr>
<tr>
<td>BEEP FAIL on/off</td>
<td>System</td>
</tr>
<tr>
<td>BEEP WARN on/off</td>
<td>Display</td>
</tr>
<tr>
<td>BLANK DISPLAY</td>
<td>Display</td>
</tr>
</tbody>
</table>
### Table 6-1. Softkey Locations (continued)

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRIGHTNESS</td>
<td>Display</td>
</tr>
<tr>
<td>C0</td>
<td>Cal</td>
</tr>
<tr>
<td>C1</td>
<td>Cal</td>
</tr>
<tr>
<td>C2</td>
<td>Cal</td>
</tr>
<tr>
<td>C3</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: FACTOR</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: FACTOR SENSOR: A</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: FACTOR SENSOR: B</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: [ ]</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 2.4 mm</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 2.92#</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 2.92 mm</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 3.5 mm C</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 3.5 mm D</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: TRL: 3.5 mm</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: 7 mm</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: H 50 Ω</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: H 75 Ω</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: KIT: USER KIT</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: Z0: LINE Z0</td>
<td>Cal</td>
</tr>
<tr>
<td>CAL: Z0: SYSTEM Z0</td>
<td>Cal</td>
</tr>
<tr>
<td>CALIBRATE: MENU</td>
<td>Cal</td>
</tr>
<tr>
<td>CALIBRATE: NONE</td>
<td>Cal</td>
</tr>
<tr>
<td>CH1: DATA: [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH1: DATA: LIMIT: LN</td>
<td>Display</td>
</tr>
<tr>
<td>CH1: MEM</td>
<td>Display</td>
</tr>
<tr>
<td>CH1: MEM [ ]</td>
<td>Copy</td>
</tr>
</tbody>
</table>
Table 6-1. Softkey Locations (continued)

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH2 DATA [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH2 DATA LIMIT LH</td>
<td>Display</td>
</tr>
<tr>
<td>CH2 MEM [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH2 MEM REF [ ]</td>
<td>Display</td>
</tr>
<tr>
<td>CH3 DATA [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH3 DATA LIMIT LH</td>
<td>Display</td>
</tr>
<tr>
<td>CH3 MEM</td>
<td>Display</td>
</tr>
<tr>
<td>CH3 MEM [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH4 DATA [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CH4 DATA LIMIT LH</td>
<td>Display</td>
</tr>
<tr>
<td>CH4 MEM</td>
<td>Display</td>
</tr>
<tr>
<td>CH4 MEM [ ]</td>
<td>Copy</td>
</tr>
<tr>
<td>CHAN PWR [COUPLED]</td>
<td>Menu</td>
</tr>
<tr>
<td>CHAN PWR [UNCOPLED]</td>
<td>Menu</td>
</tr>
<tr>
<td>CHANNEL POSITION</td>
<td>Display</td>
</tr>
<tr>
<td>CHOP A and B</td>
<td>Cal</td>
</tr>
<tr>
<td>CLEAR: BIT</td>
<td>Seq</td>
</tr>
<tr>
<td>CLEAR: LIST</td>
<td>Menu</td>
</tr>
<tr>
<td>CLEAR: SEQUENCE</td>
<td>Seq</td>
</tr>
<tr>
<td>COAX</td>
<td>Cal</td>
</tr>
<tr>
<td>COAXIAL: DELAY</td>
<td>Scale Ref</td>
</tr>
<tr>
<td>COLOR</td>
<td>Display</td>
</tr>
<tr>
<td>CONFIGURE</td>
<td>System</td>
</tr>
<tr>
<td>CONFIGURE: EXTERNAL_DISK</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>CONTINUE: SEQUENCE</td>
<td>Seq</td>
</tr>
<tr>
<td>CONTINUOUS</td>
<td>Menu</td>
</tr>
<tr>
<td>CONVERSION: [ ]</td>
<td>Meter</td>
</tr>
<tr>
<td>CORRECTION: on OFF</td>
<td>Cal</td>
</tr>
<tr>
<td>COUPLED: CH: on OFF</td>
<td>Menu</td>
</tr>
</tbody>
</table>

