Manual Supplement

Agilent Technologies

For
8753ET/ES Network Analyzers
Documentation Set (08753-90470)
and
8753ES Option 011
Documentation Set (08753-90477)

Updates for Network Analyzers with Firmware Revision 7.66

Updates for Network Analyzers with Firmware Revision 7.68

Agilent Technologies

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Regulatory and Warranty Information

The regulatory and warranty information is located in Chapter 8, "Safety and Regulatory Information" of your 8753ET or 8753ES network analyzer user's guide.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For any assistance, contact your nearest Agilent Technologies sales or service office. See Table 8-1 of your 8753ET or 8753ES network analyzer user's guide for the nearest office.

Manuals that This Document Supplements

This manual supplement provides documentation updates for all 8753ET and 8753ES network analyzers with firmware revision of 7.66, 7.68 *and* documentation printed prior to February 2001.

- In the 8753ET/ES Network Analyzers Documentation Set (part number 08753-90470), this document supplements the following manuals:

    — 8753ET and 8753ES Network Analyzers User's Guide (part number 08753-90472)

    — 8753ET and 8753ES Network Analyzers Reference Guide (part number 08753-90473)

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

    — 8753ET/ES Network Analyzers Installation and Quick Start Guide (part number 08753-90471) - *firmware revision 7.68 only*

- In the 8753ES Option 011 Network Analyzer Documentation Set (part number 08753-90477), this document supplements the following manuals:

    — 8753ES Option 011 Network Analyzer User's Guide (part number 08753-90479)

    — 8753ES Option 011 Network Analyzer Reference Guide (part number 08753-90480)

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

    — 8753ES Option 011 Network Analyzer Installation and Quick Start Guide (part number 08753-90478) - *firmware revision 7.68 only*

The information within this manual supplement has been included in manuals printed during or after February 2001.

How to Use This Guide

This guide uses the following conventions:

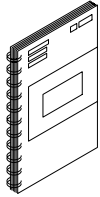|	
(Front-Panel Key)	This represents a key physically located on the instrument.
SOFTKEY	This represents a "softkey," a key whose label is determined by the instrument's firmware.
Screen Text	This represents text displayed on the instrument's screen.

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.
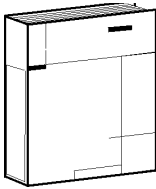
The *User's Guide* shows how to make measurements, explains commonly-used features, and tells you how to get the most performance from your analyzer.
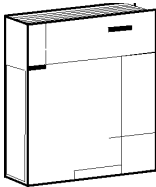
The *Reference Guide* provides reference information, such as specifications, menu maps, and key definitions.
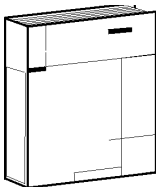
The *Programmer's Guide* provides general GPIB programming information, a command reference, and example programs. The *Programmer's Guide* contains a CD-ROM with example programs.
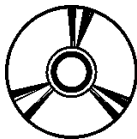
The **CD-ROM** provides the *Installation and Quick Start Guide*, the *User's Guide*, the *Reference Guide*, and the *Programmer's Guide* in PDF format for viewing or printing from a PC. This supplement is *not* included on the CD-ROM.
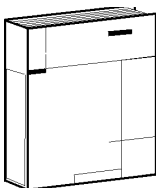
The *Service Guide* provides information on calibrating, troubleshooting, and servicing your analyzer. The *Service Guide* is not part of a standard shipment and is available only as Option 0BW, or by ordering part number 08753-90484 (8753ES without Option 011 and 8753ET) or by ordering part number 08753-90485 (8753ES with Option 011). 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 (Firmware Version 7.66)

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 guides.

- 8753ET and 8753ES Network Analyzers User's Guide (part number 08753-90472)

- 8753ES Option 011 Network Analyzer User's Guide (part number 08753-90479)

The following list describes the changes to 8753ET and 8753ES 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 to the chapter.

  — 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" on page 1-37 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**

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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
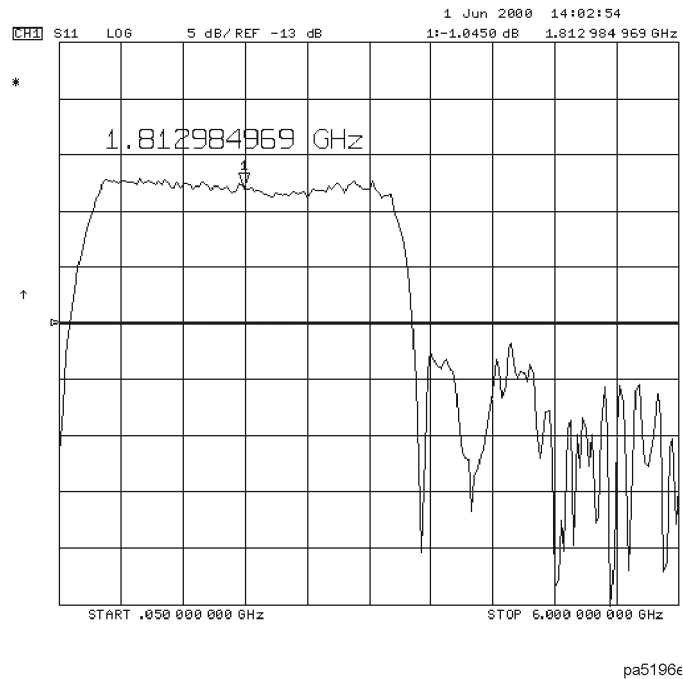
Setting Up the Analyzer to Perform the Ripple Test

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
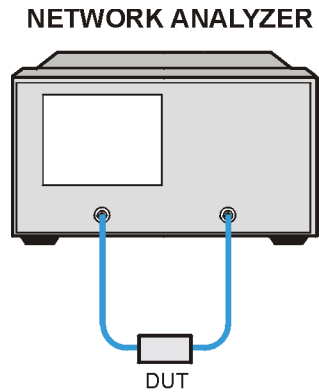
NETWORK ANALYZER

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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

pa5197e
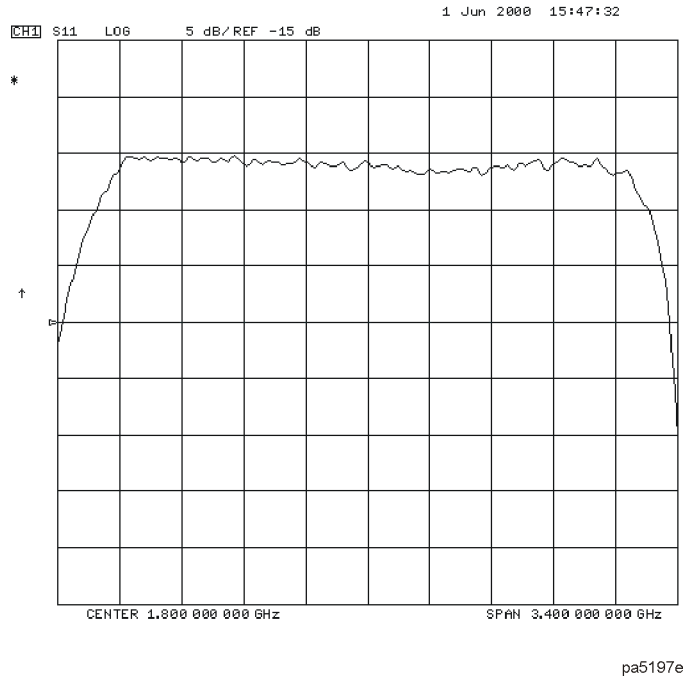
Setting Up Limits for Ripple Testing

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

pa5198e
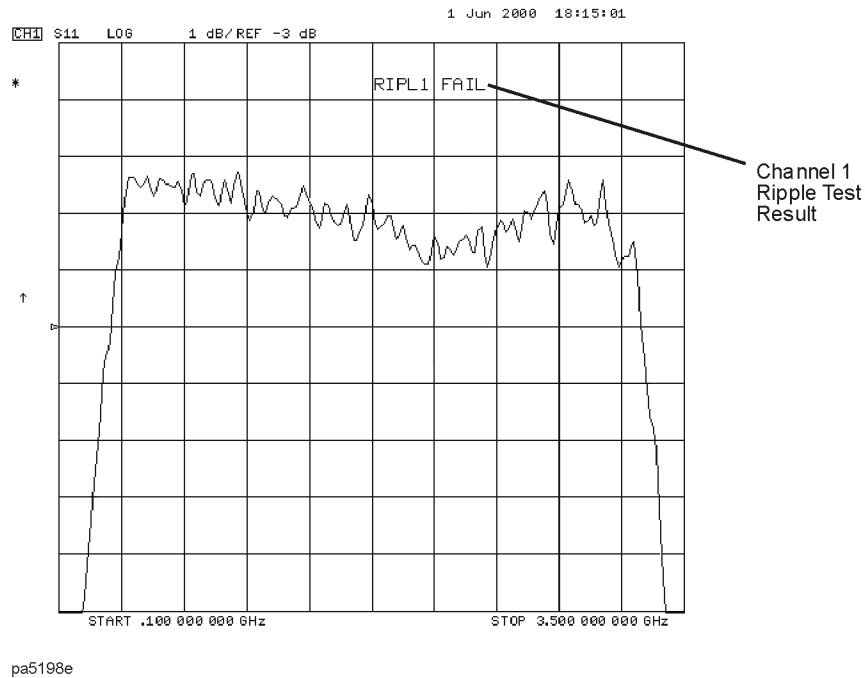
As the analyzer measures the ripple, a message is displayed indicating whether the measurement passes or fails:

- 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

pa5199e
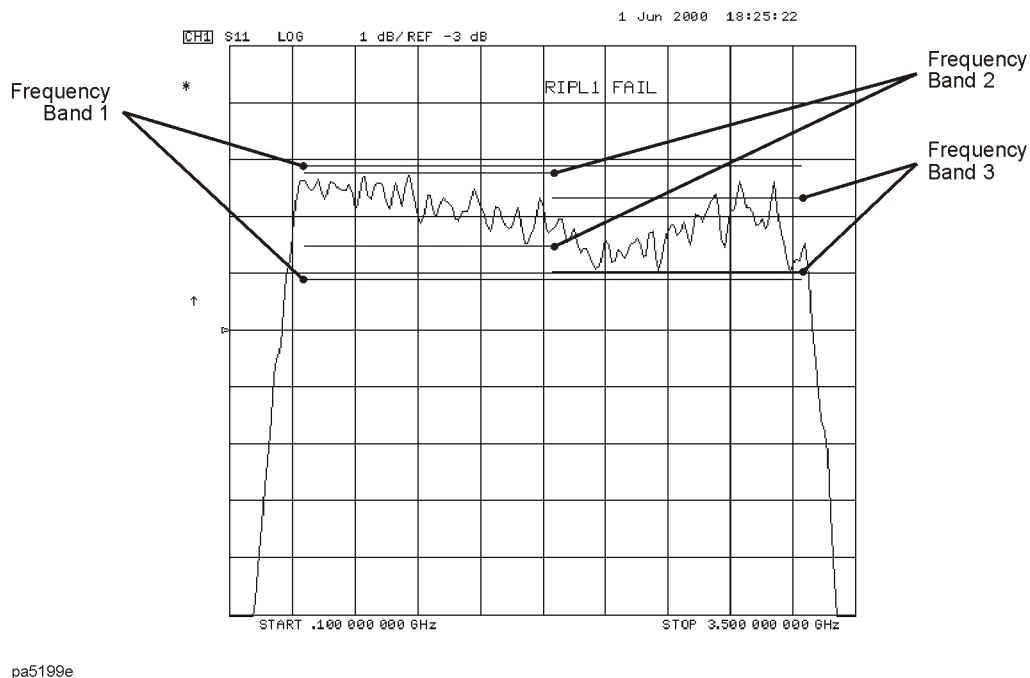
Changing the Ripple Limits Line Color. The color of the lines that represent the ripple limits can be changed by:

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


```
                                          2 Jun 2000  10:40:12
CH1 S11   LOG      1 dB/REF -3 dB

*                                  RIPL1 FAIL B1 1.675 dB


                                                              Frequency Band 1
                                                              Absolute Ripple Value


↑




     START .100 000 000 GHz          STOP 3.500 000 000 GHz
```

pa5200e
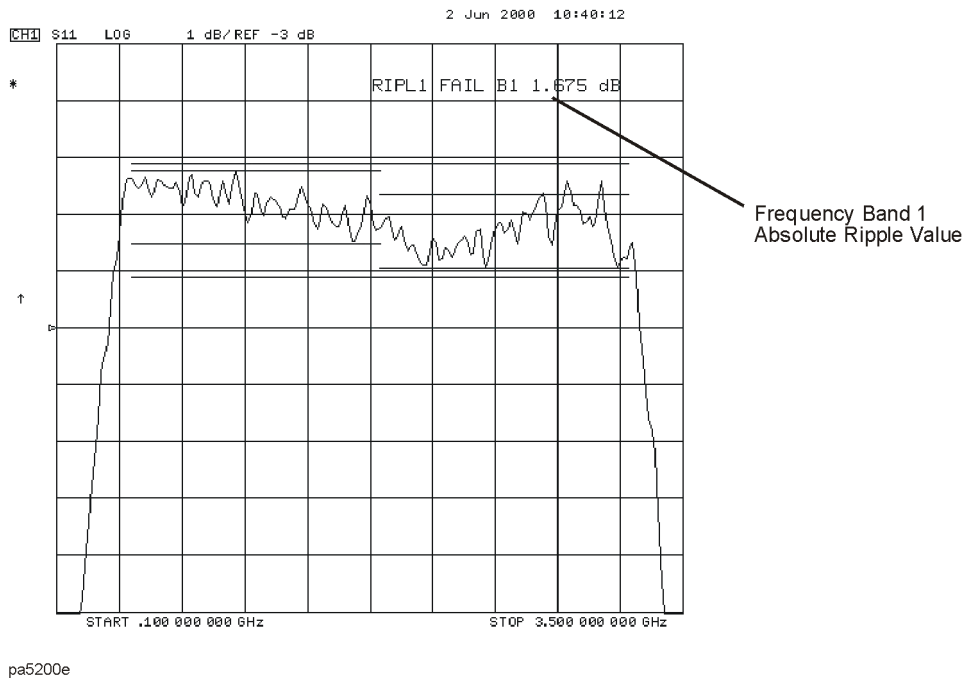
Viewing the Ripple Value in Margin Format

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

pa5201e
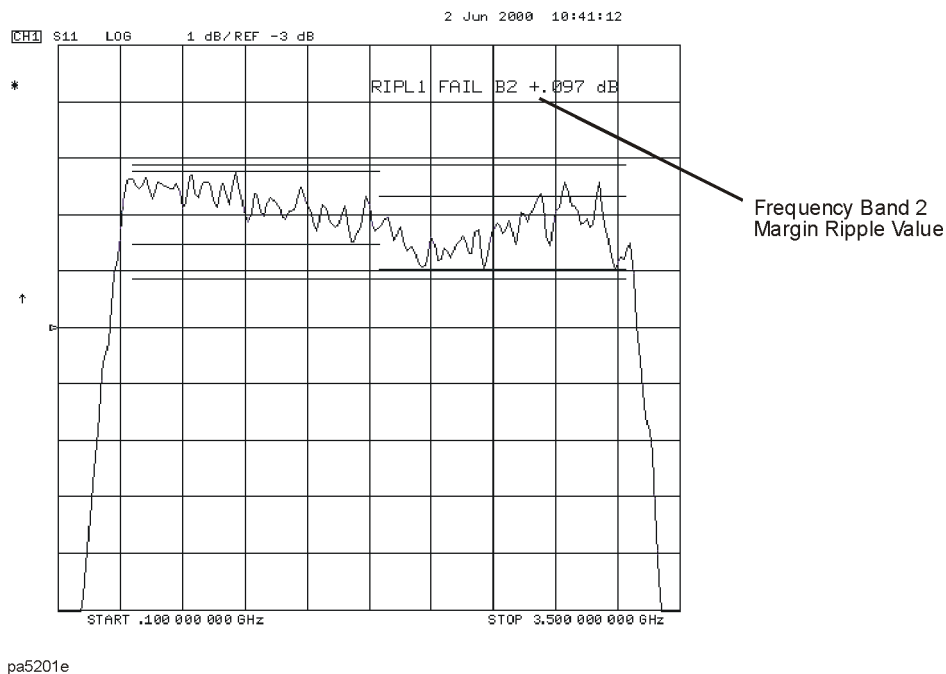
Using Bandwidth Limits to Test a Bandpass Filter

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

pa5195e
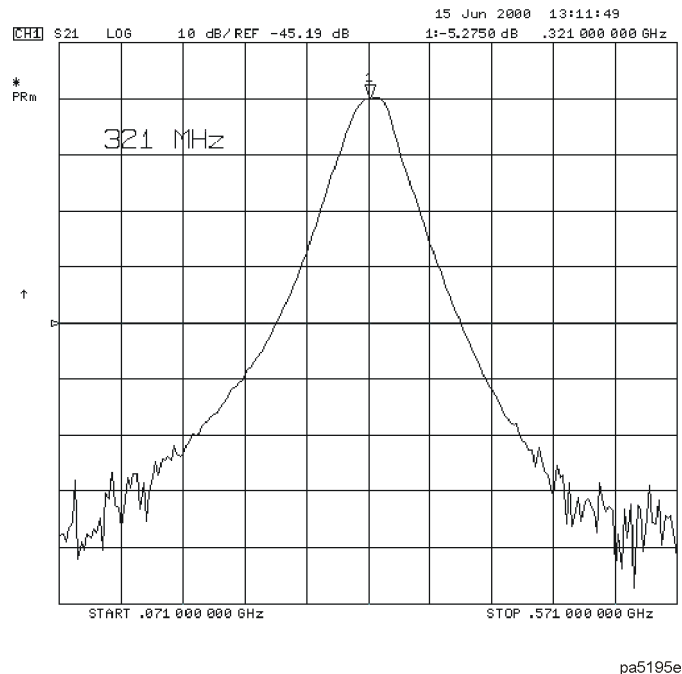
Setting Up Bandwidth Limits

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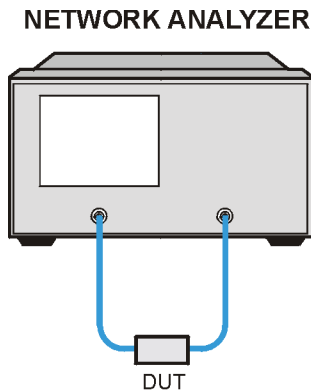
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2. Press (Preset) and choose the measurement settings. For this example, the measurement settings are as follows:

   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

15 Jun 2000 12:23:17

CH1 S21   LOG   10 dB/REF −30 dB

*
PRm

Cor   10 dB/div

CENTER .321 000 000 GHz   SPAN .200 000 000 GHz
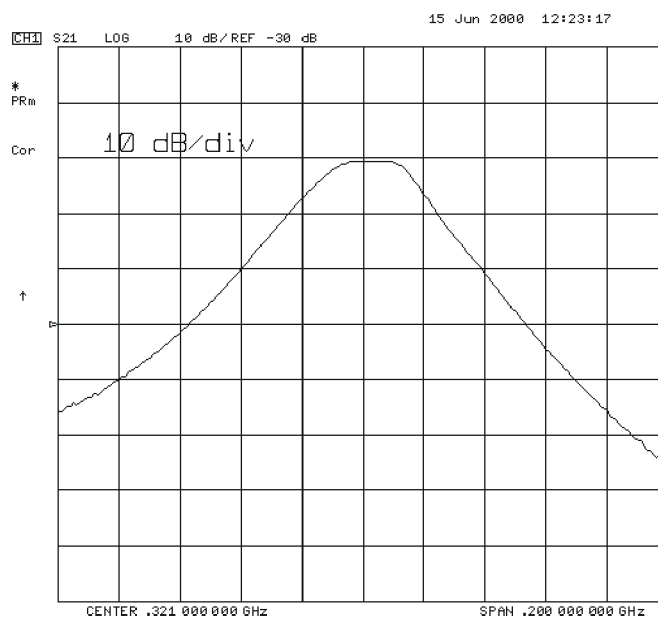
pa5191e

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

pa5192e
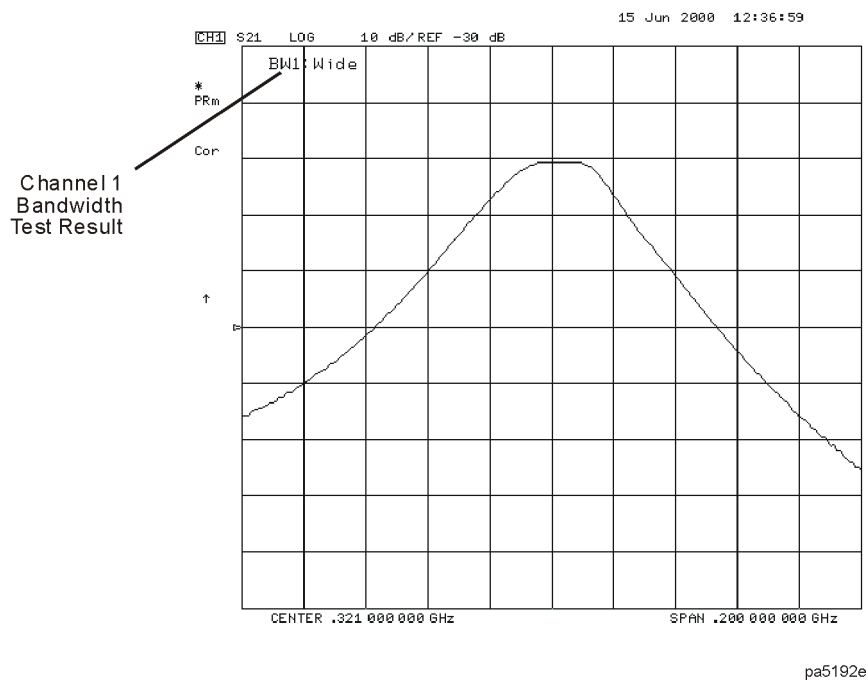
Displaying the Bandwidth Markers

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
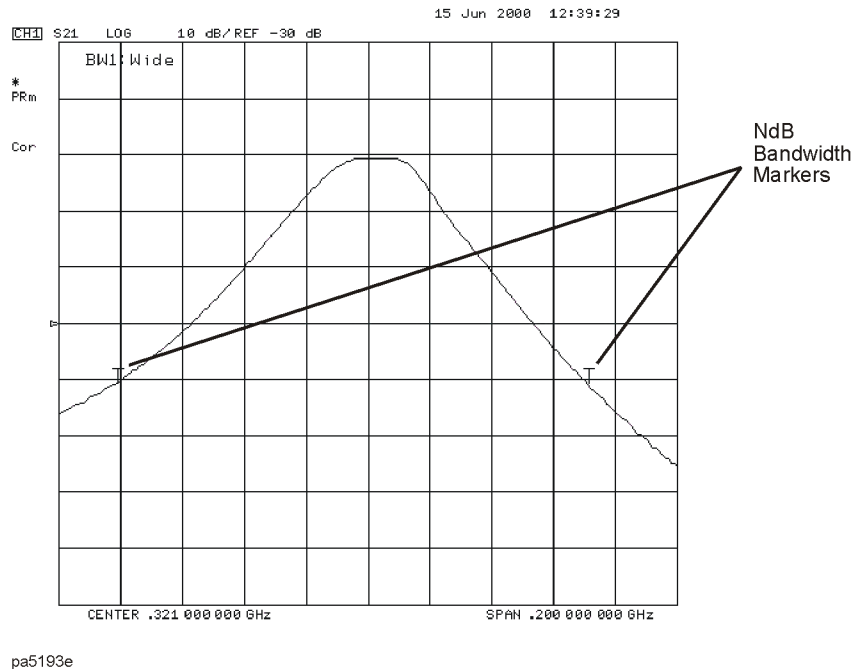
Displaying the Bandwidth Value

1. Display the bandwidth value by pressing the $\boxed{\textbf{BW DISPLAY on OFF}}$ 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

pa5194e
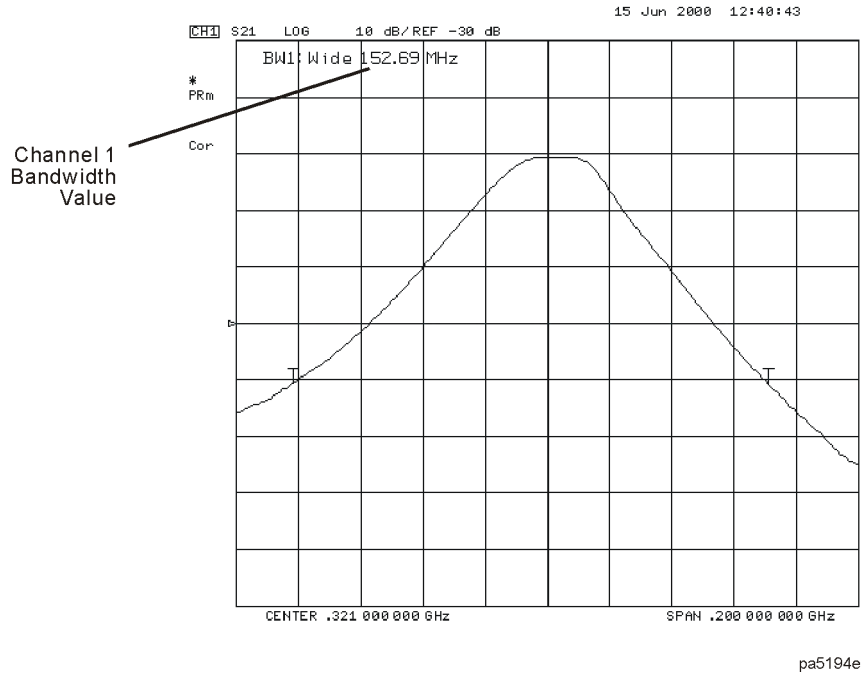
Conversion Loss Using the Frequency Offset Mode

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
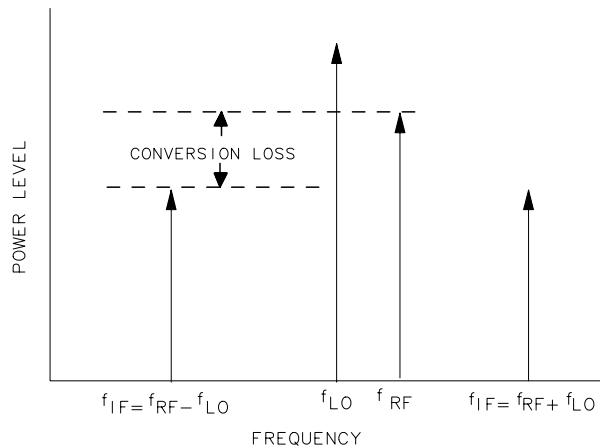
pg694d

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 (or Step 1 of Figure 1-16).

