Quick Reference Guide

HP 8753E Network Analyzer

HP Part No. 08753-90368 Supersedes January 1998
Printed in USA October 1998

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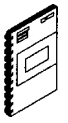
Regulatory Information

The regulatory information is in the User's *Guide* supplied with the analyzer.

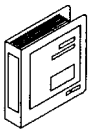
Safety, Warranty, and Assistance

Refer to the User's Guide for information on safety, warranty, and assistance.

HP 87533 Network Analyzer Documentation Map



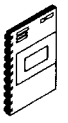
The Installation and Quick Start Guide familiarizes you with the HP 8753E/Option 011 network analyzer's front and rear panels, electrical and environmental operating requirements, as well as procedures for installing, configuring, and verifying the operation of the analyzer.



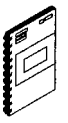
The User's Guide shows how to make measurements, explains commonly-used features, and tells you how to get the most performance from your analyzer.

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.

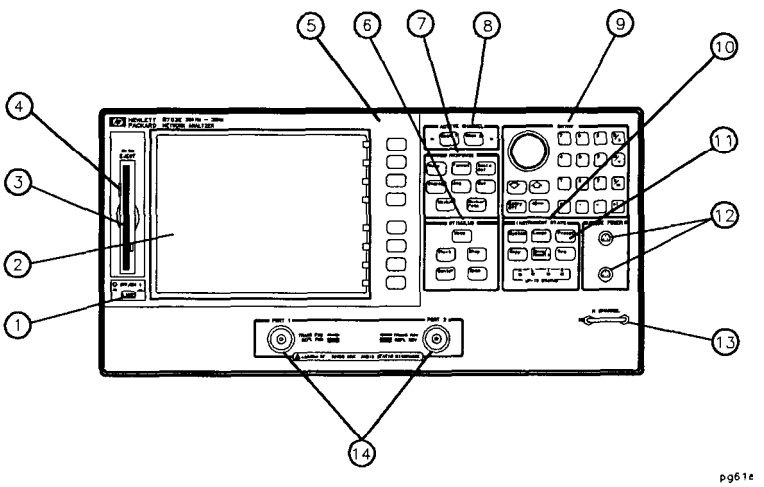


Figure l-l. HP 87533 Front Panel

Figure l-l 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

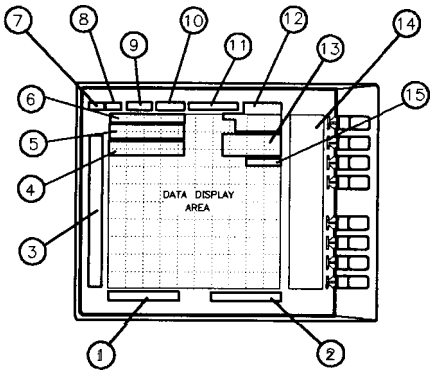


Figure **1-2.** Analyzer Display (Single Channel, Cartesian Format)

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.")

C? = 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. ")

C2 = Full two-port error-correction is active and either the power range for each port is different (uncoupled), or the TESTS E T SW 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 (Menu) MEASURE RESTART, or (Meas) key.

Del = Electrical delay has been added or subtracted, or port extensions are active.

ext = Waiting for an external trigger.

Ofs = Frequency offset mode is on.

Of?= Frequency offset mode error, the IF frequency is not within 10 MHz of expected frequency. LO inaccuracy is the most likely cause.

Gat = Gating is on (tune domain Option 010 only). (For time domain measurement procedures, refer to Chapter 2, "Making Measurements.")

H=2 = Harmonic mode is on, and the second harmonic is being measured (harmonics Option 002 only). (See "Analyzer Options Available" later in this chapter.)

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.)

P↓ = 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 .O 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

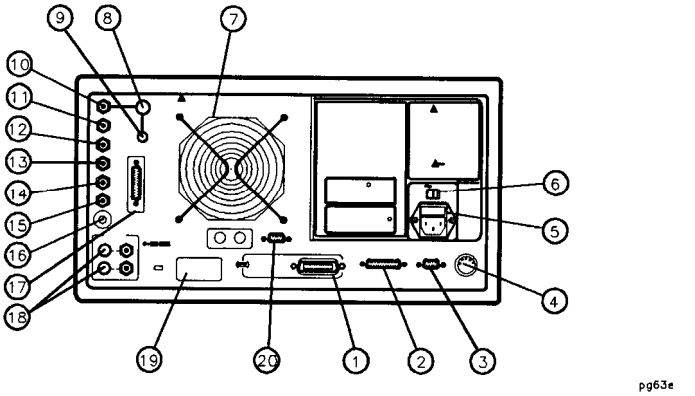


Figure 1-3. HP 87533 Rear Panel

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 BUSES. 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.

2

Making Measurements

Table 2-1. Connector Care Quick Reference

Handling and Storage	
Do	**Do Not**
Keep connectors clean	Touch mating-plane surfaces
Extend sleeve or connector nut	Set connectors contact-end down
Use plastic end-caps during storage	
Visual Inspection	
Do	**Do Not**
Inspect all connectors carefully	Use a damaged connector - ever
Look for particles, scratches, and dents	
Connector Cleaning	
Do	**Do Not**
Try compressed air first	Use any abrasives
Use isopropyl alcohol	Get liquid into plastic support beads
Clean connector threads	
Gaging Connectors	
Do	**Do Not**
Clean and zero the gage before use	Use an out-of-spec connector
Use the correct gage type	
Use correct end of calibration block	
Gage all connectors before first use	
Making Connections	
Do	**Do Not**
Align connectors carefully	Apply bending force to connection
Make preliminary connection lightly	Over tighten preliminary connection
Turn only the connector nut	Twist or screw any connection
Use a torque wrench for final connect	Tighten wrench past “break” point

Basic Measurement Sequence and Example

Basic Measurement Sequence

There are Eve 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.

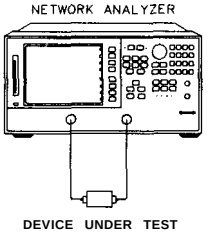


Figure 2-1. Basic Measurement Setup

Step 2. Choose the measurement parameters.

2. Press (Preset) PRESET: FACTORY.

Setting the Frequency Range

3. 'lb set the center frequency to 134 MHz, press:

(Center) (134) (M/μ)

4. 'lb set the span to 30 **MHz,** press:

   (Span) (30) (M/μ)

   Setting the Source Power

5. lb change the power level to -5 **dBm,** press:

   (Menu) POWER (-5) (x1)

   Setting the Measurement

6. lb change the number of measurement data points to 101, press:

   (Menu) NUMBER OF POINTS (⇓)

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) (M/μ)

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 (Shan 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

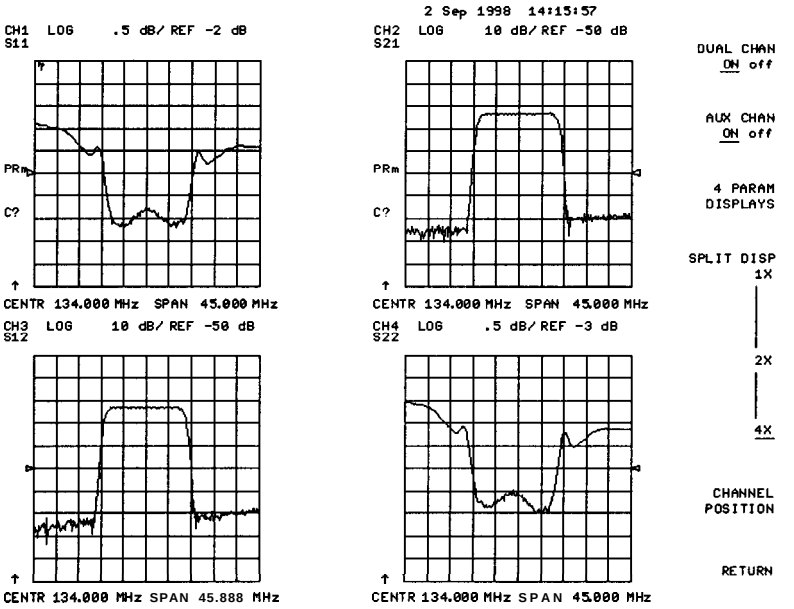


Figure 2-2. Four Parameter Display

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 (Display) menu.

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

1. Press (Display).
2. Press DUAL I 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 (Display) 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 (Ch1) (Menu) NUMBER OF PTS.
2. Press (Ch2) (Menu) NUMBER OF PTS. 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 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 (Marker) MARKER .

Delta Markers and Statistics

1. Press (MENU) Δ MKR= 1 to make marker 1 a reference marker.
2. Move marker 1 to any point that you want to reference.
3. Press MARKER 2 and move marker 2 to any position that you want to measure in reference to marker 1.

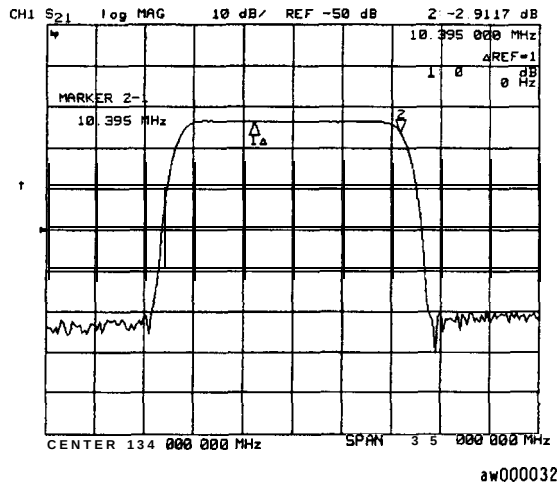


Figure 2-3. Marker 1 as the Reference Marker

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.

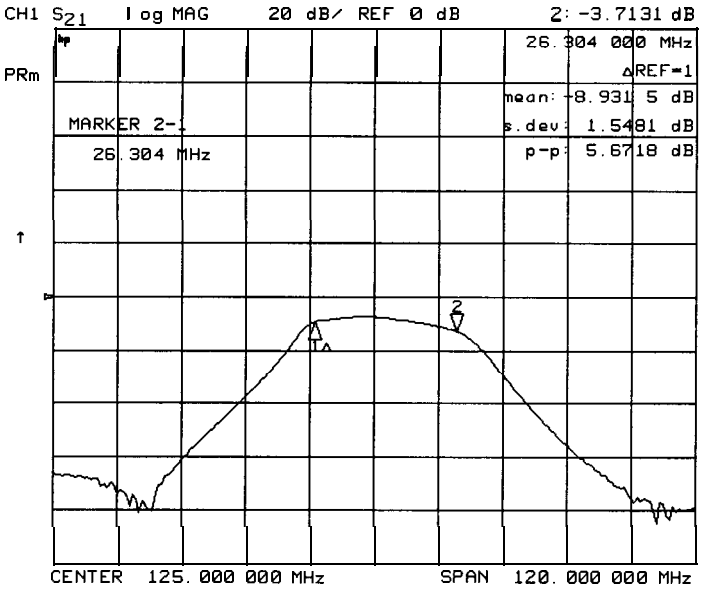


Figure 2-4. Example Statistics of Measurement Data

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 (Marker) MARKER SEARCH .
2. Press SEARCH: MIN.

Markers and the Backspace Key

Besides modifying entries and test sequences, the backspace key (⇐) 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 (Marker) MARKER u g h MARKER 5

The display will appear similar to Figure 2-5.