Softkey Locations 6-5
<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW FREQ</td>
<td>Menu</td>
</tr>
<tr>
<td>CW TIME</td>
<td>Menu</td>
</tr>
<tr>
<td>D2/D1 to D2 on OFF</td>
<td>Display</td>
</tr>
<tr>
<td>DATA and MEMORY</td>
<td>Display</td>
</tr>
<tr>
<td>DATA ARRAY on OFF</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>DATA/MEM</td>
<td>Display</td>
</tr>
<tr>
<td>DATA = MEM</td>
<td>Display</td>
</tr>
<tr>
<td>DATA → MEMORY</td>
<td>Display</td>
</tr>
<tr>
<td>DATA ONLY on OFF</td>
<td>Display</td>
</tr>
<tr>
<td>DECISION MAKING</td>
<td>Seq</td>
</tr>
<tr>
<td>DECOR LOOP COUNTER</td>
<td>Seq</td>
</tr>
<tr>
<td>DEFAULT COLORS</td>
<td>Display</td>
</tr>
<tr>
<td>DEFAULT PLOT SETUP</td>
<td>Copy</td>
</tr>
<tr>
<td>DEFAULT PRINT SETUP</td>
<td>Copy</td>
</tr>
<tr>
<td>DEFINE DISK=SAVE</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>DEFINE PLOT</td>
<td>Copy</td>
</tr>
<tr>
<td>DEFINE PRINT</td>
<td>Copy</td>
</tr>
<tr>
<td>DEFINE STANDARD</td>
<td>Cal</td>
</tr>
<tr>
<td>DELAY</td>
<td>Format</td>
</tr>
<tr>
<td>DELAY/THRU</td>
<td>Cal</td>
</tr>
<tr>
<td>DELETE ALL FILES</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>DELETE F ICE</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>DELTA LIMITS</td>
<td>System</td>
</tr>
<tr>
<td>DEMOD: AMPLITUDE</td>
<td>System</td>
</tr>
<tr>
<td>DEMOD: OFF</td>
<td>System</td>
</tr>
<tr>
<td>DEMOD: PHASE</td>
<td>System</td>
</tr>
<tr>
<td>DIRECTORY SIZE (LIF)</td>
<td>Save/Recall</td>
</tr>
</tbody>
</table>

6-6 Softkey Locations
<table>
<thead>
<tr>
<th>Softkey</th>
<th>Front-Panel Access Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISK UNIT NUMBER</td>
<td>Local</td>
</tr>
<tr>
<td>DISK UNIT NUMBER</td>
<td>Save/Recall</td>
</tr>
<tr>
<td>DISPLAY: DATA</td>
<td>Display</td>
</tr>
<tr>
<td>DISP MKRS ON/off</td>
<td>Marker Fctn</td>
</tr>
<tr>
<td>DO-BOTH FWD+REV</td>
<td>Cal</td>
</tr>
<tr>
<td>DO-SEQUENCE</td>
<td>Seq</td>
</tr>
<tr>
<td>DONE 1-PORT CAL</td>
<td>Cal</td>
</tr>
<tr>
<td>DONE 2-PORT CAL</td>
<td>Cal</td>
</tr>
<tr>
<td>DONE RESPONSE</td>
<td>Cal</td>
</tr>
<tr>
<td>DONE RESP ISOL'N CAL</td>
<td>Cal</td>
</tr>
<tr>
<td>DONE SEQ MODIFY</td>
<td>Seq</td>
</tr>
<tr>
<td>DONE TRL/LRM</td>
<td>Cal</td>
</tr>
<tr>
<td>DOWN CONVERTER</td>
<td>System</td>
</tr>
<tr>
<td>DUAL CH on OFF</td>
<td>Display</td>
</tr>
<tr>
<td>DUAL:QUAD SETUP</td>
<td>Display</td>
</tr>
<tr>
<td>DUMP GRAPH on OFF</td>
<td>System</td>
</tr>
<tr>
<td>DUPLICATE SEQUENCE</td>
<td>Seq</td>
</tr>
<tr>
<td>EACH SHEEP</td>
<td>Cal</td>
</tr>
<tr>
<td>EDIT LIMIT LINE</td>
<td>System</td>
</tr>
<tr>
<td>EDIT LIST</td>
<td>Menu</td>
</tr>
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Softkey Locations 6-9
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620 Softkey Locations
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Softkey Locations 6-21
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Table 6-1. Softkey Locations (continued)
Table 6-1. Softkey Locations (continued)

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6-24 Softkey Locations
Error Messages

Error Messages in Alphabetical Order

This chapter contains an alphabetical listing of all error messages to help you interpret any error messages that may be displayed on the analyzer, or transmitted by the instrument over HP-IB.

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2-PORT CAL REQUIRED FOR AUX CHANNEL USE

<table>
<thead>
<tr>
<th>Error Number</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>217</td>
<td>This message is displayed if you attempt to enable an auxiliary channel by pressing AUX CHAN on OFF without a full 2-port calibration being active. Perform (or recall) a full 2-port calibration and set CORRECTION on OFF to ON in the Cal menu. Then you can enable an auxiliary channel by pressing AUX CHAN on OFF in the Display menu.</td>
</tr>
</tbody>
</table>

---

ABORTING COPY OUTPUT

<table>
<thead>
<tr>
<th>Information</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This message is displayed briefly if you have pressed (Local) to abort a copy operation. If the message is not subsequently replaced by error message number 25, PRINT ABORTED, the copy device may be hung. Press (Local) once more to exit the abort process and verify the status of the copy device. At this point, the copy device will probably have an error condition which must be fixed (for example: out of paper or paper jam).</td>
</tr>
</tbody>
</table>
ADDITIONAL STANDARDS NEEDED

Error Number 68  
Error correction for the selected calibration class cannot be computed until you have measured all the necessary standards.

ADDRESS TO TALK WITH NOTHING TO SAY

Error Number 31  
You have sent a read command to the analyzer (such as ENTER 716) without first requesting data with an appropriate output command (such as OUTPDATA). The analyzer has no data in the output queue to satisfy the request.