3. Set the desired analyzer RF power to the value which will provide –10 dBm or less to the R channel input.

    For 8753ET/ES, press (Power) **PWR RANGE MAN** (0) (x1).

    For 8753ES with Option 011, press (Power) (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   8753ET/ES Connections for R Channel and
Source Calibration (IF Range)**
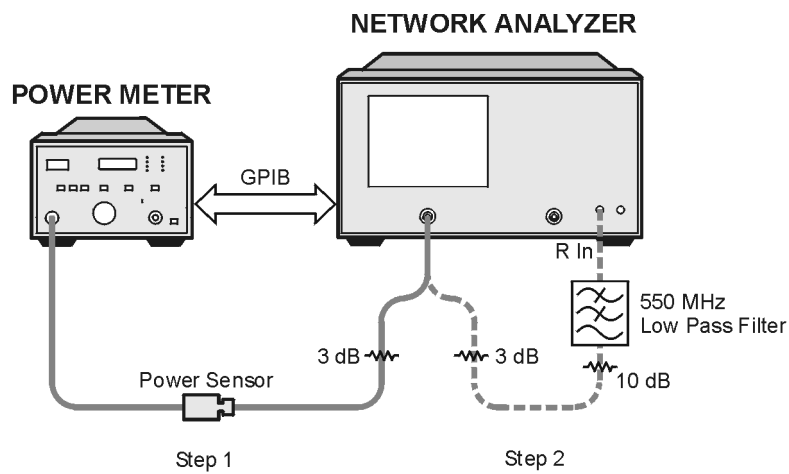
pa5181e

**Figure 1-16   8753ES Option 011 Connections for R Channel and
Source Calibration (IF Range)**
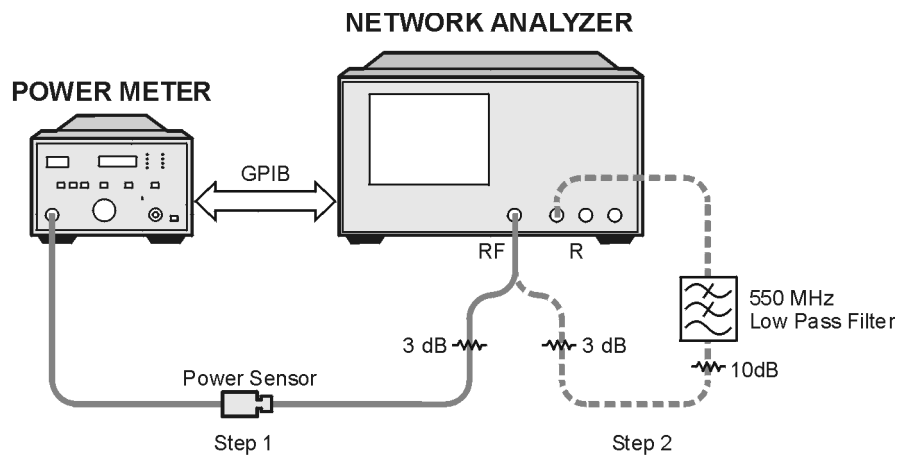
pa5183e

Setting Measurement Parameters for the IF Range

1. 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 MENU **FREQUENCY: CW** (0) (x1)

2. Select the measurement trace.

   - For 8753ET/ES, press (Meas) **INPUT PORTS** **R** .

   - For 8753ES with Option 011, press (Meas) **R** .

   The measurement trace is shown on the display.

3. To select the analyzer as the system controller by pressing (Local) **SYSTEM CONTROLLER** .

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

1. Calibrate and zero the power meter.

2. Set the power meter's address:

   SET ADDRESSES

   ADDRESS: P MTR/GPIB (aa) (where aa is the GPIB address of the power meter) (x1)

3. 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, press:

        (Cal) **PWRMTR CAL** **ONE SWEEP**

        (0) (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 (or Figure 1-16) 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.

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 MENU **FREQUENCY:CW**

        (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 1-17.

    The measurement setup diagram is shown in Figure 1-18 and Figure 1-19. Note the RF frequency values are shown in this illustration.

Figure 1-17   Diagram of Measurement Frequencies
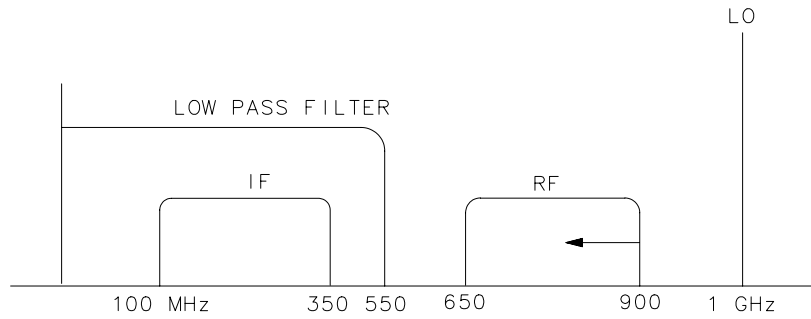
Figure 1-18   8753ET/ES Measurement Setup from Display
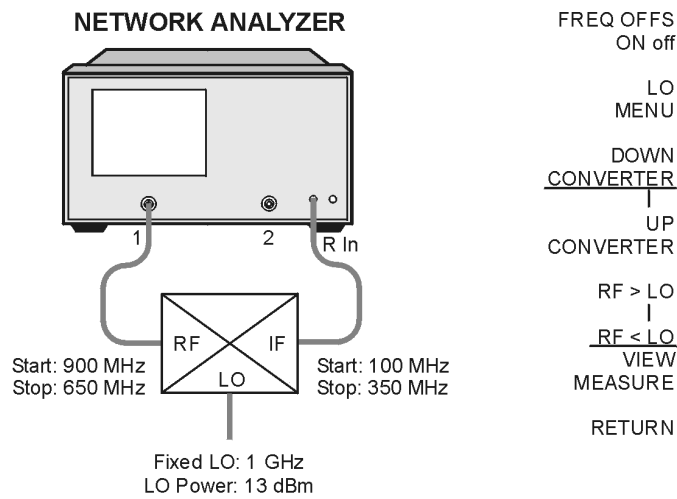
Figure 1-19   8753ES Option 011 Measurement Setup from Display
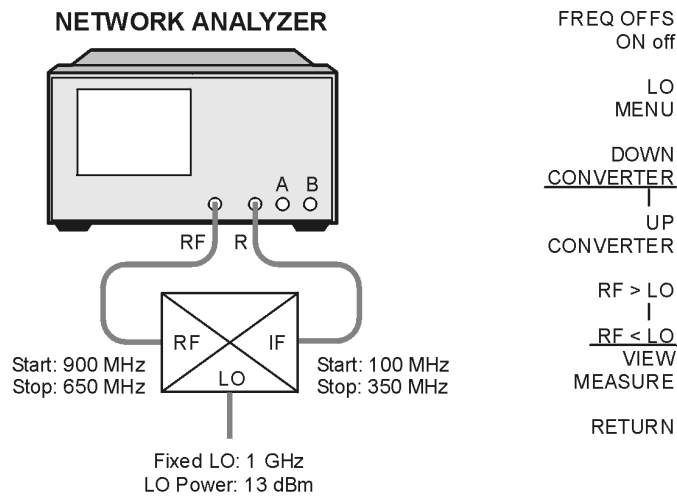
Performing a Power Meter Calibration Over the RF Range

1. Make the connections as shown in Figure 1-20 (or Figure 1-19) for the one-sweep power meter calibration over the RF range.

Figure 1-20   8753ET/ES Power Meter Calibration Equipment Setup for the RF Range

pa534e
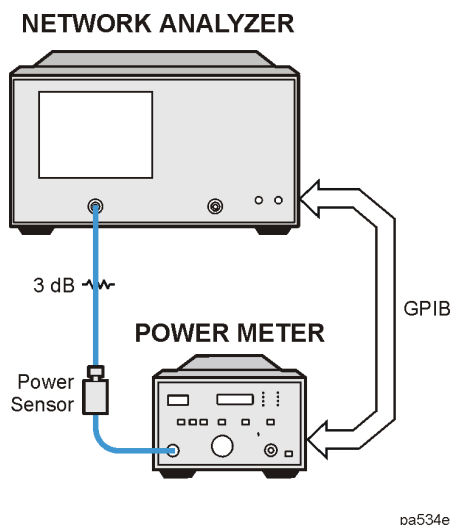
Figure 1-21   8753ES Option 011 Power Meter Calibration Equipment Setup for the RF Range

pa5187e
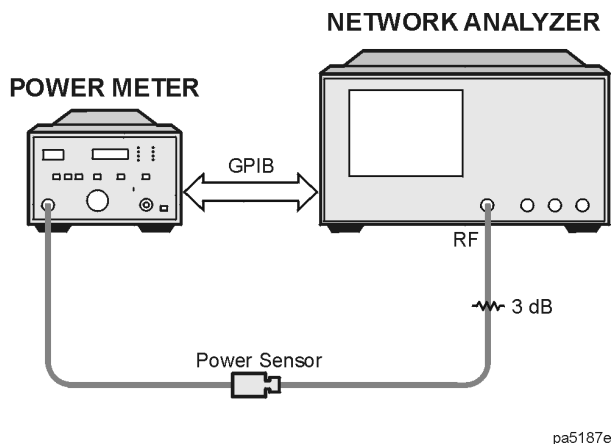
2. Use the power meter settings that were set up in steps 1 through 4 of the "Performing a Power Meter (Source) Calibration Over the IF Range" section.

   Perform a one-sweep power meter calibration over the RF frequency range at 0 dBm by pressing `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.

Performing the R-Channel Measurement

1. Connect the equipment as shown in Figure 1-22 (or Figure 1-23).

Figure 1-22   8753ET/ES R-Channel Mixer Measurement Equipment Setup
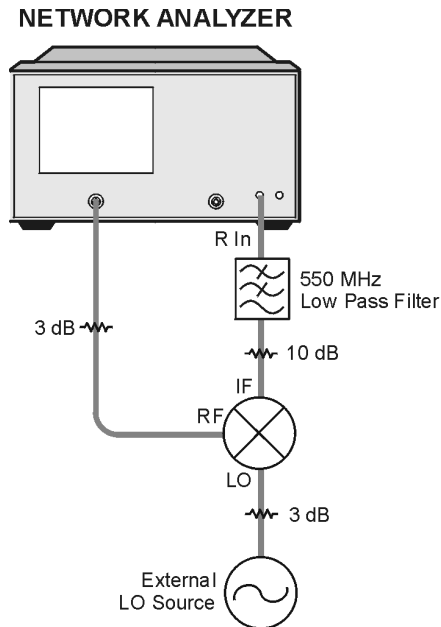
pa5184e

Figure 1-23 8753ES Option 011 R-Channel Mixer Measurement Equipment Setup
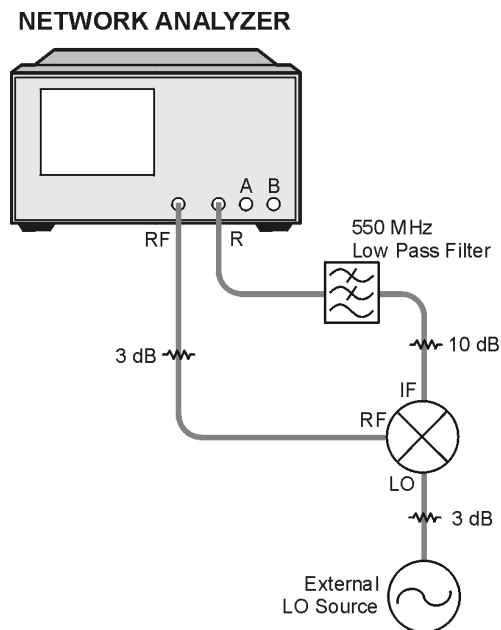
pa5186e

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 1-24   Conversion Loss Example Measurement

pa5190e

In this measurement, you set the input power and measured the output power. Figure 1-24
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.

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 ⟨10⟩ ⟨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.

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.

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:

(Cal) **CAL KIT** **SELECT CAL KIT** **USER KIT**

(Save/Recall) **SAVE STATE**

2 Supplement for the Reference Guide (Firmware Revision 7.66)

In This Chapter

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

- 8753ET and 8753ES Network Analyzers Reference Guide (part number 08753-90473)

- 8753ES Option 011 Network Analyzer Reference Guide (part number 08753-90480)

The following list describes the changes to 8753ET and 8753ES 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

Display

Display Menu
DUAL/QUAD SETUP
DISPLAY: DATA
MEMORY
DATA and MEMORY
DATA/MEM
DATA-MEM
DATA → MEMORY
MORE

Dual: Quad Setup Menu
DUAL CHAN on OFF
AUX CHAN on OFF
4 PARAM DISPLAYS
SPLIT DISP 1X 2X 4X
CHANNEL POSITION
RETURN

Channel Position
2x: [1&2]
      [3&4]
      [1&3]
      [2&4]
4x   [1][2]
      [3][4]
      [1][3]
      [2][4]
RETURN

4 Param Displays
SETUP A
SETUP B
SETUP C
SETUP D
SETUP E
SETUP F
TUTORIAL
RETURN

Display More Menu
BEEP DONE ON off
BEEP WARN on OFF
ADJUST DISPLAY
TITLE
D2/D1 to D2 on OFF
FREQUENCY BLANK
RETURN

Title Menu
SELECT LETTER
SPACE
BACK SPACE
NEWLINE
FORM FEED
ERASE TITLE
MORE
DONE

Title More Menu
ACTIVE ENTRY
ACTIVE MKR MAGNITUDE
LIMIT TEST RESULT
LOOP COUNTER
END OF LABEL
RETURN

4 Param More Displays
MORE HELP
RETURN

4 Param More Displays
RETURN

Adjust Display Menu
INTENSITY
BACKGROUND INTESITY
MODIFY COLORS
DEFAULT COLORS
BLANK DISPLAY
SAVE COLORS
RECALL COLORS *
RETURN

Modify Colors Menu
CH1 DATA LIMIT LN
CH1 MEM
CH2 DATA LIMIT LN
CH2 MEM
GRATICULE
TEXT
MORE
RETURN

Modify Colors Menu
CH3 DATA LIMIT LN
CH3 MEM
CH4 DATA LIMIT LN
CH4 MEM
REF LINE
WARNING
RIPPLE LIM LINES
RETURN

Color Adjust Menu
TINT
BRIGHTNESS
COLOR
RESET COLOR
RETURN

* Appears only when colors have been saved

ka535e

Figure 2-2   Menu Map for Save/Recall

Save/Recall

Save/Recall Menu
SAVE STATE
RE-SAVE STATE
DEFINE DISK-SAVE
RECALL STATE
RECALL KEYS
SAVE FILE FORMATS
FILE UTILITIES
SELECT DISK

Define Save Menu
DATA ARRAY on OFF
RAW ARRAY on OFF
FORMAT ARY on OFF
GRAPHICS on OFF
DATA ONLY on OFF
SAVE USING BINARY
ASCII
RETURN

Recall Menu
RECALL KEYS MENU
RECALL KEYS on OFF
RETURN

Save File Formats Menu
SAVE FILE
FILETYPE GRAPHIC
TEXT
GRAPH FMT [JPG]
TEXT FMT [CSV]
RETURN

Recall Keys Menu
RECALL REG1 *
RECALL REG2 *
RECALL REG3 *
RECALL REG4 *
RECALL REG5 *
RECALL REG6 *
RECALL REG7 *
SAVE/RCL MENU

File Utilities Menu
RENAME FILE **
DELETE FILE
DELETE ALL FILES
SEQUENCE FILENAMING
FILENAME FILE ∅
FORMAT DISK ***
RETURN

Sequence Filename Menu
FILE NAME FILE ∅
PLOT NAME PLOTFILE
RETURN

Title File Menu
SELECT LETTER
BACK SPACE
LOOP COUNTER
ERASE TITLE
CANCEL
DONE

Rename File Menu
SELECT LETTER
BACK SPACE
LOOP COUNTER
ERASE TITLE
CANCEL
DONE

Select Disk Menu
INTERNAL MEMORY
INTERNAL DISK
EXTERNAL DISK
CONFIGURE EXT DISK
RETURN

Configure Ext Disk Menu
ADDRESS: DISK
DISK UNIT NUMBER
VOLUME NUMBER
RETURN

Format Disk Menu
FORMAT INT MEMORY
FORMAT INT DISK
FORMAT EXT DISK
DIRECTORY SIZE (LIF)
FORMAT: LIF
DOS
RETURN

Lif Dir Size Menu
DIR SIZE: DEFAULT
256
512
1024
2048
4096
8192
RETURN

* These labels only appear if the particular register has been saved in internal memory.

** Does not appear during sequence modification.

*** Only appears during sequence modification when external disk is selected.

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Menu Map for System (8753ET only)

Set Clock Menu
- TIME STAMP ON off
- ROUND SECONDS
- SET MINUTES
- SET HOUR
- SET DAY
- SET MONTH
- SET YEAR
- RETURN

User Settings Menu
- PRESET SETTINGS
- K36 MODE on OFF
- K39 MODE on OFF

Preset Settings Menu
- CAL INTERP ON off

Select Limits Menu
- LIMIT LINE
- RIPPLE LIMIT
- BANDWIDTH LIMIT
- RETURN

Ripple Test Menu
- RIPL LIMIT on OFF
- RIPL TEST on OFF
- RIPL VALUE [OFF]
- RIPL VALUE BAND
- EDIT RIPL LIMIT
- RETURN

Edit Ripple Limits Menu
- FREQUENCY BAND
- MINIMUM FREQUENCY
- MAXIMUM FREQUENCY
- MAXIMUM RIPPLE
- DELETE
- ADD
- CLEAR LIST
- DONE

Bandwidth Test Menu
- BW TEST on OFF
- BW DISPLAY on OFF
- BW MARKER on OFF
- N DB POINTS
- MINIMUM BANDWIDTH
- MAXIMUM BANDWIDTH
- RETURN

Limits Menu
- LIMIT LINE on OFF
- LIMIT TEST on OFF
- BEEP FAIL on OFF
- EDIT LIMIT LINE
- LIMIT LINE OFFSETS
- RETURN

Edit Limits Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- LIMIT TYPE
- DONE

Edit Segment Menu
- STIMULUS VALUE
- MARKER➤ STIMULUS
- UPPER LIMIT
- LOWER LIMIT
- DELTA LIMITS
- MIDDLE VALUE
- MARKER➤ MIDDLE
- DONE

Edit List Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- DONE

Edit Sensor Menu
- FREQUENCY
- CAL FACTOR   ****
- DONE

System

System Menu
- SET CLOCK
- CONFIGURE MENU
- LIMIT MENU
- TRANSFORM MENU   *
- HARMONIC MEAS   **
- INSTRUMENT MODE
- SERVICE MENU   ***

Configure Menu
- RAW OFFSET ON off
- SPUR AVOID ON off
- USER SETTINGS
- RETURN

Offset Limits Menu
- STIMULUS OFFSET
- AMPLITUDE OFFSET
- MARKER➤ AMP. OFS.
- RETURN

Transform Menu
- TRANSFORM on OFF
- SET FREQ LOW PASS
- LOW PASS IMPULSE
- LOW PASS STEP
- BANDPASS
- WINDOW
- SPECIFY GATE
- RETURN

Specify Gate Menu
- GATE on OFF
- GATE: START
- STOP
- CENTER
- SPAN
- GATE SHAPE
- RETURN

Window Menu
- WINDOW: MAXIMUM
- NORMAL
- MINIMUM
- USE MEMORY on OFF
- DEMOD: OFF
- AMPLITUDE
- PHASE
- RETURN

Gate Shape Menu
- GATE SHAPE MAXIMUM
- WIDE
- NORMAL
- MINIMUM
- RETURN

Limit Type Menu
- SLOPING LINE
- FLAT LINE
- SINGLE POINT
- RETURN

Offset Table Menu
- USE SENSOR A / B
- CAL FACTOR SENSOR A
- CAL FACTOR SENSOR B
- POWER LOSS
- RETURN

Source Adjust Menu
- SRC TUNE on OFF
- SRC TUNE FREQ
- ALC ON off
- PWR DAC on OFF
- SLOPE DAC
- SRC ADJUST DACS
- HB FLTRSW on OFF
- RETURN

Adjust DACS Menu
- SLOPE OFFSET DAC
- SQUARE LAW LINEAR DAC
- DETECTOR OFFSET DAC
- LOG OFFSET DAC
- WRITE EEPROM
- RETURN

*   Only appears on instruments equipped with Option 010.

**   Only appears on instruments equipped with Option 002.

***   Service menu key descriptions are located in the 8753D Option 011 Network Analyzer Service Guide.

****   Loss appears thru the power loss path.

Instrument Mode Menu
- NETWORK ANALYZER
- EXT SOURCE AUTO
- EXT SOURCE MANUAL
- TUNED RECEIVER
- FREQ OFFS MENU
- RETURN

Frequency Offset Menu
- FREQ OFFS on OFF
- LO MENU
- DOWN CONVERTER
- UP CONVERTER
- RF > LO
- RF < LO
- VIEW MEASURE
- RETURN

LO Menu
- FREQUENCY: CW
- SWEEP
- POWER: FIXED
- SWEEP
- LO CONTROL on OFF
- LO SOURCE ADDRESS
- VIEW MEASURE
- RETURN

Harmonic Mode Menu
- HARMONIC OFF
- SECOND
- THIRD
- RETURN

Service Menu
- TESTS
- TEST OPTIONS
- SELF DIAGNOSIS
- SERVICE MODES
- ANALOG BUS on OFF
- PEEK / POKE
- FIRMWARE REVISION
- RETURN

Tests Menu
- EXECUTE TEST
- TEST OPTIONS
- INTERNAL TESTS
- EXTERNAL TESTS
- SYS VER TESTS
- ADJUSTMENT TESTS
- DISPLAY TESTS
- RETURN

Test Options Menu
- CONTINUE TEST
- REPEAT on OFF
- RECORD on OFF
- LIMITS [NORM]
- PWR LOSS on OFF
- LOSS / SENSR LISTS
- DUMP GRAPH on OFF
- RETURN

Service Modes Menu
- FRACN TUNE on OFF
- SRC ADJUST MENU
- SOURCE PLL on OFF
- PLL AUTO ON off
- PLL DIAG on OFF
- PLL PAUSE [CONT]
- MORE
- RETURN

Peek / Poke Menu
- PEEK / POKE ADDRESS
- PEEK
- POKE
- RESET MEMORY
- RETURN

Serve Mode More Menu
- SAMPLE COR ON off
- IF GAIN AUTO
- IF GAIN ON
- IF GAIN OFF
- SPUR TEST on OFF
- STORE EEPR on OFF
- SPUR AVOID ON off
- RETURN

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Set Clock Menu
- TIME STAMP ON off
- ROUND SECONDS
- SET MINUTES
- SET HOUR
- SET DAY
- SET MONTH
- SET YEAR
- RETURN

User Settings Menu
- PRESET SETTINGS
- K36 MODE on OFF *****
- K39 MODE on OFF ******

Preset Settings Menu
- CAL INTERP ON off

Select Limits Menu
- LIMIT LINE
- RIPPLE LIMIT
- BANDWIDTH LIMIT
- RETURN

Ripple Test Menu
- RIPL LIMIT on OFF
- RIPL TEST on OFF
- RIPL VALUE [OFF]
- RIPL VALUE BAND
- EDIT RIPL LIMIT
- RETURN

Edit Ripple Limits Menu
- FREQUENCY BAND
- MINIMUM FREQUENCY
- MAXIMUM FREQUENCY
- MAXIMUM RIPPLE
- DELETE
- ADD
- CLEAR LIST
- DONE

Bandwidth Test Menu
- BW TEST on OFF
- BW DISPLAY on OFF
- BW MARKER on OFF
- N DB POINTS
- MINIMUM BANDWIDTH
- MAXIMUM BANDWIDTH
- RETURN

Limits Menu
- LIMIT LINE on OFF
- LIMIT TEST on OFF
- BEEP FAIL on OFF
- EDIT LIMIT LINE
- LIMIT LINE OFFSETS
- RETURN

Edit Limits Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- LIMIT TYPE
- DONE

Edit Segment Menu
- STIMULUS VALUE
- MARKER→STIMULUS
- UPPER LIMIT
- LOWER LIMIT
- DELTA LIMITS
- MIDDLE VALUE
- MARKER→MIDDLE
- DONE

Edit List Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- DONE

Edit Sensor Menu
- FREQUENCY
- CAL FACTOR ****
- DONE

System Menu
- SET CLOCK
- CONFIGURE MENU
- LIMIT MENU
- TRANSFORM MENU *
- HARMONIC MEAS **
- INSTRUMENT MODE
- SERVICE MENU ***

System

Configure Menu
- TESTSET SW CONTINUOUS
- RAW OFFSET ON off
- SPUR AVOID ON off
- USER SETTINGS
- RETURN

Offset Limits Menu
- STIMULUS OFFSET
- AMPLITUDE OFFSET
- MARKER→AMP. OFS.
- RETURN

Transform Menu
- TRANSFORM on OFF
- SET FREQ LOW PASS
- LOW PASS IMPULSE
- LOW PASS STEP
- BANDPASS
- WINDOW
- SPECIFY GATE
- RETURN

Specify Gate Menu
- GATE on OFF
- GATE: START
- STOP
- CENTER
- SPAN
- GATE SHAPE
- RETURN

Window Menu
- WINDOW: MAXIMUM
- NORMAL
- MINIMUM
- USE MEMORY on OFF
- DEMOD: OFF
- AMPLITUDE
- PHASE
- RETURN

Gate Shape Menu
- GATE SHAPE MAXIMUM
- WIDE
- NORMAL
- MINIMUM
- RETURN

Limit Type Menu
- SLOPING LINE
- FLAT LINE
- SINGLE POINT
- RETURN

Offset Table Menu
- USE SENSOR A / B
- CAL FACTOR SENSOR A
- CAL FACTOR SENSOR B
- POWER LOSS
- RETURN

Source Adjust Menu
- SRC TUNE on OFF
- SRC TUNE FREQ
- ALC ON off
- PWR DAC on OFF
- SLOPE DAC
- SRC ADJUST DACS
- HB FLTR SW on OFF
- RETURN

Adjust DACS Menu
- SLOPE OFFSET DAC
- SQUARE LAW LINEAR DAC
- DETECTOR OFFSET DAC
- LOG OFFSET DAC
- WRITE EEPROM
- RETURN

Instrument Mode Menu
- NETWORK ANALYZER
- EXT SOURCE AUTO
- EXT SOURCE MANUAL
- TUNED RECEIVER
- FREQ OFFS MENU
- RETURN

Frequency Offset Menu
- FREQ OFFS on OFF
- LO MENU
- DOWN CONVERTER
- UP CONVERTER
- RF > LO
- RF < LO
- VIEW MEASURE
- RETURN

LO Menu
- FREQUENCY: CW
- SWEEP
- POWER: FIXED
- SWEEP
- LO CONTROL on OFF
- LO SOURCE ADDRESS
- VIEW MEASURE
- RETURN

Harmonic Mode Menu
- HARMONIC OFF
- SECOND
- THIRD
- RETURN

Service Menu
- TESTS
- TEST OPTIONS
- SELF DIAGNOSIS
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Tests Menu
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- SYS VER TESTS
- ADJUSTMENT TESTS
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- RETURN

Test Options Menu
- CONTINUE TEST
- REPEAT on OFF
- RECORD on OFF
- LIMITS [NORM]
- PWR LOSS on OFF
- LOSS / SENSR LISTS
- DUMP GRAPH on OFF
- RETURN

Service Modes Menu
- FRACN TUNE on OFF
- SRC ADJUST MENU
- SOURCE PLL on OFF
- PLL AUTO ON off
- PLL DIAG on OFF
- PLL PAUSE [CONT]
- MORE
- RETURN

Peek / Poke Menu
- PEEK / POKE ADDRESS
- PEEK
- POKE
- RESET MEMORY
- RETURN

Serve Mode More Menu
- SAMPLE COR ON off
- IF GAIN AUTO
- IF GAIN ON
- IF GAIN OFF
- SPUR TEST on OFF
- STORE EEPR on OFF
- SPUR AVOID ON off
- RETURN

* Only appears on instruments equipped with Option 010.

