Installation Note

8753D and 8753D Option 011 Network Analyzers Firmware Upgrade Kit Revision 6.14 Kit Number 08753-60185

Agilent Technologies

Part Number 08753-90393

Printed in USA December 1997

Hewlett-Packard to Agilent Technologies Transition

This documentation supports a product that previously shipped under the Hewlett-Packard company brand name. The brand name has now been changed to Agilent Technologies. The two products are functionally identical, only our name has changed. The document still includes references to Hewlett-Packard products, some of which have been transitioned to Agilent Technologies.

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Installation Note

HP 8753D and HP 8753D Option 011 Network Analyzers
Firmware Upgrade Kit Revision 6.14
Kit Number 08753-60185

HP Part Number 08753-90393 Supersedes December 1997
Printed in USA December 8, 1997

PRODUCT AFFECTED:	HP 8753D network analyzer HP 8753D Option 011 network analyzer
SERIAL NUMBERS:	All serials
TO BE PERFORMED BY:	[X] HP Service Center [X] HP personnel on-site
ESTIMATED INSTALLATION TIME:	20 minutes (add 2 hours if power supply modification is necessary)
ESTIMATED VERIFICATION TIME:	2 hours (not included in the kit price)

Description

This note contains the information required to update the firmware in the HP 8753D and HP 8753D Option 011 network analyzers. The EPROMs can be installed using the following procedure. (There are separate procedures for the HP 8753D and the HP 8753D Option 011.)

Caution This installation note is intended for HP personnel only. The analyzer warranty will be *VOID* if this firmware installation is performed by anyone other than HP personnel.

Installation Kit Parts List

Table 1. Firmware Upgrade Kit Contents (HP Part Number 08753-60185)

Qty	Description	Part Number
1	A9U4 EPROM	08753-80192
1	A9U5 EPROM	08753-80193
1	A9U24 EPROM	08753-80194
1	A9U25 EPROM	08753-80195
1	Installation note	08753-90393
1	Electrolytic capacitor	0180-4316

Caution The capacitor included in this upgrade kit may need to be installed to ensure correct display operation. To determine if you need to install the capacitor, refer to the section "Power Supply Modification," located later in this document.

Equipment and Tools Required

Table 2. Required Equipment and Tools for the 50 Ω HP 8753D

Item	Part/Model Number
Power meter	HP 437B or HP 438A
Power sensor	HP 8482A
24-in APC-7 cable (2)	8120-4779
HP-IB cable assembly	HP 10833A
APC-7 to type-N (f) adapter	85054-60031
3.5-inch floppy disk	HP 92192A (box of 10)
T-10 TORX screwdriver	
T-15 TORX screwdriver	
Medium flat-blade screwdriver	
Anti-static Wrist Strap	9300-1367
Anti-static Wrist Strap Cord	9300-0980
Static-Control Table Mat and Earth Ground Wire	9300-0797
Additional equipment required for the HP 8753D with Option 006	
Power sensor	HP 8481A

Table 3. Required Equipment and Tools for the 75 Ω HP 8753D

Item	Part/Model Number
Power meter	HP 437B or HP 438A
Power sensor	HP 8483A Option H03
24-in (75 Ω) type-N (m) to type-N (m) cable (2)	8120-2408
Adapter (75 Ω) type-N (f) to type-N (f)	1250-1529
HP-IB cable assembly	HP 10833A
3.5-inch floppy disk	HP 92192A (box of 10)
T-10 TORX screwdriver	
T-15 TORX screwdriver	
Medium flat-blade screwdriver	
Anti-static Wrist Strap	9300-1367
Anti-static Wrist Strap Cord	9300-0980
Static-Control Table Mat and Earth Ground Wire	9300-0797

Table 4. Required Equipment and Tools for the HP 8753D Option 011

Item	Part/Model Number
Power meter	HP 437B or HP 438A
Power sensor	HP 8482A
Power splitters (2)	HP 11667A Option 001
Cables (2)	HP 11500B
RF cable set	HP 11851B
HP-IB cable assembly	HP 10833A
Type-N (f) to type-N (f) adapter	1250-1472
Type-N (m) to type-N (m) adapter	1250-1475
20 dB attenuator	HP 8491A Option 020
3.5-inch floppy disk	HP 92192A (box of 10)
T-10 TORX screwdriver	
T-15 TORX screwdriver	
Medium flat-blade screwdriver	
Anti-static Wrist Strap	9300-1367
Anti-static Wrist Strap Cord	9300-0980
Static-Control Table Mat and Earth Ground Wire	9300-0797
Additional equipment required for the HP 8753D Option 011 with Option 006	
Power sensor	HP 8481A

Safety Considerations

Warning **Before you disassemble the instrument, turn the power switch OFF and unplug the instrument. Failure to unplug the instrument can result in personal injury.**

Caution Electrostatic discharge (ESD) can damage or destroy electronic components. All work on electronic assemblies should be performed at a static-safe workstation. Refer to the documentation that pertains to your instrument for information about static-safe workstations and ordering static-safe accessories.

Preliminary Operation Check for the HP 8753D

1. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (21) (x1) EXECUTE TEST.
2. Follow the displayed prompts for making the necessary connections.
3. Press CONTINUE.

   When the analyzer passes the test, it will display: PORT 1 Op Chk DONE.
4. Press RETURN TESTS (22) (x1) EXECUTE TEST.
5. Follow the displayed prompts for making the necessary connections.
6. Press CONTINUE.

   When the analyzer passes the test, it will display: PORT 2 Op Chk DONE.

Note If either check did not pass, the instrument must be adjusted or repaired before being upgraded. Notify the customer of the costs involved and obtain permission to proceed before doing so. Repairs are *not* part of the upgrade installation.

Installation Procedure for the HP 8753D

1. Put on the anti-static wrist strap that is connected to the anti-static mat and earth ground.
2. Record the instrument serial number and the firmware revision number.
3. Remove the power line cord from the analyzer.
4. Set the analyzer on its side.
5. Remove the two corner bumpers from the bottom of the instrument with the T-15 TORX screwdriver.
6. Loosen the captive screw on the bottom cover's back edge with the T-15 TORX screwdriver.
7. Slide the cover toward the rear of the instrument.
8. Carefully pry the EPROMs from their sockets on the A9 CPU board assembly with a flat blade screwdriver. The labels have the revision number and the reference designator printed on them. Their locations are shown in Figure 1. Although this operation requires moderate force, avoid bending the pins.

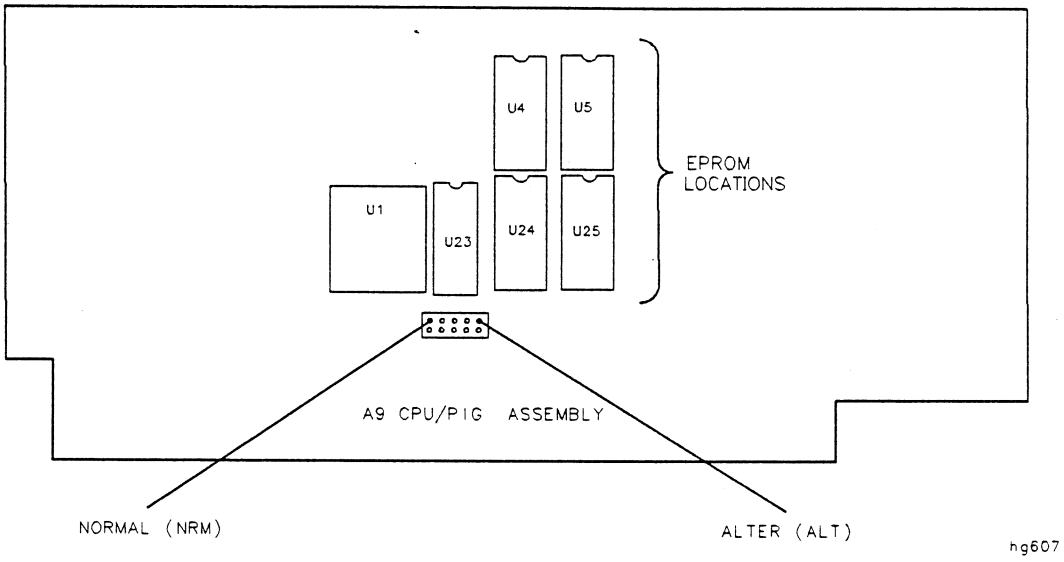

Figure 1. Component Location Diagram

9. Insert the EPROMs, provided in this kit, into the sockets. Refer to Figure 1 for correct placement and orientation. Visually confirm that all the pins of each EPROM are correctly seated in the socket and that the EPROMs have the correct revision.
10. Move the A9 CC jumper from the normal (NRM) operating position to the alternate (ALT) position as shown in Figure 1.

Caution The capacitor included in this upgrade kit may need to be installed to ensure correct display operation. To determine if you need to install the capacitor, refer to the section "Power Supply Modification," located later in this document.

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11. Reconnect the power line cord and then switch on the instrument. At the completion of the self-test, the displayed revision number should match the revision number on the EPROMs. If not, recheck all EPROMs for correct location, the correct insertion (no pins folded inside or outside sockets), and the correct revision number on the label.
12. Press (SYSTEM) SERVICE MENU PEEK/POKE RESET MEMORY (PRESET), then switch the instrument off and back on again.
13. Press (SYSTEM) SERVICE MENU PEEK/POKE PEEK/POKE ADDRESS (5243326) (x1) POKE (30) (x1). These key presses enable the power overrange/underrange feature.
14. To verify that the instrument is functioning correctly, press (PRESET) (SYSTEM) SERVICE MENU TESTS (0) (x1) EXECUTE TEST. When the test is complete, the analyzer should display:

    ALL INT PASS

    If it does not, refer to the *HP 8753D Network Analyzer Service Guide* for troubleshooting information.
15. Remove the power line cord from the analyzer.

