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HP 8510B

HP 8510B Service Manual 9018-03503

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Errata

Title & Document Type: 8510B Service Manual

Manual Part Number: 08510-90078

Revision Date: November 1988

HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement business is now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

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Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.



Agilent Technologies

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SERVICE MANUAL

HP 8510B
NETWORK ANALYZER

This manual applies directly to HP 8510B network analyzers having an HP 85102B IF Detector with serial number 2844A04500 or higher and to all HP 8510As that have been upgraded to HP 8510Bs, with operating system revision B.05.00, or higher.

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MANUAL PART NO. 08510-90078
Microfiche Part No. 08510-90079

Printed: July 1987
Revised: November 1988

HEWLETT PACKARD

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BP21.1

Table of Contents

The manual is divided into sections by descriptive tabs. Also, each section is paginated separately, beginning with page 1.

SECTION and TAB LABEL (shown in bold type and caps).

SERVICE OVERVIEW

Describes how to service the HP 8510B as a system and describes how to use the manual. This section should be read before attempting any repairs.

TROUBLESHOOTING STRATEGY: Describes how the factory service team expects you to troubleshoot and repair the system. Includes a troubleshooting flowchart and an overall system level troubleshooting procedure.

TYPES OF FAILURES: Lists the most common types of system failures and describes what to do about each.

PERIODIC MAINTENANCE: This section has some simple procedures that should be followed in order to maintain the system.

BUILT-IN DIAGNOSTICS

Describes the types of built-in system troubleshooting diagnostics and how to use them. They include Self Test, Running Error Messages, and the Service Program.

SELF TEST: This section describes all of the Self Tests and includes troubleshooting information. Refer to this section whenever there is a Self Test failure.

RUNNING ERROR MESSAGES: This section lists all of the Running Error Messages that are related to service. The messages are listed with troubleshooting suggestions. Refer to this section whenever an error message is displayed.

SERVICE PROGRAM: This section describes how to run the Service Program diagnostics to check the operation of the boards in the HP 85101, HP 85102, and Test Set. A menu map and other troubleshooting suggestions are also included.

TEST AND REPAIR

Describes the individual tests in this section.

UNRATIOED POWER TEST: This section has a procedure for checking the Test Set's ability to properly down-convert the separate RF signals. It is especially useful for testing the Test Set VTO and Samplers and the HP 85102 IF amplifiers.

FRONT PANEL TESTS: This section has several random tests that can be performed using only the HP 8510 front panel keys. Refer to this section to see if it contains a test that will help you isolate a suspected problem.

SOURCE TESTS: This section contains several quick tests that can be performed on the HP 8340/41 or HP 8350 sources. Refer to this section whenever you suspect a source problem.

ADDITIONAL TESTS: This section has several random tests that can be performed with little or no test equipment. Refer to this section to see if it contains a test that will help you isolate a suspected problem.

ASSEMBLY/DISASSEMBLY: This section has procedures for disassembling or re-assembling the HP 8510 whenever you have to replace a part.

BLOCK DIAGRAMS: This section contains all the block diagrams including an overall System Troubleshooting Diagram, block diagrams for the HP 85101, HP 85102, the HP 8510 Phase Lock System, HP 8510 power supplies, and wiring lists.

TEST SET TROUBLESHOOTING

This section contains the service portion of the test set manual that is shipped separately with the Test Set. You have to insert that section here. It has troubleshooting procedures for the specific Test Set(s). Refer to this section whenever you want to troubleshoot the Test Set.

ADJUSTMENTS

This section describes how to use the HP 8510 Adjustment software. Refer to this section whenever you replace a part that requires adjustment. You can also refer to this section to be sure your HP 85102 IF-Detector is properly adjusted.

REPLACEABLE PARTS

This section contains a list of all the part that can be replaced in the HP 8510. Refer to this section whenever you have determined that a part/assembly/board is defective and requires replacement.

SERVICE REFERENCE DOCUMENTS

This section of the manual contains the separate sections (tabs) described below.

SERVICE LOG/NOTES: This section is used to document all service performed on the HP 8510. It is also used to hold any special service information not shipped with this manual.

THEORY OF OPERATION: This section describes how the system operates, especially the Phase Lock System. Read this section to learn how the HP 8510 system hardware and firmware operate.

CONFIGURATION/CONNECTIONS: This section contains connection diagrams, similar to the installation information. Refer to this section to check your system cabling and connections.

MANUAL UPDATE INFORMATION

Refer to this section whenever you use the manual. It should contain any information about changes to the manual.

SERVICE TOOLS

This section has plastic holders containing the HP 8510 Adjustment Software and two separate items used for the SERVICE PROGRAM diagnostics.

PULSED-RF MEASUREMENT CAPABILITY (OPTION 008)

This section contains service information unique to the HP 8510B Option 008. Refer to this section for HP 85102B Option 008 replaceable parts and for Pulsed-RF system troubleshooting.

NOTE: If this error occurs when the HP 8430/41 source is in the RAMP mode, but not in the STEP mode, the problem is most likely the source or the HP 85102 A20 sweep ADC assembly. If so, be sure to check the A20 board with the Service Program diagnostics.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 8 (A22), 9 (A23), and A (A21).
- Check the a_1 channel: UNRATIOED POWER TEST.
- Check all rear panel connections.

PULSE CAL FAILURE ON TEST/REFERENCE CHANNEL(S) - OR BOTH CHANNELS

Detects a failure in the pulsed-RF circuitry.

Probable cause of failure:

- A6 Clock board (for both channels only)
- A2 Multiplexer board
- A3, A4 Test and Reference Channel Detector Boards
- A16 Sample and Hold board

Troubleshooting:

- Refer to HP 8510B Pulsed-RF Circuitry Troubleshooting procedure later in this section.

SOURCE HP-IB SYNTAX ERROR

The source does not respond to a known good HP-IB command.

Probable cause of failure:

- Source HP-IB assembly.
- HP 85101 A15 I/O assembly (HP-IB portion).
- HP-IB cable between the source and HP 85101.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Refer to the SOURCE TESTS section to check the sources.

SOURCE SWEEP SYNC ERROR

The HP 8510 is not synchronized with the source. Specifically, the HP 85102 A20 Sweep ADC is not properly tracking the 0-to-10 volt ramp from the source.

Probable cause of failure:

- A20 sweep ADC (HP 85102).
- Stop sweep or sweep output cables not connected.
- Defective source.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 test 2 (A20).
- Check cabling – refer to CONFIGURATION/CONNECTION section – especially the Stop Sweep and Sweep In/Out connections.
- Refer to SOURCE TESTS section to check source.
- Use the Trim Sweep procedure (OPERATING AND PROGRAMMING manual) to adjust the sweep ADC gain DAC.

SWEEP TIME TOO FAST

Too many sweep triggers or too rapid sweep triggers were sent from the HP 85102 A20 sweep ADC assembly. The A19 ADC control assembly sends a status bit indicating it did not have time to complete an A to D conversion before receiving the next sweep trigger.

Probable cause of error:

- A19 ADC control assembly (HP 85102).
- A20 sweep ADC assembly (HP 85102).
- Source sweep speed set too fast, especially in LOCAL operation.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 1 (A19) and 2 (A20).
- Refer to SOURCE TESTS section.

SYSTEM BUS ADDRESS ERROR

This message is displayed if the address of any HP 8510 system instrument is wrong or not recognized by the HP 85101 processor.

Probable cause of failure:

- Source (19), test set (20), or plotter at wrong HP-IB address, or have power off.
- HP-IB cable not connected.
- HP-IB cable or connector faulty.
- HP 85101 A15 I/O assembly (HP-IB portion).
- Test set A4 HP-IB assembly.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program HP-IB test for the Test Set A4 board.
- Check the cabling and the addresses on all instruments.
- Check the HP 8510 addresses: Press [SYSTEM], [HP-IB ADDRESSES].

SYSTEM BUS SRQ ERROR

The HP 8510 system bus SRQ line is stuck (not responding).

Probable cause of failure:

- Test set A4 HP-IB assembly.
- Source HP-IB assembly.
- A15 I/O assembly (HP 85101).
- HP-IB circuitry of any peripheral on the bus.
- Bad HP-IB cable or connector.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program test for the Test Set A4 HP-IB board.
- Check all HP-IB cables and all addresses.

TEST SET HP-IB SYNTAX ERROR

Test Set does not respond to a known good HP-IB command.

Probable cause of failure:

- Test set A4 HP-IB assembly.
- HP 85101 A15 I/O assembly (HP-IB portion).
- HP-IB cable between the test set and the HP 85101.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program test for the Test Set A4 HP-IB board.
- Check the cables.

UNABLE TO LOCK TO EXT 10 MHZ REF

The 10 MHz external input to the A6 clock assembly is more than + 500 Hz off frequency. The level should be > 0 dBm. If the external input is off frequency or or is less than 0 dBm, the A6 assembly sets the LIFSRQ low, alerting the processor to the unlocked condition.

If this error message occurs when the external 10 MHz input is **not** used, the probable causes of failure are:

- A6 clock assembly erroneously sets LIFSRQ low (HP 85102).
- The A6 clock LIFSRQ signal is pulled low along the way to the HP 85101 A11 processor.
- +5V input in the 85102 to the A6 clock is intermittent.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Check the 10 MHz input signal frequency and amplitude that you are applying to the rear panel of the HP 85102.

NOTE: This message is not applicable unless you are locking to an external source...for example, an HP 8510 mm-Wave system.

VTO FAILURE

The lock detector on the 85102 A22 pretune control assembly indicates that the pretune cycle has not happened. The pretune cycle steers the VTO output to a frequency where one of its harmonics mixes with the RF to produce the 20 MHz IF.

Probable cause of failure:

- Test set power turned off.
- Overheated or bad VTO (test set).
- A23 main phase lock board (HP 85102).
- IF detector/test set interconnect cable.
- A22 pretune assembly (HP 85102).
- A3 VTO summing amplifier assembly (test set).
- LPRTHLD line to test set A3 summing amplifier (from HP 85102 A22 pretune assembly).

NOTE: The power from the VTO sense line must drop about 15 dB (−18 dBm) before a VTO failure message occurs. This condition could cause the VTO frequency to be noisy and low in power.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 8 (A22) and 9 (A23).
- Check test set AC power and fuses.
- Check Test Set-IF Interconnect cable.
- Refer to TEST SET TROUBLESHOOTING section to check test set.

VTO OVER-RANGE

The VTO swept beyond its normal range. It is detected by the A3 U6 VTO end of range detector on the test set A3 VTO summing amplifier.

