

Manual Supplement

Agilent Technologies

**For
8719ET/ES, 8720ET/ES, and 8722ET/ES
Network Analyzers Documentation Set
(08720-90390)**

Updates for Network Analyzers with Firmware Revision 7.66



Agilent Technologies

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Manuals that This Document Supplements

This manual supplement provides documentation updates for all 8719ET/20ET/22ET and 8719ES/20ES/22ES network analyzers with firmware revision of 7.66 *and* documentation printed prior to July 2000.

In the 8719ET/20ET/22ET and 8719ES/20ES/22ES Network Analyzers Documentation Set (part number 08720-90390), this document supplements the following manuals:

- 8719ET/20ET/22ET and 8719ES/20ES/22ES Network Analyzers User's Guide (part number 08720-90392)
- 8719ET/20ET/22ET and 8719ES/20ES/22ES Network Analyzers Reference Guide (part number 08720-90393)
- 8719ET/ES, 8720ET/ES, 8722ET/ES, and 8753ET/ES Network Analyzers Programmer's Guide (part number 08753-90475)

The information within this manual supplements has been included in manuals printed during or after July 2000.

How to Use This Guide

This guide uses the following conventions:

Front-Panel Key

This represents a key physically located on the instrument.

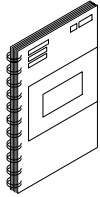
SOFTKEY

This represents a “softkey,” a key whose label is determined by the instrument's firmware.

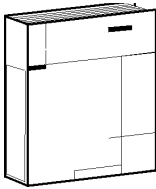
Screen Text

This represents text displayed on the instrument's screen.

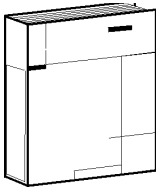
Documentation Map



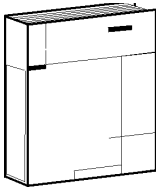
The *Installation and Quick Start Guide* provides procedures for installing, configuring, and verifying the operation of the analyzer. It also will help you familiarize yourself with the basic operation of the analyzer.



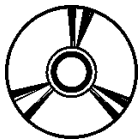
The *User's Guide* shows how to make measurements, explains commonly-used features, and tells you how to get the most performance from your analyzer.



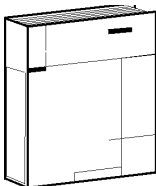
The *Reference Guide* provides reference information, such as specifications, menu maps, and key definitions.



The *Programmer's Guide* provides general GPIB programming information, a command reference, and example programs. The *Programmer's Guide* contains a CD-ROM with example programs.



The **CD-ROM** provides the *Installation and Quick Start Guide*, the *User's Guide*, the *Reference Guide*, and the *Programmer's Guide* in PDF format for viewing or printing from a PC. This supplement is *not* included on the CD-ROM.



The *Service Guide* provides information on calibrating, troubleshooting, and servicing your analyzer. The *Service Guide* is not part of a standard shipment and is available only as Option 0BW, or by ordering part number 08720-90397. A CD-ROM with the *Service Guide* in PDF format is included for viewing or printing from a PC.

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1 Supplement for the User's Guide

Using This Chapter

This chapter contains the supplemental information changes to the user's guides that coincide with the release of firmware revision 7.66. These changes pertain to the following user's guide.

8719ET/20ET/22ET and 8719ES/20ES/22ES Network Analyzers User's Guide
(part number 08720-90392)

The following list describes the changes to user's guides printed prior to July 2000. Each of the changes are described in detail in the remainder of this chapter. The page references in this list refer to page numbers in this supplement.

- Making Measurements Chapter
 - Add the **LIMIT LINE** softkey after the **LIMIT MENU** softkey in all existing locations.
 - Add the **RECALL KEYS** softkey between the **(Save/Recall)** key and the **RECALLKEYS MENU** softkey in the section titled "Limit Test Example Sequence" in "Using Test Sequencing to Test a Device" on page 1-5.
 - Add "Using Ripple Limits to Test a Device" on page 1-7.
 - Add "Using Bandwidth Limits to Test a Bandpass Filter" on page 1-17 to the chapter.
- Making Mixer Measurements Chapter
 - Replace the section titled "Conversion Loss Using the Frequency Offset Mode" on page 1-23.
- Printing, Plotting, and Saving Measurement Results Chapter
 - Add a note referencing the new "Saving in Graphical (JPEG) Form" section after the displayed paragraph in "To View Plot Files on a PC."
 - Add the new sections "Saving in Textual (CSV) Form" on page 1-33 and "Saving in Graphical (JPEG) Form" on page 1-34 to the "Saving Measurement Results" section.
- Calibrating for Increased Measurement Accuracy Chapter
 - Add a paragraph explaining the frequency entry to step 5 of "Calibrating for Non-Coaxial Devices (ES Analyzers Only)"
 - Append a note referencing the new "Saving Modified Calibration Kits to a Disk" section to step 19 of the "Calibrating for Non-Coaxial Devices (ES Analyzers Only)" section.
 - Append a note referencing the new "Saving Modified Calibration Kits to a Disk" section to step 19 of the "LRM Error Correction" section.
- Operating Concepts Chapter
 - Append "Saving Modified Calibration Kits to a Disk" to the end of the section titled "Modifying Calibration Kits."

Using Limit Lines to Test a Device

Creating Flat Limit Lines

In step 1, replace the following line:

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

with

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

Creating a Sloping Limit Line

In step 1, replace the following line:

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

with

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

Creating Single Point Limits

In step 1, replace the following line:

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

with

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

Editing Limit Segments

In step 1, replace the following line:

(System) LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE

with

(System) LIMIT MENU LIMIT LINE LIMIT LINE ON EDIT LIMIT LINE

Deleting Limit Segments

In step 1, replace the following line:

(System) LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE

with

(System) LIMIT MENU LIMIT LINE LIMIT LINE ON EDIT LIMIT LINE

Running a Limit Test

In step 1, replace the following line:

(System) LIMIT MENU LIMIT LINE ON EDIT LIMIT LINE

with

(System) LIMIT MENU LIMIT LINE LIMIT LINE ON EDIT LIMIT LINE

Activating the Limit Test

In this section, replace the following line:

(System) LIMIT MENU LIMIT TEST ON BEEP FAIL ON

with

(System) LIMIT MENU LIMIT LINE LIMIT TEST ON BEEP FAIL ON

Offsetting Limit Lines

In step 1, replace the following line:

(System) LIMIT MENU LIMIT LINE OFFSETS STIMULUS OFFSET (3) (M/μ)

with

(System) LIMIT MENU LIMIT LINE LIMIT LINE OFFSETS STIMULUS OFFSET
(3) (M/μ)

Using Test Sequencing to Test a Device

Limit Test Example Sequence

In step 1, replace the following line:

Save/Recall **RECALLKEYS MENU** **RECALL REG1**

with:

Save/Recall **RECALL KEYS** **RECALLKEYS MENU** **RECALL REG1**

This page intentionally left blank.

Using Ripple Limits to Test a Device

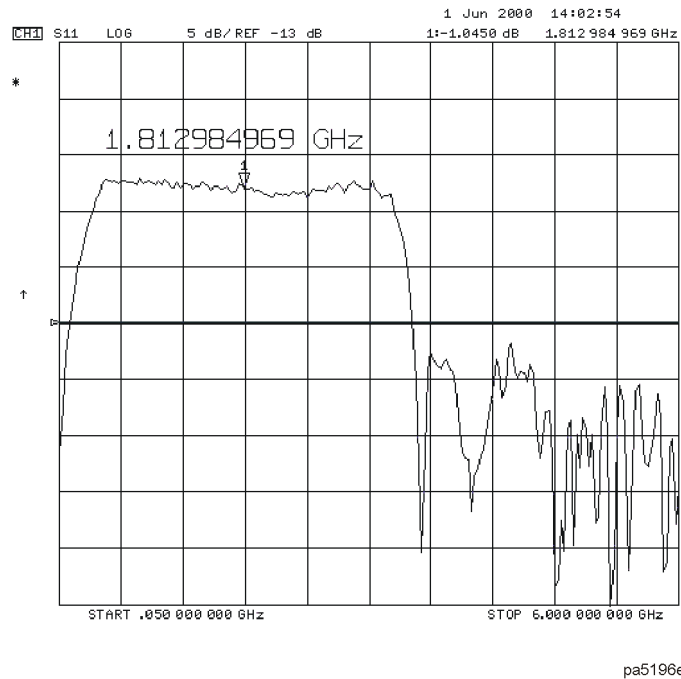
Setting Up the List of Ripple Limits to Test

Two tasks are involved in preparing for ripple testing:

- First, set up the analyzer settings to view the frequency of interest.
- Second, set up the analyzer to test over the appropriate frequencies against your specific limits.

This example will show you how to set up the analyzer to test ripple limits. In this example, we will be testing the pass band of a bandpass filter where the center frequency of the filter is approximately 1.8 GHz and has a bandwidth of approximately 2.9 GHz. Refer to [Figure 1-1](#).

Figure 1-1 Bandpass Filter Being Ripple Tested

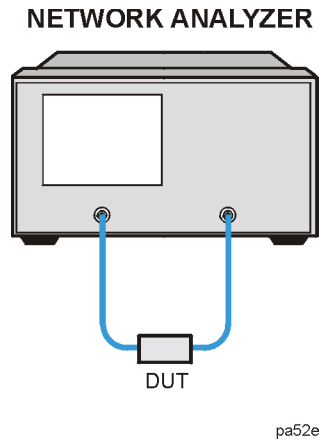


Setting Up the Analyzer to Perform the Ripple Test

This section sets up the analyzer so that a bandpass filter can be easily viewed on the analyzer display.

1. Connect your filter as shown in [Figure 1-2](#).

Figure 1-2 Connections for an Example Ripple Test Measurement



2. Press **Preset** and choose the measurement settings. For this example, the measurement settings are as follows:

- **Meas** **Trans: FWD S21 (B/R)** or on ET models: **TRANSMISSN**
- **Center** **1.8** **G/n**
- **Span** **3.4** **G/n**
- **Scale Ref** **AUTO SCALE**

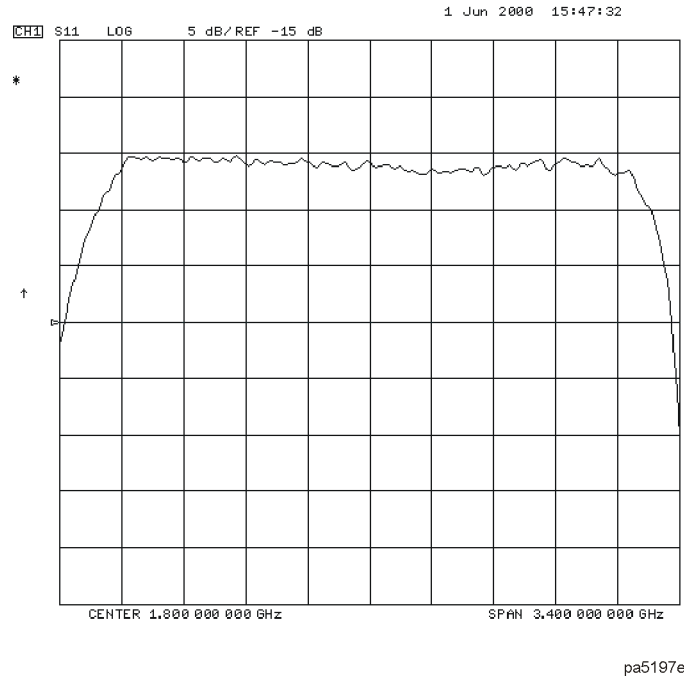
You may also want to select settings for the number of data points, power, averaging, and IF bandwidth.

3. Substitute a thru for the device and perform a response calibration by pressing:

Cal **CALIBRATE MENU** **RESPONSE** **THRU**

4. Reconnect your test device.
5. To better view the measurement trace, press **Scale Ref** **AUTO SCALE**. Refer to [Figure 1-3](#).

Figure 1-3 Filter Pass Band Before Ripple Test



Setting Up Limits for Ripple Testing

This section instructs you on setting up the ripple tests parameters. You must set up the analyzer to check the DUT at the correct frequencies and compare the measured values against the maximum allowable ripple value for each frequency band. To do this, you set up individual frequency bands. You define the stop and start frequency and the maximum allowable ripple value of each frequency band. You may set up as many as 12 frequency bands for testing ripple. The frequency bands are combined in a list that is displayed while the ripple frequency bands are being edited.

