System Verification and Performance Test Guide

HP 8753E Network Analyzer

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Table 0-1. Hewlett-Packard Sales and Service Offices

UNITED STATES

Instrument Support Center
Hewlett-Packard Company
(800) 403-0801

EUROPEAN FIELD OPERATIONS

Headquarters
Hewlett-Packard S.A.
150, Route du Nant-d'Avril
1217 Meyrin 2/Geneva
Switzerland
(41 22) 780.8111

France
Hewlett-Packard France
1 Avenue Du Canada
Zone D'Activite De Courtaboeuf
F-91947 Les Ulis Cedex
France
(33 1) 69 82 60 60

Germany
Hewlett-Packard GmbH
Hewlett-Packard Strasse
61352 Bad Homburg v.d.H
Germany
(49 6172) 16-0

Great Britain
Hewlett-Packard Ltd.
Eskdale Road, Winnersh Triangle
Wokingham, Berkshire RG41 5DZ
England
(44 734) 696622

INTERCON FIELD OPERATIONS

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3495 Deer Creek Road
Palo Alto, California, USA
94304-1316
(415) 857-5027

Australia
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
(61 3) 895-2895

Canada
Hewlett-Packard (Canada) Ltd.
17500 South Service Road
Trans-Canada Highway
Kirkland, Quebec H9J 2X8
Canada
(514) 697-4232

China
China Hewlett-Packard Company
38 Bei San Huan X1 Road
Shuang Yu Shu
Hai Dian District
Beijing, China
(86 1) 256-6888

Japan
Hewlett-Packard Japan, Ltd.
9-1 Takakura-Cho, Hachioji
Tokyo 192, Japan
(81 426) 60-2111

Singapore
Hewlett-Packard Singapore (Pte.) Ltd.
150 Beach Road
#29-00 Gateway West
Singapore 0718
(65) 291-9088

Taiwan
Hewlett-Packard Taiwan
8th Floor, H-P Building
337 Fu Hsing North Road
Taipei, Taiwan
(886 2) 712-0404

Safety Notes

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

Caution	Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the instrument. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.
Caution	Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause instrument damage.
Warning	**Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.**
Warning	**No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.**
Warning	**For continued protection against fire hazard replace line fuse only with same type and rating (F 3A/250V). The use of other fuses or material is prohibited.**
Warning	**This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.**
Warning	**The power cord is connected to internal capacitors that may remain live for 10 seconds after disconnecting the plug from its power supply.**
Warning	**The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.**

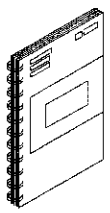
 The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.

"CE" The CE mark is a registered trademark of the European Community. (If accompanied by a year, it is when the design was proven.)

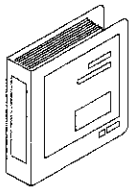
"ISM1-A" This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.

"CSA" The CSA mark is a registered trademark of the Canadian Standards Association.

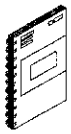
HP 8753E Network Analyzer Documentation Set



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

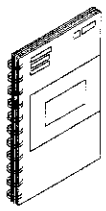


The **User's Guide** shows how to make measurements, explains commonly-used features, and tells you how to get the most performance from your analyzer.



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

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



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

The **System Verification and Test Guide** provides the system verification and performance tests and the Performance Test Record for your analyzer.

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System Verification and Performance Tests

There are two ways to confirm that the HP 8753E network analyzer is able to make measurements as specified by Hewlett-Packard. Both ways are described in this chapter.

The first way is through the system verification procedure. With system verification, the performance of the network analyzer is confirmed as a complete measurement system. The network analyzer is used to measure the traceable behavior of test devices that are part of a verification kit. All the measurement uncertainties of the network analyzer, taken as a measurement system, have been accounted for in the serialized data disk shipped with the verification kit.

The specified performance of the network analyzer can also be confirmed using the series of performance tests described in this chapter. Successful completion of an individual test confirms the specified performance of the specific subsystem tested, such as the source or receiver. Successful completion of the whole series of performance tests confirms the specified performance of the network analyzer as a complete measurement system.

How to Test the Performance of Your Analyzer

To obtain the same quality of performance testing that Hewlett-Packard has administered at the factory, you must perform:

- the system verification procedure

OR

- *all* of the performance test procedures.

This quality of performance testing guarantees that the analyzer is performing within *all* of the published specifications. Hewlett-Packard will issue a Certificate of Calibration for your analyzer if two conditions are met:

1. Your analyzer passes all the performed tests.
2. The equipment and standards that you used to perform the tests are traceable to a national standards institute.

Note If you have a particular type of measurement application that does not use all of the analyzer's measurement capabilities, you may ask your local Hewlett-Packard Customer Service Center for a subset of specifications that you want verified. However, this does create a potential for making incorrect measurements, by using a different application than what was specified.

Sections in this Chapter

- **System Verification**
- **Performance Tests**

1. Test Port Output Frequency Range and Accuracy
2. External Source Mode Frequency Range
3. Test Port Output Power Accuracy
4. Test Port Output Power Range and Linearity
5. Minimum R Channel Level
6. Test Port Input Noise Floor Level
7. Test Port Input Frequency Response
8. Test Port Crosstalk
9. Calibration Coefficients
10. System Trace Noise (Only for Analyzers *without* Option 006)
11. System Trace Noise (Only for Analyzers *with* Option 006)
12. Test Port Input Impedance
13. Test Port Receiver Magnitude Dynamic Accuracy
14. Test Port Receiver Magnitude Compression
15. Test Port Receiver Phase Compression
16. Test Port Output/Input Harmonics (Option 002 Analyzers *without* Option 006 only)
17. Test Port Output/Input Harmonics (Option 002 Analyzers *with* Option 006 only)

Performance Test Record

Find and use the appropriate "Performance Test Record" in the following subchapters:

- Performance Test Record for 30 kHz to 3 GHz
- Performance Test Record for 30 kHz to 6 GHz

System Verification Cycle and Kit Re-certification

Hewlett-Packard recommends that you verify your network analyzer measurement system every six months. Hewlett-Packard also suggests that you get your verification kit re-certified annually. Refer to *HP 85029B 7-mm Verification Kit Operating and Service Manual* for more information.

Note The system verification procedures can also apply to analyzers with Option 075 (75 ohm analyzers) if minimum loss pads and type-N (m) to APC-7 adapters are used.

Check to see how the verification kit floppy disk is labeled:

- If your verification disk is labeled `HP 8753D Verification Data Disk`, or `HP 8753D & HP 8753E Verification Data Disk`, you may proceed with the system verification.
- If your verification disk is not labeled as indicated above, you may send your HP 85029B 7-mm verification kit to the nearest service center for recertification, which includes a data disk that you can use with the HP 8753E.

HP 8753E System Verification

Equipment Required

Calibration Kit, 7-mm	HP 85031B
Verification Kit, 7-mm	HP 85029B
Test Port Extension Cable Set, 7-mm	HP 11857D
Printer	HP ThinkJet/DeskJet/LaserJet

Additional Equipment Required for Option 075 Analyzers

Minimum Loss Pad (2), 50 Ω to 75 Ω	HP 11852B
Adapter (2), APC-7 to Type-N (m)	HP 11525A

Analyzer warmup time: **1 hour**

This system verification consists of three separate procedures:

1. Initialization
2. Measurement Calibration
3. Device Verification

Initialization

1. Clear all internal memory.

Caution **This will erase all instrument states that may be stored in internal memory.**

Perform the following steps to save any instrument states that are stored in internal memory to a floppy disk.

a. Press (SAVE/RECALL) SELECT DISK INTERNAL MEMORY RETURN.

b. Select an instrument state and press RECALL STATE.

c. Press SELECT DISK INTERNAL DISK RETURN SAVE STATE.

d. If the instrument state file was not saved to disk with the same name that it had while in internal memory, you may wish to rename the file.

Press FILE UTILITIES RENAME FILE, enter the desired name, and press DONE.

e. Repeat steps a through d for each instrument state that you wish to save.

To clear all internal memory, press (SYSTEM) SERVICE MENU PEEK/POKE RESET MEMORY (PRESET).

2. Connect the equipment as shown in Figure 1-1. Let the analyzer warm up for one hour.

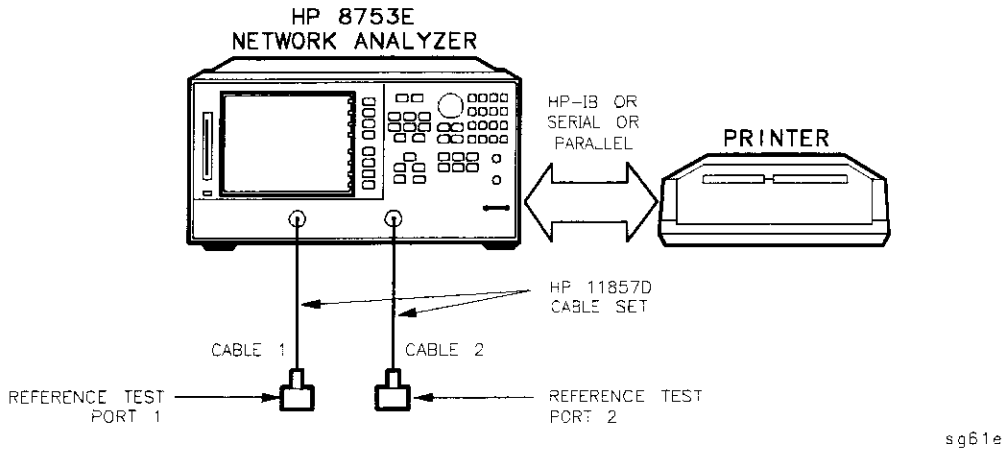

Figure 1-1. System Verification Test Setup

3. While the equipment is warming up, review the "Connector Care Quick Reference" information in the "Service Equipment and Analyzer Options" chapter. Good connections and clean, undamaged connectors are critical for accurate measurement results.
4. Insert the verification kit disk into the analyzer disk drive.
5. Press (Preset) (Save/Recall) `SELECT DISK INTERNAL DISK`.
6. If you want a printout of the verification data for all the devices, press (System) `SERVICE MENU TEST OPTIONS RECORD ON`.

Note If you switch on the record function, you *CANNOT* switch it off during the verification procedure.

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7. Position the paper in the printer so that printing starts at the top of the page.
8. If you have difficulty with the printer:
   - If the interface on your printer is HP-IB, verify that the printer address is set to 1 (or change the setting in the analyzer to match the printer).
   - If the interface on your printer is serial or parallel, be sure that you selected the printer port and the printer type correctly (refer to the *HP 8753E Network Analyzer User's Guide* for more information on how to perform these tasks).
9. Press (System) `SERVICE MENU TESTS SYS VER TESTS EXECUTE TEST`.
10. The analyzer displays `Sys Ver Init DONE`, the initialization procedure is complete.

Caution *DO NOT* press (Preset) or recall another instrument state. You must use the instrument state that you loaded during the initialization procedure.

Measurement Calibration

11. Press (Cal) CAL KIT SELECT CAL KIT CAL KIT:7mm RETURN RETURN CALIBRATE MENU FULL 2-PORT.

12. Press ISOLATION OMIT ISOLATION.

13. Press REFLECTION.

14. Connect the "open" end of the open/short combination (supplied in the calibration kit) to reference test port 1, as shown in Figure 1-2.

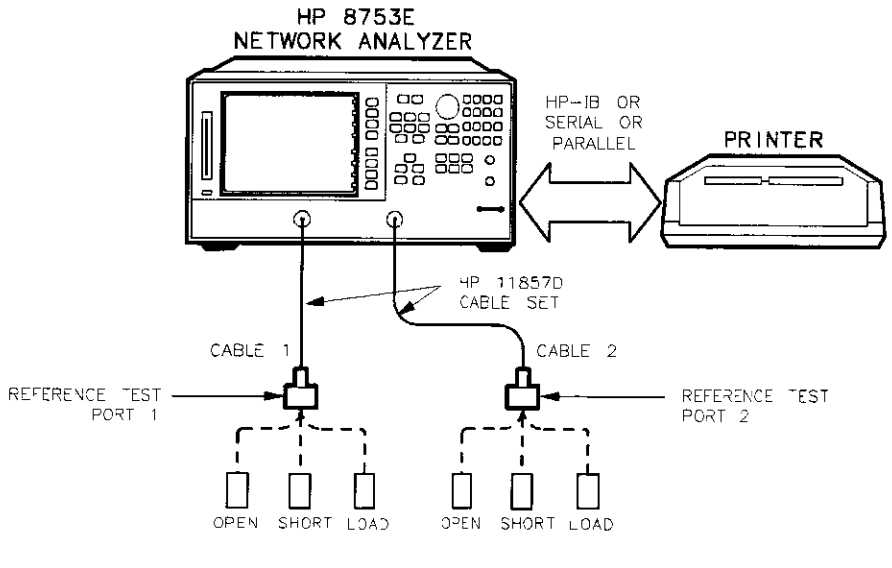


Figure 1-2. Connections for Measurement Calibration Standards

15. Press FORWARD:OPEN.

16. When the analyzer finishes measuring the standard, connect the "short" end of the open/short combination to reference test port 1.

17. Press FORWARD:SHORT.

18. When the analyzer finishes measuring the standard, connect the 50 ohm termination (supplied in the calibration kit) to reference test port 1.

19. Press FORWARD:LOAD.

20. When the analyzer finishes measuring the standard, connect the "open" end of the open/short combination to reference test port 2.

21. Press REVERSE:OPEN.

22. When the analyzer finishes measuring the standard, connect the "short" end of the open/short combination to reference test port 2.

23. Press REVERSE:SHORT.

24. When the analyzer finishes measuring the standard, connect the 50 ohm termination to reference test port 2.

25. Press REVERSE:LOAD .

26. When the analyzer finishes measuring the standard, press STANDARDS DONE .

    The analyzer briefly displays COMPUTING CAL COEFFICIENTS.

27. Connect the test port cables as shown Figure 1-3.

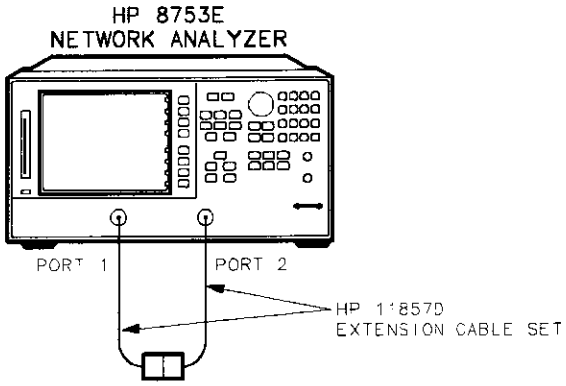


Figure 1-3. Transmission Calibration Setup

28. Press TRANSMISSION DO BOTH FWD + REV .

29. Press DONE 2-PORT CAL .

30. Press (Save/Recall) SELECT DISK INTERNAL MEMORY RETURN SAVE STATE to save the calibration into the analyzer internal memory.

31. When the analyzer finishes saving the instrument state, press SELECT DISK INTERNAL DISK .

Device Verification

32. Press (System) SERVICE MENU TESTS (28) (x1) EXECUTE TEST.

33. At the prompt, connect the 20 dB attenuator (supplied in the verification kit) as shown in Figure 1-4.

34. Press CONTINUE to run the test:

    - If you switched OFF the record function, you have to press CONTINUE after each S-parameter measurement.
    - If you switched ON the record function, the analyzer measures all S-parameters (magnitude and phase) without pausing. Also, the analyzer only displays and prints the PASS/FAIL information for the S-parameter measurements that are valid for system verification.

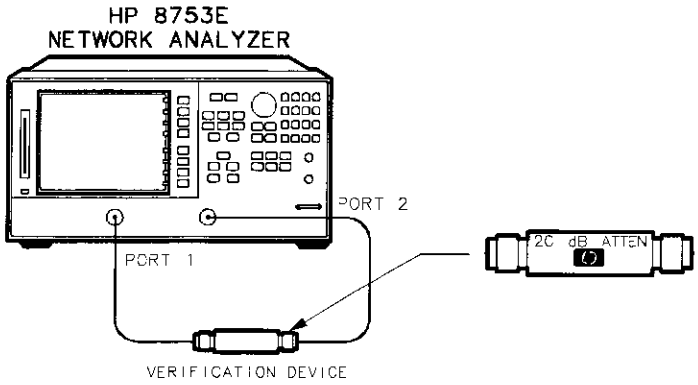


Figure 1-4. Connections for the 20 dB Verification Device

35. When the analyzer finishes all the measurements, connect the 50 dB attenuator (supplied in the verification kit), as shown in Figure 1-5.

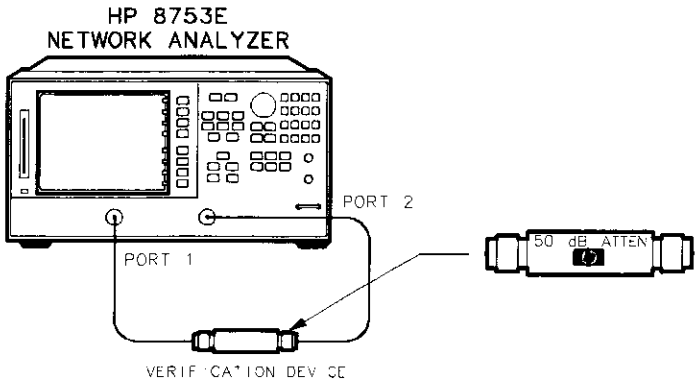


Figure 1-5. Connections for the 50 dB Verification Device

36. Press (Shift) (29) (x1) EXECUTE TEST CONTINUE.

37. When all measurements are complete, replace the verification device with the verification mismatch, as shown in Figure 1-6. Be sure that you connect Port A of the verification mismatch to reference test port 1.

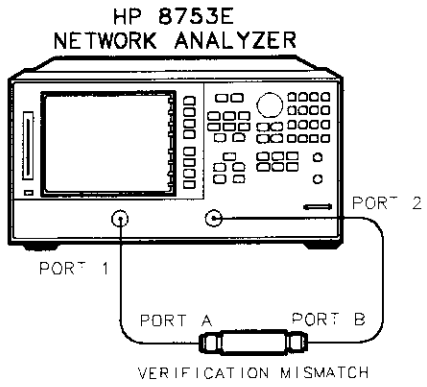


Figure 1-6. Mismatch Device Verification Setup

38. Press RETURN TESTS 30 x1 EXECUTE TEST CONTINUE.

39. When the analyzer finishes all the measurements, connect the mismatch verification device, as shown in Figure 1-7. Notice that Port B is now connected to reference test port 1.

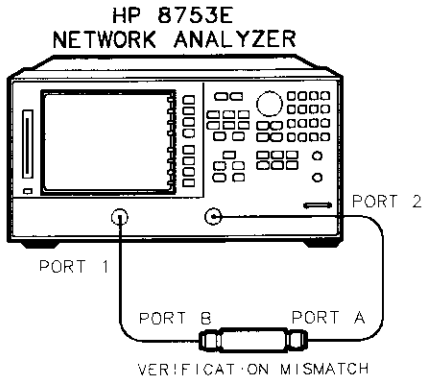


Figure 1-7. Mismatch Device Verification Setup

40. Press RETURN TESTS 31 x1 EXECUTE TEST CONTINUE.

41. You have completed the system verification procedure when the analyzer displays `Ver Def 4 DONE`.

In Case of Difficulty

1. Inspect all connections. *DO NOT* disconnect the cables from the analyzer test ports. Doing so *WILL INVALIDATE* the calibration that you have done earlier.
2. Press (Preset) (Save/Recall) SELECT DISK INTERNAL MEMORY RETURN. Using the front panel knob, highlight the title of the full 2-Port calibration that you have done earlier, then press RECALL STATE.
3. Repeat the "Device Verification" procedure.
4. If the analyzer still fails the test, check the measurement calibration as follows:
   a. Press (Preset).
   b. Recall the calibration by pressing (Save/Recall) SELECT DISK INTERNAL MEMORY RETURN.
   c. Use the front panel knob to highlight the calibration you want to recall and press RECALL STATE.
   d. Connect the short to reference test port 1.
   e. Press (Meas) Refl: FWD S11 (A/R) (Menu) TRIGGER MENU CONTINUOUS.
   f. Press (Scale Ref) SCALE/DIV (.05) (x1).
   g. Check that the trace response is 0.00 ± 0.05 dB.
   h. Disconnect the short and connect it to reference test port 2.
   i. Press (Meas) Refl: REV S22(B/R).
   j. Check that the trace response is 0.00 ± 0.05 dB.
   k. If any of the trace responses are out of the specified limits, repeat the "Measurement Calibration" and "Device Verification" procedures.
5. Refer to the "Start Troubleshooting Here" chapter of the *HP 8753E Service Guide* for more troubleshooting information.

1. Test Port Output Frequency Range and Accuracy

Specifications

Frequency Range	Frequency Accuracy[1]
30 kHz to 3 GHz	±10 ppm
3 GHz to 6 GHz[2]	±10 ppm

1 At 25° C ±5° C.

2 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Required Equipment

Frequency Counter (30 kHz to 500 Mhz) ..... HP 5350B/51B/52B
Frequency Counter (500 MHz to 6 GHz) ..... HP 5350B/51B/52B
Cable, 50Ω Type-N, 24-inch ..... HP P/N 8120-4781
Adapter, APC-3.5 (f) to Type-N (f) ..... HP P/N 1250-1745
Adapter, APC-7 to Type-N (f) ..... HP P/N 11524A
Adapter, Type-N (f) to BNC (m) ..... HP P/N 1250-1477

Additional equipment needed for an HP 8753E with Option 075

Minimum Loss Pad, 50Ω to 75Ω ..... HP 11852B

Analyzer warmup time: **30 minutes**

Perform this test to verify the frequency accuracy of the HP 8753E over its entire operating frequency range.