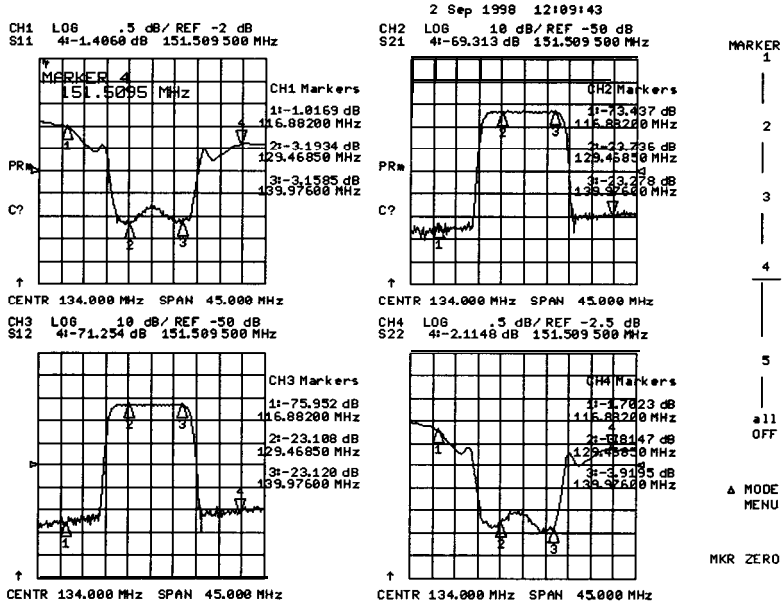


Figure 2-5. Markers before Pressing the Backspace Key

2. Press (⇐)

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.

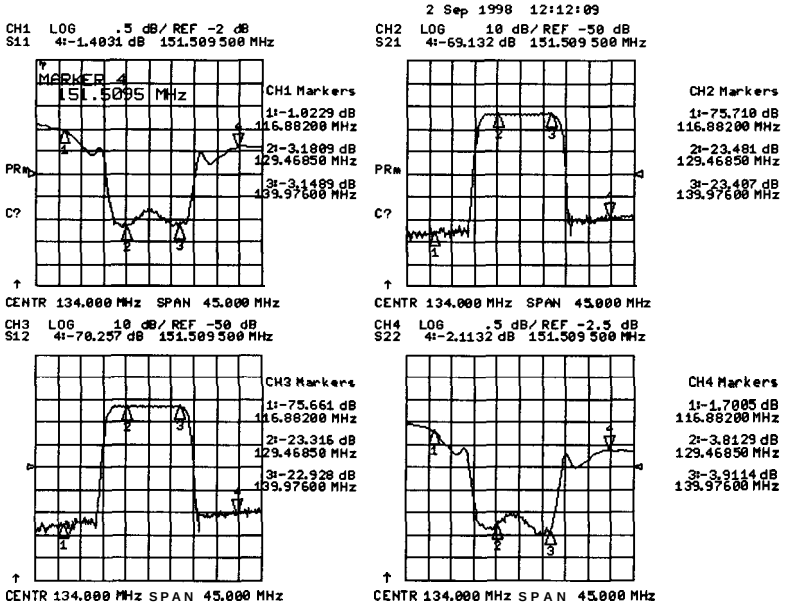


Figure 2-6. Markers after Pressing the Backspace Key

To Move Marker Information back onto the Graticules

3. Press (⇐).

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:

Frequency Range	Power Range
127 MHz to 140 MHz	-27 dB to -21 dB
100 MHz to 123 MHz	-200 dB to -65 dB
146 MHz to 160 MHz	-200 dB to -65 dB

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

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

   (System) LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE CLEAR LIST YES

2 lb 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. lb 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. lb define the limit as a flat line, press:

   LIMIT TYPE FLAT LINE RETURN

5. lb 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

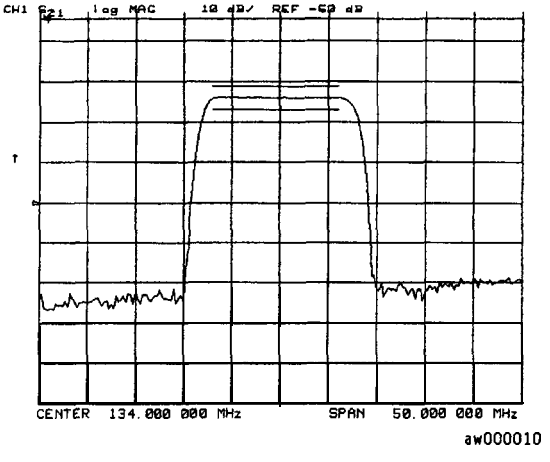


Figure 2-7. Example Flat Limit Line

6. 'lb 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 PO I MT RETURN

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

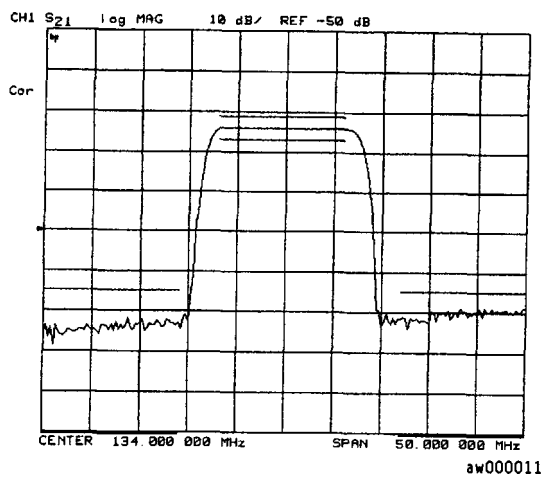


Figure 2-8. Example Flat Limit Lines

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

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

   System LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE CLEAR LIST YES

2. 'lb establish the start frequency and limits for a sloping limit line that tests the low side of the filter, press:

   ADD
   STIMULUS VALUE 123 M/μ
   UPPER LIMIT −65 x1
   LOWER LIMIT −200 x1
   DONE
   LIMIT TYPE SLOPI NG L I HE RETURN

3. 'lb terminate the lines and create a sloping limit line, press:

   ADD
   STIMULUS VALUE 125 M/μ
   UPPER LIMIT −26 x1
   LOWER LIMIT −200 x1
   DONE
   LIMIT TYPE SINGLE POI NT RETURN

4. 'lb 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. lb 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.

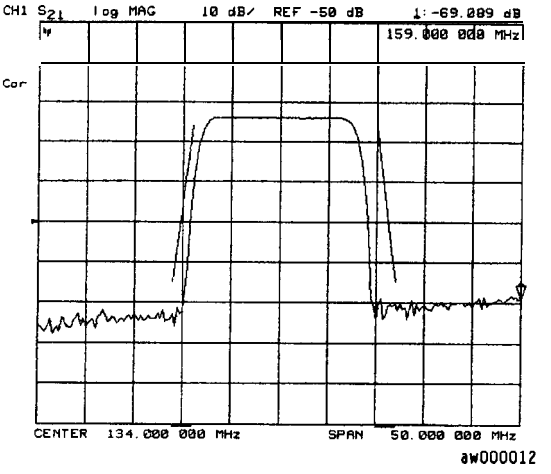


Figure 2-9. Sloping Limit Lines

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:

   System 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

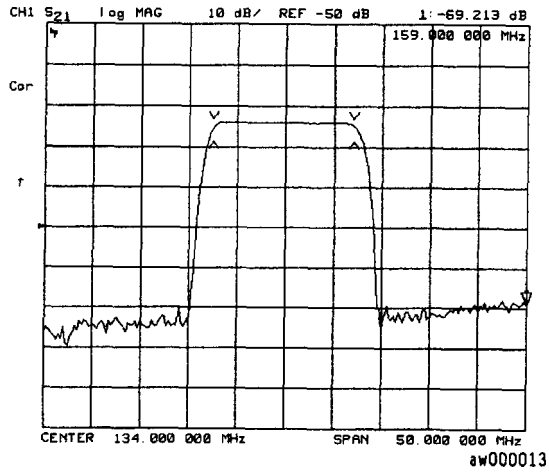


Figure 2-10. Example Single Point Limit Lines

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:

   System LIMIT 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:

   System LIMIT 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:

   SEC;MENT ⇧ or ⇩ repeatedly
   OR
   SEGMENT and enter the segment number followed by (xl.

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

   DELETE

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 ⇧ and ⇩

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 N

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.

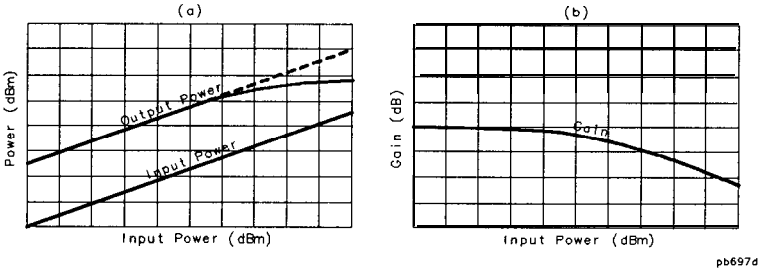


Figure 2-11. Diagram of Gain Compression

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

   (Avg) IF BW 1000 (x1)

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) DAT A →MEMORY DATA/MEM to produce a normalized trace.

6. To produce a normalized trace, perform the following steps:

   a. Press (SETUP) DUAL QUAD set DUAL CHAN on OFF to ON to view channels 1 and 2 simultaneously.

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

      (Menu) 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. To display the ratio of channel 2 data to channel 1 data on the channel 2 display, press:

      (Chan2) (DISPLAY) MORE and set D2/D1 to D2 on OFF to ON. This produces a trace that represents gain compression only.

7. Press (Marker) MARKER on the marker at approximately mid-span.

8. Press (Scale Ref) SCALE/DIV (1) (x1) to change the scale to 1 dB per division.

9. Press (Menu) 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. To locate the worst case point on the trace, press:

    (Marker Fctn) MKR SEARCH SEARCH: MIN

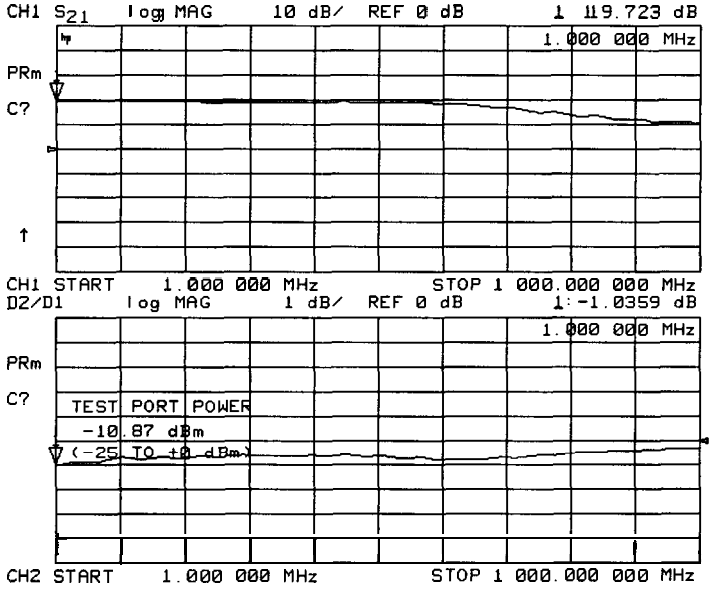


Figure 2-12.
Gain Compression using Linear Sweep and D2/D1 to D2 ON

12. If COUPLED CH OFF was selected, recouple the channel stimulus by pressing:

    [Menu) COUPLED CH ON

13. lb place the marker *exactly* on a measurement point, press:

    (Marker Fctn) MARKER MODE MENU MARKERS: DISCRETE

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

    (Seq) 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.)