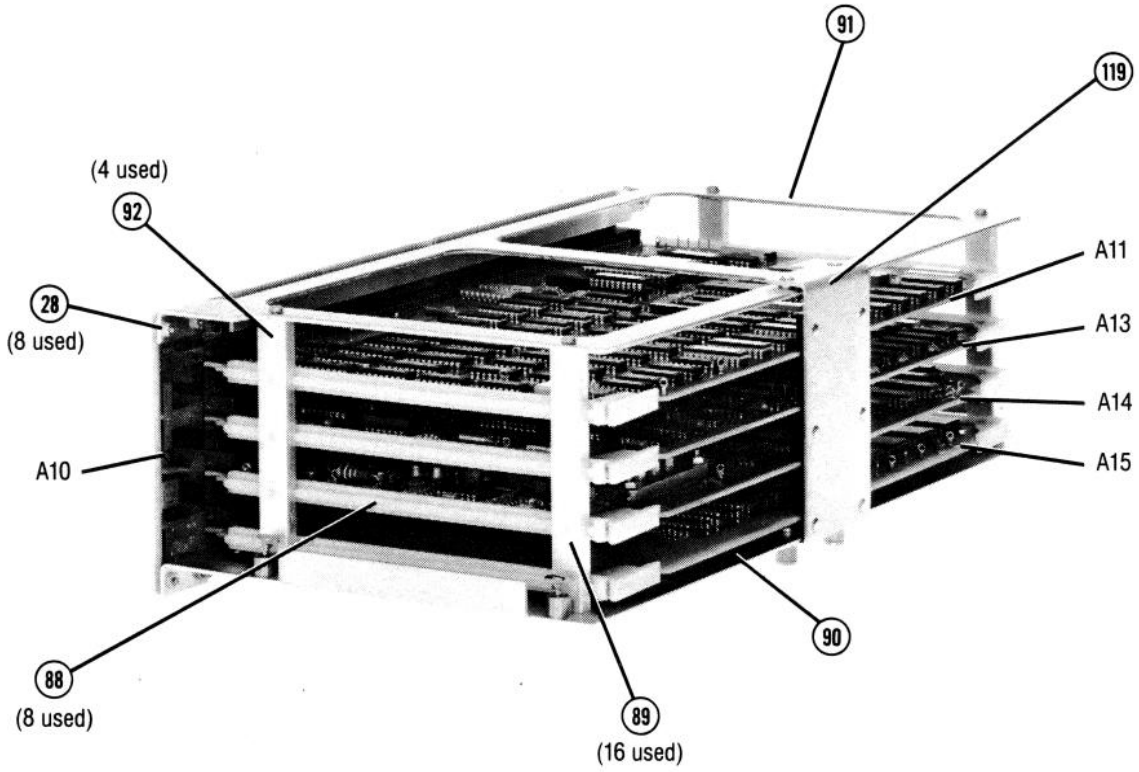
Probable cause of error:

- VTO (test set).
- A3 VTO summing amplifier (test set).
- A23 main phase lock (HP 85102).
- A20 sweep ADC (HP 85102).
- Source off frequency.
- VTUNE line to test set A3 summing amplifier (from HP 85102 A23 main phase lock assembly).
- HP 85102 0-10V swept input is not connected (BNC).

NOTE: If this error occurs **only** when the HP 8430/41 source is in the RAMP mode, the problem is probably either the source or the HP 85102 A20 sweep ADC assembly.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 2 (A20) and 9 (A23).
- Check the source, especially the 0 − 10 volt ramp linearity.
- Check the VTO and A3 Summing Amp board: refer to TEST SET TROUBLESHOOTING.



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10	85101-60010	4	1	BOARD ASSEMBLY, DAUGHTER	28480	85101-60010
A11	85101-60211	7	1	BOARD ASSEMBLY, PROCESSOR (NEW)	28480	85101-60211
A11	85101-69211	5	1	BOARD ASSEMBLY, PROCESSOR (REBUILT)	28480	85101-69211
A12				NOT ASSIGNED		
A13	85101-60212	8	1	BOARD ASSEMBLY, MEMORY (NEW)	28480	85101-60212
A13	85101-60231	1	1	BOARD ASSEMBLY, (NEW) (FIRMWARE REVISION 4.0 OR HIGHER)	28480	85101-60231
A13	85101-69231	9	1	BOARD ASSEMBLY, (REBUILT) (FIRMWARE REVISION LOWER THAN 4.0)	28480	85101-69231
A13	85101-69212	6	1	BOARD ASSEMBLY, MEMORY (REBUILT)	28480	85101-69212
A14	85101-60221	9	1	BOARD ASSEMBLY, DISPLAY GEN (NEW)	28480	85101-60221
A14	85101-69221	7	1	BOARD ASSEMBLY, DISPLAY GEN (REBUILT)	28480	85101-69221
A15	85101-60222	0	1	BOARD ASSEMBLY, IO (NEW)	28480	85101-60222
A15	85101-69222	8	1	BOARD ASSEMBLY, IO (REBUILT)	28480	85101-69222
A16				NOT ASSIGNED		
28	2200-0105	4	28	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
88	0403-0442	0	8	GUIDE-PC BD WHT NYL .062-IN-BD-THKNS	28480	0403-0442
89	4040-0771	2	16	LOCKING TAB 0.312 IN DIA; 0.040 IN	28480	4040-0771
90	85101-00007	3	1	CARD CAGE BOTTOM	28480	85101-00007
91	85101-00008	4	1	CARD CAGE-TOP	28480	85101-00008
92	85101-20026	8	4	CARD GUIDE SPRT	28480	85101-20026
119	85101-00009	5	1	PC BOARD LOCK	28480	85101-00009

Figure 10. HP 85101 Card Cage Assembly

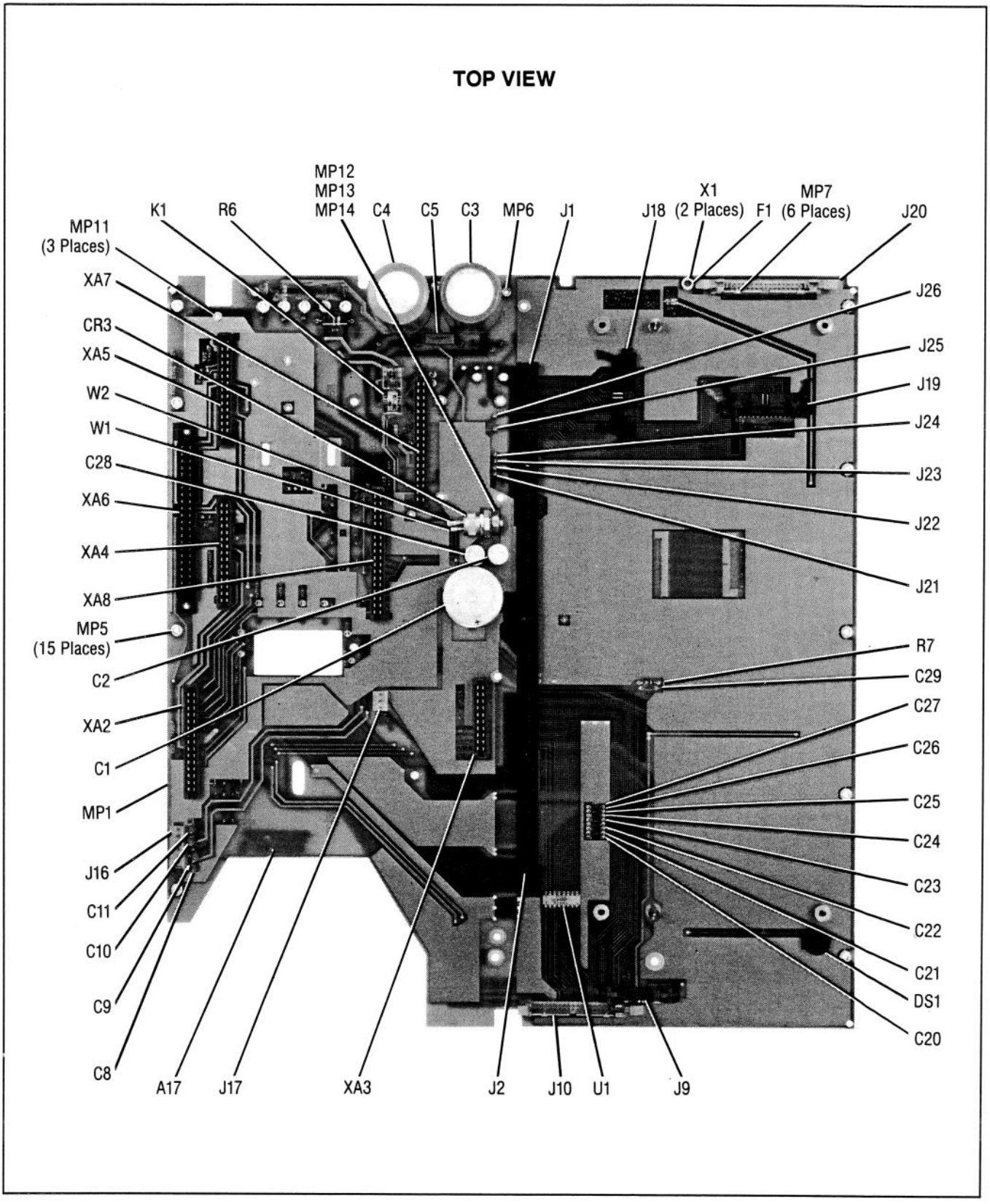


Figure 11. HP 85101 Mother Board Assembly (1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A17	85101-60230	0	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A17 IS ORDERED: C1, C3, C4	28480	85101-60230
C1	0180-2908	3	1	CAPACITOR-FXD 6300UF 28V	28480	0180-2908
C2	0180-0582	5	1	CAPACITOR-FXD 270UF+100-10% 40VDC AL	00853	301EN271U040B
C3	0180-3359	0	2	CAPACITOR FXD 500UF 250V	28480	0180-3359
C4	0180-3359	0		CAPACITOR FXD 500UF 250V	28480	0180-3359
C5	0160-4048	4	1	CAPACITOR-FXD .022UF ±20% 250VAC(RMS)	C0633	PME 271 M 522
C8	0180-4030	6	4	CAPACITOR-FXD 4.7UF±10% 50VDC TA	28480	0180-4030
C9	0180-4030	6		CAPACITOR-FXD 4.7UF±10% 50VDC TA	28480	0180-4030
C10	0180-4030	6		CAPACITOR-FXD 4.7UF±10% 50VDC TA	28480	0180-4030
C11	0180-4030	6		CAPACITOR-FXD 4.7UF±10% 50VDC TA	28480	0180-4030
C20-27	0160-4801	7	8	CAPACITOR-FXD 100PF ±5% 100VDC CER	28480	0160-4801
C28	0180-0582	5	1	CAPACITOR-FXD 270UF+100-10% 40VDC AL	00853	301EN271U040B
C29	0160-4790	3	1	CAPACITOR-FXD 10PF ±5% 100VDC CER 0±30	28480	0160-4790
CR3	1884-0046	9	1	THYRISTOR-SCR VRRM=50	03508	C230F
DS1	0960-0561	4	1	AUDIO TRANSDUCER 1-3VDC; 85DB AT 1.5V	28480	0960-0561
F1	2110-0047	3	1	FUSE 1A 125V	28480	2110-0047
J1	1251-7472	8	2	CONN-POST TYPE .100-PIN-SPCG 110-CONT	28480	1251-7472
J2	1251-7472	8		CONN-POST TYPE .100-PIN-SPCG 110-CONT	28480	1251-7472
J9	1251-5745	4	1	CONNECTOR 20-PIN M POST TYPE (A17J9 DOES NOT INCLUDE A17MP6 & A17MP7)	28480	1251-5745
J10	1251-7169	0	2	CONNECTOR 34-PIN M POST TYPE	28480	1251-7169
J16	1252-2462	8	1	CONN-POST TYPE .156-PIN-SPCG 6-CONT	28480	1252-2462
J17	1252-2461	7	1	CONN-POST TYPE .156-PIN-SPCG 3-CONT	28480	1252-2461
J18	1252-0693	3	2	CONN-POST TYPE .100-PIN-SPCG 24-CONT (A17J18 DEOS NOT INCLUDE A17MP12&A17MP13	28480	1251-7758
J19	1252-0693	3		CONN-POST TYPE .100-PIN-SPCG 24-CONT (A17J19 DEOS NOT INCLUDE A17MP14&A17MP15	28480	1251-7758
J20	1251-7169	0	1	CONNECTOR 34-PIN M POST TYPE (A17J20 DEOS NOT INCLUDE A17MP10&A17MP11	28480	1251-7169
J21	0360-0124	3	6	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J22	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J23	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J24	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J25	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J26	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
K1	0490-1433	4		RELAY	25088	8031S
MP1	0520-0174	3	2	SCREW-MACH 2-56 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP5	86701-20036	8	1	MTG BLOCK DIODE	28480	86701-20036
MP6	1251-5595	2	6	POLARIZING KEY-POST CONN	28480	1251-5595
MP7	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP11	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP12	1251-7970	1	4	LATCH-AMP-LATCH CONN	28480	1251-7970
MP13	1251-7970	1		LATCH-AMP-LATCH CONN	28480	1251-7970
MP14	1251-7970	1		LATCH-AMP-LATCH CONN	28480	1251-7970
R6	0690-6841	2	1	RESISTOR 680K 10% 1W CC TC=0+882	01121	GB6841
R7	0698-3442	9	1	RESISTOR 237K 1% .125W F TC=0±100	24546	C4-1/8-T0-237R-F
U1	1810-0037	3		NETWORK-RES 16-DIP1.0K OHM X 8	11236	761-3-R1K
W1	8151-0013	2	2	WIRE 22 1X22	00000	ORDER BY DESCRIPTION
W2	8151-0013	2		WIRE 22 1X22	00000	ORDER BY DESCRIPTION
X1	1251-2313	1	1	CONN SGL CONT.04	28480	1251-2313
XA2	1251-2035	9	3	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA3	1251-2034	8	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	28480	1251-2034
XA4	1251-2035	9		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA5	1251-2035	9		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA6	1251-7882	4	1	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
XA7	1251-2026	8	2	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	28480	1251-2026
XA8	1251-2026	8		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	28480	1251-2026