** Only appears on instruments equipped with Option 002.

*** Service menu key descriptions are located in the 8753D Option 011 Network Analyzer Service Guide.

**** Loss appears thru the power loss path.

***** Only appears on instruments equipped with Option K36.

****** Only appears on instruments equipped with Option K39.

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Hardkey/Softkey Reference

Analyzer Functions

Existing Softkeys

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

ADD	**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. **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.
CLEAR LIST	deletes all segments or bands in the list.
DELETE	deletes the segment or the frequency band indicated by the > pointer.
MAXIMUM FREQUENCY	is used to: **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. *or* **2)** set the maximum frequency of the selected frequency band when setting up ripple test parameters.
MINIMUM FREQUENCY	is used to: **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**). *or* **2)** set the minimum frequency of the selected frequency band when setting up ripple test parameters.

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	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 *N dB Points* where "*N*" 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.)

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).

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**.

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.

Supplement for the Reference Guide (Firmware Revision 7.66)
Hardkey/Softkey Reference

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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/8753

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 (Firmware Revision 7.66)

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 *N dB Point*, 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
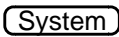
`BWLIMMAX<num>[HZ|KHZ|MHZ|GHZ];` *or* `BWLIMMAX?;`

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	(System)	**MAXIMUM BANDWIDTH**

BWLIMMIN

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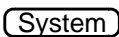
`BWLIMMIN<num>[HZ|KHZ|MHZ|GHZ];` *or* `BWLIMMIN?;`

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	(System)	**MINIMUM BANDWIDTH**

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
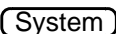
Syntax

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	(System)	**BW TEST on OFF**

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
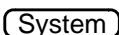
Syntax

CLER;

Description

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

Front Panel Equivalents

Command	Hardkey	Softkey
CLER	(System)	**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	(System)	**EDIT RIPL LIMIT**

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	$<0\,\vert\,1><^L_F>$
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
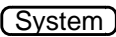
Syntax

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	(System)	**RIPL LIMIT on OFF**
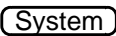
RLIMM

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	(System)	**MAXIMUM RIPPLE**

RLIMSTP

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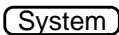
RLIMSTP<num>[HZ│KHZ│MHZ│GHZ];   *or*   RLIMSTP?;

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	(System)	**MAXIMUM FREQUENCY**

RLIMSTR

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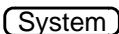
RLIMSTR<num>[HZ│KHZ│MHZ│GHZ];   *or*   RLIMSTR?;

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	(System)	**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/Recall)	**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/Recall)	**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

4 Supplement for the User's Guide (Firmware Version 7.68)

Using This Chapter

This chapter contains the supplemental information changes to the user's guides that coincide with the release of firmware revision 7.68. These changes pertain to the following user's guides.

- 8753ET and 8753ES Network Analyzers User's Guide (part number 08753-90472)

- 8753ES Option 011 Network Analyzer User's Guide (part number 08753-90479)

IMPORTANT If you are upgrading your firmware from a revision prior to revision 7.66, add the information changes from Chapter 1 , "Supplement for the User's Guide (Firmware Version 7.66)," before adding the changes from this chapter.

The following list describes the changes to 8753ET and 8753ES user's guides printed prior to February 2001. 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 Mixer Measurements Chapter

  — Change the ADDRESS: P MTR/HPIB softkey to ADDRESS: P MTR/GPIB and the PERIPHERAL HPIB ADDR softkey to PERIPHERAL GPIB ADDR . Refer to "Conversion Loss Using the Frequency Offset Mode," "High Dynamic Range Swept RF/IF Conversion Loss," and "Fixed IF Mixer Measurements" on page 4-4.

- Printing, Plotting, and Saving Measurement Results Chapter

  — Replace the section titled "Saving an Instrument State" with the revised section on page 4-5.

- Calibrating for Increased Measurement Accuracy Chapter

  — Append a note regarding the 85032F Calibration Kit after the displayed paragraph shown in "Clarifying Type-N Connector Sex" of the "Calibration Considerations" section. See page 4-7.

  — Append a paragraph referencing ECal modules after the three paragraphs displayed in "The Calibration Standards" of the "Calibration Considerations" section. See page 4-7.

  — Add information regarding the Enhanced Reflection feature to the Enhanced Response row of the "Purpose and Use of Different Error Correction Procedures" table. See page 4-8.

  — Replace the section titled "Enhanced Frequency Response Error Correction" with the revised section. See page 4-9.

  — Change the ADDRESS: P MTR/HPIB softkey to ADDRESS: P MTR/GPIB . Refer to "Power Meter Measurement Calibration" on page 4-13.

  — Replace the subsection titled "Modify the Cal Kit Thru Definition" (part of the "Calibrating for Noninsertable Devices" section) with the revised section. See page 4-15.

— Add two new sections ("Calibrating Using Electronic Calibration (ECal)" starting on page 4-17 and "Adapter Removal Using ECal (ES Analyzers Only)" starting on page 4-29) to the end of the chapter.

- Operating Concepts Chapter

  — Append the Enhanced Reflection Calibration information to the end of the subsection titled "Enhanced Response Calibration" (part of the "Calibration Routines" section). See page 4-37.

  — Append the subsection titled "ECal" to the end of the section titled "Calibration Routines." See page 4-37.

- Safety and Regulatory Information Chapter

  — Replace the warning describing the line fuse type and rating with a revised warning in the "Servicing" subsection of "Safety Considerations." See page 4-39.

Conversion Loss Using the Frequency Offset Mode

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

In Step 2 of this section, change the ADDRESS: P MTR/HPIB softkey to
ADDRESS: P MTR/GPIB .

High Dynamic Range Swept RF/IF Conversion Loss

Perform a Power Meter Calibration Over the IF Range

In Step 4 of this section, change the ADDRESS: P MTR/HPIB softkey to
ADDRESS: P MTR/GPIB .

Fixed IF Mixer Measurements

Sequence 1 Setup

Performing a Response Calibration

Change the PERIPHERAL HPIB ADDR softkey to PERIPHERAL GPIB ADDR in two
places in this section.

Addressing and Configuring the Two Sources

Change the PERIPHERAL HPIB ADDR softkey to PERIPHERAL GPIB ADDR in three
places in this section.

Sequence 2 Setup

Incrementing the Source Frequencies

Change the PERIPHERAL HPIB ADDR softkey to PERIPHERAL GPIB ADDR in two
places in this section.

Saving an Instrument State

1. Press (Save/Recall) **SELECT DISK** and select one of the storage devices:

   ❑ **INTERNAL MEMORY**

   ❑ **INTERNAL DISK**

   ❑ **EXTERNAL DISK** connect an external disk drive to the analyzer's GPIB connector, and configure as follows:

   a. Connect an external disk drive to the analyzer's GPIB connector, and configure as follows:

   b. Press (Local) **DISK UNIT NUMBER** and enter the drive where your disk is located, followed by (x1).

   c. If your storage disk is partitioned, press **VOLUME NUMBER** and enter the volume number where you want to store the instrument state file.

   d. Press **SET ADDRESSES** **ADDRESS: DISK**.

   e. Enter the GPIB address of the peripheral, if the default address is incorrect (default = 00). Follow the entry by pressing (x1).

   f. Press (Local) and select one of the following:

      — **SYSTEM CONTROLLER** allows the analyzer to control peripherals directly.

      — **TALKER/LISTENER** allows the computer controller to be involved in all peripheral access operations.

      — **USE PASS CONTROL** allows you to control the analyzer over GPIB and also allows the analyzer to take or pass control.

2. Press (Save/Recall) **SAVE STATE**.

   The analyzer saves the state in the next available register, if you are saving to internal memory, or saves the state to disk. Although one file is shown to represent an instrument state on the analyzer display, each instrument state is composed of numerous files (which can be viewed on a PC).

NOTE   If you have saved enough files that you have used all the default names (FILE00 – FILE31 for disk files, or REG1 – REG31 for memory files), you must do one of the following to save more states:

   • use another disk

   • rename an existing file to make a default name available

   • re-save a file/register

   • delete an existing file/register

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Calibration Considerations

Clarifying Type-N Connector Sex

When you are performing error correction for a system that has type-N 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. Since many devices have type-N (f) connectors, the calibration standard to select is the type-N (m). Be sure to use the port extension pin on the type-N (m) Open calibration standard.

NOTE	Since the 85032F calibration kit offsets are equal for both male and female connectors, the standard's sex type is not requested during the calibration.

The Calibration Standards

During measurement calibration, the analyzer measures actual, well-defined standards and mathematically compares the results with ideal "models" of those standards. The differences are separated into error terms which are later removed during error correction. Most of the differences are due to systematic errors—repeatable errors introduced by the analyzer, test set, and cables—which are correctable.

The standard devices required for system calibration are available in compatible calibration kits with different connector types. Each kit contains at least one short circuit, one open circuit, and an impedance-matched load. In kits that require adapters for interface to the test set ports, the adapters are phase-matched for calibration prior to measurement of non-insertable and non-reversible devices. Other standard devices can be used by specifying their characteristics in a user-defined kit, as described in the "Modifying Calibration Kits" section of Chapter 7, "Operating Concepts."

The accuracy improvement of the correction is limited by the quality of the standard devices, and by the connection techniques used. For maximum accuracy, ensure that the connectors are clean and use a torque wrench for final connections.

Electronic calibration (ECal) modules serve as the calibration standards for electronic calibration procedures. ECal modules are electronic networks that simulate impedance states that are similar to mechanical standards. The factory error correction for optimum performance is embedded in the module's memory.

Procedures for Error Correcting Your Measurements

Types of Error Correction

Purpose and Use of Different Error Correction Procedures

Correction Procedure	Corresponding Measurement	Errors Corrected	Standard Devices
Enhanced Response and Enhanced Reflection	Transmission or reflection measurement when improved accuracy is desired. Not as accurate as 2-port calibration.	Directivity, source match, and frequency response for reflection. Frequency response, source match, and isolation for transmission. Enhanced reflection corrects for load match on bilateral devices.	Short, open, load, and thru or ECal module.

Enhanced Frequency Response Error Correction

The enhanced frequency response error correction removes the following errors in the forward direction in ET models or in both the forward and reverse directions in ES models:

- removes directivity errors of the test setup

- removes source match errors of the test setup

- removes isolation errors of the test setup (optional)

- removes frequency response of the test setup

The enhanced reflection error correction may be used to remove load match from the test setup when measuring bilateral devices. Enhanced reflection terms are mathematically derived during all enhanced response calibrations but are not applied unless initiated by the **ENH. REFL. on OFF** softkey. Enhanced reflection correction is applied *after* the enhanced frequency response error correction is finished.

IMPORTANT Use enhanced reflection error correction only on bilateral devices. A bilateral device has similar forward and reverse transmission characteristics. Examples of bilateral devices are passive devices (filters, attenuators, and switches). Most active devices (amplifiers) and some passive devices (isolators and circulators) are not bilateral. If this error correction is used for a non-bilateral device, errors will occur in the resulting measurement.

---

1. Press **(Preset)**.

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

   ❏ If you want to make measurements in the forward direction (S_{21} S_{11}), press:

   (Meas) **Trans: FWD S21 (B/R)** or on ET models: **TRANSMISSN**

   ❏ For ES analyzers, if you want to make measurements in the reverse direction (S_{12} S_{22}), press **(Meas)** **Trans: REV S12 (A/R)**.

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

4. To access the measurement correction menus, press **(Cal)**.

5. If your calibration kit is different than the kit specified under the **CAL KIT [ ]** softkey, press **CAL KIT** **SELECT CAL KIT**, then select your type of kit, and press **RETURN**.

   If your type of calibration kit is not listed in the displayed menu, refer to the "Modifying Calibration Kits" section in this chapter.

6. To select the correction type, press $\boxed{\text{CALIBRATE MENU}}$ $\boxed{\text{ENHANCED RESPONSE}}$ and select the correction type.

❏ If you want to make measurements in the forward direction, press:

$\boxed{\text{S11/S21 ENH. RESP.}}$ or on ET models: $\boxed{\text{TRAN/REFL ENH. RESP.}}$

❏ For ES analyzers, if you want to make measurements in the reverse direction, press:

$\boxed{\text{S22/S12 ENH. RESP.}}$

7. Connect a shielded open circuit to PORT 1 (or PORT 2 for reverse measurements).

NOTE   Include any adapters that you will have in the device measurement. That is, connect the standard to the particular connector where you will connect your device under test.

Figure 4-1 8753ET/ES Standard Connections for Enhanced Response Calibration
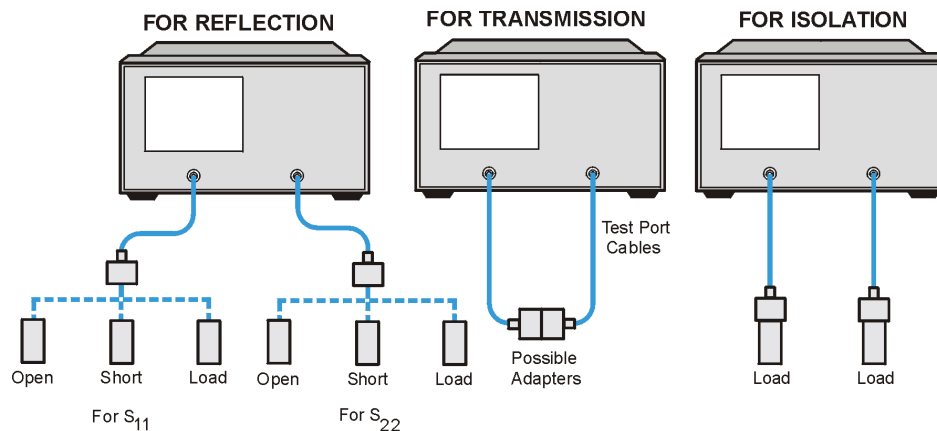
Figure 4-2 8753ES Option 011 Standard Connections for Enhanced Response Calibration

---
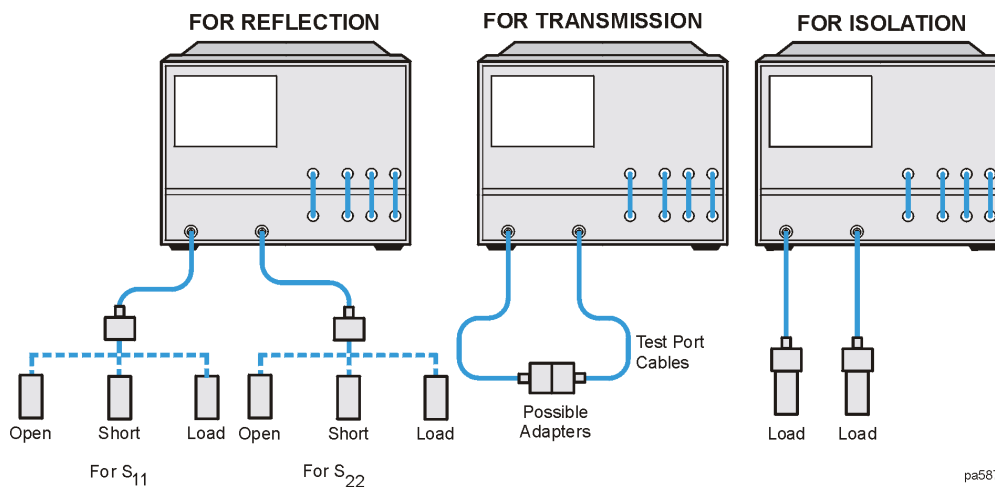
8. To measure the standard, when the displayed trace has settled, press **OPEN** .

    The analyzer displays `WAIT - MEASURING CAL STANDARD` during the standard measurement. The analyzer underlines the **OPEN** softkey after it measures the standard.

9. Disconnect the open, and connect a short circuit to the test port.

10. To measure the device, when the displayed trace has settled, press **SHORT** .

    The analyzer measures the short circuit and underlines the **SHORT** softkey.

11. Disconnect the short, and connect an impedance-matched load to the test port.

12. To measure the standard, when the displayed trace has settled, press **LOADS** , select the type of load you are using, and then press **DONE: LOADS** when the analyzer has finished measuring the load.

    Notice that the **LOADS** softkey is now underlined.

13. To compute the reflection correction coefficients, press **STANDARDS DONE** .

14. To start the transmission portion of the correction, press **TRANSMISSION** .

15. Make a "thru" connection between the points where you will connect your device under test as shown in Figure 4-1 (or Figure 4-2).

NOTE   Include any adapters or cables that you will have in the device measurement. That is, connect the standard device where you will connect your device under test.

NOTE   The thru in most calibration kits is defined with zero length. The correction will *not* work properly if a non-zero length thru is used, unless the calibration kit is modified to change the defined thru to the length used. This is important for measurements of non-insertable devices (devices having ports that are both male or both female). The modified calibration kit must be saved as the user calibration kit, and the **USER KIT** softkey must be selected before the calibration is started.

---

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

    FWD TRANS THRU or **REV TRANS THRU**

    STANDARDS DONE

    The analyzer underlines the softkey label after it makes each measurement.

17. 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 the test ports. Include the adapters that you would include for your device measurement.

NOTE   If you will be measuring highly reflective devices such as filters, use the test device, connected to the reference plane and terminated with a load, for the isolation standard.

---

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

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

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

18. To compute the error coefficients, press **DONE ENH RESP CAL** .

The analyzer displays the corrected measurement trace. The analyzer also shows the notation Cor at the left of the screen, indicating that error correction is on.

Enhanced Reflection Calibration

19. If you are measuring a bilateral device and want to remove the load match error, activate the enhanced reflection calibration by pressing **ENHANCED RESPONSE** and then pressing **ENH. REFL. on OFF** until ON is selected.

NOTE   You can save or store the measurement correction to use for later measurements. Refer to Chapter 4, "Printing, Plotting, and Saving Measurement Results" for procedures.

---

20. This completes the enhanced response correction procedure. You can connect and measure your device under test.

Power Meter Measurement Calibration

Using Sample-and-Sweep Correction Mode

Change the `ADDRESS: P MTR/HPIB` softkey to `ADDRESS: P MTR/GPIB` in the following location:

• Step 4 of "Using Sample-and-Sweep Correction Mode"

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Calibrating for Noninsertable Devices

Modify the Cal Kit Thru Definition

With this method, it is only necessary to use a thru adapter. The calibration kit thru definition is modified to compensate for the adapter and then saved as a user kit. However, the electrical delay of the adapter must first be found. The adapter match will degrade the effective load match terms on both ports as well as degrade the transmission frequency response (tracking).

1. Refer to Figure 4-3 (or Figure 4-4) while performing the steps in this procedure. Also refer to the "Adapter Removal" subsection (part of the "Calibrating for Noninsertable Devices" section) for an explanation of A1, A2, and A3.

2. Perform a 1-port calibration at "Reference Port 1." Refer to Step A of Figure 4-3 (or Figure 4-4).

Figure 4-3   8753ET/ES Determining the Electrical Delay Setup
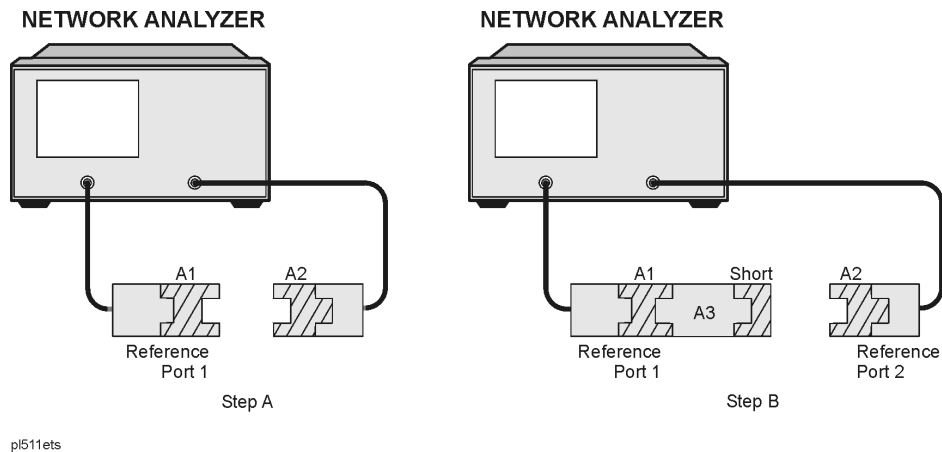
Figure 4-4   8753ES Option 011 Determining the Electrical Delay Setup
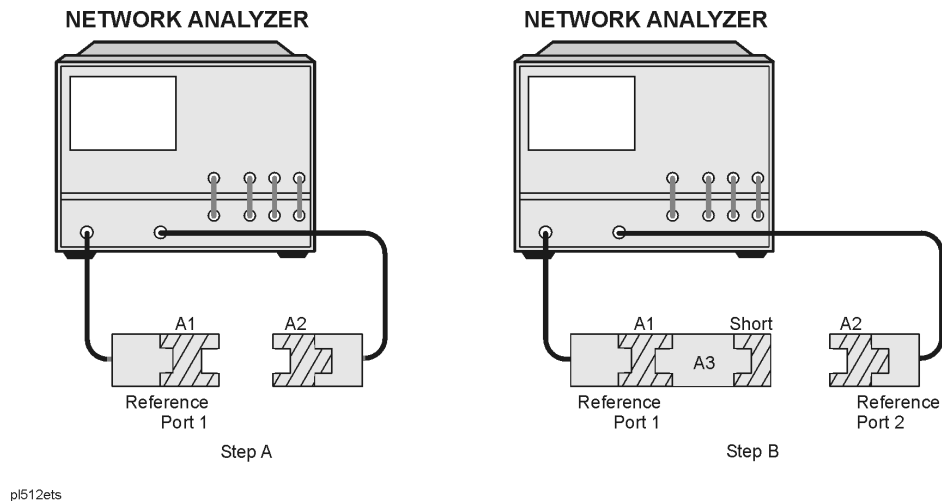
3. Connect the A3 adapter to "Reference Port 1" as shown in Step B of Figure 4-3 (or Figure 4-4). Connect a short to the open end of the A3 adapter.