1. Connect the equipment as shown in Figure 1-8.

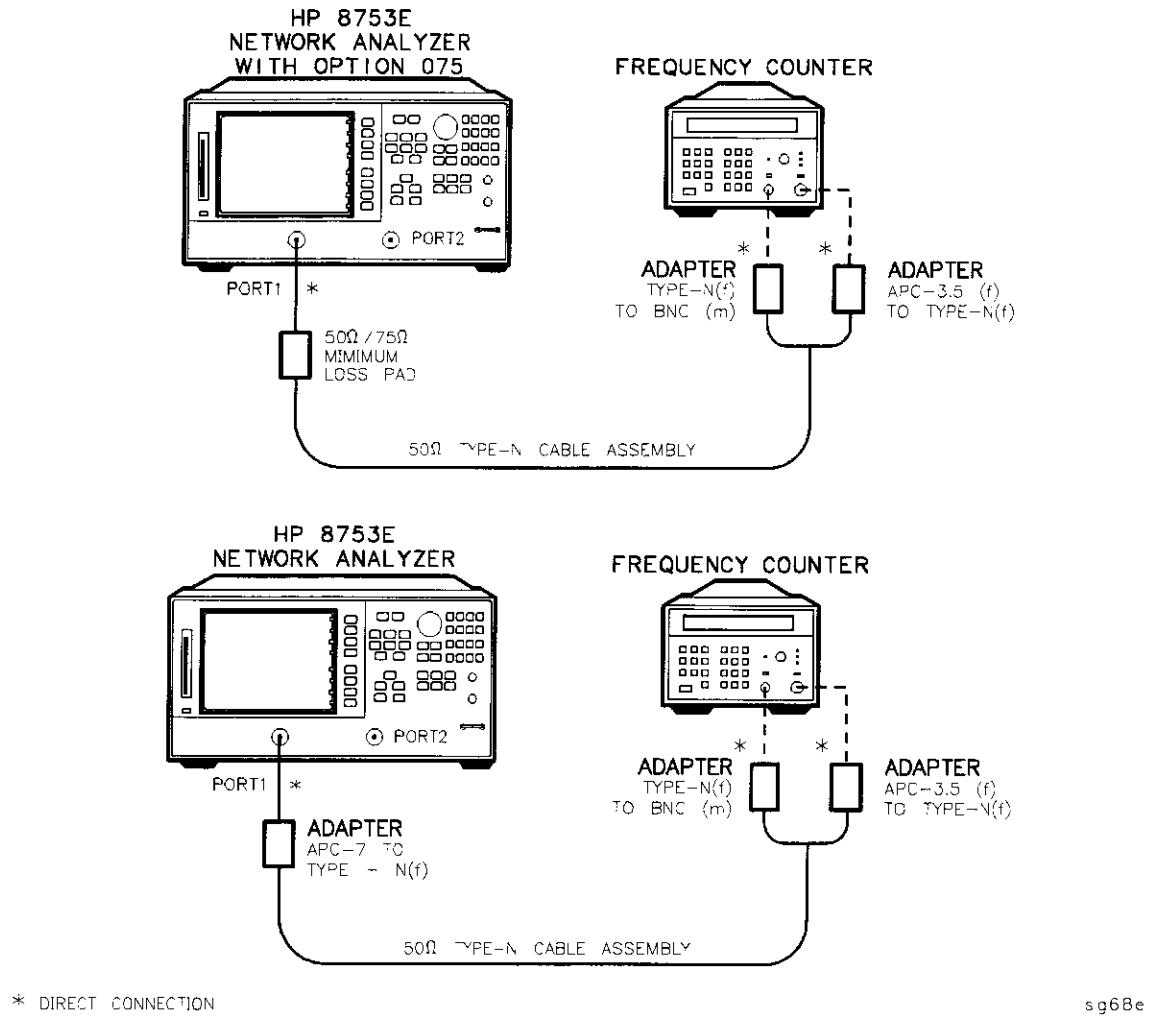


Figure 1-8. Test Port Output Frequency Range and Accuracy Test Setup

2. Press (Preset) (Menu) CW FREQ.
3. Press (30) (k/m) and write the frequency counter reading on the "Performance Test Record."
4. Repeat step 3 for each instrument frequency listed in the "Performance Test Record."

In Case of Difficulty

1. If any measured frequency is close to the specification limits, check the time base accuracy of the counter used.
2. If the analyzer fails by a significant margin at *all* frequencies (especially if the deviation increases with frequency), the master time base probably needs adjustment. In this case, refer to the "Frequency Accuracy Adjustment" procedure, located in the "Adjustments and Correction Constants" chapter of the *HP 8753E Service Guide*. The "Fractional-N Frequency Range Adjustment" also affects frequency accuracy.
3. Refer to the "Source Troubleshooting" chapter of the *HP 8753E Service Guide* for related troubleshooting information.

2. External Source Mode Frequency Range

Specifications

Frequency Range
300 kHz to 3 GHz
300 kHz to 6 GHz[1]

1 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Equipment Required

External Source ..... HP 83620A
Cable, APC-7, 24-inch ..... HP P/N 8120-4779
Adapter, APC-3.5 (f) to APC-7 ..... HP P/N 1250-1747
Adapter, APC-3.5 (m) to APC-7 ..... HP P/N 1250-1746

Analyzer warmup time: **30 minutes**

Perform this test to verify that the analyzer's reference channel, input R, is capable of phase locking to an external CW signal.

1. On the external source, press [Preset] [CW] [10] [MHz/μsec] [POWER LEVEL] [−/←] [20] [GHz/dB(m)].
2. Connect the equipment as shown in Figure 1-9.

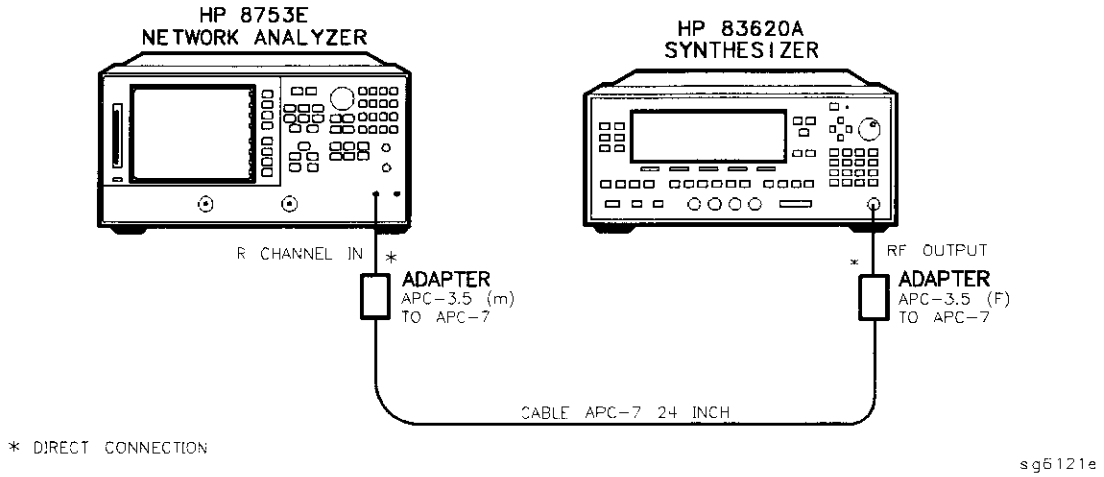


Figure 1-9. External Source Mode Frequency Range Test Setup

3. On the network analyzer, press [Preset] [Meas] INPUT PORTS R.
4. Press [System] INSTRUMENT MODE EXT SOURCE AUTO [Menu] CW FREQ [10] [M/μ].
5. Check to see if the analyzer is phase locking to the external CW signal:
   - If the analyzer displays any phase lock error messages, write "unlock" in the "Performance Test Record" for the set CW signal.

- If the analyzer does not display any phase lock error messages, write "lock" in the "Performance Test Record" for the set CW signal.

6. On the external source, press (CW) (20) (MHz/μ).
7. On the analyzer, press (20) (M/μ).
8. Repeat step 5 through 7 for the other external source CW frequencies listed in the "Performance Test Record."

In Case of Difficulty

1. Be sure the external source power is set within 0 to −25 dBm.
2. Make sure the analyzer's "Ext Source Auto" feature is selected. In addition, verify that the analyzer is set to measure its input channel R.
3. Verify that all connections are tight.

3. Test Port Output Power Accuracy

Specifications

Frequency Range	Test Port Output Power Accuracy[1]
300 kHz to 3 GHz	±1.0 dB
3 GHz to 6 GHz[2]	±1.0 dB

1 At 0 dBm and 25° C ±5° C

2 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Equipment Required for 50Ω Analyzers

Power Meter ..... HP 436A/437B/438A
Power Sensor ..... HP 8482A
Adapter, APC-7 to Type-N (f) ..... HP 11524A

Additional Equipment Required for Analyzers with Option 006

Power Sensor ..... HP 8481A

Equipment Required for 75Ω Analyzers

Power Meter ..... HP 436A/437B/438A
Power Sensor ..... HP 8483A Option H03

Analyzer warmup time: **30 minutes**

Perform this test to confirm the accuracy of the HP 8753E source output power.

1. Zero and calibrate the power meter. For more information of how to perform this task, refer to the power meter operating manual.
2. Connect the equipment as shown in Figure 1-10.

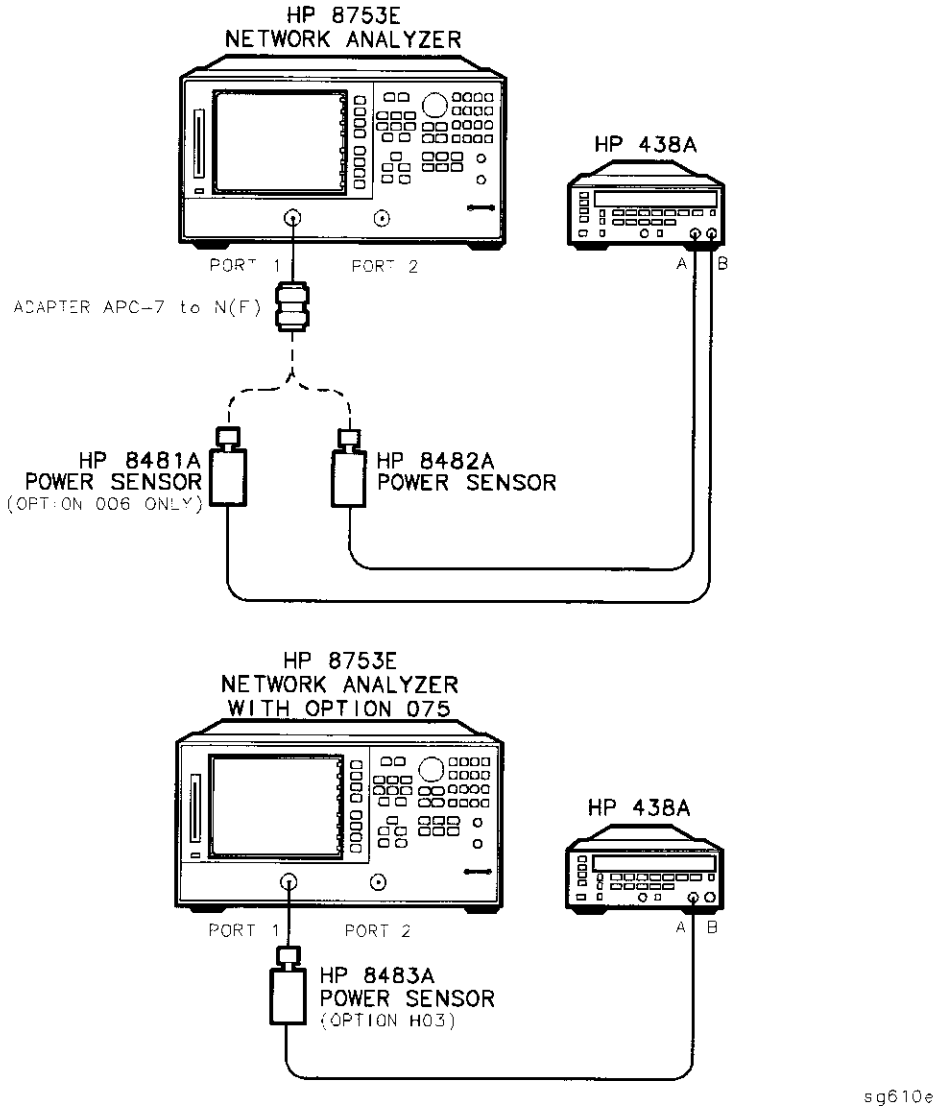


Figure 1-10. Source Output Power Accuracy Test Setup

3. Press Preset.

Note The factory preset test port power is 0 dBm.

---

4. Press Menu CW FREQ 300 k/m. Set the calibration factor on the power meter for this CW frequency.
5. Write the power meter reading on the "Performance Test Record."
6. Repeat steps 4 and 5 for each CW frequency listed in the "Performance Test Record." For analyzers with Option 006, use the HP 8481A power sensor for all frequencies above 3 GHz.

In Case of Difficulty

1. Be sure the source power is switched on. Press (Menu) POWER. Check the SOURCE PWR softkey; "on" *should* be highlighted. Otherwise, press SOURCE PWR to switch on the source power.
2. Refer to the "Source Troubleshooting" chapter of the *HP 8753E Service Guide* for more troubleshooting information.

4. Test Port Output Power Range and Linearity

Specifications

Power Range	Power Level Linearity[1]
−15 to +5 dBm	±0.2 dB
+5 to +10 dBm[2]	±0.5 dB
+5 to +8 dBm[3]	±0.5 dB

1 Relative to 0 dBm output level.

2 Applies to instruments not using Option 075.

3 For Option 075 only.

Required Equipment

Power Meter ..... HP 437B/438A
Power Sensor ..... HP 8482A
Adapter, APC-7 to Type-N (f) ..... HP 11524A

Additional Required Equipment for Analyzers with Option 006

Power Sensor ..... HP 8481A

Additional Required Equipment for Analyzers with Option 075

Power Sensor ..... HP 8483A Option H03

Analyzer warmup time: **1 hour**

Perform this test to verify the analyzer's test port output power range and power level linearity at selected CW frequencies.

1. Zero and calibrate the power meter. Refer to the power meter operating and service manual for more information on how to do this task.
2. On the network analyzer, press (Preset) (Menu) CW FREQ (300) (k/m). Set the power meter calibration factor for this CW frequency.
3. Connect the equipment as shown in Figure 1-11.

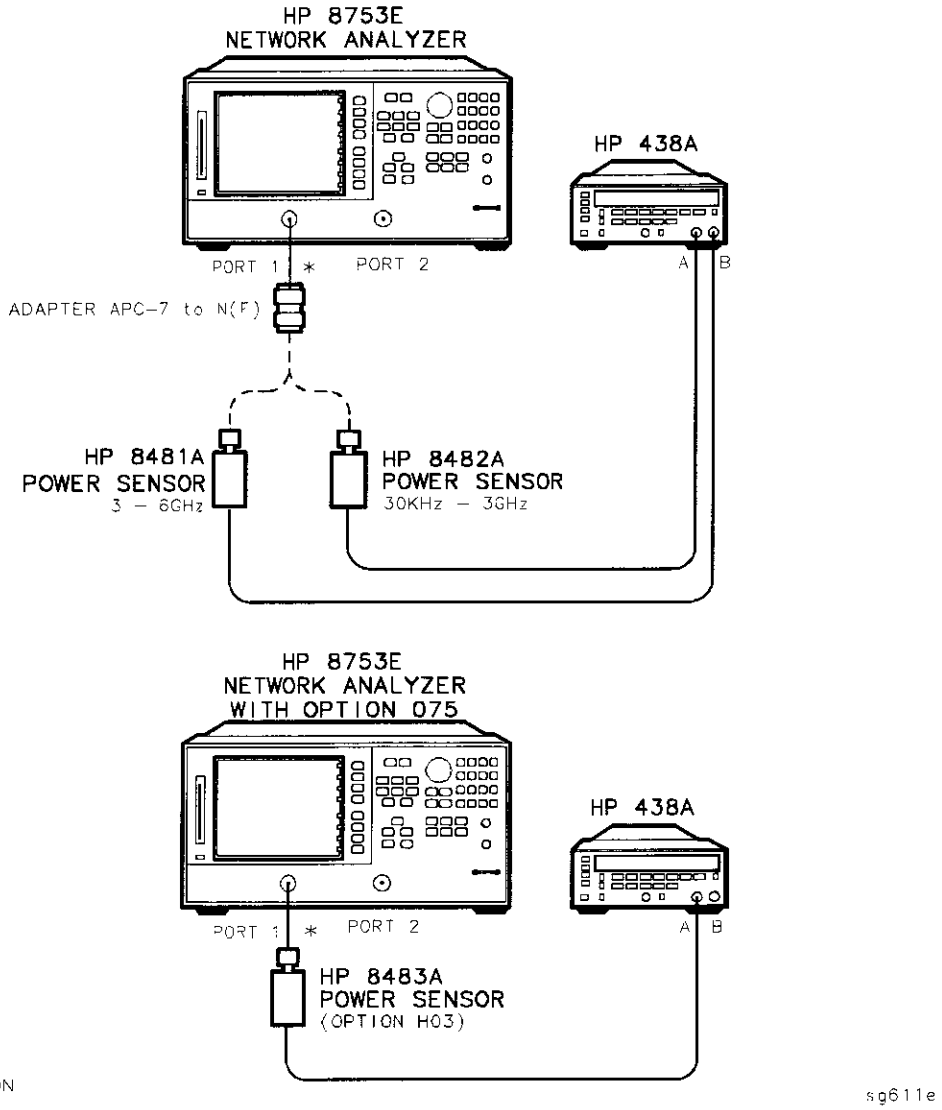


Figure 1-11. Test Port Output Power Range and Accuracy Test Setup

4. On the HP 438A, press (REL). This sets the current power level for relative power measurement.
5. On the network analyzer, press (Menu) POWER PWR RANGE MAN (-15) (x1).
6. Write the power meter reading in the "Results Measured" column on the "Performance Test Record."
7. Calculate the difference between the analyzer test port power (which appears on the analyzer's display) and the power meter reading. Write the result in the "Power Level Linearity" column on the "Performance Test Record."

8. Repeat steps 5 through 7 for the other power levels listed in the "Performance Test Record."
9. After all required power levels have been measured, press (0) (x1) to reset power to 0 dBm.
10. Press (Menu) CW FREQ (3) (G/n).
11. Set the power meter calibration factor for this CW frequency and press (REL) to set the reference at this new frequency.
12. Press (Menu) POWER (-15) (x1).
13. Write the power meter reading in the "Results Measured" column on the "Performance Test Record."
14. Calculate the difference between the analyzer test port power and the power meter reading. Write the result in the "Power Level Linearity" column of the "Performance Test Record."
15. Repeat steps 11 through 13 for the other power levels listed in the "Performance Test Record."
16. Repeat steps 9 through 13 for 6 GHz using 8481A sensor.

In Case of Difficulty

1. Ensure that the power meter and power sensor(s) are operating to specifications. Be sure you set the power meter calibration factor for the CW frequency that you are testing.
2. Verify that there is power coming out of the analyzer's test port 1. Be sure you did not accidentally switch off the analyzer's internal source. If you did so, press (Menu) POWER SOURCE PWR ON.
3. Repeat this performance test.

5. Minimum R Channel Level

Specifications

Frequency Range	Minimum R Channel Level
300 kHz to 3 GHz	< −35 dBm
3 GHz to 6 GHz[1]	<−30 dBm

1 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Required Equipment for 50Ω Analyzers

Adapter, APC-3.5 (m) to APC-7 ..... HP P/N 1250-1746
Cable, APC-7 24-inch ..... HP P/N 8120-4779

Required Equipment for 75Ω Analyzers (Option 075)

Minimum Loss Pad, 50Ω to 75Ω ..... HP 11852B
Cable, 50Ω Type-N, 24-inch ..... HP P/N 8120-4781
Adapter, APC-3.5 (m) to Type-N (f) ..... HP P/N 1250-1750

Analyzer warmup time: **1 hour**

Perform this test to determine the minimum R channel input power level at which phase lock can be accomplished.

1. Connect the equipment as shown in Figure 1-12.

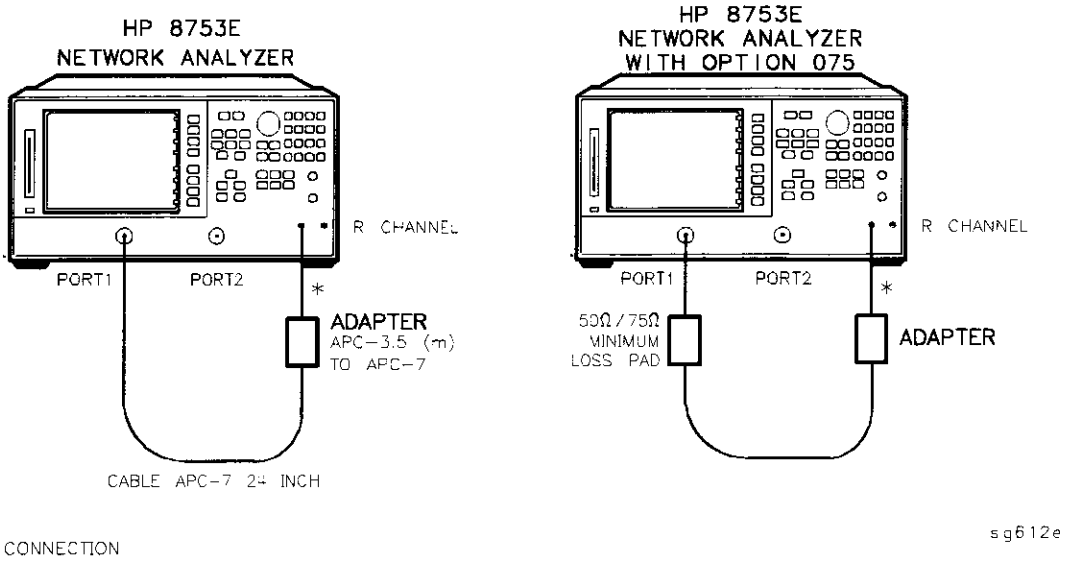


Figure 1-12. Minimum R Channel Level Test Setup

2. Press (Preset) (Meas) INPUT PORTS R.
3. Press (Menu) POWER PWR RANGE MAN POWER RANGES RANGE 4 −55 to −30.
4. Press (Scale Ref) REFERENCE VALUE (-70) (x1).

5. Press (Menu) CW FREQ (300) (k/m).
6. Press (Menu) POWER (-65) (x1).

   The analyzer displays the message CAUTION: NO IF FOUND: CHECK R INPUT LEVEL.
7. Press (↑) to increase the test port power by 1 dBm.
8. If the analyzer displays a phase lock error message, continue increasing the test port power until phase lock is achieved.
9. Write the test port power, that is displayed on the analyzer, on the "Performance Test Record."
10. Repeat steps 5 through 9 for the other CW frequencies listed in the "Performance Test Record."

In Case of Difficulty

1. Check the flexible RF cable (W8, as shown in Figure 1-13) between the R sampler assembly (A4) and the A11 phase lock assembly. Make sure it is connected between A11J1 (PL IF IN) and 1st IF Out.

Caution *Do not* push cable W8 down next to the A11 phase lock assembly.