Figure 11. HP 85101 Mother Board Assembly (2 of 4)

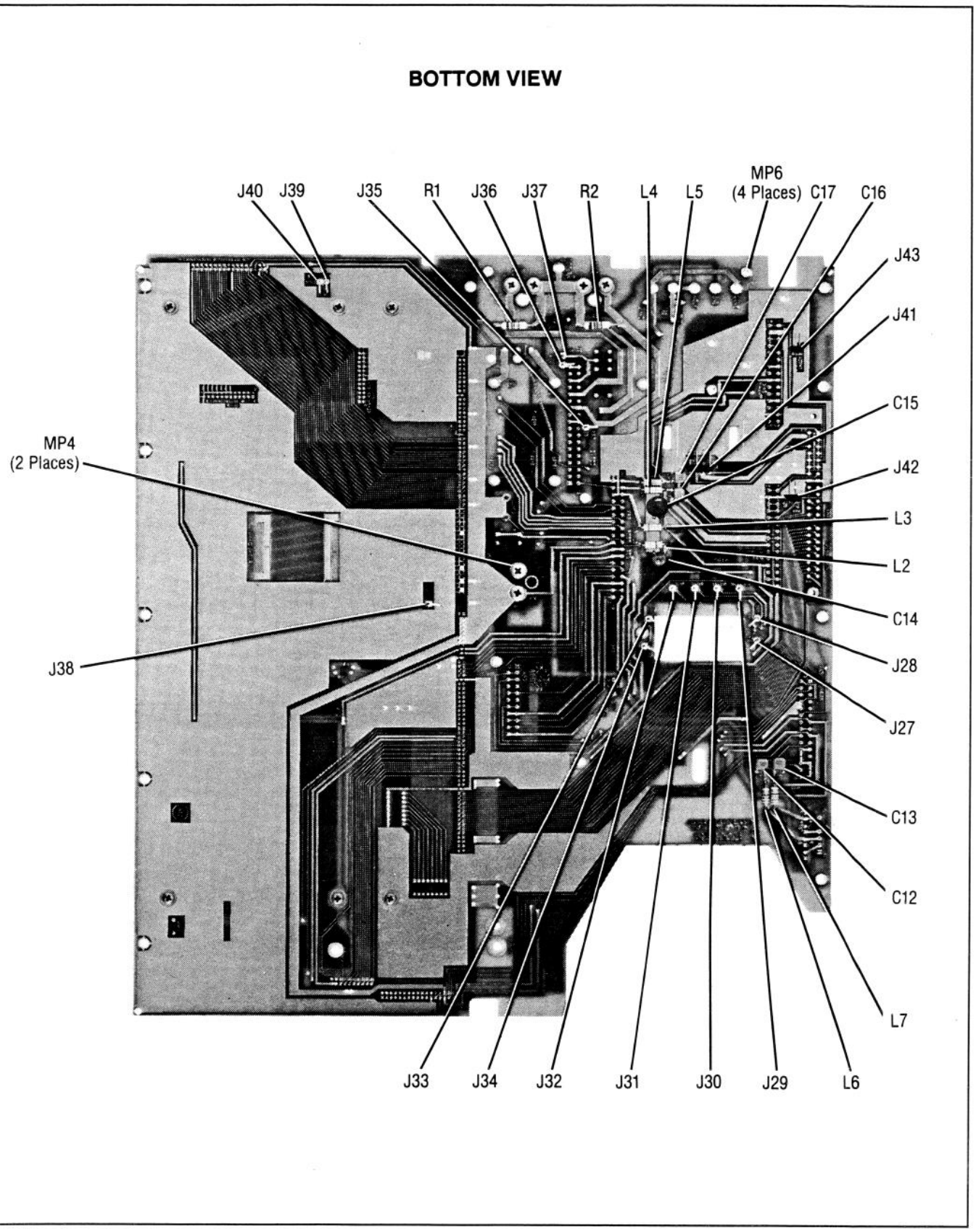


Figure 11. HP 85101 Mother Board Assembly (3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2				NOT ASSIGNED		
A3				NOT ASSIGNED		
A4				NOT ASSIGNED		
A5	85102-60203	8	1	BOARD ASSY, TEST SYNCHRONOUS DET. (NEW)	28480	85102-60203
A5	85102-69203	6	1	BOARD ASSY, TEST SYNCHRONOUS DET. (REBUILT)	28480	85102-69203
A6	85102-60006	9	1	BOARD ASSEMBLY, CLOCK (NEW)	28480	85102-60006
A6	85102-69006	7	1	BOARD ASSEMBLY, CLOCK (REBUILT)	28480	85102-69006
A7	85102-60203	8	1	BOARD ASSY, REF SYNCHRONOUS DET (NEW) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXITING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-60203
A7	85102-69203	6	1	BOARD ASSY, REF SYNCHRONOUS DET (REBUILT) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXITING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-69203
A8	85102-60008	1	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (NEW)	28480	85102-60008
A8	85102-69008	9	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (REBUILT)	28480	85102-69008
A9	85102-60206	1	1	BOARD ASSEMBLY, B2 IF MIXER (NEW)	28480	85102-60206
A9	85102-69206	9	1	BOARD ASSEMBLY, B2 IF MIXER (REBUILT)	28480	85102-69206
A10	85102-60010	5	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (NEW)	28480	85102-60010
A10	85102-69010	3	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (REBUILT)	28480	85102-69010
A11	85102-60206	1	1	BOARD ASSEMBLY, B1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A11).	28480	85102-60206
A11	85102-69206	9		BOARD ASSEMBLY, B1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A11).	28480	85102-69206
A12	85102-60010	5	1	BOARD ASSEMBLY, REF IF AMPLIFIER (NEW) (SAME AS A10; USE PREFIX A12).	28480	85102-60010
A12	85102-69010	3	1	BOARD ASSEMBLY, REF IF AMPLIFIER (REBUILT) (SAME AS A10; USE PREFIX A12).	28480	85102-69010
A13	85102-60206	1	1	BOARD ASSEMBLY, A2 IF MIXER (NEW) (SAME AS A9; USE PREFIX A13).	28480	85102-60206
A13	85102-69206	9	1	BOARD ASSEMBLY, A2 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A13).	28480	85102-69206
A14	85102-60206	1	1	BOARD ASSEMBLY, A1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A14).	28480	85102-60206
A14	85102-69206	9	1	BOARD ASSEMBLY, A1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A14).	28480	85102-69206
A15	85102-60015	0	1	BOARD ASSEMBLY, REGULATOR (NEW)	28480	85102-60015
A15	85102-69015	8	1	BOARD ASSEMBLY, REGULATOR (REBUILT)	28480	85102-69015
A16	85102-60235	6	1	REMOTE APPLICATIONS BOARD (NEW)	28480	85102-60235
A16	85102-69235	4	1	REMOTE APPLICATIONS BOARD (REBUILT)	28480	85102-69235
A17	85102-60212	9	1	BOARD ASSEMBLY, SAMPLE AND HOLD (NEW)	28480	85102-60212
A17	85102-69212	7	1	BOARD ASSEMBLY, SAMPLE AND HOLD (REBUILT)	28480	85102-69212
A18	85102-60208	3	1	BOARD ASSEMBLY, A/D CONVERTER (NEW)	28480	85102-60208
A18	85102-69208	1	1	BOARD ASSEMBLY, A/D CONVERTER (REBUILT)	28480	85102-69208
A19	85102-60019	4	1	BOARD ASSEMBLY, ADC CONTROL (NEW)	28480	85102-60019
A19	85102-69019	2	1	BOARD ASSEMBLY, ADC CONTROL (REBUILT)	28480	85102-69019
A20	85102-60234	5	1	BOARD ASSEMBLY, SWEEP ADC (NEW)	28480	85102-60234
A20	85102-69234	3	1	BOARD ASSEMBLY, SWEEP ADC (REBUILT)	28480	85102-69234
A21	85102-60021	8	1	BOARD ASSEMBLY, IF COUNTER (NEW)	28480	85102-60021
A21	85102-69021	6	1	BOARD ASSEMBLY, IF COUNTER (REBUILT)	28480	85102-69021
A22	85102-60204	9	1	BOARD ASSEMBLY, PRETUNE CONTROL (NEW)	28480	85102-60204
A22	85102-69204	7	1	BOARD ASSEMBLY, PRETUNE CONTROL (REBUILT)	28480	85102-69204
A23	85102-60227	6	1	BOARD ASSEMBLY, MAIN PHASE LOCK (NEW)	28480	85102-60227
A23	85102-69227	4	1	BOARD ASSEMBLY, MAIN PHASE LOCK (REBUILT)	28480	85102-69227
A24	85102-60024	1	1	BOARD ASSY, PROCESSOR INTERFACE (NEW)	28480	85102-60024
A24	85102-69024	7	1	BOARD ASSY, PROCESSOR INTERFACE (REBUILT)	28480	85102-69024
A26	85102-60026	3	1	BOARD ASSEMBLY, RECTIFIER (NEW)	28480	85102-60026
A26	85102-69026	1	1	BOARD ASSEMBLY, RECTIFIER (REBUILT)	28480	85102-69026

Figure 17. HP 85102 Board Location (2 of 2)