In this example, we will create one ripple limit (or frequency band) that spans the entire pass band from 500 MHz to 3.2 GHz. We will also create two additional frequency bands that when merged, will span the pass band with tighter limits. Using the Ripple Edit Menu, we will create a ripple limits list on the analyzer that is similar to the following table.

Table 1-1 Ripple Limits for Ripple Test Example

Frequency Band	Minimum Frequency	Maximum Frequency	Maximum Ripple
1	500 MHz	3.2 GHz	2.0 dB
2	500 MHz	1.85 GHz	1.3 dB
3	1.85 GHz	3.2 GHz	1.3 dB

Notice that Frequency Band 1 overlaps in frequency the remaining frequency bands. Whereas, Frequency Bands 2 and 3 are separate bands that cover the same span of frequency. This can be done to put tighter limits over narrower frequency spans within the bandpass or to customize the ripple test to meet your specific requirements.

1. To access the ripple test menu, press:

(System) LIMIT MENU RIPPLE LIMIT

2. To access the ripple test edit menu, press **EDIT RIPL LIMIT**.
3. Add the first frequency band (Frequency Band 1) to be tested by pressing **ADD**.
4. Set the lower frequency value of Frequency Band 1 by pressing:

MINIMUM FREQUENCY **(500)** **(M/μ)**

5. Set the upper frequency value of Frequency Band 1 by pressing:

MAXIMUM FREQUENCY **(3.2)** **(G/n)**

6. Set the maximum allowable ripple amplitude value of Frequency Band 1 by pressing:

MAXIMUM RIPPLE **(2.0)** **(x1)**

7. Repeat steps 3 through 6 for the two remaining frequency bands to be tested for maximum ripple.

The network analyzer allows you to enter up to 12 frequency bands to be tested for maximum ripple.

8. After you have entered all of the ripple test frequency band parameters, return to the ripple test menu by pressing **DONE**.

Editing Ripple Test Limits

Once the frequency band limits for ripple testing has been created, the limits may be changed using the same menu that was used to create them. Using the edit ripple test menu, you may:

- change existing frequency band limits
- add more frequency band limits
- delete individual frequency band limits
- clear all frequency band limits

Changing Existing Frequency Band Limits

Existing frequency band limits may be changed for testing the ripple. This procedure guides you through changing the existing frequency band limits.

1. To access the ripple test edit menu from the ripple test menu, press:

EDIT RIPL LIMIT

2. Enter the frequency band whose limits you want to change by pressing:

a. **FREQUENCY BAND**

- b. The numeric key indicating the frequency band number that you are changing.

The frequency band number is located in the left column of the list of frequency bands.

3. Make the changes to the selected band by pressing:
 - a. **MINIMUM FREQUENCY** and the new value to change the lower frequency of the frequency band.
 - b. **MAXIMUM FREQUENCY** and the new value to change the upper frequency of the frequency band.
 - c. **MAXIMUM RIPPLE** and the new decibel value to change the maximum allowable ripple of the frequency band. Terminate the new decibel value with the **(x1)** key.
4. Repeat steps 2 and 3 for additional frequency bands to be changed to test the ripple.
5. After you have entered the necessary changes to the ripple test frequency band parameters, return to the ripple test menu by pressing **DONE**.

Adding Additional Frequency Bands

More frequency band limits may be added for testing the ripple. This procedure guides you through adding the more frequency band limits.

The network analyzer allows you to enter up to 12 frequency bands for maximum ripple testing.

1. To access the ripple test edit menu, press **EDIT RIPL LIMIT**.
2. Create a new frequency band by pressing **ADD**.
3. Set the lower frequency value of the frequency band by pressing:
 - a. **MINIMUM FREQUENCY**
 - b. the numeric keys indicating the minimum frequency value of the frequency band
 - c. the appropriate frequency key (either **(G/n)**, **(M/μ)**, or **(k/m)**)
4. Set the upper frequency value of the frequency band by pressing:
 - a. **MAXIMUM FREQUENCY**
 - b. the numeric keys indicating the maximum frequency value of the frequency band
 - c. the appropriate frequency key (either **(G/n)**, **(M/μ)**, or **(k/m)**)
5. Set the maximum allowable ripple amplitude value of the frequency band by pressing:
 - a. **MAXIMUM RIPPLE**
 - b. the decibel value of the frequency band's maximum allowable ripple
 - c. **(x1)**
6. Repeat steps 2 through 5 for additional frequency bands to be tested for maximum ripple.
7. After you have added all of the new frequency bands, return to the ripple test menu by pressing **DONE**.

Deleting Existing Frequency Bands

Frequency band limits may be deleted for testing the ripple. This procedure guides you through deleting existing frequency band limits. You may delete individual frequency bands or delete all of the frequency bands from the list.

1. To access the ripple test edit menu, press:

EDIT RIPL LIMIT

2. Select the first frequency band (as an example, Frequency Band 3) to be deleted by pressing:

FREQUENCY BAND **3** **x1** **DELETE**

3. Repeat step 2 until you have deleted the required frequency bands from the list.
4. If you need to delete all of the frequency bands, you can delete them all by pressing:

CLEAR LIST

When this softkey is pressed, you will be asked to confirm that you want to delete all of the frequency bands from the list.

5. After you have finished deleting the frequency bands, you can return to the ripple test menu by pressing **DONE**.

Running the Ripple Test

Once the list of ripple limits has been set up, you are ready to run the ripple test. From the Ripple Test Menu, you can:

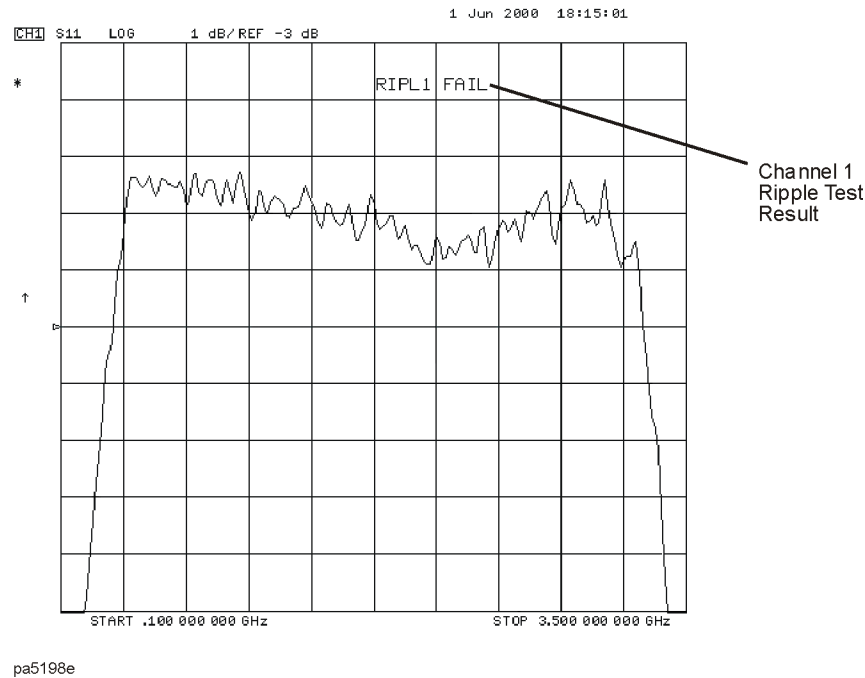
- start and stop the ripple test
- display and hide the ripple test limit lines
- select a frequency band and display its ripple measurement in two ways:
 - ☐ the absolute measured ripple value
 - ☐ the margin which the measured ripple passes or fails the user-defined maximum ripple value

Starting and Stopping the Ripple Test

Once the list of ripple limits have been set up, start the ripple test by pressing

RIPL TEST on OFF from the Ripple Test Menu until ON is displayed on the softkey. Pressing this softkey toggles the analyzer between ripple test on and ripple test off status. [Figure 1-4](#) shows the filter pass band (with the scale changed to 1 dB/division) being ripple tested. Note that the filter fails the ripple test. The portions of the pass band trace which do not meet the test requirements are displayed in red.

Figure 1-4 Filter Passband with Ripple Test Activated



As the analyzer measures the ripple, a message is displayed indicating whether the measurement passes or fails:

- If the ripple test passes, a **RIPL n PASS** message (where n = the channel number) is displayed in the color assigned to Channel 1 Memory. The ripple test must pass in *all* frequency bands before the pass message is displayed.
- If the ripple test fails, a **RIPL n FAIL** message (where n = the channel number) is displayed in red. The portion of the trace that exceeds the user-specified maximum ripple value is also displayed in red.

Displaying the Ripple Limits

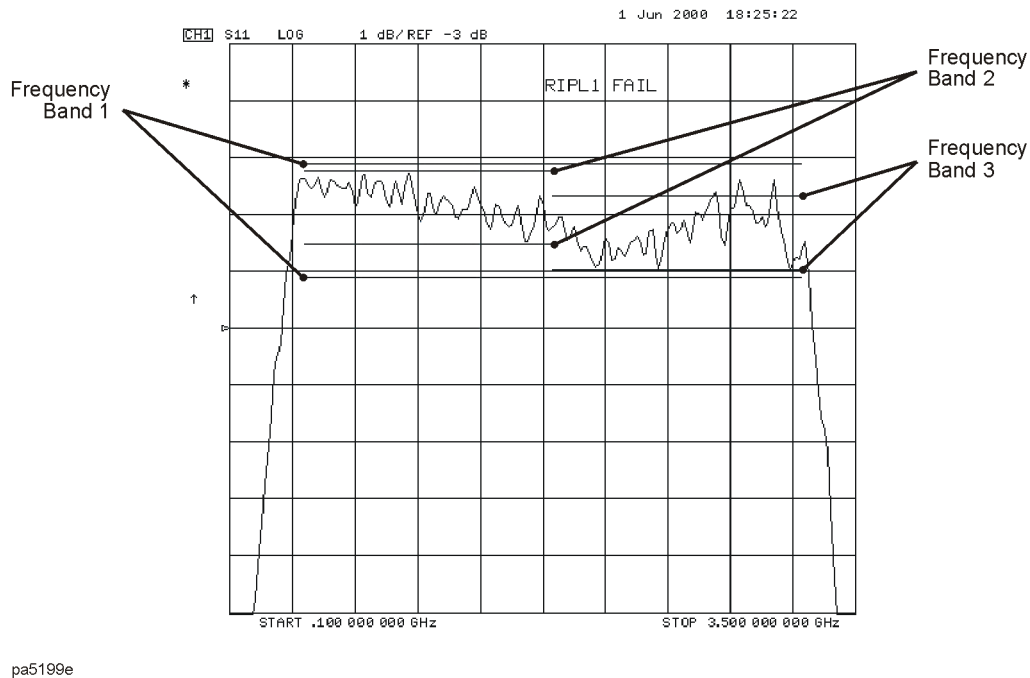
After the list of ripple limits has been set up, display the ripple test limits by pressing **RIPL LIMIT on OFF** from the Ripple Test Menu until ON is displayed on the softkey. Pressing this softkey toggles the analyzer ripple limits display on and off. If the ripple limits are displayed and the ripple test is off, the ripple limits are displayed near the top of the graticule and are not compared with the displayed trace. However, once the ripple test is started, the ripple limits are displayed with respect to the measured trace in the following manner:

- If the ripple test passes, the ripple limits are drawn on the display for each frequency band. Within each frequency band, an upper and lower ripple limit is drawn such that they are equidistant above the upper point of the measured trace and below the lower point of the measured trace.
- If the ripple test fails, the ripple limits are drawn on the display for each frequency band. Within each frequency band, the lower ripple limit is drawn at the lowest point on the measured trace and the upper ripple limit is drawn at the user-specified maximum

ripple value above the lower ripple limit. The ripple that exceeds the maximum ripple value extends above the upper limit. This measured trace that extends above the upper limit is displayed in red.

Figure 1-5 shows the filter pass band tested with the ripple limits activated. Notice that there are three sets of ripple limits shown. Also notice that the measured trace exceeds the upper ripple limit only in Frequency Band 3.

Figure 1-5 Filter Pass Band with Ripple Test and Ripple Limits Activated



Changing the Ripple Limits Line Color. The color of the lines that represent the ripple limits can be changed by:

1. pressing the **Display** key
2. pressing **MORE ADJUST DISPLAY MODIFY COLORS MORE**
3. pressing **RIPPLE LIM LINES TINT** and turning the analyzer front panel knob until the desired color appears (You may also use the step keys or the numeric keypad instead of the front panel knob to change the color.)

Checking the Ripple Value

Once the ripple test has been started and is running, you may display the ripple value of each frequency band in one of two formats, the *absolute* format or the *margin* format. Both formats are described in this section.