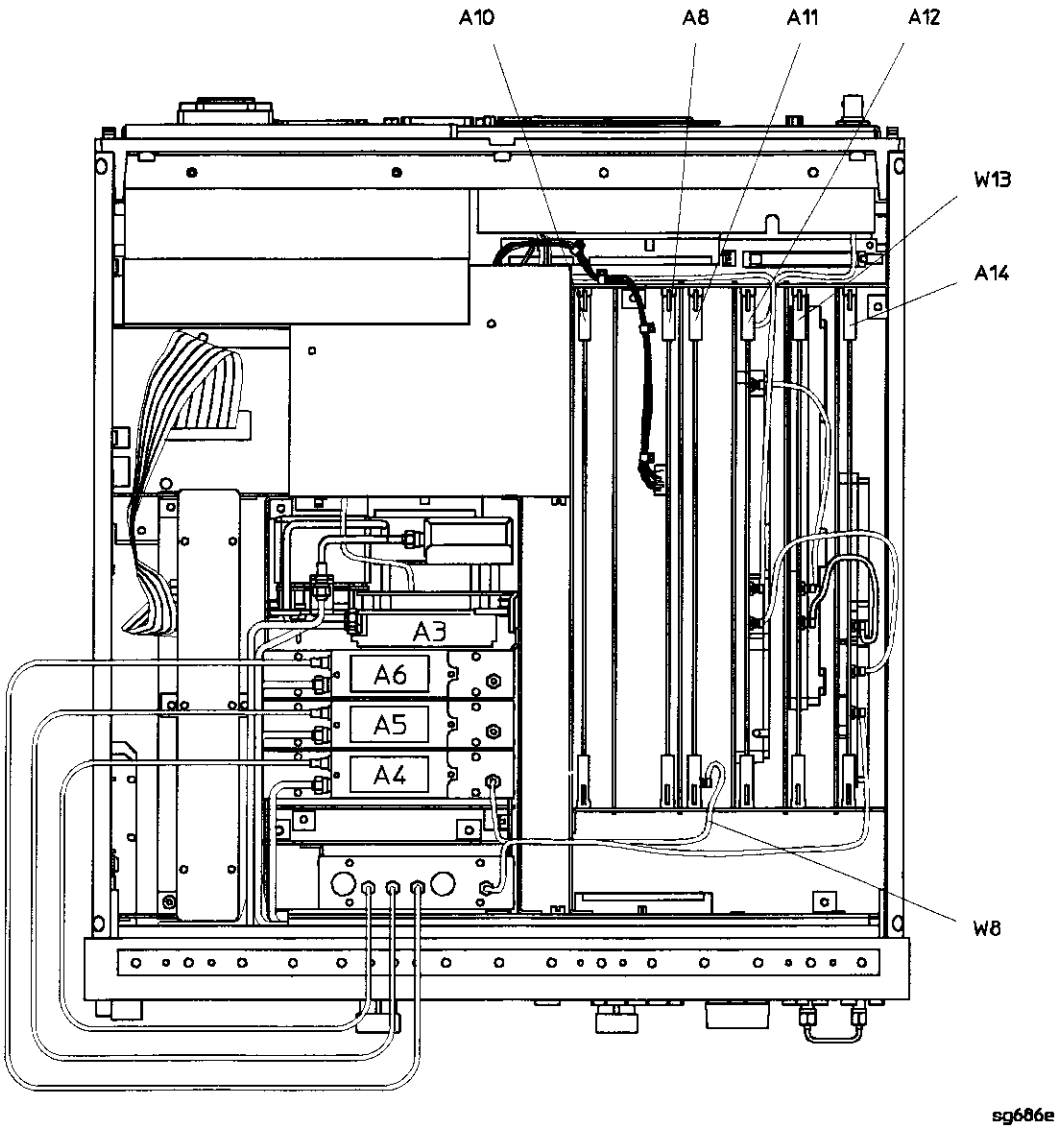


Figure 1-13. Flexible RF Cable Location

2. Using an ohmmeter, verify that the RF cable is not open. In addition, examine both the cable connectors – measure the resistance between the cable center pin and the cable connector and make sure it is *not* close to zero.
3. Check the R sampler by substituting it with the B sampler (A6).
   a. Move cable W8 to the B sampler (A6), as shown in Figure 1-14.

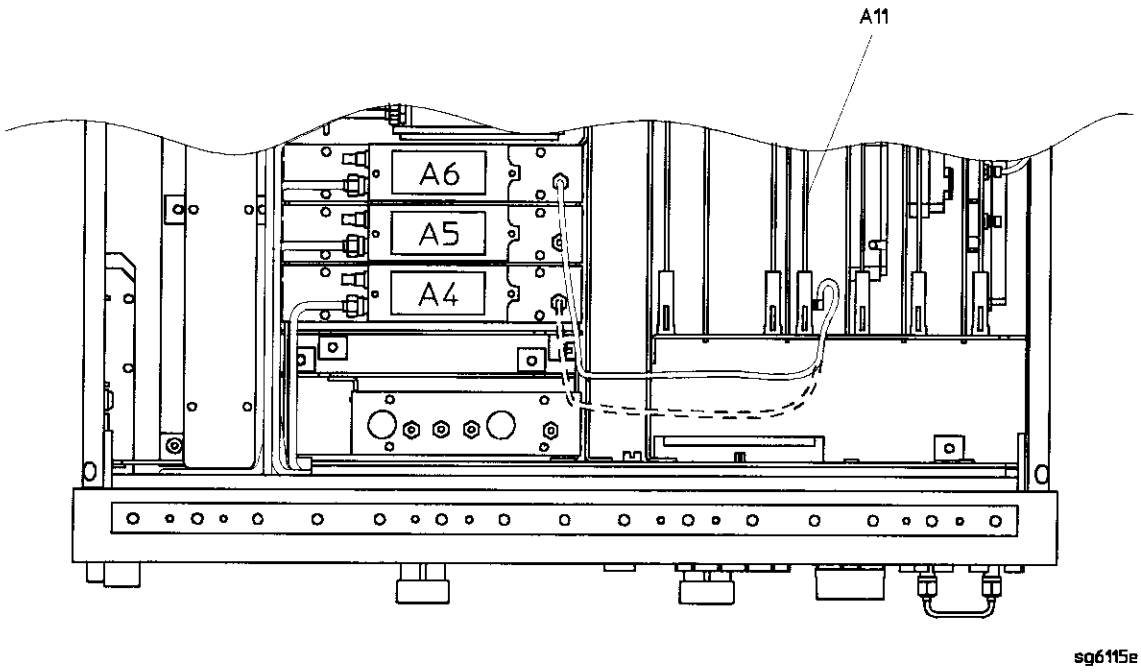


Figure 1-14. Connections for Substituting the R Sampler (A4)

4. Connect the equipment as shown in Figure 1-15.

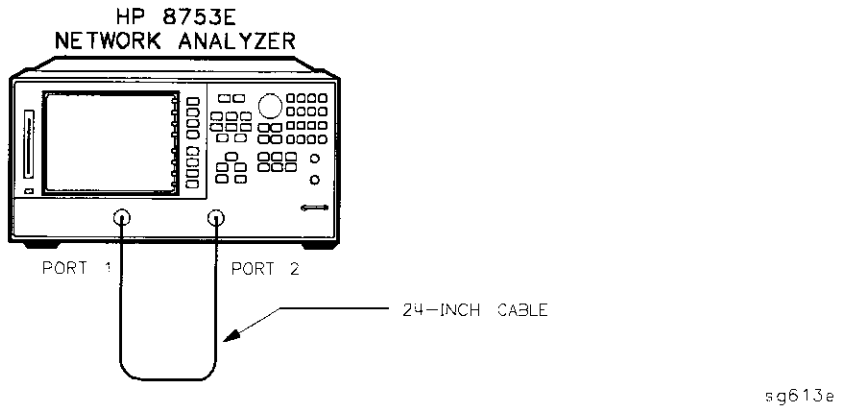


Figure 1-15. Setup for Checking the R Sampler (A4)

5. Repeat the test, but select the B sampler (A6) by pressing (Meas) INPUT PORTS B in step 2. Use the following specifications:

   300 kHz to 3 GHz <–27 dBm
   3 GHz to 6 GHz <–22 dBm

6. If the analyzer fails the test, replace the A11 assembly.
7. Verify that the high/low band adjustments are still within specifications. For more information on how to perform this task, refer to the "High/Low Band Transition Adjustment" located in the "Adjustments and Correction Constants" chapter of the *HP 8753E Service Guide*.
8. Refer to the "Source Troubleshooting" chapter of the *HP 8753E Service Guide* for more troubleshooting information.

6. Test Port Input Noise Floor Level

Specifications

Frequency Range	Test Port	IF Bandwidth	Average Noise Level
300 kHz to 3.0 GHz	Port 1	3 kHz	−82 dBm
300 kHz to 3.0 GHz	Port 1	10 Hz	−102 dBm
300 kHz to 3.0 GHz	Port 2	3 kHz	−82 dBm
300 kHz to 3.0 GHz	Port 2	10 Hz	−102 dBm
3.0 GHz to 6.0 GHz[1]	Port 1	3 kHz	−77 dBm
3.0 GHz to 6.0 GHz[1]	Port 1	10 Hz	−97 dBm
3.0 GHz to 6.0 GHz[1]	Port 2	3 kHz	−77 dBm
3.0 GHz to 6.0 GHz[1]	Port 2	10 Hz	−97 dBm

1 Only for analyzer with Option 006 – 30 kHz to 6 GHz range.

Equipment Required for 50Ω Analyzers

Calibration Kit, 7-mm ..... HP 85031B

Equipment Required for 75Ω Analyzers

Calibration Kit, Type-N ..... HP 85036B

Analyzer warmup time: **1 hour**

Perform this test to determine the HP 8753E port 1 and port 2 noise floor levels at the input test ports.

Port 1 Noise Floor Level from 300 kHz to 3 GHz (IF BW = 3 kHz)

1. Connect the equipment as shown in Figure 1-16.

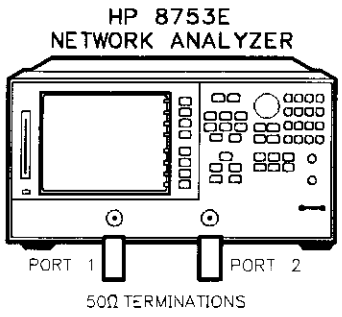


Figure 1-16. Source Input Noise Floor Test Setup

2. Press (Preset) (Avg) IFBW (3000) (x1) (Menu) POWER (-85) (x1) (Start) (300 kHz) (Stop) (3) (G/n).
3. Press (Meas) INPUT PORTS A TESTPORT 2 (Format) LIN MAG (Scale Ref) AUTO SCALE.
4. Press (Marker Fctn) MARKER MODE MENU STATS ON (Menu) TRIGGER MENU SINGLE.
5. When the analyzer finishes the sweep, notice the mean value (which appears on the analyzer display).
6. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

Note Notice that the mean value that is displayed on the analyzer is in μUnits. So, for example, if the displayed value is 62 μU, the value that you would put in the equation is (62×10^{-6}).

7. Write this calculated value on the "Performance Test Record."

Port 1 Noise Floor Level from 300 kHz to 3 GHz (IF BW = 10 Hz)

8. Press (Avg) IF BW (10) (x1) to change the IF bandwidth to 10 Hz.
9. Press (Menu) TRIGGER MENU SINGLE.
10. When the analyzer finishes the sweep, notice the mean value.
11. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

12. Write this calculated value on the "Performance Test Record."

Port 2 Noise Floor Level from 300 kHz to 3 GHz (IF BW = 10 Hz)

13. Press (Meas) INPUT PORTS B TESTPORT 1 (Format) LIN MAG.
14. Press (Menu) TRIGGER MENU SINGLE.
15. When the analyzer finishes the sweep, notice the mean value.
16. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

17. Write this calculated value on the "Performance Test Record."

Port 2 Noise Floor Level from 300 kHz to 3 GHz (IF BW = 3 kHz)

18. Press (Avg) IF BW (3) (k/m) to change the IF bandwidth to 3 kHz.
19. Press (Menu) TRIGGER MENU SINGLE.
20. When the analyzer finishes the sweep, notice the mean value.
21. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

22. Write this calculated value on the "Performance Test Record."
23. This completes the "Test Port Input Noise Floor Level" procedure if your analyzer does not have Option 006. Otherwise continue with the next section.

Port 2 Noise Floor Level from 3 GHz to 6 GHz (IF BW = 3 kHz)

24. Press (Start) (3) (G/n) (Stop) (6) (G/n).
25. Press (Menu) TRIGGER MENU SINGLE.
26. When the analyzer finishes the sweep, notice the mean value.
27. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

28. Write this calculated value on the "Performance Test Record."

Port 2 Noise Floor Level from 3 GHz to 6 GHz (IF BW = 10 Hz)

29. Press (Avg) IF BW (10) (x1) to change the IF bandwidth to 10 Hz.
30. Press (Menu) TRIGGER MENU SINGLE.
31. When the analyzer finishes the sweep, notice the mean value.
32. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

33. Write this calculated value on the "Performance Test Record."

Port 1 Noise Floor Level for 3 GHz to 6 GHz (IF BW = 10 Hz)

34. Press (Meas) INPUT PORTS A TESTPORT 2.
35. Press (Menu) TRIGGER MENU SINGLE.
36. When the analyzer finishes the sweep, notice the mean value.
37. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

38. Write this calculated value on the "Performance Test Record."

Port 1 Noise Floor Level from 3 GHz to 6 GHz (IF BW = 3 kHz)

39. Press (Avg) IF BW (3) (k/m).
40. Press (Menu) TRIGGER MENU SINGLE.
41. When the analyzer finishes the sweep, notice the mean value.
42. Convert the measured linear magnitude mean value to log magnitude, using this equation.

$$Power\ (dBm) = 20 * [\log_{10}(linear\ magnitude\ mean\ value)]$$

43. Write this calculated value on the "Performance Test Record."

In Case of Difficulty

1. Perform the "ADC Linearity Correction Constants (Test 52)," located in the "Adjustments and Correction Constants" chapter of the *HP 8753E Service Guide*.
2. Repeat the "Test Port Input Noise Floor Level" procedure.
3. Suspect the A10 Digital IF assembly if the analyzer fails both test port input noise floor tests.
4. Refer to the "Receiver Troubleshooting" chapter of the *HP 8753E Service Guide* for more troubleshooting information.

7. Test Port Input Frequency Response

Specifications

Frequency Range	Test Port	Input Frequency Response
300 kHz to 3 GHz	Port 1	±1 dB
300 kHz to 3 GHz	Port 2	±1 dB
3 GHz to 6 GHz[1]	Port 1	±2 dB
3 GHz to 6 GHz[1]	Port 2	±2 dB

1 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Equipment Required for 50Ω Analyzers

Power Meter ..... HP 436A/437B/438A
Power Sensor ..... HP 8482A
Cable, APC-7 24-inch ..... HP P/N 8120-4779
Adapter, APC-7 to Type-N (f) ..... HP 11524A

Additional Equipment Required for Analyzers with Option 006

Power Sensor ..... HP 8481A

Equipment Required for 75Ω Analyzers

Power Meter ..... HP 436A/437B/438A
Power Sensor ..... HP 8483A Option H03
Cable, Type-N ..... HP P/N 8120-2408

Analyzer warmup time: **1 hour**

Perform this test to examine the vector sum of all test setup error vectors in both magnitude and phase change as a function of frequency.

Power Meter Calibration for Test Port 1 from 300 kHz to 3 GHz

1. Zero and calibrate the power meter.
2. Connect the equipment as shown in Figure 1-17.

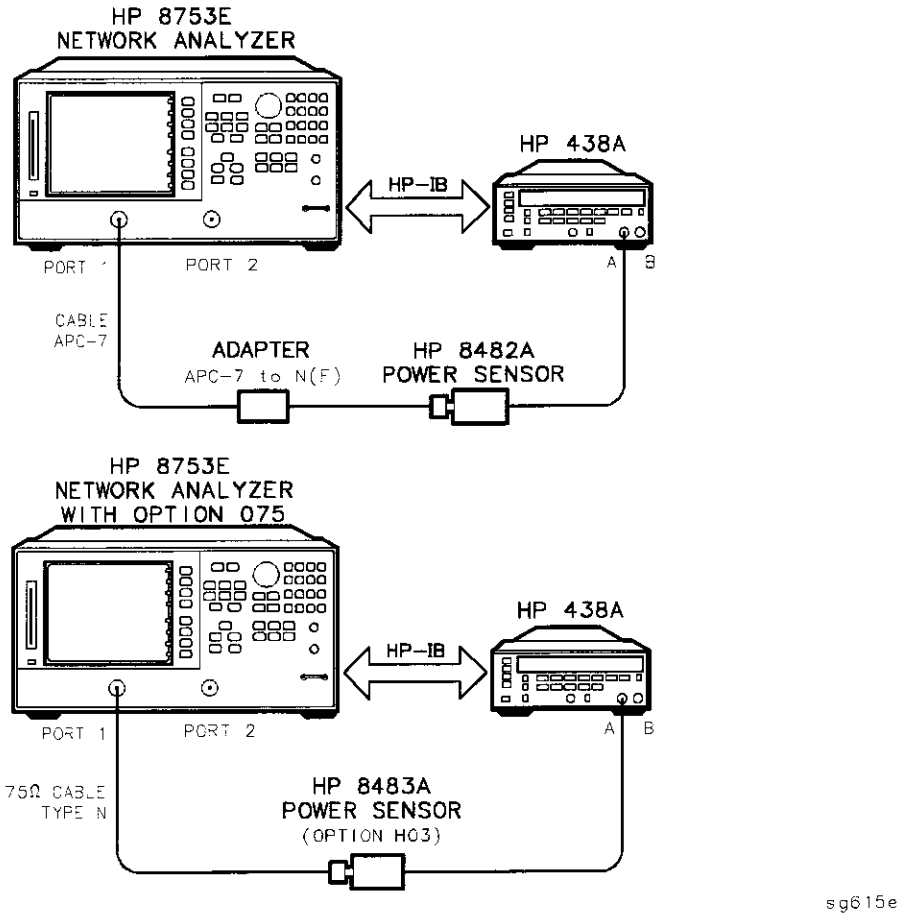


Figure 1-17. Setup for Power Meter Calibration on Test Port 1

3. Press (Preset) (Start) (300) (k/m).
4. **Only for Analyzers with Option 006:** Press (Stop) (3) (G/n).
5. Press (Local) SYSTEM CONTROLLER.
6. Press SET ADDRESSES and POWER MTR until the analyzer shows the correct power meter model.

7. Press ADDRESS: P MTR/HPIB. The default power meter HP-IB address is 13. Make sure it is the same as your power meter HP-IB address. Otherwise, use the analyzer front panel keypad to enter the correct HP-IB address for your power meter.
8. Press (Menu) NUMBER of POINTS (51) (x1).
9. Press POWER PWR RANGE MAN to turn the auto power range off.

Note The analyzer displays the PRm annotation, indicating that the analyzer power range is set to MANUAL.

---

10. Press PORT POWER to uncouple the test port output power.
11. Press (Cal) PWRMTR CAL.
12. Press LOSS/SENSR LISTS CAL FACTOR SENSOR A. Refer to the back of the power sensor to locate the different calibration factor values along with their corresponding frequencies.

Note The analyzer's calibration factor sensor table can hold a MAXIMUM of 12 calibration factor data points.

The following softkeys are included in the sensor calibration factor entries menu:

SEGMENT	press to select a point where you can use the front panel knob or entry keys to enter a value.
EDIT	press to edit or change a previously entered value.
DELETE	press to delete a point from the sensor calibration factor table.
ADD	select this key to add a point into the sensor calibration factor table.
CLEAR LIST	select this key to erase the entire sensor calibration factor table.
DONE	select this key when done entering points to the sensor calibration factor table.

As an example, the following are the keystrokes for entering the first two calibration factor data points for the HP 8482A power sensor (assuming CF% = 96.4 at 100 kHz and CF% = 98.4 at 300 kHz):

a. From the sensor calibration factor entries menu, press ADD.

b. Press FREQUENCY 100 k/m. If you make an entry error, press ← and re-enter the correct value again.

c. Press CAL FACTOR 96.4 x1.

d. Press DONE to terminate the first calibration factor data point entry.

e. To enter the second cal factor data point, press ADD.

f. Press FREQUENCY 300 k/m.

g. Press CAL FACTOR 98.4 x1.

h. To terminate the second calibration factor data point entry, press DONE.

i. Press SEGMENT and use the front panel knob to scroll through the sensor calibration factors table. Check to be sure all values are entered correctly. If you spot an error, use the front panel knob to point to the data point you want to modify and press EDIT.

13. Press the appropriate softkeys to create a power sensor calibration factors table.

14. Press DONE to exit the sensor calibration factor entries menu.

15. Press RETURN ONE SWEEP TAKE CAL SWEEP to start the power meter calibration.

Wait until the analyzer finishes the sweep, then continue with this procedure.

Note The analyzer displays the PC annotation, indicating the power meter calibration is done and the error correction is active.

Test Port 2 Input Frequency Response from 300 kHz to 3 GHz

16. Connect the equipment as shown in Figure 1-18.

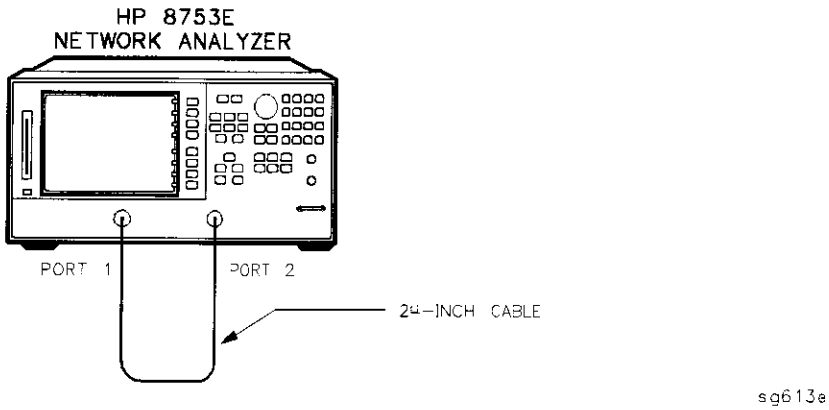


Figure 1-18. Test Port 2 Input Frequency Response Test Setup

17. Press (Meas) INPUT PORTS B.

18. Press (Scale Ref) SCALE/DIV (1) (x1).

19. Press (Marker) MARKER 1 (Marker Fctn) MKR SEARCH SEARCH:MIN to put marker 1 at the minimum magnitude location of the trace.

20. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH:MAX to position marker 2 at the maximum magnitude location of the trace.

21. Write the marker 1 or marker 2 value (which appears on the analyzer display), whichever has the larger absolute magnitude, in the "Performance Test Record."

Power Meter Calibration on Port 2 from 300 kHz to 3 GHz

22. Connect the equipment as shown Figure 1-19.

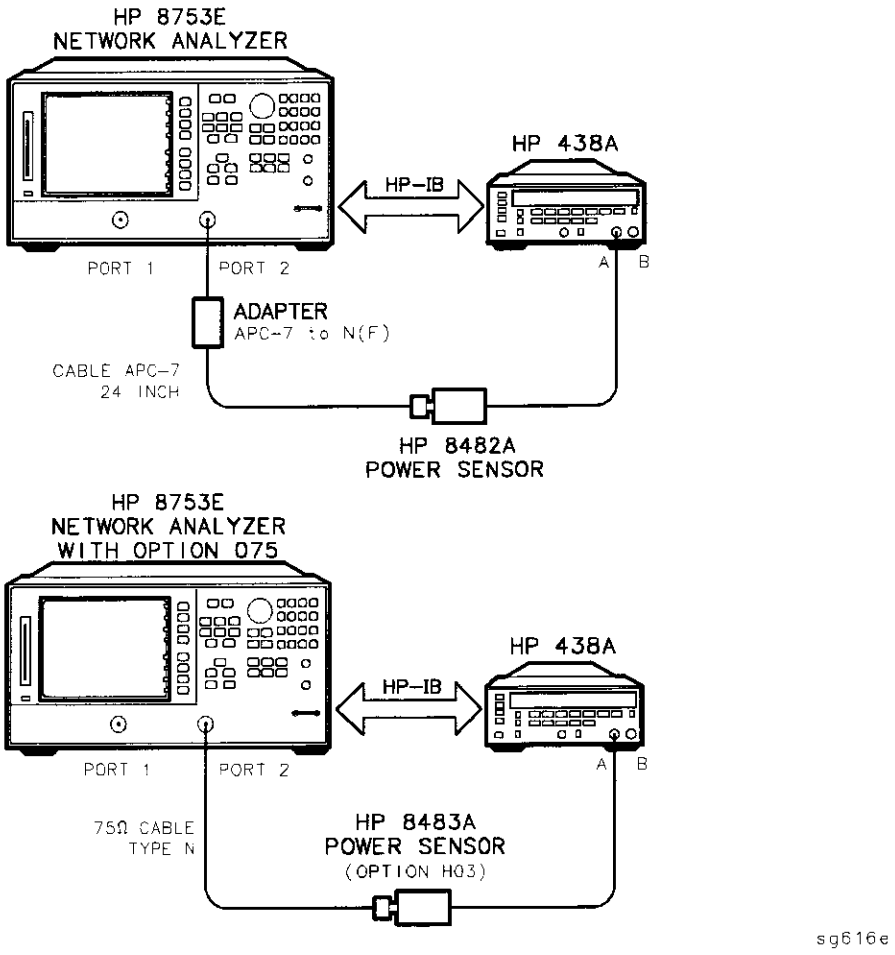


Figure 1-19. Setup for Power Meter Calibration on Test Port 2

23. Press (Meas) `INPUT PORTS TESTPORT 2`.

24. Press (Cal) `PWRMTR ONE SWEEP TAKE CAL SWEEP` to start the power meter calibration for test port 2.

25. When the analyzer displays the message `POWER METER CALIBRATION SWEEP DONE`, connect the equipment as shown as in Figure 1-20.