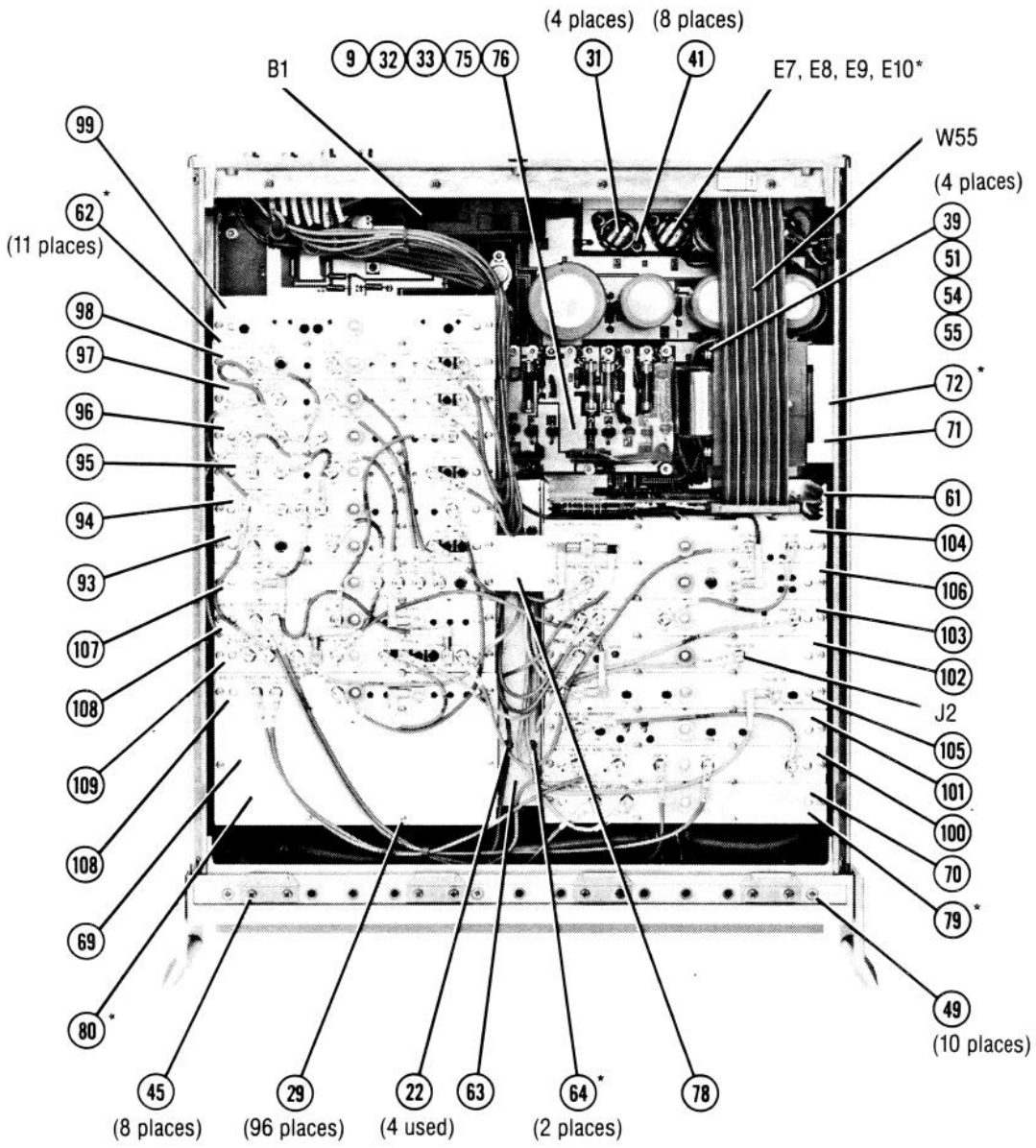


Figure 18. HP 85102 Top Internal (1 of 2)

Pulsed-RF Service Information

This section includes information pertaining to the pulsed-RF measurement capability portion of the HP 8510B Network Analyzer and should be used in conjunction with the standard HP 8510B manual set. This information applies to HP 8510Bs with Pulsed-RF Measurement Capability (Option 008). If your HP 8510B does not include option 008, you may discard this information.

Place this section, including the Pulsed-RF Measurement Capability (Option 008) tab, at the end of your HP 8510B Service manual (HP part number 08510-90078). If you do not have a service manual, you may discard this information.

The information in this pulsed-RF section is organized in the same sequence as the tabs in the HP 8510B Service manual. Information contained in the standard HP 8510B Service manual will not be duplicated here; only information unique to the pulsed-RF system will appear here.

SERVICE OVERVIEW

As with the standard HP 8510 system, the service strategy of the pulsed-RF system is to locate the faulty board or assembly and replace it with a new or rebuilt one.

Refer to the tab entitled Service Overview in this manual for more troubleshooting information on the standard HP 8510 system, if necessary.

TEST AND REPAIR

This section contains troubleshooting procedures and block diagrams for the pulsed-RF system. The troubleshooting procedure allows you to isolate the majority of all HP 8510 Pulsed-RF system problems to an instrument or board level.

UNRATIOED POWER TEST

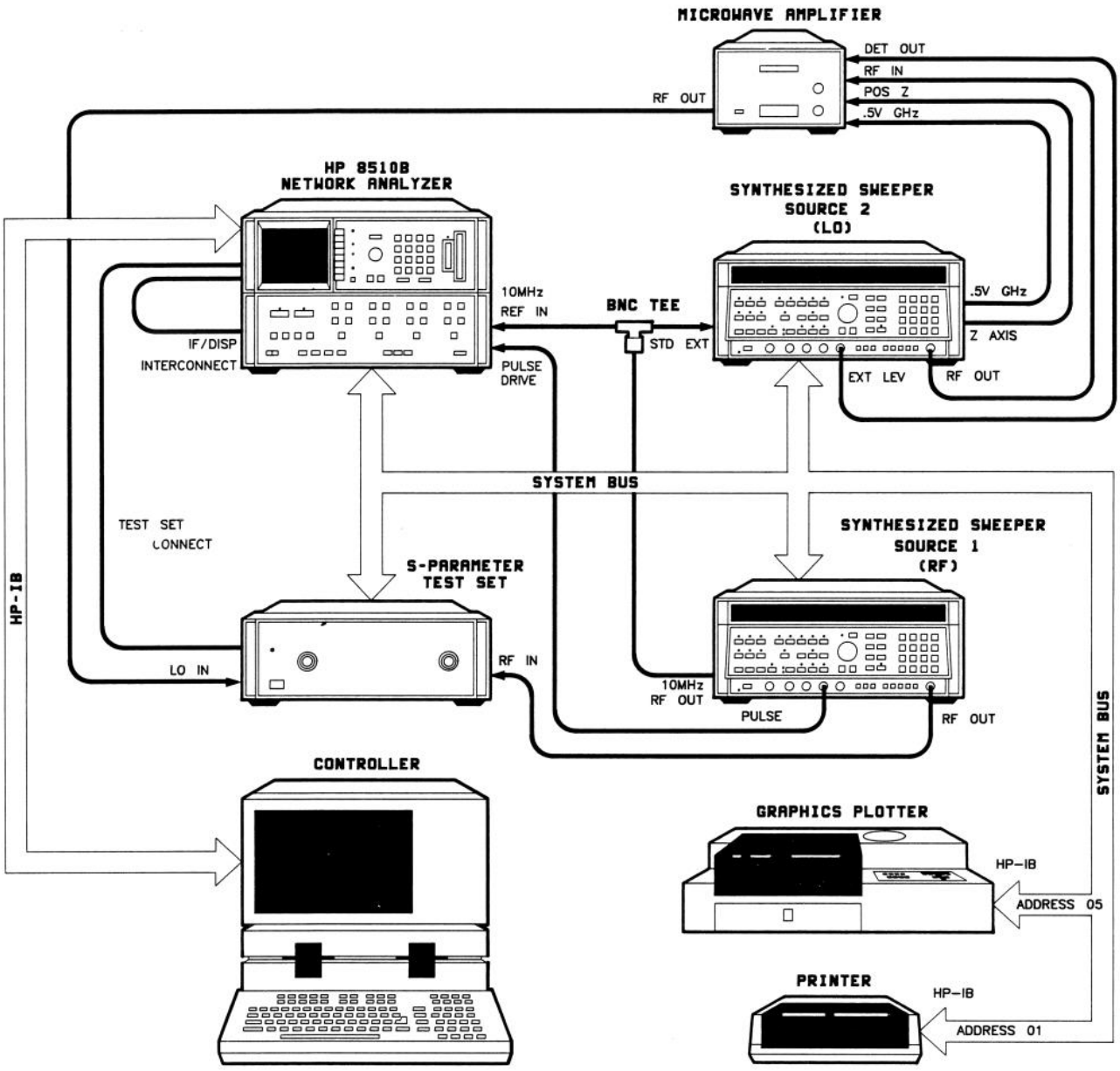
This test is a useful troubleshooting tool. Refer to the HP 85110A Test Set Manual (HP part number 85110-90001) for the unratioed power test procedure.

BLOCK DIAGRAMS

A functional block diagram (Figure 1) for the HP 8510B pulsed-RF system and an HP 8510B Option 008 block diagram (Figure 2) are included as troubleshooting tools.

HP 8510B PULSED-RF SYSTEM TROUBLESHOOTING

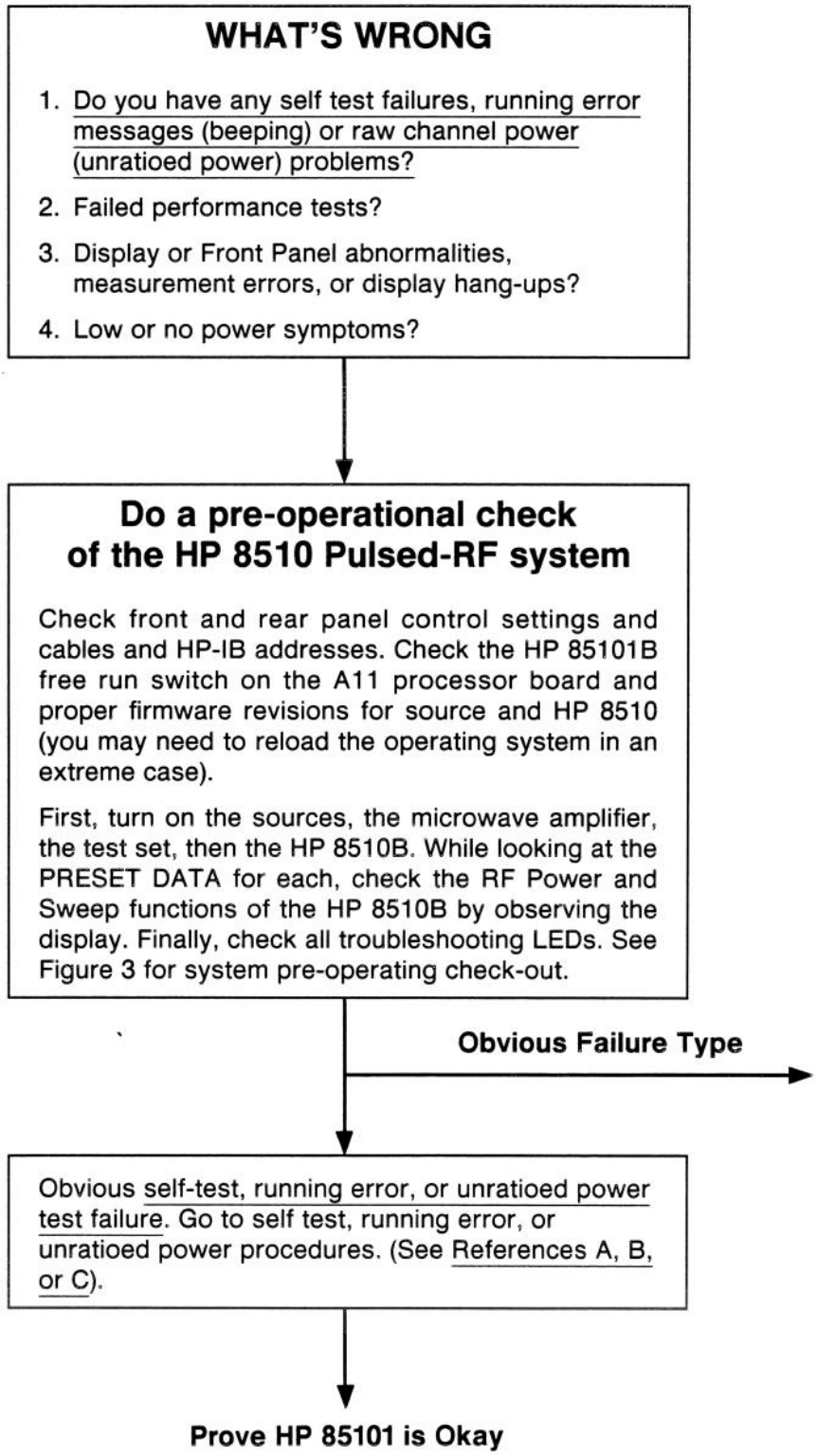
The following procedure is an outline of the procedure taught during the HP 8510 service seminar and is therefore more effective for those who have taken the seminar. Untrained customers and other service people can also use this procedure if thoroughly familiar with the HP 8510 Operating and Service Manuals, or guided by a trained HP 8510 customer engineer. Most troubleshooting tools mentioned in this procedure are automated and built into the HP 8510B firmware. Refer to Figure 3 for equipment set up.