16. Move the A9 CC jumper from the alternate (ALT) position to the normal (NRM) operating position as shown in Figure 1.
17. Reinstall the bottom cover and corner bumpers.
18. Determine if your analyzer requires adjustments:
    a. If you are upgrading the firmware from revision 5.30 or higher, you have completed the necessary procedures in this installation note.
    b. If you are upgrading the firmware from any revision lower than revision 5.30 (for example 5.24), continue with the following adjustment procedures.

Adjusting the HP 8753D Analyzer

After you have upgraded the firmware, perform the following procedures:

- Source Default Correction Constants
- Sampler Magnitude and Phase Correction Constants
- RF Output Power Correction Constants

Source Default Correction Constants for the HP 8753D (Test 44)

Warmup time: none

This internal adjustment test writes default correction constants for the source power accuracy.

1. Move the A9 CC jumper to the ALT position, as shown in Figure 1.
2. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (44) (x1). When the display shows: *Source Def, press EXECUTE TEST. Press YES at the query to alter the correction constants.

   The test is complete when the display shows: *Source Def DONE.

In Case of Difficulty

Refer to "Source Troubleshooting" in the *HP 8753D Network Analyzer Service Guide* if the message: *Source Def FAIL appears on the analyzer display.

Sampler Magnitude and Phase Correction Constants for the HP 8753D (Test 53)

Warmup time: 30 minutes

This adjustment procedure corrects the overall flatness of the microwave components that make up the analyzer receiver and signal separation sections. This adjustment is necessary for the HP 8753D to meet the published test port flatness specifications.

1. Press (PRESET) (LOCAL) SYSTEM CONTROLLER.
2. Press (LOCAL) SET ADDRESSES ADDRESS: P MTR/HPIB. The default power meter address is 13. Refer to the power meter manual as required to observe or change its HP-IB address.
3. Press POWER MTR: to toggle between the 438A/437 and 436A power meters. Choose the appropriate model number.

Note If you are using the HP 438A power meter, connect the HP 8482A power sensor to channel A, and the HP 8481A power sensor to channel B.

Power Sensor Calibration Factor Entry

4. Press (SYSTEM) SERVICE MENU TEST OPTIONS LOSS/SENSR LISTS CAL FACTOR SENSOR A to access the calibration factor menu for power sensor A (HP 8482A).
5. Build a table of up to twelve points (twelve frequencies with their calibration factors):
   a. Input a frequency value and then press the appropriate key ((G/n), (M/μ), or (k/m)).
   b. Enter the calibration factor percentage that corresponds to the frequency you entered.

   The cal factor and frequency values are found on the back of the sensor. If you make a mistake, press (←) and re-enter the correct value.

Note The following terms are part of the sensor calibration menu:

SEGMENT allows you to select a frequency point.

EDIT allows you to edit or change a previously entered value.

DELETE allows you to delete a point from the sensor cal factor table.

ADD allows you to add a point into the sensor cal factor table.

CLEAR LIST allows you to erase the entire sensor cal factor table.

DONE allows you to complete the points entry of the sensor cal factor table.

6. **For Option 006 Instruments Only:** Press CAL FACTOR SENSOR B to create a power sensor calibration table for power sensor B (HP 8481A), using the softkeys mentioned above.

Determine the Cable Insertion Loss for a 50 Ω HP 8753D

Note If your analyzer is 75 Ω, go to the next procedure, "Determine the Cable Insertion Loss for a 75 Ω HP 8753D."

7. Press (PRESET) (MEAS) Trans : FWD S21(B/R).
8. Press (CENTER) (1) (G/n) (SPAN) (50) (M/μ).
9. Press (CAL) CAL KIT SELECT CAL KIT CAL KIT : 7mm RETURN RETURN CALIBRATE MENU RESPONSE.
10. Connect the 24-inch APC-7 cable from Port 1 to Port 2 and press THRU.

    Press DONE : RESPONSE when the analyzer is done measuring the thru.
11. Press (SAVE/RECALL) SAVE STATE to save the calibration that you just made.
12. Make the connections as shown in Figure 2.

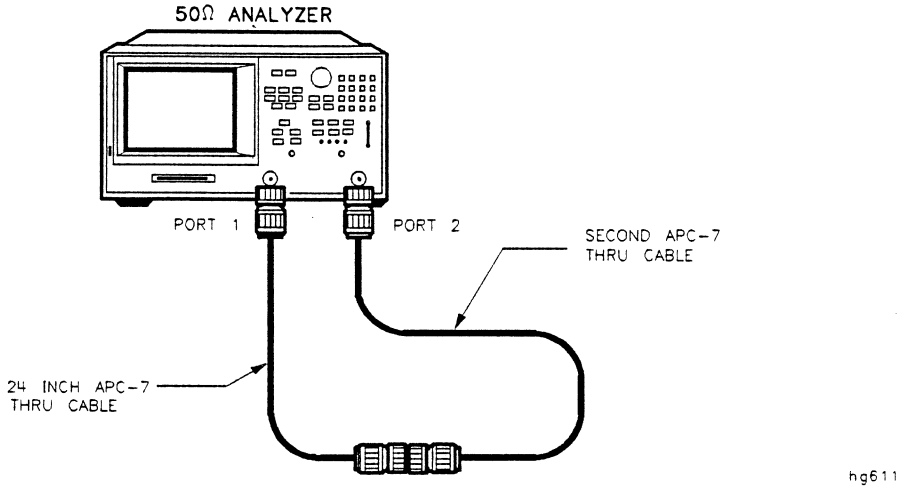

Figure 2. Connections for a 50 Ω Analyzer Insertion Loss Measurement

13. Press (SCALE REF) SCALE/DIV (.1) (MARKER) MARKER 1 (1) (G/n) (x1). Record the insertion loss of the second thru cable as shown in the upper-right corner of the analyzer display.

Determine the Cable Insertion Loss for a 75 Ω HP 8753D

14. Zero and calibrate the power meter and sensor.
15. Press (PRESET) (MENU) CW FREQ (1) (G/n).
16. Connect the HP 8483A power sensor to the analyzer Port 1 and press (REFERENCE) on the HP 437B power meter.
17. Connect the equipment as shown in Figure 3.

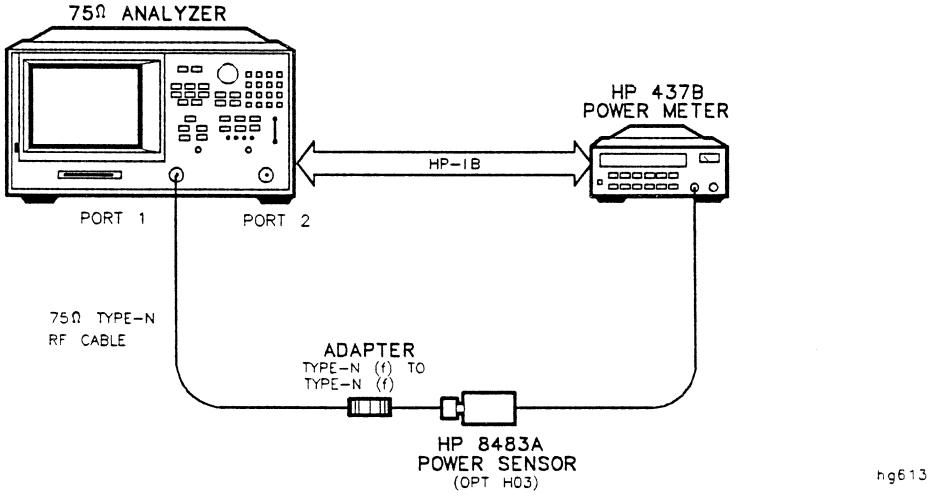

Figure 3. Connections for a 75 Ω Analyzer Insertion Loss Measurement

18. Record the power meter reading. This is the insertion loss of the RF cable.

Sampler Correction Constants Routine for a 50 Ω HP 8753D

Note If your analyzer is 75 Ω, go to the next procedure, "Sampler Correction Constants Routine for a 75 Ω HP 8753D."

19. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (53) (x1) EXECUTE TEST and answer YES at the prompt.
20. Using the APC-7 to type-N adapter, connect the HP 8482A power sensor to the analyzer Port 1, as shown in Figure 4, when the message: CONNECT <3 GHz SENSOR A TO PORT 1 appears. Press CONTINUE to start the test. This part of the test will take about 7 minutes.

    - If the message: Sampler Cor - FAIL appears on the analyzer display, check the following:

      a. The HP-IB address of your power meter is set at 13. Rerun this routine ("Sampler Correction Constants Routine").

      b. The HP 8482A power sensor is connected to Port 1. Rerun this routine ("Sampler Correction Constants Routine").