To display the ripple value, press **RIPL VALUE []**. Pressing this softkey toggles between **RIPL VALUE [OFF]**, **RIPL VALUE [ABSOLUTE]**, and **RIPL VALUE [MARGIN]**. **RIPL TEST on OFF** from the Ripple Test Menu until ON is displayed on the softkey. Pressing this softkey toggles the analyzer between ripple test on

and ripple test off status.

When the Absolute and Margin choices are selected, the frequency band and measurement value are displayed to the right side of the pass/fail message described previously. This display is displayed in the same color as the pass/fail message.

The frequency band of the displayed value is displayed as **B n** (where n = the frequency band number). The frequency band may be changed to display the value of each band. To change the displayed frequency band value, from the Ripple Test Menu, press

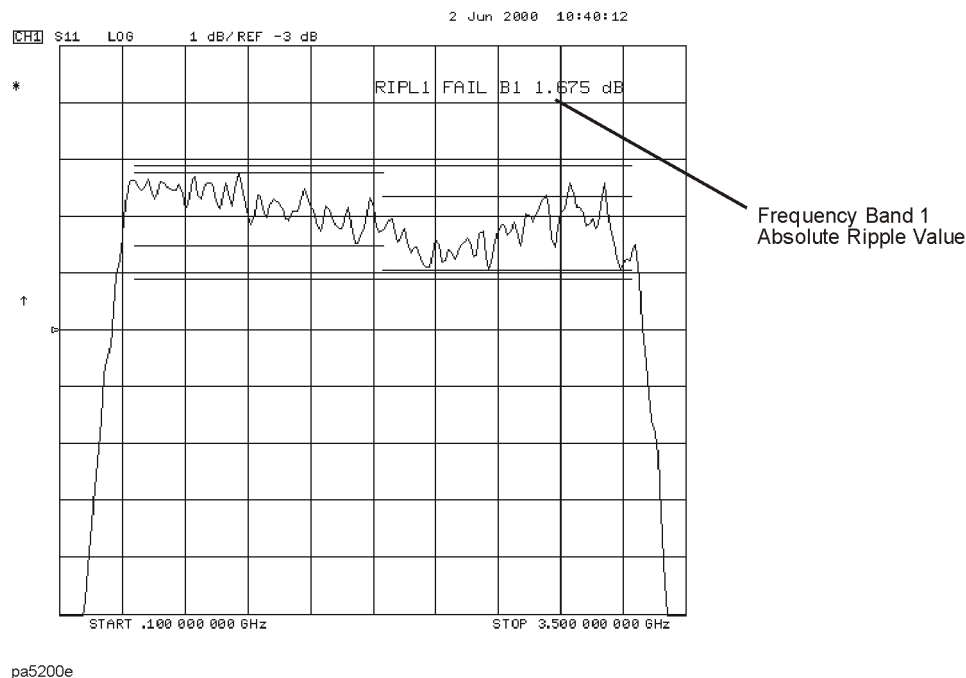
RIPL VALUE BAND and then use the  and  keys (or the numerical keypad) to select the desired frequency band.

Viewing the Ripple Value in Absolute Format

When **RIPL VALUE [ABSOLUTE]** is selected, the absolute ripple value of the selected frequency band is displayed. The absolute ripple value is the measured maximum level minus the measured minimum level within the frequency band. This value is displayed in dB.

Figure 1-6 shows the ripple test with absolute ripple value displayed for Frequency Band 1. The **B1** indicates that the ripple value displayed is for Frequency Band 1. Notice that Frequency Band 1 passes the ripple test. It has an absolute ripple value of 1.675 dB while the maximum ripple value entered for Frequency Band 1 was 2.0 dB. Thus, even though the ripple test fails because of Frequency Band 3, the ripple passes in Frequency Band 1.

Figure 1-6 Filter Pass Band with Absolute Ripple Value for Band 1 Activated

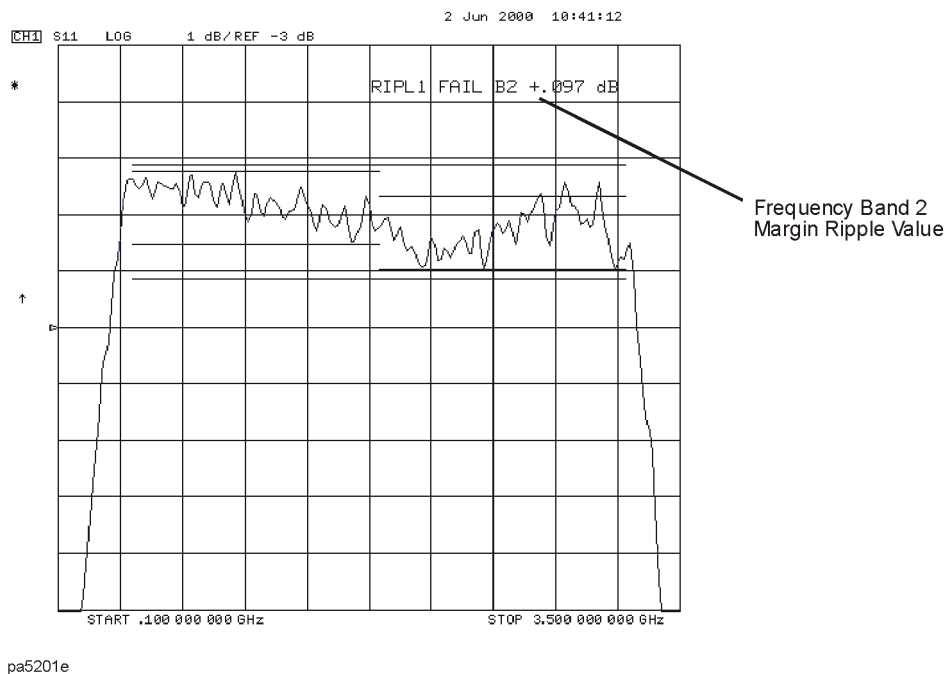


Viewing the Ripple Value in Margin Format

When **RIPL VALUE [MARGIN]** is selected, the margin by which the ripple value passed or failed is displayed. The ripple value margin is the user-defined maximum ripple minus the absolute ripple value within the frequency band. This value is displayed in dB. A positive value is the margin that the ripple passes the ripple test in the frequency band. A negative value is the margin that the ripple fails the ripple test in the frequency band.

Figure 1-7 shows the ripple test with margin ripple value displayed for Frequency Band 2. Notice that Frequency Band 2 passes the ripple test with a margin of 0.097 dB. The plus sign (+) indicates this band passes the ripple test by the amount displayed. A minus sign (–) would indicate that the band failed by the displayed amount.

Figure 1-7 Filter Pass Band with Margin Ripple Value for Band 2 Activated

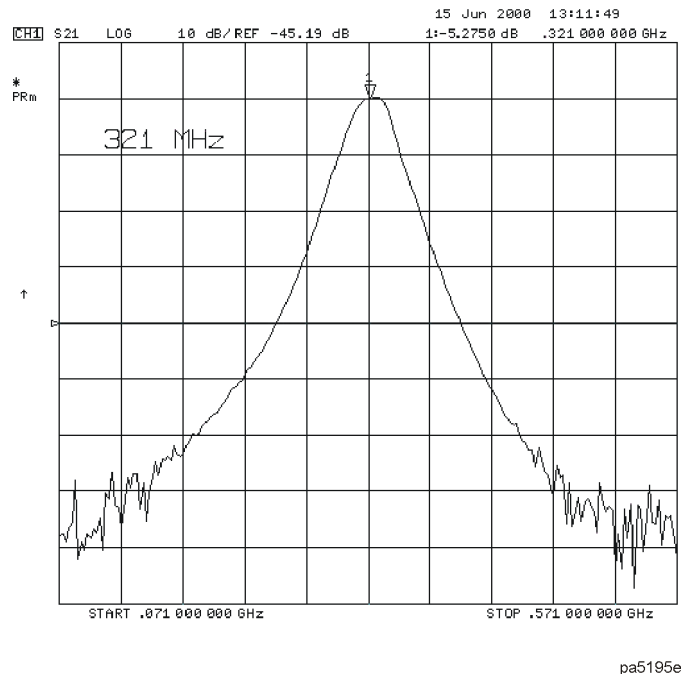


Using Bandwidth Limits to Test a Bandpass Filter

The bandwidth testing mode can be used to test the bandwidth of a bandpass filter. The bandwidth test finds the peak of a signal in the passband and locates a point on each side of the passband at an amplitude below the peak (that you specify during the test setup). The frequency between these two points is the bandwidth of the filter. This bandwidth is compared to minimum and maximum allowable bandwidths that you specify during the test setup.

This example shows you how to test the bandwidth of a bandpass filter. In this example, we will be testing the pass band of a bandpass filter where the center frequency of the filter is approximately 321 MHz. Refer to [Figure 1-8](#).

Figure 1-8 Bandpass Filter Being Bandwidth Tested



Setting Up Bandwidth Limits

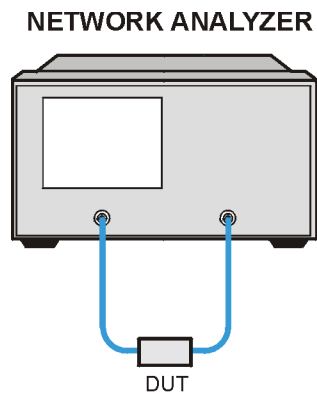
When you set up the bandwidth limits to test the bandpass filter, you will first set up the analyzer to perform the bandwidth test and then you will set up bandwidth limits of the bandwidth test.

Setting Up the Analyzer to Perform the Bandwidth Test

This section sets up the analyzer so that a bandpass filter can be easily viewed on the analyzer display.

1. Connect your filter as shown in [Figure 1-9](#).

Figure 1-9 Connections for a Bandpass Filter Example Measurement



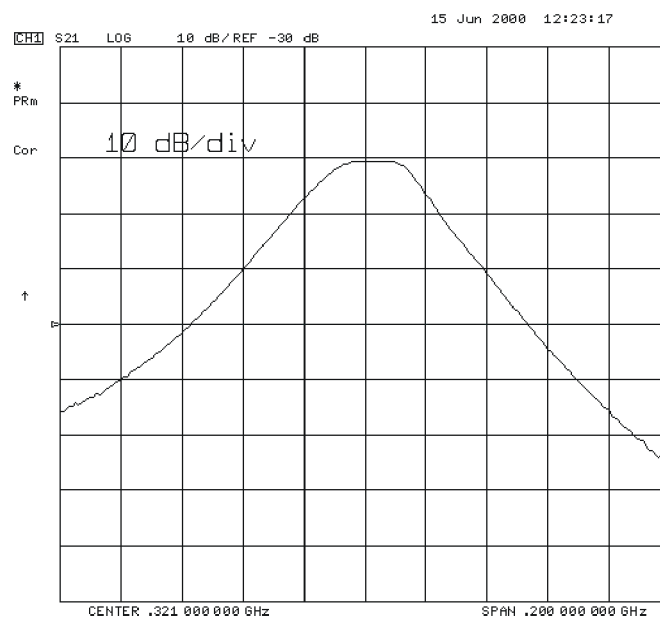
pa52e

2. Press **Preset** and choose the measurement settings. For this example, the measurement settings are as follows:

- a. **Meas** **Trans: FWD S21 (B/R)** or on ET models: **TRANSMISSN**
- b. **Center** **321** **M/μ**
- c. **Span** **200** **M/μ**
- d. **Scale Ref** **AUTO SCALE**

You may also want to select settings for the number of data points, power, averaging, and IF bandwidth.

Figure 1-10 Filter Pass Band Before Bandwidth Test



pa5191e

3. Substitute a thru for the device and perform a response calibration by pressing:

[Cal] CALIBRATE MENU RESPONSE THRU

4. Reconnect your test device.

Refer to [Figure 1-10](#).

Setting Up the Bandwidth Limits

When you set up the bandwidth limits to test the bandpass filter, you will set

- the amplitude below the peak that is used to measure the filter's bandwidth. This setting is called *N dB Points*.
- the *Maximum Bandwidth* value. If the measured bandwidth is greater than this value, the test will fail.
- the *Minimum Bandwidth* value. If the measured bandwidth is less than this value, the test will fail.

