Installation Note

8719DU/8720DU/8722DU
Option 000 Performance Upgrade Kit
for the 8719D/8720D/8722D Network Analyzers

IMPORTANT   Be sure to read the enclosed section, "Installation Options" before starting.

Agilent Technologies

08720-90372

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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 08720-90372

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Installation Note

HP 8719DU/8720DU/8722DU
Option 000 Performance Upgrade Kit
for the HP 8719D/8720D/8722D Network Analyzers

IMPORTANT! Be sure to read the enclosed section, "Installation Options" before starting.

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PRODUCT AFFECTED: HP 8719D/8720D/8722D Network Analyzer

SERIAL NUMBERS: All serials

TO BE PERFORMED BY: [X] HP Service Center
                                     [X] HP personnel on-site
                                     [X] Customer
                                     See "Installation Options" below.

ESTIMATED INSTALLATION TIME: 1 hour (add the time needed to back up
                                     instrument states, if desired.)

ESTIMATED VERIFICATION TIME: 30 minutes (not included in the kit price)

Description

The HP 8720DU Option 000 Performance Upgrade Kit is used to replace the A7 CPU board in the analyzer with a new board designed with a faster microprocessor and enhanced firmware. Faster measurement speeds, data transfers, and instrument state recalls are made possible with this upgrade. Loading new firmware revisions can now be accomplished with a 3.5 inch floppy disk rather than by replacing EEPROMs. This note contains the information required to upgrade the A7 CPU board in the HP 8719DU/8720DU/8722DU network analyzer.

Installation Options

1. Installation at HP Service Center

   ■ included in the kit price

   ■ call 1-800-403-0801 to schedule with a service center

   ■ send the analyzer and upgrade kit to the designated service center

   ■ does not include repair — requires an operational analyzer

2. Installation by HP personnel at customer's site

   ■ travel time and labor (including backup of instrument states, if desired) in excess of the 1 hour estimated installation time to be paid by customer.

3. Installation by customer

Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of 90 days from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Hewlett-Packard. Buyer shall prepay shipping charges to Hewlett-Packard and Hewlett-Packard shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Hewlett-Packard from another country.

Hewlett-Packard warrants that its software and firmware designated by Hewlett-Packard for use with an instrument will execute its programming instructions when properly installed on that instrument. Hewlett-Packard does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error-free.

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Performance Upgrade Kit: Parts List

Qty	Description	HP Part Number
1	CPU board[1]	08753-63272
1	User's Guide Supplement	08753-90380
1	Installation Note	08720-90372
1	Firmware Disk	08720-10007

1 CPU Repair kit: 08720-69253

Required Equipment and Tools

Required Equipment and Tools

Item	HP Part/Model Number
3.5-inch floppy disk	HP 92192A (box of 10)
T-10 TORX screwdriver	N/A
T-15 TORX screwdriver	N/A
Antistatic Wrist Strap	9300-1367
Antistatic Wrist Strap Cord	9300-0980
Static-Control Table Mat and Earth Ground Wire	9300-0797

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.

Record the Analyzer Information

1. Turn on the analyzer.

2. Record the firmware revision, serial number, and option numbers which appear on the display.

Perform the Operator's Check

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: Op Ck Port 1 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: Op Ck Port 2 DONE.

Note	If either check did not pass, the instrument must be adjusted or repaired before being upgraded. Repair costs are *not* included in the cost of the upgrade installation.

Back Up the Correction Constants

The correction constants, which are unique to the instrument, are stored in EEPROM on the A7 CPU board. By creating an EEPROM backup disk, you will have a copy of all the correction constants data that you need to replace the A7 CPU board.

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: "FILEnn" (nn = 00 or the next highest available number). 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.

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"

Back Up the Instrument States

All instrument states that you have saved to the analyzer's internal memory will be lost when the A7 CPU board is replaced. If you want to save these instrument states, you must back them up on a disk before replacing the board. For an explanation of this procedure, refer to "Printing, Plotting, and Saving Measurement Results," located in the *User's Guide*. This procedure may be very time consuming, depending on the number of instrument states that you choose to back up. Each instrument state file will have to be renamed.