17. To maintain the calibration for the CW frequency, press:

   (Cal) INTERPOL ON CORRECTION ON

18. Press (SETUP) (Display) DUAL: QUAD as set 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) 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 (Chan2) [Marker) MKR MODE MENU MARKERS: UNCOUPLED.

26. lb 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 MENU A MODE OFF

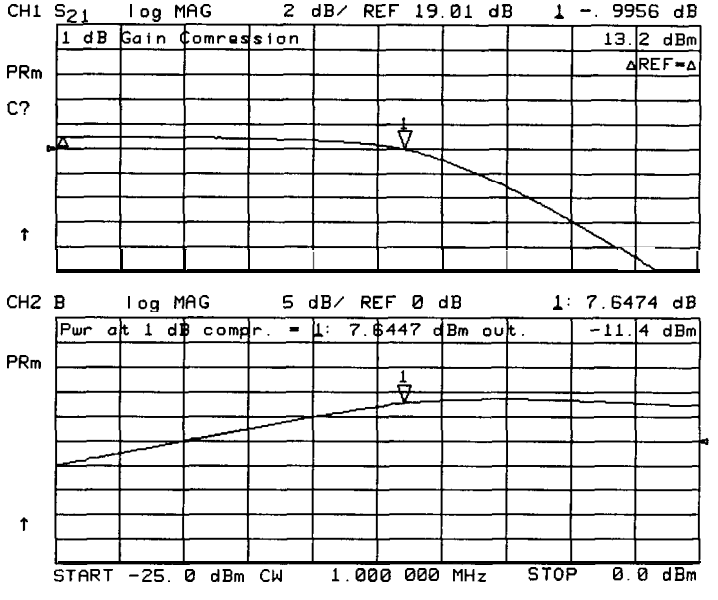


Figure 2-13. Gain Compression using Power Sweep

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.

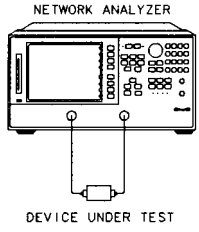
Note

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 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:



pg67e

Figure 2-14. Swept List Measurement Setup

2. Set the following measurement parameters:

Meas Trans: FWD S21 (B/R)
Center 900 M/μ
Span 500 M/μ

Observe the Characteristics of the Filter

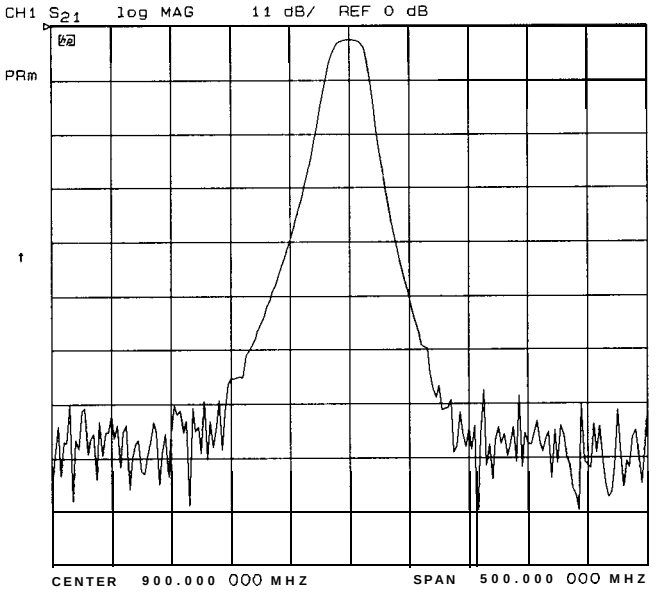


Figure 2-15. Characteristics of a Filter

- Generally, the pass band of a Elter 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. 'lb 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) (M/μ)
   STOP (880) (M/μ)
   NUMBER of POINTS (51) (x1)

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

   MORE
   LIST POWER ON off SEGMENT POWER (10) (x1)
   LIST IF BW ON off 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) (M/μ)
   SPAN (40) (M/μ)
   STEP SIZE (.2) (M/μ)

6. To specify a lower power level for the pass band, press

   MORE
   SEGMENT POWER (-10) (x1)
   SEGMENT IF BW (3700) (x1)
   RETURN DONE

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) (x1)

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

   MORE
   SEGMENT POWER (10) (x1)
   SEGMENT IF BW (300) (x1)
   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.

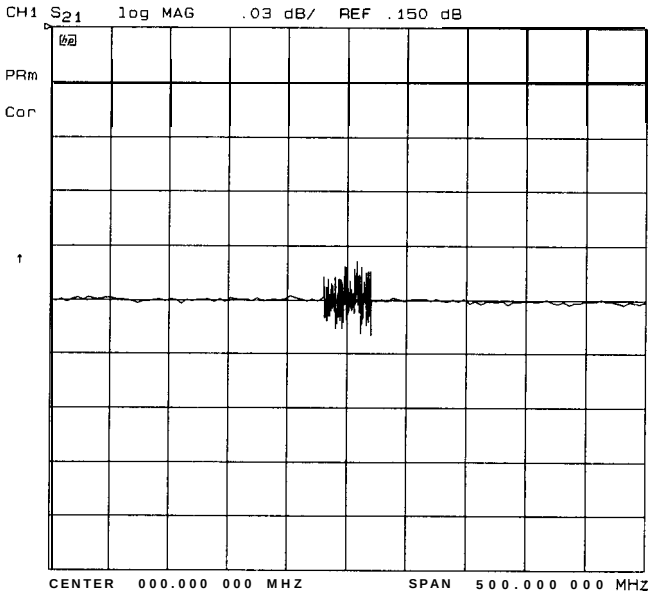


Figure 2-16. Calibrated Swept List Thru Measurement

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).

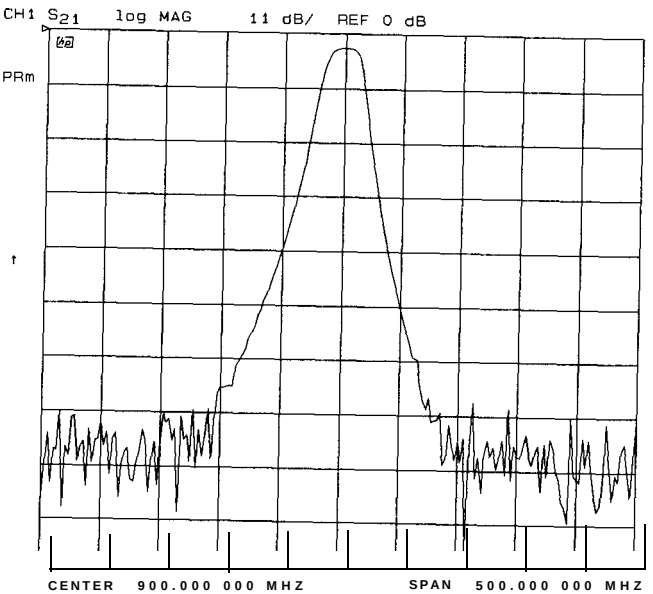


Figure 2-17.
Filter Measurement using Linear Sweep
(Power: 0 dBm/IF BW: 3700 Hz)

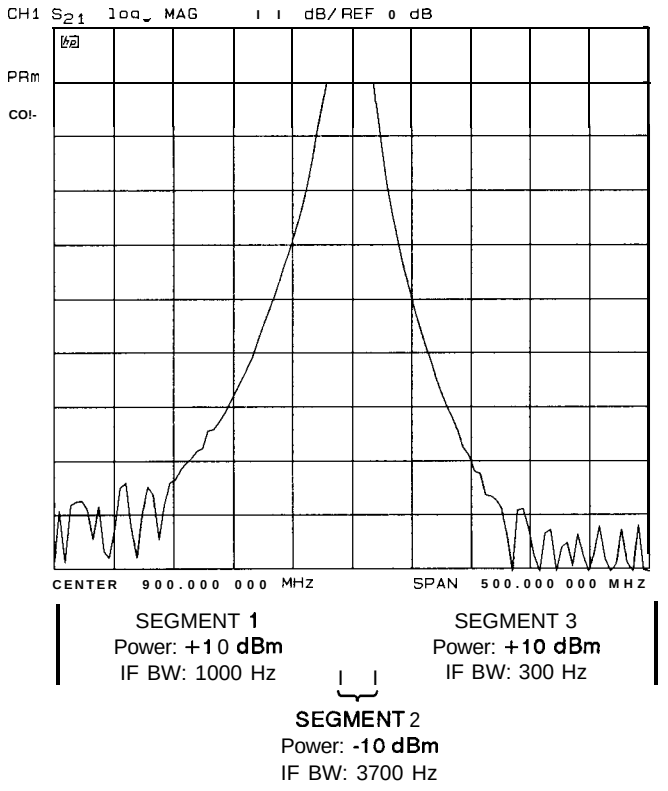


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Figure 2-18. Filter Measurement using Swept List Mode

3

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 broad-band (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 RF > LO or RF < LO.

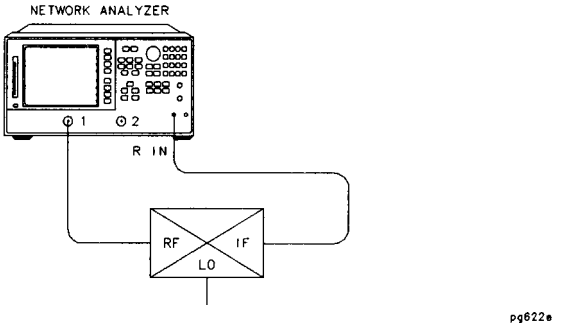


Figure 3-1. Down Converter **Port** Connections

- 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 > LO.

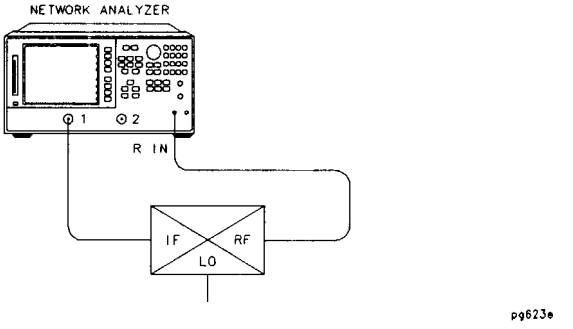


Figure 3-2. Up Converter Port Connections

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.

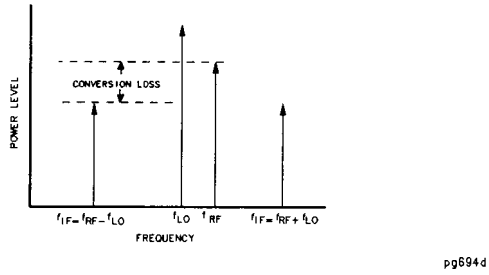


Figure 3-3.
An Example Spectrum of RF, LO, and IF Signals Present in a Conversion Loss Measurement

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

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

   (Menu)
   POWER 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,

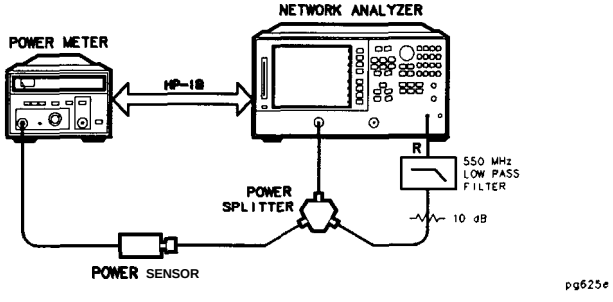


Figure 3-4. Connections for R Channel and Source Calibration

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

   (System) I NSTRUMENT MODE FREQ OFFS MENU
   (Start) (100) (M/μ)
   (Stop) (350) (M/μ)
   FREQ OFFS ON
   (Menu) POWER (0) (x1)

6. 'lb view the measurement trace, press:

   (Meas) INPUT PORTSR

7. Select the BP 87533 as the system controller:

   (Local)
   SYSTEM CONTROLLER

8. Set the power meter's address:

   SET ADDRESSES
   ADDRESS: P MTR/HP IB (##) (x1)

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 LISTS CAL FACTO R SE NSOR A and enter the correction factors as listed on the power sensor. Press ADDFR E QU E NCY (XX) (M/μ) CAL FACTOR (XX) (x1) DONE for each correction factor. When finished, press DONE.