1. To access the bandwidth menu, press:

[System] LIMIT MENU BANDWIDTH LIMIT

2. To set the amplitude below the peak passband amplitude that you want to measure the bandwidth. In this case, we are setting the bandwidth that will be measured 40 dB below the peak amplitude of the bandpass filter by pressing:

N DB POINTS **[40] [x1]**

3. To set the minimum bandwidth for the bandwidth test, press:

MINIMUM BANDWIDTH **[100] [M/μ]**

4. To set the maximum bandwidth for the bandwidth test, press:

MAXIMUM BANDWIDTH **[150] [M/μ]**

Running a Bandwidth Test

After setting up the bandwidth limits, you are ready to run the bandwidth test and check the test results. For this example, we will:

- Start the test.
- Display the bandwidth markers.
- Review the test results.

Activating the Bandwidth Test

1. Start the bandwidth test by pressing the **BW TEST on OFF** softkey until ON is displayed.

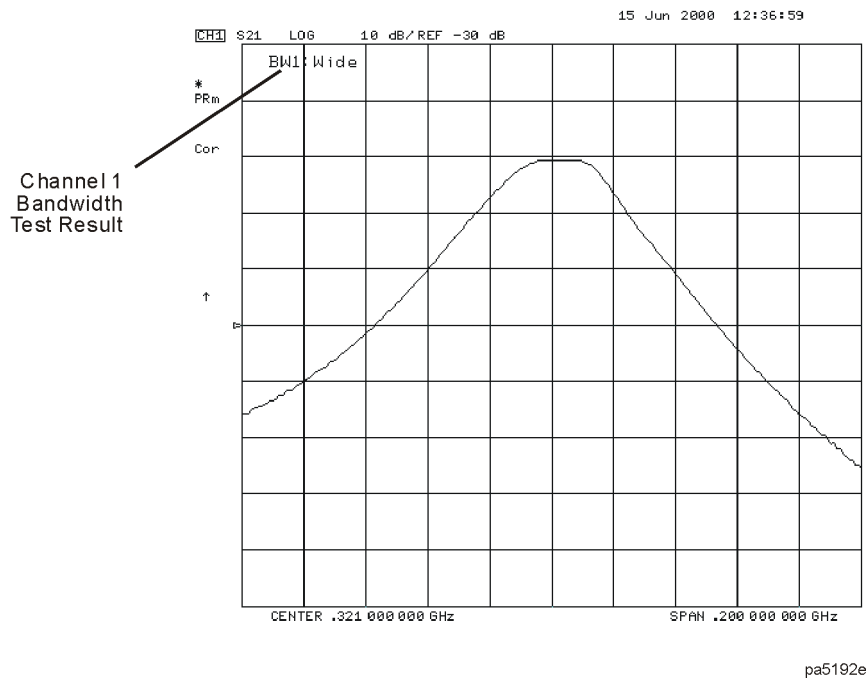
The bandwidth test continues to run until the softkey is returned to the OFF position.

The test displays a message in the upper left corner of the graticule showing that the bandwidth test is being performed and the channel on which the test is being performed. For example, BW1: indicates that the bandwidth test is being run on channel 1. See [Figure 1-11](#).

The test also displays a message indicating whether the filter passes or fails the bandwidth test. When the filter is passing the test, the message indicates Pass. When the filter is failing the test, the failure message indicates either Wide (when the pass band is wider than the maximum bandwidth input) or Narrow (when the pass band is narrower than the minimum bandwidth input).

When the filter passes the bandwidth test, the color of the bandwidth test Pass message is green. When the filter fails the bandwidth test, the color of the bandwidth test Wide/Narrow message is red.

Figure 1-11 Filter Pass Band with Bandwidth Test Activated

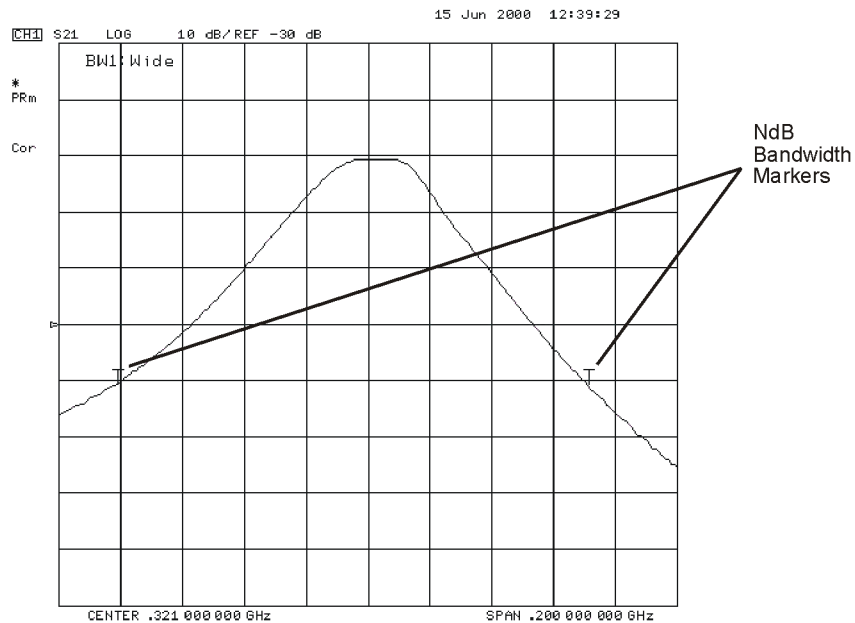


Displaying the Bandwidth Markers

1. Display the bandwidth markers by pressing the **BW MARKER on OFF** softkey until ON is displayed on the softkey.

When the bandwidth markers are displayed, a marker is placed on each side of the peak amplitude at a position equal to the N dB Points value below the peak. The markers are placed at the 40 dB points on the signal in [Figure 1-12](#). The bandwidth markers resemble the following symbol: T

Figure 1-12 Bandwidth Markers Placed 40 dB Below the Bandpass Peak



pa5193e

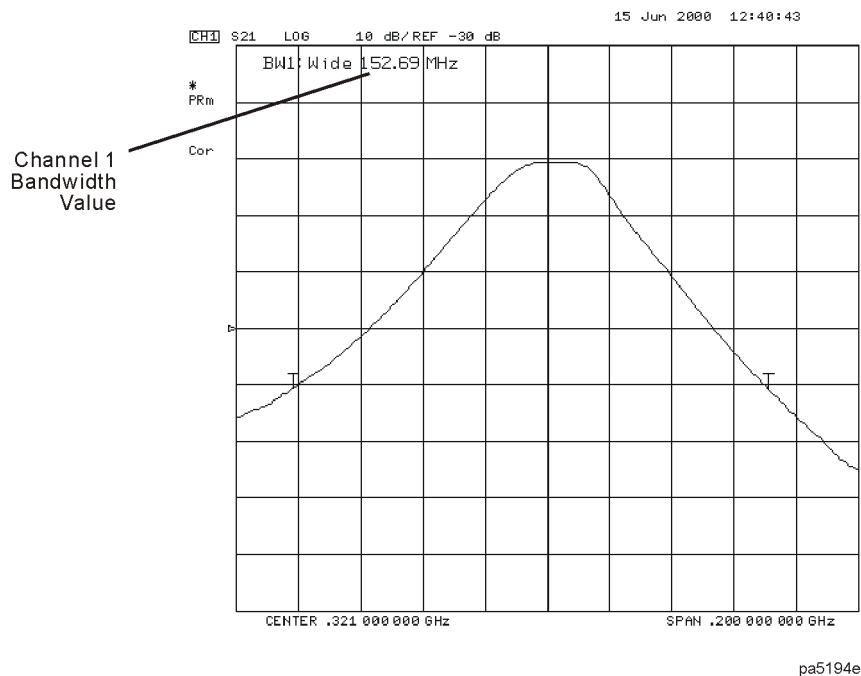
Displaying the Bandwidth Value

1. Display the bandwidth value by pressing the **BW DISPLAY on OFF** softkey until ON is displayed on the softkey.

When this softkey is set to the ON position, the measured bandwidth value is displayed in the upper left corner of the display, to the right of the bandwidth Pass/Wide/Narrow message. This value changes as the analyzer continues measuring the bandwidth. The bandwidth value is displayed in [Figure 1-13](#).

If the filter is failing the bandwidth test, the color of the bandwidth value is red, the same color as the failure (Wide) message of [Figure 1-11](#). If the filter is passing the bandwidth test, the displayed bandwidth value is green (the same color as the bandwidth test Pass message).

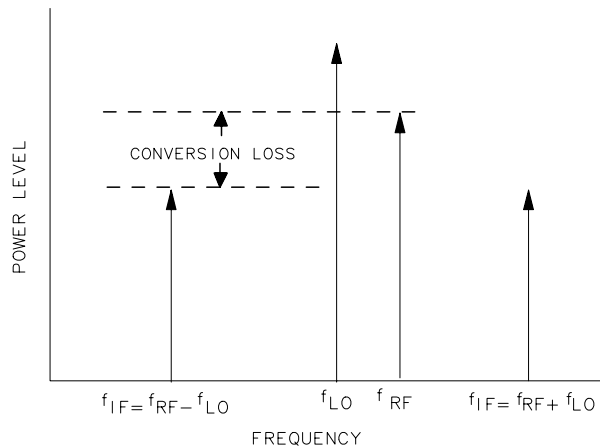
Figure 1-13 Filter Pass Band with Bandwidth Value Displayed



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. 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 1-14 An Example Spectrum of RF, LO, and IF Signals Present in a Conversion Loss Measurement



pg694d

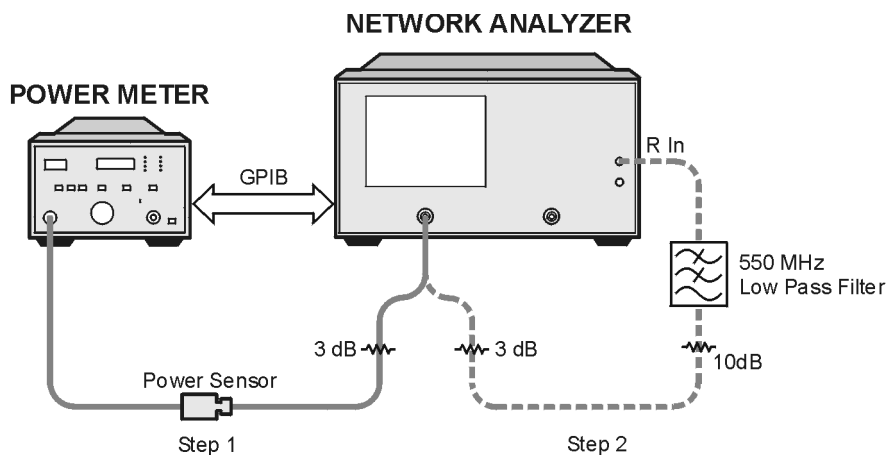
The following procedure describes the R channel swept IF frequency conversion loss measurement of a broadband component mixer with power meter calibration. For this example, we will use an LO frequency of 1 GHz (1000 MHz), an IF start frequency of 100 MHz, and an IF stop frequency of 350 MHz.

1. Set the LO source to the desired CW frequency of 1000 MHz and power level to 13 dBm.
2. Connect the measurement equipment as shown in Step 1 of [Figure 1-15](#).
3. Set the desired analyzer RF power to the value which will provide -10 dBm or less to the R channel input. Press:

Power **PWR RANGE MAN** **0** **x1**

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

Figure 1-15 Connections for R Channel and Source Calibration (IF Range)



pa5182e

Setting Measurement Parameters for the IF Range

- From the front panel of the analyzer, set the desired receiver (IF) frequency and source output power by pressing:

[System] INSTRUMENT MODE FREQ OFFS MENU

[Start] 100 [M/μ] [Stop] 350 [M/μ]

If the LO frequency is not set to 0 Hz, press:

LO FREQUENCY 0 [x1]

- To select the measurement trace, press:

[Meas] INPUT PORTS R

The measurement trace is shown on the display.

- Select the analyzer as the system controller:

[Local] SYSTEM CONTROLLER

Performing a Power Meter (Source) Calibration Over the IF Range

- Calibrate and zero the power meter.
- Set the power meter's address:

SET ADDRESSES

ADDRESS: P MTR/GPIB [aa] (where *aa* is the GPIB address of the power meter)

[x1]

- Select the appropriate power meter by pressing **POWER MTR []** until the correct model number is displayed (Agilent 436A or Agilent 438A/437).

NOTE The Agilent E4418B and Agilent E4419B power meters have a “437 emulation” mode. This allows these power meters, with an Agilent 848X-series power sensor, to be used with the network analyzer. In this step, when selecting a power meter, choose the 438A/437 selection.