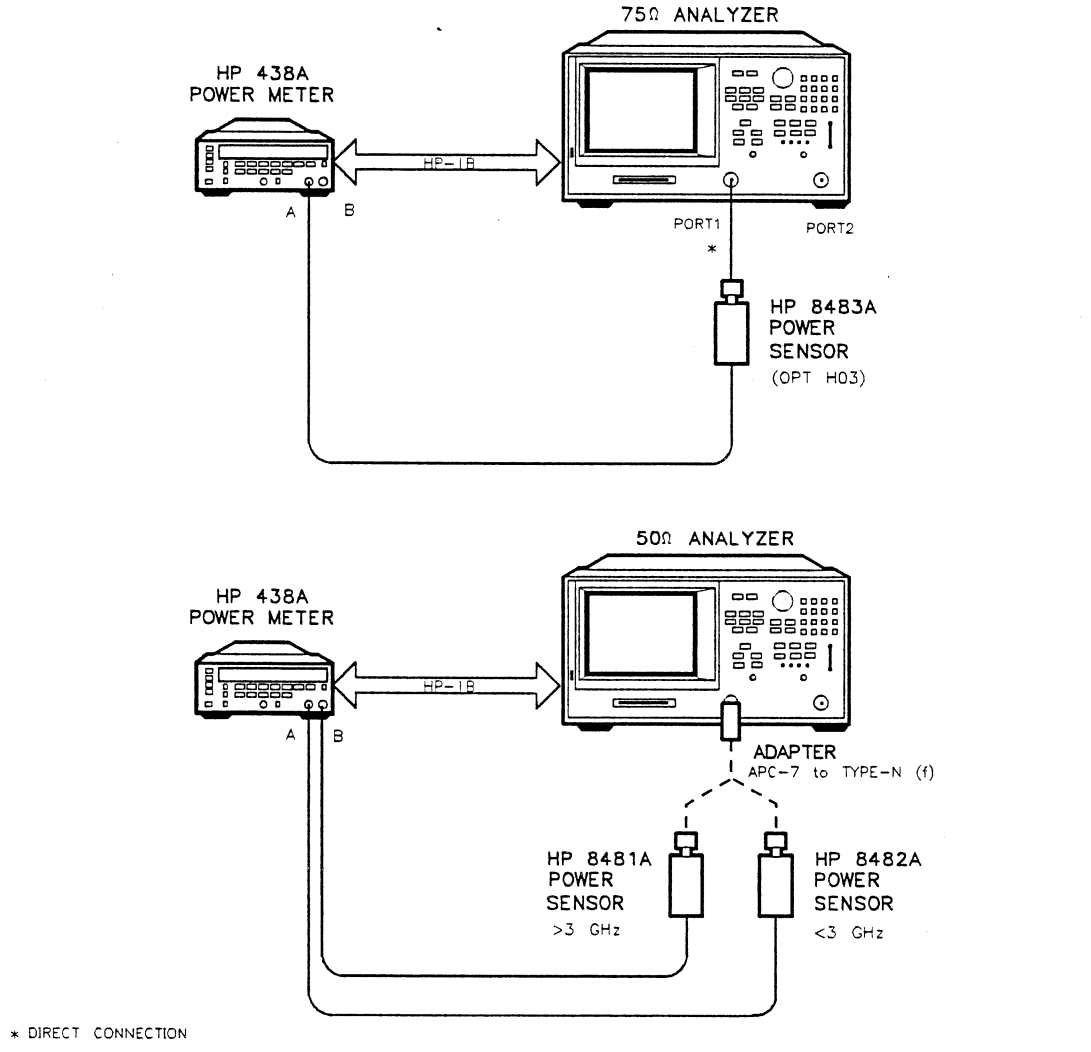

Figure 4. Connections for Sampler Correction Routine

21. **For Option 006 Instruments Only:** Using the APC-7 to type-N adapter, connect the HP 8481A power sensor to the analyzer Port 1, as shown in Figure 4, when the message: CONNECT 6 GHz SENSOR B TO PORT 1 appears. Press CONTINUE to start the test. This part of the test will take about 20 seconds.

22. Using the APC-7 to type-N adapter, connect the HP 8482A power sensor to the analyzer Port 2 when the message: CONNECT <3 GHz SENSOR A TO PORT 2 appears. Press CONTINUE to start the test. This part of the test will take about 10 minutes.

23. **For Option 006 Instruments Only:** Using the APC-7 to type-N adapter, connect the HP 8481A power sensor to the analyzer Port 2 when the message: CONNECT 6 GHz SENSOR TO PORT 2 appears. Press CONTINUE to start the test. This part of the test will take about 20 seconds.

24. Connect the second thru cable from Port 1 to Port 2 when the message: CONNECT PORT 1 TO PORT 2 appears. Press CONTINUE.

25. Enter the insertion loss of the second thru cable (determined in step 13) and press CONTINUE. For example, if the insertion loss of the thru cable at 1 GHz is found to be 0.25 dB, then press (.25) (x1).

26. When the analyzer completes the test, observe the display for the results:
    - If you see: Sampler Cor - DONE, the adjustment is done.
    - If you see: Sampler Cor - FAIL, it is necessary to adjust the sampler gain offset values, which are stored in EEPROM.
      a. Access the first address by pressing (SYSTEM) SERVICE MENU PEEK/POKE PEEK/POKE ADDRESS (5242936) (x1).
      b. Enter the new value at the accessed address by pressing POKE (46) (x1).
      c. Access the second address by pressing PEEK/POKE ADDRESS (5242940) (x1).
      d. Enter the new value at the accessed address by pressing POKE (46) (x1).
      e. Press (PRESET) for the analyzer to use the new values.
      f. Repeat the "Sampler Correction Constants Routine."

Note If the analyzer still displays: Sampler Cor - FAIL, refer to the manual adjustment in "Adjustments" located in the *HP 8753D Network Analyzer Service Guide.*

Sampler Correction Constants Routine for a 75 Ω HP 8753D

27. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (53) (x1) EXECUTE TEST and answer YES at the prompt.

28. Connect the HP 8483A power sensor to the analyzer Port 1, as shown in Figure 4, when the message: CONNECT <3 GHz SENSOR A TO PORT 1 appears. Press CONTINUE to start the test. This part of the test will take about 7 minutes.
    - If the message: Sampler Cor - FAIL appears on the analyzer display, check the following:
        a. The HP-IB address of your power meter is set at 13. Rerun this routine ("Sampler Correction Constants Routine").
        b. The HP 8483A power sensor is connected to Port 1. Rerun this routine ("Sampler Correction Constants Routine").
29. Connect the HP 8483A power sensor to the analyzer Port 2 when the message: CONNECT <3 GHz SENSOR A TO PORT 2 appears. Press CONTINUE to start the test. This part of the test will take about 10 minutes.
30. Connect the RF cable from Port 1 to Port 2 when the message: CONNECT PORT 1 TO PORT 2 appears. Press CONTINUE.
31. Enter the insertion loss of the RF cable (determined in step 18) and press CONTINUE. For example, if the insertion loss of the RF cable at 1 GHz is found to be 0.25 dB, then press (.25) (x1).
32. When the analyzer completes the test, observe the display for the results:
    - If you see: Sampler Cor - DONE, the adjustment is done.
    - If you see: Sampler Cor - FAIL, it is necessary to adjust the sampler gain offset values, which are stored in EEPROM.
        a. Access the first address by pressing (SYSTEM) SERVICE MENU PEEK/POKE PEEK/POKE ADDRESS (5242936) (x1).
        b. Enter the new value at the accessed address by pressing POKE (46) (x1).
        c. Access the second address by pressing PEEK/POKE ADDRESS (5242940) (x1).
        d. Enter the new value at the accessed address by pressing POKE (46) (x1).
        e. Press (PRESET) for the analyzer to use the new values.
        f. Repeat the "Sampler Correction Constants Routine."

Note If the analyzer still displays: Sampler Cor - FAIL, refer to the manual adjustment in "Adjustments" located in the *HP 8753D Network Analyzer Service Guide.*

RF Output Power Correction Constants for the HP 8753D (Test 47)

Warmup Time: 30 minutes

This procedure adjusts several correction constants that can improve the output power level accuracy of the internal source. They are related to the power level, power slope, power slope offset, and the ALC roll-off factors among others.

1. Press (PRESET) (LOCAL) SYSTEM CONTROLLER SET ADDRESSES ADDRESS: P MTR/HPIB to see the address at which the analyzer expects to find the power meter (the default address is 13). Refer to the power meter manual as required to observe or change its address.
2. Connect the equipment as shown in Figure 4.

Source Correction Routine for the HP 8753D

3. Press (SYSTEM) SERVICE MENU TESTS (47) (x1).
4. Press EXECUTE TEST and YES at the prompt to alter the correction constants.
5. Follow the instruction at the prompt and press CONTINUE.
6. When the analyzer completes the test, observe the display for the results:
   - If you see: DONE, the adjustment is done. Press (PRESET) and then move the A9 CC jumper back to its NRM (normal) operating position.
   - If you see: FAIL, re-run this routine in the following order:
     a. Press (PRESET).
     b. Repeat the "Source Default Correction Constants (Test 44)" procedure.
     c. Repeat the "RF Output Power Correction Constants (Test 47)" procedure.

Backup the New Correction Constants

The correction constants, that are unique to your instrument, are stored in EEPROM on the A9 controller assembly. By creating an EEPROM backup disk, you will have a copy of all the correction constant data should you need to replace or repair the A9 assembly.

7. Insert a 3.5-inch disk into the analyzer disk drive.
8. If the disk is not formatted, follow these steps:
   a. Press (SAVE/RECALL) FILE UTILITIES FORMAT DISK.
   b. Select the format type:
      - To format a LIF disk, select FORMAT:LIF.
      - To format a DOS disk, select FORMAT:DOS.
   c. Press FORMAT INT DISK and answer YES at the query.
9. Press (SYSTEM) SERVICE MENU SERVICE MODES MORE STORE EEPR ON (SAVE/RECALL) SELECT DISK INTERNAL DISK RETURN SAVE STATE.