11. lb 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. 'lb calibrate the R channel over the IF range, press:

    (Cal) RECEIVER CAL
    TAKE RCVR CAL SWEEP

    Once completed, the display should read 0 dBm.

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

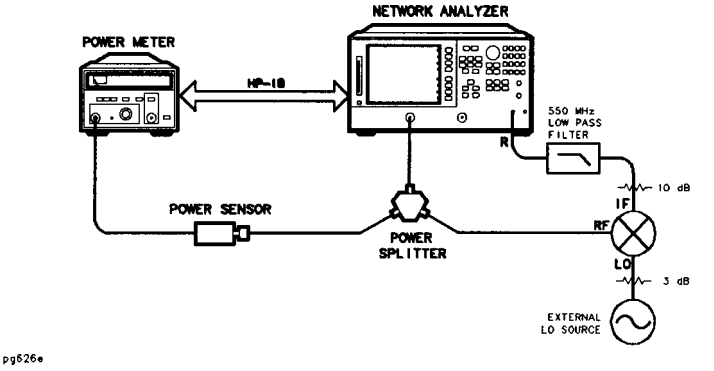


Figure 3-5.
Connections **for a One-Sweep Power Meter Calibration for Mixer Measurements**

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

System
I NSTRUMENT MODE
FREQ OFFS MENU
LO MENUFREQUENCY : CW 1000 M/μ

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

RETURN
DOWN CONVERTER
RF<LO

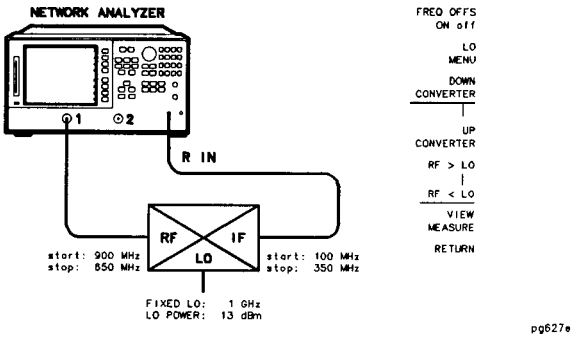


Figure 3-6. Measurement Setup from Display

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

Scale Ref AUTOSCALE

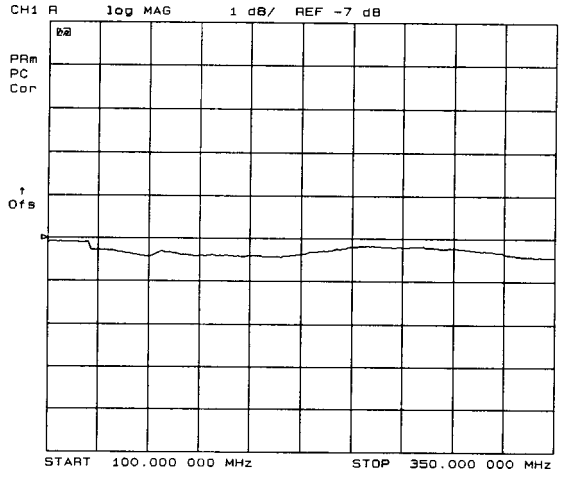


Figure 3-7. Conversion Loss Example Measurement

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.

'lb 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:

   Preset
   Start 100 M/μ
   Stop 2.5 G/n
   Menu POWER PWR RANGE MAN 0 x1

2. Calibrate and zero the power meter.
3. Connect the measurement equipment as shown in Figure 3-8.

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

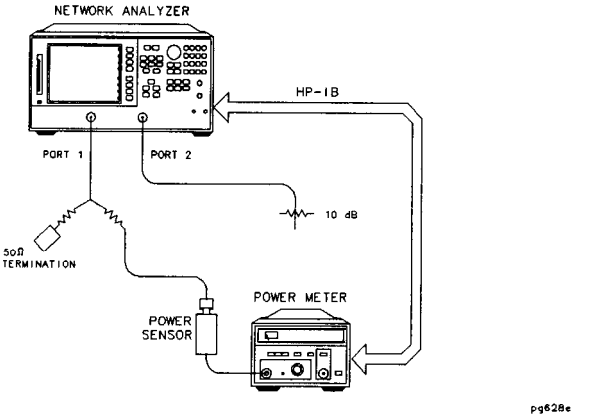


Figure 3-8.
Connections for Broad Band Power Meter Calibration

4. Connect the measurement equipment as shown in Figure 3-9.

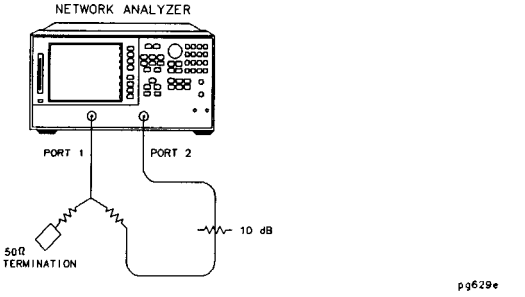


Figure 3-9. Connections for Receiver Calibration

5. Set the following analyzer parameters:

Start 100 M/μ
Stop 1 G/n

6. lb calibrate the B channel over the IF range, press:

   Meas INPUT PORTS B
   Cal RECEIVER CAL TAKE RCVR CAL SWEEP

   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

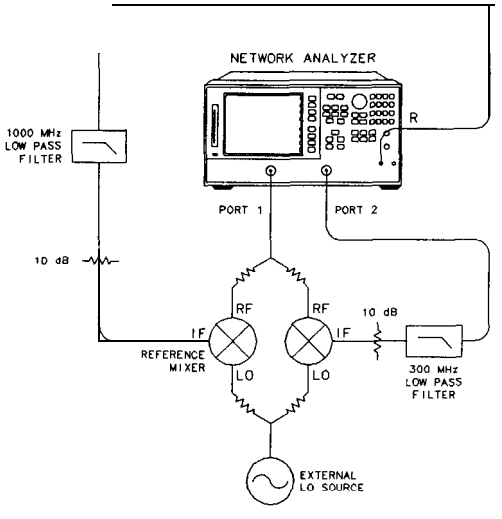


Figure 3-10.
Connections **for a High Dynamic Range Swept IF Conversion Loss Measurement**

9. To set the frequency offset mode LO frequency, press:

   (System) I NSTRUMENT MODE FREQ OFFS MENU
   LO MENU FREQUENCY: CW (1500) (M/μ)

10. To 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. To view the conversion loss in the best vertical resolution, press:

    VI EW MEASURE
    (Scale Ref) AUTOSCALE

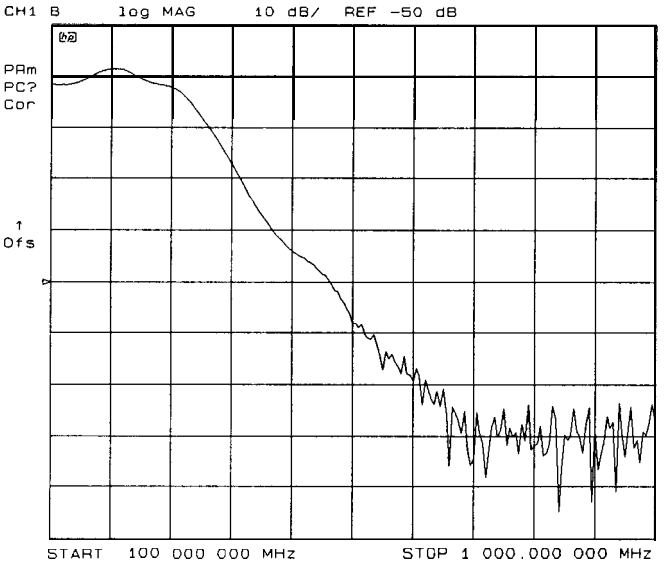


Figure 3-11. Example of Swept IF Conversion Loss Measurement

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.

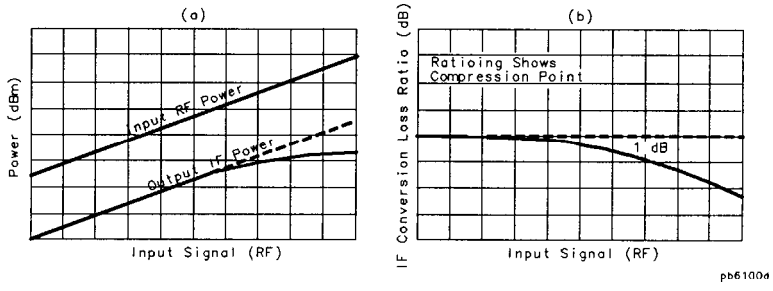


Figure 3-12.
Conversion Loss and Output Power as a Function of Input Power Level Example

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

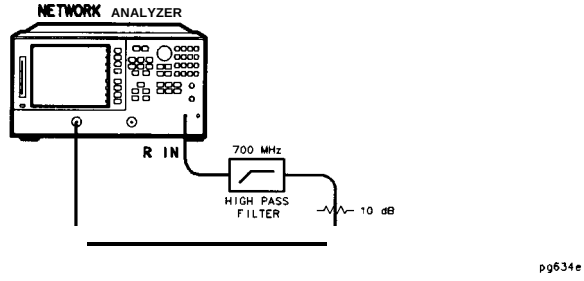


Figure 3-13.
Connections for the First Portion of Conversion Compression Measurement

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

Meas INPUT PORTS R

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.

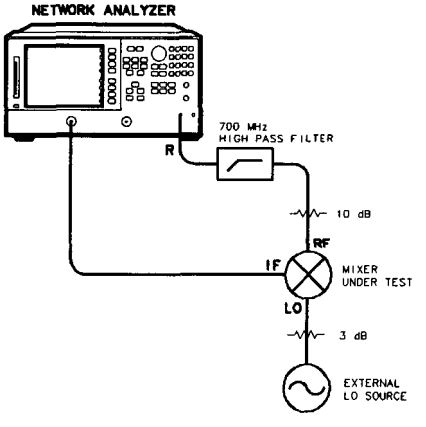


Figure 3-14.
Connections for the Second Portion of Conversion Compression Measurement

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

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

9. To select the converter type, press:

   RETURN
   UP CONVERTER

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

    RF> 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.

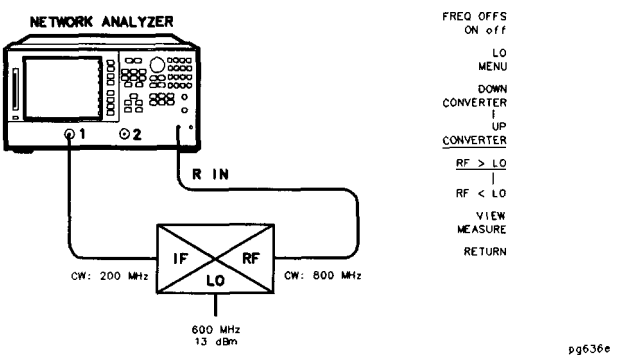


Figure 3-15.
Measurement Setup Diagram Shown on Analyzer Display

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

    VI EW 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

13. Press:

    (Marker) MKR ZERO
    (Marker Fctn)
    MKR SEARCH ON TARGET (-1) (x1)

    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.