4. Press **[Cal]** **PWRMTR CAL** **LOSS/SENSR LISTS** **CAL FACTOR** **SENSOR A** and enter the correction factors as listed on the power sensor. Press **ADD** **FREQUENCY** **[fff]** (where *fff* is the frequency of the calibration factor in MHz) **[M/μ]** **CAL FACTOR** **[nnn]** (where *nnn* is the calibration factor number) **[x1]** **DONE** for each correction factor. When finished, press **DONE**.
5. To perform a one sweep power meter calibration over the IF frequency range at 0 dBm (–10 dBm for 8722ES), press:

[Cal] **PWRMTR CAL** **ONE SWEEP**
[0] **[x1]** (or on 8722ES: **[–10]** **[x1]**) **TAKE CAL SWEEP**

NOTE Because power meter calibration requires a longer sweep time, you may want to reduce the number of points before pressing **TAKE CAL SWEEP**. After the power meter calibration is finished, return the number of points to its original value and the analyzer will automatically interpolate this calibration.

6. To calibrate the R channel over the IF range, connect the equipment as shown in Step 2 of [Figure 1-15](#) and press:

[Cal] **CALIBRATE MENU** **RECEIVER CAL** **[0]** **[x1]** **TAKE RCVR CAL SWEEP**

- ☐ The low pass filter is required to limit the range of frequencies passed into the R channel input port. The filter is selected to pass the IF frequencies for the measurement but prevent the LO feedthrough and unwanted mixer products from confusing the phase-lock loop operation.

- ☐ A pad is used to isolate the filter and improve the IF port match for the mixer.

Once completed, the display should read 0 dBm (–10 dBm, 8722ES).

Setting the Analyzer to the RF Frequency Range

1. While the analyzer is still set to the IF frequency range, set the frequency offset mode LO frequency from the analyzer by pressing:

[System] **INSTRUMENT MODE** **FREQ OFFS MENU** **LO FREQUENCY**
[1000] **[M/μ]**

The LO menu is used to set only the LO CW frequency. All other settings apply when using the HP/Agilent 8625A external source.

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

RETURN DOWN CONVERTER RF < LO

3. Turn on frequency offset operation by pressing:

FREQS OFFS ON

Notice in this high-side LO, down conversion configuration, the analyzer's source is actually sweeping backwards, as shown in [Figure 1-16](#).

The measurement setup diagram is shown in [Figure 1-17](#). Note the RF frequency values are shown in this illustration.

Figure 1-16 Diagram of Measurement Frequencies

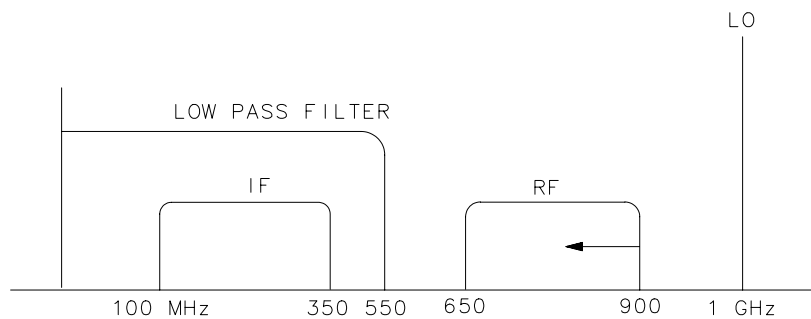
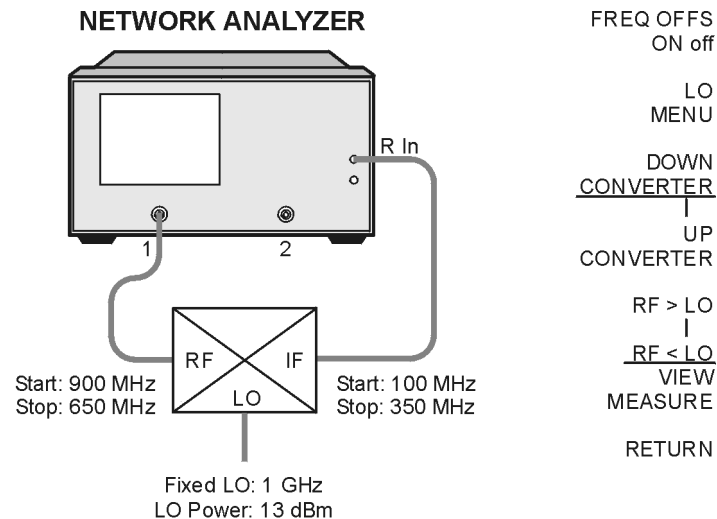


Figure 1-17 Measurement Setup from Display

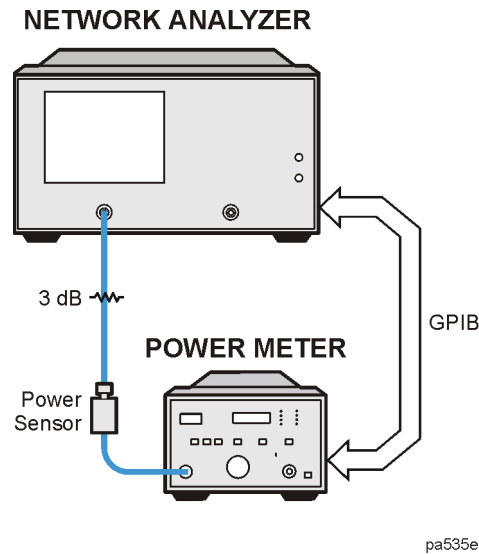


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Performing a Power Meter Calibration Over the RF Range

1. Make the connections as shown in [Figure 1-18](#) for the one-sweep power meter calibration over the RF range.

Figure 1-18 Power Meter Calibration Equipment Setup for the RF Range



2. Use the power meter settings that were set up in steps 1 through 4 of the [“Performing a Power Meter \(Source\) Calibration Over the IF Range”](#) section.
3. Perform a one-sweep power meter calibration over the RF frequency range at 0 dBm by pressing:

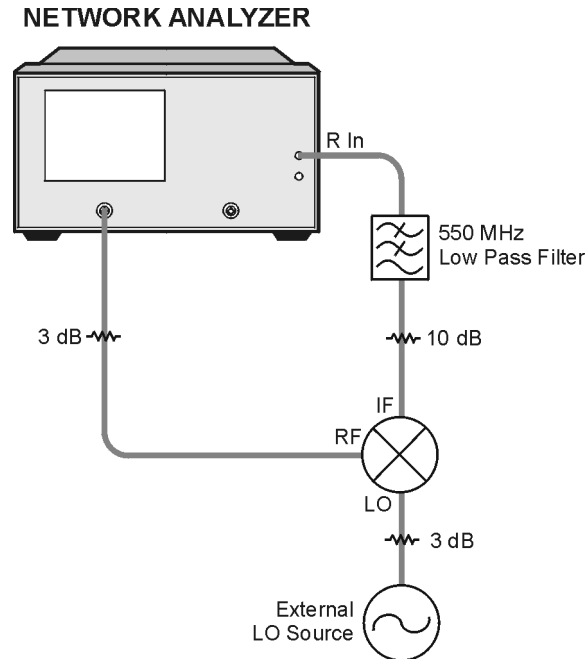
Cal **PWRMTR CAL** **ONE SWEEP** **0** **x1** **(-10)** **x1**, 8722ES)
TAKE CAL SWEEP

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.

Performing the R-Channel Measurement

1. Connect the equipment as shown in [Figure 1-19](#).

Figure 1-19 R-Channel Mixer Measurement Equipment Setup

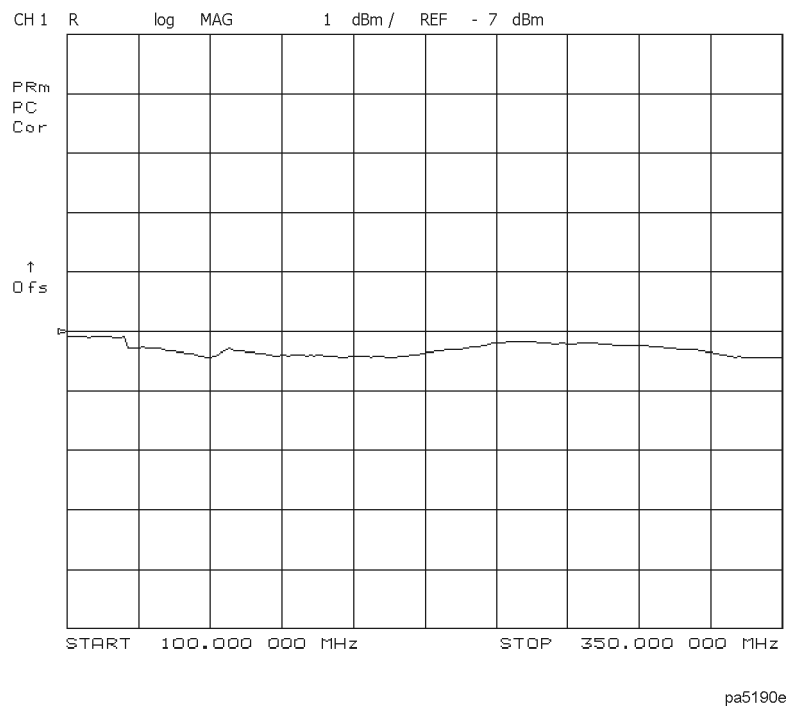


pa5185e

The analyzer is now displaying the conversion loss of the mixer calibrated with power meter accuracy.

2. To view the conversion loss in the best vertical resolution, press **Scale Ref** **AUTOSCALE**.

Figure 1-20 Conversion Loss Example Measurement



In this measurement, you set the input power and measured the output power. [Figure 1-20](#) shows the absolute loss through the mixer versus mixer output frequency. If the mixer under test contained built-in amplification, then the measurement results would have shown conversion gain.

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To View Plot Files on a PC

To modify the color or font size, consult the documentation for the particular application being used.

NOTE Plot files may also be saved to a floppy disk as a JPEG file and used on a personal computer. Refer to [“Saving in Graphical \(JPEG\) Form” on page 1-34.](#)

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Saving Measurement Results

Saving in Textual (CSV) Form

Textual measurement results can be saved in a comma-separated value (CSV) format and imported into a spreadsheet application. Additional information is also saved as a preamble to the measurement results. The saved information includes:

- network analyzer model number and firmware version
- date the file was saved
- type of measurement being done
- start and stop frequencies
- sweep time
- port power
- IF bandwidth
- channel number
- number of points
- format
- the frequency (or time) and the real and imaginary measurement values for each of points measured

1. Press **Save/Recall** **SAVE FILE FORMATS**.
2. Make sure that **TEXT FMT [CSV]** is displayed.
3. Make sure that **FILETYPE: TEXT** is underlined. If it is not underlined, press the softkey so that TEXT is underlined.
4. Insert a 3.5-inch floppy disk in the network analyzer's disk drive.
5. Press **SAVE FILE** to save the display information as text in the CSV format.

The text file may be retrieved from the floppy disk on personal computer and can be imported into an application that accepts text in the comma-separated value format, such as a spreadsheet.

How the Analyzer Names These Files Sequentially

When text files are saved, the analyzer generates the file names automatically in the following format:

txtcss.csv

- where:* txt is a constant that indicates that this is a text file,
- c is the indicator of the channel (1–4) on which the measurement data was taken (channel-file index number).
- ss is a 2-digit, sequential indicator of the measurement (file index number). The file index number may be numbered from 00–31. As the next measurement is taken, the file index number is incremented.
- If all four channels are making measurements and a save is performed, there will be four channel numbers that share the same file index number. For example, the files would be named txt100.csv, txt200.csv, txt300.csv, and txt400.csv. If a measurement does not include all four channels, unused channel-file index numbers will not be used by the next measurement. However, if all of the files that share a file index number are erased, that file index number will be re-used.
- csv is the file format, comma-separated value in this case.

Saving in Graphical (JPEG) Form

Graphical measurement results can be saved in JPEG format and used as an illustration in a text editor or desktop publishing application.¹

1. Press **(Save/Recall)** **SAVE FILE FORMATS**.
2. Make sure that **GRAPH FMT [JPG]** is displayed.
3. Make sure that **FILETYPE: GRAPHIC** is underlined. If it is not underlined, press the softkey so that GRAPHIC is underlined.
4. Insert a 3.5-inch floppy disk in the network analyzer's disk drive.
5. Press **SAVE FILE** to save the display as a graphic in the JPEG format.

The graphic file may be retrieved from the floppy disk on personal computer and can be imported into an application that accepts graphics in the JPEG format.