4. Measure the delay of the adapter by pressing (Format) **DELAY**.

5. Divide the resulting delay measurement by 2 to determine the delay of the thru and the short in one direction.

6. Determine the offset delay of the calibration short by examining the define standard menu (see the "Define Standard Menus" section in Chapter 7).

7. Subtract the offset delay of the short (determined in step 6) from the delay of the thru and the short in one direction (determined in step 5). The result is electrical delay of the thru. This value is used in the next step.

8. Modify the calibration kit thru definition by entering in the electrical delay of adapter A3. Save this as a user kit.

   For example, if A3 has 100 ps of delay, press:

   (Cal) **CAL KIT** **MODIFY** **DEFINE STANDARD** (4) (x1)

   MODIFY STD DEFINITION **SPECIFY OFFSET** **OFFSET DELAY** (0.100) (G/n)

   STD DONE (DEFINED) **RETURN** **KIT DONE (MODIFIED)** **SAVE USER KIT**

9. Perform the desired calibration with this new user kit.

10. Connect the test device as shown in the figure titled "Calibrated Measurement" (in the "Adapter Removal" subsection of the "Calibrating for Noninsertable Devices" section) and measure the device.

Calibrating Using Electronic Calibration (ECal)

This section describes Electronic Calibration (ECal).

Use the following steps to perform the calibration.

1. Set up the measurement for which you are calibrating. Refer to "Set Up the Measurement."

2. Connect the ECal equipment. Refer to "Connect the ECal Equipment" on page 4-18.

3. Select the ECal options. Refer to "Select the ECal Options" on page 4-20.

4. Perform the calibration. Refer to "Perform the Calibration" on page 4-21.

5. Perform the confidence check. Refer to "Perform the Confidence Check" on page 4-24.

Set Up the Measurement

1. Press (Preset).

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

   ❏ If you want to make a reflection measurement on PORT 1 (in the forward direction, S_{11}), leave the instrument default setting or press:

   (Meas) **Refl: FWD S11 (A/R)** or on ET models: **REFLECTION**

   ❏ If you want to make a transmission measurement in the forward direction (S_{21}), press:

   (Meas) **Trans: FWD S21 (B/R)** or on ET models: **TRANSMISSN**

   ❏ For ES analyzers, if you want to make a transmission measurement in the reverse direction (S_{12}), press:

   (Meas) **Trans: REV S12 (A/R)**

   ❏ For ES analyzers, if you want to make a reflection measurement on PORT 2 (in the reverse direction, S_{22}), press:

   (Meas) **Refl: REV S22 (B/R)**

3. Set any other measurement parameters that you want for the device measurement: frequency, span, power, sweep type, number of points, or IF bandwidth.

Connect the ECal Equipment

1. Connect the power supply to the PC interface unit. Refer to Figure 4-5 (or Figure 4-6).

Figure 4-5   8753ET/ES ECal Setup
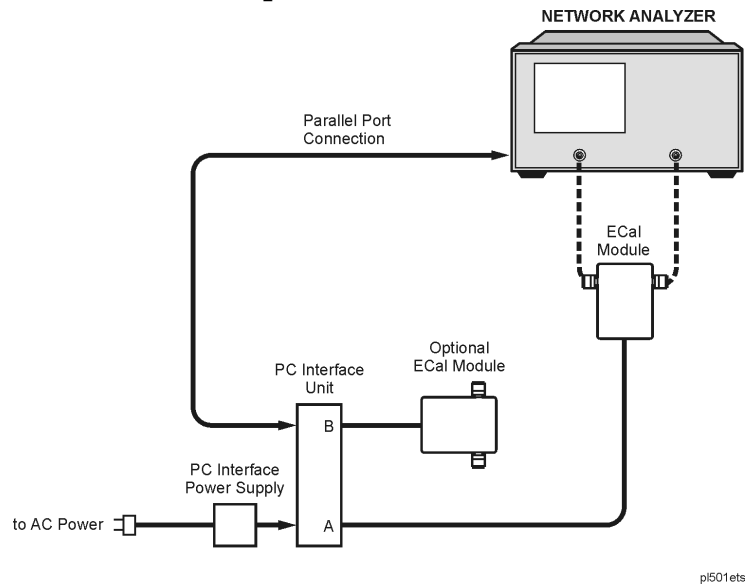
Figure 4-6   8753ES Option 011 ECal Setup
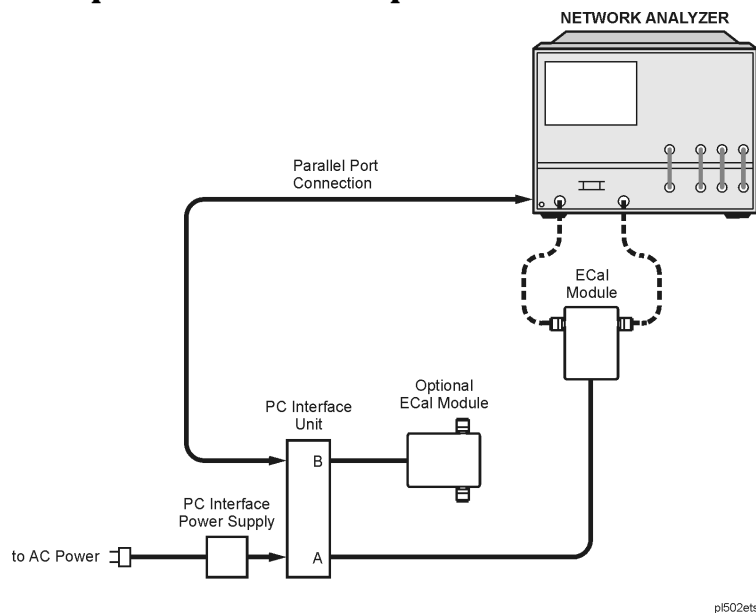
2. Connect the power supply to the ac source.

3. Connect one end of a DB25 cable to the Parallel Port connector on the rear of the network analyzer. Connect the other end of the DB25 cable to the connector on the PC interface unit labeled "DB25 Interface to Parallel Interface on Personal Computer."

CAUTION	Only connect the DB25 cable to the ***Parallel Port*** connector of the network analyzer.
	If the cable is connected to the Test Set - I/O Interconnect connector, damage to the PC interface unit could occur.

NOTE	For steps 3 through 5, use the three DB25 cables (part number 8120-8710) shipped with the 85097A Electronic Calibration System. Other cables may not give reliable results.

4. Connect one end of a DB25 cable to the connector on the PC interface unit labeled "DB25 Interface to ECal Module A." Connect the other end of the DB25 cable to the parallel cable connector on the ECal module.

5. If you need to calibrate with a second ECal module, connect one end of another DB25 cable to the connector on the PC interface unit labeled "DB25 Interface to ECal Module B." Connect the other end of the DB25 cable to the parallel cable connector on the ECal module.

NOTE	Why Use a Second ECal Module?
	If the frequency span of the measurement that you set up earlier exceeds the span of a single ECal module, you need to use another ECal module whose frequency range allows the rest of the measurement span to be calibrated. The frequency range of the ECal modules is listed in the "General Information" chapter of the 85097A Electronic Calibration System User's Guide.

6. Using an RF cable (or a microwave cable, as appropriate), connect one port of the ECal module to test port 1 of the analyzer. Refer to Figure 4-5 (or Figure 4-6).

CAUTION	RF ECal modules can be damaged if you apply excessive torque to the connectors. Do not exceed the recommended torque indicated in the Electronic Calibration Module Reference Guide (part number 85091-90009).

NOTE	It is not critical which ECal module port (Port A or Port B) is connected to the network analyzer test ports. The network analyzer detects where each ECal module port is connected and uses the appropriate module data. If Port A is connected to Port 1 of the analyzer, the calibration will be performed slightly faster.

7. Using an RF cable (or a microwave cable, as appropriate), connect the other port of the ECal module to test port 2 of the analyzer.

Select the ECal Options

In addition to the standard ECal method, there are two options that you may want to use when performing the electronic calibration. They are:

- ECal using a manual thru

  Calibration using a **manual thru** is more accurate than calibrating using the thru internal to the ECal module. (A zero-length thru is created by connecting the two test port cables together.) The improved loss of the manual thru compared to the ECal module's thru, increases the accuracy of other error terms in the correction. The accuracy of the overall calibration is improved. Manual thrus can only be used with ECal modules having connectors of the opposite sex.

- ECal using isolation averaging

  During the isolation measurement portion of ECal, you are actually measuring instrument crosstalk. Typically, the data during this measurement is near the noise floor. (See also the "Omitting Isolation Calibration" in Chapter 6, "Calibrating for Increased Measurement Accuracy" in the user's guide.)

  When the crosstalk is near (or in) the noise floor, one way to reduce the noise is to turn on the isolation averaging. When the random noise of the instrument is averaged, its magnitude declines. As the energy of the trace is averaged, the displayed data becomes smoother. When the random noise is reduced, the network analyzer display shows the non-random crosstalk data.

NOTE   If you are performing an ECal using two modules, selecting either option sets up the option to be performed with both modules.

To Select the Manual Thru Calibration Option

1. To select the manual thru calibration option, press (Cal) **ECal MENU** **CONFIGURE [ ]** .

2. Press **MAN'L THRU on OFF**   until **ON** is selected.

3. Press **RETURN** .

4. Continue with step 2 of .

To Select the Isolation Calibration Option

1. To select the isolation calibration option, press (Cal) **ECal MENU**   **CONFIGURE [ ]** .

2. Press **OMIT ISOLATION ON off**   until **OFF** is selected.

   The isolation measurement is normally off. Therefore, the default setting for the **OMIT ISOLATION ON off** softkey is **ON**. When isolation is *not* omitted (**OMIT ISOLATION on OFF**), isolation standards are measured.

3. Press **ISOLATION AVERAGES** , enter the isolation averages numeric value on the front panel keypad, and then press (x1).

NOTE   The isolation averaging default is set to take 10 sweeps. This isolation
              averaging value is less than the network analyzer default sweep averaging
              value of 16.

---

4. Press **RETURN** .

5. Continue with step 2 of "Perform the Calibration."

Perform the Calibration

1. Press (Cal) **ECal MENU** .

   When ECal is first selected (or when you select module A or module B), there is a small
   initial delay so that the network analyzer can detect and download the calibration
   information from the internal memory of the ECal module.

2. Press **MODULE A b**   so that A is selected.

NOTE   If you are calibrating with two modules, the overlapping frequency span will
              be determined by the second module. Therefore, if you want to use the
              calibration data of Module A in the overlapping frequency span, calibrate
              using Module B first, and then calibrate using Module A.

---

3. Press the ECal calibration selection.

   • The calibration choices for ES models are:

     — **S11 1-PORT** performs a measurement calibration for reflection-only. Measures
       of one-port devices or properly terminated two-port devices, at port 1 of an
       S-parameter test set.

     — **S22 1-PORT** performs a measurement calibration for reflection-only. Measures
       of one-port devices or properly terminated two-port devices, at port 2 of an
       S-parameter test set.

     — **FULL 2-PORT**   performs a complete calibration for measurement of all four
       S-parameters of a two-port device. This is the most accurate calibration for
       measurements of two-port devices.

     — **S11/S21 ENH. RESP.** performs an S11 and S21 enhanced response calibration
       (forward direction). Enhanced response generates a 1-port cal for S11 and an
       improved calibration over the response cal for S21.

     — **S22/S12 ENH. RESP.**   performs an S22 and S12 enhanced response calibration
       (reverse direction). Enhanced response generates a 1-port cal for S22 and an
       improved calibration over the response cal for S12.

   • The calibration choices for ET models are:

     — **REFLECTION 1-PORT** performs a reflection 1-port calibration.

— **TRANS/REFL ENH. RESP.** performs a transmission (same as S21) and reflection (same as S11) enhanced response calibration (forward direction). Enhanced response generates a 1-port cal for reflection and an improved calibration over the response cal for transmission.

Once the ECal calibration selection is made, the network analyzer performs the calibration.

4. If you selected the manual thru calibration option, when the prompt is displayed, remove the ECal module from the setup and connect the manual thru (the two test ports connected together) as shown in Figure 4-7 (or Figure 4-8).

Figure 4-7 8753ET/ES Manual Thru Setup

NETWORK ANALYZER

Parallel Port
Connection

Second
ECal Module

PC Interface
Unit

First
ECal Module

B

PC Interface
Power Supply

to AC Power

A

pl503ets
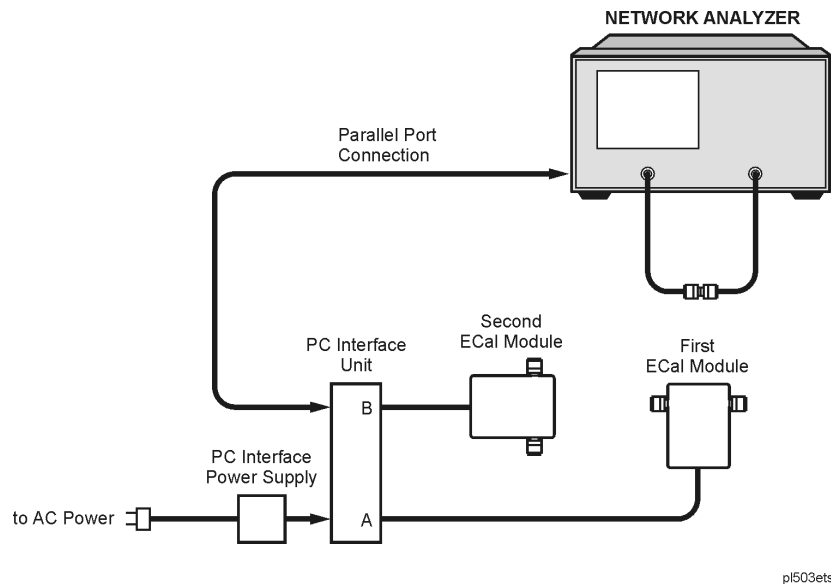
Figure 4-8 8753ES Option 011 Manual Thru Setup

NETWORK ANALYZER

Parallel Port
Connection

Second
ECal Module

PC Interface
Unit

First
ECal Module

B

PC Interface
Power Supply

to AC Power

A

pl504ets
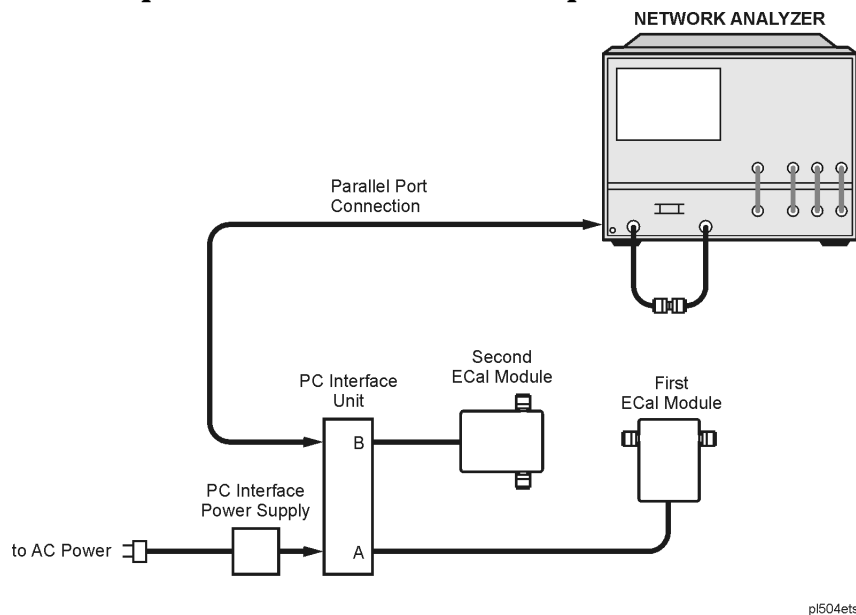
5. After you connect the manual thru, press **CONTINUE ECal** to complete the manual thru portion of the ECal.

6. If you are calibrating using two ECal modules, a prompt is displayed directing you to remove the first module and connect the second module. Follow this prompt as shown in Figure 4-9 (or Figure 4-10).

Figure 4-9   8753ET/ES Connect the Second ECal Module
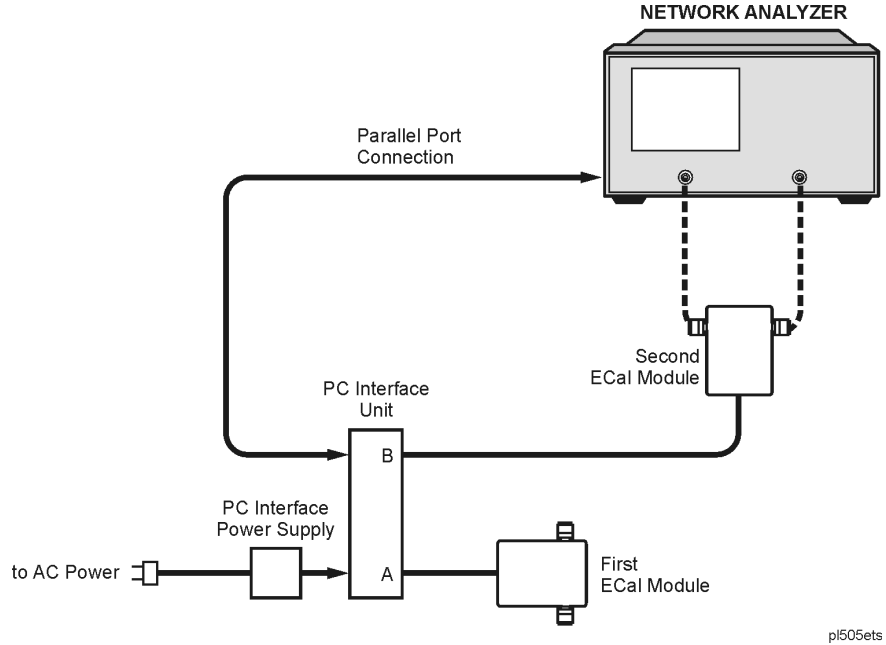
Figure 4-10 8753ES Option 011 Connect the Second ECal Module
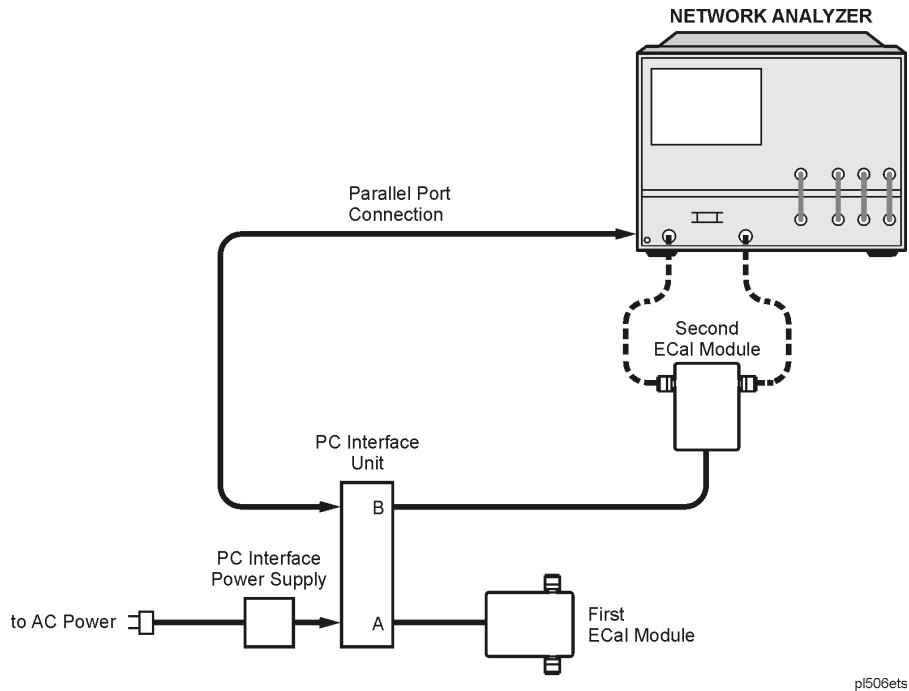
7. After you connect the second ECal module, press **CONTINUE ECal** to continue the ECal.

8. Repeat steps 4 and 5 if you selected to calibrate using the manual thru option.

9. Review the displayed calibration results. Refer to "Perform the Confidence Check" on page 4-24.

10. Save the calibration results by pressing (Save/Recall).

Display the Module Information

Display information about the module by pressing (Cal) **ECal MENU**   **CONFIGURE [ ]**   **MODULE INFO** .

A text window is displayed that contains the following information about the selected module.

1	PC interface unit port to which it is connected		**6**	Number of measurement points
2	Model number		**7**	Start (minimum) frequency
3	Serial number		**8**	Stop (maximum) frequency
4	Connector type		**9**	Suggested warmup time
5	Date of last certification		**10**	Warmup status (This is the remaining time on an internal analyzer timer. The timer simply counts down the recommended ECal module warmup time. When the timer reaches zero, a message is displayed indicating that the ECal module is ready. The ECal module temperature or status is *not* read. The timer is reset when the analyzer is powered up or preset or when a new module is attached.)

Perform the Confidence Check

The confidence check is a means of visually checking the quality of the calibration. The confidence check displays the currently measured data (DATA trace) and the factory-premeasured data (MEM trace) for the module's confidence state. The confidence state, an independent reference standard, was not used for the calibration. For a good calibration measurement, there should be no significant difference between the traces (see Figure 4-11).

To Perform the Confidence Check

NOTE   A confidence check is only valid after an ECal has been performed.

---

1. Press (Cal) **ECal MENU**   **CONFIGURE [ ]** .

2. Press **MODULE A b**   until the correct module (A or B) is selected.

3. Select CONFIDENCE CHECK to display the confidence check and the ECal Confidence Menu.

4. Press PARAMETER [ ] until the S-parameter that you want to view is displayed.

   Pressing the PARAMETER [ ] softkey toggles between the **S11**, **S21**, **S12**, and **S22** (or for the ET models, **TRANS** (transmission) and **REFL** (reflection)) calibration traces. The confidence check will only display the S-parameter calibration data for which you calibrated. Uncalibrated S-parameter data traces are invalid. The memory trace still displays the module's factory-premeasured trace.

   For example,

If you performed:	You can view:
A 1-port calibration • S11 1-PORT (ES models) • S22 1-PORT (ES models) • REFLECTION 1-PORT (ET models)	Only one calibrated S-parameter
An enhanced response calibration • S11/S21 ENH. RESP. (ES models) • S22/S12 ENH. RESP. (ES models) • TRANS/REFL ENH. RESP. (ET models)	Only two calibrated S-parameters, one at a time
A full 2-port calibration • FULL 2-PORT (ES models)	All four calibrated S-parameters, one at a time

5. Press TRACE TYPE [ ] until the calibration confidence check trace that you want to view is displayed.

   Pressing the TRACE TYPE [ ] softkey toggles between the five trace-type display options. The confidence check can display the measured ECal results (DATA) and the premeasured calibration data (MEM) in following five ways.

   • **DATA&MEM** displays two traces representing the measured ECal results and module's premeasured calibration data trace.

   • **DATA/MEM** displays a single trace representing the ratio of the measured ECal results to the module's premeasured calibration data.

   • **DATA-MEM** displays a single trace representing the difference between the measured ECal results and the module's premeasured calibration data.

   • **DATA** displays a single trace representing only the measured ECal results.

   • **MEM** displays a single trace representing only the module's premeasured calibration data.

6. If you want to change the scale of the display, press **AUTO SCALE** .

   The **AUTO SCALE** softkey is located in this menu for convenience in viewing the confidence check data. It acts the same as **AUTO SCALE** under the (Scale Ref) key.

7. Review the confidence check display.

Figure 4-11 Confidence Check Display showing DATA&MEM Trace Type
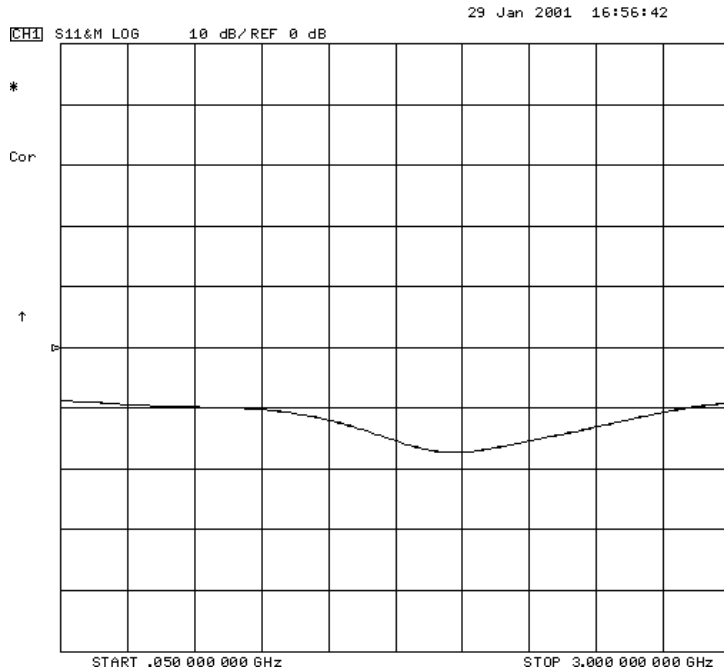
8. If you want to check other calibration S-parameters or trace types, repeat steps 4 through 7.