Remove the Rear Panel Assembly

Note	Although not mandatory, it is recommended that the rear panel assembly be removed before replacing the A7 CPU board. It is easier to work with the ribbon cable connectors with the rear panel assembly removed.

Refer to Figure 1-1.

1. Disconnect the power cord.

2. Remove the four rear standoffs (item 2).

3. Loosen the top cover screw and slide the top cover off.

4. Remove the instrument bottom cover and record the keyword label(s) that are located on the exposed sheet metal next to the A7 CPU assembly. Note that each keyword is for EACH option installed in the instrument.

5. If the analyzer has option 1D5, remove the BNC jumper from the high stability frequency reference (item 3).

6. If the analyzer has option 085, remove the RF cable (item 4) and the connectors' attaching hardware (item 5).

7. Remove the hardware (item 6) that attaches the RS-232 connector to the rear panel.

8. Remove the four screws (item 7) that attach the interface bracket to the rear panel.

9. Remove the six screws (item 8) and (item 9), that attach the preregulator to the rear panel.

10. Remove the eight screws (item 10) from the rear frame: four from the top edge and four from the bottom edge.

11. Remove the screw from the pc board stabilizer and remove the stabilizer.

12. Lift the reference board (A12) from its motherboard connector and disconnect the flexible RF cable (item 11).

13. Pull the rear panel away from the frame. Disconnect the ribbon cable (item 12) from the motherboard connector, pressing down and out on the connector locks. Disconnect the wiring harness (item 13) from the motherboard.
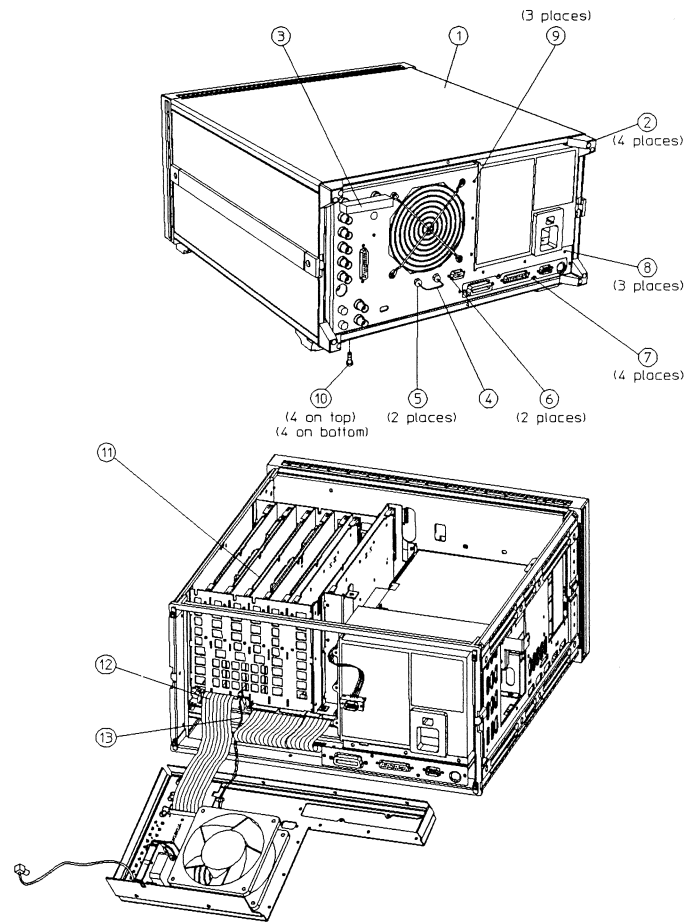
Figure 1-1.

Remove the A7 CPU Board

Refer to Figure 1-2.