HI R FLOW RESTRICTED: CHECK FAN FILTER

Error Number 20  
Something is restricting the air flow into the analyzer. Check for any debris and clean or replace the fan filter.

ALL REGISTERS HAVE BEEN USED

Error Number 200  
You have used all of the available registers; you can store no more instrument states even though you may still have sufficient memory. There are 31 registers available, plus the present instrument state.

ANALOG BUS DISABLED IN 6 KHZ IF BW

Error Number 212  
When you press [Avg] IF BW E 60001, the analog bus is disabled and not available for use in troubleshooting. For a description of the analog bus, refer to the \textit{HP 8753E Service Guide}.

7-2 Error Messages
**ANALOG INPUT OVERLOAD**

Error Number 60  The power level of the analog input is too high. Reduce the power level of the analog input source.

**ANOTHER SYSTEM CONTROLLER ON HP-IB BUS**

Error Number 37  You must remove the active controller from the bus or the controller must relinquish the bus before the analyzer can assume the system controller mode.

**ARGUMENT OUT OF RANGE**

Error Number 206  The argument for a programming command is out of the specified range. Refer to the *HP 8753E Programming and Command Reference Guide* for a list of programming commands and argument ranges.

**ASCII: MISSING 'BEGIN' STATEMENT**

Error Number 193  The citilile you just downloaded over the HP-IB or via disk was not properly organized. The analyzer is unable to read the “BEGIN” statement.

**ASCII: MISSING 'CITIFILE' STATEMENT**

Error Number 194  The citifile you just downloaded over the HP-IB or via disk was not properly organized. The analyzer is unable to read the “CITIFILE” statement.
ASCII: MISSING 'DATA' STATEMENT

Error Number 195
The citifile you just downloaded over the HP-IB or via disk was not properly organized. The analyzer is unable to read the “DATA” statement.

ASCII: MISSING 'VAR' STATEMENT

Error Number 196
The citifile you just downloaded over the HP-IB or via disk was not properly organized. The analyzer is unable to read the “VAR” statement.

AVERAGING INVALID ON NON-RATIO MEASURE

Error Number 13
You cannot use sweep-to-sweep averaging in single-input measurements. Sweep-sweep averaging is valid only for ratioed measurements (A/R, B/R, A/B, and S-parameters). You can use noise reduction techniques, such as narrower IF bandwidth, for single input measurements.

BAD FREQ FOR HARMONIC OR FREQ OFFSET

Error Number 181
You turned on time domain or recalled a calibration that resulted in start and stop frequencies that are beyond the allowable limits.

BATTERY FAILED. STATE MEMORY CLEARED

Error Number 183
The battery protection of the non-volatile CMOS memory has failed. The CMOS memory has been cleared. Refer to the HP 8753E Network Analyzer Service Guide for battery replacement instructions.

7-4 Error Messages
BATTERY LOW! STORE SAVE REGS TO DISK

Error Number 184 The battery protection of the non-volatile CMOS memory is in danger of failing. If this occurs, all of the instrument state registers stored in CMOS memory will be lost. Save these states to a disk and refer to the HP 8753E Network Analyzer Service Guide for battery replacement instructions.

BLOCK INPUT ERROR

Error Number 34 The analyzer did not receive a complete data transmission. This is usually caused by an interruption of the bus transaction. Clear by pressing the [Local] key or aborting the I/O process at the controller.

BLOCK INPUT LENGTH ERROR

Error Number 35 The length of the header received by the analyzer did not agree with the size of the internal array block. Refer to the HP 8753E Programming and Command Reference Guide for instructions on using analyzer input commands.

CALIBRATION ABORTED

Error Number 74 You have changed the active channel during a calibration so the calibration in progress was terminated. Make sure the appropriate channel is active and restart the calibration.
**CALIBRATION REQUIRED**

Error Number 63

A calibration set could not be found that matched the current stimulus state or measurement parameter. You will have to perform a new calibration.

---

**CANNOT FORMAT DOS DISKS ON THIS DRIVE**

Error Number 185

You have attempted to initialize a floppy disk to DOS format on an external disk drive that does not support writing to all 80 tracks of the double density and high density disks. The older single-sided disks had only 66 tracks and some disk drives were limited to accessing that number of tracks. To format the disk, either choose another external disk drive or use the analyzer's internal disk drive.

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**CANNOT MODIFY FACTORY PRESET**

Error Number 199

You have attempted to rename, delete, or otherwise alter the factory preset state. The factory preset state is permanently stored in CMOS memory and cannot be altered. If your intent was to create a user preset state, you must create a new instrument state, save it, and then rename it to “UPRESET”.

---

**CANNOT READ/WRITE HFS FILE SYSTEM**

Error Number 203

The disk is being accessed by the analyzer and is found to contain an HFS (hierarchical file system) or files nested within subdirectories. The analyzer does not support HFS. Replace the disk medium with a LIF or DOS formatted disk that does not contain files nested within subdirectories.

---

**7-6 Error Messages**
CAN'T STORE/LOAD SEQUENCE, INSUFFICIENT MEMORY

Error Number 127 Your sequence transfer to or from a disk could not be completed due to insufficient memory.