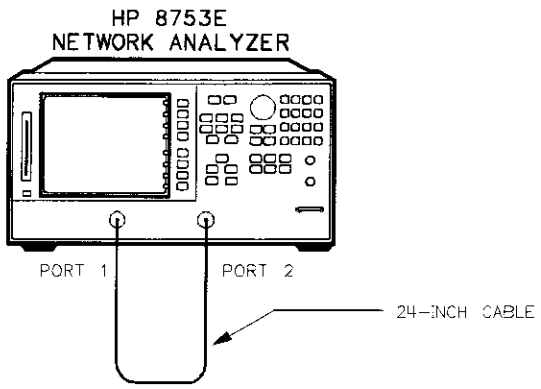


Figure 1-20. Test Port 1 Input Frequency Response Test Setup

Test Port 1 Input Frequency Response from 300 kHz to 3 GHz

26. Press (Meas) INPUT PORTS A.
27. Press (Marker) MARKER 1 (Marker Fctn) MKR SEARCH SEARCH:MIN.
28. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH:MAX.
29. Write the marker 1 or marker 2 reading, whichever has the larger absolute magnitude, in the "Performance Test Record."
30. This completes the "Test Port Input Frequency Response" procedure if your analyzer does not have Option 006. Otherwise continue with the next sections.

Power Meter Calibration for Test Port 2 from 3 GHz to 6 GHz

31. Replace the power sensor with the HP 8481A, and then setup the power meter:
    - If the power meter is an HP 438A, press (LCL).
    - If the power meter is an HP 437B, press (PRESET/LOCAL).
    - If the power meter is an HP 436A, cycle the line power.
32. Connect the equipment as shown in Figure 1-21.

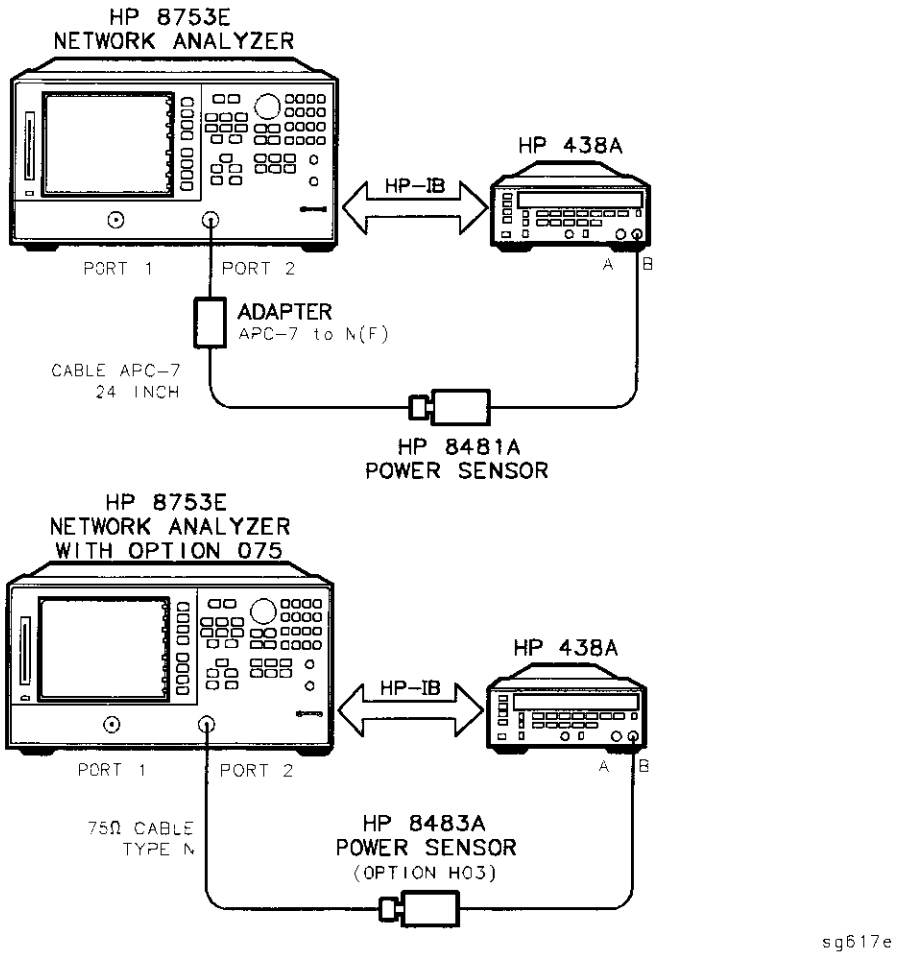


Figure 1-21. Setup for Power Meter Calibration on Test Port 2

33. Press (Start) (3) (G/n) (Stop) (6) (G/n).

34. Press (Cal) PWRMTR CAL .

35. Press LOSS/SENSR LISTS CAL FACTOR SENSOR B . Repeat step 10 to build a calibration factor sensor table for the HP 8481A power sensor.

36. Press DONE to exit the sensor calibration factor entries menu.

37. To select the HP 8481A power sensor, press USE SENSOR B .

38. Press RETURN TAKE CAL SWEEP to start the power meter calibration.

Test Port 1 Input Frequency Response from 3 GHz to 6 GHz

39. When the analyzer finishes the calibration sweep, connect the equipment as shown in Figure 1-22.

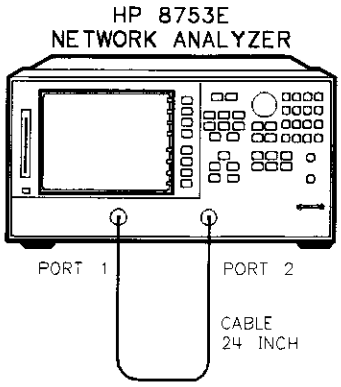


Figure 1-22. Setup for Test Port 1 Input Frequency Response

40. Press (Meas) INPUT PORTS A.

41. Press (Marker) MARKER 1 (Marker Fctn) MKR SEARCH SEARCH:MIN to put marker 1 at the minimum magnitude location of the trace.

42. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH:MAX to position marker 2 at the maximum magnitude location of the trace.

43. Write the marker 1 or marker 2 reading, whichever has the largest absolute magnitude, in the "Performance Test Record."

Power Meter Calibration on Test Port 1 from 3 GHz to 6 GHz

44. Connect the equipment as shown in Figure 1-23.

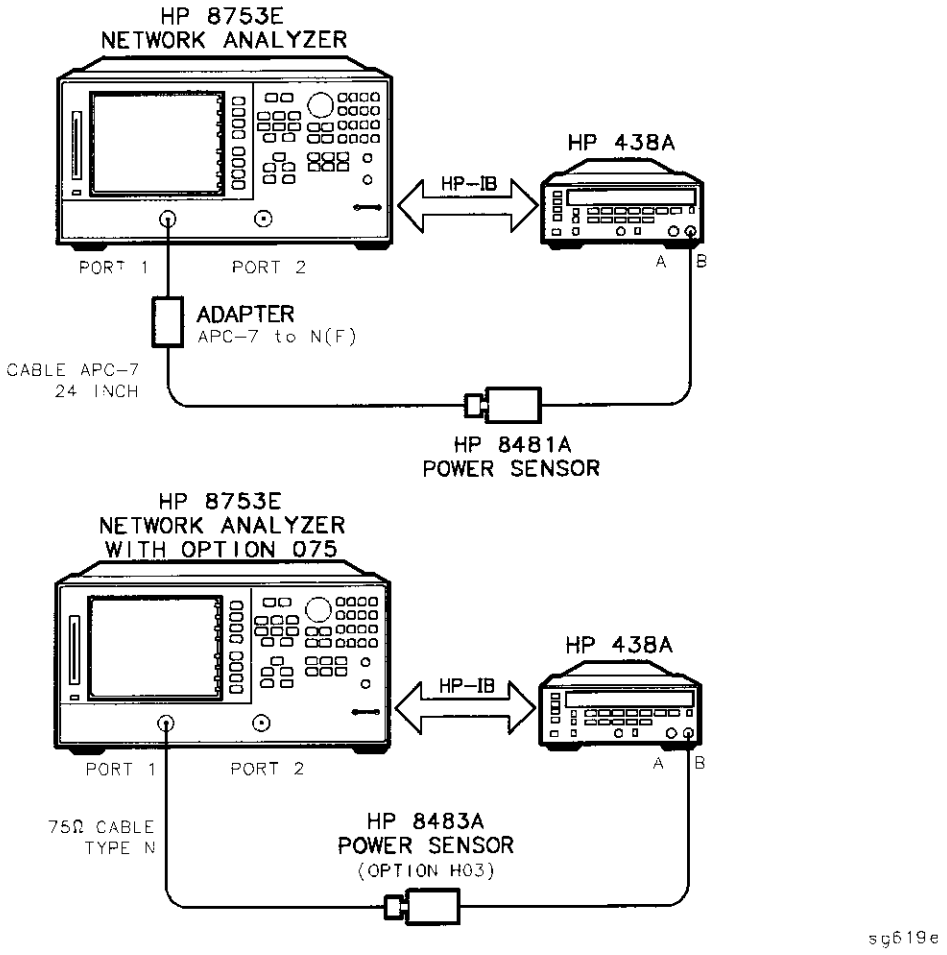


Figure 1-23. Setup for Power Meter Calibration on Test Port 1

45. Press (Meas) `INPUT PORTS TESTPORT 1` .

46. Press (Cal) `PWRMTR ONE SWEEP TAKE CAL SWEEP` to start the power meter calibration for output test port 1.

Test Port 2 Input Frequency Response from 3 GHz to 6 GHz

47. When the analyzer displays the message POWER METER CALIBRATION SWEEP DONE, connect the equipment as shown as in Figure 1-24.

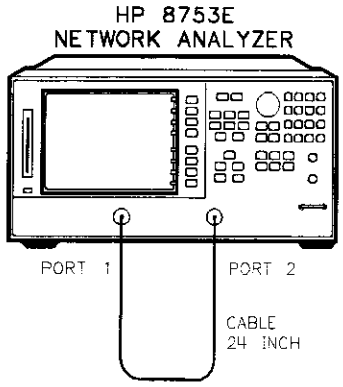


Figure 1-24. Test Port 2 Input Frequency Response Test Setup

48. Press (Meas) INPUT PORTS B.

49. Press (Marker) MARKER 1 (Marker Fctn) MKR SEARCH SEARCH:MIN.

50. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH:MAX.

51. Write the marker 1 or marker 2 reading, whichever has the largest magnitude, in the "Performance Test Record."

In Case of Difficulty

1. Be sure you have used the correct power sensor for the frequency range.
2. Verify that the calibration factors that you have entered for the power sensors are correct.
3. Repeat this test with a "known good" thru cable.

8. Test Port Crosstalk

Specifications

Frequency Range	Crosstalk[1]
300 kHz to 3 GHz	100 dB
3 GHz to 6 GHz[2]	90 dB

1 At 25° C ±5° C.

2 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Required Equipment for 50Ω Analyzers

Calibration Kit, 7-mm ..... HP 85031B
Cable, APC-7 24-inch ..... HP P/N 8120-4779

Required Equipment for 75Ω Analyzers

Calibration Kit, 75Ω, Type-N ..... HP 85036B

Analyzer warmup time: **1 hour**

Perform this test to verify the signal leakage between the analyzer's test ports.

1. Connect the equipment as shown in Figure 1-25.

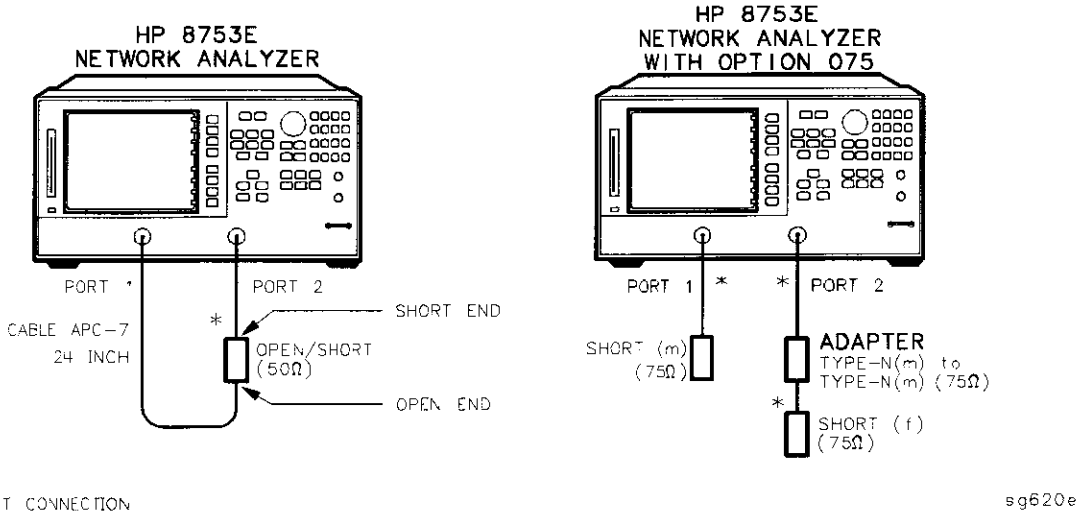


Figure 1-25. Test Port Crosstalk Test Setup

2. Press Preset Menu POWER 10 x1.
3. Press Avg IF BW 10 x1.

Crosstalk to Test Port 2 from 300 kHz to 3 GHz

4. Press [Start] [300] [k/m] [Stop] [3] [G/n].
5. Press [Meas] Trans: FWD S21 (B/R).
6. Press [Scale Ref] REFERENCE VALUE [-100] [x1].
7. Press [Menu] TRIGGER MENU SINGLE.
8. Press [Marker Fctn] MKR SEARCH SEARCH: MAX.
9. Write the marker value (which appears on the analyzer display) in the "Performance Test Record."

Crosstalk to Test Port 1 from 300 kHz to 3 GHz

10. Press [Meas] Trans: REV S12 (A/R).
11. Press [Menu] TRIGGER MENU SINGLE.
12. Press [Marker Fctn] MKR SEARCH SEARCH: MAX.
13. Write the marker value (which appears on the analyzer display) in the "Performance Test Record."
14. This completes the "Test Port Crosstalk" performance test if your analyzer does not have Option 006. Otherwise, proceed to the next section.

Crosstalk to Test Port 1 from 3 GHz to 6 GHz

15. Press [Start] [3] [G/n] [Stop] [6] [G/n].
16. Press [Menu] TRIGGER MENU SINGLE.
17. Press [Marker Fctn] MKR SEARCH SEARCH: MAX.
18. Write the marker value (which appears on the analyzer display) in the "Performance Test Record."

Crosstalk to Test Port 2 from 3 GHz to 6 GHz

1. Press (Meas) Trans: FWD S21 (B/R) .
2. Press (Menu) TRIGGER MENU SINGLE .
3. Press (Marker Fctn) MKR SEARCH SEARCH: MAX .
4. Write the marker value (which appears on the analyzer display) in the "Performance Test Record."

In Case of Difficulty

1. Remove the instrument top cover. Using an 8 lb-inch torque wrench, verify that ALL semirigid cables connected to the sampler/mixer assemblies are tight. In addition, tighten any loose screws on the sampler/mixer assemblies (A4/5/6) and the pulse generator assembly (A7).
2. Remove the instrument bottom cover. Refer to Figure 1-26. Verify that cables W1, W31 and W32 are tight.
3. Repeat this test.

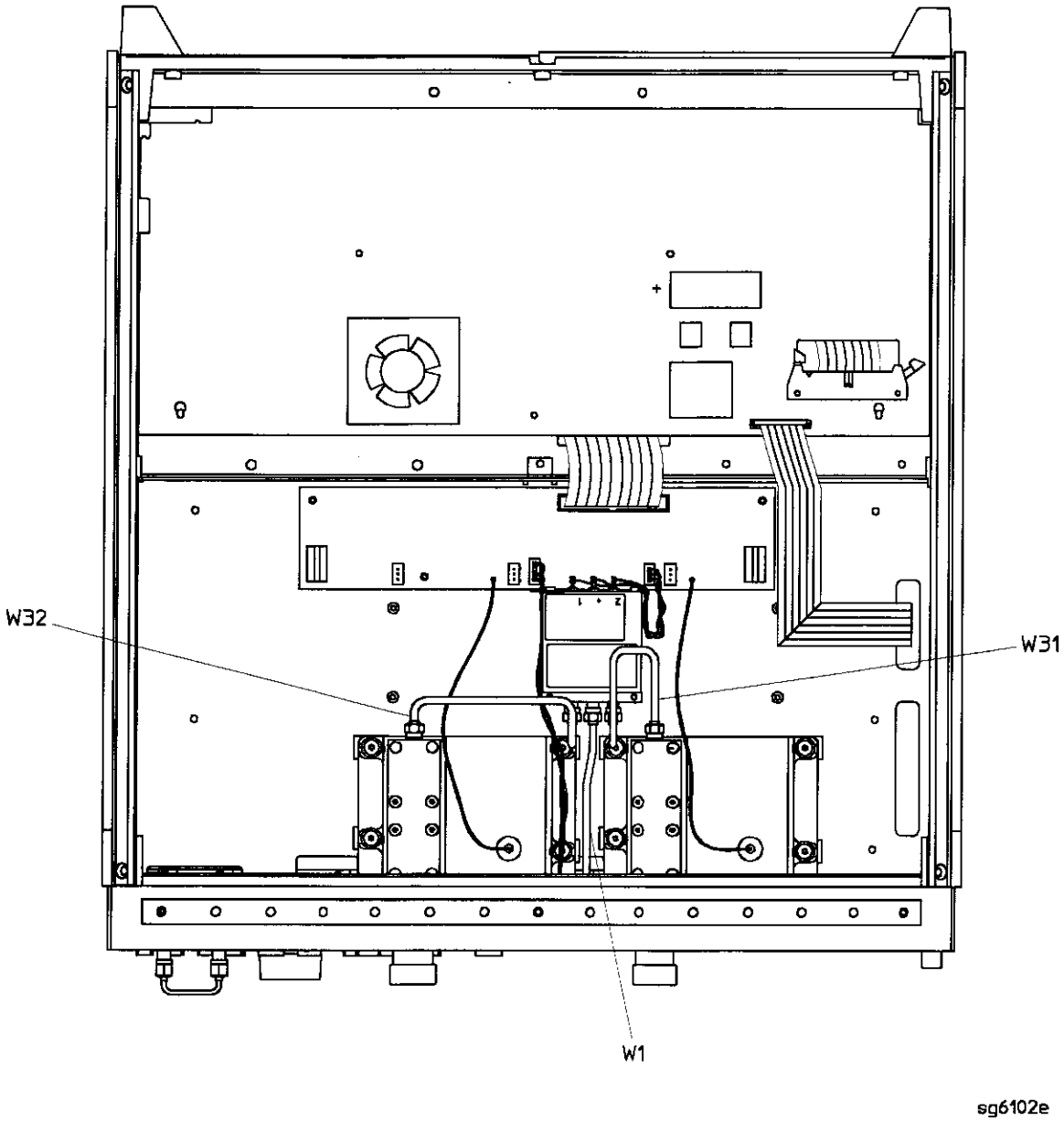


Figure 1-26. HP 8753E Bottom View

9. Calibration Coefficients

Specifications

Uncorrected[1] Error Terms	Frequency Range		
	300 kHz to 1.3 GHz	1.3 GHz to 3 GHz	3 GHz to 6 GHz[2]
Directivity	35 dB	30 dB	25 dB
Source Match	16 dB	16 dB	14 dB
Load Match	18 dB	16 dB	14 dB
Transmission Tracking	±1.5 dB	±1.5 dB	±2.5 dB
Reflection Tracking	±1.5 dB	±1.5 dB	±2.5 dB

1 At 25° ±5° C, with less than 1° C deviation from the measurement calibration temperature.

2 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Equipment Required for 50Ω Analyzers

Calibration Kit, 7-mm ..... HP 85031B
Cable, APC-7, 24-inch ..... HP P/N 8120-4779

Equipment Required for 75Ω Analyzers

Calibration Kit, Type-N ..... HP 85036B
Cable, Type-N, 24-inch ..... HP P/N 8120-4781

Analyzer warmup time: **30 minutes**

Perform this procedure to verify the analyzer uncorrected test port characteristics.

Note The crosstalk calibration coefficients are omitted in this procedure. They are covered in the "Test Port Crosstalk" performance test.

First Full 2-Port Calibration

1. Connect the equipment as shown in Figure 1-27.

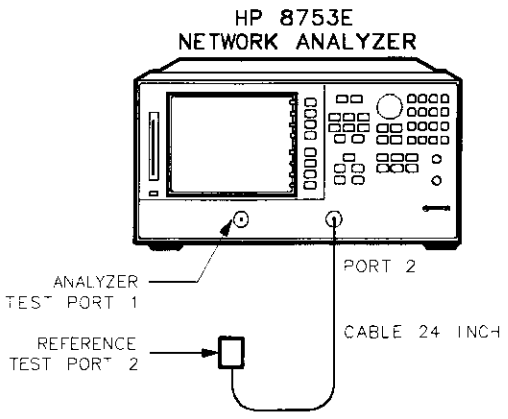


Figure 1-27. First Full 2-Port Calibration Test Setup

2. Press (Preset) (Start) (300) (k/m).
3. Press (Cal) CAL KIT SELECT CAL KIT CAL KIT:7mm RETURN RETURN CALIBRATE MENU FULL 2-PORT.
4. Press ISOLATION OMIT ISOLATION.
5. Connect the "open" end of the open/short combination (supplied in the calibration kit) to analyzer test port 1.
6. Press REFLECTION FORWARD:OPEN.
7. Connect the "short" end of the open/short combination to analyzer test port 1.
8. Press FORWARD:SHORT.
9. Replace the open/short combination with the 50 ohm termination (supplied in the calibration kit).
10. Press FORWARD:LOAD.
11. Connect the "open" end of the open/short combination to the reference test port 2.
12. Press REVERSE:OPEN.
13. Connect the "short" end of the open/short combination to the reference test port 2.
14. Press REVERSE: SHORT.
15. Connect the 50 ohm termination to the reference test port 2.
16. Press REVERSE: LOAD.
17. When the analyzer displays PRESS 'DONE' IF FINISHED WITH STD(s), press STANDARDS DONE.