1. Turn the analyzer over and remove the screw (item 2) that secures the CPU board to the deck.

2. Disconnect the ribbon cable (item 3), sliding your finger nail between the cable and the connector.

3. Disconnect the ribbon cable (item 4) from the CPU board.

4. Slide the board towards the front of the instrument so that it disconnects from the three standoffs (item 5).

5. Disconnect the ribbon attached at the rear of the CPU board.

6. Lift the board off of the standoffs and place it in an antistatic bag.

Install the New A7 CPU Board

1. Reverse the order of the removal procedure.

2. On the CPU board, set the A7 Switch to the Alter Mode configuration (see Figure 1-3).

Figure 1-2.

sb6108d

CPU Assembly

8 ████████ 1   8 ████████ 1   ■=▯=▯
Normal Mode   Alter Mode   Rocker Slide

dg62d
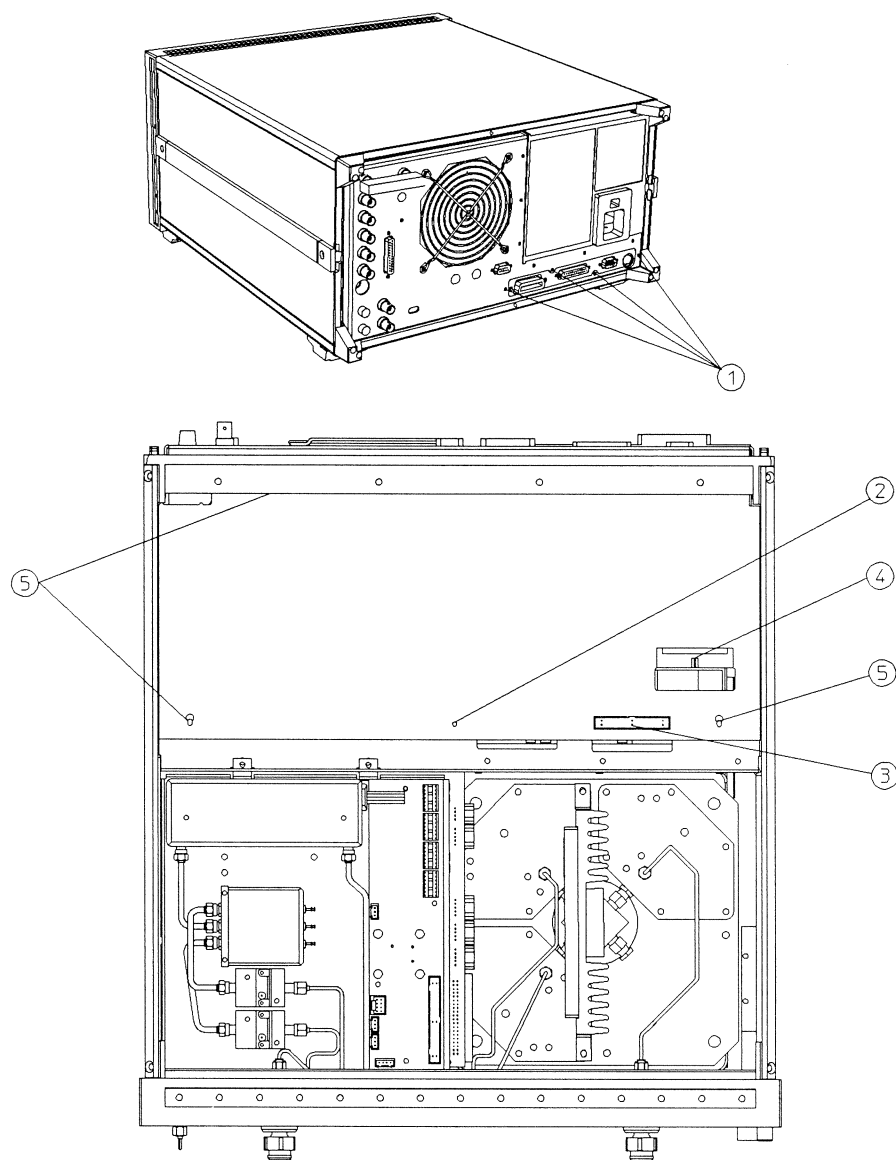
Figure 1-3.