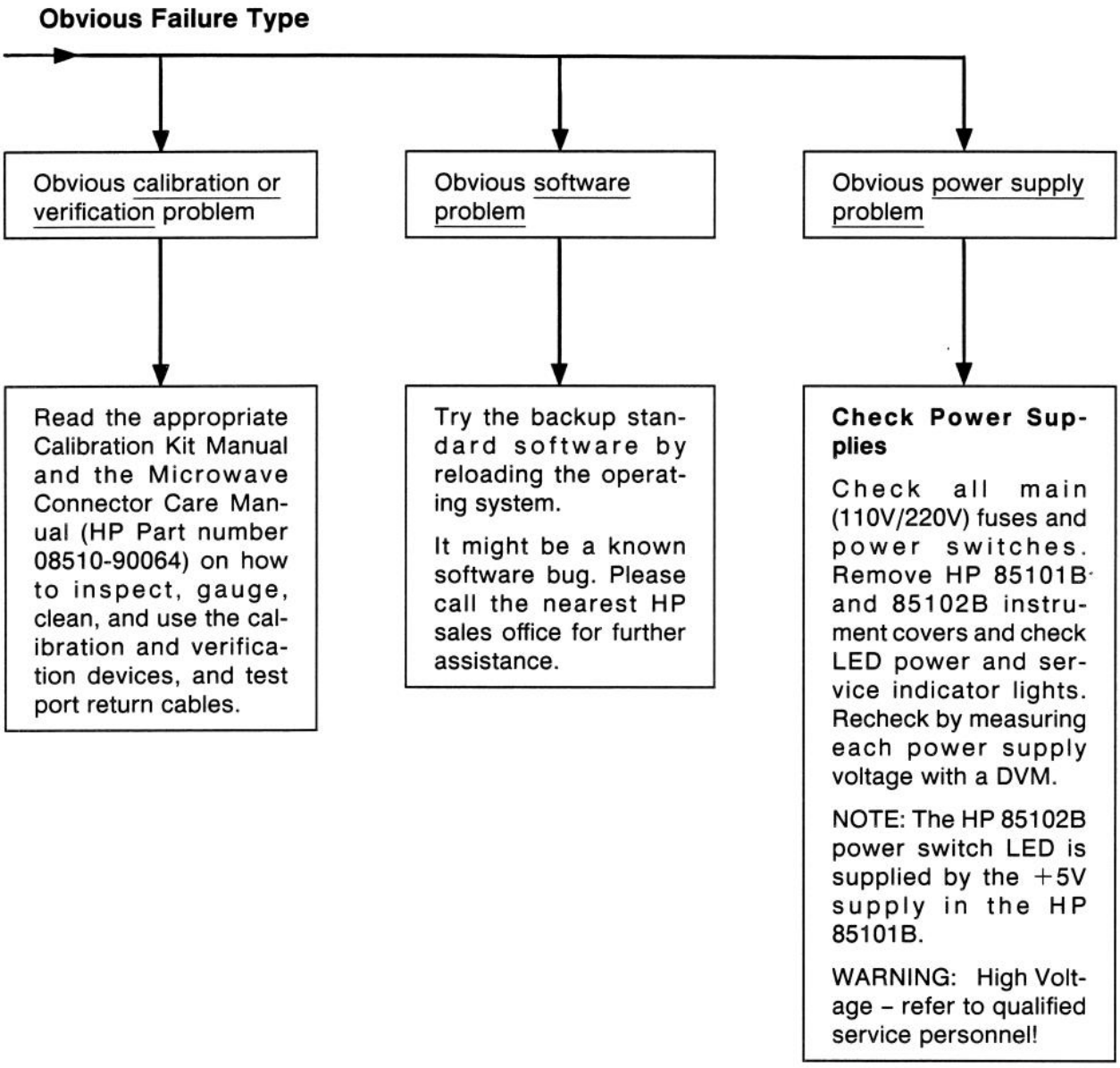


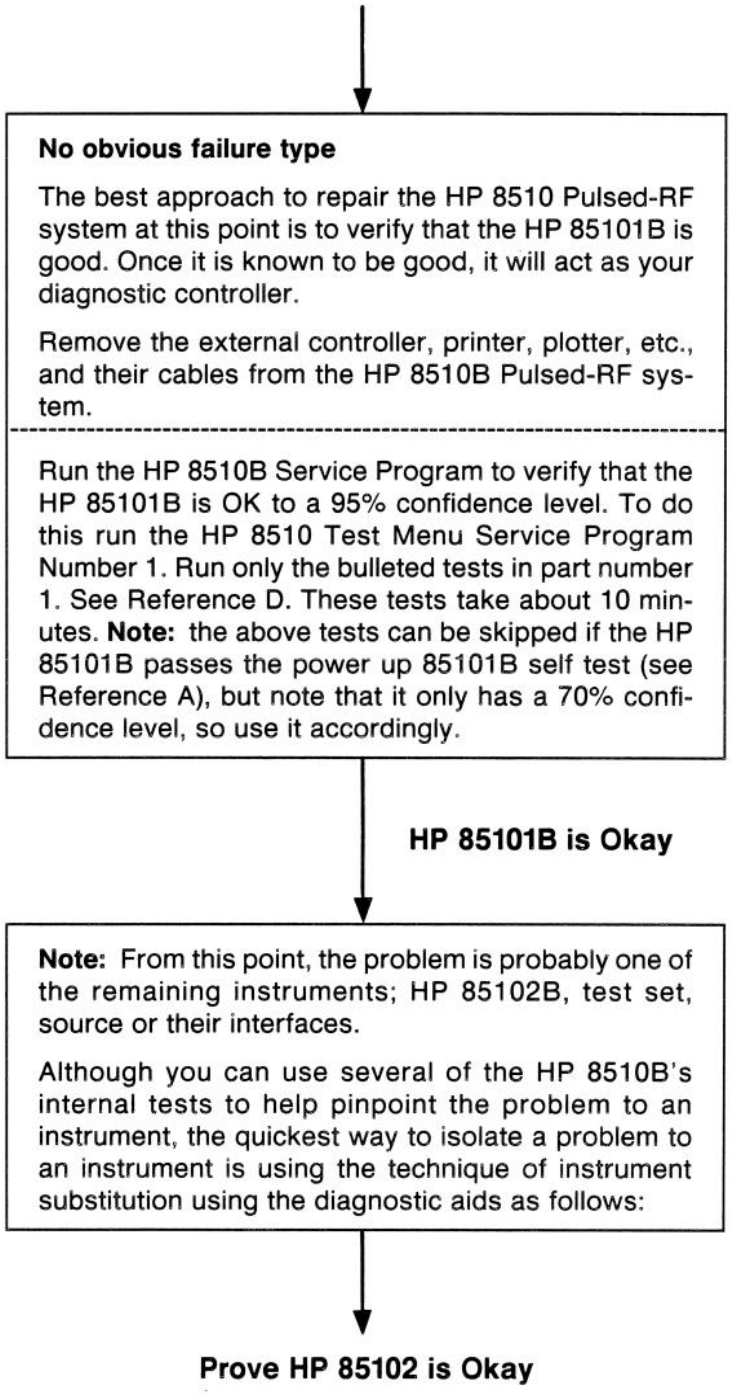
STANDARD HP-IB ADDRESSES FOR 8510 SYSTEM BUS INSTRUMENTS	
HP 8510 HP-IB ADDRESS	16
SYSTEM BUS ADDRESS	17
SOURCE ADDRESS	LO 18
SOURCE ADDRESS	RF 19
TEST SET ADDRESS	#1 20
TEST SET ADDRESS (OPTIONAL)	#2 21
PLOTTER ADDRESS	05
PRINTER ADDRESS	01

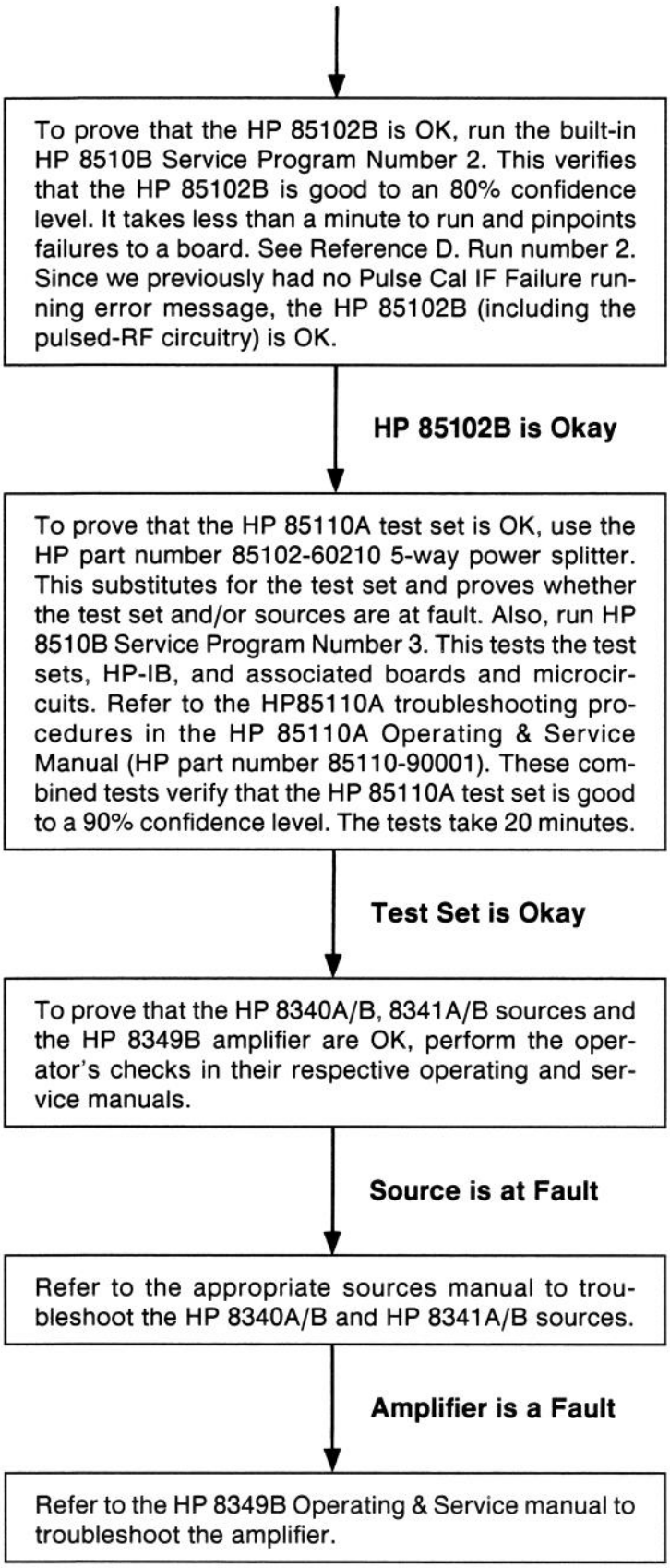
Figure 3. HP 8510B Pulsed-RF System Bus Instruments

Abbreviated HP 8510B Pulsed-RF System Service Flow Chart (How to Troubleshoot the System to the Instrument and Board Level)




Obvious Failure Type
Obvious calibration or verification problem
Obvious software problem
Obvious power supply problem
Read the appropriate Calibration Kit Manual and the Microwave Connector Care Manual (HP Part number 08510-90064) on how to inspect, gauge, clean, and use the calibration and verification devices, and test port return cables.
Try the backup standard software by reloading the operating system.
It might be a known software bug. Please call the nearest HP sales office for further assistance.
Check Power Supplies
Check all main (110V/220V) fuses and power switches. Remove HP 85101B and 85102B instrument covers and check LED power and service indicator lights. Recheck by measuring each power supply voltage with a DVM.
NOTE: The HP 85102B power switch LED is supplied by the +5V supply in the HP 85101B.
WARNING: High Voltage – refer to qualified service personnel!