Note The analyzer creates a default file: "FILE0". The filename appears in the upper-left corner of the display. The file type: "ISTATE(E)", indicates that the file is an instrument-state with EEPROM backup.

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10. Press FILE UTILITIES RENAME FILE ERASE TITLE. Use the front panel knob and the SELECT LETTER softkey (or an external keyboard) to rename the file "FILE0" to "N*12345*" where *12345* represents the last 5 digits of the instrument's serial number. (The first character in the filename must be a letter.) When you are finished renaming the file, press DONE.

11. Write the following information on the disk label:
    - Analyzer serial number
    - Today's date
    - "EEPROM Backup Disk"

Preliminary Operation Check for the HP 8753D Option 011

1. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (21) (x1) EXECUTE TEST.
2. Follow the displayed prompts for making the necessary connections.
3. Press CONTINUE.

   When the analyzer passes the test, it will display: R&A Op Chk DONE.
4. Press RETURN TESTS (22) (x1) EXECUTE TEST.
5. Follow the displayed prompts for making the necessary connections.
6. Press CONTINUE.

   When the analyzer passes the test, it will display: R&B Op Chk DONE.

Note If either check did not pass, the instrument must be adjusted or repaired before being upgraded. Notify the customer of the costs involved and obtain permission to proceed before doing so. Repairs are *not* part of the upgrade installation.

Installation Procedure for HP 8753D Option 011

1. Put on the anti-static wrist strap that is connected to the anti-static mat and earth ground.
2. Record the instrument serial number and the firmware revision number.
3. Remove the power line cord from the analyzer.
4. Set the analyzer on its side.
5. Remove the two corner bumpers from the bottom of the instrument with the T-15 TORX screwdriver.
6. Loosen the captive screw on the bottom cover's back edge with the T-15 TORX screwdriver.
7. Slide the cover toward the rear of the instrument.
8. Carefully pry the EPROMs from their sockets on the A9 CPU board assembly with a flat blade screwdriver. The labels have the revision number and the reference designator printed on them. Their locations are shown in Figure 5. Although this operation requires moderate force, avoid bending the pins.

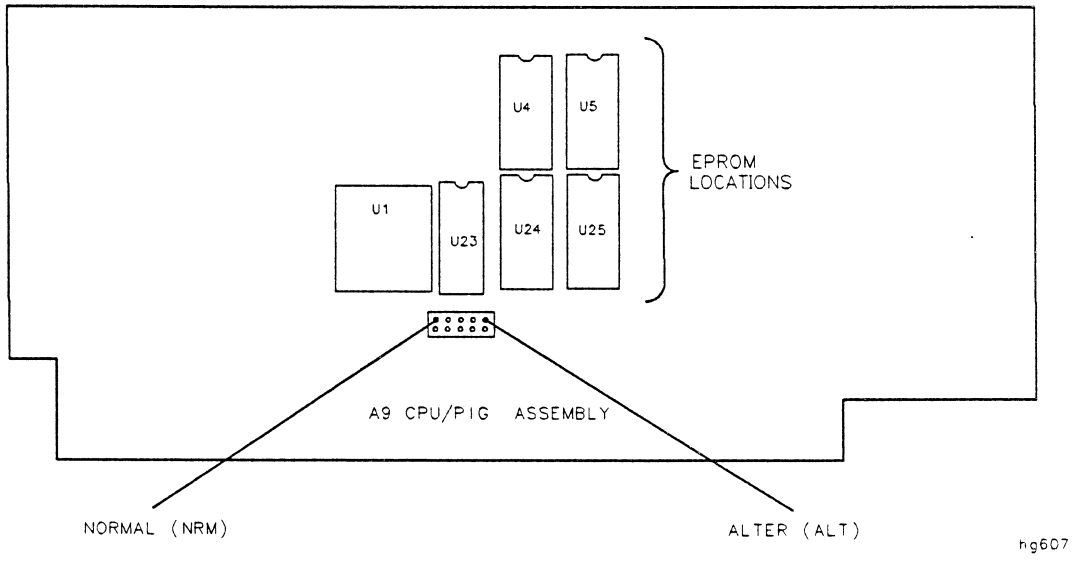

Figure 5. Component Location Diagram

9. Insert the EPROMs, provided in this kit, into the sockets. Refer to Figure 5 for correct placement and orientation. Visually confirm that all the pins of each EPROM are correctly seated in the socket and that the EPROMs have the correct revision.

Caution The capacitor included in this upgrade kit may need to be installed to ensure correct display operation. To determine if you need to install the capacitor, refer to the section "Power Supply Modification," located later in this document.

10. Reinstall the bottom cover and corner bumpers, reconnect the power line cord and switch on the instrument. At the completion of the self-test, the displayed revision number should match the revision number on the EPROMs. If not, recheck all EPROMs for correct location, the correct insertion (no pins folded inside or outside sockets), and the correct revision number on the label.
11. Press (SYSTEM) SERVICE MENU PEEK/POKE RESET MEMORY (PRESET), then switch the instrument off and back on again.
12. Press (SYSTEM) SERVICE MENU PEEK/POKE PEEK/POKE ADDRESS (5243326) (x1) POKE (30) (x1). These key presses enable the power overrange/underrange feature.
13. To verify that the instrument is functioning correctly, press (PRESET) (SYSTEM) SERVICE MENU TESTS (0) (x1) EXECUTE TEST. When the test is complete, the analyzer should display:

    ALL INT PASS

    If it does not, refer to the *HP 8753D Option 011 Network Analyzer Service Guide* for troubleshooting information.
14. Determine if your analyzer requires adjustments:
    a. If you are upgrading the firmware from revision 5.30 or higher, you have completed the necessary procedures in this installation note.
    b. If you are upgrading the firmware from any revision lower than revision 5.30 (for example 5.24), continue with the following adjustment procedures.

Adjusting the HP 8753D Option 011 Analyzer

After you have upgraded the firmware, perform the following procedures:

- Source Default Correction Constants
- Sampler Magnitude and Phase Correction Constants
- RF Output Power Correction Constants

Source Default Correction Constants for the HP 8753D Option 011 (Test 44)

Warmup Time: none

This internal adjustment test writes default correction constants for the source power accuracy.

1. Move the A9 CC jumper to the ALT position, as shown in Figure 5.
2. Press (PRESET) (SYSTEM) SERVICE MENU TESTS (44) (x1). When the display shows: *Source Def, press EXECUTE TEST. Press YES at the query to alter the correction constants.

   The test is complete when the display shows: *Source Def DONE.

In Case of Difficulty

Refer to "Source Troubleshooting" in the *HP 8753D Option 011 Network Analyzer Service Guide* if the message: *Source Def FAIL appears on the analyzer display.

Sampler Magnitude and Phase Correction Constants for the HP 8753D Option 011 (Test 53)

Warmup time: 30 minutes

This adjustment procedure corrects the overall flatness of the microwave components that make up the analyzer receiver and signal separation sections. This adjustment is necessary for the HP 8753D Option 011 to meet the published test port flatness specifications.

1. Press (PRESET) (LOCAL) SYSTEM CONTROLLER.
2. Press (LOCAL) SET ADDRESSES ADDRESS: P MTR/HPIB. The default power meter address is 13. Refer to the power meter manual as required to observe or change its HP-IB address.
3. Press POWER MTR: to toggle between the 438A/437 and 436A power meters. Choose the appropriate model number.

Note If you are using the HP 438A power meter, connect the HP 8482A power sensor to channel A, and for Option 006, connect the HP 8481A power sensor to channel B.

Power Sensor Calibration Factor Entry

4. Press (SYSTEM) SERVICE MENU TEST OPTIONS LOSS/SENSR LISTS CAL FACTOR SENSOR A to access the calibration factor menu for power sensor A (HP 8482A).
5. Build a table of up to twelve points (twelve frequencies with their calibration factors):
   a. Input a frequency value and then press the appropriate key ((G/n), (M/μ), or (k/m)).
   b. Enter the calibration factor percentage that corresponds to the frequency you entered.

   The calibration factor and frequency values are found on the back of the sensor. If you make a mistake, press (←) and re-enter the correct value.

Note The following terms are part of the sensor calibration menu:

SEGMENT allows you to select a frequency point.

EDIT allows you to edit or change a previously entered value.

DELETE allows you to delete a point from the sensor cal factor table.

ADD allows you to add a point into the sensor cal factor table.

CLEAR LIST allows you to erase the entire sensor cal factor table.

DONE allows you to complete the points entry of the sensor cal factor table.

---

6. **For Option 006 Instruments Only:** Press CAL FACTOR SENSOR B to create a power sensor calibration table for power sensor B (HP 8481A), using the softkeys mentioned above.