Load the New Firmware

1. Place the firmware disk into the disk drive.

2. Turn the instrument on. The firmware will be loaded automatically during power-on. The front panel LEDs should step through a sequence for approximately one minute as firmware is loaded. The display will be blank during this time.
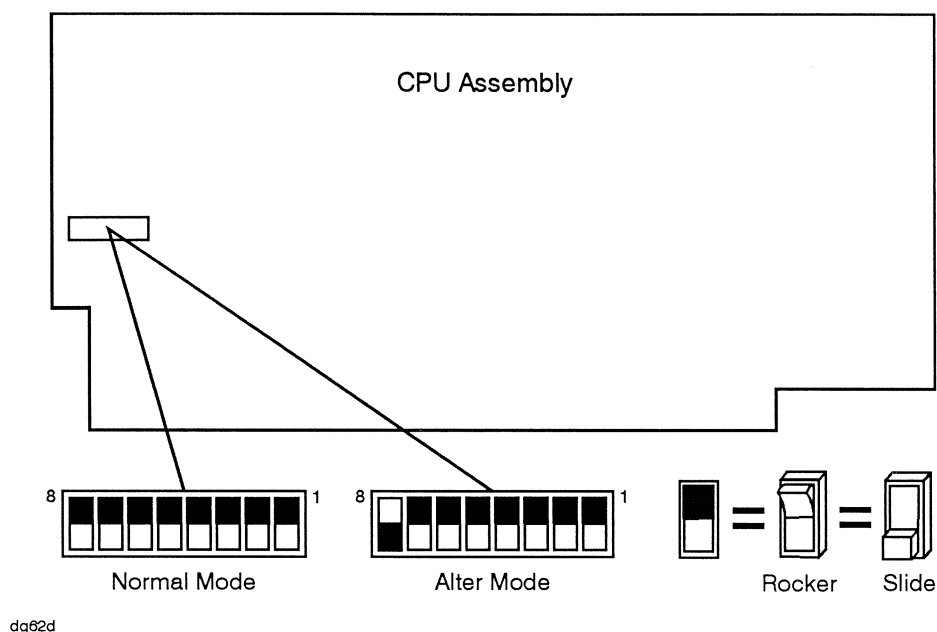
   At the end of a successful loading, the LEDs for Channel 1 and Testport 1 will remain on and the display will turn on indicating the version of firmware that was loaded.

   The display may indicate No IF or No Phase Lock. This is normal for this procedure.

3. Remove the firmware disk from the disk drive.

In Case of Difficulty

If the firmware did not load successfully, LED patterns on the front panel can help you isolate the problem.

■ If the following LED pattern is present, an acceptable firmware filename was not found on the disk. (The desired format for firmware filenames is 8720D_07._02.) Check that the firmware disk used was for the HP 8719D/20D/22D.

LED Pattern					
CH1	CH2	R	L	T	S
•					

- If any of the following LED patterns are present, the firmware disk may be defective.

LED Pattern					
CH1	CH2	R	L	T	S
		•			
	•	•			
•		•			
•	•	•			
			•		
	•		•		
•			•		
•	•		•		
		•	•		
	•	•	•		
•		•	•		
		•			•
	•	•			•

- If any other LED pattern is present, the CPU board is defective.

Note	If firmware did not load, a red LED on the CPU board will be flashing.

- If the following LED pattern is present on the CPU board, suspect the disk drive or associated cabling:

● ● ● ○ ● ● ○ ○

(front of instrument ⇊)

Store the Analyzer Serial Number

This procedure stores the analyzer serial number in the A7 CPU assembly EEPROMs.

1. Press (Preset) DISPLAY MORE TITLE ERASE TITLE to erase the HP logo from the display.

2. Enter the analyzer serial number (recorded earlier) by using an external keyboard, or by rotating the front panel knob to position the arrow below each character of the instrument serial number, and then pressing SELECT LETTER to enter each character. Enter a total of ten characters.

   Press BACKSPACE if you made a mistake.

3. Press DONE when you have finished entering the title.

Caution	You *CANNOT* correct mistakes after you perform step 4, unless you contact the factory for a keyword to clear the serial number. If needed, this keyword should be used in the next procedure, "Store the Analyzer Option(s) Information," for clearing the incorrect serial number. After this is done, repeat the procedure "Store the Analyzer Serial Number."

4. Press (System) SERVICE MENU TESTS (49) (x1) EXECUTE TEST YES .

5. Observe the analyzer for the results of the routine:

- If the analyzer displays the message `Serial Cor DONE`, you have completed this procedure.