CAUTION: AUX CHANNELS MEASURE S-PARAMETERS ONLY

Error Number 216 This message is displayed if you attempt to select a measurement type other than an S-parameter for an auxiliary channel.

CAUTION: CORRECTION OFF; AUX CHANNEL(S) DISABLED

Error Number 215 This message is displayed when correction is forced off due to a stimulus change that is not compatible with the current calibration while an auxiliary channel is enabled. The auxiliary channels are restored when correction is turned on by pressing [Cal] Correction on OFF.

CAUTION: POWER OUT MAY BE UNLEVELLED

Error Number 179 There is either a hardware failure in the source or you have attempted to set the power level too high. The analyzer allows the output power to be set higher or lower than the specified available power range. However, these output powers may be unleveled or unavailable. Check to see if the power level you set is within specifications. If it is, refer to the HP 8753E Network Analyzer Service Guide for troubleshooting.

CH1 (CH2) TARGET VALUE NOT FOUND

Error Number 159 Your target value for the marker search function does not exist on the current data trace.

Error Messages 7-7
CONTINUOUS SWITCHING NOT ALLOWED

Error Number 10
Your current measurement requires different power ranges on channel 1 and channel 2. To protect the attenuator from undue mechanical wear, test set hold will be activated.

The “tsH” (test set hold) indicator in the left margin of the display indicates that the inactive channel has been put in the sweep hold mode.

COPY: device not responding; copy aborted

Error Number 170
The printer or plotter is not accepting data. Verify the cable connections, HP-IB addresses, and otherwise ensure that the copy device is ready.

COPY OUTPUT COMPLETED

Information Message
The analyzer has completed outputting data to the printer or plotter. The analyzer can now accept another copy command.

CORRECTION AND DOMAIN RESET

Error Number 65
When you change the frequency range, sweep type, or number of points, error-correction is switched off and the time domain transform is recalculated, without error-correction. You can either correct the frequency range, sweep type, or number of points to match the calibration, or perform a new calibration. Then perform a new time domain transform.

7-8 Error Messages
CORRECTION CONSTANTS NOT STORED

Error Number 3  A store operation to the EEPROM was not successful. You must change a switch position on the A9 CPU assembly. Refer to the “A9 CC Switch Position Procedure” in the “Adjustments and Correction Constants” chapter of the HP 8753E Network Analyzer Service Guide.

CORRECTION ON: AUX CHANNEL(S) RESTORED

Error Number 214  This message is displayed when a calibration is restored and that calibration previously had one or both auxiliary channels enabled.

CORRECTION TURNED OFF

Error Number 66  Critical parameters in your current instrument state do not match the parameters for the calibration set, therefore correction has been turned off. The critical instrument state parameters are sweep type, start frequency, frequency span, and number of points.

CURRENT PARAMETER NOT IN CAL SET

Error Number 64  Correction is not valid for your selected measurement parameter. Either change the measurement parameters or perform a new calibration.

D2/D1 INVALID WITH SINGLE CHANNEL

Error Number 130  You can only make a D2/D1 measurement if both channels are on.
D2/D1 INVALID: CH1 CH2 NUM PTS DIFFERENT
Error Number 152
You can only make a D2/D1 measurement if both channels have the same number of points.

DEADLOCK
Error Number 111
A fatal firmware error occurred before instrument preset completed. Call your local Hewlett-Packard sales and service office.

DEMODULATION NOT VALID
Error Number 17
Demodulation was selected when the analyzer was not in CW tune mode. Select demodulation only after putting the analyzer into CW time mode.

DEVICE: not on, no + connect, wrong addr
Error Number 119
The device at the selected address cannot be accessed by the analyzer. Verify that the device is switched on, and check the HP-IB connection between the analyzer and the device. Ensure that the device address recognized by the analyzer matches the HP-ID address set on the device itself.

DIRECTORY FULL
Error Number 188
There is no room left in the directory to add files.
Either delete files or get a new disk.

7-10 Error Messages
DISK HARDWARE PROBLEM

Error Number 39 The disk drive is not responding correctly. Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting information. If using an external disk drive, refer to the disk drive operating manual.

DISK IS WRITE PROTECTED

Error Number 48 The store operation cannot write to a write-protected disk. Slide the write-protect tab over the write-protect opening in order to write data on the disk.

DISK MEDIUM NOT INITIALIZED

Error Number 40 You must initialize the disk before it can be used.

DISK MESSAGE LENGTH ERROR

Error Number 190 The analyzer and the external disk drive aren’t communicating properly. Check the HP-IB connection and then try substituting another disk drive to isolate the problem instrument.

DISK: not on, not connected, wrong addr

Error Number 38 The disk cannot be accessed by the analyzer. Verify power to the disk drive, and check the HP-IB connection between the analyzer and the disk drive. Ensure that the disk drive address recognized by the analyzer matches the HP-IB address set on the disk drive itself.

Error Messages 7-11
**DISK READ/WRITE ERROR**

Error Number 189  There may be a problem with your disk. Try a new floppy disk. If a new floppy disk does not eliminate the error, suspect hardware problems.