Sampler Correction Constants Routine

7. Press (SYSTEM) SERVICE MENU TESTS (53) (x1) EXECUTE TEST YES.
8. Connect the equipment as shown in Figure 6.

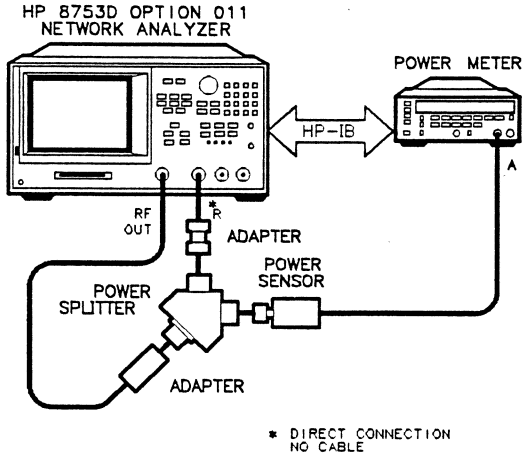

Figure 6. Input R Sampler Correction Setup

9. Press CONTINUE.

   The analyzer starts the first part of the automatic adjustment. This part will take about 7 minutes.

10. **For Option 006 Instruments Only:** After the analyzer has finished the first part of the adjustment, disconnect the HP 8482A sensor from the power splitter, and replace it with the HP 8481A.

    - If you are using the HP 438A power meter, the HP 8481A should be connected to the meter's channel B.

11. Press CONTINUE.
12. Connect the equipment as shown in Figure 7. Use two cables of equal electrical length at the power splitter outputs.

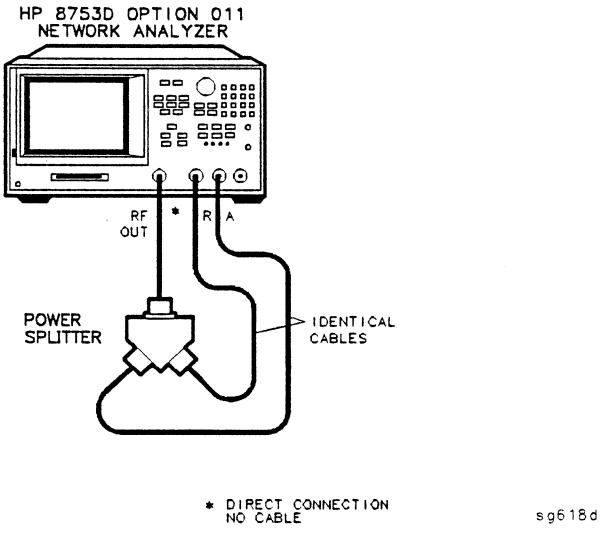

Figure 7. Input A Sampler Correction Setup

13. Press CONTINUE.

    The analyzer starts the second part of the automatic adjustment.

14. Follow the analyzer prompt to move the cable from input A to input B, as shown in Figure 8.

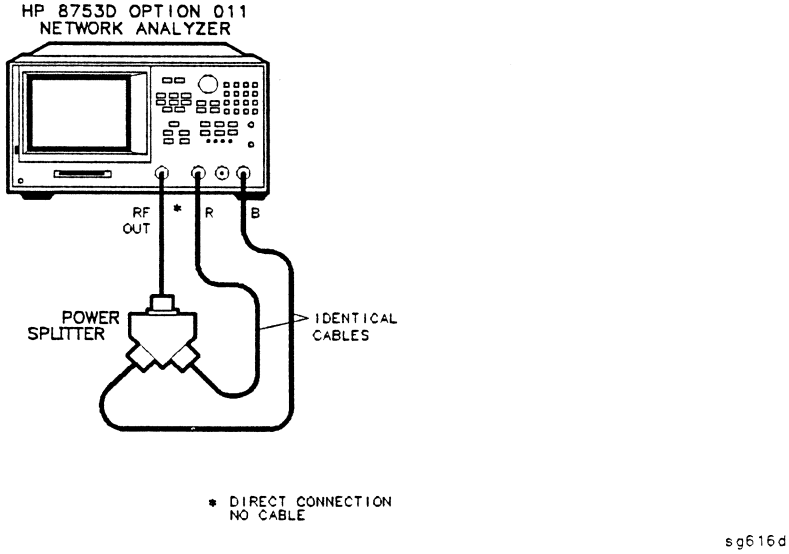

Figure 8. Input B Sampler Correction Setup

15. Press CONTINUE.

    The analyzer starts the third part of the automatic adjustment.

16. When the analyzer completes the adjustment, observe the display:

    - If the analyzer shows: DONE, this procedure is complete.
    - If the analyzer shows: FAIL, press (PRESET) and then repeat this entire procedure ("Sampler Magnitude and Phase Correction Constants"). If the analyzer shows: FAIL again, refer to "Receiver Troubleshooting" in the *HP 8753D Option 011 Network Analyzer Service Guide* for troubleshooting information.

RF Output Power Correction Constants for the HP 8753D Option 011 (Test 47)

Warmup Time: 30 minutes

This procedure adjusts several correction constants that can improve the output power level accuracy of the internal source. They are related to the power level, power slope, power slope offset, and the ALC roll-off factors among others.

1. Press (PRESET) (LOCAL) SYSTEM CONTROLLER SET ADDRESSES ADDRESS: P MTR/HPIB to see the address at which the analyzer expects to find the power meter (the default address is 13). Refer to the power meter manual as required to observe or change its address.

Power Loss through Power Splitter Determination

2. Connect the equipment as shown in Figure 9, using splitter #1.

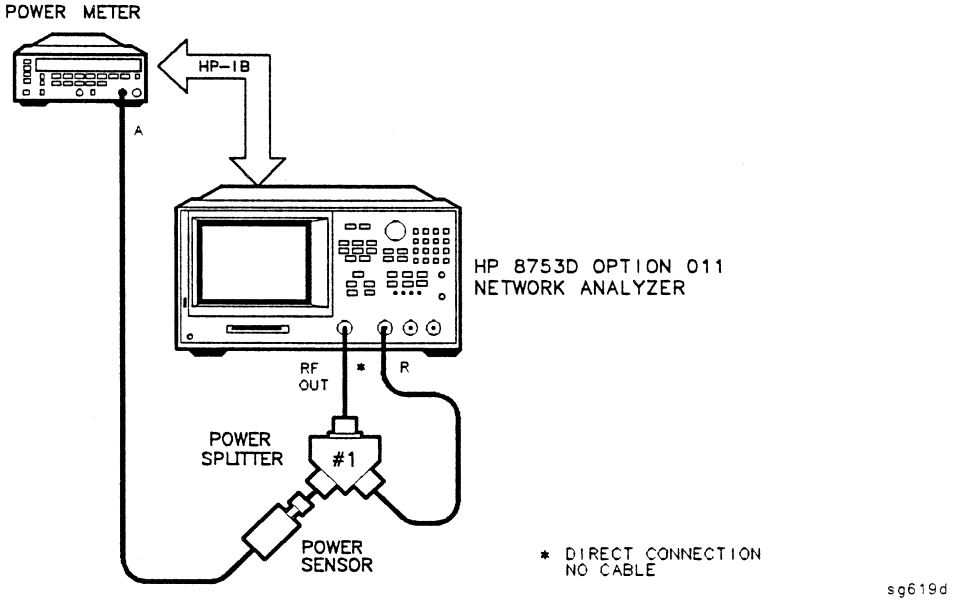

Figure 9. Setup A for the HP 8753D Option 011 RF Output Correction Constants

3. Press (MENU) CW FREQ (300) (k/m).

4. Record the power meter reading in the first column of Table 5.

Table 5. Loss through the Power Splitter

Setup A Reading (First Reading)	Setup B Reading (Second Reading)	Power Loss of #2 (Enter in Analyzer)
300 kHz:_____dB	minus_____dB	equals_____dB
50 MHz:_____dB	minus_____dB	equals_____dB
1.5 GHz:_____dB	minus_____dB	equals_____dB
3 GHz:_____dB	minus_____dB	equals_____dB
6 GHz[1]:_____dB	minus_____dB	equals_____dB

1 For Option 006 instruments only.

5. Repeat the previous step at 50 MHz, 1.5 GHz, 3 GHz, and 6 GHz (for Option 006).
6. Reconfigure the equipment as shown in Figure 10.

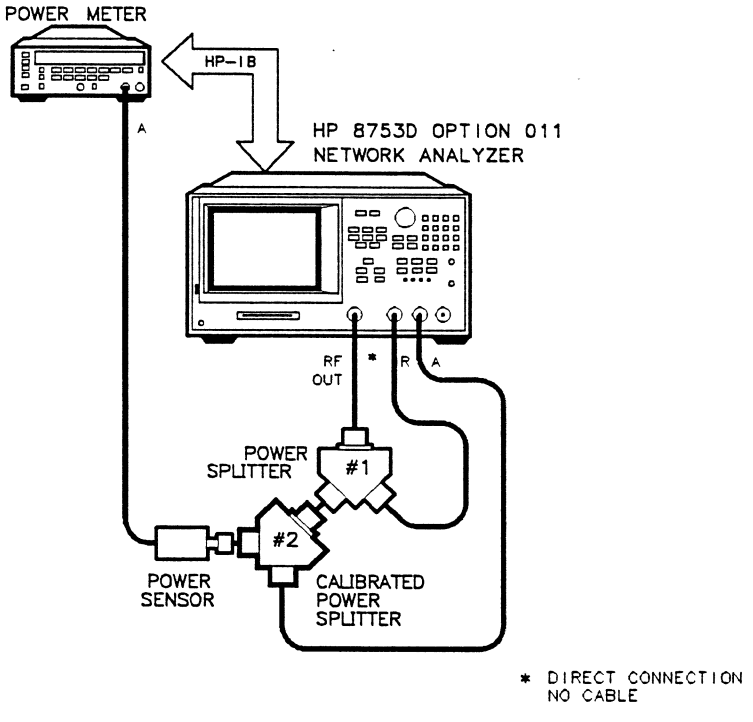

Figure 10. Setup B for the HP 8753D Option 011 RF Output Correction Constants

7. Repeat the measurements at the same frequencies (300 kHz, 50 MHz, 1.5 GHz, 3 GHz, 6 GHz), and record the power meter readings in the second column in Table 5.
8. Subtract the value of each frequency in the second column from the value in the first column, and enter the difference in the third column.
9. Press (SYSTEM) SERVICE MENU TEST OPTIONS LOSS/SENSR LISTS POWER LOSS and enter the power loss data in the same way you entered the calibration factors (see the previous section titled "Power Sensor Calibration Factor Entry").