1. The network analyzer firmware is based in part on the work of the Independent JPEG Group.

Calibrating for Non-Coaxial Devices (ES Analyzers Only)

TRL Error Correction

Modify the Standard Definitions

5. To define the LINE/MATCH standard, press:

DEFINE STANDARD (6) (x1) **DELAY/THRU** **MODIFY STD DEFINITION**
SPECIFY OFFSET **OFFSET DELAY** (.08) (G/n) **MAXIMUM FREQUENCY**

Enter a frequency greater than the maximum frequency range of the analyzer. For example, press (50) (G/n). Then, press **STD OFFSET DONE**.

Label the Calibration Kit

19. To save the newly defined kit into nonvolatile memory, press:

KIT DONE (MODIFIED) **SAVE USER KIT**

NOTE	Refer to “Saving Modified Calibration Kits to a Disk” in the “Operating Concepts” chapter for information about saving modified calibration kits, along with calibration data and instrument states, to a disk.
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LRM Error Correction

Create a User-Defined LRM Calibration Kit

19. To save the newly defined kit into nonvolatile memory, press:

KIT DONE (MODIFIED) **SAVE USER KIT**

NOTE	Refer to “Saving Modified Calibration Kits to a Disk” in the “Operating Concepts” chapter for information about saving modified calibration kits, along with calibration data and instrument states, to a disk.
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Modifying Calibration Kits

Saving Modified Calibration Kits to a Disk

The calibration kit, along with any calibration data and other instrument state information, can be saved to an ISTATE file on a floppy disk. To save a modified calibration kit with an instrument state, press:

2 Supplement for the Reference Guide

In This Chapter

This chapter contains the supplemental information changes to the reference guide that coincide with the release of firmware revision 7.66. These changes pertain to the following reference guide.

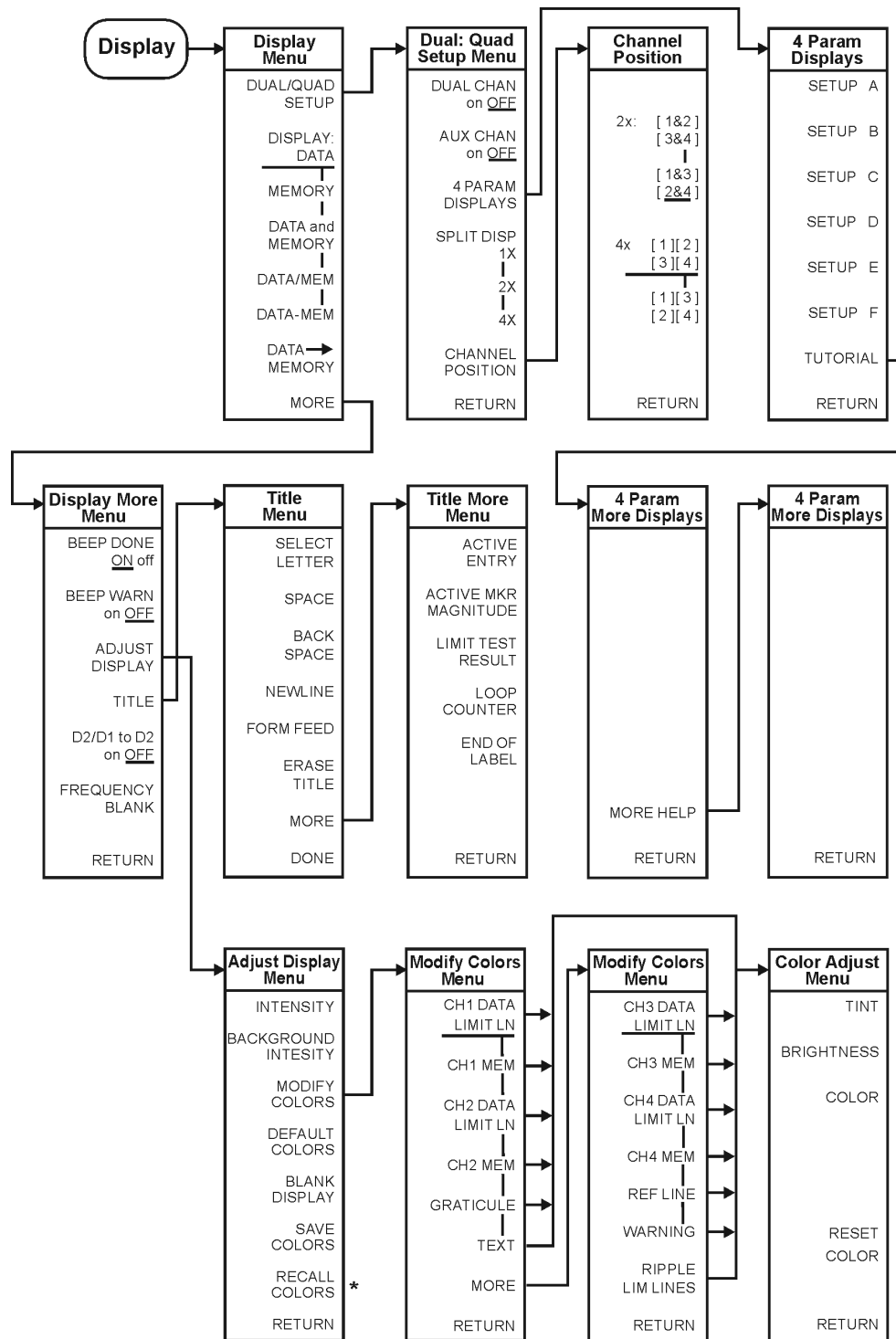
8719ET/20ET/22ET and 8719ES/20ES/22ES Network Analyzers Reference Guide
(part number 08720-90393)

The following list describes the changes to reference guides printed prior to July 2000. Each of the changes are described in detail in the remainder of this chapter. The page references in this list refer to page numbers in this supplement.

- Menu Maps Chapter
 - Replace the Display menu map using [Figure 2-1 on page 2-3](#).
 - Replace the Save/Recall menu map using [Figure 2-2 on page 2-4](#).
 - Replace the System menu map for the 8753ET using [Figure 2-3](#).
 - Replace the System menu map for the 8753ES using [Figure 2-4](#).
- Hardkey/Softkey Reference Chapter
 - Replace the description for five existing softkeys. See [“Existing Softkeys” on page 2-9](#).
 - Add 24 new softkeys and their descriptions. See [“New Softkeys” on page 2-10](#).
- Error Messages Chapter
 - Add four new error messages. See to [“Error Messages” on page 2-15](#).
- Options and Accessories Chapter
 - Update the Agilent Technologies Internet URL. See [“Accessories Available” on page 2-16](#).
- Preset State and Memory Allocation Chapter
 - Add the Limit Menu preset conditions for Ripple Limits and Bandwidth Limit to the Preset Conditions table. See [“Preset Conditions” on page 2-17](#).

Menu Maps

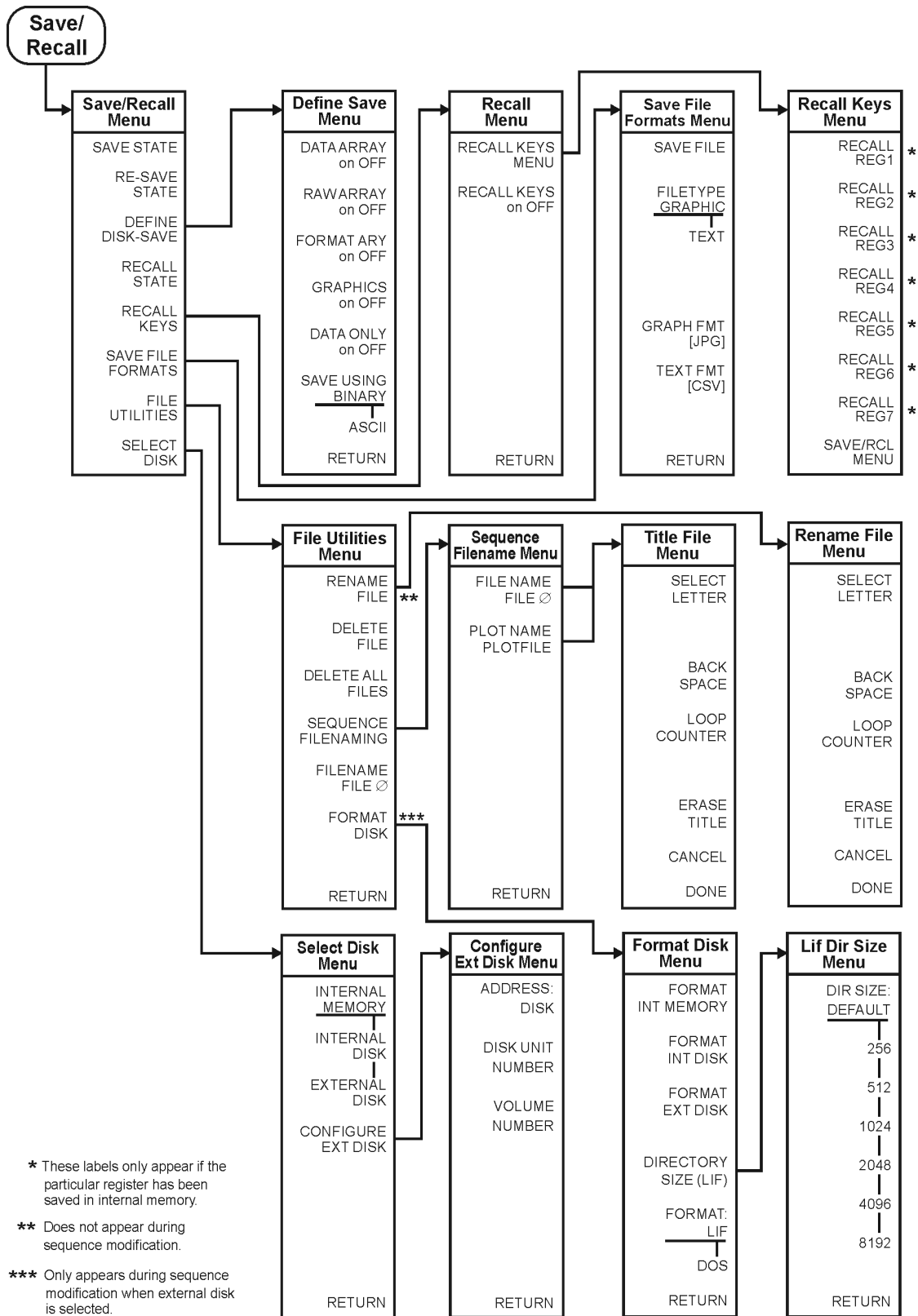
Figure 2-1 Menu Map for Display



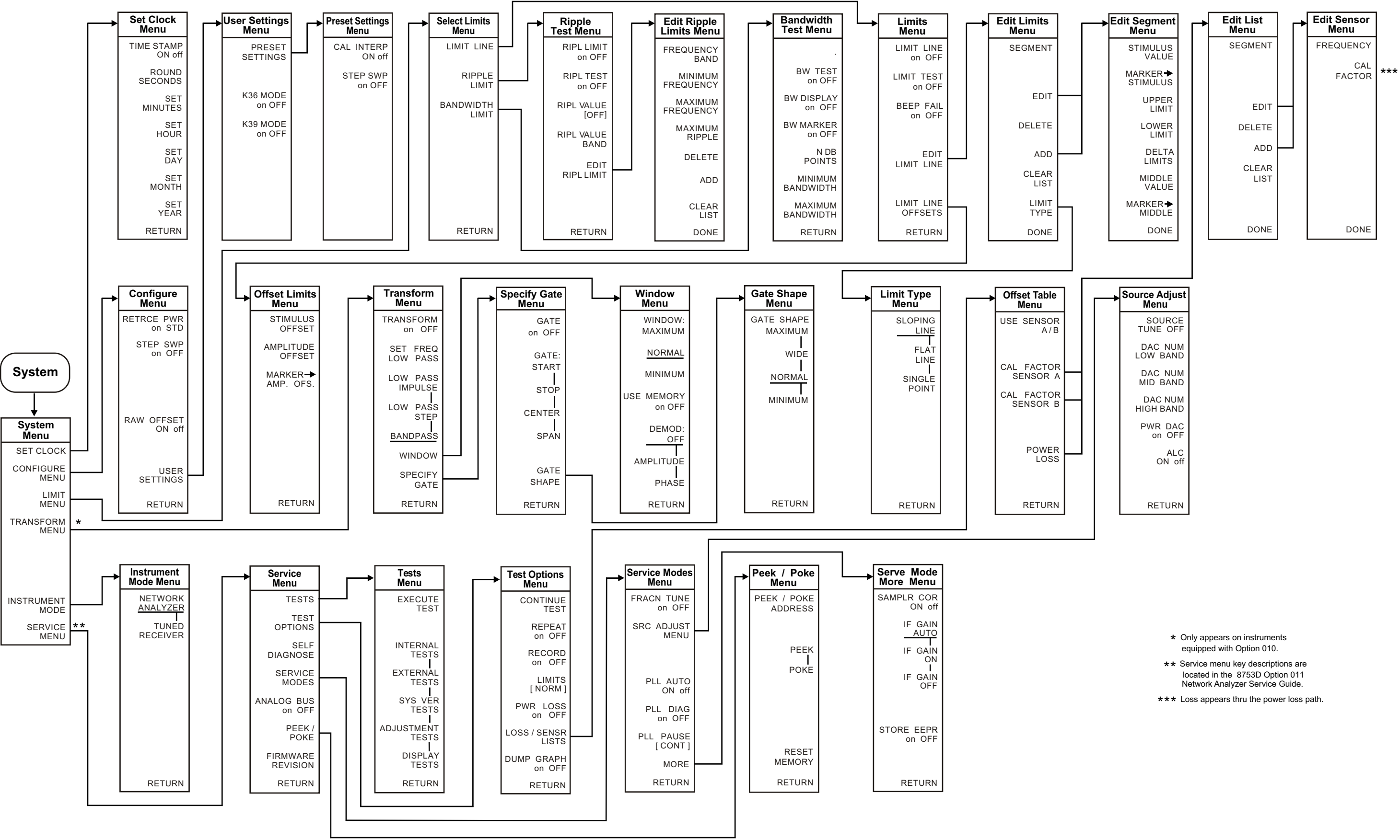
* Appears only when colors have been saved