**DISK WEAR – REPLACE DISK SOON**

Error Number 49  Cumulative use of the disk is approaching the maximum. Copy files as necessary using an external controller. If no controller is available, load instrument states from the old disk and store them to a newly initialized disk using the save/recall features of the analyzer. Discard the old disk.

**DOMAIN RESET**

Error Number 67  Time domain calculations were reset due to a change in the frequency range, sweep type, or number of points. Perform a new time domain transform on the new state.

**DOSNAME LIMITED TO 8 CHAR + 3 CHAR EXTENSION**

Error Number 180  A DOS file name must meet the following criteria:

- minimum of 1 character
- format is `filename.ext`
  - maximum of 8 characters in the filename
  - maximum of 3 characters in the extension field (optional)
  - a dot separates the `filename` from the extension field (the dot is not part of the name on the disk)

7-12 Error Messages
**DUPLICATING TO THIS SEQUENCE NOT ALLOWED**

Error Number 125

A sequence cannot be duplicated to itself.

---

**EXCEEDED 7 STANDARDS PER CLASS**

Error Number 72

When modifying calibration kits, you can **define** a maximum of seven standards for any class.

---

**EXTERNAL SOURCE MODE REQUIRES CW TIME**

Error Number 148

An external source can only be phase locked and measured in the CW time sweep mode.

---

**EXT SOURCE NOT READY FOR TRIGGER**

Error Number 191

There is a hardware problem with the **HP 8625A** external source. Verify the connections between the analyzer and the external source. If the connections are correct, refer to the source operating manual.

---

**EXT SRC: NOT ON/CONNECTED OR WRONG ADDR**

Error Number 162

The analyzer is unable to communicate with the external source. Check the connections and the **HP-IB** address on the source.

---

**FILE NOT COMPATIBLE WITH INSTRUMENT**

Information Message

You cannot recall user graphics that had been saved on an earlier model of analyzer with a monochrome display. These files cannot be used with the HP 87533.
FILE NOT FOUND

Error Number
192

The requested file was not found on the current disk medium.

FILE NOT FOUND OR WRONG TYPE

Error Number
197

During a resave operation, either the Ele was not found or the type of Ele was not an instrument state Ele.

FIRST CHARACTER MUST BE A LETTER

Error Number
42

The first character of a disk Ele title or an internal save register title must be an alpha character.

FORMAT NOT VALID FOR MEASUREMENT

Error Number
75

Conversion measurements (Z or Y reflection and transmission) are not valid with Smith chart and SWR formats.

FORMATTING DATA

Information Message

The list information is being processed for a list data output to a copy device and stored in the copy spool buffer. During this time, the analyzer's resources are dedicated to this task (which takes less than a few seconds).

FREQ. OFFSET ONLY VALID IN NETWORK ANALYZER MODE

Error Number
140

You can only make frequency offset measurements in the network analyzer mode.

7-14 Error Messages
Error Number  
204  
The number of points selected for setting the low pass transform frequencies is too high. Reduce the number of points so that the low pass criteria is met.

Error Message 7-16
**HP 8753 Source Parameters Changed**

Error Number 61

Some of the stimulus parameters of the instrument state have been changed, because you have turned correction on. A calibration set for the current measurement parameter was found and activated. The instrument state was updated to match the stimulus parameters of the calibration state.

This message also appears when you have turned on harmonic mode or frequency offset, and the present frequency range cannot be used with one of these modes.

---

**HP IB Copy In Progress, Abort With Local**

Error Number 169

An HP-IB copy was already in progress when you requested the HP-IB for another function. Ib abort the first copy, press (Local), otherwise the HP-IB is unavailable until the first copy is completed.

---

**IF BW Key Disabled, Edit List Mode Tbl**

Information Message

When list IF bandwidth has been enabled and swept list mode is on, you will not be able to change the IF bandwidth using the IF BW key. Ib change the IF bandwidth, edit the swept list table.

---

**Illegal Unit or Volume Number**

Error Number 46

The disk unit or volume number set in the analyzer is not valid. Refer to the disk drive operating manual.
INIT DISK removes all data from disk

Information Message Continuing with the initialize operation will destroy any data currently on the disk.

INITIALIZATION FAILED

Error Number 47 The disk initialization failed, probably because the disk is damaged.

INSTRUMENT STATE MEMORY CLEARED

Error Number 56 All instrument state registers have been cleared from memory along with any saved calibration data, memory traces, and calibration kit definitions. Additionally, all user-settable selections (such as HP-IB addresses) are set to their defaults.

INSUFFICIENT MEMORY

Error Number 51 Your last front panel or HP-IB request could not be implemented due to insufficient memory space. In some cases, this is a fatal error from which you can escape only by presetting the instrument.

INSUFFICIENT MEMORY FOR PRINT/ PLOT

Error Number 168 There is not enough memory available for the print or plot function. Increase the available memory by changing or eliminating a memory-intensive operation such as reducing the number of points in the sweep.
**INSUFFICIENT MEMORY, PWRMTRCAL OFF**

Error Number 154  There is not enough memory space for the power meter calibration array. Increase the available memory by clearing one or more save/recall registers, or by reducing the number of points.