No obvious failure type
The best approach to repair the HP 8510 Pulsed-RF system at this point is to verify that the HP 85101B is good. Once it is known to be good, it will act as your diagnostic controller.
Remove the external controller, printer, plotter, etc., and their cables from the HP 8510B Pulsed-RF system.
Run the HP 8510B Service Program to verify that the HP 85101B is OK to a 95% confidence level. To do this run the HP 8510 Test Menu Service Program Number 1. Run only the bulleted tests in part number 1. See Reference D. These tests take about 10 minutes. Note: the above tests can be skipped if the HP 85101B passes the power up 85101B self test (see Reference A), but note that it only has a 70% confidence level, so use it accordingly.
HP 85101B is Okay
Note: From this point, the problem is probably one of the remaining instruments; HP 85102B, test set, source or their interfaces.
Although you can use several of the HP 8510B's internal tests to help pinpoint the problem to an instrument, the quickest way to isolate a problem to an instrument is using the technique of instrument substitution using the diagnostic aids as follows:
Prove HP 85102 is Okay


To prove that the HP 85102B is OK, run the built-in HP 8510B Service Program Number 2. This verifies that the HP 85102B is good to an 80% confidence level. It takes less than a minute to run and pinpoints failures to a board. See Reference D. Run number 2. Since we previously had no Pulse Cal IF Failure running error message, the HP 85102B (including the pulsed-RF circuitry) is OK.
HP 85102B is Okay
To prove that the HP 85110A test set is OK, use the HP part number 85102-60210 5-way power splitter. This substitutes for the test set and proves whether the test set and/or sources are at fault. Also, run HP 8510B Service Program Number 3. This tests the test sets, HP-IB, and associated boards and microcircuits. Refer to the HP85110A troubleshooting procedures in the HP 85110A Operating & Service Manual (HP part number 85110-90001). These combined tests verify that the HP 85110A test set is good to a 90% confidence level. The tests take 20 minutes.
Test Set is Okay
To prove that the HP 8340A/B, 8341A/B sources and the HP 8349B amplifier are OK, perform the operator's checks in their respective operating and service manuals.
Source is at Fault
Refer to the appropriate sources manual to troubleshoot the HP 8340A/B and HP 8341A/B sources.
Amplifier is a Fault
Refer to the HP 8349B Operating & Service manual to troubleshoot the amplifier.

Reference	Description	Location
A	HP 8510B Automatic Self Tests	Built-in to HP 8510B
B	HP 8510B Running Error Messages	Built-in to HP 8510B
C	Unratioed Power Test	HP 85110A Test Set Manual
D	Built-in Diagnostics	HP 8510B Training Manual tab labelled "Diagnostics"

HP 85102B PULSED-RF CIRCUITRY TROUBLESHOOTING

Continue with the pulsed-RF circuitry troubleshooting procedure if the HP 8510B Pulsed-RF System Service Flow chart led you here. If not, return to this flow chart to verify that the HP 85102B is faulty.

The service of the pulsed-RF section of the HP 85102B is based on having the following spare boards:

Assembly	Description	HP Part Number
A2	Pulse Multiplexer	85102-60002*
A3, A4	Test/Ref. Pulse Detector	85102-60003*
A6	Clock	85102-60006
A16	Pulse Track and Hold	85102-60016*
A19	ADC Control	85102-60019
A20	SWEEP ADC	85102-60234

*Unique to the pulsed-RF system (Option 008)

Follow the procedure below to troubleshoot the pulsed-RF circuitry to the assembly level.

1. Turn off the system and replace the A2, A3, and A16 boards with your spare boards. If one of the Pulse Cal Failure running error messages appears on the CRT, replace the board it refers to (A3 = test channel, A4 = reference channel).

NOTE: Mark your spare boards somehow to keep them separate from the boards that are possibly bad.

2. Recable the HP 85102 and turn the system on.
3. If the system still appears to be broken, remove the spare detector board from the A3 slot and exchange it with the A4 board. Replace the original A3 board.

   Although the A3 and A4 boards are identical, they are adjusted at the factory and should remain in their original orientation if possible.

4. Turn the system back on.
5. One by one, exchange the spare boards with the original boards until the system does not work again. The last board replaced is the faulty board.
6. Replace all of the original boards except for the faulty board located in step 5.

If the A3, A4 or A16 boards were faulty, the A3 and A4 boards must be readjusted. Refer to the adjustment procedure later in this section.

A3/A4 PULSE DETECTOR ADJUSTMENT

If either the A3, A4 or A16 assembly is replaced, the A3 and A4 assemblies must be adjusted to minimize the circularity error. Follow the procedure on the next page to make this adjustment.

Connect the equipment as shown in Figure 4. This is the standard pulse configuration except the HP 85102 is on top of the HP 85101, the connection from the RF source to the A2 assembly is different, and the two sources are disconnected from the system bus. Use the test cable and the SMA to SMB adapter to make the connection from the RF source output to the A2J3 input.

NOTE: Make sure to connect the source's 10 MHz REF OUT to the HP 85102's 10 MHz IN and set the LO source Frequency Standard switch to EXT.

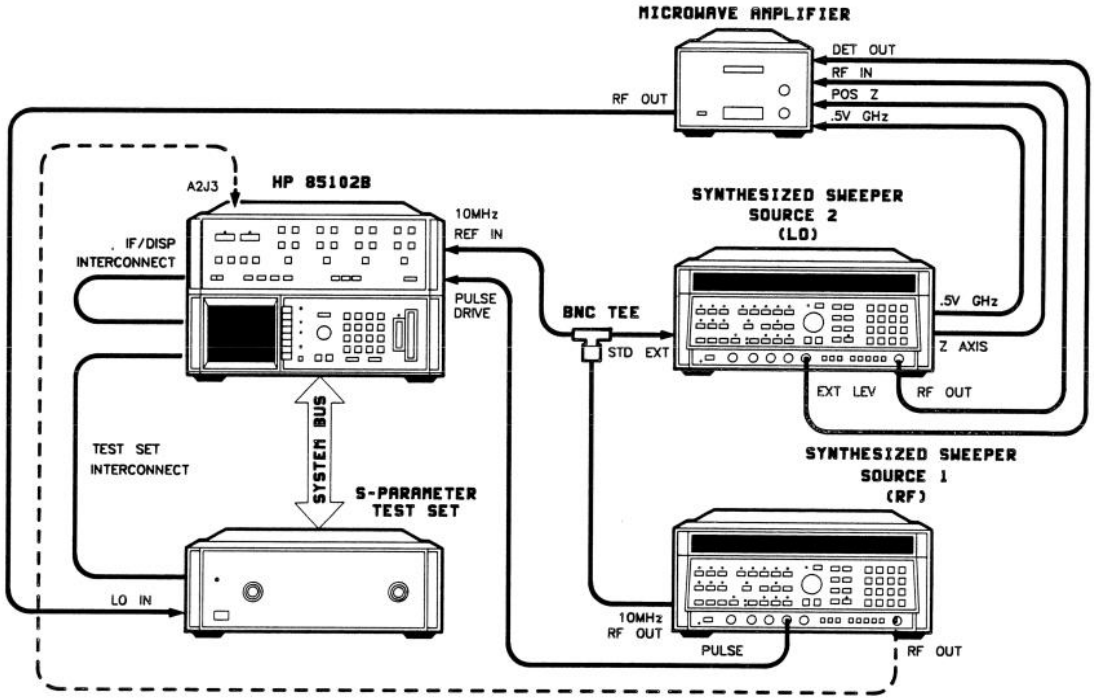


Figure 4. A3 Adjustment Procedure Setup

1. Allow the equipment to warm up for at least one hour.
2. On the HP 8510, press **[PRESET] [DOMAIN] [PULSE PROFILE]**. Ignore the SYSTEM BUS ADDRESS ERROR on the CRT display.
3. On the RF source, press **[LOCAL] [POWER LEVEL] [-] [1] [0] [GHz/dBm]**.
4. Press **[CW] [2] [0] [.] [1] [MHz/sec]**.
5. Press PARAMETER **[MENU] [USER 2 b2]**.
6. Press RESPONSE **[MENU] [AVERAGING ON] [8] [x1]**

   [SMOOTHING ON] [3] [x1]

   [REF VALUE] [= MARKER]

   [SCALE] [.] [0] [2] [x1]
7. Press **[SYSTEM] [RESET IF CORRECTION]**.
8. Adjust the two variable ceramic capacitors on the A3 Pulse Detector board (near J2 and J3) for minimum ripple. Press **[RESET IF CORRECTION]** at the end of each sweep while adjusting these capacitors. The ripple should be $\leq$0.04 dB peak-to-peak after **[RESET IF CORRECTION]**.

   NOTE: Noise can sometimes make this adjustment appear temporarily out of specification. Ignore non-repeatable spikes.

9. Return to step 5 but substitute **[USER 3 a2]** where applicable. Move the test cable to J5 on the A2 IF MUX board (refer to Figure 5) and replace the original cable on J3. Repeat this procedure from step 6 for the A4 board.

When the boards have been adjusted, turn the instruments OFF, remove the test cable and replace the original cable on J5. Replace the top cover on the HP 85102. The system can be reconfigured with the HP 85101 on top of the HP 85102 if desired.

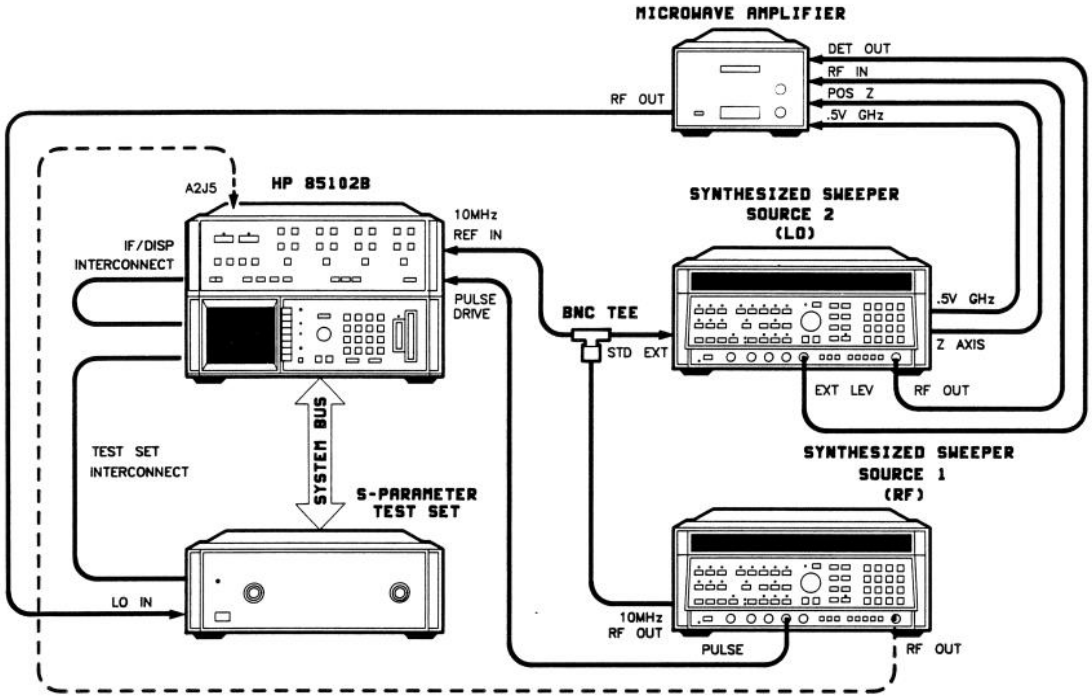


Figure 5. A4 Adjustment Procedure Setup

When the adjustments are complete, perform the settling time test later in this section to verify pulsed-RF system operation.

SETTLING TIME

Settling time is the time required for a ratioed, high-level measurement to reach within 0.1 dB of its final value when the system is in pulse profile mode. For the pulsed-RF system, the settling time is 1 μsecond.