9. When finished, select **RETURN** to complete the confidence check.

Investigating the Calibration Results Using the ECal Service Menu

CAUTION   The confidence check described in the previous section displays the ECal data of a single state. This confidence state is a calibrated standard *not* used during ECal. It is provided to give an independent assessment of the quality of a calibration. In the Ecal Service menu, you may also display each of the calibration standards which are used during an ECal calibration, along with the analyzer's measurement of those standards.

You may notice a difference in measurement results when comparing ECal confidence state data and ECal standard state data. This result may be related to certain measurement errors with the network analyzer system, which add uncertainty to measurement results. More detailed information regarding measurement uncertainty is documented in the "Determining System Measurement Uncertainties" chapter of the network analyzer's reference guide. Additional information on improving your measurements can be found in Chapter 5, "Optimizing Measurement Results" in the user's guide.

Using the ECal Service menu is not a standard part of the ECal procedure. It is a tool to allow you to identify problems in the calibration equipment, cables, connectors, or procedures.

The Confidence Check menu supports the comparison of the measured data versus the module's premeasured calibration data for the confidence state. The ECal Service menu supports the comparison of the measured data versus the module's premeasured calibration data for the remainder of the module states, in addition to the confidence state.

Access the ECal Service menu by pressing   **ECal SERVICE**   from the Confidence Check menu.

The ECal Service menu softkeys are:

ECal STD [ ]   Toggles the analyzer to show the data for the following calibration states:

- **CONF** (Confidence)
- **THRU**
- **ISOL** (Isolation)
- **S11 REFL** (S11 Reflection)
- **S22 REFL** (S22 Reflection)

REFL STD [ ]   Toggles between the available S11 and S22 reflection states listed in the   **ECal STD [ ]**   softkey described above.

- **S11 REFL** allows up to 13 reflection states.
- **S22 REFL** allows up to 13 reflection states.

NOTE	When there is no premeasured calibration data for a given state and measurement parameter, a warning is displayed indicating that no module date is available.

PARAMETER [ ] Toggles the analyzer to show the data for the following S-parameters:

- **S11** (ES models)
- **S21** (ES models)
- **S12** (ES models)
- **S22** (ES models)
- **RFL** (ET models) - Reflection
- **TRN** (ET models) - Transmission

TRACE TYPE [ ] Toggles through the following trace types:

- **DATA&MEM** displays two traces representing the measured ECal results and the module's premeasured calibration data trace.
- **DATA/MEM** displays a single trace representing a ratio of the measured ECal results to the module's premeasured calibration data.
- **DATA-MEM** displays a single trace representing the difference between the measured ECal results and the module's premeasured calibration data.
- **DATA** displays a single trace representing only the measured ECal results.
- **MEM** displays a single trace representing only the module's premeasured calibration data.

AUTO SCALE Changes scale and reference values to bring the trace data in view on the display. The analyzer determines the smallest possible scale factor that will put all displayed data onto 80% of the vertical graticule. The reference value is chosen to put the trace in center screen.

RETURN Returns to the ECal Confidence Check menu.

NOTE	When returning to the Confidence Check menu from the ECal Service menu, press the **SET CONF STANDARD** softkey on the ECal Confidence Check menu. If this softkey is not pressed, the confidence check information displayed may not be accurate.

Adapter Removal Using ECal (ES Analyzers Only)

A device under test (DUT) whose connectors cannot be connected directly to a test configuration is considered to be a *noninsertable device*. See Figure 4-12 (or Figure 4-13). Noninsertable devices can be caused because the DUT has:

- input or output connectors with the same sex connector as the test configuration.

- input or output connectors of a different connector type than the test configuration.

Figure 4-12 8753ET/ES Noninsertable Device

NETWORK ANALYZER

DUT

Reference
Port 1

Reference
Port 2

pa592e
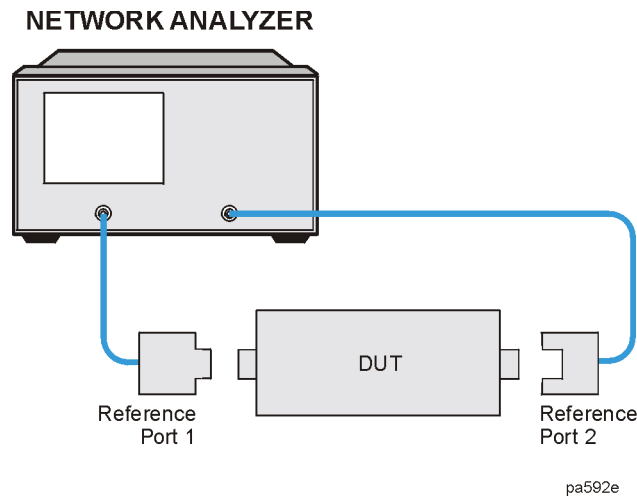
Figure 4-13 8753ES Option 011 Noninsertable Device

NETWORK ANALYZER

DUT

Reference
Port 1

Reference
Port 2

pa593e
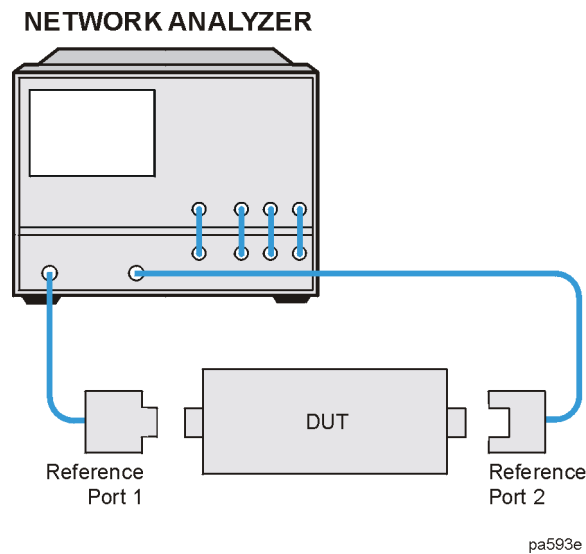
The adapter removal calibration technique may be used with the ECal calibration to accurately measure noninsertable devices. The following adapters (shown in Figure 4-14 or Figure 4-15) are needed.

- Adapter A1, which mates with port 1 of the DUT, must be installed on Port 1 of the analyzer.

- Adapter A2, which mates with port 2 of the DUT, must be installed on Port 2 of the analyzer.

- Adapter A3 must match the connectors on the DUT. The effects of this adapter will be completely removed with this calibration technique.

NOTE   Adapters A1 and A2 become part of the test setup to allow connection to the DUT. Adapter A3 is used during the calibration only. Its effects will be removed.

Figure 4-14 8753ET/ES Adapters Needed
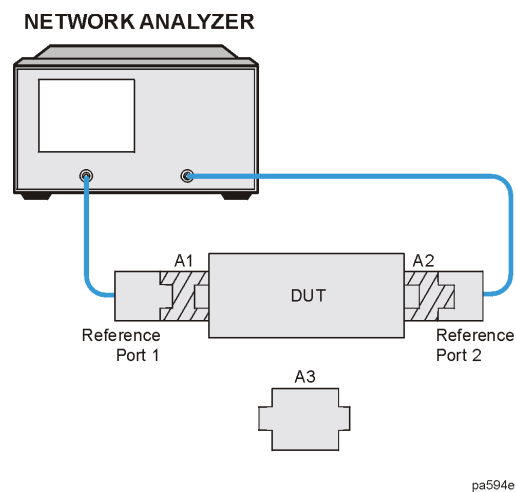
Figure 4-15 8753ES Option 011 Adapters Needed
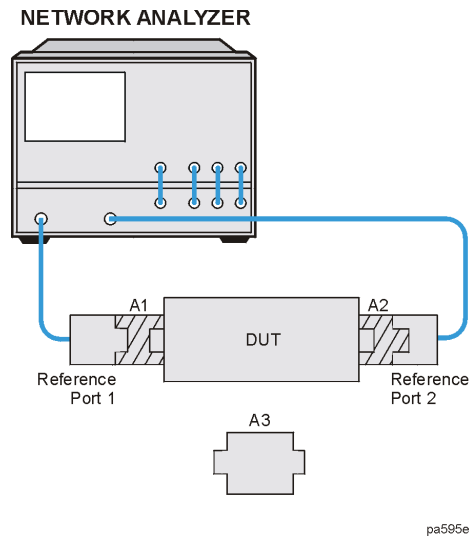
The following requirements must also be met:

• An ECal module for performing a 2-port error correction for each connector type must be available.

• Specified electrical length of adapter A3 within ± 1/4 wavelength for the measurement frequency range.

For each port, a separate 2-port error correction needs to be performed to create two calibration sets. The adapter removal algorithm uses the resultant data from the two calibration sets and the nominal electrical length of the adapter to compute the adapter's actual S-parameters. This data is then used to generate a separate third calibration set in which the forward and reverse match and tracking terms are as if port 1 and port 2 could be connected. This is possible because the actual S-parameters of the adapter are measured with great accuracy, thus allowing the effects of the adapter to be completely removed when the third calibration set is generated.

Perform the 2-Port Error Corrections

1. Connect adapter A3 to adapter A2 on port 2 as shown in Figure 4-16 (or Figure 4-17).

Figure 4-16 8753ET/ES Two-Port Cal Set 1
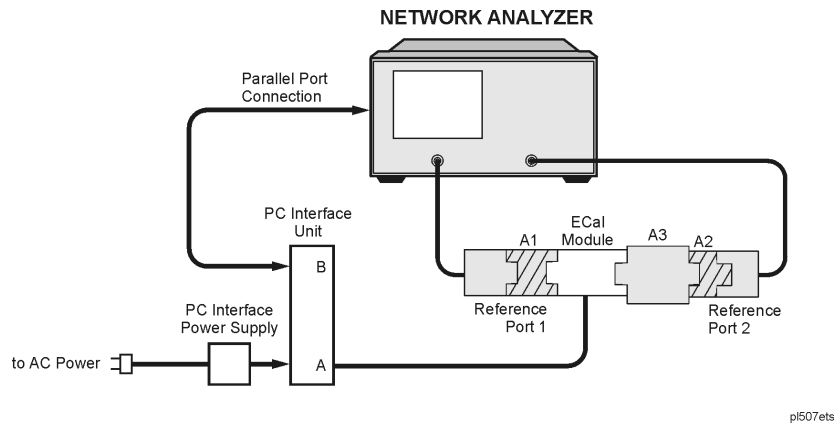
Figure 4-17 8753ES Option 011 Two-Port Cal Set 1
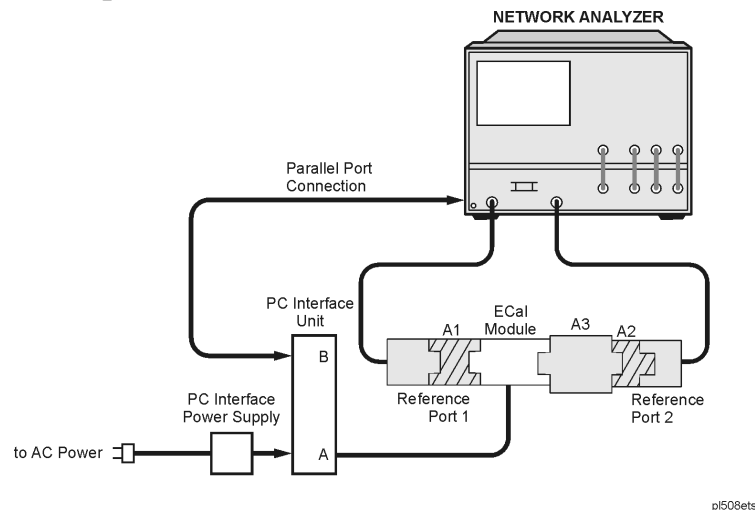
2. Connect the ECal module between adapter A1 and adapter A3.

3. Press ⌈Cal⌉ **ECal MENU** **MODULE A b** .

4. Press **FULL 2-PORT** to perform the first 2-port error correction using the ECal module.

NOTE   When using adapter removal calibration, you must save calibration sets to the internal disk, not to internal memory.

---

5. Save the results to disk. Name the file "PORT1."

6. Remove the ECal module and adapter A3 from the setup. Connect adapter A3 to adapter A1 on port 1 as shown in Figure 4-18 (or Figure 4-19).

Figure 4-18 8753ET/ES Two-Port Cal Set 2
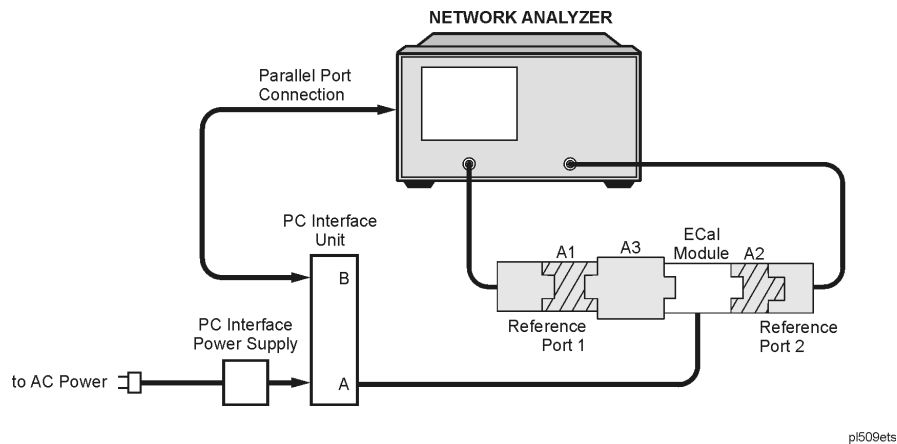
Figure 4-19 8753ES Option 011 Two-Port Cal Set 2
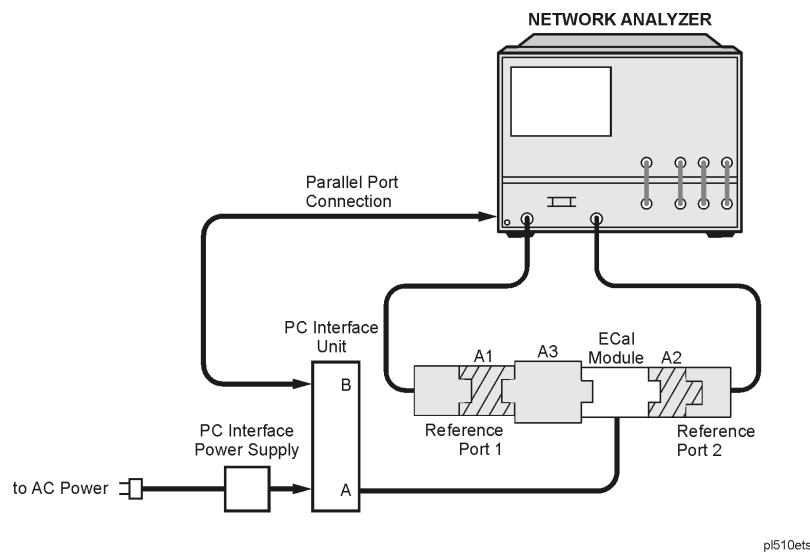
7. Connect the ECal module between adapter A3 and adapter A2.

---

8. Press ⌈Cal⌉ **ECal MENU** .

9. Press **FULL 2-PORT** to perform the second 2-port error correction using the ECal module.

10.Save the results to disk. Name the file "PORT2."

11.Determine the electrical delay of adapter A3. If you have adapter specifications that identify the electrical delay, you may use that information and continue with "Remove the Adapter" on page 4-34. If you do not know the delay of adapter A3, perform the "Determine the Electrical Delay" procedure on page 4-33.

Determine the Electrical Delay

This procedure determines the electrical delay of adapter A3 using a short.

1. Refer to Figure 4-20 (or Figure 4-21) while performing the steps in this procedure.

2. Perform a 1-port calibration at "Reference Port 1." Refer to Step A of Figure 4-20 (or Figure 4-21).

    This 1-port calibration can either be a manual calibration or an ECal.

Figure 4-20 8753ET/ES Determining the Electrical Delay Setup
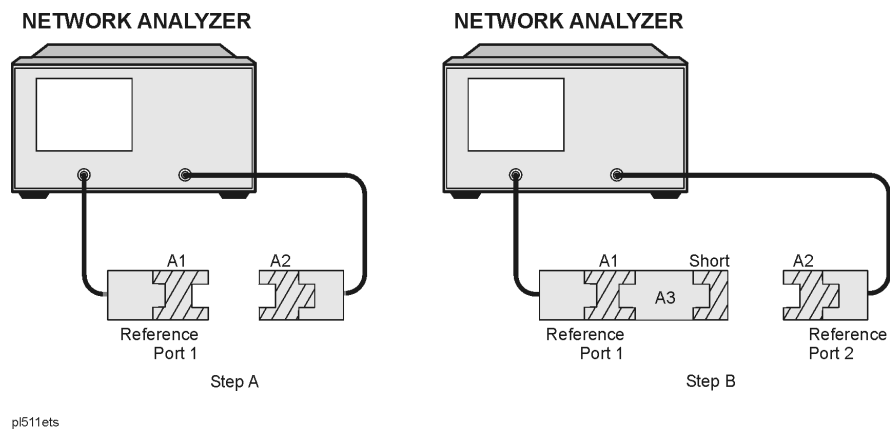
Figure 4-21 8753ES Option 011 Determining the Electrical Delay Setup
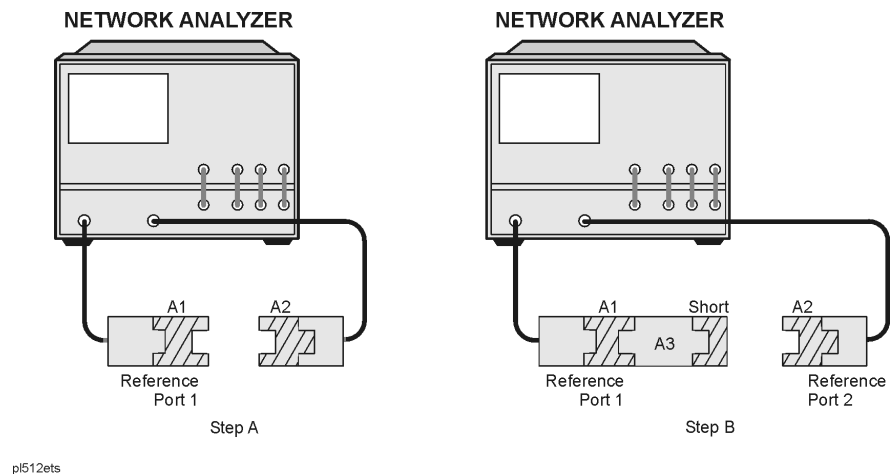
3. Connect the A3 adapter to "Reference Port 1" as shown in Step B of Figure 4-20 (or Figure 4-21). Connect a short to the open end of the A3 adapter.

4. Measure the delay of the adapter by pressing (Format) **DELAY** .

5. Divide the resulting delay measurement by 2 to determine the delay of the thru and the short in one direction.

6. Determine the offset delay of the calibration short by examining the define standard menu. (See the "Define Standard Menus" section in Chapter 7, "Operating Concepts" of the user's guide.)

7. Subtract the offset delay of the short (determined in step 6) from the delay of the thru and the short in one direction (determined in step 5). The result is electrical delay of the thru. This value is used in the next procedure.

Remove the Adapter

When the two sets of error correction files have been created (now referred to as "calibration sets"), the A3 adapter may be removed.

1. Press (Cal) **MORE** **ADAPTER REMOVAL** to display the following menu:

   HELP ADAPT REMOVAL   (This Help softkey provides a quick reference guide to using the adapter removal technique.)

   RECALL CAL SETS

   ADAPTER DELAY

   ADAPTER COAX

   ADAPTER WAVEGUIDE

   REMOVE ADAPTER

2. Press **RECALL CAL SETS** to display **RECALL CAL PORT 1** and **RECALL CAL PORT 2** .

   RECALL CAL SETS also displays the internal (or external if internal not used) disk file directory.

NOTE   In the following two steps, calibration data is recalled, not instrument states.

---

3. From the disk directory, choose the file associated with the port 1 error correction, then press **RECALL CAL PORT 1** .

4. When this is complete, choose the file for the port 2 error correction and press **RECALL CAL PORT 2** .

5. When complete, press **RETURN** .

6. Enter the value of adapter A3 electrical delay by pressing **ADAPTER DELAY** and entering the value.

7. Select the appropriate key: **ADAPTER COAX** or **ADAPTER WAVEGUIDE** .

---

8. Press REMOVE ADAPTER to complete the technique for calculating the new error coefficients and overwrite the current active calibration set in use.

   This process uses up an internal memory register. The calibration in this register is *not* the calibration created by adapter removal, rather it is a "scratch" calibration. You may wish to delete the register, or re-save the new calibration in this register as shown in the following step.

9. To save the results of the new calibration set, press (Save/Recall) **SELECT DISK** **INTERNAL MEMORY** **RETURN** **SAVE STATE** .

NOTE   Adapter removal can leave a residual state in internal memory. This is not a valid instrument state and should be deleted.

---

10. Connect the DUT to the network analyzer as shown in Figure 4-22 (or Figure 4-23) to perform calibrated measurements.

Figure 4-22 8753ET/ES Calibrated Measurement

NETWORK ANALYZER

A1   A2
DUT
Reference   Reference
Port 1   Port 2

pa5100e
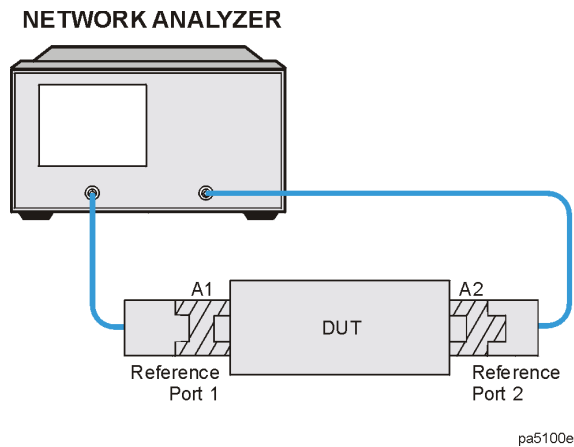
Figure 4-23 8753ES Option 011 Calibrated Measurement

NETWORK ANALYZER

A1   A2
DUT
Reference   Reference
Port 1   Port 2

pa5101e
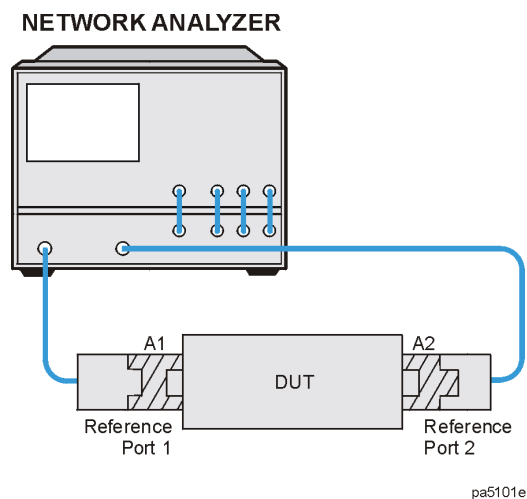
Verify the Results

Since the effect of the adapter has been removed, it is easy to verify the accuracy of the technique by simply measuring the adapter itself. Because the adapter was used during the creation of the two calibration sets, and the technique removes its effects, measurement of the adapter itself should show the S-parameters.

If unexpected phase variations are observed, this indicates that the electrical delay of the adapter was not specified within a quarter wavelength over the frequency range of interest. To correct this, recall both cal sets; since the data was previously stored to disk, change the adapter delay, and press **REMOVE ADAPTER** .

Calibration Routines

Enhanced Response Calibration

The enhanced response calibration, activated by pressing the `ENHANCED RESPONSE` softkey within the calibrate menu, provides a one-port calibration to correct for directivity, source match, and frequency response for reflection measurements, and corrects for source match as well as frequency response for transmission measurements.

For ES models, enhanced response calibration improves accuracy in transmission measurements compared to a response calibration or a response and isolation calibration, but it is not as accurate as a full 2-port calibration. For ET models, this calibration provides the best accuracy for measurements with a T/R test set.

Enhanced Reflection Calibration

The enhanced reflection calibration is activated by selecting `ENH. REFL. ON off` under the `ENHANCED RESPONSE` menu.

The enhanced reflection calibration effectively removes load match error from the enhanced response calibration performed on a bilateral device. A bilateral device has an identical forward (S_{21}) and reverse transmission (S_{12}) response. Most passive devices (such as filters, attenuators, or switches) are bilateral. Some passive devices (circulators, isolators) and most active devices do not have identical forward and reverse transmission responses and enhanced reflection calibration will not work with these devices.

ECal

The ECal calibration menu is activated by pressing `ECal MENU` in the calibration menu.

The ECal (Electronic Calibration) system determines systemic errors of the analyzer through a one-time connection of an ECal module to the network analyzer ports. The random error of connector repeatability is reduced substantially through a one-time connection when compared to frequent connections and disconnections of the conventional short/open/load methods.

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Safety Considerations

Servicing

WARNING	**For continued protection against fire hazard replace line fuse only with same type and rating (115V operation: T 5A 125 V UL/CSA; 230V operation: T 4A H 250V IEC). The use of other fuses or material is prohibited.**

5 Supplement for the Reference Guide (Firmware Revision 7.68)

In This Chapter

This chapter contains the supplemental information changes to the reference guides that coincide with the release of firmware revision 7.68. These changes pertain to the following reference guides.

- 8753ET and 8753ES Network Analyzers Reference Guide (part number 08753-90473)

- 8753ES Option 011 Network Analyzer Reference Guide (part number 08753-90480)

IMPORTANT If you are upgrading your firmware from a revision prior to revision 7.66, add the information changes from Chapter 2 , "Supplement for the Reference Guide (Firmware Revision 7.66)," before adding the changes from this chapter.