    Wait for the message COMPUTING CAL COEFFICIENTS to disappear from the analyzer display before proceeding to the next step.
18. Connect the equipment as shown in Figure 1-28.

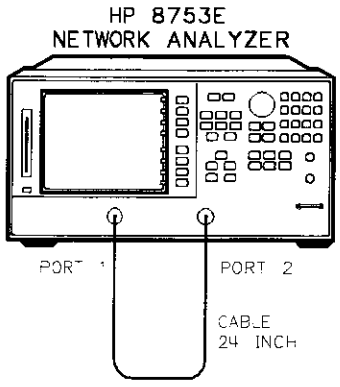


Figure 1-28. Transmission Calibration Test Setup

19. Press TRANSMISSION DO BOTH FWD + REV.

20. Press DONE 2-PORT CAL .

Directivity (Forward) Calibration Coefficient

21. Press System SERVICE MENU TESTS 32 x1 EXECUTE TEST .
22. When the analyzer finishes the test, press Marker.
23. Using the front panel knob, locate the maximum value of the data trace for the 300 kHz to 1.3 GHz frequency range.
24. Write the maximum value in the "Performance Test Record."
25. Repeat the previous two steps for the other frequency range(s) listed on the "Performance Test Record."

Source Match (Forward) Calibration Coefficient

26. Press System SERVICE MENU TESTS 33 x1 EXECUTE TEST .
27. When the analyzer finishes the test, repeat steps 22 through 25.

Transmission Tracking (Forward) Calibration Coefficient

28. Press System SERVICE MENU TESTS 37 x1 EXECUTE TEST .
29. When the analyzer finishes the test, repeat steps 22 through 25.

Reflection Tracking (Forward) Calibration Coefficient

30. Press System SERVICE MENU TESTS 34 x1 EXECUTE TEST .
31. When the analyzer finishes the test, repeat steps 22 through 25.

Load Match (Reverse) Calibration Coefficient

32. Press System SERVICE MENU TESTS 42 x1 EXECUTE TEST .
33. When the analyzer finishes the test, repeat steps 22 through 25.

Transmission Tracking (Reverse) Calibration Coefficient

34. Press System SERVICE MENU TESTS 43 x1 EXECUTE TEST .
35. When the analyzer finishes the test, repeat steps 22 through 25.

Second Full 2-Port Calibration

36. Connect the equipment as shown in Figure 1-29.

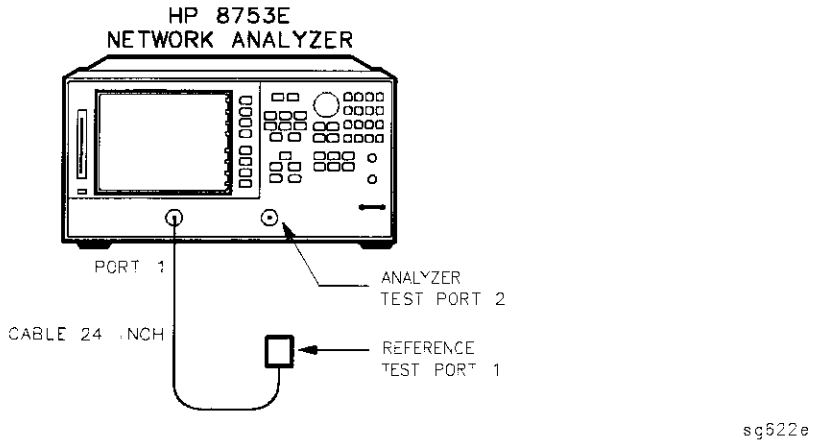


Figure 1-29. Second Full 2-Port Calibration Test Setup

37. Press (Preset) (Start) (300) (k/m).
38. Press (Cal) CAL KIT SELECT CAL KIT CAL KIT:7mm RETURN RETURN CALIBRATE MENU FULL 2-PORT.
39. Press ISOLATION OMIT ISOLATION.
40. Connect the "open" end of the open/short combination (supplied in the calibration kit) to reference test port 1.
41. Press REFLECTION FORWARD:OPEN.
42. Connect the "short" end of the open/short combination to reference test port 1.
43. Press FORWARD:SHORT.
44. Replace the open/short combination with the 50 ohm termination (supplied in the calibration kit).
45. Press FORWARD:LOAD.
46. Connect the "open" end of the open/short combination to the analyzer test port 2.
47. Press REVERSE:OPEN.
48. Connect the "short" end of the open/short combination to the analyzer test port 2.
49. Press REVERSE: SHORT.
50. Connect the 50 ohm termination to the analyzer test port 2.
51. Press REVERSE: LOAD.
52. When the analyzer displays PRESS 'DONE' IF FINISHED WITH STD(s), press STANDARDS DONE.

    Wait for the message COMPUTING CAL COEFFICIENTS to disappear from the analyzer display before proceeding to the next step.

53. Connect the equipment as shown in Figure 1-30.

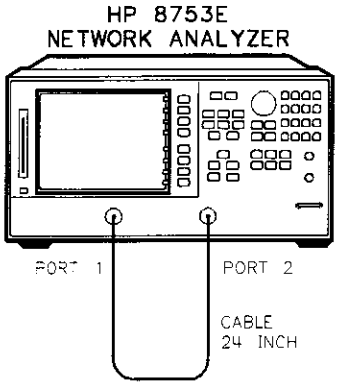


Figure 1-30. Transmission Calibration Test Setup

54. Press TRANSMISSION DO BOTH FWD + REV .

55. Press DONE 2-PORT CAL .

Load Match (Forward) Calibration Coefficient

56. Press (System) SERVICE MENU TESTS (36) (x1) EXECUTE TEST .

57. When the test is done, press (Marker) MARKER 1 .

58. Using the front panel knob, locate the maximum value of the data trace for the 300 kHz to 1.3 GHz frequency range.

59. Write the maximum value on the "Performance Test Record."

60. Repeat the previous three steps for the other frequency range(s) listed on the "Performance Test Record."

Directivity (Reverse) Calibration Coefficient

61. Press (System) SERVICE MENU TESTS (38) (x1) EXECUTE TEST .

62. When the analyzer finishes the test, repeat steps 57 through 60.

Source Match (Reverse) Calibration Coefficient

63. Press (System) SERVICE MENU TESTS (39) (x1). At the prompt, press EXECUTE TEST .

64. When the analyzer finishes the test, repeat steps 57 through 60.

Reflection Tracking (Reverse) Calibration Coefficient

65. Press (System) SERVICE MENU TESTS (40) (x1) EXECUTE TEST .

66. When the analyzer finishes the test, repeat steps 57 through 60.

10. System Trace Noise (Only for Analyzers without Option 006)

Frequency Range	Ratio	System Trace Noise (Magnitude[1])	System Trace Noise (Phase[1])
30 kHz to 3 GHz	A/R	<0.006 dB rms	<0.038° rms
30 kHz to 3 GHz	B/R	<0.006 dB rms	<0.038° rms

1 At +5 dBm into test port, 3 kHz IF bandwidth, and CW sweep.

Required Equipment for 50Ω Analyzers

Cable, APC-7, 24-inch ..... HP P/N 8120-4779

Required Equipment for 75Ω Analyzers

Cable, 75Ω, Type-N 24-inch ..... HP P/N 8120-2408

Analyzer warmup time: **1 hour**

Perform this test to measure the system trace noise at a designated frequency in both the A/R and B/R ratioed measurements.

1. Connect the equipment as shown in Figure 1-31.

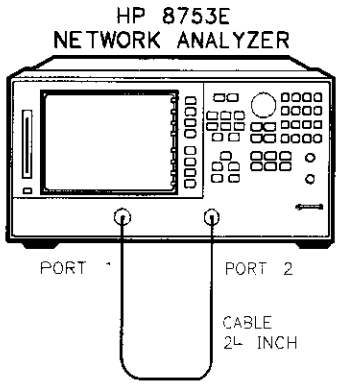


Figure 1-31. System Trace Noise Test Setup

2. Press (Preset) (Menu) POWER (5) (x1).
3. Press RETURN CW FREQ (3) (G/n) NUMBER of POINTS (1601) (x1).
4. Press (Marker Fctn) MARKER MODE MENU STATS ON to activate the instrument's statistic feature.

System Trace Noise for A/R Magnitude

5. Press (Meas) Trans: REV S12 (A/R) .
6. Press (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
7. When the analyzer displays the "Hld" annotation, press (Scale Ref) AUTO SCALE .
8. Write the s.dev (standard deviation) value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for A/R Phase

9. Press (Format) PHASE .
10. Press (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
11. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
12. Write the s.dev value on the "Performance Test Record."

System Trace Noise for B/R Magnitude

13. Press (Meas) Trans: FWD S21 (B/R) .
14. Press (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
15. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
16. Write the s.dev value on the "Performance Test Record."

System Trace Noise for B/R Phase

17. Press (Format) PHASE .
18. Press (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
19. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
20. Write the s.dev value on the "Performance Test Record."

In Case of Difficulty

1. Perform the "ADC Offset Correction Constants" procedure, located in the "Adjustments and Correction Constants" chapter.
2. Repeat this performance test.
3. Suspect the A10 Digital IF board assembly if the analyzer still fails the test.

11. System Trace Noise (Only for Analyzers with Option 006)

Specifications

Frequency Range	Ratio	System Trace Noise (Magnitude[1])	System Trace Noise (Phase[1])
30 kHz to 3 GHz	A/R	<0.006 dB rms	<0.038° rms
30 kHz to 3 GHz	B/R	<0.006 dB rms	<0.038° rms
3 GHz to 6 GHz	A/R	<0.010 dB rms	<0.070° rms
3 GHz to 6 GHz	B/R	<0.010 dB rms	<0.070° rms

1 At +5 dBm into test port, 3 kHz IF bandwidth, and CW sweep.

Required Equipment

Cable, APC-7, 24-inch ..... HP P/N 8120-4779

Analyzer warmup time: **1 hour**

Perform this test to measure the system trace noise at designated CW frequencies in both the A/R and B/R ratioed measurements.

1. Connect the equipment as shown in Figure 1-32.

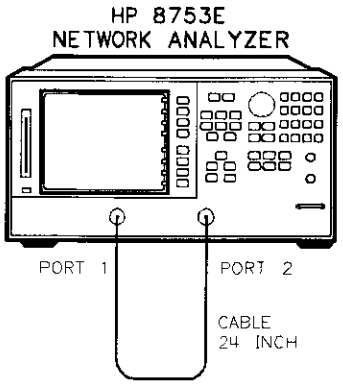


Figure 1-32. System Trace Noise Test Setup

2. Press (Preset) (Menu) POWER (5) (x1) RETURN NUMBER of POINTS (1601) (x1).
3. Press (Marker Fctn) MARKER MODE MENU STATS ON to activate the instrument's statistic feature.

System Trace Noise for A/R Magnitude from 30 kHz to 3 GHz

4. Press (Meas) Trans: REV S12 (A/R) .
5. Press (Menu) CW FREQ (3) (G/n) TRIGGER MENU NUMBER of GROUPS (5) (x1).
6. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
7. Write the s.dev value shown, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for A/R Magnitude from 3 GHz to 6 GHz

8. Press (Menu) CW FREQ (6) (G/n) TRIGGER MENU NUMBER of GROUPS (5) (x1).
9. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
10. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for A/R Phase from 3 GHz to 6 GHz

11. Press (Format) PHASE .
12. Press (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
13. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
14. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for A/R Phase from 30 kHz to 3 GHz

15. Press (Menu) CW FREQ (3) (G/n) TRIGGER MENU NUMBER of GROUPS (5) (x1).
16. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
17. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for B/R Magnitude from 30 kHz to 3 GHz

18. Press (Meas) Trans: FWD S21 (B/R) (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
19. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE .
20. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for B/R Magnitude from 3 GHz to 6 GHz

21. Press (Menu) CW FREQ (6) (G/n) TRIGGER MENU NUMBER of GROUPS (5) (x1).
22. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE.
23. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for B/R Phase from 3 GHz to 6 GHz

24. Press (Format) PHASE (Menu) TRIGGER MENU NUMBER of GROUPS (5) (x1).
25. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE.
26. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

System Trace Noise for B/R Phase from 30 kHz to 3 GHz

27. Press (Menu) CW FREQ (3) (G/n) TRIGGER MENU NUMBER of GROUPS (5) (x1).
28. When the analyzer finishes the number of sweeps, press (Scale Ref) AUTO SCALE.
29. Write the s.dev value, which appears on the analyzer display, on the "Performance Test Record."

In Case of Difficulty

1. Perform the "ADC Offset Correction Constants" procedure, located in the "Adjustments and Correction Constants" chapter.
2. Repeat this performance test.
3. Suspect the A10 Digital IF board assembly if the analyzer still fails the test.

12. Test Port Input Impedance

Specifications

Frequency Range	Test Port Input	Return Loss
300 kHz to 1.3 GHz	Port 1	≥18 dB
1.3 GHz to 3 GHz	Port 1	≥16 dB
3 GHz to 6 GHz	Port 1	≥14 dB
300 kHz to 1.3 GHz	Port 2	≥18 dB
1.3 GHz to 3 GHz	Port 2	≥16 dB
3 GHz to 6 GHz	Port 2	≥14 dB

Required Equipment for 50Ω Analyzers

Cable, APC-7, 24-inch ..... HP P/N 8120-4779
Calibration Kit, 7-mm ..... HP 85031B

Required Equipment for 75Ω Analyzers

Cable, 75Ω, Type-N, 24-inch ..... HP P/N 8120-2408
Calibration Kit, 75Ω, Type-N ..... HP 85036B

Analyzer warmup time: **1 hour**

Perform this test to measure the return loss of each input test port.

1. Connect the equipment as shown in Figure 1-33.

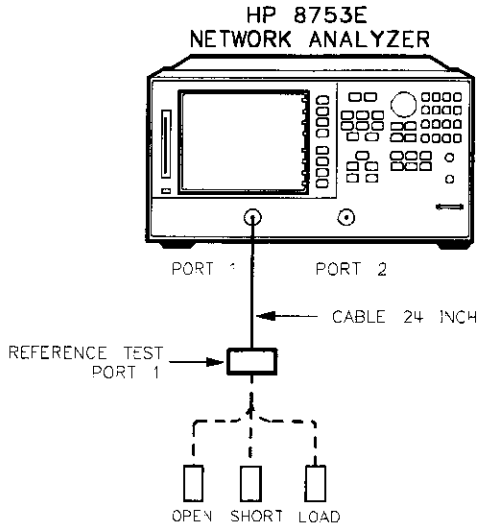


Figure 1-33. S11 1-Port Cal Test Setup

2. Press (Preset) AVE IF BW 3000 x1 (Menu) NUMBER of POINTS (1601) (x1).
3. Press (Start) (300) (k/m).
4. Press (Cal) CAL KIT SELECT CAL KIT and select the appropriate calibration kit:
   - If your analyzer is 50Ω, press CAL KIT: 7mm.
   - If your analyzer is 75Ω, press CAL KIT: N 75Ω.
5. Press RETURN RETURN CALIBRATE MENU S11 1-PORT.
6. Connect an open to reference test port 1, as shown in Figure 1-33.
7. Press FORWARD: OPEN.
8. When the analyzer displays the prompt CONNECT STD THEN PRESS KEY TO MEASURE, connect a short to reference test port 1.
9. Press FORWARD: SHORT.
10. At the prompt, connect a load to reference test port 1.
11. Press FORWARD: LOAD.
12. When the analyzer displays 'DONE' IF FINISHED WITH CAL, press DONE 1-PORT CAL.
13. Press (Save/Recall) SAVE STATE.
14. Connect the equipment as shown in Figure 1-34.

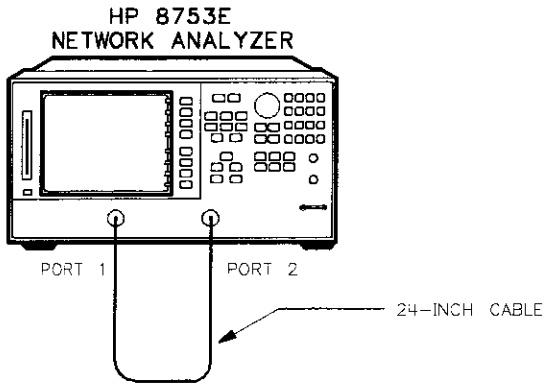


Figure 1-34. Test Port 2 Input Impedance Test Setup

15. Press (Marker) to turn the analyzer's marker 1 on. Use the front panel knob to locate the maximum value of the data trace for each of the frequency ranges listed in the "Performance Test Record."
16. Write these maximum values on the "Performance Test Record."
17. Connect the equipment as shown in Figure 1-35.

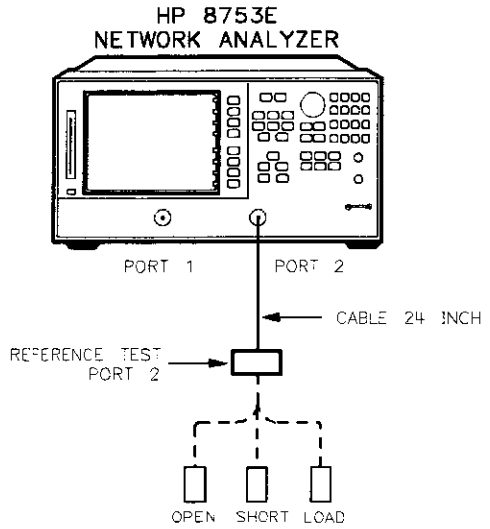


Figure 1-35. S22 1-Port Cal Test Setup

18. Press (Cal) `CALIBRATE MENU` `S22 1-PORT`.
19. At the prompt, connect an open to reference test port 2, as shown in Figure 1-35.
20. Press `REVERSE: OPEN`.
21. When the analyzer displays the prompt `CONNECT STD THEN PRESS KEY TO MEASURE`, connect a short to reference test port 2.
22. Press `REVERSE: SHORT`.

23. At the prompt, connect a load to reference test port 2.
24. Press REVERSE: LOAD .
25. When the analyzer displays 'DONE' IF FINISHED WITH CAL, press DONE 1-PORT CAL .
26. Press (Save/Recall) SAVE STATE to save the 1-Port calibration.
27. Connect the equipment as shown in Figure 1-36.

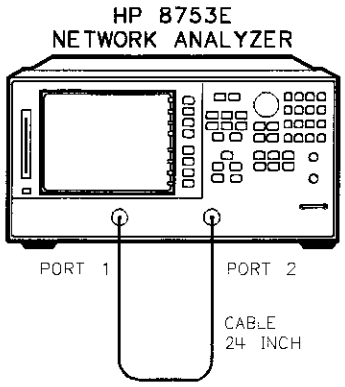


Figure 1-36. Test Port 1 Input Impedance Test Setup

28. Press (Marker) to activate the analyzer's marker 1. Use the front panel knob to locate the maximum value of the data trace for each of the frequency ranges listed in the "Performance Test Record."
29. Write the maximum values on the "Performance Test Record."

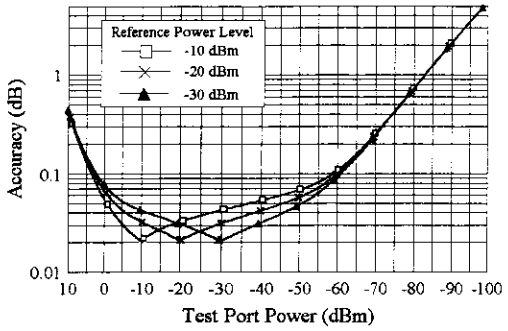
In Case of Difficulty

1. Suspect the A10 digital IF board assembly if the analyzer fails BOTH test port tests.
2. Refer to the "Receiver Troubleshooting" chapter of the *HP 8753E Service Guide* for more troubleshooting information.

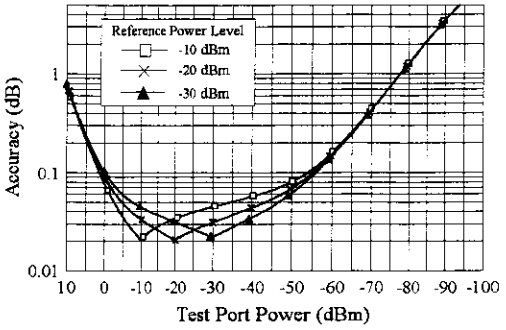
13. Test Port Receiver Magnitude Dynamic Accuracy

Specifications

HP8753E Magnitude Dynamic Accuracy 0.3 to 3000 MHz



HP8753E Magnitude Dynamic Accuracy 3-6 GHz



Required Equipment

Power Meter ..... HP 436A/437B/438A
Power Sensor ..... HP 8482A
Step Attenuator, 110 dB ..... HP 8496A Option 001, H18
(See notes on the following page.)
Adapter (2), APC-7 to Type-N (f) ..... HP 11524A
Adapter, Type-N (f) to Type-N (f) ..... HP P/N 1250-0777
Cable (3), 50Ω, Type-N, 24-inch 8120-4781
Cable, HP-IB ..... HP 10833A
Diskette, 3.5 inch ..... any
Calibration Kit, Type-N, 50 Ω ..... HP 85032B

Additional Required Equipment for 75Ω Analyzers

Minimum Loss Pad (2), 50Ω to 75Ω ..... HP 11852B

Analyzer warmup time: **1 hour**

Note

The HP 8496A step attenuator (Option 001, H18) comes with a special calibration that supports the measurement uncertainties expressed in the test record for this performance test.

The special calibration consists of two measurements. The first is a measurement of the attenuation at each step. The data reported for this measurement have the following uncertainites:

- ±0.006 dB from 0 to 40 dB
- ±0.015 dB from >40 to 80 dB
- ±0.025 dB from >80 to 90 dB
- ±0.05 dB >90 dB

The second calibration measurement characterizes match stability between attenuator settings for each attenuator port. The vector difference of S_{11} or (S_{22}) between the reference attenuation step and all the other steps is measured. The magnitude of this difference is certified to be <0.0316 (>30 dB).

Note

The HP 8496A used for this test will have known attenuator errors for attenuations up to 100 dB using a test frequency of 30 MHz. The attenuation used as a reference is 0 dB. If the available calibration data is not expressed as attenuation errors, it can be converted to such a form by the following equation:

(actual attenuation) – (expected attenuation) = attenuator error

Actual attenuation values that are greater than the expected attenuation values will result in positive errors. Actual attenuation values that are less than the expected attenuation values will result in negative errors.

Initial Calculations

1. Fill in the attenuator error values (referenced to 0 dB attenuation) in Table 1-1 by referring to the calibration data for the HP 8496A step-attenuator. Refer to the note on the previous page.
   a. Find the column in the HP 8496A attenuation error table that pertains to the attenuation errors for 30 MHz.
   b. Starting with the "10 dB" step in this column, write down the value in the corresponding space in Table 1-1 for column "B." This value should be placed in the row for the 10 dB HP 8496A setting.
   c. Continue transferring the remaining values of the HP 8496A attenuation errors to column "B" in Table 1-1.
2. In Table 1-1, transfer the 10 dB error value located within the parenthesis in column "B" to each space in column "C."