---

**INVALID KEY**

Error Number 2  You pressed an undefined softkey.

---

**LIMIT THBLE EMPTY**

Error Number 205  Limit lines cannot be turned on unless a limit table has been created. Refer to “Testing a Device with Limit Lines” in Chapter 2 for information on how to create a limit table.

---

**LIST MODE OFF: INVALID WITH LO FREQ**

Error Number 182  List mode has been turned off in the frequency offset mode because it is incompatible with your selected LO frequency.

---

**LIST THBLE EMPTY**

Error Number 9  The frequency list is empty. To implement list frequency mode, add segments to the list table.

---

7-18 Error Messages
**LOG SWEEP REQUIRES 2 OCTAVE MINIMUM SPAN**

Error Number 150  
A logarithmic sweep is only valid if the stop frequency is greater than four times the start frequency. For frequency spans of less than two octaves, the sweep type automatically reverts to linear sweep.

---

**LOW PASS: FREQ LIMITS CHANGED**

Information Message  
The frequency domain data points must be harmonically related from dc to the stop frequency. That is, stop = n x start, where n = number of points. If this condition is not true when a low pass mode (step or impulse) is selected and transform is turned on, the analyzer resets the start and stop frequencies. The stop frequency is set close to the entered stop frequency, and the start frequency is set equal to stop/n.

---

**MEMORY FOR CURRENT SEQUENCE IS FULL**

Error Number 132  
All the memory in the sequence you are modifying is filled with instrument commands.

---

**MORE SLIDES NEEDED**

Error Number 71  
When you use a sliding load (in a user-defined calibration hit), you must set at least three slide positions to complete the calibration.
NO CALIBRATION CURRENTLY IN PROGRESS
Error Number 69
The RESUME CAL SEQUENCE softkey is not valid unless a calibration is already in progress. Start a new calibration.

NO DISK MEDIUM IN DRIVE
Error Number 41
You have no disk in the current disk unit. Insert a disk, or check the disk unit number stored in the analyzer.

NO FAIL FOUND
Service Error Number 114
The self-diagnose function of the instrument operates on an internal test failure. At this time, no failure has been detected.

NO FILE(S) FOUND ON DISK
Error Number 45
No files of the type created by an analyzer store operation were found on the disk or the disk drive is empty. If you requested a specific file title, that file was not found on the disk.

NO IF FOUND: CHECK R INPUT LEVEL
Error Number 5
The first IF signal was not detected during pretune. Check the front panel R channel jumper. If there is no visible problem with the jumper, refer to the HP 8753E Network Analyzer Service Guide for troubleshooting.

7-20 Error Messages
NO LIMIT LINES DISPLAYED
Error Number 144  You can turn limit lines on but they cannot be displayed on polar or Smith chart display formats.

NO MARKER DELTA —SPAN NOT SET
Error Number 15  You must turn the delta marker mode on, with at least two markers displayed, in order to use the MARKER — SPAN softkey function.

NO MEMORY AVAILABLE FOR INTERPOLATION
Error Number 123  You cannot perform interpolated error correction due to insufficient memory.

NO MEMORY AVAILABLE FOR SEQUENCING
Error Number 126  You cannot modify the sequence due to insufficient memory.

NO SPACE FOR NEW CAL. CLEAR REGISTERS
Error Number 70  You cannot store a calibration set due to insufficient memory. You can free more memory by clearing a saved instrument state from an internal register (which may also delete an associated calibration set, if all the instrument states using the calibration kit have been deleted). You can store the saved instrument state and calibration set to a disk before clearing them. After deleting the instrument states, press [Preset] to run the memory packer.
NOT ALLOWED DURING POWER METER CAL

Error Number 198
When the analyzer is performing a power meter calibration, the HP-IB bus is unavailable for other functions such as printing or plotting.

NOT ENOUGH SPACE ON DISK FOR STORE

Error Number 44
The store operation will **overflow** the available disk space. Insert a new disk or purge files to create free disk space.

NO VALID MEMORY TRACE

Error Number 54
If you are going to display or otherwise use a memory trace, you must first store a data trace to memory.

NO VALID STATE IN REGISTER

Error Number 55
You have requested the analyzer, over HP-IB (or by sequencing), to load an instrument state from an *empty* internal register.

ONLY LETTERS AND NUMBERS ARE ALLOWED

Error Number 43
You can only use alpha-numeric characters (and underscores) in disk file titles or internal save register titles. Other symbols are not allowed, except for the “underscore” symbol.
<table>
<thead>
<tr>
<th>Optional Function; Not Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Number</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overlap in List Type Changed to Stepped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Number 211</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel Port Not Available for GPIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Number 165</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel Port Not Available for Copy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Number 167</td>
</tr>
</tbody>
</table>
PHASE LOCK CAL FAILED

Error Number 4

An internal phase lock calibration routine is automatically executed at power-on, preset, and any time a loss of phase lock is detected. This message indicates that phase lock calibration was initiated and the first IF detected, but a problem prevented the calibration from completing successfully. Refer to the HP 8753E Network Analyzer Service Guide and execute pretune correction test 48.