The following list describes the changes to 8753ET and 8753ES reference guides printed prior to February 2001. 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 5-1 on page 5-3.

  — Replace the Save and Recall menu map using Figure 5-2 on page 5-5.

  — Replace the Calibration menu map for the 8753ET using Figure 5-3.

  — Replace the Calibration menu map for the 8753ES using Figure 5-4.

  — Replace the Calibration menu map for the 8753ES Option 011 using Figure 5-5.

  — Replace the System menu map for the 8753ET using Figure 5-6.

  — Replace the System menu map for the 8753ES and 8753ES Option 011 using Figure 5-7.

- Hardkey/Softkey Reference Chapter

  — Adjust the description of four existing softkeys. See "Changes to Existing Softkeys" on page 5-17.

  — Add 18 new softkeys and their descriptions. See "New Softkeys" on page 5-18.

- Error Messages Chapter

  — Add 19 new error messages. See to "Error Messages" on page 5-21.

- Options and Accessories Chapter

  — Add two calibration kits and update electronic calibration (ECal) options. See "Options and Accessories" on page 5-27.

- Preset State and Memory Allocation Chapter

  — Add six new preset values. See "Preset State and Memory Allocation" on page 5-29.

Menu Maps

Figure 5-1   Menu Map for Display

Display

Display Menu
- DUAL/QUAD SETUP
- DISPLAY: DATA
- MEMORY
- DATA and MEMORY
- DATA/MEM
- DATA-MEM
- DATA → MEMORY
- MORE

Dual: Quad Setup Menu
- DUAL CHAN on OFF
- AUX CHAN on OFF
- 4 PARAM DISPLAYS
- SPLIT DISP 1X
- 2X
- 4X
- CHANNEL POSITION
- RETURN

Channel Position
- 2x: [1&2]
       [3&4]
       [1&3]
       [2&4]
- 4x   [1][2]
      [3][4]
      [1][3]
      [2][4]
- RETURN

4 Param Displays
- SETUP A
- SETUP B
- SETUP C
- SETUP D
- SETUP E
- SETUP F
- TUTORIAL
- RETURN

Display More Menu
- BEEP DONE ON off
- BEEP WARN on OFF
- ADJUST DISPLAY
- TITLE
- D2/D1 to D2 on OFF
- FREQUENCY BLANK
- RETURN

Title Menu
- SELECT LETTER
- SPACE
- BACK SPACE
- NEWLINE
- FORM FEED
- ERASE TITLE
- MORE
- DONE

Title More Menu
- ACTIVE ENTRY
- ACTIVE MKR MAGNITUDE
- LIMIT TEST RESULT
- LOOP COUNTER
- END OF LABEL
- RETURN

4 Param More Displays
- MORE HELP
- RETURN

4 Param More Displays
- RETURN

Adjust Display Menu
- INTENSITY
- BACKGROUND INTESITY
- MODIFY COLORS
- DEFAULT COLORS
- BLANK DISPLAY
- SAVE COLORS
- RECALL COLORS *
- RETURN

Modify Colors Menu
- CH1 DATA LIMIT LN
- CH1 MEM
- CH2 DATA LIMIT LN
- CH2 MEM
- GRATICULE
- TEXT
- MORE
- RETURN

Modify Colors Menu
- CH3 DATA LIMIT LN
- CH3 MEM
- CH4 DATA LIMIT LN
- CH4 MEM
- REF LINE
- WARNING
- RIPPLE LIM LINES
- RETURN

Color Adjust Menu
- TINT
- BRIGHTNESS
- COLOR
- RESET COLOR
- RETURN

* Appears only when colors have been saved

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Figure 5-2 Menu Map for Save/Recall

Save/
Recall

Save/Recall Menu
SAVE STATE
RE-SAVE STATE
DEFINE DISK-SAVE
RECALL STATE
RECALL KEYS
SAVE FILE FORMATS
FILE UTILITIES
SELECT DISK

Define Save Menu
DATA ARRAY on OFF
RAW ARRAY on OFF
FORMAT ARY on OFF
GRAPHICS on OFF
DATA ONLY on OFF
SAVE USING BINARY
ASCII
RETURN

Recall Menu
RECALL KEYS MENU
RECALL KEYS on OFF
RETURN

Save File Formats Menu
SAVE FILE
FILETYPE GRAPHIC
TEXT
GRAPH FMT [JPG]
TEXT FMT [CSV]
RETURN

Recall Keys Menu
RECALL REG1 *
RECALL REG2 *
RECALL REG3 *
RECALL REG4 *
RECALL REG5 *
RECALL REG6 *
RECALL REG7 *
SAVE/RCL MENU

File Utilities Menu
RENAME FILE **
DELETE FILE
DELETE ALL FILES
SEQUENCE FILENAMING
FILENAME FILE ∅
FORMAT DISK ***
RETURN

Sequence Filename Menu
FILE NAME FILE ∅
PLOT NAME PLOTFILE
RETURN

Title File Menu
SELECT LETTER
BACK SPACE
LOOP COUNTER
ERASE TITLE
CANCEL
DONE

Rename File Menu
SELECT LETTER
BACK SPACE
LOOP COUNTER
ERASE TITLE
CANCEL
DONE

Select Disk Menu
INTERNAL MEMORY
INTERNAL DISK
EXTERNAL DISK
CONFIGURE EXT DISK
RETURN

Configure Ext Disk Menu
ADDRESS: DISK
DISK UNIT NUMBER
VOLUME NUMBER
RETURN

Format Disk Menu
FORMAT INT MEMORY
FORMAT INT DISK
FORMAT EXT DISK
DIRECTORY SIZE (LIF)
FORMAT: LIF
DOS
RETURN

Lif Dir Size Menu
DIR SIZE: DEFAULT
256
512
1024
2048
4096
8192
RETURN

* These labels only appear if the particular register has been saved in internal memory.

** Does not appear during sequence modification.

*** Only appears during sequence modification when external disk is selected.

kl501ets

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Cal

Correction Menu
- CORRECTION on OFF
- INTERPOL ON off
- CALIBRATE MENU
- RESUME CAL SEQUENCE
- ECal MENU
- CAL KIT [ ]
- PWRMTR CAL [OFF]
- MORE

ECal Menu
- MODULE A b
- REFLECTION 1-PORT
- TRAN/REFL ENH. RESP.
- CONFIGURE [MODULE A]
- RETURN

ECal Pause Menu
- CONTINUE ECal
- ABORT ECal

ECal Config Menu
- MODULE A b
- CONFIDENCE CHECK
- MODULE INFO
- OMIT ISOL ON off
- ISOLATION AVERAGES
- MAN'L THRU on OFF
- RETURN

ECal Confidence
- SET CONF STANDARD
- PARAMETER [RFL]
- TRACE TYPE [DATA]
- AUTO SCALE
- RETURN

ECal Service Menu
- ECal STD [CONF]
- REFL STD [0]
- PARAMETER [RFL]
- TRACE TYPE [DATA]
- ECal SERVICE

Power Meter Cal. Main Menu
- PWRMTR CAL OFF
- EACH SWEEP
- ONE SWEEP
- TAKE CAL SWEEP
- NUMBER of READINGS
- PWR LOSS on OFF
- LOSS/SENSR LISTS
- RETURN

Pwr. Loss/Sens. Lists Menu
- USE SENSOR A/B
- CAL FACTOR SENSOR A
- CAL FACTOR SENSOR B
- POWER LOSS
- RETURN

Segment Modify Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- DONE

Seg. Edit (Cal Factor) Menu
- FREQUENCY
- CAL FACTOR
- DONE

Seg. Edit (Pwr. Loss) Menu
- FREQUENCY
- LOSS
- DONE

Clear List Menu
- CLEAR LIST
- YES
- NO

Calibrate Menu
- ENHANCED RESPONSE
- RESPONSE
- RESPONSE & ISOL'N
- REFLECTION 1-PORT
- RECEIVER CAL

Enhanced Response Menu
- TRAN / REFL ENH. RESP.
- ENH. REFL. on OFF
- RETURN

Enh. Resp. Cal. Menu
- REFLECT'N
- TRANS-MISSION
- ISOLATION
- DONE FWD ENH RESP

Enh. Resp. Refl. Menu
- FORWARD: OPENS
- SHORTS
- LOAD
- STANDARDS DONE

Enh. Resp. Trans. Menu
- DO BOTH FWD THRUS
- FWD TRANS THRU
- FWD MATCH THRU
- STANDARDS DONE

Enh. Resp. Isolation Menu
- OMIT ISOLATION
- FWD ISOL'N
- ISOLATION DONE

Opens Menu
- OPEN (M)
- OPEN (F)
- DONE: OPENS

→ Calibration Factor Softkey Path
→ Power Loss Softkey Path

Cal Kit Menu
- SELECT CAL KIT
- SAVE USER KIT
- MODIFY [ ]
- RETURN

Select Cal Kit Menu
- 7mm 85031
- 3.5mmD 85033D/E
- N 50 85032F
- N 50 85032B/E
- N 75 85036
- USER KIT
- MORE
- RETURN

Select Cal Kit More Menu
- 2.4mm 85056
- 2.92* 85056K
- 2.9mm other kits
- TRL 3.5mm 85052C
- 7-16 85038
- 3.5mmC 85033C
- RETURN

Calibrate More Menu
- PORT EXTENSIONS
- VELOCITY FACTOR
- SET Z
- ALTERNATE RFL/TRN
- CHOP RFL/TRN
- RETURN

Reference Plane Menu
- EXTENSIONS on OFF
- EXTENSION INPUT A
- EXTENSION INPUT B
- EXTENSION REFL PORT
- EXTENSION TRANS PORT
- RETURN

Modify Cal Kit Menu
- DEFINE STANDARD
- SPECIFY CLASS
- LABEL CLASS
- LABEL KIT
- TRL/LRM OPTION
- KIT DONE (MODIFIED)

Specify Class Menu
- S11A
- S11B
- S11C
- S22A
- S22B
- S22C
- MORE
- SPECIFY CLASS DONE

Specify Class More Menu
- FWD TRANS
- REV TRANS
- FWD MATCH
- REV MATCH
- RESPONSE
- RESPONSE & ISOL'N
- MORE
- SPECIFY CLASS DONE

Specify Class More Menu
- SPECIFY: TRL THRU
- TRL REFLECT
- TRL LINE OR MATCH
- SPECIFY CLASS DONE

Response & Isolation Menu
- RESPONSE
- ISOL 'N STD
- DONE RESP ISOL 'N CAL

Response Menu
- SHORT (M)
- SHORT (F)
- OPEN (M)
- OPEN (F)
- THRU

Reflection 1-Port Menu
- FORWARD: OPENS
- SHORTS
- DONE 1-PORT CAL

Shorts Menu
- SHORT (M)
- SHORT (F)
- LOAD
- DONE: SHORTS

Rcvr Cal Menu
- TAKE RCVR CAL SWEEP
- RETURN

TRL Option Menu
- CAL Z0: LINE Z0
- SYSTEM Z0
- SET REF: THRU
- REFLECT
- RETURN

Label Class Menu
- S11A
- S11B
- S11C
- S22A
- S22B
- S22C
- MORE
- LABEL CLASS DONE

Label Class More Menu
- FWD TRANS
- REV TRANS
- FWD MATCH
- REV MATCH
- RESPONSE
- RESPONSE & ISOL'N
- MORE
- LABEL CLASS DONE

Label Class / Kit More Menu
- LABEL: TRL THRU
- TRL REFLECT
- TRL LINE OR MATCH
- LABEL CLASS DONE

Label Select Menu
- SELECT LETTER
- SPACE
- BACK SPACE
- ERASE TITLE
- DONE

Define Standard Menu
- STD TYPE: OPEN
- SHORT
- LOAD
- DELAY / THRU
- ARBITRARY IMPEDANCE
- MODIFY STD DEFINITION
- RETURN

Def. Arbitrary Imped. Menu
- TERMINAL IMPEDANCE
- FIXED
- SLIDING
- SPECIFY OFFSET
- LABEL STD
- STD DONE (DEFINED)

Define Delay/ Thru Menu
- SPECIFY OFFSET
- LABEL STD
- STD DONE (DEFINED)

Define Load Menu
- FIXED
- SLIDING
- OFFSET
- SPECIFY OFFSET
- LABEL STD
- STD DONE (DEFINED)

Define Short Menu
- SPECIFY OFFSET
- LABEL STD
- STD DONE (DEFINED)

Define Open Menu
- C0
- C1
- C2
- C3
- SPECIFY OFFSET
- LABEL STD
- STD DONE (DEFINED)

Specify Offset Menu
- OFFSET DELAY
- OFFSET LOSS
- OFFSET Z0
- MINIMUM FREQUENCY
- MAXIMUM FREQUENCY
- COAX
- WAVEGUIDE
- STD OFFSET DONE

Label Standard Menu
- SELECT LETTER
- SPACE
- BACK SPACE
- ERASE TITLE
- DONE

1. When two ECal modules are used in a measurement, the routine will pause to allow you to insert the next module. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.

2. When "MAN'L THRU" is turned "ON", the calibration will pause and allow you to insert your own thru. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.

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Menu Map For Cal (8753ES only)

Cal

Correction Menu: CORRECTION on OFF · INTERPOL on OFF · CALIBRATE MENU · RESUME CAL SEQUENCE · ECal MENU · CAL KIT [ ] · PWRMTR CAL [OFF] · MORE

ECal Menu: MODULE A b · S11 1-PORT · S22 1-PORT · FULL 2-PORT · S11/S21 ENH. RESP. · S22/S12 ENH. RESP. · CONFIGURE [MODULE A] · RETURN

ECal Pause Menu: CONTINUE ECal · ABORT ECal

ECal Config Menu: MODULE A b · CONFIDENCE CHECK · MODULE INFO · OMIT ISOL ON off · ISOLATION AVERAGES · MAN'L THRU on OFF · RETURN

ECal Confidence: SET CONF STANDARD · PARAMETER [S11] · TRACE TYPE [DATA] · AUTO SCALE · RETURN

ECal Service Menu: ECal STD [CONF] · REFL STD [0] · PARAMETER [S11] · TRACE TYPE [DATA] · AUTO SCALE · ECal SERVICE · RETURN

Power Meter Cal. Main Menu: PWRMTR CAL on OFF · EACH SWEEP · ONE SWEEP · TAKE CAL SWEEP · NUMBER of READINGS · PWR LOSS on OFF · LOSS/SENSR LISTS · RETURN

Pwr. Loss/Sens. Lists Menu: USE SENSOR A/B · CAL FACTOR SENSOR A · CAL FACTOR SENSOR B · POWER LOSS · RETURN

Segment Modify Menu: SEGMENT · EDIT · DELETE · ADD · CLEAR LIST · DONE

Seg. Edit (Cal Factor) Menu: FREQUENCY · CAL FACTOR · DONE

Seg. Edit (Pwr. Loss) Menu: FREQUENCY · LOSS · DONE

Clear List Menu: CLEAR LIST · YES · NO

Define Standard Menu: STD TYPE: OPEN · SHORT · LOAD · DELAY/THRU · ARBITRARY IMPEDANCE · MODIFY STD DEFINITION · RETURN

Def. Arbitrary Imped. Menu: TERMINAL IMPEDANCE · FIXED · SLIDING · SPECIFY OFFSET · LABEL STD · STD DONE (DEFINED)

Define Delay/Thru Menu: SPECIFY OFFSET · LABEL STD · STD DONE (DEFINED)

Define Load Menu: FIXED · SLIDING OFFSET · SPECIFY OFFSET · LABEL STD · STD DONE (DEFINED)

Define Short Menu: SPECIFY OFFSET · LABEL STD · STD DONE (DEFINED)

Define Open Menu: C0 · C1 · C2 · C3 · SPECIFY OFFSET · LABEL STD · STD DONE (DEFINED)

Specify Offset Menu: OFFSET DELAY · OFFSET LOSS · OFFSET Z0 · MINIMUM FREQUENCY · MAXIMUM FREQUENCY · COAX · WAVEGUIDE · STD OFFSET DONE

Label Standard Menu: SELECT LETTER · SPACE · BACK SPACE · ERASE TITLE · DONE

Cal Kit Menu: SELECT CAL KIT · SAVE USER KIT · MODIFY [ ] · RETURN

Select Cal Kit Menu: 7mm 85031 · 3.5mmD 85033D/E · N 50 85032F · N 50 85032B/E · N 75 85036 · TRL 3.5mm · USER KIT · MORE · RETURN

Select Cal Kit More Menu: 2.4mm 85056 · 2.92* 85056K · 2.9mm other kits · TRL 3.5mm 85052C · 7-16 85038 · 3.5mmC 85033C · RETURN

Calibrate More Menu: PORT EXTENSIONS · VELOCITY FACTOR · SET Z · ADAPTER REMOVAL · TESTSET SW CONTINUOUS · ALTERNATE A and B · CHOP A and B · RETURN

Adapter Removal Menu: HELP ADAPT REMOVAL · RECALL CAL STETS · ADAPTER DELAY · ADAPTER: COAX · WAVEGUIDE · REMOVE ADAPTER · RETURN

Recall Cal Sets Menu: RECALL CAL PORT1 · RECALL CAL PORT2 · RETURN

Reference Plane Menu: EXTENSIONS on OFF · EXTENSION INPUT A · EXTENSION INPUT B · EXTENSION PORT 1 · EXTENSION PORT 2 · RETURN

Modify Cal Kit Menu: DEFINE STANDARD · SPECIFY CLASS · LABEL CLASS · LABEL KIT · TRL/LRM OPTION · KIT DONE (MODIFIED)

Specify Class Menu: S11A · S11B · S11C · S22A · S22B · S22C · MORE · SPECIFY CLASS DONE

Specify Class More Menu: FWD TRANS · REV TRANS · FWD MATCH · REV MATCH · RESPONSE · RESPONSE & ISOL'N · MORE · SPECIFY CLASS DONE

Specify Class More Menu: SPECIFY: TRL THRU · TRL REFLECT · TRL LINE OR MATCH · SPECIFY CLASS DONE

Calibrate Menu: ENHANCED RESPONSE · RESPONSE · RESPONSE & ISOL'N · S11 1-PORT · S22 1-PORT · FULL 2-PORT · TRL*/LRM* 2-PORT · RECEIVER CAL

Enhanced Response Menu: S11/S21 ENH. RESP. · S22/S12 ENH. RESP. · ENH. REFL. on OFF · RETURN

Enh. Resp. Cal. Menu: REFLECT'N · TRANS-MISSION · ISOLATION · DONE *** ENH RESP

Enh. Resp. Refl. Menu: *** OPENS · SHORTS · LOAD · STANDARDS DONE

Enh. Resp. Trans. Menu: DO BOTH *** THRUS · *** TRANS · *** MATCH THRU · STANDARDS DONE

Enh. Resp. Isolation Menu: OMIT ISOLATION · *** ISOL'N · ISOLATION DONE

Response Menu: SHORT (M) · SHORT (F) · OPEN (M) · OPEN (F) · THRU

Response & Isolation Menu: RESPONSE · ISOL 'N STD · DONE RESP ISOL 'N CAL

Shorts Menu: SHORT (M) · SHORT (F) · DONE: SHORTS

TRL Option Menu: CAL Z0: LINE Z0 · SYSTEM Z0 · SET REF: THRU · REFLECT · RETURN

Label Class Menu: S11A · S11B · S11C · S22A · S22B · S22C · MORE · LABEL CLASS DONE

Label Class More Menu: FWD TRANS · REV TRANS · FWD MATCH · REV MATCH · RESPONSE · RESPONSE & ISOL'N · MORE · LABEL CLASS DONE

Label Class More Menu: LABEL: TRL THRU · TRL REFLECT · TRL LINE OR MATCH · LABEL CLASS DONE

Label Select Kit Menu: SELECT LETTER · SPACE · BACK SPACE · ERASE TITLE · DONE

Rcvr Cal Menu: TAKE RCVR CAL SWEEP · RETURN

TRL/LRM Cal Menu: THRU THRU · S11 REFL OPENS · S22 REFL OPENS · ISOLATION · LINE/MATCH · DONE TRL/LRM

TRL/LRM Isolation Menu: OMIT ISOLATION · DO BOTH FWD + REV · FWD ISOL 'N ISOL 'N STD · REV ISOL 'N ISOL 'N STD · ISOLATION DONE

Line / Match Menu: DO BOTH FWD + REV · LN/MATCH1 LOAD · LN/MATCH2 LOAD · DONE LINE / MATCH

2-Port Trans. Menu: DO BOTH FWD + REV · FWD TRANS THRU · FWD MATCH THRU · REV TRANS THRU · REV MATCH THRU · STANDARDS DONE

2-Port Isolation Menu: OMIT ISOLATION · DO BOTH FWD + REV · FWD ISOL 'N ISOL 'N STD · REV ISOL 'N ISOL 'N STD · ISOLATION DONE

Full 2-Port Menu: REFLECTION · TRANS-MISSION · ISOLATION · DONE 2-PORT CAL

2-Port Reflection Menu: FORWARD: OPENS · SHORTS · LOAD · REVERSE: OPENS · SHORTS · LOAD · STANDARDS DONE

S22 1-Port Menu: REVERSE: OPENS · SHORTS · LOAD · DONE 1-PORT CAL

S11 1-Port Menu: FORWARD: OPENS · SHORTS · LOAD · DONE 1-PORT CAL

Opens Menu: OPEN (M) · OPEN (F) · DONE: OPENS

→ Calibration Factor Softkey Path

→ Power Loss Softkey Path

1. When two ECal modules are used in a measurement, the routine will pause to allow you to insert the next module. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.

2. When "MAN'L THRU" is turned "ON", the calibration routine will pause and allow you to insert your own thru. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.

*** Represents "FORWARD"/"FWD" when calibrating the forward path or "REVERSE"/"REV" when calibrating the reverse path.

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Cal

Correction Menu
CORRECTION on OFF
INTERPOL ON off
CALIBRATE MENU
RESUME CAL SEQUENCE
ECal MENU
CAL KIT [ ]
PWRMTR CAL [OFF]
MORE

ECal Menu
MODULE A b
S11 1-PORT 1
S22 1-PORT 1
FULL 2-PORT 1,2
S11/S21 ENH. RESP. 1,2
S22/S12 ENH. RESP. 1,2
CONFIGURE [MODULE A]
RETURN

ECal Pause Menu
CONTINUE ECal
ABORT ECal

ECal Config Menu
MODULE A b
CONFIDENCE CHECK
MODULE INFO
OMIT ISOL ON off
ISOLATION AVERAGES
MAN'L THRU on OFF
RETURN

ECal Confidence
SET CONF STANDARD
PARAMETER [S11]
TRACE TYPE [DATA]
AUTO SCALE
RETURN

ECal Service Menu
ECal STD [CONF]
REFL STD [0]
PARAMETER [S11]
TRACE TYPE [DATA]
AUTO SCALE
ECal SERVICE
RETURN

Power Meter Cal. Main Menu
PWRMTR CAL OFF
EACH SWEEP
ONE SWEEP
TAKE CAL SWEEP
NUMBER of READINGS
PWR LOSS on OFF
LOSS/SENSR LISTS
RETURN

Pwr. Loss/Sens. Lists Menu
USE SENSOR A / B
CAL FACTOR SENSOR A
CAL FACTOR SENSOR B
POWER LOSS
RETURN

Segment Modify Menu
SEGMENT
EDIT
DELETE
ADD
CLEAR LIST
DONE

Seg. Edit (Cal Factor) Menu
FREQUENCY
CAL FACTOR
DONE

Seg. Edit (Pwr. Loss) Menu
FREQUENCY
LOSS
DONE

Clear List Menu
CLEAR LIST
YES
NO

Define Standard Menu
STD TYPE:
OPEN
SHORT
LOAD
DELAY / THRU
ARBITRARY IMPEDANCE
MODIFY STD DEFINITION
RETURN

Def. Arbitrary Imped. Menu
TERMINAL IMPEDANCE
FIXED
SPECIFY OFFSET
LABEL STD
STD DONE (DEFINED)

Define Delay/Thru Menu
FIXED
SLIDING
SPECIFY OFFSET
LABEL STD
STD DONE (DEFINED)

Define Load Menu
FIXED
SLIDING
OFFSET
SPECIFY OFFSET
LABEL STD
STD DONE (DEFINED)

Define Short Menu
SPECIFY OFFSET
LABEL STD
STD DONE (DEFINED)

Define Open Menu
C0
C1
C2
C3
SPECIFY OFFSET
LABEL STD
STD DONE (DEFINED)

Specify Offset Menu
OFFSET DELAY
OFFSET LOSS
OFFSET Z0
MINIMUM FREQUENCY
MAXIMUM FREQUENCY
COAX
WAVEGUIDE
STD OFFSET DONE

Label Standard Menu
SELECT LETTER
BACK SPACE
ERASE TITLE
DONE

Calibration Factor Softkey Path
Power Loss Softkey Path

Cal Kit Menu
SELECT CAL KIT
SAVE USER KIT
MODIFY [ ]
RETURN

Select Cal Kit Menu
7mm 85031
3.5mmD 85033D/E
N 50 85032F
N 50 85032B/E
N 75 85036
USER KIT
MORE
RETURN

Select Cal Kit More Menu
2.4mm 85056
2.92* 85056K
2.9mm other kits
TRL 3.5mm 85052C
7-16 85038
3.5mmC 85033C
RETURN

Calibrate More Menu
PORT EXTENSIONS
VELOCITY FACTOR
SET Z
ADAPTER DELAY
TESTSET SW CONTINUOUS
ALTERNATE A and B
CHOP A and B
RETURN