Table 1-1. Magnitude Dynamic Accuracy Calculations

A	B	C	D (B – C)	E	F (E – D)
8496A Attn. (dB)	Attn. Error (ref 0 dB)	10 dB Error Value	Attn. Error (ref 10 dB)	Expected Measurement (dB)	Expected Measurement (corrected) (dB)
0	0 dB	_____	_____	10	_____
10	(_____)	_____	0 dB	0	_____
20	_____	_____	_____	– 10	_____
30	_____	_____	_____	– 20	_____
40	_____	_____	_____	– 30	_____
50	_____	_____	_____	– 40	_____
60	_____	_____	_____	– 50	_____
70	_____	_____	_____	– 60	_____
80	_____	_____	_____	– 70	_____
90	_____	_____	_____	– 80	_____

3. The values in column "D" result from changing the reference attenuation of the calibration data of the HP 8496A to 10 dB.

   Calculate the attenuation error values for this column by subtracting the values in column "C" from the values in column "B" (B – C = D).
4. The values in column "F" result from correcting the expected measurement value by the amount of attenuator error.

   Calculate the values in this column by subtracting the values in column "D" from the values in column "E" (E – D = F).
5. Transfer the values from column "F" in Table 1-1 to column "F" in the "Performance Test Record" for both test ports.

Port 1 Power Meter Calibration

6. Zero and calibrate the power meter. (Refer to the power meter manual for details on this procedure.)
7. Connect the equipment as shown in Figure 1-37.

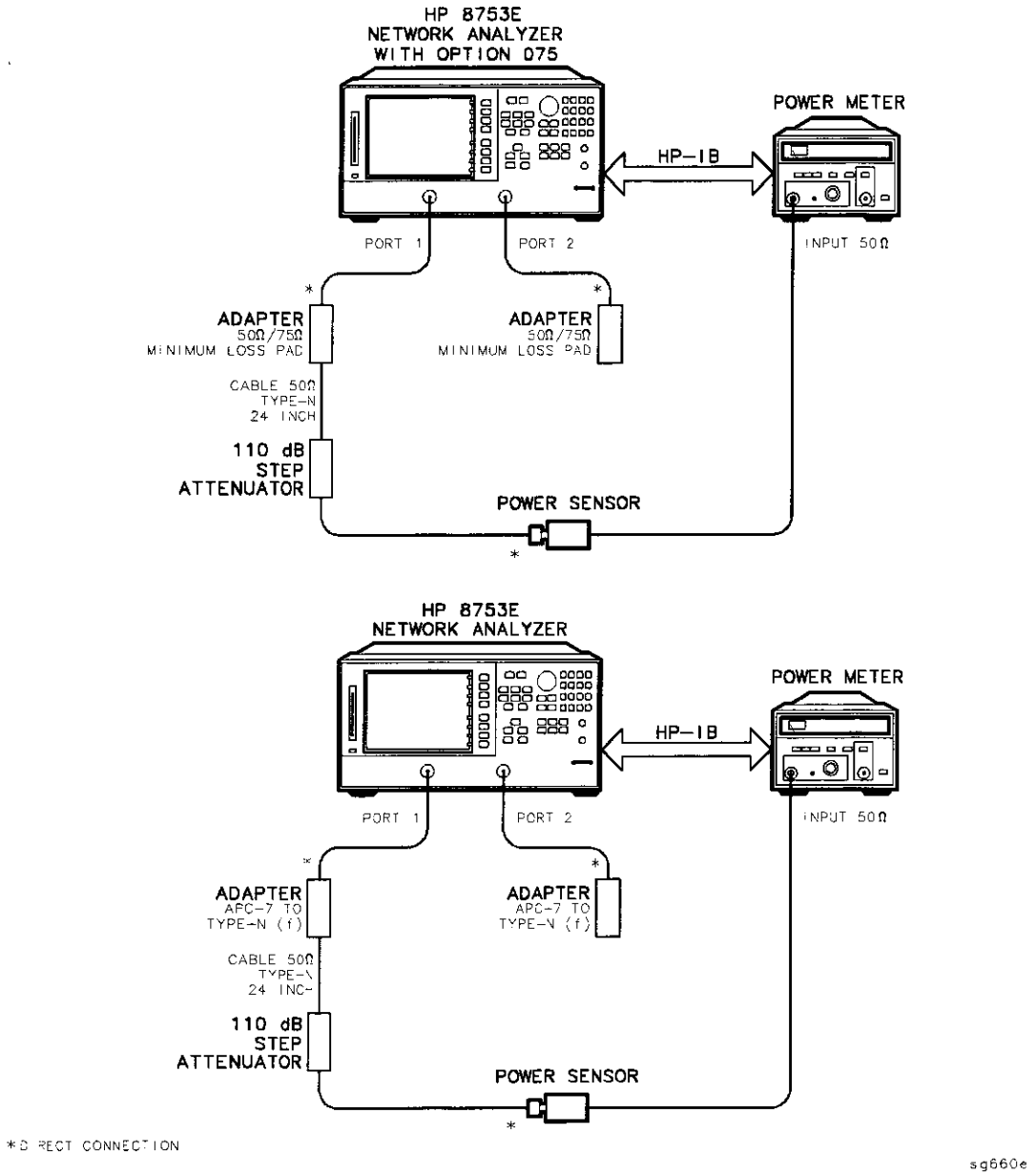


Figure 1-37. Power Meter Calibration for Magnitude Dynamic Accuracy

8. Set the HP 8496A to 10 dB.
9. Set the following analyzer parameters:

   (Preset) (Menu) CW FREQ (30) (M/μ)

   NUMBER of POINTS (51) (x1)

   POWER (−10) (x1)

   (Avg) IF BW (10) (x1)

10. Set up the HP 8753E for power meter calibration:
    a. Select the HP 8753E as the system controller:

       (Local)

       SYSTEM CONTROLLER

    b. Set the power meter's address:

       SET ADDRESSES

       ADDRESS: P MTR/HPIB (13) (x1)

    c. Select the appropriate power meter by pressing POWER MTR [ ] until the correct model number is displayed (HP 436A or HP 438A/437).
    d. Select the cal kit and enter the power sensor calibration data.

       (Cal) CAL KIT SELECT CAL KIT N50Ω

       (Cal) PWRMTR CAL LOSS/SENSOR LISTS CAL FACTOR SENSOR A (enter the power sensor calibration data for 30 MHz) DONE

11. Take a power meter calibration sweep.

    (Cal) PWRMTR CAL (−20) (x1)

    ONE SWEEP TAKE CAL SWEEP

12. Verify that the power meter reads approximately −20 dBm.

Adapter Removal Calibration

13. Connect the equipment as shown in the Figure 1-38:

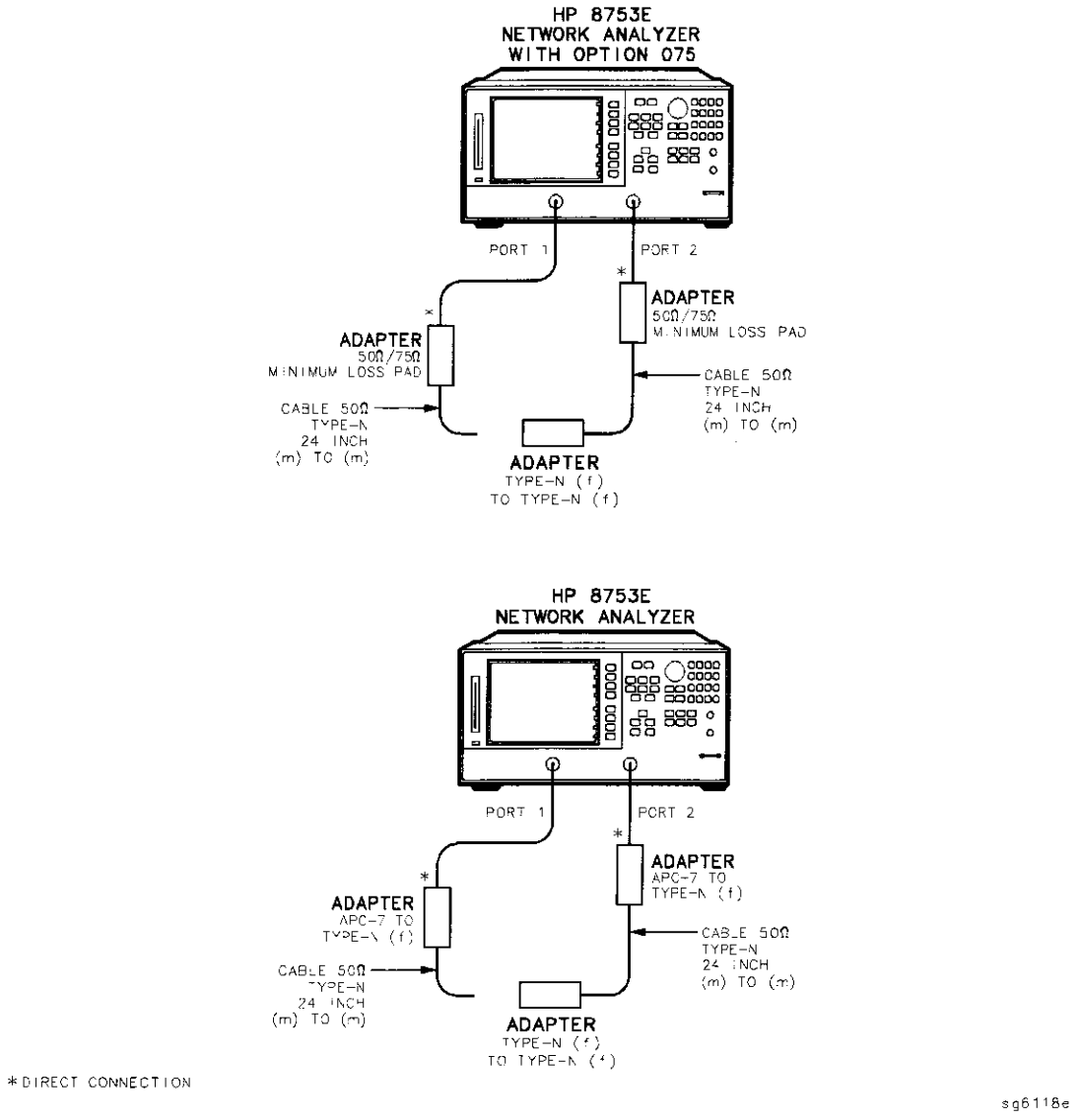


Figure 1-38. Full 2-Port Calibration with Adapter Removal

14. Perform a full 2-port error correction with isolation.

Note When you are performing error-correction for a system that has type-N test port connectors, the softkey menus label the sex of the test port connector – *not* the calibration standard connector. For example, the label `SHORT (F)` refers to the short that will be connected to the female *test port*.

---

15. Save the results to disk. Name the file "PORT1."
16. Move the adapter to reference test port 1 and perform another full 2-port error correction.
17. Save the results to disk. Name the file "PORT2."

18. Press (Cal) MORE ADAPTER REMOVAL RECALL CAL SETS .
19. From the disk directory, choose the file "PORT1"and press RECALL CAL PORT 1 .
20. When this is complete, choose the file "PORT2" and press RECALL CAL PORT 2 .
21. When complete, press RETURN .
22. To enter the adapter delay, press ADAPTER DELAY (.110) (G/n) (default for Type-N adapter 1250-1777). The analyzer display will read 110 ps.
23. Press ADAPTER COAX REMOVE ADAPTER .
24. Save the results of the new cal set.

Measure Test Port 2 Magnitude Dynamic Accuracy

25. Remove the Type-N (f) to (f) adapter and connect the equipment as shown in Figure 1-39. Confirm that the step attenuator is set to 10 dB.

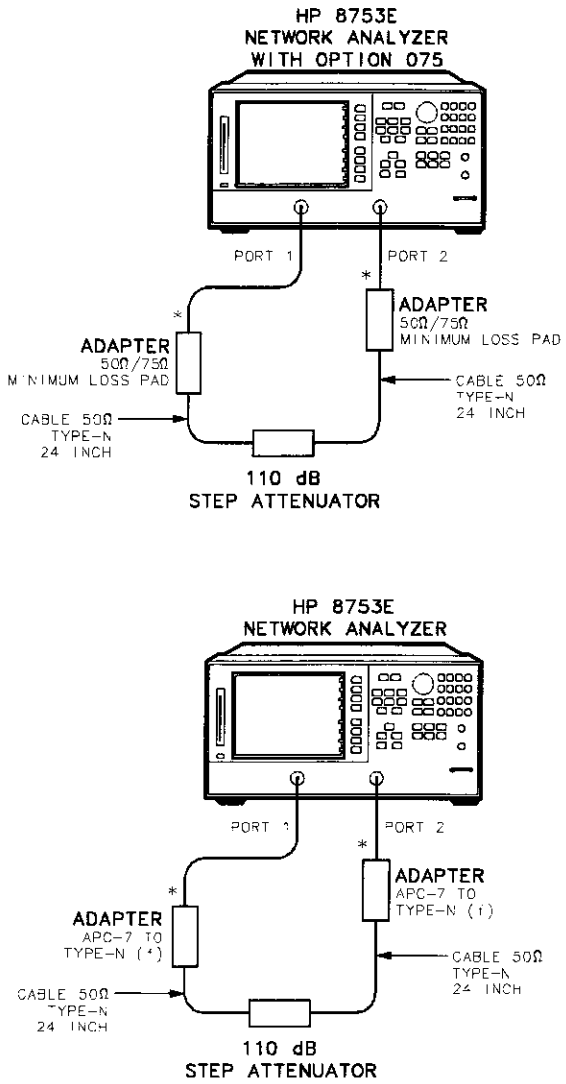


Figure 1-39. Magnitude Dynamic Accuracy Measurement

26. To set up the dynamic accuracy measurement, press the following:

    (Meas) Trans:FWD S21 (B/R)

    (Marker Fctn) MKR MODE MENU STATS ON

    (Menu) TRIGGER MENU SINGLE

27. Wait for the sweep to finish, then press (Display) DATA → MEM DATA/MEM.

28. Set the step attenuator to 0 dB.

29. Press (Menu) TRIGGER MENU SINGLE.

30. Write the mean value (which appears on the analyzer's display) in the "Test Port Measurement" column of the "Performance Test Record." This column is also labeled "G."

31. Repeat steps 28 through 30 for each setting of the step attenuator.

32. Calculate dynamic accuracy for each step by using the formula |G − F|. Place these values in the appropriate column of the "Performance Test Record."

Measure Test Port 1 Magnitude Dynamic Accuracy

33. Set the step attenuator to 10 dB.
34. To set up the dynamic accuracy measurement, press the following:

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

    (Display) DATA

    (Menu) TRIGGER MENU SINGLE

35. Wait for the sweep to finish, then press (Display) DATA → MEM DATA/MEM.
36. Set the step attenuator to 0 dB.
37. Press (Menu) TRIGGER MENU SINGLE.
38. Write the mean value (which appears on the analyzer's display) in the "Test Port Measurement" column of the "Performance Test Record." This column is also labeled "G."
39. Repeat steps 36 through 38 for each setting of the step attenuator.
40. Calculate dynamic accuracy for each step by using the formula |G – F|. Place these values in the appropriate column of the "Performance Test Record."

In Case of Difficulty

1. If the analyzer fails the test at ALL power levels, be sure you followed the recommended attenuator settings as listed in the "Performance Test Record." Repeat this performance test.
2. If both test port measured values are out of specifications:
   a. Recalibrate the power meter.
   b. Repeat this performance test.
3. If the analyzer fails either test port 2 or test port 1 dynamic accuracy at lower power levels:
   a. Perform the "IF Amplifier Correction Constants" and "ADC Offset Correction Constants" procedures (located in the "Adjustments and Correction Constants" chapter).
   b. Repeat this performance test.
   c. If it still fails, replace the A10 Digital IF assembly.
   d. Repeat the two adjustment procedures mentioned in this step and then repeat this performance test.

14. Test Port Receiver Magnitude Compression

Specifications

Frequency Range	Test Port	Magnitude[1]
300 kHz to 3 GHz	Port 1	≤0.45 dB
3 GHz to 6 GHz[2]	Port 1	≤0.80 dB
300 kHz to 3 GHz	Port 2	≤0.45 dB
3 GHz to 6 GHz[2]	Port 2	≤0.80 dB

1 With a 10 Hz IF bandwidth.

2 Only for analyzers with Option 006 – 30 kHz to 6 GHz range.

Required Equipment for 50Ω Analyzers

Cable, APC-7, 24-inch ..... HP P/N 8120-4779

Required Equipment for 75Ω Analyzers

Cable, 75Ω, Type-N, 24-inch ..... HP P/N 8120-2408

Analyzer warmup time: **1 hour**

Perform this test to verify the compression/expansion magnitude levels of the analyzer's test port receiver samplers.

Test Port 2 Magnitude Compression

1. Connect the equipment as shown in Figure 1-40.

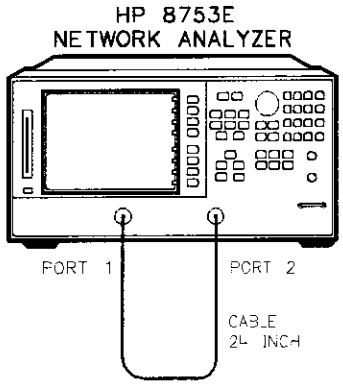


Figure 1-40. Test Port Magnitude Compression Test Setup

2. Press (Preset) (Meas) Trans: FWD S21 (B/R).
3. Press (Avg) IF BW (10) (x1).
4. Press (Menu) CW FREQ (50) (M/μ).
5. Press SWEEP TYPE MENU POWER SWEEP START (-10) (x1).

6. Press (Menu) TRIGGER MENU SINGLE.
7. At the end of the sweep, press (Scale Ref) AUTO SCALE.
8. Press (Marker Fctn) MKR SEARCH SEARCH: MAX.
9. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH: MIN.
10. Press (Marker) ΔMODE MENU ΔREF = 1.
11. Write the absolute value of the marker 2 reading in the "Performance Test Record."
12. Press (Menu) CW FREQ (1) (G/n).
13. Press TRIGGER MENU SINGLE.
14. At the end of the sweep, press (Scale Ref) AUTO SCALE.
15. Press (Marker) MARKER ΔREF=1 (Marker Fctn) MKR SEARCH SEARCH: MAX.
16. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH: MIN.
17. Write the absolute value of marker 2 in the "Performance Test Record."
18. Repeat steps 12 through 17 for the other frequencies listed for Port 2 on the "Performance Test Record."

Test Port 1 Magnitude Compression

19. Press (Meas) Trans: REV S12 (A/R).
20. Press (Menu) CW FREQ (50) (M/μ).
21. Press TRIGGER MENU SINGLE.
22. At the end of the sweep, press (Scale Ref) AUTO SCALE.
23. Press (Marker) MARKER ΔREF = 1 (Marker Fctn) MKR SEARCH SEARCH: MAX.
24. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH: MIN.
25. Write the absolute value of the marker 2 reading in the "Measured Value" column of the "Performance Test Record."
26. Repeat steps 19 through 25 for the other CW frequencies listed for Port 1 in the "Performance Test Record."

In Case of Difficulty

1. If the analyzer fails "Test Port 2 Magnitude Compression":
   a. Repeat this test.
   b. Replace the A6 B sampler assembly if the analyzer still fails the test.
2. If the analyzer fails "Test Port 1 Magnitude Compression":
   a. Repeat this test.
   b. Replace the A5 A sampler assembly if the analyzer still fails the test.

15. Test Port Receiver Phase Compression

Specifications

CW Frequency	Test Port	Phase[1]
300 kHz to 3 GHz	Port 1	≤6°
3 GHz to 6 GHz[2]	Port 1	≤7.5°
300 kHz to 3 GHz	Port 2	≤6°
3 GHz to 6 GHz[2]	Port 2	≤7.5°

1 With 10 Hz IF bandwidth.

2 Only for analyzer with Option 006 – 30 kHz to 6 GHz range.

Required Equipment for 50Ω Analyzers

Cable, APC-7, 24-inch ..... HP P/N 8120-4779

Required Equipment for 75Ω Analyzers

Cable, 75Ω, Type-N, 24-inch ..... HP P/N 8120-2408

Analyzer warmup time: **1 hour**

Perform this test to verify the compression/expansion phase relationships of the analyzer's test port receiver samplers.

Test Port 2 Phase Compression

1. Connect the equipment as shown in Figure 1-41.

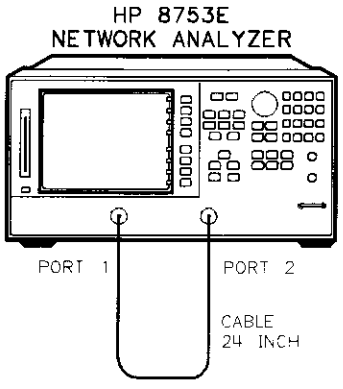


Figure 1-41. Test Port Phase Compression Test Setup

2. Press (Preset) (Meas) Trans: FWD S21 (B/R) (Format) PHASE.
3. Press (Avg) IF BW (10) (x1).
4. Press (Menu) SWEEP TYPE MENU POWER SWEEP START (-10) (x1).
5. Press (Menu) CW FREQ (50) (M/μ).

6. Press (Menu) TRIGGER MENU SINGLE.
7. At the end of the sweep, press (Scale Ref) AUTO SCALE.
8. Press (Marker Fctn) MKR SEARCH SEARCH: MAX.
9. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH: MIN.
10. Press (Marker) ΔMODE MENU ΔREF = 1.
11. Write the absolute value of the marker 2 reading in the "Measured Value" column of the "Performance Test Record."
12. Repeat steps 5 to 11 for the other CW frequencies listed for Port 2 in the "Performance Test Record."

Test Port 1 Phase Compression

13. Press (Meas) Trans: REV S12 (A/R) (Format) PHASE.
14. Press (Menu) CW FREQ (50) (M/μ).
15. Press (Menu) TRIGGER MENU SINGLE.
16. At the end of the sweep, press (Scale Ref) AUTO SCALE.
17. Press (Marker) MARKER ΔREF = 1 (Marker Fctn) MKR SEARCH SEARCH: MAX.
18. Press (Marker) MARKER 2 (Marker Fctn) MKR SEARCH SEARCH: MIN.
19. Write the absolute value of the marker 2 reading in the "Measured Value" column of the "Performance Test Record."
20. Repeat steps 14 to 19 for the other CW frequencies listed for Port 1 in the "Performance Test Record."

In Case of Difficulty

1. If the analyzer fails the "Test Port 2 Phase Compression" test:
   a. Repeat this test.
   b. Replace the A6 B sampler assembly if analyzer still fails the test.
2. If the analyzer fails the "Test Port 1 Phase Compression" test:
   a. Repeat this test.
   b. Replace the A5 A sampler assembly if analyzer still fails the test.

16. Test Port Output/Input Harmonics (Option 002 Analyzers without Option 006 Only)

Specifications

Test Port	Harmonic	Limit
Output	2nd	< −25 dBc @ +10 dBm
Output	3rd	< −25 dBc @ +10 dBm
Input Port 1	2nd	< −15 dBc @ +8 dBm
Input Port 1	3rd	< −30 dBc @ +8 dBm
Input Port 2	2nd	< −15 dBc @ +8 dBm
Input Port 2	3rd	< −30 dBc @ +8 dBm

Equipment Required for 50Ω Analyzers

Cable, APC-7, 24-inch ..... HP P/N 8120-4779
Attenuator (2), 20 dB, APC-7 ..... HP 8492A Option 020

Equipment Required for 75Ω Analyzers

Minimum Loss Pad (2) ..... HP 11852B
Cable, Type-N ..... HP P/N 8120-2408
Attenuator (2), 20 dB, Type-N ..... HP 8491A Option 020

Analyzer warmup time: **30 minutes**

Perform this test to determine the spectral purity of the HP 8753E input and output test ports.