Source Correction Routine

10. Press (SYSTEM) SERVICE MENU TESTS (47) (x1) EXECUTE TEST YES.

11. Connect the equipment as shown in Figure 11, using splitter #2.

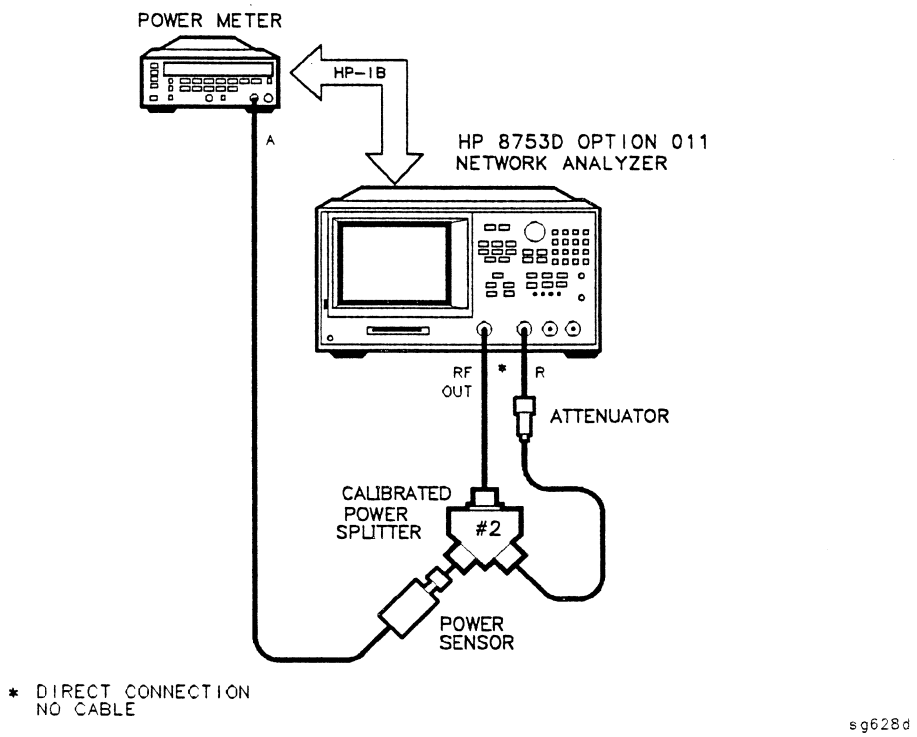

Figure 11. Setup C for the HP 8753D Option 011 RF Output Correction Constants

12. Follow the instruction at the prompt and press CONTINUE.

13. Observe the analyzer display for the results of the adjustment routine:
    - If the analyzer shows: DONE, press (PRESET) and move the A9 CC jumper back to the NRM (normal operating) position.
    - If the analyzer fails this routine, refer to "Source Troubleshooting" in the *HP 8753D Option 011 Network Analyzer Service Guide.*

Backup the New Correction Constants

The correction constants that are unique to your instrument are stored in EEPROM on the A9 controller assembly. By creating an EEPROM backup disk, you will have a copy of all the correction constant data should you need to replace or repair the A9 assembly.

14. Insert a 3.5-inch disk into the analyzer disk drive.
15. If the disk is not formatted, follow these steps:
    a. Press (SAVE/RECALL) FILE UTILITIES FORMAT DISK.
    b. Select the format type:
       - To format a LIF disk, select FORMAT:LIF.
       - To format a DOS disk, select FORMAT:DOS.
    c. Press FORMAT INT DISK and answer YES at the query.
16. Press (SYSTEM) SERVICE MENU SERVICE MODES MORE STORE EEPR ON (SAVE/RECALL) SELECT DISK INTERNAL DISK RETURN SAVE STATE.

Note The analyzer creates a default file: "FILE0". The filename appears in the upper-left corner of the display. The file type: "ISTATE(E)" indicates that the file is an instrument-state with EEPROM backup.

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17. Press FILE UTILITIES RENAME FILE ERASE TITLE. Use the front panel knob and the SELECT LETTER softkey to rename the file "FILE0" to "N*12345*" where *12345* represents the last 5 digits of the instrument's serial number. (The first character in the filename must be a letter.) When you are finished renaming the file, press DONE.
18. Write the following information on the disk label:
    - Analyzer serial number
    - Today's date
    - "EEPROM Backup Disk"

Power Supply Modification

Note This section only applies to analyzers with an instrument serial number of 0000A00000 to 3410A06400 and a firmware revision number less than 6.12.

If you have determined that it is not necessary to modify the power supply, return to the section "Installation Procedure for the HP 8753D" or "Installation Procedure for the HP 8753D Option 011."

Overview

After installing the new firmware, some analyzers may demonstrate CRT problems related to the power-down routine of the CPU. Typical symptoms include a blank display, unusual colors, or lack of colors after the power has been cycled twice following the installation of the firmware. To restore correct display operation, modify the power supply by replacing capacitor C7 with the new capacitor supplied in the upgrade kit.

To determine if your analyzer will demonstrate this problem, you will need to remove the preregulator and inspect its underside to find the power supply serial number.

Step 1: Remove the Analyzer Rear Panel

Tools Required

- T-10 TORX screwdriver
- T-15 TORX screwdriver
- ESD (electrostatic discharge) grounding wrist strap

Removal

1. Remove the analyzer top cover.
2. Remove six screws (item 1) from the rear frame: two from the top edge and four from the bottom edge.
3. Remove the screw from the pc board stabilizer (item 2) and remove the stabilizer.
4. Lift the reference board (A12) from its motherboard connector and disconnect W13 from A12J3.
5. Remove the six screws (item 3), next to the preregulator, from the rear panel as shown.
6. Remove the four screws (item 4), surrounding the connector interfaces, from the rear panel as shown.

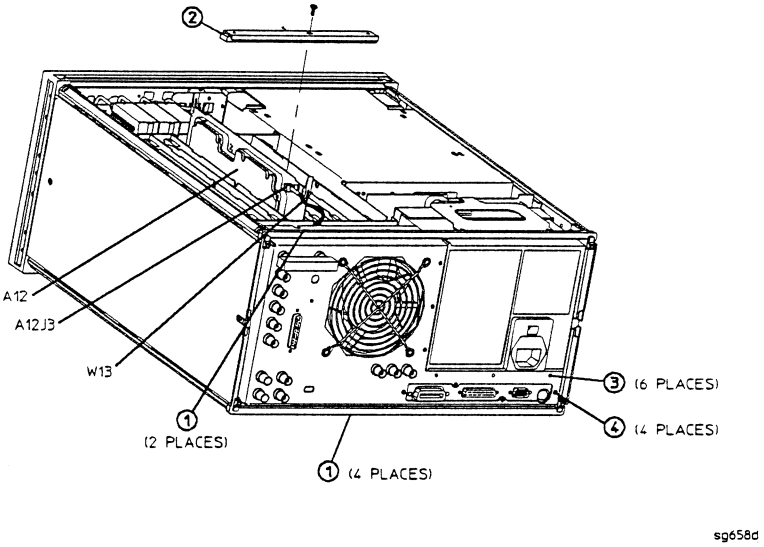

Figure 12. Rear Panel

7. Pull the rear panel away from the frame.
8. Remove the bracket (item 5) that secures the graphics board (A19), removing the two screws that attach it to the rear frame. *The preregulator is now sitting loosely in the instrument.* Gently press the top of the graphics board (A19) towards the display (A18), then lift up.

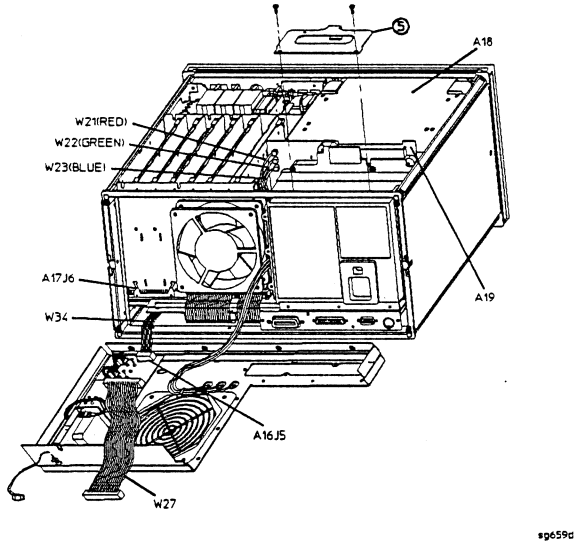

Figure 13. Rear Panel

Step 2: Remove the Preregulator

Tools Required

- T-10 TORX screwdriver
- T-15 TORX screwdriver
- ESD (electrostatic discharge) grounding wrist strap

Removal

1. Disconnect the wire bundle (A15W1) from A8J2 and A17J3.
2. Remove the preregulator (A15) from the frame.

Note

- When reinstalling the preregulator (A15), make sure the three grommets (item 1) on A15W1 are seated in the two slots (item 2) on the back side of the preregulator and the slot (item 3) in the card cage wall.
- After reinstalling the preregulator (A15), be sure to set the line voltage selector to the appropriate setting, 115 V or 230 V.