This message may appear if you connect a mixer between the RF output and R input before turning on frequency offset mode. Ignore it: it will go away when you turn on frequency offset. This message may also appear if you turn on frequency offset mode before you define the offset.

PHASE LOCK FAILURE

Error Number 7

The first IF signal was detected at pretune, but phase lock could not be acquired. Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting.

PHASE LOCK LOST

Error Number 8

Phase lock was acquired but then lost. Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting information.

PLOT ABORTED

Error Number 27

When you press the Local key, the analyzer aborts the plot in progress.

7-24 Error Messages
PLOTTER: not on, not connect, wrong addr

Error Number 26
The plotter does not respond to control. Verify power to the plotter, and check the HP-IB connection between the analyzer and the plotter. Ensure that the plotter address recognized by the analyzer matches the HP-IB address set on the plotter itself.

PLOTTER NOT READY—PINCHWHEELS UP

Error Number 28
The plotter pinch wheels clamp the paper in place. If you raise the pinch wheels, the plotter indicates a “not ready” status on the bus.

POSSIBLE FALSE LOCK

Error Number 6
Phase lock has been achieved, but the source may be phase locked to the wrong harmonic of the synthesizer. Perform the source pretune correction routine documented in the “Adjustments and Correction Constants” chapter in the HP 8753E Network Analyzer Service Guide.

POWER METER INVALID

Error Number 116
The power meter indicates an out-of-range condition. Check the test setup.
POWER METER HOT SETTLED

Error Number 118 Sequential power meter readings are not consistent.
Verify that the equipment is set up correctly. If so,
preset the instrument and restart the operation.

POWER SUPPLY HOT!

Error Number 21 The temperature sensors on the A8 post-regulator
assembly have detected an over-temperature condition.
The power supplies regulated on the post-regulator
have been shut down.

POWER SUPPLY SHUTDOWN!

Error Number 22 One or more supplies on the A8 post-regulator assembly
have been shut down due to an over-current,
over-voltage, or under-voltage condition.

PRESS [MENU], SELECT CW (IF) FREQ, THEN SWEPT LO

Error Number 161 When you are sweeping the RF and LO, the IF must be
fixed.

PRINT ABORTED

Error Number 25 When you press the (Local) key, the analyzer aborts
output to the printer.

7-26 Error Messages
**print color not supported with EPSON**

Error Number 178 You have defined the printer type as EPSON-l%. Color print is not supported with this printer. The print will abort.

**PRINTER: busy**

Error Number 176 The parallel port printer is not accepting data.

**PRINTER: error**

Error Number 175 The parallel port printer is malfunctioning. The analyzer cannot complete the copy function.

**PRINTER: not connected**

Error Number 173 There is no printer connected to the parallel port.

**PRINTER: not handshaking**

Error Number 177 The printer at the parallel port is not responding.

**PRINTER: not on line**

Error Number 172 The printer at the parallel port is not set on line.
**PRINTER: not on, not connected, wrong addr**

Error Number 24  The printer does not respond to control. Verify power to the printer, and check the HP-IB connection between the analyzer and the printer. Ensure that the printer address recognized by the analyzer matches the HP-ID address set on the printer itself.

**PRINTER: paper error**

Error Number 171  There is a paper-related problem with the parallel port printer such as a paper jam or out-of-paper condition.

**PRINTER: power off**

Error Number 174  The power to the printer at the parallel port is off.

**PRINT/PLT INPROGRESS, ABORT WITH LOCAL**

Error Number 166  If a print or plot is in progress and you attempt a second print or plot, this message is displayed and the second attempt is ignored. To abort a print or plot in progress, press [Local].

**PROCESSING DISPLAY LIST**

Information Message  The display information is being processed for a screen print to a copy device and stored in the copy spool buffer. During this time, the analyzer's resources are dedicated to this task (which takes less than a few seconds).
PWR MTR NOT ON/CONNECTED OR WRONG ADORS

Error Number 117  The power meter cannot be accessed by the analyzer. Verify that the power meter address and model number set in the analyzer match the address and model number of the actual power meter.

RANGE CAUSED POWER LVL CHANGE IN LIST

Error Number 213  The selected power range changed the power level of one or more segments in the swept list table. Change the segment power or change the power range.

REQUESTED DATA NOT CURRENTLY AVAILABLE

Error Number 30  The analyzer does not currently contain the data you have requested. For example, this condition occurs when you request error term arrays and no calibration is active.

SAVE FAILED. INSUFFICIENT MEMORY

Error Number 151  You cannot store an instrument state in an internal register due to insufficient memory. Increase the available memory by clearing one or more save/recall registers and pressing (Preset), or by storing files to a disk.

SEGMENT #n POWER OUTSIDE RANGE LIMIT

Information Message  The selected power range does not support the power level of one or more segments in the swept list table. This message appears when swept list mode is not on and reports the first segment that is out of range. Change the segment power or change the power range.
SEGMENT \#n START FREQ OVERLAPS PREVIOUS SEGMENT

Information Message A segment entered in the swept list table caused one or more frequency segments to overlap. This message appears when swept list mode is not on and reports the first segment that is overlapping another. Change the frequency ranges of the overlapping segments.