Adapter Removal Menu
HELP ADAPT REMOVAL
RECALL CAL STETS
ADAPTER DELAY
ADAPTER: COAX
WAVEGUIDE
REMOVE ADAPTER
RETURN

Recall Cal Sets Menu
RECALL CAL PORT 1
RECALL CAL PORT 2
RETURN

Reference Plane Menu
EXTENSIONS on OFF
EXTENSION INPUT A
EXTENSION INPUT B
EXTENSION PORT 1
EXTENSION PORT 2
RETURN

Modify Cal Kit Menu
DEFINE STANDARD
SPECIFY CLASS
LABEL CLASS
LABEL KIT
TRL/LRM OPTION
KIT DONE (MODIFIED)

Specify Class Menu
S11A
S11B
S11C
S22A
S22B
S22C
MORE
SPECIFY CLASS DONE

Specify Class More Menu
FWD TRANS
REV TRANS
FWD MATCH
REV MATCH
RESPONSE
RESPONSE & ISOL'N
MORE
SPECIFY CLASS DONE

Specify Class More Menu
SPECIFY:
TRL THRU
TRL REFLECT
TRL LINE OR MATCH
SPECIFY CLASS DONE

Calibrate Menu
ENHANCED RESPONSE
RESPONSE
RESPONSE & ISOL'N
S11 1-PORT
S22 1-PORT
FULL 2-PORT
TRL/LRM 2-PORT
RECEIVER CAL

Enhanced Response Menu
S11/S21 ENH. RESP.
S22/S12 ENH. RESP.
ENH. REFL. on OFF
RETURN

Enh. Resp. Cal. Menu
REFLECT'N
TRANS-MISSION
ISOLATION
DONE *** ENH RESP

Enh. Resp. Refl. Menu
***: OPENS
SHORTS
LOAD
STANDARDS DONE

Enh. Resp. Trans. Menu
DO BOTH *** THRUS
*** TRANS THRU
*** MATCH THRU
STANDARDS DONE

Enh. Resp. Isolation Menu
OMIT ISOLATION
*** ISOL'N
ISOLATION DONE

Response Menu
SHORT
OPEN
THRU

Response & Isolation Menu
RESPONSE
ISOL'N STD
DONE RESP ISOL 'N CAL

TRL Option Menu
CAL Z0:
LINE Z0
SYSTEM Z0
SET REF:
THRU
REFLECT
RETURN

Label Class Menu
S11A
S11B
S11C
S22A
S22B
S22C
MORE
LABEL CLASS DONE

Label Class More Menu
FWD TRANS
REV TRANS
FWD MATCH
REV MATCH
RESPONSE
RESPONSE & ISOL'N
MORE
LABEL CLASS DONE

Label Class More Menu
LABEL:
TRL THRU
TRL REFLECT
TRL LINE OR MATCH
LABEL CLASS DONE

Label Select Menu
SELECT LETTER
SPACE
BACK SPACE
ERASE TITLE
DONE

Rcvr Cal Menu
TAKE RCVR CAL SWEEP
RETURN

TRL/LRM Cal Menu
THRU THRU
S11 REFL OPEN
S22 REFL OPEN
ISOLATION
LINE/MATCH
DONE TRL/LRM

TRL/LRM Isolation Menu
OMIT ISOLATION
DO BOTH FWD + REV
FWD ISOL 'N ISOL 'N STD
REV ISOL 'N ISOL 'N STD
ISOLATION DONE

Line / Match Menu
DO BOTH FWD + REV
LN/MATCH1 LOAD
LN/MATCH2 LOAD
DONE LINE / MATCH

2-Port Trans. Menu
DO BOTH FWD + REV
FWD TRANS THRU
FWD MATCH THRU
REV TRANS THRU
REV MATCH THRU
STANDARDS DONE

2-Port Isolation Menu
OMIT ISOLATION
DO BOTH FWD + REV
FWD ISOL 'N ISOL 'N STD
REV ISOL 'N ISOL 'N STD
ISOLATION DONE

Full 2-Port Menu
REFLECTION
TRANS-MISSION
ISOLATION
DONE 2-PORT CAL

2-Port Reflection Menu
FORWARD: OPEN
SHORT
LOAD
REVERSE: OPEN
SHORT
LOAD
STANDARDS DONE

S22 1-Port Menu
REVERSE: OPEN
SHORT
LOAD
DONE I-PORT CAL

S11 1-Port Menu
FORWARD: OPEN
SHORT
LOAD
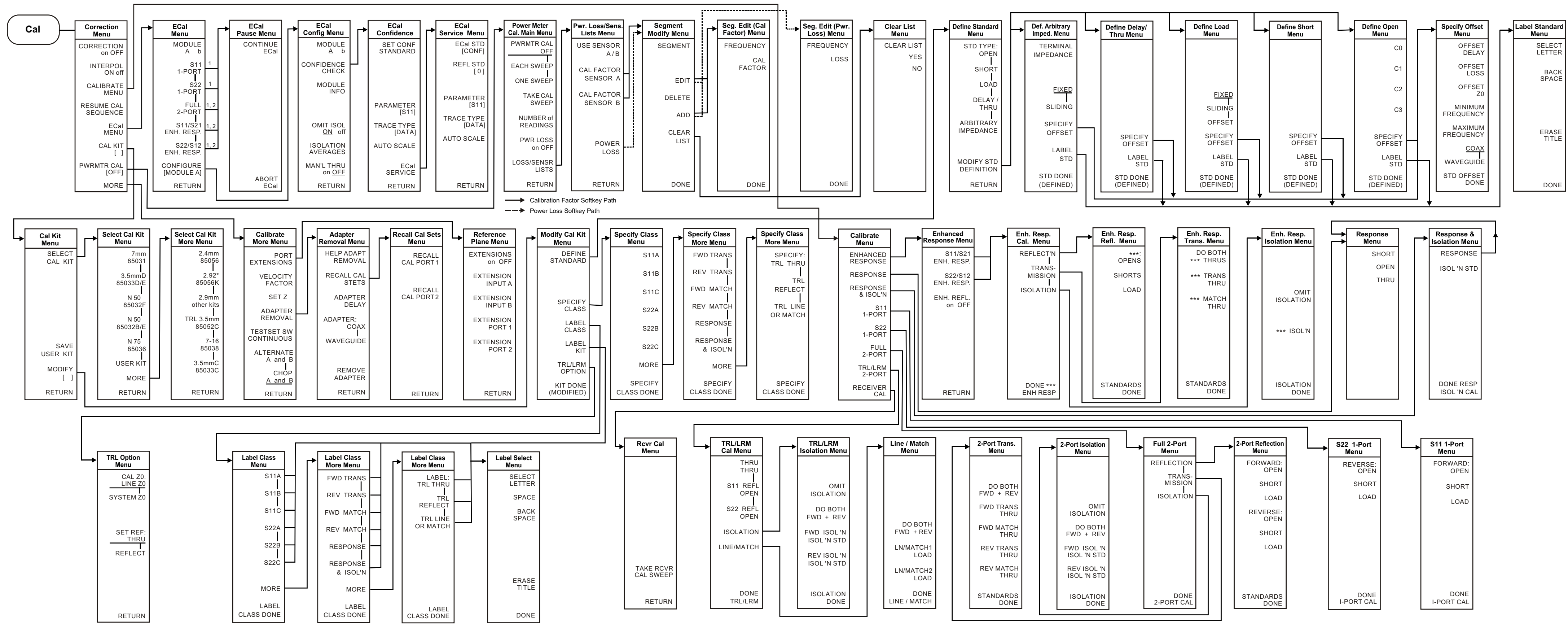DONE I-PORT CAL

1. When two ECal modules are used in a measurement, the routine will pause to allow you to insert the next module. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.

2. When "MAN'L THRU" is turned "ON", the calibration routine will pause and allow you to insert your own thru. A "CONTINUE ECal" and "ABORT ECal" menu will be displayed during the pause.
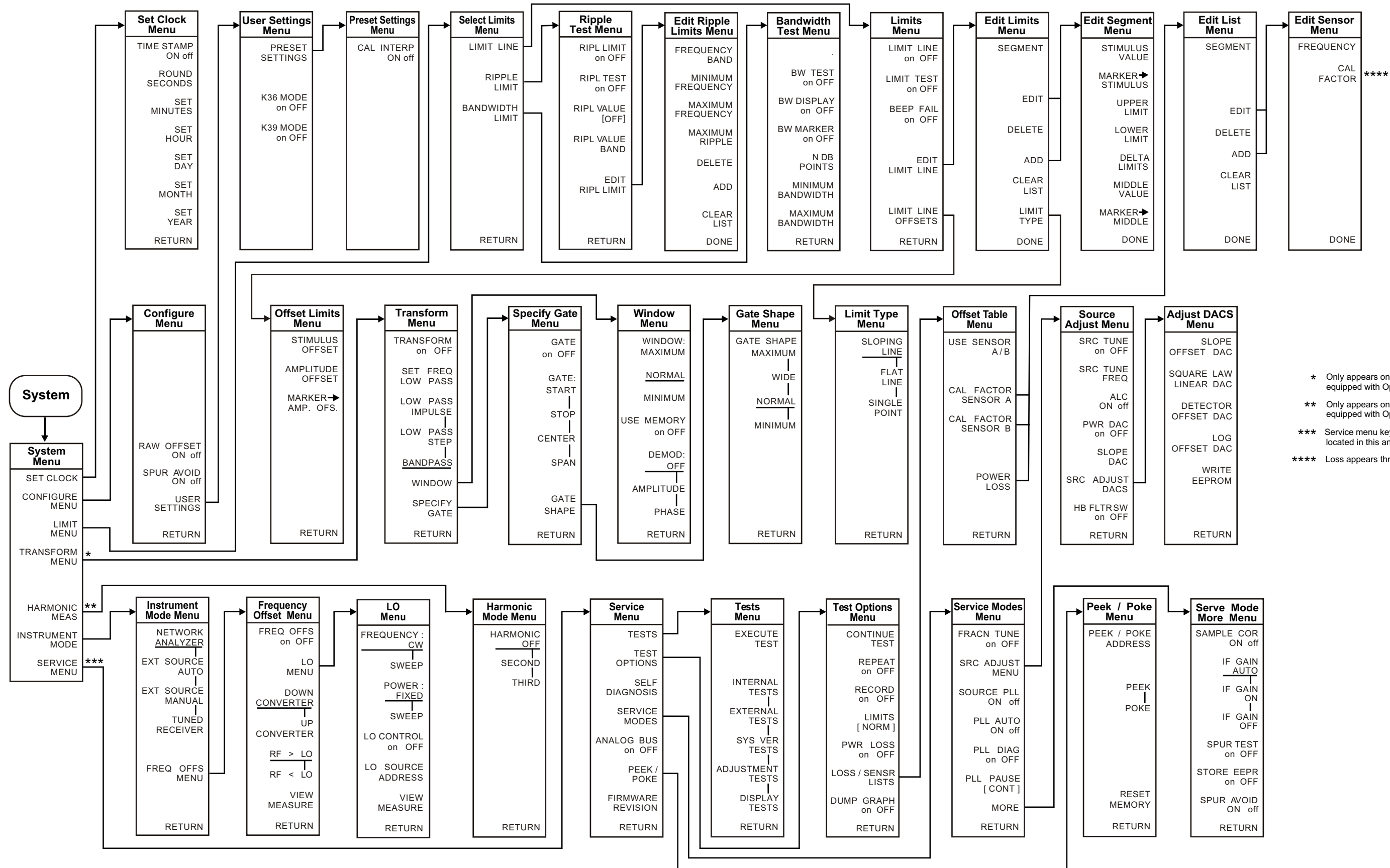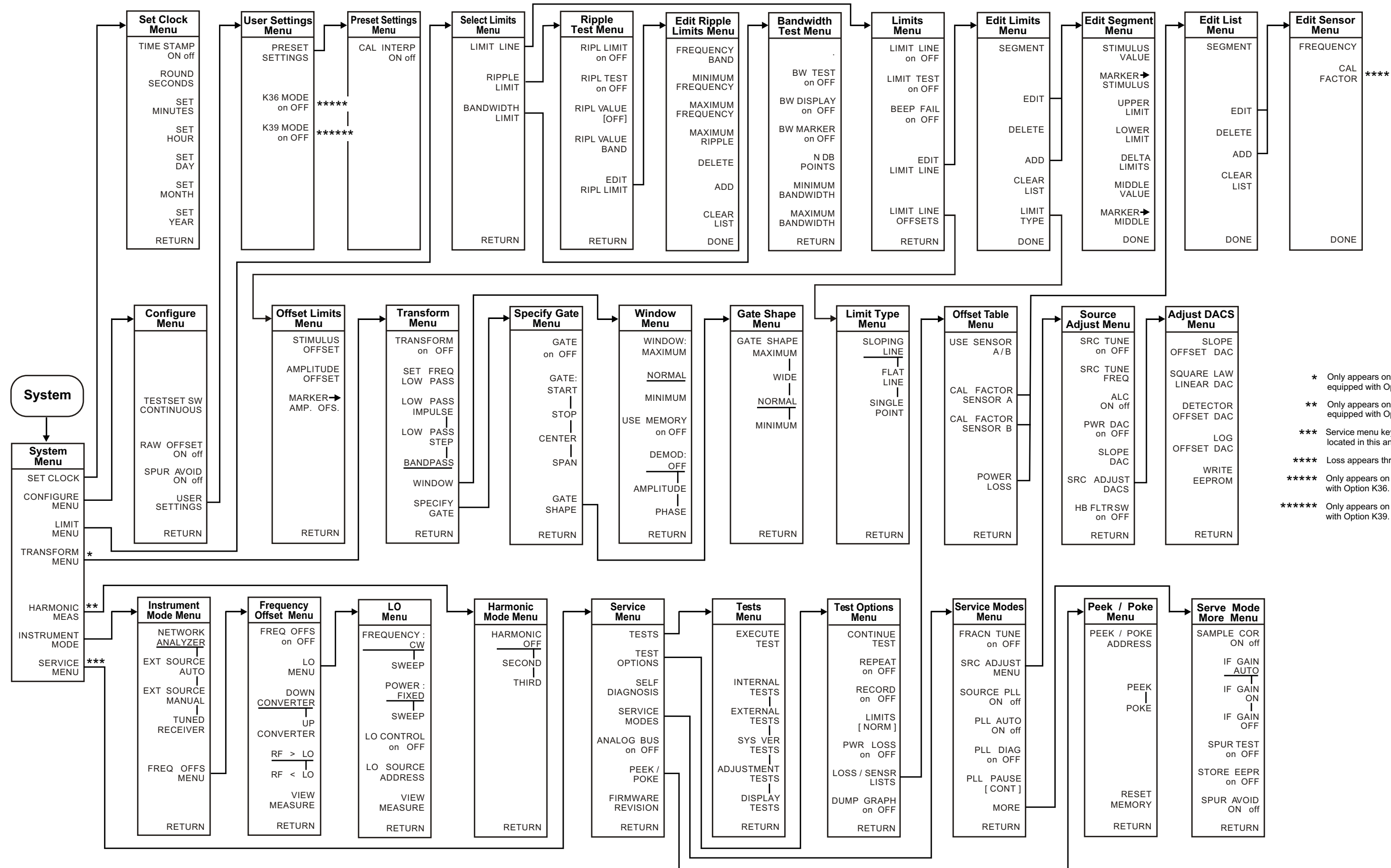
*** Represents "FORWARD"/"FWD" when calibrating the forward path or "REVERSE"/"REV" when calibrating the reverse path.

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Menu Map For Cal (8753ES Option 011)

Set Clock Menu
TIME STAMP ON off
ROUND SECONDS
SET MINUTES
SET HOUR
SET DAY
SET MONTH
SET YEAR
RETURN

User Settings Menu
PRESET SETTINGS
K36 MODE on OFF
K39 MODE on OFF

Preset Settings Menu
CAL INTERP ON off

Select Limits Menu
LIMIT LINE
RIPPLE LIMIT
BANDWIDTH LIMIT
RETURN

Ripple Test Menu
RIPL LIMIT on OFF
RIPL TEST on OFF
RIPL VALUE [OFF]
RIPL VALUE BAND
EDIT RIPL LIMIT
RETURN

Edit Ripple Limits Menu
FREQUENCY BAND
MINIMUM FREQUENCY
MAXIMUM FREQUENCY
MAXIMUM RIPPLE
DELETE
ADD
CLEAR LIST
DONE

Bandwidth Test Menu
BW TEST on OFF
BW DISPLAY on OFF
BW MARKER on OFF
N DB POINTS
MINIMUM BANDWIDTH
MAXIMUM BANDWIDTH
RETURN

Limits Menu
LIMIT LINE on OFF
LIMIT TEST on OFF
BEEP FAIL on OFF
EDIT LIMIT LINE
LIMIT LINE OFFSETS
RETURN

Edit Limits Menu
SEGMENT
EDIT
DELETE
ADD
CLEAR LIST
LIMIT TYPE
DONE

Edit Segment Menu
STIMULUS VALUE
MARKER➤ STIMULUS
UPPER LIMIT
LOWER LIMIT
DELTA LIMITS
MIDDLE VALUE
MARKER➤ MIDDLE
DONE

Edit List Menu
SEGMENT
EDIT
DELETE
ADD
CLEAR LIST
DONE

Edit Sensor Menu
FREQUENCY
CAL FACTOR
****
DONE

System

System Menu
SET CLOCK
CONFIGURE MENU
LIMIT MENU
TRANSFORM MENU *
HARMONIC MEAS **
INSTRUMENT MODE
SERVICE MENU ***

Configure Menu
RAW OFFSET ON off
SPUR AVOID ON off
USER SETTINGS
RETURN

Offset Limits Menu
STIMULUS OFFSET
AMPLITUDE OFFSET
MARKER➤ AMP. OFS.
RETURN

Transform Menu
TRANSFORM on OFF
SET FREQ LOW PASS
LOW PASS IMPULSE
LOW PASS STEP
BANDPASS
WINDOW
SPECIFY GATE
RETURN

Specify Gate Menu
GATE on OFF
GATE: START
STOP
CENTER
SPAN
GATE SHAPE
RETURN

Window Menu
WINDOW: MAXIMUM
NORMAL
MINIMUM
USE MEMORY on OFF
DEMOD: OFF
AMPLITUDE
PHASE
RETURN

Gate Shape Menu
GATE SHAPE MAXIMUM
WIDE
NORMAL
MINIMUM
RETURN

Limit Type Menu
SLOPING LINE
FLAT LINE
SINGLE POINT
RETURN

Offset Table Menu
USE SENSOR A / B
CAL FACTOR SENSOR A
CAL FACTOR SENSOR B
POWER LOSS
RETURN

Source Adjust Menu
SRC TUNE on OFF
SRC TUNE FREQ
ALC ON off
PWR DAC on OFF
SLOPE DAC
SRC ADJUST DACS
HB FLTR SW on OFF
RETURN

Adjust DACS Menu
SLOPE OFFSET DAC
SQUARE LAW LINEAR DAC
DETECTOR OFFSET DAC
LOG OFFSET DAC
WRITE EEPROM
RETURN

Instrument Mode Menu
NETWORK ANALYZER
EXT SOURCE AUTO
EXT SOURCE MANUAL
TUNED RECEIVER
FREQ OFFS MENU
RETURN

Frequency Offset Menu
FREQ OFFS on OFF
LO MENU
DOWN CONVERTER
UP CONVERTER
RF > LO
RF < LO
VIEW MEASURE
RETURN

LO Menu
FREQUENCY : CW
SWEEP
POWER : FIXED
SWEEP
LO CONTROL on OFF
LO SOURCE ADDRESS
VIEW MEASURE
RETURN

Harmonic Mode Menu
HARMONIC OFF
SECOND
THIRD
RETURN

Service Menu
TESTS
TEST OPTIONS
SELF DIAGNOSIS
SERVICE MODES
ANALOG BUS on OFF
PEEK / POKE
FIRMWARE REVISION
RETURN

Tests Menu
EXECUTE TEST
TEST OPTIONS
INTERNAL TESTS
EXTERNAL TESTS
SYS VER TESTS
ADJUSTMENT TESTS
DISPLAY TESTS
RETURN

Test Options Menu
CONTINUE TEST
REPEAT on OFF
RECORD on OFF
LIMITS [NORM]
PWR LOSS on OFF
LOSS / SENSR LISTS
DUMP GRAPH on OFF
RETURN

Service Modes Menu
FRACN TUNE on OFF
SRC ADJUST MENU
SOURCE PLL on OFF
PLL AUTO ON off
PLL DIAG on OFF
PLL PAUSE [CONT]
MORE
RETURN

Peek / Poke Menu
PEEK / POKE ADDRESS
PEEK
POKE
RESET MEMORY
RETURN

Serve Mode More Menu
SAMPLE COR ON off
IF GAIN AUTO
IF GAIN ON
IF GAIN OFF
SPUR TEST on OFF
STORE EEPR on OFF
SPUR AVOID ON off
RETURN

* Only appears on instruments equipped with Option 010.
** Only appears on instruments equipped with Option 002.
*** Service menu key descriptions are located in this analyzer's service guide.
**** Loss appears thru the power loss path.

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Menu Map for System (8753ET only)

Menu Map for System (8753ES only)

Set Clock Menu
- TIME STAMP ON off
- ROUND SECONDS
- SET MINUTES
- SET HOUR
- SET DAY
- SET MONTH
- SET YEAR
- RETURN

User Settings Menu
- PRESET SETTINGS
- K36 MODE on OFF *****
- K39 MODE on OFF ******

Preset Settings Menu
- CAL INTERP ON off

Select Limits Menu
- LIMIT LINE
- RIPPLE LIMIT
- BANDWIDTH LIMIT
- RETURN

Ripple Test Menu
- RIPL LIMIT on OFF
- RIPL TEST on OFF
- RIPL VALUE [OFF]
- RIPL VALUE BAND
- EDIT RIPL LIMIT
- RETURN

Edit Ripple Limits Menu
- FREQUENCY BAND
- MINIMUM FREQUENCY
- MAXIMUM FREQUENCY
- MAXIMUM RIPPLE
- DELETE
- ADD
- CLEAR LIST
- DONE

Bandwidth Test Menu
- BW TEST on OFF
- BW DISPLAY on OFF
- BW MARKER on OFF
- N DB POINTS
- MINIMUM BANDWIDTH
- MAXIMUM BANDWIDTH
- RETURN

Limits Menu
- LIMIT LINE on OFF
- LIMIT TEST on OFF
- BEEP FAIL on OFF
- EDIT LIMIT LINE
- LIMIT LINE OFFSETS
- RETURN

Edit Limits Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- LIMIT TYPE
- DONE

Edit Segment Menu
- STIMULUS VALUE
- MARKER→ STIMULUS
- UPPER LIMIT
- LOWER LIMIT
- DELTA LIMITS
- MIDDLE VALUE
- MARKER→ MIDDLE
- DONE

Edit List Menu
- SEGMENT
- EDIT
- DELETE
- ADD
- CLEAR LIST
- DONE

Edit Sensor Menu
- FREQUENCY
- CAL FACTOR ****
- DONE

System

System Menu
- SET CLOCK
- CONFIGURE MENU
- LIMIT MENU
- TRANSFORM MENU *
- HARMONIC MEAS **
- INSTRUMENT MODE
- SERVICE MENU ***

Configure Menu
- TESTSET SW CONTINUOUS
- RAW OFFSET ON off
- SPUR AVOID ON off
- USER SETTINGS
- RETURN

Offset Limits Menu
- STIMULUS OFFSET
- AMPLITUDE OFFSET
- MARKER→ AMP. OFS.
- RETURN

Transform Menu
- TRANSFORM on OFF
- SET FREQ LOW PASS
- LOW PASS IMPULSE
- LOW PASS STEP
- BANDPASS
- WINDOW
- SPECIFY GATE
- RETURN

Specify Gate Menu
- GATE on OFF
- GATE: START
- STOP
- CENTER
- SPAN
- GATE SHAPE
- RETURN

Window Menu
- WINDOW: MAXIMUM
- NORMAL
- MINIMUM
- USE MEMORY on OFF
- DEMOD: OFF
- AMPLITUDE
- PHASE
- RETURN

Gate Shape Menu
- GATE SHAPE MAXIMUM
- WIDE
- NORMAL
- MINIMUM
- RETURN

Limit Type Menu
- SLOPING LINE
- FLAT LINE
- SINGLE POINT
- RETURN

Offset Table Menu
- USE SENSOR A / B
- CAL FACTOR SENSOR A
- CAL FACTOR SENSOR B
- POWER LOSS
- RETURN

Source Adjust Menu
- SRC TUNE on OFF
- SRC TUNE FREQ
- ALC ON off
- PWR DAC on OFF
- SLOPE DAC
- SRC ADJUST DACS
- HB FLTR SW on OFF
- RETURN

Adjust DACS Menu
- SLOPE OFFSET DAC
- SQUARE LAW LINEAR DAC
- DETECTOR OFFSET DAC
- LOG OFFSET DAC
- WRITE EEPROM
- RETURN

Instrument Mode Menu
- NETWORK ANALYZER
- EXT SOURCE AUTO
- EXT SOURCE MANUAL
- TUNED RECEIVER
- FREQ OFFS MENU
- RETURN

Frequency Offset Menu
- FREQ OFFS on OFF
- LO MENU
- DOWN CONVERTER
- UP CONVERTER
- RF > LO
- RF < LO
- VIEW MEASURE
- RETURN

LO Menu
- FREQUENCY: CW
- SWEEP
- POWER: FIXED
- SWEEP
- LO CONTROL on OFF
- LO SOURCE ADDRESS
- VIEW MEASURE
- RETURN

Harmonic Mode Menu
- HARMONIC OFF
- SECOND
- THIRD
- RETURN

Service Menu
- TESTS
- TEST OPTIONS
- SELF DIAGNOSIS
- SERVICE MODES
- ANALOG BUS on OFF
- PEEK / POKE
- FIRMWARE REVISION
- RETURN

Tests Menu
- EXECUTE TEST
- TEST OPTIONS
- INTERNAL TESTS
- EXTERNAL TESTS
- SYS VER TESTS
- ADJUSTMENT TESTS
- DISPLAY TESTS
- RETURN

Test Options Menu
- CONTINUE TEST
- REPEAT on OFF
- RECORD on OFF
- LIMITS [NORM]
- PWR LOSS on OFF
- LOSS / SENSR LISTS
- DUMP GRAPH on OFF
- RETURN

Service Modes Menu
- FRACN TUNE on OFF
- SRC ADJUST MENU
- SOURCE PLL ON off
- PLL AUTO ON off
- PLL DIAG ON OFF
- PLL PAUSE [CONT]
- MORE
- RETURN

Peek / Poke Menu
- PEEK / POKE ADDRESS
- PEEK
- POKE
- RESET MEMORY
- RETURN

Serve Mode More Menu
- SAMPLE COR ON off
- IF GAIN AUTO
- IF GAIN ON
- IF GAIN OFF
- SPUR TEST on OFF
- STORE EEPR on OFF
- SPUR AVOID ON off
- RETURN

* Only appears on instruments equipped with Option 010.
** Only appears on instruments equipped with Option 002.
*** Service menu key descriptions are located in this analyzer's service guide.
**** Loss appears thru the power loss path.
***** Only appears on instruments equipped with Option K36.
****** Only appears on instruments equipped with Option K39.