- If the analyzer does not display `DONE`, then either the serial number that you entered in steps 3 and 4 did not match the required format, or a serial number was already stored. Check the serial number recognized by the analyzer:

  a. Press (Preset) (System) `SERVICE MENU FIRMWARE REVISION`.

  b. Look for the serial number displayed on the analyzer screen.

  c. Rerun this adjustment test.

- If the analyzer continues to fail this adjustment routine, contact your nearest HP Sales and Service Office, listed at the end of this document.

Store the Analyzer Option(s) Information

This procedure stores instrument option(s) information in CPU assembly EEPROMs. You can also use this procedure to remove a serial number by using the factory supplied keyword, as referred to in "Store the Analyzer Serial Number."

1. Press (Preset) (Display) `MORE TITLE ERASE TITLE`.

2. Enter an option keyword (recorded earlier in the section "Remove the Analyzer Rear Panel") by using an external keyboard, or by rotating the front panel knob to position the arrow below each character of the keyword, and then pressing `SELECT LETTER` to enter each letter.

   Press `BACKSPACE` if you made a mistake.

3. Press `DONE` when you have finished entering the title.

Caution	Do not confuse "I" with "1" or "O" with "0" (zero).

4. Press (System) `SERVICE MENU TESTS` (50) (x1) `EXECUTE TEST YES`.

5. Observe the analyzer for the results of the adjustment routine:

   - If the analyzer displays `Option Cor DONE`, you have completed this procedure.

   - If the analyzer has more than one option, repeat steps 2-5 to enter the remaining keyword(s) for options.

   - If the analyzer displays `Option Cor FAIL`, check the keyword used in step 3 and make sure it is correct. Pay special attention to the letters "I" or "0", the numbers "1" or "0" (zero). Repeat this entire adjustment test.

   - If the analyzer continues to fail the adjustment routine, contact your nearest HP Sales and Service Office, listed at the end of this document.

Re-load the Correction Constants

1. Insert the "EEPROM Backup Disk" (created earlier) into the disk drive.

2. Press (Save/Recall) SELECT DISK INTERNAL DISK . Use the front panel knob to highlight the file "N12345" where N12345 represents the file name of the EEPROM data for the analyzer.

3. Press RETURN RECALL STATE to down load the correction constants data into the instrument EEPROMs.

4. Press (Preset) to load the EEPROM Constants. Verify that good data was transferred to EEPROM by performing a simple measurement.

Re-load the Instrument States

If you want to re-load the analyzer's instrument states from your backup disk (created earlier), refer to "Printing, Plotting, and Saving Measurement Results," located in the *User's Guide.* This procedure may be very time consuming, depending on the number of instrument states that you choose to re-load. Each instrument state file will have to be renamed.

Configure the Analyzer to Produce a Time Stamp

You can set a clock, and then activate it, if you want the time and date to appear on your hardcopies.

1. Press (System) SET CLOCK .

2. Press SET YEAR and enter the current year (four digits), followed by (x1).

3. Press SET MONTH and enter the current month of the year, followed (x1).

4. Press SET DAY and enter the current day of the month, followed by (x1).

5. Press SET HOUR and enter the current hour of the day (0-23), followed by (x1).

6. Press SET MINUTES and enter the next immediate minute, followed by (x1).

7. Press ROUND SECONDS when the current time is exactly as you have set it.

8. Press TIME STAMP until TIME STAMP ON appears on the softkey label.

Verify Successful Installation

1. Turn the analyzer off and then on.
2. Verify the following information on the display:

   a. The new firmware revision number matches the number printed on the firmware disk.

   b. All other options have been re-established.

3. Repeat the section titled "Perform the Operator's Check," located earlier in this document.
4. Turn the analyzer off.
5. Move the A7 switch back to its NORMAL position. Refer to Figure 1-3.
6. Reinstall the rear panel assembly by reversing the order of the removal procedure.