Note The test port input 3rd harmonic specifications are *better* than the test port output 3rd harmonic specifications.

Test Port Output Worst Case 2nd Harmonic

1. Press [Preset] [Menu] POWER [10] [x1].
2. Press [Start] [16] [M/μ] [Stop] [1.5] [G/n] to set the frequency range.
3. Press [Avg] IF BW [10] [x1] to set the IF bandwidth to 10 Hz.
4. Connect the equipment as shown in Figure 1-42.

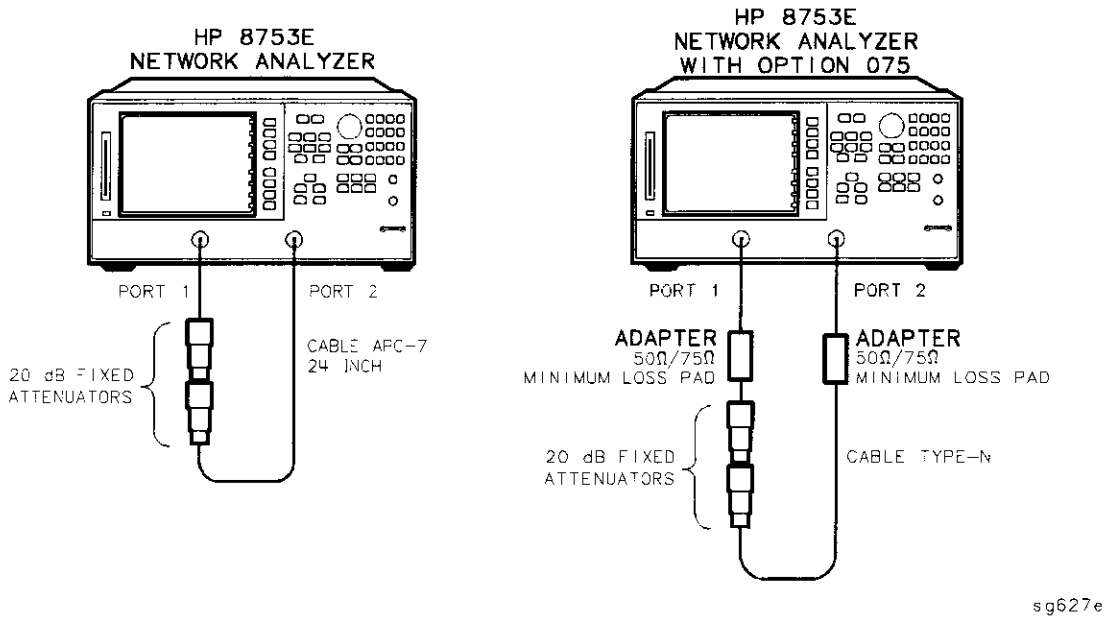


Figure 1-42. Test Port Output Harmonics Test Setup

5. Press (Meas) `Trans:REV S12 (A/R) INPUT PORTS A`.
6. After one sweep, press (Display) `DATA→MEMORY DATA/MEM` to normalize the trace.
7. Press (System) `HARMONIC MEAS HARMONIC SECOND`.
8. After one sweep, press (Scale Ref) `AUTO SCALE` to get a better viewing of the trace.
9. Press (Marker Fctn) `MKR SEARCH SEARCH MAX`.
10. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case test port output 2nd harmonic.

Test Port Output Worst Case 3rd Harmonic

11. Press (Stop) (1) (G/n) to change the stop frequency to 1 GHz.
12. Press (System) `HARMONIC MEAS HARMONIC OFF`.
13. After one sweep, press (Display) `DATA→MEMORY DATA/MEM` to normalize the trace.
14. Press (Scale Ref) `AUTO SCALE SCALE/DIV` (1) (x1) to get a better viewing of the trace.
15. Press (System) `HARMONIC MEAS HARMONIC THIRD`.
16. After one sweep, press (Scale Ref) `AUTO SCALE`.
17. Press (Marker Fctn) `MKR SEARCH SEARCH MAX`.
18. Write the marker 1 value on the "Performance Test Record."

Port 1 Input Worst Case 2nd Harmonic

19. Connect the equipment as shown in Figure 1-43.

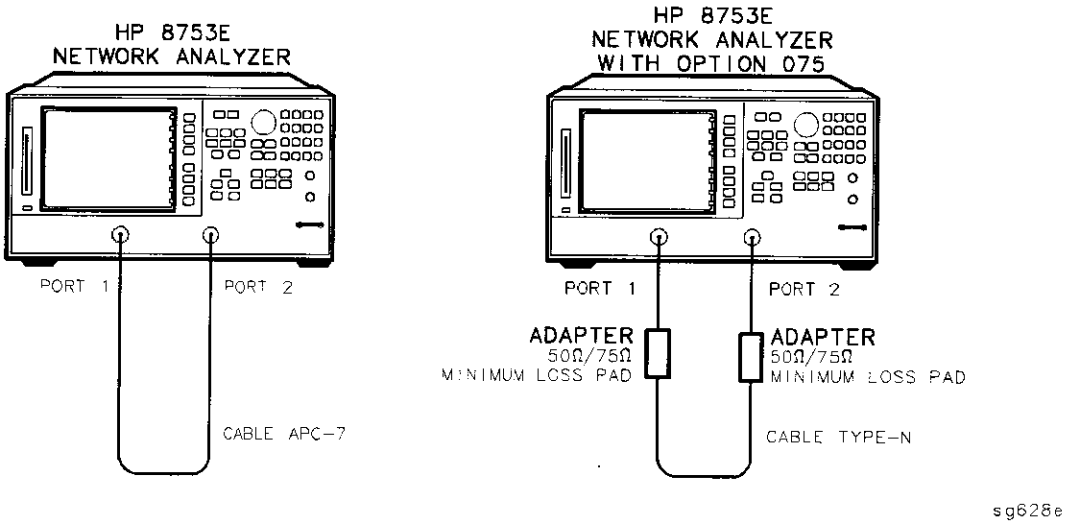


Figure 1-43. Receiver Harmonics Test Setup

20. Press (Preset) (Menu) POWER (8) (x1).
21. Press (Avg) IF BW (1) (0) (x1).
22. Press (Start) (16) (M/μ) (Stop) (1.5) (G/n) to set the frequency range.
23. Press (Meas) Trans:REV S12 (A/R) INPUT PORTS A.
24. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
25. Press (System) HARMONIC MEAS HARMONIC SECOND.
26. After one sweep, press (Scale Ref) AUTO SCALE to get a better viewing of the trace.
27. Press (Marker Fctn) MKR SEARCH SEARCH MAX.
28. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case port 1 input (receiver channel A) 2nd harmonic.

Port 1 Input Worst Case 3rd Harmonic

29. Press (Stop) (1) (G/n) to change the stop frequency for measuring the receiver 3rd harmonic.
30. Press (System) HARMONIC MEAS HARMONIC OFF.
31. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
32. Press (Scale Ref) AUTO SCALE SCALE/DIV (1) (x1) to get a better viewing of the trace.
33. Press (System) HARMONIC MEAS HARMONIC THIRD.
34. After one sweep, press (Scale Ref) AUTO SCALE.

35. Press (Marker Fctn) MKR SEARCH SEARCH MAX .
36. Write the marker 1 value on the "Performance Test Record."
37. Press (System) HARMONIC MEAS HARMONIC OFF .

Port 2 Input Worst Case 2nd Harmonic

38. Press (Stop) (1.5) (G/n) to set the stop frequency for measuring the 2nd harmonic.
39. Press (Meas) Trans:FWD S21 (B/R) INPUT PORTS B .
40. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
41. Press (System) HARMONIC MEAS HARMONIC SECOND .
42. After one sweep, press (Scale Ref) AUTO SCALE to get a better viewing of the trace.
43. Press (Marker Fctn) MKR SEARCH SEARCH MAX .
44. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case port 2 input (receiver channel B) 2nd harmonic.

Port 2 Input Worst Case 3rd Harmonic

45. Press (Stop) (1) (G/n) to change the stop frequency for measuring the receiver 3rd harmonic.
46. Press (System) HARMONIC MEAS HARMONIC OFF .
47. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
48. Press (Scale Ref) AUTO SCALE SCALE/DIV (1) (x1) to get a better viewing of the trace.
49. Press (System) HARMONIC MEAS HARMONIC THIRD .
50. After one sweep, press (Scale Ref) AUTO SCALE .
51. Press (Marker Fctn) MKR SEARCH SEARCH MAX .
52. Write the marker 1 value on the "Performance Test Record."

17. Test Port Output/Input Harmonics (Option 002 Analyzers with Option 006 Only)

Specifications

Test Port	Harmonic	Limit
Output	2nd	< −25 dBc @ +10 dBm
Output	3rd	< −25 dBc @ +10 dBm
Input Port 1	2nd	< −15 dBc @ +8 dBm
Input Port 1	3rd	< −30 dBc @ +8 dBm
Input Port 2	2nd	< −15 dBc @ +8 dBm
Input Port 2	3rd	< −30 dBc @ +8 dBm

Equipment Required

Cable, APC-7, 24-inch ..... HP P/N 8120-4779
Attenuator (2), 20 dB ..... HP 8492A Opt 020

Analyzer warmup time: **30 minutes**

Perform this test to determine the spectral purity of the HP 8753E input and output test ports.

Note The test port input 3rd harmonic specifications are *better* than the test port output 3rd harmonic specifications.

Test Port Output Worst Case 2nd Harmonic

1. Press [Preset] [Menu] POWER [10] [x1] to set the test port power to +10 dBm.
2. Press [Start] [16] [M/μ] [Stop] [3] [G/n] to set the frequency range.
3. Press [Avg] IF BW [10] [x1] to set the IF bandwidth to 10 Hz.
4. Connect the equipment as shown in Figure 1-44.

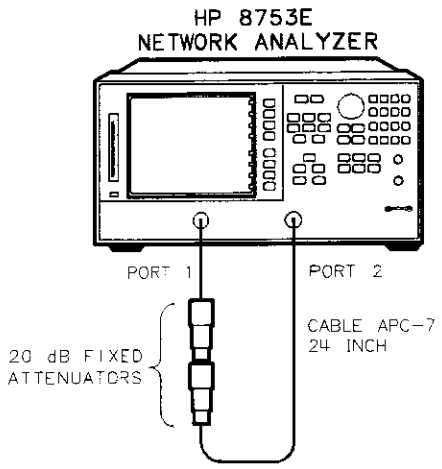


Figure 1-44. Test Port Output Harmonics Test Setup

5. Press [Meas] Trans:REV S12 (A/R) INPUT PORTS A.
6. After one sweep, press [Display] DATA→MEMORY DATA/MEM to normalize the trace.
7. Press [System] HARMONIC MEAS HARMONIC SECOND.
8. After one sweep, press [Scale Ref] AUTO SCALE to get a better viewing of the trace.
9. Press [Marker Fctn] MKR SEARCH SEARCH MAX.
10. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case test port output 2nd harmonic.

Test Port Output Worst Case 3rd Harmonic

11. Press (Stop) (2) (G/n) to change the stop frequency to 2 GHz.
12. Press (System) HARMONIC MEAS HARMONIC OFF .
13. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
14. Press (Scale Ref) AUTO SCALE SCALE/DIV (1) (x1) to get a better viewing of the trace.
15. Press (System) HARMONIC MEAS HARMONIC THIRD .
16. After one sweep, press (Scale Ref) AUTO SCALE .
17. Press (Marker Fctn) MKR SEARCH SEARCH MAX .
18. Write the marker 1 value on the "Performance Test Record."

Port 1 Input Worst Case 2nd Harmonic

19. Connect the equipment as shown in Figure 1-45.

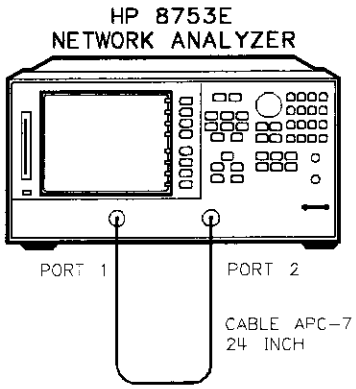


Figure 1-45. Receiver Harmonics Test Setup

20. Press (Preset) (Menu) POWER (8) (x1).
21. Press (Avg) IF BW (10) (x1).
22. Press (Start) (16) (M/μ) (Stop) (3) (G/n) to set the frequency range.
23. Press (Meas) Trans:REV S12 (A/R) INPUT PORTS A.
24. After one sweep, press (Display) DATA→MEMORY DATA/MEM to normalize the trace.
25. Press (System) HARMONIC MEAS HARMONIC SECOND.
26. After one sweep, press (Scale Ref) AUTO SCALE to get a better viewing of the trace.
27. Press (Marker Fctn) MKR SEARCH SEARCH: MAX.
28. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case port 1 input (receiver channel A) 2nd harmonic.

Port 1 Input Worst Case 3rd Harmonic

29. Press [Stop] [2] [G/n] to change the stop frequency for measuring the receiver 3rd harmonic.
30. Press [System] HARMONIC MEAS HARMONIC OFF .
31. After one sweep, press [Display] DATA→MEMORY DATA/MEM to normalize the trace.
32. Press [Scale Ref] AUTO SCALE SCALE/DIV [1] [x1] to get a better viewing of the trace.
33. Press [System] HARMONIC MEAS HARMONIC THIRD .
34. After one sweep, press [Scale Ref] AUTO SCALE .
35. Press [Marker Fctn] MKR SEARCH SEARCH: MAX .
36. Write the marker 1 value on the "Performance Test Record."
37. Press [System] HARMONIC MEAS HARMONIC OFF .

Port 2 Input Worst Case 2nd Harmonic

38. Press [Stop] [3] [G/n] to set the stop frequency for measuring the 2nd harmonic.
39. Press [Meas] Trans:FWD S21 (B/R) INPUT PORTS B .
40. After one sweep, press [Display] DATA→MEMORY DATA/MEM to normalize the trace.
41. Press [System] HARMONIC MEAS HARMONIC SECOND .
42. After one sweep, press [Scale Ref] AUTO SCALE to get a better viewing of the trace.
43. Press [Marker Fctn] MKR SEARCH SEARCH MAX .
44. Write the marker 1 value (which appears on the analyzer display) on the "Performance Test Record." This is the worst case port 2 input (receiver channel B) 2nd harmonic.

Port 2 Input Worst Case 3rd Harmonic

45. Press [Stop] [2] [G/n] to change the stop frequency for measuring the receiver 3rd harmonic.
46. Press [System] HARMONIC MEAS HARMONIC OFF .
47. After one sweep, press [Display] DATA→MEMORY DATA/MEM to normalize the trace.
48. Press [Scale Ref] AUTO SCALE SCALE/DIV [1] [x1] to get a better viewing of the trace.
49. Press [System] HARMONIC MEAS HARMONIC THIRD .
50. After one sweep, press [Scale Ref] AUTO SCALE .
51. Press [Marker Fctn] MKR SEARCH SEARCH: MAX .
52. Write the marker 1 value on the "Performance Test Record."

Performance Test Record

For Analyzers with a Frequency Range of 30 kHz to 3 GHz

Note See the next "Performance Test Record" section if your analyzer frequency range is from 30 kHz to 6 GHz (Option 006).

HP 8753E Performance Test Record (1 of 12)

Calibration Lab Address:

Report Number _____

Date _____

_____ Last Calibration Date _____

_____ Customer's Name _____

_____ Performed by _____

Model HP 8753E

Serial No. _____ Option(s) _____

Firmware Revision _____

Ambient Temperature _____° C Relative Humidity _____%

Test Equipment Used:

Description	Model Number	Trace Number	Cal Due Date
Frequency Counter			
Power Meter			
Power Sensor			
Calibration Kit			
Verification Kit			

Notes/Comments: _____

_____

_____

HP 8753E Performance Test Record (2 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 1. Test Port Output Frequency Range and Accuracy

CW Frequencies (MHz)	Min. (MHz)	Results Measured (MHz)	Max. (MHz)	Measurement Uncertainty (MHz)
0.03	0.029 999 7	_____	0.030 000 3	± 0.000 000 050
0.3	0.299 997	_____	0.300 003	± 0.000 000 520
5.0	4.999 950	_____	5.000 050	± 0.000 009
16.0	15.999 840	_____	16.000 160	± 0.000 028
31.0	30.999 690	_____	31.000 310	± 0.000 054
60.999 999	60.999 390	_____	61.000 610	± 0.000 105
121.0	120.998 790	_____	121.001 210	± 0.000 207
180.0	179.998 200	_____	180.001 800	± 0.000 307
310.0	309.995 900	_____	310.003 100	± 0.000 528
700.0	699.930 000	_____	700.007 000	± 0.001 192
1 300.0	1 299.987	_____	1 300.013	± 0.002 212
2 000.0	1 999.980	_____	2 000.020	± 0.003 403
3 000.0	2 999.970	_____	3 000.030	± 0.005 104

▶▶ 2. External Source Mode Frequency Range

Test Frequencies (GHz)	Results
0.010	_____
0.020	_____
0.100	_____
1.000	_____
2.000	_____
3.000	_____

HP 8753E Performance Test Record (3 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company Model HP 8753E Serial Number _____	Report Number _____ Date _____

▶▶ 3. Test Port Output Power Accuracy

Test Frequencies	Test Port Output Power (dBm)	Specification (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
Center Frequency				
300 kHz	0	± 1	_____	± 0.465
20 MHz	0	± 1	_____	± 0.10
50 MHz	0	± 1	_____	± 0.10
100 MHz	0	± 1	_____	± 0.10
200 MHz	0	± 1	_____	± 0.10
500 MHz	0	± 1	_____	± 0.10
1 GHz	0	± 1	_____	± 0.13
2 GHz	0	± 1	_____	± 0.13
3 GHz	0	± 1	_____	± 0.27

▶▶ 4. Test Port Output Power Range and Linearity

Test Settings	Results Measured (dB)	Power Level Linearity (dB)	Specification (dB)	Measurement Uncertainty (dB)
CW Frequency = 300 kHz				
− 15	_____	_____	± 0.2	± 0.03
− 13	_____	_____	± 0.2	± 0.03
− 11	_____	_____	± 0.2	± 0.03
− 9	_____	_____	± 0.2	± 0.02
− 7	_____	_____	± 0.2	± 0.02
− 5	_____	_____	± 0.2	± 0.02
− 3	_____	_____	± 0.2	± 0.02
− 1	_____	_____	± 0.2	± 0.02
+ 1	_____	_____	± 0.2	± 0.03
+ 3	_____	_____	± 0.2	± 0.03
- 5	_____	_____	± 0.5	± 0.03

HP 8753E Performance Test Record (4 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 4. Test Port Output Power Range and Linearity (continued)

Test Settings	Results Measured (dB)	Power Level Linearity (dB)	Specification (dB)	Measurement Uncertainty (dB)
+ 7	_____	_____	± 0.5	± 0.03
+ 8	_____	_____	± 0.5	± 0.03
+ 9	_____	_____	± 0.5	± 0.03
+ 10	_____	_____	± 0.5	± 0.03
CW Frequency = 3 GHz				
− 15	_____	_____	± 0.2	± 0.03
− 13	_____	_____	± 0.2	± 0.03
− 11	_____	_____	± 0.2	± 0.03
− 9	_____	_____	± 0.2	± 0.02
− 7	_____	_____	± 0.2	± 0.02
− 5	_____	_____	± 0.2	± 0.02
− 3	_____	_____	± 0.2	± 0.02
− 1	_____	_____	± 0.2	± 0.02
+ 1	_____	_____	± 0.2	± 0.03
+ 3	_____	_____	± 0.2	± 0.03
+ 5	_____	_____	± 0.5	± 0.03
+ 7	_____	_____	± 0.5	± 0.03
+ 8	_____	_____	± 0.5	± 0.03
+ 9	_____	_____	± 0.5	± 0.03
+ 10	_____	_____	± 0.5	± 0.03

HP 8753E Performance Test Record (5 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▸▸ 5. Minimum R Channel Level

CW Frequency	Specification (dB)	Test Port Power	Measurement Uncertainty (dB)
300 kHz	< −35	_____	± 1.0
3.29 MHz	< −35	_____	± 1.0
3.31 MHz	< −35	_____	± 1.0
15.90 MHz	< −35	_____	± 1.0
16.10 MHz	< −35	_____	± 1.0
30.90 MHz	< −35	_____	± 1.0
31.10 MHz	< −35	_____	± 1.0
1.6069 GHz	< −35	_____	± 1.0
1.6071 GHz	< −35	_____	± 1.0
3.000 GHz	< −35	_____	± 1.0

▸▸ 6. Test Port Input Noise Floor Level

Frequency Range	Test Port	IF Bandwidth	Specification (dBm)	Calculated Value	Measurement Uncertainty
300 kHz - 3 GHz	Port 1	3 kHz	− 82	_____	N/A
300 kHz - 3 GHz	Port 1	10 Hz	− 102	_____	N/A
300 kHz - 3 GHz	Port 2	10 Hz	− 102	_____	N/A
300 kHz - 3 GHz	Port 2	3 kHz	− 82	_____	N/A

HP 8753E Performance Test Record (6 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 7. Test Port Input Frequency Response

Frequency Range	Test Port	Specification (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
300 kHz—3 GHz	Port 2	± 1	_____	0.47
300 kHz—3 GHz	Port 1	± 1	_____	0.47

▶▶ 8. Test Port Crosstalk

Test Settings	Specification (dB)	Measured Value (dB)	Measurement Uncertainty
Crosstalk to Test Port 2 300 kHz—3 GHz	< −100	_____	N/A
Crosstalk to Test Port 1 300 kHz—3 GHz	< −100	_____	N/A

HP 8753E Performance Test Record (7 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 9. Calibration Coefficients

Test Description	Frequency Range	Spec. (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
Forward Direction				
Directivity	300 kHz - 1.3 GHz	≥ 35	_____	± 0.9
Directivity	1.3 GHz - 3 GHz	≥ 30	_____	± 0.8
Forward Direction				
Source Match	300 kHz - 1.3 GHz	≥ 16	_____	± 0.2
Source Match	1.3 GHz - 3 GHz	≥ 16	_____	± 0.2
Forward Direction				
Trans. Tracking	300 kHz - 1.3 GHz	± 1.5	_____	± 0.006
Trans. Tracking	1.3 GHz - 3 GHz	± 1.5	_____	± 0.009
Forward Direction				
Refl. Tracking	300 kHz - 1.3 GHz	± 1.5	_____	± 0.001
Refl. Tracking	1.3 GHz - 3 GHz	± 1.5	_____	± 0.005
Reverse Direction				
Load Match	300 kHz - 1.3 GHz	≥ 18	_____	± 0.1
Load Match	1.3 GHz - 3 GHz	≥ 16	_____	± 0.2

HP 8753E Performance Test Record (8 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 9. Calibration Coefficients (continued)