    (Marker) Δ MODE A MODE OFF

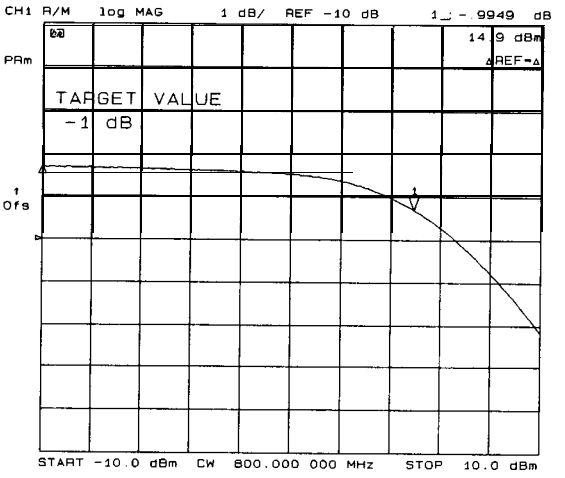


Figure 3-16.
Example Swept Power Conversion Compression Measurement

Isolation Example Measurements

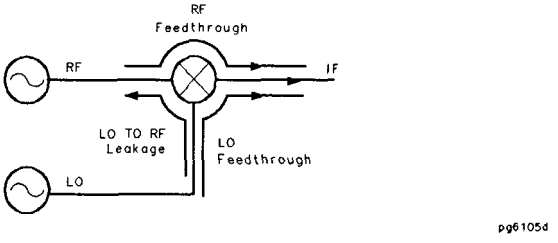


Figure 3-17. Signal Flow in a Mixer Example

LO to IF Isolation

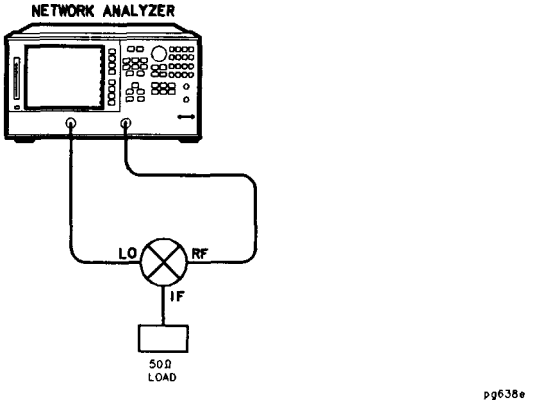


Figure 3-18. Connections for a Mixer Isolation Measurement

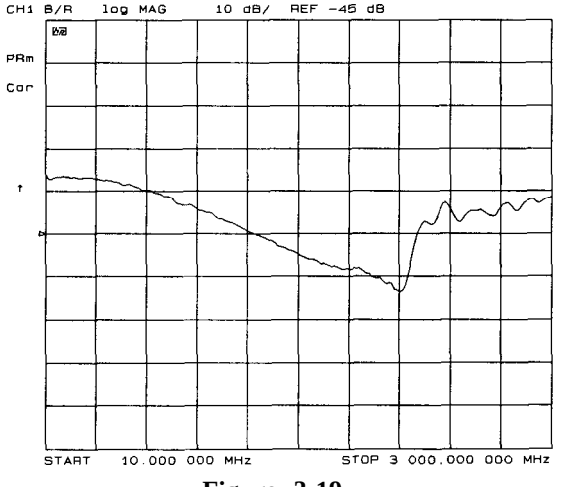


Figure 3-19.
Example Mixer LO to RF Isolation Measurement

RF Feedthrough

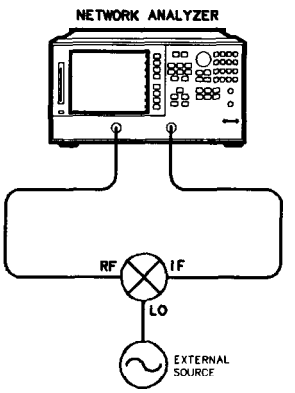


Figure 3-20. Connections for a Mixer RF Feedthrough Measurement

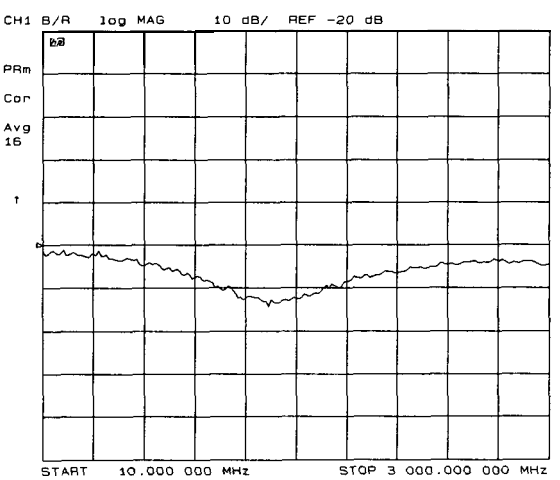


Figure 3-21.
Example Mixer RF Feedthrough Measurement

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.

4

Printing, Plotting, and Saving Measurement Results

Configuring a Print Function

1. Connect the printer to the analyzer interface port.
2. Press (Local) SET ADDRESSES PR I NTER PORT PRNTR TYPE 1 until the correct printer choice appears.
3. Select one of the following printer interfaces:
   - Choose PRNTR PORT HPIB if your printer has an HP-IB interface.
     - Enter the HP-IB address of the printer, followed by (x1).
     - I Press (Local) SYSTEM CONTROLLER or USE PASS CONTROL.
   - Choose PARALLEL [CO PY 1 if your printer has a parallel (centronics) interface.
   - Choose SERIAL 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 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 (Copy) DEFINE PRINT.
2. Press PRINT: MONOCHROME or PRINT: COLOR.
3. Press AUTO-FEED until the correct choice (ON or OFF) is highlighted.
   - Choose AUTO-FEED ON if you want to print one measurement per page.
   - Choose AUTO-FEED OFF 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 (Copy) DEFINE PRINT DEFAULT PRNT SETUP.

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 [1 until the correct printer choice appears.

3. Configure the analyzer for one of the following printer interfaces:

   - Choose PRNTR PORT HPIB 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 [COPY 1 if your printer has a parallel (centronics) interface.
   - Choose SERIAL 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 (xl.

     b. 'lb select the transmission control method that is compatible with your printer, press XMIT CNTRL (transmit control - handshaking protocol) until the correct method appears.

4. Press (Local) SET ADDRESSES PLOTTER PORT and then PLTR TYPE until PLTR TYPE CHPGL PRTJ 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.
     - Enter the HP-IB address of the plotter, followed by (x1).
     - Press (Local) SYSTEM CONTROLLER or USE PASS CONTROL.
   - Choose PHHLLEL [COPY 1 if your plotter has a parallel (centronics) interface.
   - Choose SER I 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 (x1).
     b. lb select the transmission control method that is compatible with your plotter, press XMIT 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 to 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 (Copy) DEFINE PLOT.

Choosing Display Elements

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

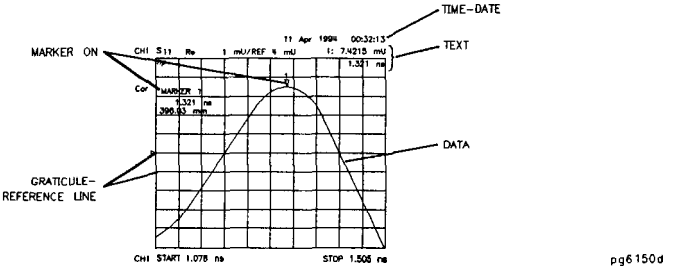


Figure 4-1. Plot Components Available through Definition

Selecting Auto-Feed

3. Press **HUT 0 -FEED until** the correct choice is highlighted.

- Choose HUT 0 – FEED 0 N if you want a "page eject" sent to the plotter or HPGL compatible printer after each time you press PLOT.
- Choose HUT 0 – FEED 0 F F if you want multiple plots on the same sheet of paper.

Note The peripheral ignores HUT 0 -FEED 0 N when you are plotting to a quadrant.

Selecting Pen Numbers and Colors

4. Press MORE and select the plot element where you want to change the pen number. For example, press 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

Pen Number	Color
0	white
1	cyan
2	magenta
3	blue
4	yellow
5	green
6	red
7	black

Table 4-2. Default Pen Numbers for Plot Elements

Corresponding Key	Plot Element	Channel 1 Channel 3 Pen Numbers	Channel 2 Channel 4 Pen Numbers
PEN NUM DATA	Measurement Data Trace	2	3
PEN NUM MEMORY	Displayed Memory Trace	5	6
PEN NUM GRATICULE	Graticule and Reference Line	1	1
PEN NUM TEXT	Displayed Text	7	7
PEN NUM MARKER	Displayed Markers and Values	7	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 l/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

Plot Elements	Channel 1 and 3 Line Type Numbers	Channel 2 and 4 Line Type Numbers
Data Trace	7	7
Memory Trace	7	7

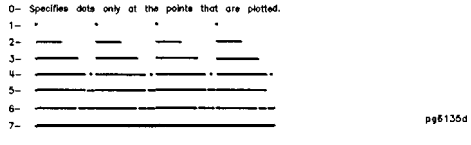
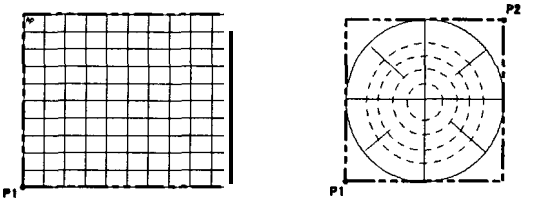


Figure 4-2. Line Types Available

Choosing Scale

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



pg6157d

Figure 4-3.
Locations of **P1** and **P2** in SCALE PLOT [GRAT] **Mode**

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 PLOTMORE MORE DEFAULT 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.

Define Save	Modification Flexibility During Recall
Raw Data Array	Most
Data Array	Medium
Format Array	Least

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.

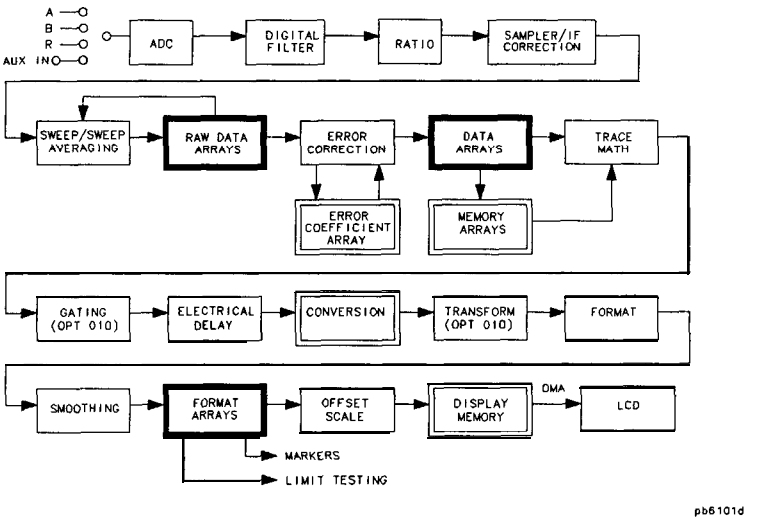


Figure 4-4. Data Processing Flow Diagram

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 ASCII for CITIFILE, S2P, and CAE applications or when you want to import the information into a spread sheet 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 (⇩) repeatedly until the name of the Ele that you want to recall is high-lighted.