ka535e

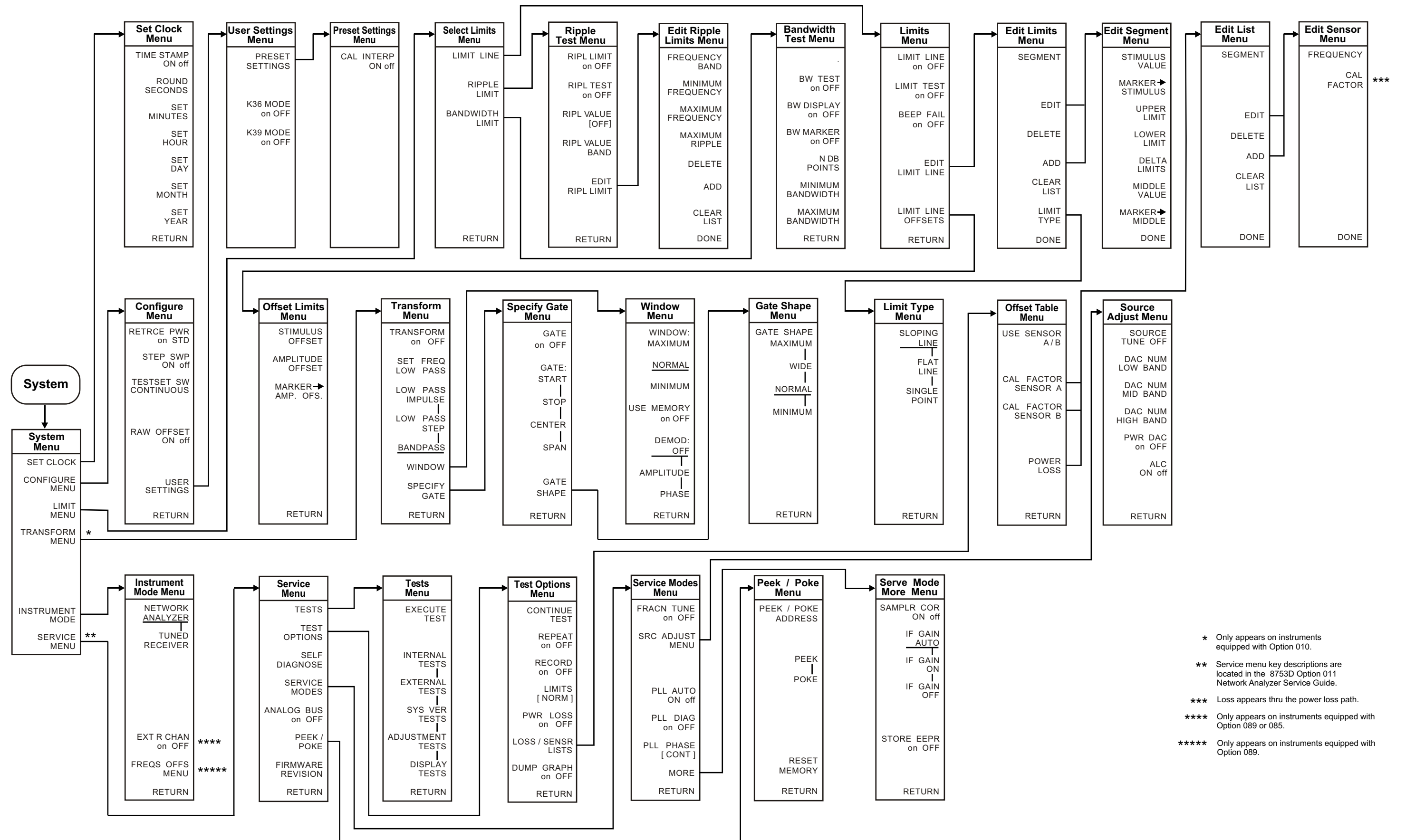
Figure 2-2 Menu Map for Save/Recall



ka536e



* Only appears on instruments equipped with Option 010.
** Service menu key descriptions are located in the 8753D Option 011 Network Analyzer Service Guide.
*** Loss appears thru the power loss path.



Hardkey/Softkey Reference

Analyzer Functions

Existing Softkeys

The description of these softkeys changed for reference guides printed prior to July 2000:

ADD	<p>1) displays the edit segment menu and adds a new segment to the end of the list. The new segment is initially a duplicate of the segment indicated by the pointer > and selected with the SEGMENT softkey.</p> <p>2) adds a new frequency band to the Ripple Limit list which is indicated by the pointer >. The new frequency band is a duplicate of the most recently selected frequency band.</p>
CLEAR LIST	deletes all segments or bands in the list.
DELETE	deletes the segment or the frequency band indicated by the > pointer.
MAXIMUM FREQUENCY	<p>is used to:</p> <p>1) define the highest frequency at which a calibration kit standard can be used during measurement calibration. In waveguide, this is normally the upper cutoff frequency of the standard.</p> <p><i>or</i></p> <p>2) set the maximum frequency of the selected frequency band when setting up ripple test parameters.</p>
MINIMUM FREQUENCY	<p>is used to:</p> <p>1) define the lowest frequency at which a calibration kit standard can be used during measurement calibration. In waveguide, this must be the lower cutoff frequency of the standard, so that the analyzer can calculate dispersive effects correctly (see OFFSET DELAY).</p> <p><i>or</i></p> <p>2) set the minimum frequency of the selected frequency band when setting up ripple test parameters.</p>

New Softkeys

These are new softkeys and do not appear in reference guides printed prior to July 2000:

BANDWIDTH LIMIT	selects the bandwidth limit line choice. This selection leads to the menu used to define and test bandwidth limits of a bandpass filter. Refer to the “Using Bandwidth Limits to Test a Bandpass Filter” section in the “Making Measurements” chapter of the user’s guide.
BW DISPLAY on OFF	displays the measured bandwidth value to the right of the pass/fail message.
BW MARKER on OFF	displays the cutoff frequencies of the bandwidth using markers on the data trace.
BW TEST on OFF	<p>turns bandpass filter bandwidth testing on or off. When bandwidth testing is on, the analyzer locates the maximum point of the data trace and uses it as the reference from which to measure the filter’s bandwidth. Then, the analyzer determines the two cutoff frequencies of the bandpass filter. The cutoff frequencies are the two points on the data trace at a user-specified amplitude below the reference point. The cutoff frequencies are also referred to as the <i>N dB Points</i> where “<i>N</i>” is defined as the number of decibels below the peak of the bandpass that the filter is specified. (The amplitude is specified using the N DB POINTS softkey.)</p> <p>The bandwidth is the frequency difference between the two cutoff frequencies. The bandwidth is compared to the user-specified minimum and maximum bandwidth limits (entered using the MINIMUM BANDWIDTH and MAXIMUM BANDWIDTH softkeys).</p> <p>If the test passed, a message is displayed in green text in the upper left portion of the LCD. An example of this message is: BW1: Pass, where the “1” indicates the channel where the bandwidth test is performed. If the bandwidth test does not pass, a fail message indicating whether the bandpass was too wide or too narrow is displayed in red text. An example of this message is BW1: Wide.</p>
EDIT RIPL LIMIT	selects the menu used to edit the ripple limits. The edit ripple limits menu allows you to add, change, or delete ripple limits for the ripple test.

FILETYPE: GRAPHIC

saves the display to the disk drive as a graphic file when **SAVE FILE** is pressed. The format of the graphic file is determined by the **GRAPH FMT []** selection.

FILETYPE: TEXT

saves the display to the disk drive as a text file when **SAVE FILE** is pressed. The form of the text file is determined by the **TEXT FMT []** selection.

FREQUENCY BAND

selects an existing frequency band to be reviewed, edited, or deleted. The maximum number of frequency bands is 12 (numbered 1 to 12).

GRAPH FMT []

sets the format of the graphic file when **FILETYPE: GRAPHIC** is selected. The only graphic selection currently available is the JPEG format.

LIMIT MENU

accesses the menu that allows you to set up the three limit line types: standard limit lines, ripple limit lines, and bandwidth limit lines.

MAXIMUM BANDWIDTH

sets the maximum bandwidth value of the bandwidth test limits.

MAXIMUM RIPPLE

sets the maximum ripple allowed of the selected frequency band. The maximum allowable ripple is 100 dB.

MINIMUM BANDWIDTH

sets the minimum bandwidth value of the bandwidth test limits.

N DB POINTS

sets the N dB point which is used to determine the bandwidth test cutoff frequencies. Enter the number of decibels below the peak of the bandpass that the filter is specified.

RECALL KEYS

accesses two recall keys which allows you to set the recall keys menu as the initial menu displayed when **(Save/Recall)** is pressed or select specific registers to recall.

RIPL LIMIT on OFF

displays lines that represent the ripple limits when the ripple test is set to ON.

RIPL TEST on OFF

turns ripple testing on or off. When ripple testing is on, the analyzer sets the lower ripple limit line at the lowest amplitude point within the frequency band and sets the upper limit line at the user-specified amplitude above. If the trace data remains at or below the upper limit line, that portion of the ripple test passes. If the trace data rises above the upper limit line within the frequency band, the test fails. Data within each frequency band is compared with the defined ripple limit of the band. The ripple test checks each frequency band using this method. A maximum of 12 frequency bands can be tested on each channel. These bands may overlap in frequency. If all of the channel's frequency bands pass the ripple test, the analyzer displays a pass message.

If the test passed, a message is displayed in orange text in the upper right portion of the LCD. An example of this message is: **RIPL1 PASS**, where the "1" indicates the channel where the ripple test is performed. If the ripple test does not pass, a fail message is displayed in red text. An example of this message is **RIPL1 FAIL**.

RIPL VALUE []

displays the ripple value of the selected frequency band. The ripple value can be displayed in two ways or turned off. Selecting OFF removes the displayed ripple value from the display. Selecting ABSOLUTE or MARGIN displays the ripple value. The ripple value is preceded on the display by an indicator of the selected band. For example, when the ripple value is preceded by "B2", this indicates that the ripple value shown is for Band 2. The frequency band indicator and ripple value are displayed in the same color as the pass/fail message for the overall ripple test.

When ABSOLUTE is selected, the display shows the absolute ripple of the data trace within the frequency band.

When MARGIN is selected, the display shows the difference between the maximum allowable ripple and the absolute ripple value within the frequency band. When the margin value is preceded by a plus sign (+), this indicates that the ripple within the selected frequency band is passing by the value shown. When the margin value is preceded by a negative sign (-), this indicates that the ripple within the selected band is failing by the value shown.

RIPL VALUE BAND

selects a frequency band to display the ripple value. When **RIPL VALUE []** is set to the absolute or margin choices, this softkey selects the ripple measurement for the selected frequency band.

RIPPLE LIM LINES

selects ripple limit line trace on the display color modification.