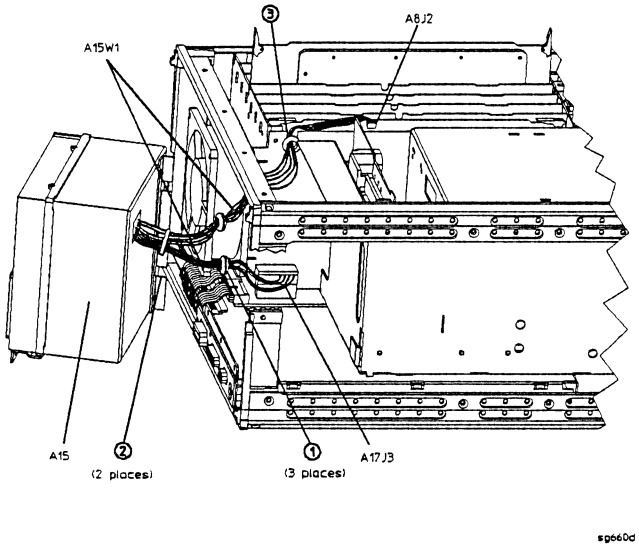

Figure 14. Preregulator

Step 3: Verify the Power Supply Serial Number

Find the power supply serial number located on the underside of the preregulator. If the serial number is less than 53224159, it is necessary to modify the power supply by continuing with Step 4.

Note If you have determined that it is not necessary to modify the power supply, reassemble the analyzer by reversing the order of the removal procedures of Step 2 and Step 1, beginning with Step 2. Next, return to the section "Installation Procedure for the HP 8753D" or "Installation Procedure for the HP 8753D Option 011."

Step 4: Modify the Power Supply

Tools Required

- #2 POZIDRIV screwdriver
- 5/16-inch open-end torque wrench (set to 21 in-lb)
- Soldering equipment
- ESD (electrostatic discharge) grounding wrist strap

Removal and Modification

1. Remove the four large screws and lock-washers from the housing of the preregulator. Separate the preregulator housing, being careful not to break the white plastic line switch push rod (HP 08753-40002).
2. Remove the four standoffs from the pre reg in board (HP 08753-60215).
3. Disconnect the J1 and J2 connectors from the pre reg in board.
4. Locate the two spade connectors on the receptacle for the AC power cable. Note that the polarity of each connector is distinguished by a color-coded wire. Record the correct polarity for each spade connector and then disconnect them.
5. Remove the pre reg in board from the housing and replace C7, using the 220 μF, 50 V electrolytic capacitor provided in the upgrade kit.

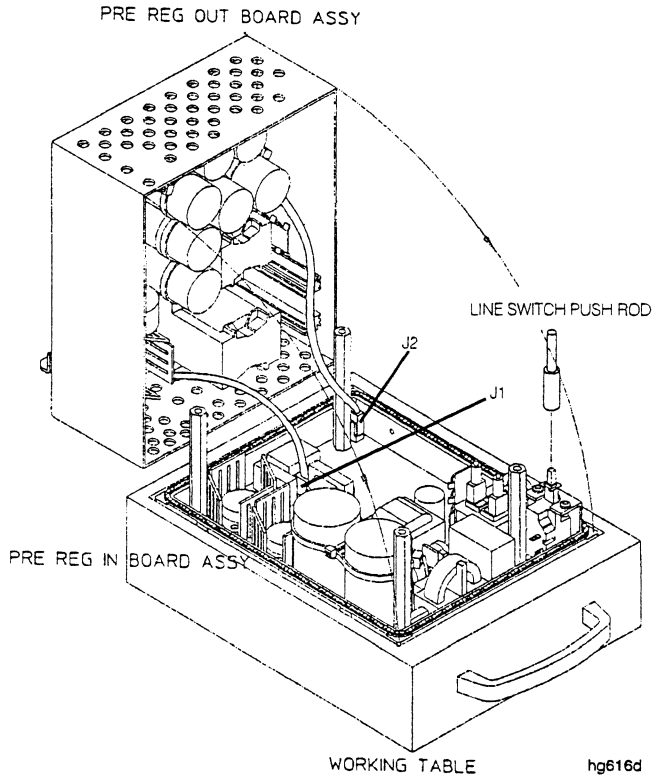

Figure 15. Preregulator Assembly: All Instruments

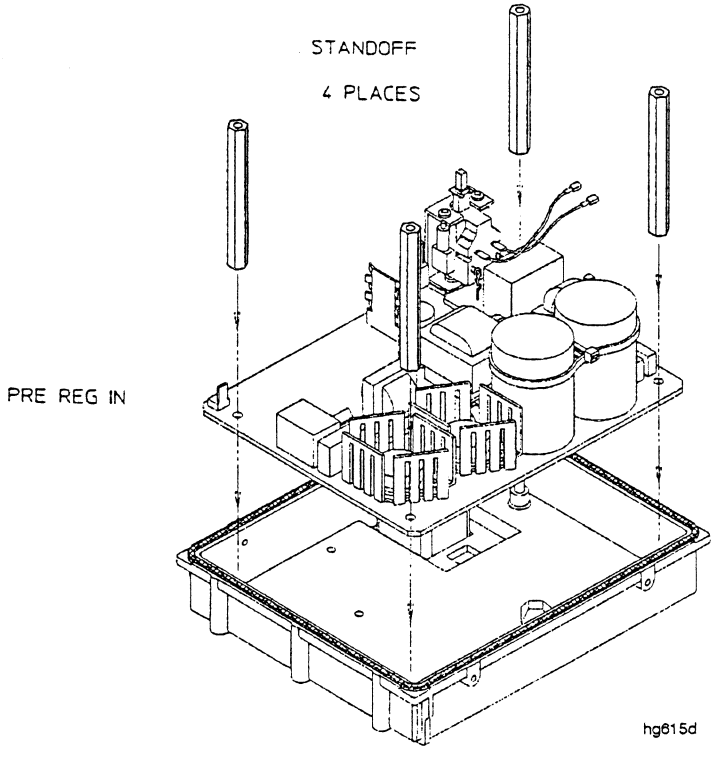

Figure 16. Pre Reg In Board with Standoffs: All Instruments

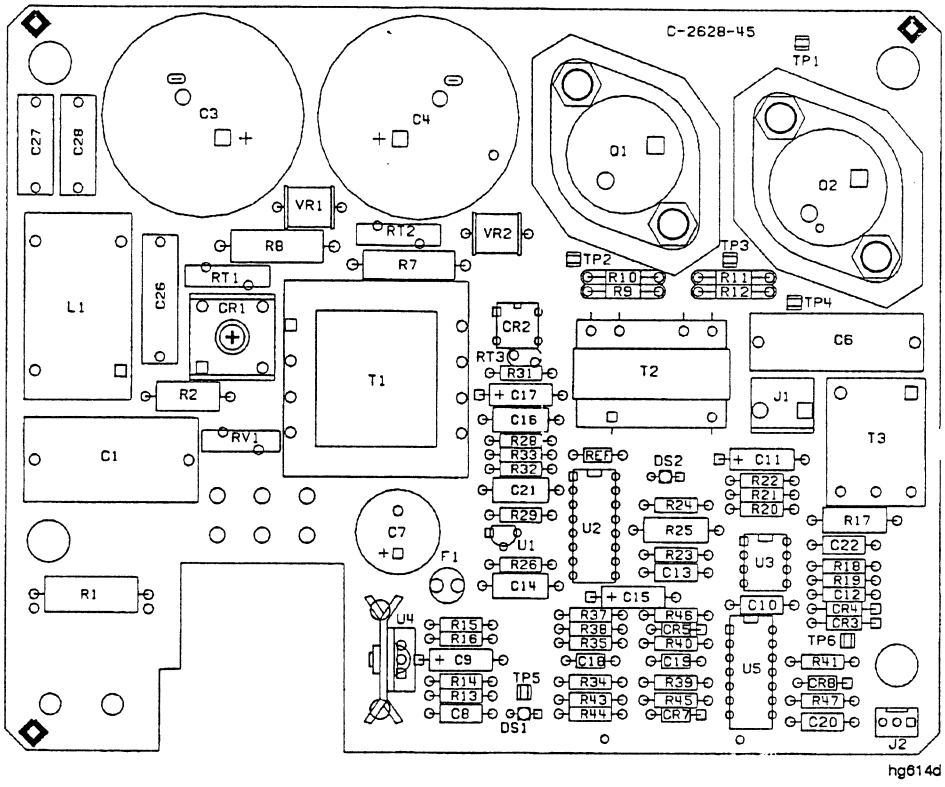

Figure 17. Pre Reg In Board: All Instruments

Replacement

1. Reverse the order of the removal procedure.

Note When reassembling the preregulator housing, be sure that the J1 and J2 connector wires are made to fit into the area of U2, U3, and U5.

Step 5: Reassemble the Analyzer

To reassemble the analyzer, reverse the order of the removal procedures of Step 2 and Step 1, beginning with Step 2. Next, return to the section "Installation Procedure for the HP 8753D" or "Installation Procedure for the HP 8753D Option 011."