4. Press RETURN RECALL STHTE.

5

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 $\pm 1^{\circ}$ 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 SHORT (F) 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. lb select a response correction, press:

   Cal CALIBRATE MENU RESPONSE

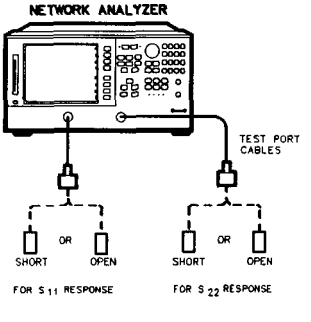


Figure 5-1.
Standard Connections for a Response Error-Correction for Reflection Measurement

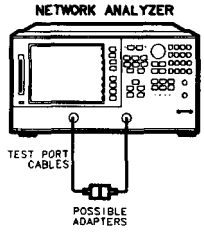
3. 'lb measure the standard when the displayed trace has settled, press:

   SHORT or OPEN

Response Error-Correction for Transmission Measurements

1. Select the type of measurement you want to make.
2. lb select a response correction, press:

   (Cal) CALIBRATE MENU RESPONSE



pg6118

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

3. 'lb 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. lb select a response and isolation correction, press:

   (Cal) CAL I BRATE MENU RESPONSE & I SOL ' N RESPONSE

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

   THRU

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.

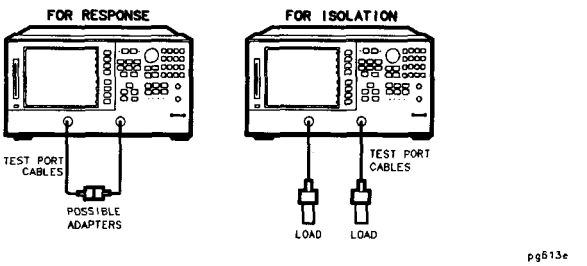


Figure 5-3.
Standard Connections for a Response and Isolation Error-Correction for Transmission Measurements

6. lb help remove crosstalk noise, set the analyzer as follows:
   a. Press (Avg) AVERAGING ON AVERAGING FACTOR and enter at least four times more averages than desired during the device measurement.
   b. Press (Cal) MORE ALTERNATE A and B to eliminate one crosstalk path.
7. 'lb measure the calibration standard, press:

   (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 tunes or turn averaging off.
9. To compute the isolation error coefficients, press:

   (Cal) RESUME CAL SEQUENCE DONE RESP I SOL ' N CAL

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 1-PORT

   - If you want to make a reflection measurement at PORT 2, press:

     S22 1 -PORT

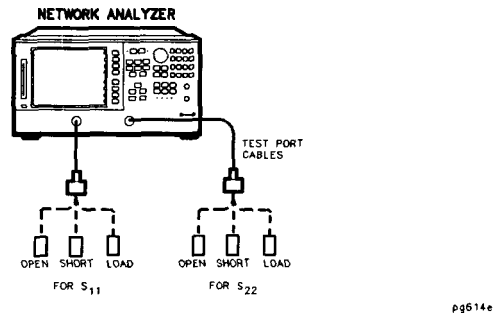


Figure 5-4.
Standard Connections for a One-Port Reflection Error-Correction

   - To measure the standards in sequence, press:

     OPEN

     SHORT

     LOAD

   - To compute the error coefficients, press:

     DONE: 1-PORT CAL

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. lb select the correction type, press:

   (Cal) CAL I BRATE MENU FULL 2-PORT REFLECTION

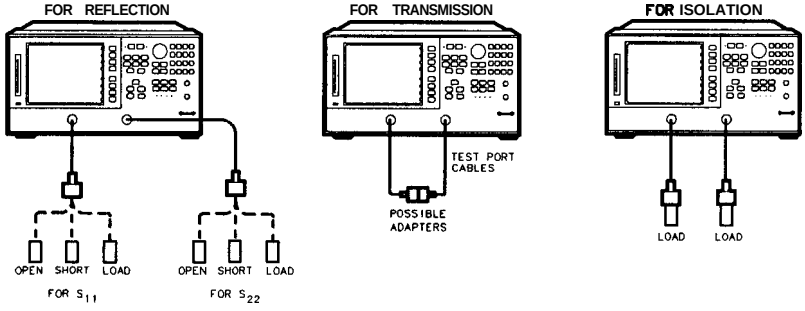


Figure 5-5.
Standard Connections for Full Two-Port Error-Correction

3. 'lb 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. lb compute the reflection correction coefficients, press:

   STANDARDS DONE

6. 'lb 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.

8. To measure the standard, when the trace has settled, press:

   DO BOTH FWD+REV

9. Press ISOLATION and select from the following two options:

   - If you will be measuring devices with a dynamic range less than 90 dB, press:

     OMIT ISOLATION

   - If you will be measuring devices with a dynamic range greater than 90 dB, follow these steps:

     a. Connect impedance-matched loads to PORT 1 and PORT 2. Include the adapters that you would include for your device measurement.

     b. Activate at least four times more averages than desired during the device measurement.

     c. Press (Cal) RESUME CAL SEQUENCE
     ISOLATION FWD ISOL'N ISOL'N STD
     REV ISOL'N ISOL'N STD ISOLATION DONE.

     d. Return the averaging to the original state of the measurement, and press (Cal) RESUME CAL SEQUENCE.

10. To compute the error coefficients, press:

    DONE 2-PORT CAL

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 conflgured.
2. Press (Cal) PWRMTR CAL LOSS/SENSR LISTS CAL FACTOR SENSOR 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

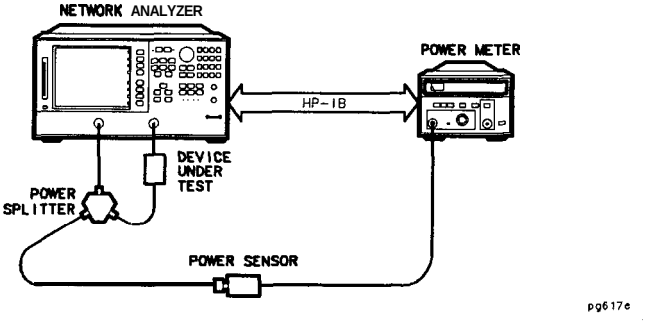


Figure 5-6. Sample-and-Sweep Mode for Power Meter Calibration

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:

   (Local)
   SYSTEM CONTROLLER

4. Set the power meter's address:

   SET ADDRESSES
   ADDRESS: P MTR/HPIB (##) (x1)

5. Select the appropriate power meter by pressing POWER MTR [I 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) PWRMTR 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.

9. Press (Cal) PWRMTR CAL ONE SWEEP TAKE CAL SWEEP.

Using Continuous Correction Mode

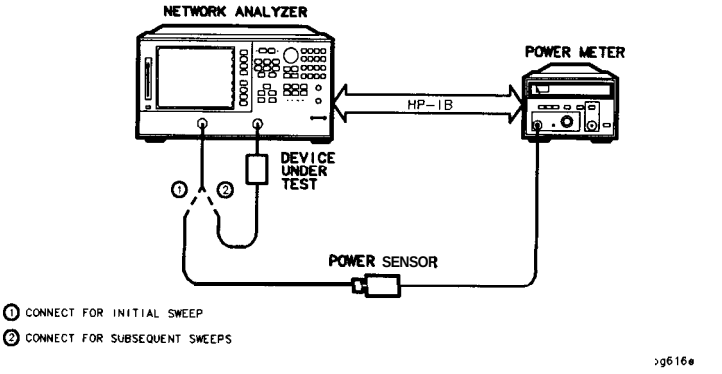


Figure 5-7.
Continuous Correction Mode for Power Meter Calibration

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 (Cal) PWRMTR 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 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. Press (Cal) PWRMTR 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**
3. When finished, press DONE LIST FREQ[SWEPT 1.

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 5-1. Band Switch Points

Baud	Frequency Span
0	.01 MHz to .3 MHz
1	.3 MHz to 3.3 MHz
2	3.3 MHz to 16 MHz
3	16 MHz to 31 MHz
4	31 MHz to 61 MHz
5	61 MHz to 121 MHz
6	121 MHz to 178 MHz
7	178 MHz to 296 MHz
8	296 MHz to 536 MHz
9	536 MHz to 893 MHz
10	893 MHz to 1.607 GHz
11	1.607 GHz to 3 GHz
12 (Option 006)	3 GHz to 4.95 GHz
13 (Option 006)	4.95 GHz to 6 GHz

To Set the Auto Sweep Time Mode

- Press (Menu) SWEEP TIME (0) (xl) to re-enter the auto mode.

To Widen the System Bandwidth

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

IF BW	Sweep Time (secs)[1]
6000	0.077
3700	0.102
3000	0.128
1000	0.254
300	0.707
100	2.010
30	6.980
10	21.40

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

To Reduce the Averaging Factor

1. Press (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) 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.

Number of Points	Sweep Time (secs)[1]
51	0.062
101	0.066
201	0.106
401	0.181
801	0.330
1601	0.633

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) SWEEP TYPE MENU.
2. Select the sweep type.

To Activate Chop Sweep Mode

- Press (Cal) 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:

   (Cal) MORE TEST SET SW

2. lb activate the hold mode, press:

   (0) (x1)

   The analyzer will then display TEST SET SW HOLD.

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

   (X) (x1)

   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 (xl.

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 (Avg) IF BW.
2. Enter the bandwidth value that you want, followed by (xl.

Change Measurement Averaging

1. Press (Avg) AVERAGING FACTOR.
2. Enter a value followed by (xl.
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 (xl].

Reducing Receiver Crosstalk

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

6

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

Softkey	Front-Panel Access Key
Δ MODE MENU	Marker
Δ MODE OFF	Marker
Δ REF = 1	Marker
Δ REF = 2	Marker
Δ REF = 3	Marker
Δ REF = 4	Marker
Δ REF = 5	Marker
Δ REF = Δ FIXED MKR	Marker
1/S	Meas
2X: [1&2]/[3&4]	Display
2X: [1&3]/[2&4]	Display
4X: [1] [2]/[3] [4]	Display
4X: [1] [3]/[2] [4]	Display
4 PARAM DISPLAYS	Display
A	Meas
A/B	Meas
A/R	Meas
ACTIVE ENTRY	Display
ACTIVE MRK MAGNITUDE	Display
ADAPTER:COAX	Cal
ADAPTER:WAVEGUIDE	Cal
ADAPTER DELAY	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
ADAPTER REMOVAL	Cal
ADDRESS: 8753	Local
ADDRESS: CONTROLLER	Local
ADDRESS: DISK	Local
ADDRESS: DISK	Save/Recall
ADDRESS: P MTR/HPIB	Local
ADJUST DISPLAY	Display
ALL OFF	Marker
ALL SEGS SWEEP	Menu
ALTERNATE A and B	Cal
AMPLITUDE	System
AMPLITUDE OFFSET	System
ANALOG IN Aux Input	Meas
ARBITRARY IMPEDANCE	Cal
ASSERT SRQ	Seq
AUTO FEED on OFF	Copy
AUTO SCALE	Scale Ref
AUX CHAN on OFF	Display
AVERAGING FACTOR	Avg
AVERAGING on OFF	Avg
AVERAGING RESTART	Avg
B	Meas
B/R	Meas
BACKGROUND INTENSITY	Display
BANDPASS	System
BEEP DONE ON off	Display
BEEP FAIL on OFF	System
BEEP WARN on OFF	Display
BLANK DISPLAY	Display