RIPPLE LIMIT

selects the ripple limit line choice. This selection leads to menus used to define ripple limits or specifications with which to compare a test device. Refer to the “Using Ripple Limits to Test a Device” section in the “Making Measurements” chapter of the user’s guide.

SAVE FILE

saves the display information to the disk drive. The type of information saved is dependent on the FILETYPE selection. The FILETYPE selection can either be graphic or text.

SAVE FILE FORMATS

accesses the save file menu which allows you to save the display information to the disk drive as either graphic or textual information.

TEXT FMT []

sets the format of the text file when **FILETYPE: TEXT** is selected. The only text selection currently available is the comma separated values (CSV) format.

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Error Messages

Error Messages in Alphabetical Order

BANDWIDTH LIMIT INVALID: MIN BW > MAX BW

Information Message The bandwidth test has a minimum bandwidth greater than the maximum bandwidth. Change the minimum bandwidth to a frequency less than the frequency of the maximum bandwidth or change the maximum bandwidth to a frequency greater than the frequency of the minimum bandwidth.

CAUTION: FLOPPY DISK IS FULL

Error Number 218 This message is displayed if you try to save files to the floppy disk that does not have enough memory to perform the save task. Correct by inserting a new floppy disk in the front panel disk drive or by erasing files from the current floppy disk.

CAUTION: TOO MANY SEGMENTS OR POINTS

Information Message This message is displayed if you try to insert too many segments or points using your current function.

RIPPLE LIMIT TABLE EMPTY

Information Message The ripple limit table does not have any frequency bands defined. Add at least one frequency band to the ripple limit table for ripple testing.

Error Messages in Numerical Order

Error Number	Error
218	CAUTION: FLOPPY DISK IS FULL

Options and Accessories

Accessories Available

For accessories not listed in this section, refer to the configuration guide for your analyzer or refer to the following Internet site:

www.agilent.com/find/8720

Preset State and Memory Allocation

Preset State

Table 2-1 Preset Conditions

Preset Conditions	Preset Value
Limit Menu	
Limit Lines	
Limit Lines	Off
Limit Testing	Off
Limit List	Empty
Edit Mode	Upper/Lower Limits
Stimulus Offset	0 Hz
Amplitude Offset	0 dB
Limit Type	Sloping Line
Beep Fail	Off
Ripple Limit	
Ripple Limit	Off
Ripple Test	Off
Bandwidth Limit	
Bandwidth Test	Off
Bandwidth Display	Off
Bandwidth Marker	Off

3 Supplement for the Programmer's Guide

In This Chapter

This chapter contains the supplemental information changes to the programmer's guide that coincides with the release of firmware revision 7.66. These changes pertain to:

The Programmer's Guide for 8719ET/ES, 8720ET/ES, 8722ET/ES, and 8753ET/ES Network Analyzers (part number 08753-90475)

The following list describes the changes to programmer's guides printed prior to July 2000. Each of the changes are described in detail in the remainder of this chapter. The page references in this list refer to page numbers in this supplement.

- Alphabetical Command Reference Chapter
 - Add 20 programming commands. See the [“Alphabetical Command Reference” on page 3-3](#).
- Appendix A: Preset Conditions
 - Replace the Limit Line Conditions table in the [“Preset State”](#) section using [Table 3-1 on page 3-15](#).
- Appendix B: Command Listings
 - Add 22 new programming commands to the “Alphabetical List of Commands” using the [“Alphabetical List of New Commands” on page 3-17](#).
 - Add one new programming command to the “OPC-Compatible List of Commands” using the [“OPC-Compatible List of New Commands” on page 3-17](#).

Alphabetical Command Reference

BWLIMDB

Syntax

BWLIMDB<num>; or BWLIMDB?;

Description

Command	Description	Range	Query Response
BWLIMDB	Enters the <i>N dB Point</i> , the amplitude below the peak that is used to measure the filter's bandwidth.	0.001 to 300 dB	<num><L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
BWLIMDB	System	N DB POINTS

BWLIMDISP

Syntax

BWLIMDISP<ON|OFF>; or BWLIMDISP?;

Description

Command	Description	Range	Query Response
BWLIMDISP	Turns the measured bandwidth value in the upper left corner of the display on and off. The measured bandwidth value is displayed near the bandwidth Pass/Wide/Narrow message.	N/A	<0 1><L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
BWLIMDISP	System	BW DISPLAY on OFF

BWLIMMAX

Syntax

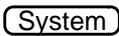

BWLIMMAX<num> [HZ | KHZ | MHZ | GHZ] ; *or* BWLIMMAX? ;

Description

Command	Description	Range	Query Response
BWLIMMAX	Enters the maximum bandwidth value. If the measured bandwidth is greater than this value, the filter fails the bandwidth test.	stimulus range ^a	<num><L _F >

a. Refer to “Preset State and Memory Allocation” in your analyzer’s reference guide.

Front Panel Equivalents

Command	Hardkey	Softkey
BWLIMMAX		

BWLIMMIN

Syntax

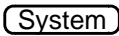

BWLIMMIN<num> [HZ | KHZ | MHZ | GHZ] ; *or* BWLIMMIN? ;

Description

Command	Description	Range	Query Response
BWLIMMIN	Enters the minimum bandwidth value. If the measured bandwidth is less than this value, the filter fails the bandwidth test.	stimulus range ^a	<num><L _F >

a. Refer to “Preset State and Memory Allocation” in your analyzer’s reference guide.

Front Panel Equivalents

Command	Hardkey	Softkey
BWLIMMIN		

BWLIMSTAT

Syntax

BWLIMSTAT;

Description

Command	Description	Range	Response
BWLIMSTAT	Returns the results of the bandwidth test. A returned value of 0 indicates that the filter passed the bandwidth test. A returned value of -1 indicates that the filter failed the bandwidth test because it is narrower than the bandwidth limit. A returned value of 1 indicates that the filter failed the bandwidth test because it is wider than the bandwidth limit.	N/A	<-1 0 1>< ^L _F >

No Front Panel Equivalents

GPIB only: no front panel equivalent.

BWLIMTEST



Syntax

BWLIMTEST<ON|OFF>; *or* BWLIMTEST?;

Description

Command	Description	Range	Query Response
BWLIMTEST	Turns the bandwidth test on and off.	N/A	<0 1>< ^L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
BWLIMTEST		

BWLIMVAL

Syntax

BWLIMVAL ;

Description

Command	Description	Range	Response
BWLIMVAL	Returns the measured bandwidth value.	N/A	<num>< ^L _F >

Front Panel Equivalents

GPIB only: no front panel equivalent.

CLER

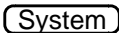
Syntax

CLER ;

Description

Command	Description	Range	Query Response
CLER	Clears (or deletes) the all of existing ripple test limits.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
CLER		CLEAR LIST

EDITRLIM

Syntax

EDITRLIM;

Description

Command	Description	Range	Query Response
EDITRLIM	Begins the editing of the ripple limit list.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
EDITRLIM	<div>System</div>	<div>EDIT RIPL LIMIT</div>

OUTP

NOTE Because this is an “Alphabetical Command Reference,” the output commands are listed alphabetically, rather than by function, in both the “Syntax” section and the “Description” section.

Syntax

```
OUTPFARPLPT ;
OUTPRPLBNDALL ;
OUTPRPLBNDPF ;
OUTPRPLBNDVAL ;
```

Description

NOTE Most commands that output an array require that you set the format for data transfers with the `FORM` command.

Command	Description	Range	Response
OUTPFARPLPT	Outputs the onscreen failed ripple point information in the following comma-separated value format: the number of failed points followed by pairs of numbers representing the first failed frequency, first failure value, second failed frequency, second failure value, and so on.	N/A	<num,array>< ^L _F >
OUTPRPLBNDALL	Outputs the measured ripple values for all active frequency bands in the following comma-separated value format: the number of bands followed by pairs of numbers representing the first band number (1), ripple value of first band, second band number (2), ripple value of second band, and so on.	N/A	<num,array>< ^L _F >
OUTPRPLBNDPF	Outputs the pass/fail status for selected frequency band (see “ SELBND ”) as “1” (band passes) or as “0” (band fails).	N/A	<0 1>< ^L _F >
OUTPRPLBNDVAL	Outputs the ripple value for selected frequency band (see “ SELBND ”).	N/A	<num>< ^L _F >

Front Panel Equivalents

GPIB only: no front panel equivalent.

RLIMLINE

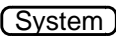
Syntax

RLIMLINE<ON|OFF>; *or* RLIMLINE?;

Description

Command	Description	Range	Query Response
RLIMLINE	Turns the lines that represent the ripple test limits on and off.	N/A	<0 1>< ^L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMLINE		RIPL LIMIT on OFF

RLIMM

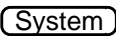
Syntax

RLIMM<num>[DB]; *or* RLIMM?;

Description

Command	Description	Range	Query Response
RLIMM	Sets the value of the maximum allowable ripple limit for current frequency band.	0.01 to 100 dB	<num>< ^L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMM		MAXIMUM RIPPLE

RLIMSTP

Syntax

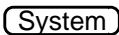
RLIMSTP<num>[HZ|KHZ|MHZ|GHZ]; *or* RLIMSTP?;

Description

Command	Description	Range	Query Response
RLIMSTP	Sets the stop frequency of the current frequency band.	stimulus range ^a	<num><L _F >

a. Refer to “Preset State and Memory Allocation” in your analyzer’s reference guide.

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMSTP		MAXIMUM FREQUENCY

RLIMSTR

Syntax

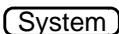
RLIMSTR<num>[HZ|KHZ|MHZ|GHZ]; *or* RLIMSTR?;

Description

Command	Description	Range	Query Response
RLIMSTR	Sets the start frequency of the current ripple limit.	stimulus range ^a	<num><L _F >

a. Refer to “Preset State and Memory Allocation” in your analyzer’s reference guide.

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMSTR		MINIMUM FREQUENCY

RLIMTEST

Syntax

RLIMTEST<ON|OFF>; *or* RLIMTEST?;

Description

Command	Description	Range	Query Response
RLIMTEST	Turns the ripple limit test on and off.	N/A	<0 1>< ^L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMTEST	System	RIPL TEST on OFF

RLIMVAL

Syntax

RLIMVAL<OFF|ABS|MAR>;

Description

Command	Description	Range	Query Response
RLIMVAL	Displays the ripple limit value of the selected band (see “SELBND”) in absolute format (ABS) or margin format (MAR). OFF turns the displayed ripple limit value off.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
RLIMVAL	System	RIPL VALUE []

SAVECSV


Syntax

SAVECSV;

Description

Command	Description	Range	Query Response
SAVECSV	Saves the current measurement to the disk drive in the comma-separated value (CSV) format.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
SAVECSV		SAVE FILE when GRAPH FMT [] is set to CSV and FILETYPE: GRAPHIC is selected.

SAVEJPG


Syntax

SAVEJPG;

Description

Command	Description	Range	Query Response
SAVEJPG	Saves the current display to the disk drive in the JPG format. OPC-compatible.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
SAVEJPG		SAVE FILE when GRAPH FMT [] is set to JPG and FILETYPE: GRAPHIC is selected.

SELBND

Syntax

SELBND<num>; or SELBND?;

Description

Command	Description	Range	Query Response
SELBND	Selects the ripple frequency band for the following commands: OUTPRPLBNDPF, OUTPRPLBNDVAL, and RLIMVAL.	integers 1–12	<num>< ^L _F >

Front Panel Equivalents

Command	Hardkey	Softkey
SELBND	System	FREQUENCY BAND

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Preset Conditions

Preset State

Table 3-1 Limit Line Conditions

Preset Conditions	Preset Value
Limit Lines	
Limit Lines	Off
Limit Testing	Off
Limit List	Empty
Edit Mode	Upper/Lower Limits
Stimulus Offset	0 Hz
Amplitude Offset	0 dB
Limit Type	Sloping Line
Beep Fail	Off
Ripple Limit	
Ripple Limit	Off
Ripple Test	Off
Bandwidth Limit	
Bandwidth Test	Off
Bandwidth Display	Off
Bandwidth Marker	Off

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Command Listings

Alphabetical List of New Commands

BWLIMDB	EDITRLIM	RLIMSTR
BWLIMDISP	OUTPFARPLPT	RLIMTEST
BWLIMMAX	OUTPRPLBNDALL	RLIMVAL
BWLIMMIN	OUTPRPLBNDPF	SAVECSV
BWLIMSTAT	OUTPRPLBNDVAL	SAVEJPG
BWLIMTEST	RLIMLINE	SELBND
BWLIMVAL	RLIMM	
CLER	RLIMSTP	

OPC-Compatible List of New Commands

SAVEJPG

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