Test Description	Frequency Range	Spec. (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
Reverse Direction				
Trans. Tracking	300 kHz - 1.3 GHz	± 1.5	_____	± 0.006
Trans. Tracking	1.3 GHz - 3 GHz	± 1.5	_____	± 0.009
Forward Direction				
Load Match	300 kHz - 1.3 GHz	≥ 18	_____	± 0.1
Load Match	1.3 GHz - 3 GHz	≥ 16	_____	± 0.2
Reverse Direction				
Directivity	300 kHz - 1.3 GHz	≥ 35	_____	± 0.9
Directivity	1.3 GHz - 3 GHz	≥ 30	_____	± 0.8
Reverse Direction				
Source Match	300 kHz - 1.3 GHz	≥ 16	_____	± 0.2
Source Match	1.3 GHz - 3 GHz	≥ 16	_____	± 0.2
Reverse Direction				
Refl. Tracking	300 kHz - 1.3 GHz	± 1.5	_____	± 0.001
Refl. Tracking	1.3 GHz - 3 GHz	± 1.5	_____	± 0.005

HP 8753E Performance Test Record (9 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 10. System Trace Noise

CW Frequency (GHz)	Ratio	Specification	Measured Value	Measurement Uncertainty
3	A/R	< 0.006 dB rms	_____	±0.001 dB
3	A/R	< 0.038° rms	_____	±0.01°
3	B/R	< 0.006 dB rms	_____	±0.001 dB
3	B/R	< 0.038° rms	_____	±0.01°

▶▶ 12. Test Port Input Impedance

Frequency Range	Test Port	Return Loss (dB)	Specification (dB)	Measurement Uncertainty (dB)
300 kHz—1.3 GHz	Port 2	_____	≥ 18	± 1.5
1.3 GHz—3 GHz	Port 2	_____	≥ 16	± 1.5
300 kHz—1.3 GHz	Port 1	_____	≥ 18	± 1.5
1.3 GHz—3 GHz	Port 1	_____	≥ 16	± 1.5

HP 8753E Performance Test Record (10 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ **13. Test Port Receiver Magnitude Dynamic Accuracy**

		G	F	|G – F|		
Test Port Input Power (dBm)	**8496A Attn. (dB)**	**Test Port Measurement (dB)**	**Expected Measurement (corrected) (dB)**	**Dynamic Accuracy (Calculated)**	**Spec. (dB)**	**Meas. Uncer. (dB)**
Test Port 2						
– 10	0	_____	_____	_____	≤ 0.033	± 0.008
– 20 (Ref)	10	_____	0.000	_____	≤ 0.020	± 0.008
– 30	20	_____	_____	_____	≤ 0.031	± 0.008
– 40	30	_____	_____	_____	≤ 0.042	± 0.008
– 50	40	_____	_____	_____	≤ 0.057	± 0.008
– 60	50	_____	_____	_____	≤ 0.098	± 0.017
– 70	60	_____	_____	_____	≤ 0.247	± 0.017
– 80	70	_____	_____	_____	≤ 0.725	± 0.017
– 90	80	_____	_____	_____	≤ 2.097	± 0.017
– 100	90	_____	_____	_____	≤ 5.399	± 0.027
Test Port 1						
– 10	0	_____	_____	_____	≤ 0.033	± 0.008
– 20 (Ref)	10	_____	0.000	_____	≤ 0.020	± 0.008
– 30	20	_____	_____	_____	≤ 0.031	± 0.008
– 40	30	_____	_____	_____	≤ 0.042	± 0.008
– 50	40	_____	_____	_____	≤ 0.057	± 0.008
– 60	50	_____	_____	_____	≤ 0.098	± 0.017
– 70	60	_____	_____	_____	≤ 0.247	± 0.017
– 80	70	_____	_____	_____	≤ 0.725	± 0.017
– 90	80	_____	_____	_____	≤ 2.097	± 0.017
– 100	90	_____	_____	_____	≤ 5.399	± 0.027

HP 8753E Performance Test Record (11 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 14. Test Port Receiver Magnitude Compression

CW Frequency	Test Port	Measured Value (dB)	Specification (dB)	Measurement Uncertainty
50 MHz	Port 2	_____	≤ 0.45	N/A
1 GHz	Port 2	_____	≤ 0.45	N/A
2 GHz	Port 2	_____	≤ 0.45	N/A
3 GHz	Port 2	_____	≤ 0.45	N/A
50 MHz	Port 1	_____	≤ 0.45	N/A
1 GHz	Port 1	_____	≤ 0.45	N/A
2 GHz	Port 1	_____	≤ 0.45	N/A
3 GHz	Port 1	_____	≤ 0.45	N/A

▶▶ 15. Test Port Receiver Phase Compression

CW Frequency	Test Port	Measured Value (degrees)	Specification (degrees)	Measurement Uncertainty
50 MHz	Port 2	_____	≤ 6°	N/A
1 GHz	Port 2	_____	≤ 6°	N/A
2 GHz	Port 2	_____	≤ 6°	N/A
3 GHz	Port 2	_____	≤ 6°	N/A
50 MHz	Port 1	_____	≤ 6°	N/A
1 GHz	Port 1	_____	≤ 6°	N/A
2 GHz	Port 1	_____	≤ 6°	N/A
3 GHz	Port 1	_____	≤ 6°	N/A

HP 8753E Performance Test Record (12 of 12)
For 30 kHz—3 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 16. Test Port Output/Input Harmonics (Option 002 without Option 006)

Test Description	Specification (dBc)	Measurement Value (dBc)	Measurement Uncertainty (dB)
Test Port Output Harmonics			
2nd	≤ 25	_____	± 1.5
3rd	≤ 25	_____	± 1.5
Port 1 Input Harmonics			
2nd	≤ 15	_____	± 1.5
3rd	≤ 30	_____	± 1.5
Port 2 Input Harmonics			
2nd	≤ 15	_____	± 1.5
3rd	≤ 30	_____	± 1.5

Performance Test Record

For Analyzers with a Frequency Range of 30 kHz to 6 GHz

Note See the previous "Performance Test Record" section if your analyzer frequency range is from 30 kHz to 3 GHz.

HP 8753E Performance Test Record (1 of 14)

Calibration Lab Address:

Report Number _____

Date _____

_____ Last Calibration Date _____

_____ Customer's Name _____

_____ Performed by _____

Model HP 8753E Option 006

Serial No. _____ Option(s) _____

Firmware Revision _____

Ambient Temperature _____° C Relative Humidity _____%

Test Equipment Used:

Description	Model Number	Trace Number	Cal Due Date
Frequency Counter			
Power Meter			
Power Sensor			
Calibration Kit			
Verification Kit			

Notes/Comments: _____

_____

_____

HP 8753E Performance Test Record (2 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 1. Test Port Output Frequency Range and Accuracy

Test Frequencies (MHz)	Min. (MHz)	Results Measured (MHz)	Max. (MHz)	Measurement Uncertainty (MHz)
0.03	0.029 999 7	_____	0.030 000 3	± 0.000 000 050
0.3	0.299 997	_____	0.300 003	± 0.000 000 520
5.0	4.999 950	_____	5.000 050	± 0.000 009
16.0	15.999 840	_____	16.000 160	± 0.000 028
31.0	30.999 690	_____	31.000 310	± 0.000 054
60.999 999	60.999 390	_____	61.000 610	± 0.000 105
121.0	120.998 790	_____	121.001 210	± 0.000 207
180.0	179.998 200	_____	180.001 800	± 0.000 307
310.0	309.995 900	_____	310.003 100	± 0.000 528
700.0	699.930 000	_____	700.007 000	± 0.001 192
1 300.0	1 299.987	_____	1 300.013	± 0.002 212
2 000.0	1 999.980	_____	2 000.020	± 0.003 403
3 000.0	2 999.970	_____	3 000.030	± 0.005 104
4.0	3.999 960	_____	4.000 040	± 0.006 805
5.0	4.999 950	_____	5.000 050	± 0.008 506
6.0	5.999 940	_____	6.000 060	± 0.010 207

HP 8753E Performance Test Record (3 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 2. External Source Mode Frequency Range

Test Frequencies (GHz)	Result
0.010	_____
0.020	_____
0.100	_____
1.000	_____
2.000	_____
3.000	_____
4.000	_____
5.000	_____
6.000	_____

▶▶ 3. Test Port Output Power Accuracy

Test Frequency	Test Port Output Power (dBm)	Specification (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
300 kHz	0	± 1	_____	± 0.47
20 MHz	0	± 1	_____	± 0.25
50 MHz	0	± 1	_____	± 0.12
100 MHz	0	± 1	_____	± 0.12
200 MHz	0	± 1	_____	± 0.12
500 MHz	0	± 1	_____	± 0.12
1 GHz	0	± 1	_____	± 0.12
2 GHz	0	± 1	_____	± 0.15
3 GHz	0	± 1	_____	± 0.15
4 GHz	0	± 1	_____	± 0.17
5 GHz	0	± 1	_____	± 0.17
6 GHz	0	± 1	_____	± 0.17

HP 8753E Performance Test Record (4 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 4. Test Port Output Power Range and Linearity

Test Settings	Results Measured (dB)	Power Level Linearity (dB)	Specification (dB)	Meas. Uncert. (dB)
CW Frequency = 300 kHz				
− 15	_____	_____	± 0.2	± 0.03
− 13	_____	_____	± 0.2	± 0.03
− 11	_____	_____	± 0.2	± 0.03
− 9	_____	_____	± 0.2	± 0.02
− 7	_____	_____	± 0.2	± 0.02
− 5	_____	_____	± 0.2	± 0.02
− 3	_____	_____	± 0.2	± 0.02
− 1	_____	_____	± 0.2	± 0.02
+ 1	_____	_____	± 0.2	± 0.03
+ 3	_____	_____	± 0.2	± 0.03
− 5	_____	_____	± 0.5	± 0.03
+ 7	_____	_____	± 0.5	± 0.03
+ 8	_____	_____	± 0.5	± 0.03
+ 9	_____	_____	± 0.5	± 0.03
− 10	_____	_____	± 0.5	± 0.03
CW Frequency = 3 GHz				
− 15	_____	_____	± 0.2	± 0.03
− 13	_____	_____	± 0.2	± 0.03
− 11	_____	_____	± 0.2	± 0.03
− 9	_____	_____	± 0.2	± 0.02
− 7	_____	_____	± 0.2	± 0.02
− 5	_____	_____	± 0.2	± 0.02
− 3	_____	_____	± 0.2	± 0.02
− 1	_____	_____	± 0.2	± 0.02
+ 1	_____	_____	± 0.2	± 0.03
+ 3	_____	_____	± 0.2	± 0.03
+ 5	_____	_____	± 0.5	± 0.03

HP 8753E Performance Test Record (5 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 4. Test Port Output Power Range and Linearity (continued)

Test Settings	Results Measured (dB)	Power Level Linearity (dB)	Specification (dB)	Meas. Uncert. (dB)
+ 7	_____	_____	± 0.5	± 0.03
+ 8	_____	_____	± 0.5	± 0.03
+ 9	_____	_____	± 0.5	± 0.03
+ 10	_____	_____	± 0.5	± 0.03
CW Frequency = 6 GHz				
− 15	_____	_____	± 0.2	± 0.03
− 13	_____	_____	± 0.2	± 0.03
− 11	_____	_____	± 0.2	± 0.03
− 9	_____	_____	± 0.2	± 0.03
− 7	_____	_____	± 0.2	± 0.02
− 5	_____	_____	± 0.2	± 0.02
− 3	_____	_____	± 0.2	± 0.02
− 1	_____	_____	± 0.2	± 0.02
+ 1	_____	_____	± 0.2	± 0.02
+ 3	_____	_____	± 0.2	± 0.03
+ 5	_____	_____	± 0.5	± 0.03
+ 7	_____	_____	± 0.5	± 0.03
+ 8	_____	_____	± 0.5	± 0.03
+ 9	_____	_____	± 0.5	± 0.03
+ 10	_____	_____	± 0.5	± 0.03

HP 8753E Performance Test Record (6 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 5. Minimum R Channel Level

CW Frequency	Specification (dB)	Test Port Power	Measurement Uncertainty (dB)
300 kHz	< −35	_____	± 1.0
3.29 MHz	< −35	_____	± 1.0
3.31 MHz	< −35	_____	± 1.0
15.90 MHz	< −35	_____	± 1.0
16.10 MHz	< −35	_____	± 1.0
30.90 MHz	< −35	_____	± 1.0
31.10 MHz	< −35	_____	± 1.0
1.6069 GHz	< −35	_____	± 1.0
1.6071 GHz	< −35	_____	± 1.0
3.000 GHz	< −35	_____	± 2.0
4.000 GHz	< −30	_____	± 2.0
5.000 GHz	< −30	_____	± 2.0
6.000 GHz	< −30	_____	± 2.0

▶▶ 6. Test Port Input Noise Floor Level

Frequency Range	Test Port	IF Bandwidth	Specification (dBm)	Calculated Value	Measurement Uncertainty
300 kHz—3 GHz	Port 1	3 kHz	− 82	_____	N/A
300 kHz—3 GHz	Port 1	10 Hz	− 102	_____	N/A
300 kHz—3 GHz	Port 2	10 Hz	− 102	_____	N/A
300 kHz—3 GHz	Port 2	3 kHz	− 82	_____	N/A
3 GHz—6 GHz	Port 2	3 kHz	− 77	_____	N/A
3 GHz—6 GHz	Port 2	10 Hz	− 97	_____	N/A
3 GHz—6 GHz	Port 1	10 Hz	− 97	_____	N/A
3 GHz—6 GHz	Port 1	3 kHz	− 77	_____	N/A

HP 8753E Performance Test Record (7 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006** **Serial Number** _____	**Report Number** _____ **Date** _____

▶▶ 7. Test Port Input Frequency Response

Frequency Range	Test Port	Specification (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
300 kHz—3 GHz	Port 2	± 1	_____	0.47
300 kHz—3 GHz	Port 1	± 1	_____	0.47
3 GHz—6 GHz	Port 1	± 2	_____	0.17
3 GHz—6 GHz	Port 2	± 2	_____	0.17

▶▶ 8. Test Port Crosstalk

Test Settings	Specification (dB)	Measured Value (dB)	Measurement Uncertainty
Crosstalk to Test Port 2 300 kHz—3 GHz	< −100	_____	N/A
Crosstalk to Test Port 1 300 kHz—3 GHz	< −100	_____	N/A
Crosstalk to Test Port 1 3 GHz—6 GHz	< −90	_____	N/A
Crosstalk to Test Port 2 3 GHz—6 GHz	< −90	_____	N/A

HP 8753E Performance Test Record (8 of 14)
For 30 kHz—6 GHz Analyzers

Hewlett-Packard Company **Model HP 8753E Option 006**	**Report Number** _____
Serial Number _____	**Date** _____

▶▶ 9. Calibration Coefficients

Test Description	Frequency Range	Spec. (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
Forward Direction				
Directivity	300 kHz—1.3 GHz	≥ 35	_____	± 0.9
Directivity	1.3 GHz—3 GHz	≥ 30	_____	± 0.8
Directivity	3 GHz—6 GHz	≥ 25	_____	± 0.8
Forward Direction				
Source Match	300 kHz—1.3 GHz	≥ 16	_____	± 0.2
Source Match	1.3 GHz—3 GHz	≥ 16	_____	± 0.2
Source Match	3 GHz—6 GHz	≥ 14	_____	± 0.3
Forward Direction				
Trans. Tracking	300 kHz—1.3 GHz	± 1.5	_____	± 0.006
Trans. Tracking	1.3 GHz—3 GHz	± 1.5	_____	± 0.009
Trans. Tracking	3 GHz—6 GHz	± 2.5	_____	± 0.021
Forward Direction				
Refl. Tracking	300 kHz—1.3 GHz	± 1.5	_____	± 0.001
Refl. Tracking	1.3 GHz—3 GHz	± 1.5	_____	± 0.005
Refl. Tracking	3 GHz—6 GHz	± 2.5	_____	± 0.020
Reverse Direction				
Load Match	300 kHz—1.3 GHz	≥ 18	_____	± 0.1
Load Match	1.3 GHz—3 GHz	≥ 16	_____	± 0.2
Load Match	3 GHz—6 GHz	≥ 14	_____	± 0.2

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▶▶ 9. Calibration Coefficients (continued)

Test Description	Frequency Range	Spec. (dB)	Measured Value (dB)	Measurement Uncertainty (dB)
Reverse Direction				
Trans. Tracking	300 kHz—1.3 GHz	± 1.5	_____	± 0.006
Trans. Tracking	1.3 GHz—3 GHz	± 1.5	_____	± 0.009
Trans. Tracking	3 GHz—6 GHz	± 2.5	_____	± 0.021
Forward Direction				
Load Match	300 kHz—1.3 GHz	≥ 18	_____	± 0.1
Load Match	1.3 GHz—3 GHz	≥ 16	_____	± 0.2
Load Match	3 GHz—6 GHz	≥ 14	_____	± 0.2
Reverse Direction				
Directivity	300 kHz—1.3 GHz	≥ 35	_____	± 0.9
Directivity	1.3 GHz—3 GHz	≥ 30	_____	± 0.8
Directivity	3 GHz—6 GHz	≥ 25	_____	± 0.8
Reverse Direction				
Source Match	300 kHz - 1.3 GHz	≥ 16	_____	± 0.2
Source Match	1.3 GHz - 3 GHz	≥ 16	_____	± 0.2
Source Match	3 GHz - 6 GHz	≥ 14	_____	± 0.3
Reverse Direction				
Refl. Tracking	300 kHz - 1.3 GHz	± 1.5	_____	± 0.001
Refl. Tracking	1.3 GHz - 3 GHz	± 1.5	_____	± 0.005
Refl. Tracking	3 GHz - 6 GHz	± 2.5	_____	± 0.020

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▶▶ 11. System Trace Noise

Frequency (GHz)	Ratio	Measured Value	Specification	Measurement Uncertainty
3	A/R (Magnitude)	_____	≤ 0.006 dB rms	± 0.001 dB
6	A/R (Magnitude)	_____	≤ 0.010 dB rms	± 0.001 dB
6	A/R (Phase)	_____	≤ 0.070° rms	± 0.01 °
3	A/R (Phase)	_____	≤ 0.038° rms	± 0.01 °
3	B/R (Magnitude)	_____	≤ 0.006 dB rms	± 0.001 dB
6	B/R (Magnitude)	_____	≤ 0.010 dB rms	± 0.001 dB
6	B/R (Phase)	_____	≤ 0.070° rms	± 0.01 °
3	B/R (Phase)	_____	≤ 0.038° rms	± 0.01 °

▶▶ 12. Test Port Input Impedance

Test Description	Test Port	Return Loss (dB)	Specification (dB)	Measurement Uncertainty (dB)
300 kHz—1.3 GHz	Port 2	_____	≥ 18	± 1.5
1.3 GHz—3 GHz	Port 2	_____	≥ 16	± 1.5
3 GHz—6 GHz	Port 2	_____	≥ 14	± 1.0
300 kHz—1.3 GHz	Port 1	_____	≥ 18	± 1.5
1.3 GHz—3 GHz	Port 1	_____	≥ 16	± 1.5
3 GHz—6 GHz	Port 1	_____	≥ 14	± 1.0

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▶▶ 13. Test Port Receiver Magnitude Dynamic Accuracy

		G	F	|G − F|		
Test Port Input Power (dBm)	**8496A Attn. (dB)**	**Test Port Measurement (dB)**	**Expected Measurement (corrected) (dB)**	**Dynamic Accuracy (Calculated)**	**Spec. (dB)**	**Meas. Uncer. (dB)**
Test Port 2						
− 10	0	_____	_____	_____	≤ 0.033	± 0.008
− 20 (Ref)	10	_____	0.000	_____	≤ 0.020	± 0.008
− 30	20	_____	_____	_____	≤ 0.031	± 0.008
− 40	30	_____	_____	_____	≤ 0.042	± 0.008
− 50	40	_____	_____	_____	≤ 0.057	± 0.008
− 60	50	_____	_____	_____	≤ 0.098	± 0.017
− 70	60	_____	_____	_____	≤ 0.247	± 0.017
− 80	70	_____	_____	_____	≤ 0.725	± 0.017
− 90	80	_____	_____	_____	≤ 2.097	± 0.017
− 100	90	_____	_____	_____	≤ 5.399	± 0.027
Test Port 1						
− 10	0	_____	_____	_____	≤ 0.033	± 0.008
− 20 (Ref)	10	_____	0.000	_____	≤ 0.020	± 0.008
− 30	20	_____	_____	_____	≤ 0.031	± 0.008
− 40	30	_____	_____	_____	≤ 0.042	± 0.008
− 50	40	_____	_____	_____	≤ 0.057	± 0.008
− 60	50	_____	_____	_____	≤ 0.098	± 0.017
− 70	60	_____	_____	_____	≤ 0.247	± 0.017
− 80	70	_____	_____	_____	≤ 0.725	± 0.017
− 90	80	_____	_____	_____	≤ 2.097	± 0.017
− 100	90	_____	_____	_____	≤ 5.399	± 0.027

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▶▶ 14. Test Port Receiver Magnitude Compression

CW Frequency	Test Port	Measured Value (dB)	Specification (dB)	Measurement Uncertainty
50 MHz	Port 2	_____	≤ 0.45	N/A
1 GHz	Port 2	_____	≤ 0.45	N/A
2 GHz	Port 2	_____	≤ 0.45	N/A
3 GHz	Port 2	_____	≤ 0.45	N/A
4 GHz	Port 2	_____	≤ 0.80	N/A
5 GHz	Port 2	_____	≤ 0.80	N/A
6 GHz	Port 2	_____	≤ 0.80	N/A
50 MHz	Port 1	_____	≤ 0.45	N/A
1 GHz	Port 1	_____	≤ 0.45	N/A
2 GHz	Port 1	_____	≤ 0.45	N/A
3 GHz	Port 1	_____	≤ 0.45	N/A
4 GHz	Port 1	_____	≤ 0.80	N/A
5 GHz	Port 1	_____	≤ 0.80	N/A
6 GHz	Port 1	_____	≤ 0.80	N/A

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▶▶ 15. Test Port Receiver Phase Compression

CW Frequency	Test Port	Measured Value (degrees)	Specification (degrees)	Measurement Uncertainty
50 MHz	Port 2	_____	≤ 6°	N/A
1 GHz	Port 2	_____	≤ 6°	N/A
2 GHz	Port 2	_____	≤ 6°	N/A
3 GHz	Port 2	_____	≤ 6°	N/A
4 GHz	Port 2	_____	≤ 7.5°	N/A
5 GHz	Port 2	_____	≤ 7.5°	N/A
6 GHz	Port 2	_____	≤ 7.5°	N/A
50 MHz	Port 1	_____	≤ 6°	N/A
1 GHz	Port 1	_____	≤ 6°	N/A
2 GHz	Port 1	_____	≤ 6°	N/A
3 GHz	Port 1	_____	≤ 6°	N/A
4 GHz	Port 1	_____	≤ 7.5°	N/A
5 GHz	Port 1	_____	≤ 7.5°	N/A
6 GHz	Port 1	_____	≤ 7.5°	N/A

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▶▶ 17. Output/Input Test Port Harmonics (Option 002 only)

Test Description	Specification (dBc)	Measurement Value (dBc)	Measurement Uncertainty (dB)
Test Port Output Harmonics			
2nd	≤ 25	_____	± 1.5
3rd	≤ 25	_____	± 1.5
Port 1 Input Harmonics			
2nd	≤ 15	_____	± 1.5
3rd	≤ 30	_____	± 1.5
Port 2 Input Harmonics			
2nd	≤ 15	_____	± 1.5
3rd	≤ 30	_____	± 1.5

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