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
BRIGHTNESS	Display
C0	Cal
C1	Cal
C2	Cal
C3	Cal
CAL FACTOR	Cal
CAL FACTOR SENSOR A	Cal
CAL FACTOR SENSOR B	Cal
CAL KIT [ ]	Cal
CAL KIT: 2.4mm	Cal
CAL KIT: 2.92*	Cal
CAL KIT: 2.92mm	Cal
CAL KIT: 3.5mmC	Cal
CAL KIT: 3.5mmD	Cal
CAL KIT: TRL 3.5mm	Cal
CAL KIT: 7mm	Cal
CAL KIT: N 50Ω	Cal
CAL KIT: N 75Ω	Cal
CAL KIT: USER KIT	Cal
CAL Z0: LINE Z0	Cal
CAL Z0: SYSTEM Z0	Cal
CALIBRATE MENU	Cal
CALIBRATE: NONE	Cal
CH1 DATA [ ]	Copy
CH1 DATA LIMIT LN	Display
CH1 MEM	Display
CH1 MEM [ ]	Copy

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
CH2 DATA [ ]	Copy
CH2 DATA LIMIT LN	Display
CH2 MEM [ ]	Copy
CH2 MEM REF LINE	Display
CH3 DATA [ ]	Copy
CH3 DATA LIMIT LN	Display
CH3 MEM	Display
CH3 MEM [ ]	Copy
CH4 DATA [ ]	Copy
CH4 DATA LIMIT LN	Display
CH4 MEM	Display
CH4 MEM [ ]	Copy
CHAN PWR [COUPLED]	Menu
CHAN PWR [UNCOUPLED]	Menu
CHANNEL POSITION	Display
CHOP A and B	Cal
CLEAR BIT	Seq
CLEAR LIST	Menu
CLEAR SEQUENCE	Seq
COAX	Cal
COAXIAL DELAY	Scale Ref
COLOR	Display
CONFIGURE	System
CONFIGURE EXTERNAL DISK	Save/Recall
CONTINUE SEQUENCE	Seq
CONTINUOUS	Menu
CONVERSION [ ]	Meas
CORRECTION on OFF	Cal
COUPLED CH on OFF	Menu

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
CW FREQ	Menu
CW TIME	Menu
D2/D1 to D2 on OFF	Display
DATA and MEMORY	Display
DATA ARRAY on OFF	Save/Recall
DATA/MEM	Display
DATA - MEM	Display
DATA → MEMORY	Display
DATA ONLY on OFF	Save/Recall
DECISION MAKING	Seq
DECR LOOP COUNTER	Seq
DEFAULT COLORS	Display
DEFAULT PLOT SETUP	Copy
DEFAULT PRINT SETUP	Copy
DEFINE DISK-SAVE	Save/Recall
DEFINE PLOT	Copy
DEFINE PRINT	Copy
DEFINE STANDARD	Cal
DELAY	Format
DELAY/THRU	Cal
DELETE ALL FILES	Save/Recall
DELETE FILE	Save/Recall
DELTA LIMITS	System
DEMOD: AMPLITUDE	System
DEMOD: OFF	System
DEMOD: PHASE	System
DIRECTORY SIZE (LIF)	Save/Recall

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
DISK UNIT NUMBER	Local
DISK UNIT NUMBER	Save/Recall
DISPLAY: DATA	Display
DISP MKRS ON off	Marker Fctn
DO BOTH FWD + REV	Cal
DO SEQUENCE	Seq
DONE 1-PORT CAL	Cal
DONE 2-PORT CAL	Cal
DONE RESPONSE	Cal
DONE RESP ISOL'N CAL	Cal
DONE SEQ MODIFY	Seq
DONE TRL/LRM	Cal
DOWN CONVERTER	System
DUAL CH on OFF	Display
DUAL:QUAD SETUP	Display
DUMP GRAPH on OFF	System
DUPLICATE SEQUENCE	Seq
EACH SWEEP	Cal
EDIT LIMIT LINE	System
EDIT LIST	Menu
ELECTRICAL DELAY	Scale Ref
EMIT BEEP	Seq
END OF LABEL	Display
END SWEEP HIGH PULSE	Seq
END SWEEP LOW PULSE	Seq
ERASE TITLE	Cal
ERASE TITLE	Display
ERASE TITLE	Save/Recall
EXT SOURCE AUTO	System

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
EXT SOURCE MANUAL	System
EXT TRIG ON POINT	Menu
EXT TRIG ON SWEEP	Menu
EXTENSION INPUT A	Cal
EXTENSION INPUT B	Cal
EXTENSION PORT 1	Cal
EXTENSION PORT 2	Cal
EXTENSIONS on OFF	Cal
EXTERNAL DISK	Save/Recall
FILETITLE FILE0	Save/Recall
FILENAME	Save/Recall
FILE UTILITES	Save/Recall
FIXED	Cal
FIXED MKR AUX VALUE	Marker
FIXED MKR POSITION	Marker
FIXED MKR STIMULUS	Marker
FIXED MKR VALUE	Marker
FLAT LINE	System
FORM FEED	Display
FORMAT ARY on OFF	Save/Recall
FORMAT DISK	Save/Recall
FORMAT: DOS	Save/Recall
FORMAT: LIF	Save/Recall
FORMAT EXT DISK	Save/Recall
FORMAT INT DISK	Save/Recall
FORMAT INT MEMORY	Save/Recall
FREQ OFFS MENU	System
FREQ OFFS on OFF	System
FREQUENCY	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
FREQUENCY BLANK	Display
FREQUENCY: CW	System
FREQUENCY: SWEEP	System
FULL 2-PORT	Cal
FULL PAGE	Copy
FWD ISOL'N ISOL'N STD	Cal
FWD MATCH	Cal
FWD MATCH THRU	Cal
FWD TRANS	Cal
FWD TRANS THRU	Cal
G+jB MKR	Marker
GATE: CENTER	System
GATE: SPAN	System
GATE: START	System
GATE: STOP	System
GATE on OFF	System
GATE SHAPE	System
GATE SHAPE MAXIMUM	System
GATE SHAPE MINIMUM	System
GATE SHAPE NORMAL	System
GOSUB SEQUENCE	Seq
GRAPHICS on OFF	Save/Recall
GRATICULE [ ]	Copy
GRATICULE TEXT	Display
HARMONIC MEAS	System
HARMONIC OFF	System
HARMONIC SECOND	System
HARMONIC THIRD	System

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
HELP ADAPT REMOVAL	Cal
HOLD	Menu
HP-IB DIAG on off	Local
IF BW [ ]	Avg
IF LIMIT TEST FAIL	Seq
IF LIMIT TEST PASS	Seq
IF LOOP COUNTER = 0	Seq
IF LOOP < > COUNTER 0	Seq
IMAGINARY	Format
INCR LOOP COUNTER	Seq
INIT DISK? YES	Save/Recall
INITIALIZE DISK	Save/Recall
INPUT PORTS	Meas
INSTRUMENT MODE	System
INTENSITY	Display
INTERNAL DISK	Save/Recall
INTERNAL MEMORY	Save/Recall
INTERPOL on OFF	Cal
ISOLATION	Cal
ISOLATION DONE	Cal
ISOL'N STD	Cal
KIT DONE (MODIFIED)	Cal
LABEL CLASS	Cal
LABEL CLASS DONE	Cal
LABEL KIT	Cal
LABEL STD	Cal
LEFT LOWER	Copy
LEFT UPPER	Copy

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
LIMIT LINE OFFSETS	System
LIMIT LINE on OFF	System
LIMIT MENU	System
LIMIT TEST on OFF	System
LIMIT TEST RESULT	Display
LIMIT TYPE	System
LIN FREQ	Menu
LIN MAG	Format
LIN MKR	Marker Fctn
LIST FREQ	Menu
LIST IF BW on OFF	Menu
LIST POWER on OFF	Menu
LIST TYPE	Menu
LINE/MATCH	Cal
LINE TYPE DATA	Copy
LINE TYPE MEMORY	Copy
LIST	Copy
LN/MATCH 1	Cal
LN/MATCH 2	Cal
LO CONTROL on OFF	System
LO MENU	System
LO SOURCE ADDRESS	System
LOAD	Cal
LOAD NO OFFSET	Cal
LOAD OFFSET	Cal
LOAD SEQ FROM DISK	Seq
LOG FREQ	Menu
LOG MAG	Format
LOG MKR	Marker Fctn

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
LOOP COUNTER	Seq
LOOP COUNTER	Seq
LOSS	Cal
LOSS/SENSR LISTS	Cal
LOWER LIMIT	System
LOW PASS I MPULSE	System
LOW PASS STEP	System
tANUAL TRG ON FOINT	Menu
MARKER → AMP. OFS.	System
MARKER → CENTER	Marker Fctn
MARKER → CW	Seq
MARKER → DELAY	Marker Fctn
MHRKER → DELAY	Scale Ref
MHRKER → MIDDLE	System
MARKER → REFERENCE	Marker Fctn
MHRKER → REFERENCE	Scale Ref
tARKER → SPAN	Marker Fctn
MARKER → START	Marker Fctn
MARKER → STIMULUS	System
MHRKER → STOP	Marker Fctn
MHRKER 1	Marker
MARKER 2	Marker
MARKER 3	Marker
MHRKER 4	Marker
MARKER 5	Marker
MHRKER al 1 OFF	Marker
tARKER MODE MENU	Marker
MARKERS: CONTINUOUS	Marker

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
MARKERS: COUPLED	Marker
MARKERS: DISCRETE	Marker
MARKERS: UNCOUPLED	Marker
MAX	Marker Fctn
MAXIMUM FREQUENCY	[call
MEASURE RESTART	Menu
MEMORY	Display
MIDDLE VALUE	System
MIN	(Marker)
MINIMUM	System
MINIMUM FREQUENCY	[call
MKR SEARCH [ ]	Marker Fctn
MKR ZERO	(Marker)
MODIFY [ ]	Cal
MODIFY COLORS	(Display)
NETWORK ANALYZER	System
NEW SEQ/MODIFY SEQ	Seq
NEWLINE	[Display)
NEXT PAGE	Copy
NORMAL	System
NUMBER OF GROUPS	(Menu)
NUMBER OF POINTS	(Menu)
NUMBER OF READINGS	Cal
OFFSET	Cal
OFFSET DELAY	Cal
OFFSET LOADS DONE	Cal
OFFSET LOSS	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
OFFSET Z0	Cal
OMIT ISOLATION	Cal
ONE-PATH 2-PORT	Cal
ONE SWEEP	Cal
OPEN	Cal
OP PARMS (MKRS etc)	Copy
P MTR/HPIB TO TITLE	Seq
PARALL IN BIT NUMBER	Seq
PARALL IN IF BIT H	Seq
PARALL IN IF BIT L	Seq
PARALLEL	Local
PARALLEL [ ]	Local
PARALLEL OUT ALL	Seq
PAUSE TO SELECT	Seq
PEN NUM DATA	Copy
PEN NUM GRATICULE	Copy
PEN NUM MARKER	Copy
PEN NUM MEMORY	Copy
PEN NUM TEXT	Copy
PERIPHERAL HPIB ADDR	Seq
PHASE	Format
PHASE	System
PHASE OFFSET	Scale Ref
PLOT	Copy
PLOT DATA ON off	Copy
PLOT GRAT ON off	Copy
PLOT MEM ON off	Copy
PLOT MKR ON off	Copy

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
PLOT SPEED [ ]	Copy
PLOT TEXT ON off	Copy
PLOTTER BAUD RATE	Local
PLOTTER FORM FEED	Copy
PLOTTER PORT	Local
PLTR PORT: DISK	Local
FLTR PORT: HPIB	Local
PLTR PORT: PARALLEL	Local
PLTR PORT: SERIAL	Local
PLTR TYPE [ ]	Local
POLAR	Format
POLAR MKR MENU	Marker
PORT EXTENSIONS	Cal
PORT PWR [COUPLED]	Menu
PORT PWR [UNCOUPLED]	Menu
POWER	Menu
POWER: FIXED	System
POWER: SWEEP	System
POWER LOSS	Cal
POWER MTR [ ]	Local
POWER RANGES	Menu
POWER SWEEP	Menu
PRESET: FACTORY	Preset
PRESET : USER	Preset
PREVIOUS PAGE	Copy
PRINT: COLOR	Copy