The following procedure checks the settling time of the pulsed-RF system and indirectly checks the bandwidth of the system.

1. Connect the equipment as shown in Figure 3.
2. Turn the system on and load the system configuration tape for the pulsed-RF configuration (refer to the HP 8510 Introductory Pulsed-RF Measurements User's Guide).

3. On the HP 8510B press:

   DOMAIN **[PULSE PROFILE]**
   RESPONSE **[MENU] [AVERAGING ON/restart] [1] [2] [8] [x1]**
   STIMULUS **[MENU] [NUMBER of POINTS] [101]**

4. On the HP 8510B press:

   [MARKER] [1] [5] [.] [7] [M/μ] The trace should be settled at this time, so a magnitude reference can be taken here.

   [MARKER] [2] [1] [M/μ] The time at which the trace should be within 0.1 dB of its final value.

   [MARKER] [ΔMODE MENU] [ΔREF =2] [MARKER 1] The Δmarker value, shown in the upper left corner of the CRT, should be <0.1 dB. This shows that within 1 μsecond, the trace had settled to within 0.1 dB of it final value, as specified. Refer to Figure 6.

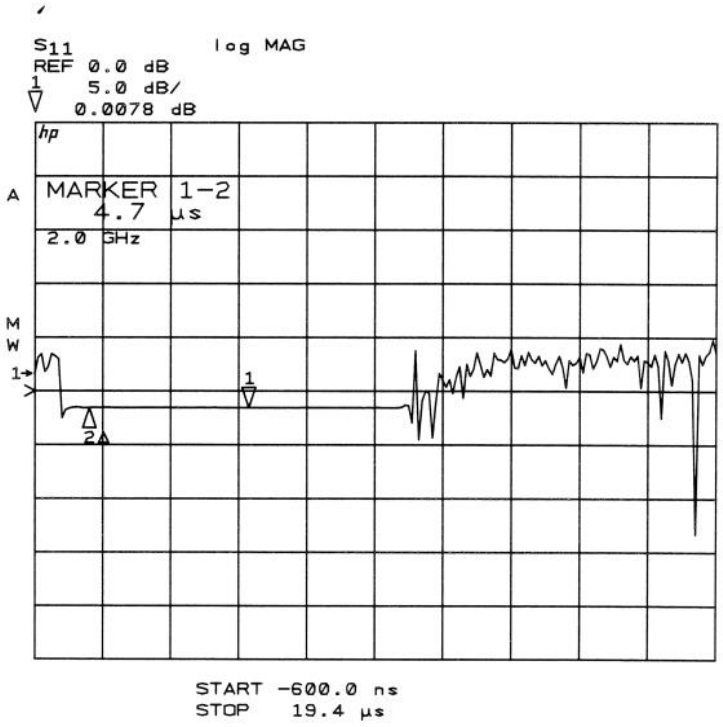


Figure 6. Settling Time Response

Replaceable Parts

Figure 7 thru 13 show the new replaceable parts list for the HP 85102B Option 008 IF Detector. Option 008 changes the HP 85102B only; all other replaceable parts are the same as for the standard HP 8510B.

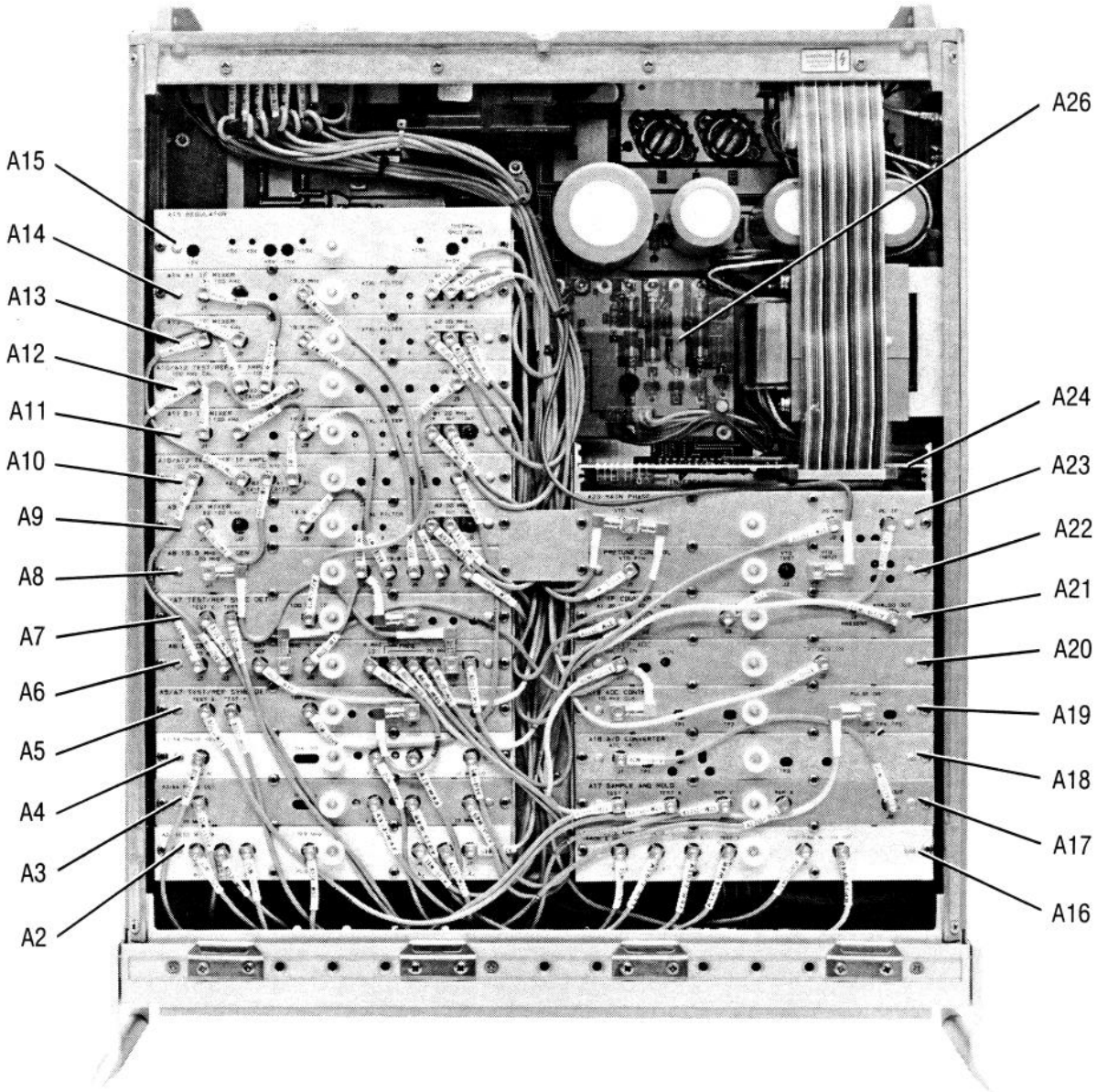


Figure 7. HP 85102 Option 008 Board Location (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	85102-60002	5	1	BOARD ASSY, PULSE MUX	28480	85102-60002
A3	85102-60003	6	1	BOARD ASSY, PULSE DETECTOR	28480	85102-60003
A4	85102-60003	6	1	BOARD ASSY, PULSE DETECTOR	28480	85102-60003
A5	85102-60203	8	1	BOARD ASSY, TEST SYNCHRONOUS DET. (NEW)	28480	85102-60203
A5	85102-69203	6	1	BOARD ASSY, TEST SYNCHRONOUS DET. (REBUILT)	28480	85102-69203
A6	85102-60006	9	1	BOARD ASSEMBLY, CLOCK (NEW)	28480	85102-60006
A6	85102-69006	7	1	BOARD ASSEMBLY, CLOCK (REBUILT)	28480	85102-69006
A7	85102-60203	8	1	BOARD ASSY, REF SYNCHRONOUS DET (NEW) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXISTING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-60203
A7	85102-69203	6	1	BOARD ASSY, REF SYNCHRONOUS DET (REBUILT) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXISTING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-69203
A8	85102-60008	1	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (NEW)	28480	85102-60008
A8	85102-69008	9	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (REBUILT)	28480	85102-69008
A9	85102-60206	1	1	BOARD ASSEMBLY, B2 IF MIXER (NEW)	28480	85102-60206
A9	85102-69206	9	1	BOARD ASSEMBLY, B2 IF MIXER (REBUILT)	28480	85102-69206
A10	85102-60010	5	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (NEW)	28480	85102-60010
A10	85102-69010	3	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (REBUILT)	28480	85102-69010
A11	85102-60206	1	1	BOARD ASSEMBLY, B1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A11).	28480	85102-60206
A11	85102-69206	9		BOARD ASSEMBLY, B1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A11).	28480	85102-69206
A12	85102-60010	5	1	BOARD ASSEMBLY, REF IF AMPLIFIER (NEW) (SAME AS A10; USE PREFIX A12).	28480	85102-60010
A12	85102-69010	3	1	BOARD ASSEMBLY, REF IF AMPLIFIER (REBUILT) (SAME AS A10; USE PREFIX A12).	28480	85102-69010
A13	85102-60206	1	1	BOARD ASSEMBLY, A2 IF MIXER (NEW) (SAME AS A9; USE PREFIX A13).	28480	85102-60206
A13	85102-69206	9	1	BOARD ASSEMBLY, A2 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A13).	28480	85102-69206
A14	85102-60206	1	1	BOARD ASSEMBLY, A1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A14).	28480	85102-60206
A14	85102-69206	9	1	BOARD ASSEMBLY, A1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A14).	28480	85102-69206
A15	85102-60015	0	1	BOARD ASSEMBLY, REGULATOR (NEW)	28480	85102-60015
A15	85102-69015	8	1	BOARD ASSEMBLY, REGULATOR (REBUILT)	28480	85102-69015
A16	85102-60016	1	1	REMOTE APPLICATIONS BOARD	28480	85102-60016
A17	85102-60212	9	1	BOARD ASSEMBLY, SAMPLE AND HOLD (NEW)	28480	85102-60212
A17	85102-69212	7	1	BOARD ASSEMBLY, SAMPLE AND HOLD (REBUILT)	28480	85102-69212
A18	85102-60208	3	1	BOARD ASSEMBLY, A/D CONVERTER (NEW)	28480	85102-60208
A18	85102-69208	1	1	BOARD ASSEMBLY, A/D CONVERTER (REBUILT)	28480	85102-69208
A19	85102-60019	4	1	BOARD ASSEMBLY, ADC CONTROL (NEW)	28480	85102-60019
A19	85102-69019	2	1	BOARD ASSEMBLY, ADC CONTROL (REBUILT)	28480	85102-69019
A20	85102-60234	5	1	BOARD ASSEMBLY, SWEEP ADC (NEW)	28480	85102-60234
A20	85102-69234	3	1	BOARD ASSEMBLY, SWEEP ADC (REBUILT)	28480	85102-69234
A21	85102-60021	8	1	BOARD ASSEMBLY, IF COUNTER (NEW)	28480	85102-60021
A21	85102-69021	6	1	BOARD ASSEMBLY, IF COUNTER (REBUILT)	28480	85102-69021
A22	85102-60204	9	1	BOARD ASSEMBLY, PRETUNE CONTROL (NEW)	28480	85102-60204
A22	85102-69204	7	1	BOARD ASSEMBLY, PRETUNE CONTROL (REBUILT)	28480	85102-69204
A23	85102-60227	6	1	BOARD ASSEMBLY, MAIN PHASE LOCK (NEW)	28480	85102-60227
A23	85102-69227	4	1	BOARD ASSEMBLY, MAIN PHASE LOCK (REBUILT)	28480	85102-69227
A24	85102-60024	1	1	BOARD ASSY, PROCESSOR INTERFACE (NEW)	28480	85102-60024
A24	85102-69024	7	1	BOARD ASSY, PROCESSOR INTERFACE (REBUILT)	28480	85102-69024
A26	85102-60026	3	1	BOARD ASSEMBLY, RECTIFIER (NEW)	28480	85102-60026
A26	85102-69026	1	1	BOARD ASSEMBLY, RECTIFIER (REBUILT)	28480	85102-69026