SELECTED SEQUENCE IS EMPTY

Error Number 124 The sequence you attempted to run does not contain instrument commands.

SELF TEST \#n FAILED

Service Error Number 112 Internal test \#n has failed. Several internal test routines are executed at instrument preset. The analyzer reports the first failure detected. Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting information on internal tests and the self-diagnose feature.

SEQUENCE ABORTED

Error Number 157 The sequence running was stopped prematurely when you pressed the Local key.

SEQUENCE MAY HAVE CHANGED, CAN'T CONTINUE

Error Number 153 When you pause a sequence, you cannot continue it if you have modified it. You must start the sequence again.

7-30 Error Messages
SLIDES ABORTED (MEMORY REALLOCATION)

Error Number 73
You cannot perform sliding load measurements due to insufficient memory. Increase the available memory by clearing one or more save/recall registers and pressing [Preset], or by storing files to a disk.

SOURCE POWER DISABLED • EDIT LIST MODE TBL

Information Message
When list power has been enabled and swept list mode is on, you will not be able to change the power level using the POWER key. To change the power level, edit the swept list table.

SOURCE POWER TURNED OFF, RESET UNDER POWER MENU

Information Message
You have exceeded the maximum power level at one of the inputs and power has been automatically reduced. The annotation PJ indicates that power trip has been activated. When this occurs, reset the power and then press [Menu] POWER SOURCE PWR on OFF, to switch on the power.

STARTING COPY SPOOLER

Information Message
The analyzer is beginning to output data from the spool buffer to the copy device. The analyzer resumes normal operation; the data is being output to the copy device in the background.
SWEEP MODE CHANGED TO CW TIME SWEEP
Error Number 187 If you select external source auto or manual instrument mode and you do not also select CW mode, the analyzer is automatically switched to CW.

SWEEP TIME INCREASED
Error Number 11 You have made instrument changes that cause the analyzer sweep time to be automatically increased. Some parameter changes that cause an increase in sweep time are narrower IF bandwidth, an increase in the number of points, and a change in sweep type.

SWEEP TIME TOO FAST
Error Number 12 The fractional-N and digital IF circuits have lost synchronization. Refer to the HP 8753E Network Analyzer Service Guide for troubleshooting information.

SWEEP TRIGGER SET TO HOLD
Information Message The instrument is in a hold state and is no longer sweeping. lb take a new sweep, press (Menu) TRIGGER MENUSINGLE or CONTINUOUS.
SYNTAX ERROR

Error Number 33 
You have improperly formatted an HP-IB command. 
Refer to the HP 8753E Programming and Command Reference Guide for proper command syntax.

SYST CTRL OR PASS CTRL IN LOCAL MENU

Error Number 36 
The analyzer is in talker/listener mode. In this mode, the analyzer cannot control a peripheral device on the bus. Use the local menu to change to system controller or pass control mode.

TEST ABORTED

Error Number 113 
You have prematurely stopped a service test.

THIS LIST FREQ INVALID

Error Number 133 
You have set frequencies in the list that are outside of the allowable frequency range of the analyzer. Reduce the frequency range of the list.
TOO MANY NESTED SEQUENCES. SEQ ABORTED
Error Number 164
You can only nest sequences to a maximum level of six. The sequence will abort if you nest more than six.

TOO MANY SEGMENTS OR POINTS
Error Number 50
You can have a maximum of 30 segments or 1632 points in frequency list mode. In power meter calibrations, you can have a maximum of 12 segments for power sensor cal factors and power loss functions.

TRANSFORM, GATE NOT ALLOWED
Error Number 16
You can perform a time domain transformation only in linear and CW sweep types.

TROUBLE! CHECK SETUP AND START OVER
Service Error Number 115
Your equipment setup for the adjustment procedure in progress is not correct. Check the setup diagram and instructions HP 8753E Network Analyzer Service Guide. Start the procedure again.

WAITING FOR CLEAN SWEEP
Information Message
In single sweep mode, the instrument ensures that all changes to the instrument state, if any, have been implemented before taking the sweep. The command that you have initiated is being processed and will not be complete until the new sweep is completed. An asterisk * is displayed in the left margin until a complete fresh sweep has been taken.

7-34 Error Messages
WAITING FOR DISK

Information Message
This message is displayed between the start and finish of a read or write operation to a disk.

WAITING FOR HP-IB CONTROL

Information Message
You have instructed the analyzer to use pass control (USEPASC). When you send the analyzer an instruction that requires active controller mode, the analyzer requests control of the bus and simultaneously displays this message. If the message remains, the system controller is not relinquishing the bus.

WRITE ATTEMPTED WITHOUT SELECTING INPUT TYPE

Error Number
32
You have sent the data header “#A” to the analyzer with no preceding input command (such as INPUDATA). The instrument recognized the header but did not know what type of data to receive. Refer to the HP 8753E Programming and Command Reference Guide for command syntax information.

WRONG DISK FORMAT, INITIALIZE DISK

Error Number
77
You have attempted to store, load, or read Ele titles, but your disk format does not conform to the Logical Interchange Format (LIF) or DOS format. You must initialize the disk before reading or writing to it.

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