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
PRINT COLORS	Copy
PRINT: MONOCHROME	Copy
PRINT MONOCHROME	Copy
PRINT SEQUENCE	Seq
PRINTER BAUD RATE	Local
PRINTER FORM FEED	Copy
PRINTER PORT	Local
PRNTR PORT: HPIB	Local
PRNTR PORT: PARALLEL	Local
PRNTR PORT: SERIAL	Local
PRNTR TYPE [ ]	Local
PWR LOSS on OFF	Cal
PWR RANGE AUTO man	Cal
PWRMTR CAL [ ]	Cal
PWRMTR CAL [OFF]	Cal
R	Meas
R+jX MKR	Marker
RANGE 0 -15 TO +10	Menu
RANGE 1 -25 TO 0	Menu
RANGE 2 -35 TO -10	Menu
RANGE 3 -45 TO -20	Menu
RANGE 4 -55 TO -30	Menu
RANGE 5 -65 TO -40	Menu
RANGE 6 -75 TO -50	Menu
RANGE 7 -85 TO -60	Menu
RAW ARRAY on OFF	Save/Recall
RAW OFFSET ON Off	System
Re/Im MKR	Marker

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
REAL	Format
RECALL CAL PORT 1	Cal
RECALL CAL PORT 2	Cal
RECALL CAL SETS	Cal
RECALL COLORS	Display
RECALL KEYS MENU	Save/Recall
RECALL KEYS on OFF	Save/Recall
RECALL REG1	Save/Recall
RECALL REG2	Save/Recall
RECALL REG3	Save/Recall
RECALL REG4	Save/Recall
RECALL REG5	Save/Recall
RECALL REG6	Save/Recall
RECALL REG7	Save/Recall
RECALL STATE	Save/Recall
RECEIVER CAL	Cal
REFERENCE POSITION	Scale Ref
REFERENCE VALUE	Scale Ref
REFL: FWD S11 (A/R)	Meas
REFL: REV S22 (B/R)	Meas
REFLECT AND LINE	Cal
REFLECTION	Cal
REMOVE ADAPTER	Cal
RENAME FILE	Save/Recall
RE-SAVE STATE	Save/Recall
RESET COLOR	Display
RESPONSE	Cal
RESPONSE & ISOL'N	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
RESUME CAL SEQUENCE	Cal
REV ISOL'N ISOL'N STD	Cal
REV MATCH	Cal
REV MATCH THRU	Cal
REV TRANS	Cal
REV TRANS THRU	Cal
RF > LO	System
RF < LO	System
RIGHT LOWER	Copy
RIGHT UPPER	Copy
ROUND SECONDS	System
S PARAMETERS	Meas
S11 1-PORT	Cal
S11A	Cal
S11B	Cal
S11C	Cal
S11 REFL OPEN	Cal
S22 1-PORT	Cal
S22A	Cal
S22B	Cal
S22C	Cal
S22 REFL OPEN	Cal
SAMPLR COR ON off	System
SAVE COLORS	Display
SAVE USER KIT	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
SAVE USING ASCII	Save/Recall
SAVE USING BINARY	Save/Recall
SCALE/DIV	Scale Ref
SCALE PLOT [ ]	Copy
SEARCH LEFT	Marker Fctn
SEARCH RIGHT	Marker Fctn
SEARCH: MAX	Marker Fctn
SEARCH: MIN	Marker Fctn
SEARCH: OFF	Marker Fctn
SECOND	System
SEGMENT	Cal
SEGMENT	System
SEGMENT: CENTER	Menu
SEGMENT IF BW	Menu
SEGMENT POWER	Menu
SEGMENT: SPAN	Menu
SEGMENT: START	Menu
SEGMENT: STOP	Menu
SEL QUAD [ ]	Copy
SELECT DISK	Save/Recall
SELECT LETTER	Display
SEQUENCE 1 SEQ1	Seq
SEQUENCE 2 SEQ2	Seq
SEQUENCE 3 SEQ3	Seq
SEQUENCE 4 SEQ4	Seq
SEQUENCE 5 SEQ5	Seq
SEQUENCE 6 SEQ6	Seq

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
SEQUENCE FILENAMING	Save/Recall
SET ADDRESSES	Local
SET BIT	Seq
SET CLOCK	System
SET DAY	System
SET FREQ LOW PASS	System
SET HOUR	System
SET MINUTES	System
SET MONTH	System
SET REF: THRU	System
SET REF: REFLECT	System
SET YEAR	System
SET Z0	Cal
SETUP A	Display
SETUP B	Display
SETUP C	Display
SETUP D	Display
SETUP E	Display
SETUP F	Display
SHORT	Cal
SINGLE	Menu
SINGLE POINT	System
SINGLE SEQ SWEEP	Menu
SLIDING	Cal
SLOPE	Menu
SLOPE on OFF	Menu
SLOPING LINE	System
SMITH CHART	Format

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
SMITH MKR MENU	Marker
SMOOTHING APERTURE	Avg
SMOOTHING on OFF	Avg
SOURCE PWR ON off	Menu
SPACE	Display
SPAN	Menu
SPAN	System
SPECIAL FUNCTIONS	Seq
SPECIFY CLASS	Cal
SPECIFY GATE	System
SPECIFY OFFSET	Cal
SPLIT DISP 1X 2X 4X	Display
SPUR AVOID On Off	System
STANDARDS DONE	Cal
STATS on OFF	Marker Fctn
STD DONE (MODIFIED)	Cal
STD OFFSET DONE	Cal
STD TYPE:	Cal
STEP SIZE	Menu
STIMULUS VALUE	System
STIMULUS OFFSET	System
STORE SEQ TO DISK	Seq
SWEEP	System
SWEEP TIME [ ]	Menu
SWEEP TYPE MENU	Menu
SWR	Format
SYSTEM CONTROLLER	Local
TAKE CAL SWEEP	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
TAKE RCVR CAL SWEEP	Cal
TALKER/LISTENER	(Local)
TARGET	Marker Fctn
TERMINAL IMPEDANCE	Cal
TEST PORT 1 2	Meas
TESTSET I/O FWD	Seq
TESTSET I/O REV	Seq
TESTSET SW XXXX	Cal System
TEXT	Display
TEXTL 1	Copy
THRU	Cal
THRU THRU	Cal
TIMESTAMP ON of f	[System]
TINT	Display
TITLE	Display
TITLE SEQUENCE	Seq
TITLE TO MEMORY	Seq
TITLE TO PTR/HPIB	Seq
TITLE TO PERIPHERAL	Seq
TITLE TO PRNTR/HPIB	Seq
TRACKING on OFF	Marker Fctn
TRANS DONE	Cal
TRANS: FWD S21 (B/R)	Meas
TRANS: REV S12 (B/R)	Meas
TRANSFORM MENU	System
TRANSFORM on OFF	System
TRANSMISSION	Cal

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
TRIGGER MENU	Menu
TRIGGER: TRIG OFF	Menu
TRL*/LRM* 2-PORT	Cal
TRL/LRM OPTION	Cal
TTL I/O	Seq
TTL OUT HIGH	Seq
TTL OUT LOW	Seq
TUNED RECEIVER	System
UNCOUPLED	Marker
UP CONVERTER	System
UPPER LIMIT	System
USE MEMORY on OFF	System
USE PASS CONTROL	Local
USER	Preset
USER KIT	Cal
USE SENSOR A / B	Cal
VELOCITY FACTOR	Cal
VIEW MEASURE	System
VOLUME NUMBER	Local
VOLUME NUMBER	Save/Recall
WAIT x	Seq
WARNING	Display
WARNING [ ]	Copy
WAVEGUIDE	Cal
WAVEGUIDE DELAY	Scale Ref
WIDE	System
WIDTH VALUE	Marker Fctn
WIDTHS on OFF	Marker Fctn

Table 6-1. Softkey Locations (continued)

Softkey	Front-Panel Access Key
WINDOW	System
WINDOW: MAXIMUM	System
WINDOW: MINIMUM	System
WINDOW: NORMAL	System
XMIT CNTRL [ ]	Local
Y: REFL	Meas
Y: TRANS	Meas
Z: REFL	Meas
Z: TRANS	Meas

7

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 my be displayed on the analyzer, or transmitted by the instrument over HP-IB.

2-PORT CAL REQU I RED FOR AUX CHANNEL USE

Error Number 217

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 CORRECT ION 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.

ABORT I NG COPY OUTPUT

Information Message

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).

ADDITIONAL STANDARDS NEEDED

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

ADDRESSED 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 F I LTER

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) I F 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 ***HP 8753E Service Guide.***

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.

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. 'lb format the disk, either choose another external disk drive or use the analyzer's internal disk drive.

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.

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 UNLEVELED

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.

CONTINUOUS SWITCHING NOT ALLOWED

Error Number 10

Your current measurement requires different power ranges on channel 1 and channel 2. 'lb 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.

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.t connect. , wrong addrs

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.

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. lf 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 addrs

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.

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.

DOS NAME LIMITED TO 8 CHARS + 3 CHAR EXTENSION

Error Number 180

A DOS file name must meet the following criteria:

- minimum of 1 character
- format is file name.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)

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.

FREQS CANNOT BE CHANGED, TOO MANY POINTS

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.

FUNCTION NOT AVAILHBLE

Error Number 202 — The function you requested over HP-IB is not available on the current instrument.

FUNCTION NOT VALID

Error Number 14 — The function you requested is incompatible with the current instrument state.

FUNCTION NOT VALID DURING MOD SEQUENCE

Error Number 131 — You cannot perform sequencing operations while a sequence is being modified.

FUNCTION NOT VALID FOR INTERNAL MEMORY

Error Number 201 — The function you selected only works with disk files.

FUNCTION ONLY VALID DURING MOD SEQUENCE

Error Number 164 — You can only use the GOSUB SEQUENCE capability when you are building a sequence. Attempting to use this softkey at any other time returns an error message and no action is taken.

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. lb 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. lb 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,PWR MTR CAL 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 TABLE 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 TABLE EMPTY

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

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.

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.

OPTIONAL FUNCTION; NOT INSTALLED

Error Number 1

The function you requested requires a capability provided by an option to the standard analyzer. That option is not currently installed. (Refer to Chapter 1 for a description of the available options.)

OVERLAP ! LIST TYPE CHANGED TO STEPPED

Error Number 211

The list type changed to stepped because one or more frequency segments in the swept list table overlapped. Change the frequency ranges of the overlapping segments and switch back to swept list mode.

PHRHLLEL PORT NOT AVAILABLE FOR GPIO

Error Number 165

You have defined the parallel port as COPY for sequencing in the HP-IB menu. 'lb access the parallel port for general purpose I/O (GPIO), set the selection to [GPIO] .

PHRHLLEL PORT NOT AVAILABLE FOR COPY

Error Number 167

You have defined the parallel port as general purpose I/O (GPIO) for sequencing. The definition was made under the (Local) key menus. lb access the parallel port for copy, set the selection to PARALLEL [COPY1.

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.

PLOTTER: not on, not connect, wrong addrs

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-PINCH WHEELS 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 NOT 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 SHUT DOWN!

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.

PRINTABORTED

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

`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 addrs

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/PLOT IN PROGRESS, 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. lb 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 ADDRS

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 FHILED

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.

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. lb 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 PΨ 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.

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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