Firmware History

Revision 6.14

Firmware Enhancements and Features

1. A major improvement has been made in disk writes for the CITIfile and S2P (Touchstone) ASCII formats.
2. Error numbers (error table) are now synchronized with all revisions.
3. Data files with S2P now have suffixes dependent on the channel number (S1 or S2).
4. In operating parameters pages, the specific model number has been replaced with the word ANALYZER.
5. Calibration kit labels under the SELECT CAL KIT menu now include the HP calibration kit most commonly associated with that connector geometry.
6. Single parameter, linear magnitude marker display format now shows in engineering units (autoscales to U, mU, μU, etc.)
7. The DEFINE STANDARD menu for the selection of calibration standard "type" has been changed. To access this menu, press (CAL) `CAL KIT` `MODIFY` `DEFINE STANDARD` . The choices of open, short, load, delay/thru, and arbitrary impedance now work the same as the choices in other "one-of-n" menus. (For a "one-of-n" menu example, press the (FORMAT) key.) The DEFINE STANDARD menu remains displayed after pressing `OPEN` , or `SHORT` , or whatever "type" the user has selected, thus showing the latest selection for a particular calibration standard number. Further, a new message box appears above the active entry for calibration standard number. The message reads, "`Select # with arrow keys, then press MODIFY STD`". Pressing the new softkey `MODIFY STD DEFINITION` then brings up the menu appropriate for the "type." For example, if an open was selected, the `C0` , `C1` , etc. menu appears. If a load was selected, the `FIXED` , `SLIDING` , etc. menu appears.

   These changes help the front panel user only. HP-IB operation remains unchanged.

Firmware Problems Fixed

1. Fixed the problem experienced with downloading cal coefficients using `INPUCALC` when the number of coefficients in the current I-state does not match the download number of points.
2. Fixed the ADC offset correction test to avoid spurs when finding the most linear region.
3. Fixed the slow HP-IB access to the internal disk.
4. Fixed the inadvertent test set switching by programming the test port on each sweep (ESD issue).
5. Fixed the sampler correction phase error experienced when measuring B/R with an IF bandwidth setting of 3700 Hz.
6. Option 011, HP 85047A Test Set: fixed the unwanted activation of the doubler during attenuator changes.

Revision D.06.12

Firmware Enhancements and Features

1. There are now 5 markers per channel (previously 4 per channel). The MARKER FCTN menu has been revamped accordingly.
2. Calibration features, such as the softkey DO BOTH FWD & REV in Full 2-Port or TRL calibration, are improved and more user friendly. It is easier to modify or create a TRL cal kit because separate TRL class entries are now allowed. HP-IB commands are like those for the HP 8510.
3. Minor improvements have been made to the user interface for disk operations. The file last selected on the disk directory page is remembered when the user selects SAVE/RECALL. If the user tries to save a file to the internal disk drive when the disk has been removed, the internal disk drive remains the selected drive.
4. Waveguide delay can now be selected by pressing (SCALE REF) ELECTRICAL DELAY.
5. The dump-graphics feature, previously added as a carry-over from the 8720C, can be selected by pressing (SYSTEM) SERVICE MENU TEST OPTIONS DUMP GRAPH. This feature can be toggled between on and off, which enables/disables the dumping of the graphical output during the System Verification service tests (SYS VER TESTS).
6. The SELL (set learn string revision) command has been updated to work with post 5.00 revisions. The current 875x can now generate and receive instrument learn strings from all the previous shipment releases. Disk compatibility between the various 8753 revisions and the current revision is now supported.
7. The capability to store S-parameter data to component data files using the "Touchstone" format (S2P) has been added.
8. A new IF bandwidth filter setting of 3700 Hz has been added.
9. The individual power ranges will now allow 3 dB over and under the values shown with each power range selection. To enable the power overrange/underrange feature, press (SYSTEM) SERVICE MENU PEEK/POKE PEEK/POKE ADDRESS (5243326) (x1) POKE (30) (x1).
10. Enhancements have been made to the file naming capability for files generated by the instrument during execution of a sequence. The new menu can be found by pressing (SAVE/RECALL) FILE UTILITIES SEQUENCE FILENAMING. The TITLE FILE menu also gained a new softkey to support the inclusion of the sequence loop counter in the filenames.
11. A method of external calibration, Take 4 mode, provides a remote-only command that directs the network analyzer to take a single "group" or sweep (consisting of a forward and reverse sweep) and to collect the raw data for all 4 S-parameters. The user can then extract the raw data for the S-parameters (or the pre-raw data, which has not had sampler correction nor attenuator offsets applied) and perform the error correction in an external computer (using previously extracted calibration arrays).
12. The following are the choices from the new CONFIGURE menu, selected by pressing (SYSTEM) CONFIGURE:

    - TESTSET SW Toggles testset switching between continuous and hold.
    - RAW OFFSET Toggles attenuator and sampler cal offsets on or off.
    - SPUR AVOID Toggles spur avoidance on or off.

13. A new feature, Adapter Removal, is designed for cases where the device under test is "non-insertable" and thus an adapter is required. This feature requires two full 2-port calibrations, one for each port, and subsequently provides a calibration for the test device with the effects of the adapter removed. The menu is found by pressing (CAL) MORE ADAPTER REMOVAL.

14. New HP-IB commands:

HP-IB Cmd	Description
IFBW3700	Set IF Bandwidth to 3700 Hz.
SWPSTART	Sweep start (Take4).
RAWOFFS<ON|OFF>	Raw Offsets (Take4).
TAKE4<ON|OFF>	Take4 mode On/off.
SM8<ON|OFF>	Spur Avoidance On/off.
OUTPPREx	Output "pre-raw" arrays, x=1-4 (Take4).
TITP	Title Plot to Disk file.
TITF0	Title the save state filename, only in sequence mode.
ADAP1[D]	Set adapter electrical delay.
ADPTCOAX	Set adapter to COAXial.
ADPTWAVE	Set adapter to WAVEguide.
MODS	Compute new cal set using adapter removal.
CALSPORT1	Recall cal set associated with Port 1 for adapter removal.
CALSPORT2	Recall cal set associated with Port 2 for adapter removal.

15. Additional Limit Line and Data Point Functions:

- These HPIB-only functions are a portion of the option K96 functions that have sufficiently broad applicability to be added to the standard firmware set.

HP-IB Cmd	Description
MINMAX	Enable/disable min/max recording per segment. Min and max values are recorded per limit segment.
OUTPAMAX	Output max values for all limit line segments.
OUTPAMIN	Output min values for all limit line segments.
OUTPSEGAM	Output limit test min/max all segments. Output the segment number, max stimulus, max value, min stimulus, min value for all active segments.
OUTPSEGM[n]	Output limit test min/max for a specified segment.
SELSEG[n]	Select segment number for the OUTPSEGF and OUTPSEGM commands to report on.

SELMAXPT	Select the last point number in the range of points that the OUTPDATR command will report.
SELMINPT	Select the first point number in the range of points that the OUTPDATR command will report.
SELPT[n]	Select point number that OUTPDATP will report.
OUTPDATP	Output trace data indexed by point (see SELPT).
OUTPDATR	Output trace data for range of points (see SELMINPT, SELMAXPT).
OUTPLIM1	Output status of limit test for channel 1.
OUTPLIM2	Output status of limit test for channel 2.
SELSEG[n]	Select segment number for the OUTPSEGF and OUTPSEGM commands to report on.
OUTPSEGAF	Output the segment number and its status for all active segments.
OUTPSEGF	Output limit test status per segment.
OUTPFAIP	Output Fail Point: this command is similar to OUTPLIMF except that it reports the number of failures first, followed by the stimulus and trace values for each failed point in the test (note: use command LIMITEST<ON> to function properly).

For more information concerning these firmware revision 6.12 enhancements and features, see the following:

Title	Part Number	Rev.
HP 8753D Network Analyzer User's Guide	08753-90257	Jul 97
HP 8753D Option 011 Network Analyzer User's Guide	08753-90304	Jul 97
HP 8753D Network Analyzer Programmer's Guide Including Option 011	08753-90256	Jul 97
HP 8753D Network Analyzer Service Guide	08753-90405	Jul 97
HP 8753D Option 011 Network Analyzer Service Guide	08753-90406	Jul 97
HP 8719D, 8720D, 8722D, 8753D Programming Examples Disk: HP BASIC	08753-10028	Jul 97
HP 8719D, 8720D, 8722D, 8753D Programming Examples Disk: QuickC & QuickBASIC	08753-10029	Jul 97

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Spain (*tel*) (+34) 91 631 3300 (*alt*) (+34) 91 631 3000 (*fax*) (+34) 91 631 3301	**Sweden** (*tel*) 0200 88 22 55* (*alt*) (+46) (0)8 5064 8686 (*fax*) 020 120 2266*	**Switzerland (French)** (*tel*) 0800 80 5353 opt. 2* (*alt*) (+33) (0)1 6453 5623 (*fax*) (+41) (0)22 567 5313	**Switzerland (German)** (*tel*) 0800 80 5353 opt. 1* (*alt*) (+49) (0)7031 464 6333 (*fax*) (+41) (0)1 272 7373
Switzerland (Italian) (*tel*) 0800 80 5353 opt. 3* (*alt*) (+39) (0)2 9260 8484 (*fax*) (+41) (0)22 567 5314	**United Kingdom** (*tel*) (+44) (0)7004 666666 (*alt*) (+44) (0)7004 123123 (*fax*) (+44) (0)7004 444555		

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