Troubleshooting

1. If the display information is not observed, as listed previously in the section titled "Verify Successful Installation," examine all connections to the CPU board. Improper connections may be diagnosed as follows:

   a. If the Channel 1 and Testport 1 LEDs are on but the display is blank, examine the item 4 ribbon cable connector. Refer to Figure 1-2.

   b. If the Testport 2 LED is on but the display is blank, examine the item 3 ribbon cable connector.

Firmware History

Firmware Revision 7.12 (includes all features of revisions 6.14 and 6.12)

Firmware Enhancements and Features

1. A new IF bandwidth filter setting of 6000 Hz can now be selected in addition to the previously available settings of 10, 30, 100, 300, 1000, 3000, and 3700 Hz.

2. Swept list mode, a new list frequency sweep mode, takes data while sweeping through the defined frequency points, increasing throughput by up to 6 times over a stepped sweep. In addition, this mode allows the test port power and IF bandwidth to be set independently for each segment that is defined.

3. New HP-IB commands:

HP-IB Cmd	Description
LISIFBW<ON|OFF>	Enables/disables the IFBW setting for a list-frequency table in swept list mode.
LISPWRM<ON|OFF>	Enables/disables the power setting for a list-frequency table in swept list mode.
LISTTYPE<LSTP|LSWP>	Selects either the stepped list mode or the swept list mode to use with a list-frequency table.
SEGIFBW[D]	Sets the IFBW for the active segment of a list-frequency table in swept list mode.
SEGPOWER[D]	Sets the power for the active segment of a list-frequency table in swept list mode.

Firmware Revision 6.14 (includes all features of revision 6.12)

Firmware Revision 6.14 is the revised code for both the HP 8753D (including Option 011) and the HP 8719D/8720D/8722D Network Analyzers.

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.). HP 8753D (including Option 011) only.

7. Changed the list table default frequency from MHz to GHz. HP 8719D/8720D/8722D only.

8. Updated the 7mm calibration constants based on the HP 85050 series calibration kits. HP 8719D/8720D/8722D only.

9. 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 CO , 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 slow HP-IB access to the internal disk.

3. Fixed the inadvertent test set switching by programming the test port on each sweep. HP 8753D (including Option 011) only.

4. Fixed the sampler correction phase error experienced when measuring B/R with an IF bandwidth setting of 3700 Hz. HP 8753D (including Option 011) only.

5. Option 011, HP 85047A Test Set: fixed the unwanted activation of the doubler during attenuator changes. HP 8753D (including Option 011) only.

6. Fixed the POSSIBLE FALSE LOCK error message from appearing at incorrect times. HP 8719D/8720D/8722D only.

7. Option 400: fixed the loss of phase lock experienced under the following conditions— during the first sweep after test set switching, with power meter calibration on one port. HP 8719D/8720D/8722D only.

8. Fixed R channel drop-out when sweeping under the following conditions— CF= 2.55 GHz, Span= 100 MHz. HP 8719D/8720D/8722D only.

Firmware Revision 6.12

Firmware Enhancements and Features

Firmware Revision 6.12 merges the codes of the HP 8753D (including Option 011) and the HP 8719D/8720D/8722D Network Analyzers.

Carry-Over From the HP 8719D/8720D/8722D Network Analyzer. The following enhancements and features are a carry-over from the HP 8719D/8720D/8722D but are new in firmware revision 6.12 to the HP 8753D (including Option 011):

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 Network Analyzer.

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 (HP 8753D including Option 011). The current HP 875x can now generate and receive instrument learn strings from all the previous shipment releases. Disk compatibility between the various HP 8753 revisions and the current revision is now supported.

7. 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. HP 8753D (including Option 011) only.

New Enhancements and Features.

The following enhancements and features are new in firmware revision 6.12:

1. The capability to store S-parameter data to component data files using the "Touchstone" format (S2P) has been added.

2. A new IF bandwidth filter setting of 3700 Hz has been added.

3. The individual power ranges will now allow 3 dB over and under the values shown with each power range selection.

4. 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.

5. 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).

6. 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.

7. 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. HP 8753D (including Option 011) only.
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.

8. Additional Limit Line and Data Point Functions:

These HPIB-only functions were previously available only with option K96, but have now been added to the standard firmware set. Example programs using these functions are available in the Programmer's Guides with a print date of July 1997 or later.

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).

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