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Hardkey/Softkey Reference

Changes to Existing Softkeys

The description of these softkeys changed for the reference guides printed prior to February 2001.

3.5mmD 85033D/E	selects the 85033D or the 85033E cal kit.
CAL KIT [ ]	indicates the currently selected cal kit and leads to the select cal kit menu, which is used to select one of the default calibration kits available for different connector types. This, in turn, leads to additional menus used to define calibration standards other than those in the default kits (refer to "Modifying Calibration Kits" in the "Operating Concepts" chapter of the user's guide). When a calibration kit has been specified, its connector type is displayed in brackets in the softkey label. The cal kits available are listed below, refer to the softkey descriptions for these softkeys for more information.

- **2.4mm 85056**

- **2.92* 85056K**

- **2.92mm other kits**

- **3.5mmC 85033C**

- **3.5mmD 85033D/E**

- **7-16 85038**

- **7mm 85031**

- **N 50Ω 85032B/E**

- **N 50Ω 85032F**

- **N 75Ω 85036**

- **TRL 3.5mm 85052C**

N 50Ω 85032B/E	selects the 85032B/E cal kit.
N 50Ω 85032F	selects the 85032F cal kit.

New Softkeys

Added new softkeys that refer to electronic calibration (ECal) and enhanced reflection.

ABORT ECal	is displayed during ECal dual module operation and during manual thru operation as a pause in the process of measurement. Press this softkey to stop the process and return to the main ECal menu.
CONFIDENCE CHECK	provides access to the ECal confidence menu. This menu contains choices to compare current measurements of the selected ECal module against factory measurements.
CONFIGURE MENU	provides access to the configure menu. This menu contains softkeys to control raw offsets, spur avoidance, the test set transfer switch, and user preset settings.
CONFIGURE [MODULE A]	provides access to the ECal module configure menu. This menu contains softkeys to check the operation of the module, to get information about the module, and to set isolation parameters.
CONTINUE ECal	is displayed during ECal dual module operation and during manual thru operation as a pause in the process of measurement. After you have inserted the next module or connected the thru, press this softkey to continue the process.
ECal MENU	provides access to the calibration menu for ECal correction routines and other menu choices that pertain to ECal operation.
ECal SERVICE	provides access to the service menu for ECal. In this menu you can check the operation of the ECal module.
ECal STD [CONF]	is located in the ECal service menu. This softkey allows you to check ECal module parameters. The choices are: CONF (confidence state), THRU, ISOL, S11 REFL, and S22 REFL.
ENH. REFL. on OFF	selects the enhanced reflection calibration. This calibration improves the response of an enhanced response calibration.

NOTE   Use enhanced reflection only on a bilateral device. A bilateral device has similar forward and reverse transmission characteristics. Examples of bilateral devices are passive devices (filters, attenuators, and switches). Most active devices (amplifiers) and some passive devices (isolators and circulators) are not bilateral. If this calibration is used for a non-bilateral device, errors may occur in the resulting measurement.

ISOLATION AVERAGES — allows the number of isolation averages taken in the ECal correction to be set manually. Use the number keypad to set the number of averages. The number of averages can be set from 1 to 999. The default number of averages is 10.

MAN' L THRU on OFF — allows the insertion of a different thru during the ECal correction routine. When turned ON, the routine will pause for the insertion of the thru and display a menu that contains a continue and abort softkey.

MODULE A b — selects the module to be used in the ECal operation. Select the module according to frequency range and connector type of the DUT. In some cases the Module B selection will not be used.

MODULE INFO — presents a text window that contains information about the selected module.

OMIT ISOL ON off — is used to toggle the isolation portion of the calibration for the ECal correction routine.

PARAMETER [S11] — is located in the ECal confidence and ECal service menus. In ES models you can display the S11, S22, S21, or S12 ECal module factory response and the actual measurement response. In ET models, you can display the TRN or RFL responses.

REFL STD [0] — is located in the ECal service menu. This allows you to select different reflection standards in the ECal module. The number of reflection standards varies with ECal module type.

SET CONF STANDARD — sets the ECal module back the confidence state. Used after exiting the ECal service menu to reset the Ecal module back to the confidence state.

TRACE TYPE [DATA] — is located in the ECal confidence menu and ECal service menu. This softkey allows you to display the ECal module factory response and measurement data in different forms. The choices include: DATA, DATA&MEM, DATA/MEM, DATA-MEM, and MEM.

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Error Messages

Error Messages in Alphabetical Order

CANNOT DETERMINE ORIENTATION

Information
Message

There is a problem with the ECal module in the RF path. Check RF connections, power connections, and interface connections to module.

ECal: CHECKING ORIENTATION

Information
Message

This message is displayed while the network analyzer verifies that the ECal module is properly connected in the RF path.

ECal: CONFIDENCE STATE

Information
Message

This message is displayed when the confidence state is initiated. The confidence state response will be displayed.

ECal FAILED

Error Number
224

This is a serious ECal failure. It may occur due to corrupt data in the ECal module or a problem with the network analyzer. If the error message continues, contact the service center. For a list of sales and service centers near you, refer to *Chapter 8, Safety and Regulatory Informatio*n in the user's guide.

ECal: ISOLATION STATE

Information
Message

This message is displayed when ECal module is set to the isolation state.

ECal: MODULE NOT IN RF PATH

Error Number
219

The ECal module is not in the RF path. Check all connections to the ECal module.

ECal: MODULE NOT RESPONDING

Error Number
222

The ECal module is not responding to the network analyzer. Check all the ECal module connections and the power supply connection.

ECal: MODULE NOT SUPPORTED

Information
Message

The ECal module that is being used for calibration is not compatible with the network analyzer. Refer to the *Electronic Calibration Module Reference Guide* for information regarding compatibility.

ECal: REFLECTION STATE

Information Message	This message is displayed when the ECal module is set to the reflection state.

ECal: SELECTING BEST REFECTION REFLECTION STATE

Information Message	The network analyzer is in the process of selecting the most accurate reflection response.

ECal: SELECT OTHER MODULE

Error Number 221	This error occurs when two ECal modules are connected. The selected ECal module may not be able to measure the selected frequency range. Check the frequency range of the other module and connect in the RF path.

ECal: THRU STATE

Information Message	This message is displayed when the ECal module is set to the thru state.

ISOL AVERAGES < SWP AVERAGES

Error Number 223	The isolation averages are less than the instrument sweep averages. Increase the isolation averages to be equal to or greater than instrument sweep averages. This error can only occur when instrument averaging is turned on.

NO MODULE DATA FOR THIS PARAMETER

Information Message	This message is displayed in Ecal service when there is no parameter data in the ECal module.

NO MODULE DATA FOR ISOLATION STD

Information Message	This message is displayed in ECal service when there is no isolation data in the ECal module.

OK TO ALTER CORRECTION CONSTANTS?

Error Number 186	This message is displayed as a prompt during operations when the correction constants will be changed. Correction constants may be change in the adjustment tests in the service menu.

SELECTED MODULE OUTSIDE START-STOP FREQ RANGE

Error Number 220	The start and stop frequency range is outside the limits of the ECal module. Manually set the frequency limits to within the module range.

VALID ONLY FOR BILATERAL DEVICES

Information
Message

This message is displayed when an enhanced reflection calibration is initiated. If the device tested is not a bilateral device, the enhanced reflection calibration will cause errors in the measurement results.

A bilateral device has similar forward and reverse transmission characteristics. Examples of bilateral devices are passive devices (filters, attenuators, and switches). Most active devices (amplifiers) and some passive devices (isolators and circulators) are not bilateral.

WAIT: ECal MODULE BEING READ

Information
Message

The data from ECal is being read by the network analyzer.

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Error Messages in Numerical Order

Error Number	Error
219	ECal MODULE NOT IN RF PATH
220	SELECTED MODULE OUTSIDE START-STOP FREQ RANGE
221	ECal SELECT OTHER MODULE
222	ECal MODULE NOT RESPONDING
223	ISOL AVGS < SWP AVGS
224	ECal FAILED

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Options and Accessories

Accessories Available

Added new calibration kits and updated Electronic calibration (ECal) section.

Calibration Kits

Choose a kit for each connector type to be used.

- 85032F 50 Ω type-N calibration kit (30 kHz to 9 GHz)
  Contains a female and male open and short, female and male load standard, and a torque wrench.

  — Option 500
    Adds four type-N to 7-mm adapter.

- 85033E 50 Ω 3.5-mm calibration kit (30kHz to 9 GHz)
  Contains a female and male open and short, female and male load standard, and a torque wrench.

  — Option 400
    Adds four 3.5 mm to Type-N adapters.

  — Option 500
    Adds four 3.5 mm to 7-mm adapters.

RF electronic calibration (ECal) modules and PC software

This product family provides electronic calibration (ECal) capability. With ECal, the usual calibration kit standards are replaced by one solid-state calibration module. A full two-port calibration can be done with a single connection, with reduced errors and wear on connectors. ECal requires the 85097A PC interface kit, an 85090-series calibration module with the appropriate connector type, and a network analyzer with firmware version 7.68 and above.

NOTE   For network analyzers with firmware versions between 7.60 and 7.68, a PC with Windows®[1] 95, 98, 2000 or NT 4.0 loaded with software from the 85097A PC interface kit is used to perform the ECal calibration.

- 85097A ECal PC interface kit and software

  — Contains PC interface module for connecting an ECal module to a PC or a network analyzer (with firmware version 7.68 and above) and PC ECal control software.

- 85091B RF ECal module (30 kHz to 9 GHz), 7-mm connectors

- 85092B RF ECal module (30 kHz to 9 GHz), 50 Ω type-N (m) to 50 Ω type-N (f) connectors

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1. Windows is a U.S. registered trademark of Microsoft Corporation.

- — Option 00F substitutes type-N (f) to type-N (f) RF ECal module.

- — Option 00M substitutes type-N (m) to type-N (m) RF ECal module.

- — Option 00A adds:

  - — type-N (f) to type-N (f) adapter

  - — type-N (m) to type-N (m) adapter

- 85093B RF ECal module (30 kHz to 9 GHz), 3.5-mm (m) to 3.5-mm (f) connectors

  - — Option 00F substitutes 3.5-mm (f) to 3.5-mm (f) RF ECal module.

  - — Option 00M substitutes 3.5-mm (m) to 3.5-mm (m) RF ECal module.

  - — Option 00A adds:

    - — 3.5-mm (f) to 3.5-mm (f) adapter

    - — 3.5-mm (m) to 3.5-mm (m) adapter

- 85098B RF ECal module (30 kHz to 7.5 GHz), 7-16 (m) to 7-16 (f) connectors

  - — Option 00F substitutes 7-16 (f) to 7-16 (f) RF ECal module.

  - — Option 00M substitutes 7-16 (m) to 7-16 (m) RF ECal module.

  - — Option 00A adds:

    - — 7-16 (f) to 7-16 (f) adapter

    - — 7-16 (m) to 7-16 (m) adapter

- 85096B RF ECal module (30 kHz to 3 GHz), 75 Ω type-N (m) to 75 Ω type-N (f) connectors

  - — Option 00F substitutes module with two type-N female connectors.

  - — Option 00M substitutes module with two type-N male connectors.

  - — Option 00A adds:

    - — type-N (m) to type-N (m) adapter

    - — type-N (f) to type-N (f) adapter

- 85099B RF ECal module (30 kHz to 3 GHz), 75 Ω type-F (m) to type-F (f) connectors

  - — Option 00F substitutes module with two type-F female connectors.

  - — Option 00M substitutes module with two type-F male connectors.

  - — Option 00A adds:

    - — type-F (m) to type-F (m) adapter

    - — type-F (f) to type-F (f) adapter

Preset State and Memory Allocation

Added new preset value for enhanced reflection and ECal.

Preset State

Table 5-1. Preset Conditions

Preset Conditions	Preset Value
Enhanced Reflection Calibration	Off
Electronic Calibration (ECal)	
Module	A (information may not be loaded)
Omit Isolation	On
Isolation Averages	10
Manual Thru	Off

6 Supplement for the Programmer's Guide (Firmware Revision 7.68)

In This Chapter

This chapter contains the supplemental information changes to the programmer's guide that coincides with the release of firmware revision 7.68. These changes pertain to:

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

IMPORTANT If you are upgrading your firmware from a revision prior to revision 7.66, add the information changes from Chapter 3 , "Supplement for the Programmer's Guide (Firmware Revision 7.66)," before adding the changes from this chapter.

The following list describes the changes to programmer's guides printed prior to February 2001. 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 the new command options to the existing CALI and CALK commands of the "Alphabetical Command Reference" section. CALI has one new command option and CALK has two new command options. See page 6-3.

    — Add the 18 new ECal programming commands (page 6-5 through page 6-14) to the "Alphabetical Command Reference" section.

- Appendix A: Preset Conditions

    — Add enhanced reflection preset conditions from Table 6-1 to the existing "Calibration Conditions" table. See page 6-15.

    — Add Table 6-2, "Electronic Calibration (ECal) Conditions,"to the existing "Preset Conditions" section. See page 6-15.

- Appendix B: Command Listings

    — Add 21 new programming commands to the "Alphabetical List of Commands" subsection of the "Command Listings" section. See page 6-17.

    — Add 2 new programming commands to the "OPC-Compatible List of Commands" subsection of the "Command Listings" section. See page 6-17.

Alphabetical Command Reference

CALI

Syntax

`CALI<EREFL>;` *or* `CALI<EREFL>?;`

Description

Command	Description	Range	Query Response
CALIEREFL	Turns the enhanced reflection response on or off.	N/A	$<0|1><^L_F>$

Front Panel Equivalents

Command	Hardkey	Softkey
CALIEREFL	(Cal)	**ENH. REFL. on OFF**

CALK

Syntax

`CALK<32F|35ME>;` *or* `CALK<|32F|35ME>?;`

Description

Command	Description	Range	Query Response
CALK32F	Selects a 32F calibration kit (85032F) as the default cal kit.	N/A	$<0|1><^L_F>$
CALK35ME	Selects a 33D/E calibration kit (85033D/E) as the default cal kit for all analyzers.	N/A	$<0|1><^L_F>$

Front Panel Equivalents

Command	Hardkey	Softkey
CALK32F	(Cal)	**N 50Ω 85032F**
CALK35ME	(Cal)	**3.5mmD 85033D/E**

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ECALAB?

Syntax

ECALAB?;

Description

Command	Description	Range	Query Response
ECALAB?	Queries the analyzer for the currently selected module. This query returns the integer "1" if the "A" module is selected or the integer "0" if the "B" module is selected.	N/A	$<0 \mid 1><^L_F>$

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALCONT

Syntax

ECALCONT;

Description

Command	Description	Range	Query Response
ECALCONT	Continues a paused ECal during a manual thru operation or a dual module operation. This command is used with the polling command "ECALPAUSED" on page 6-13 which returns the integer "1" when paused or the integer "0" when not paused.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
ECALCONT	(Cal)	**CONTINUE ECal**

ECALDONE

Syntax

`ECALDONE;`

Description

Command	Description	Range	Query Response
ECALDONE	This command is designed to be used in a polling loop to determine if the ECal operation is finished. The command returns information immediately. The integer "1" is returned if the ECal has completed the calibration or returns the integer "0" if the ECal is not finished.	N/A	N/A

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALERC

Syntax

`ECALERC;`

Description

Command	Description	Range	Query Response
ECALERC[a]	Performs an ECal forward enhanced response calibration.	N/A	N/A

a. For ES analyzers, S_{11} / S_{21} enhanced response is performed. For ET analyzers, transmission / reflection enhanced response is performed.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALERC	⌈Cal⌋	ES models: **S11/21 ENH. RESP.** ET models: **TRAN/REFL ENH. RESP.**

ECALFREQS

Syntax

ECALFREQS;

Description

Command	Description	Range	Response
ECALFREQS	Extracts an array of the factory calibration frequency values that are stored in the ECal module. Before using this command, use "ECALNFREQS" on page 6-12 to determine the number of frequency points stored in the module. Use this number to dimension the array for data from the ECALFREQS command. This is an ASCII transfer.	varies with ECal module	$<array><^L_F>$

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALFUL2

Syntax

ECALFUL2;

Description

Command	Description	Range	Query Response
ECALFUL2[a]	Performs an ECal full two-port calibration.	N/A	N/A

a. This command is not valid with ET analyzers.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALFUL2	(Cal)	**FULL 2-PORT**

ECALISOAVG

Syntax

`ECALISOAVG<NUM>; or ECALISOAVG?;`

Description

Command	Description	Range	Query Response
ECALISOAVG	Sets the number of averages in the ECal isolation averages function.	1-999	$<num><^L_F>$

Front Panel Equivalents

Command	Hardkey	Softkey
ECALISOAVG	(Cal)	**ISOLATION AVERAGES**

ECALMANTHRU

Syntax

`ECALMANTHRU<ON|OFF>; or ECALMANTHRU?;`

Description

Command	Description	Range	Query Response
ECALMANTHRUON	Sets manual thru to "on."	N/A	$<0|1><^L_F>$
ECALMANTHRUOFF	Sets manual thru to "off."	N/A	$<0|1><^L_F>$

Front Panel Equivalents

Command	Hardkey	Softkey
ECALMANTHRUON	(Cal)	**MAN ' L THRU ON off**
ECALMANTHRUOFF	(Cal)	**MAN ' L THRU on OFF**

ECALMODID

Syntax

ECALMODID;

Description

Command	Description	Range	Response

ECALMODID	This command returns the selected ECal module model number and serial number in string form.
	
	Model number output:
	
	   MODEL NUMBER: XXXXX-XXXXX
	
	Serial number output:
	
	   SERIAL NUMBER: XXXXX
		N/A	$<\$><^L_F>$

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALMODINF

Syntax

ECALMODINF;

Description

Command	Description	Range	Response
ECALMODINF	This command returns string variables on the following information on the selected ECal module. Model Number: xxxxx-xxxxx Serial Number: xxxxx Connector Type: connector type Last Certification: ddmmmyear Module Number of Points: xxx Module Start Frequency: xxxxx[a] Module Stop Frequency: xxxxxxxxxx[a] Suggested Warmup Time: xxx SECONDS Module Warmup Status: xxx[b] For an example of the output data, refer to the description on module information in the user's guide in the "Calibrating for Increased Measurement Accuracy" chapter.	N/A	$<array><^L_F>$

a. Output in hertz.
b. Can be polled in a loop to return the latest warmup time. When warmup time is finished, the string "READY" will be returned.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALMODINF	(Cal)	**MODULE INFO**

ECALMODSELA

Syntax

`ECALMODSELA;`

Description

Command	Description	Range	Query Response
ECALMODSELA	Sets the active module to "A". If no module is connected to "A", error message 222 "ECal MODULE NOT RESPONDING" will be set in the error buffer.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
ECALMODSELA	(Cal)	**MODULE A b**

ECALMODSELB

Syntax

`ECALMODSELB;`

Description

Command	Description	Range	Query Response
ECALMODSELB	Sets the active module to "B". If no module is connected to "B", error message 222 "ECal MODULE NOT RESPONDING" will be set in the error buffer.	N/A	N/A

Front Panel Equivalents

Command	Hardkey	Softkey
ECALMODSELB	(Cal)	**MODULE a B**

ECALNFREQS

Syntax

ECALNFREQS;

Description

Command	Description	Range	Response
ECALNFREQS	Extracts the number of the factory calibration frequency points that are stored in the ECal module. Use this command to determine the size of the array to put the frequency values returned from the command "ECALFREQS" on page 6-7.	varies with ECal module	$<num><^L_F>$

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALOMII

Syntax

ECALOMII<ON|OFF>; or ECALOMII?;

Description

Command	Description	Range	Query Response
ECALOMIION	Sets omit isolation to "on."	N/A	$<0|1><^L_F>$
ECALOMIIOFF	Sets omit isolation to "off."	N/A	$<0|1><^L_F>$

Front Panel Equivalents

Command	Hardkey	Softkey
ECALOMIION	(Cal)	**OMIT ISOL ON off**
ECALOMIIOFF	(Cal)	**OMIT ISOL on OFF**

ECALPAUSED

Syntax

ECALPAUSED;

Description

Command	Description	Range	Query Response
ECALPAUSED	This command is designed to be used in a polling loop to determine if the ECal operation is in the pause stage of a manual thru and a dual module calibration. Used with the command "ECALCONT" on page 6-5. Returns the integer "1" if the ECal is paused or returns the integer "0" if the ECal is not paused.	N/A	N/A

Front Panel Equivalents

GPIB only: no front panel equivalent

ECALRERC

Syntax

ECALRERC;

Description

Command	Description	Range	Query Response
ECALRERC[a]	Starts an ECal reverse enhanced response calibration.	N/A	N/A

a. For ES analyzers, an S_{22} / S_{12} enhanced response is performed. This command is not valid with ET analyzers.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALRERC	Cal	**S22/12 ENH. RESP.**

ECALS11

Syntax

ECALS11;

Description

Command	Description	Range	Query Response
ECALS11[a]	Performs an ECal S_{11} one-port reflection calibration.	N/A	N/A

a. For ES analyzers, an S_{11} one port calibration is performed. For ET analyzers, a reflection one-port calibration is performed.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALS11	[Cal]	ES models: **S11 1-PORT** ET models: **REFLECTION 1-PORT**

ECALS22

Syntax

ECALS22;

Description

Command	Description	Range	Query Response
ECALS22[a]	Performs an ECal S_{22} one-port reflection calibration.	N/A	N/A

a. This command is not valid with ET analyzers.

Front Panel Equivalents

Command	Hardkey	Softkey
ECALS22	[Cal]	**S22 1-PORT**

Preset Conditions

Table 6-1 Calibration Conditions

Preset Conditions	Preset Value
Enhanced Reflection Calibration	Off

Table 6-2 Electronic Calibration (ECal) Conditions

Preset Conditions	Preset Value
Module	A (information may not be loaded)
Omit Isolation	On
Isolation Averages	10
Manual Thru	Off

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Command Listings

Alphabetical List of Commands

CALIEREFL	ECALFREQS	ECALMODSELB
CALK32F	ECALFUL2	ECALNFREQS
CALK35ME	ECALISOAVG	ECALOMII
ECALAB?	ECALMANTHRU	ECALPAUSED
ECALCONT	ECALMODID	ECALRERC
ECALDONE	ECALMODINF	ECALS11
ECALERC	ECALMODSELA	ECALS22

OPC-Compatible List of Commands

ECALMODSELA	ECALMODSELB

7 Supplement for the Installation and Quick Start Guide (Firmware Version 7.68)

Using This Chapter

This chapter contains the supplemental information changes to the installation and quick start guides that coincide with the release of firmware revision 7.68. These changes pertain to the following installation and quick start guides.

- 8753ET and 8753ES Network Analyzers Installation and Quick Start Guide (part number 08753-90471)

- 8753ES Option 011 Network Analyzer Installation and Quick Start Guide (part number 08753-90478)

The following list describes the changes to 8753ET and 8753ES installation and quick start guides printed prior to February 2001. 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.

- Front Matter

  — Replace the warning describing the line fuse type and rating with a revised warning in "General Safety Considerations." See page 7-3.

- Quick Start: Learning How to Make Measurements Chapter

  — Replace the paragraph describing checking and replacing the fuse with the revised paragraph in the "Power-Up Problems" subsection of "If You Encounter a Problem." See page 7-4.

General Safety Considerations

WARNING   **For continued protection against fire hazard replace line fuse only with same type and rating (115V operation: T 5A 125V UL/ 230V operation: T 4A H 250V IEC). The use of other fuses or material is prohibited.**

If You Encounter a Problem

Power-Up Problems

Refer to Figure 2-17 to remove the fuse from the power module. You can use a continuity light or an ohmmeter to check the fuse. An ohmmeter should read very close to zero ohms if the fuse is good. For 115V operation, use Fuse, T 5A 125V, UL listed/CSA certified to 248 standard (part number 2110-1059). For 230V operation, use Fuse, T 4A H 250V, built to IEC 127-2/5 standard (part number 2110-1036).

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