Figure 7. HP 85102 Option 008 Board Location (2 of 2)

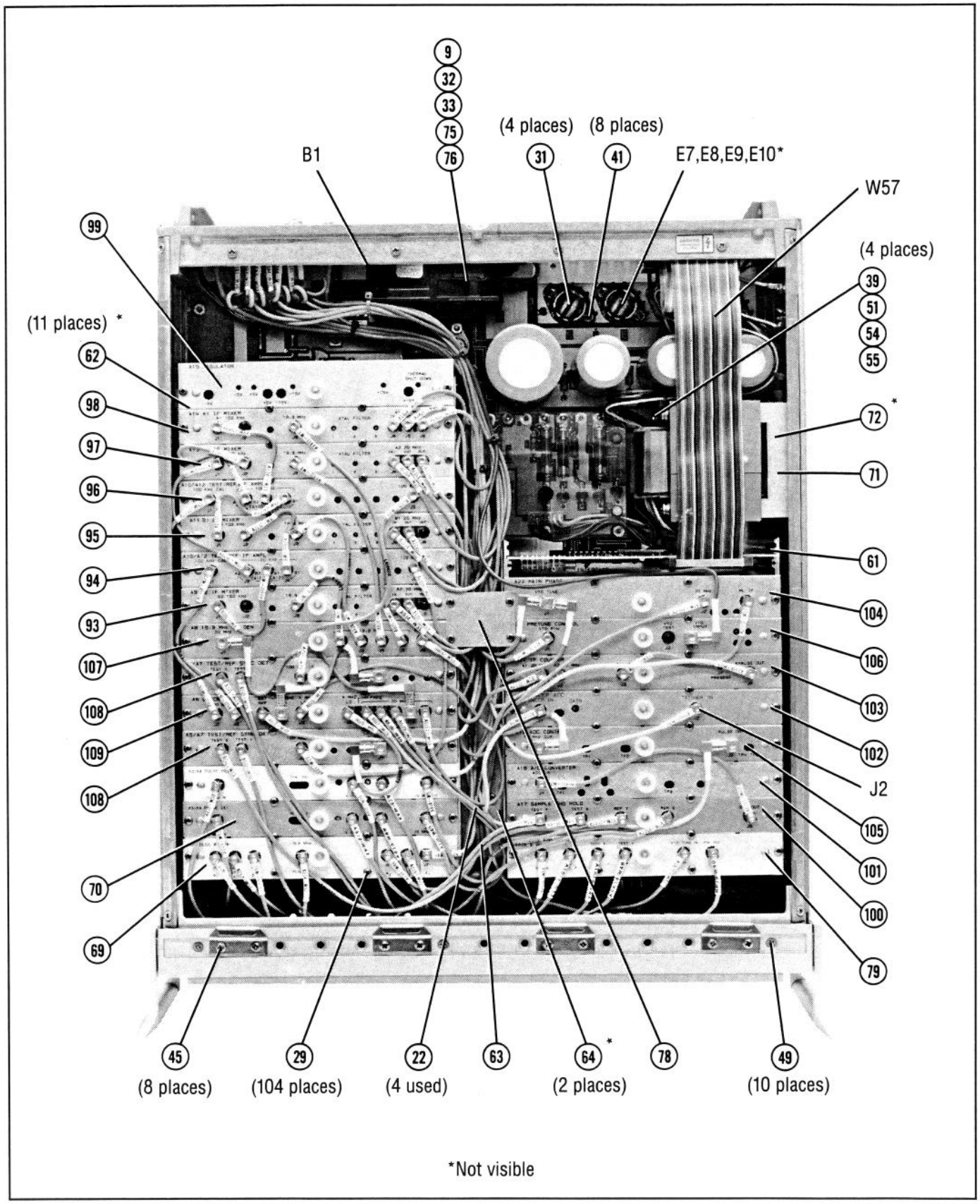


Figure 8. HP 85102 Option 008 Top Internal (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E7	0340-0596	1	4	INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E8	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E9	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E10	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
Q1	1854-0679	1	1	TRANSISTOR NPN 2N5885 SI TO-3 PD=200W	28480	1854-0679
Q2, Q4	1853-0351	4	2	TRANSISTOR PNP 2N6053 SI DARL TO-3	28480	1853-0351
Q3	1854-0611	1	1	TRANSISTOR NPN 2N6055 SI DARL TO-3	28480	1854-0611
W57	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	0624-0099	1	16	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
31	1205-0399	7	4	HEAT SINK SGL TO-3-CS	28480	1205-0399
32	1390-0104	3	1	FASTENER-SNAP-IN GROM PANEL THKNS	28480	1390-0104
33	1390-0281	7	1	FASTENER-SNAP-IN PLGR PANEL THKNS	28480	1390-0281
39	2190-0017	4	4	WASHER-LK HLCL NO. 8 .168-IN-ID	28480	2190-0017
42	2200-0113	4	8	SCREW-MACH 4-40 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
45	0515-0887	4	8	SCREW-MACH 6-32 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
49	2360-0333	8	10	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
51	2510-0138	0	4	SCREW-MACH 8-32 3-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
54	3050-0005	5	4	WASHER-SHLDR NO. 6 .14-IN-ID .375-IN-OD	28480	3050-0005
55	3050-0139	6	4	WASHER-FL MTLC NO. 8 .172-IN-ID	28480	3050-0139
61	08505-20133	4	1	ENCLOSURE CKT	28480	08505-20133
62	08505-20163	0	1	ENCLOSURE CKT	28480	08505-20163
63	85102-00028	9	1	BRACKET-WIREWAY	28480	85102-00028
64	85102-00029	0	2	BRACKET	28480	85102-00029
69	85102-00058	5	1	CVR-PLS IF MUX	28480	85102-00058
70	85102-00059	6	2	CVR-PLS DETECTOR	28480	85102-00059
71	85102-20070		1	MOUNT TRANSFORMER	28480	85102-20070
72	85102-20070		1	MOUNT TRANSFORMER	28480	85102-20070
75	85102-20058	7	1	SAFETY COVER	28480	85102-20058
76	85102-20059	8	1	SAFETY COVER	28480	85102-20059
78	85102-00037	0	1	CLIP	28480	85102-00037
79	85102-00060	9	1	CVR-REM APP/T&H	28480	85102-00060
93	85102-00009	6	1	CVR-RF B2 IF MXR	28480	85102-00009
94	85102-00010	9	1	CVR-TEST IF AMP	28480	85102-00010
95	85102-00011	0	1	CVR-RF B1 IF MXR	28480	85102-00011
96	85102-00012	1	1	CVR-REF IF AMP	28480	85102-00012
97	85102-00013	2	1	CVR-RF A2 IF MXR	28480	85102-00013
98	85102-00014	3	1	CVR-RF A1 IF MXR	28480	85102-00014
99	85102-00015	4	1	COVER-REGULATOR	28480	85102-00015
100	85102-00017	6	1	CVR-RF SMPL/HLD	28480	85102-00017
101	85102-00018	7	1	COVER-A/D CONVTR	28480	85102-00018
102	85102-00020	1	1	CVR-RF SWP ADO	28480	85102-00020
103	85102-00021	2	1	CVR-RF IF CNTR	28480	85102-00021
104	85102-00023	4	1	CVR-RF MAIN P/L	28480	85102-00023
105	85102-00019	8	1	CVR-RF ADC	28480	85102-00019
106	85102-00022	3	1	CVR-RF PRETUNE CONTROL	28480	85102-00022
107	85102-00008	5	1	CVR-RF 19.9 MHZ LO	28480	85102-00008
107	85102-00005	2	1	CVR-RF SYNC DET	28480	85102-00005
109	85102-00006	3	1	CVR A6 CLOCK	28480	85102-00006

Figure 8. HP 85102 Option 008 Top Internal (2 of 2)

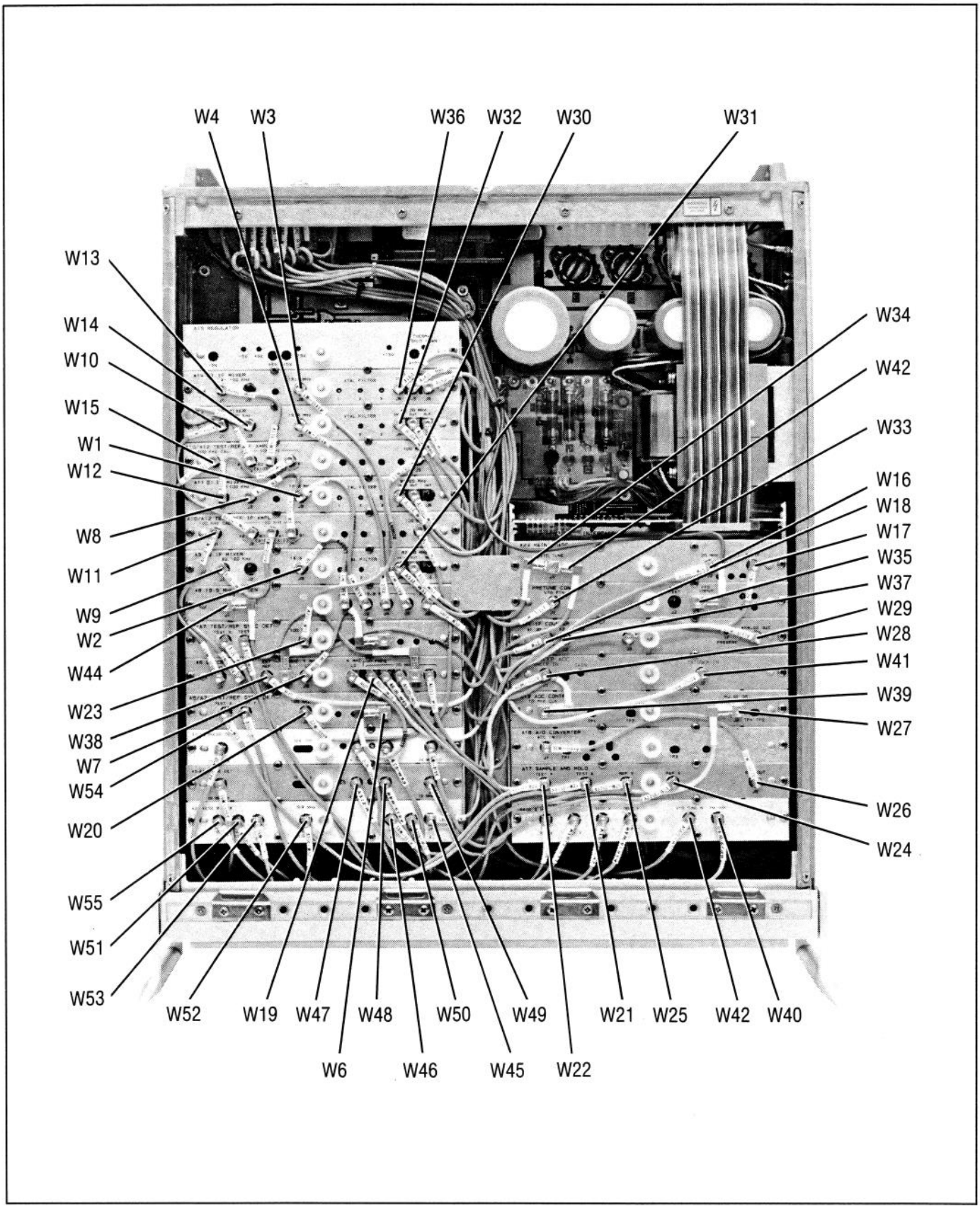
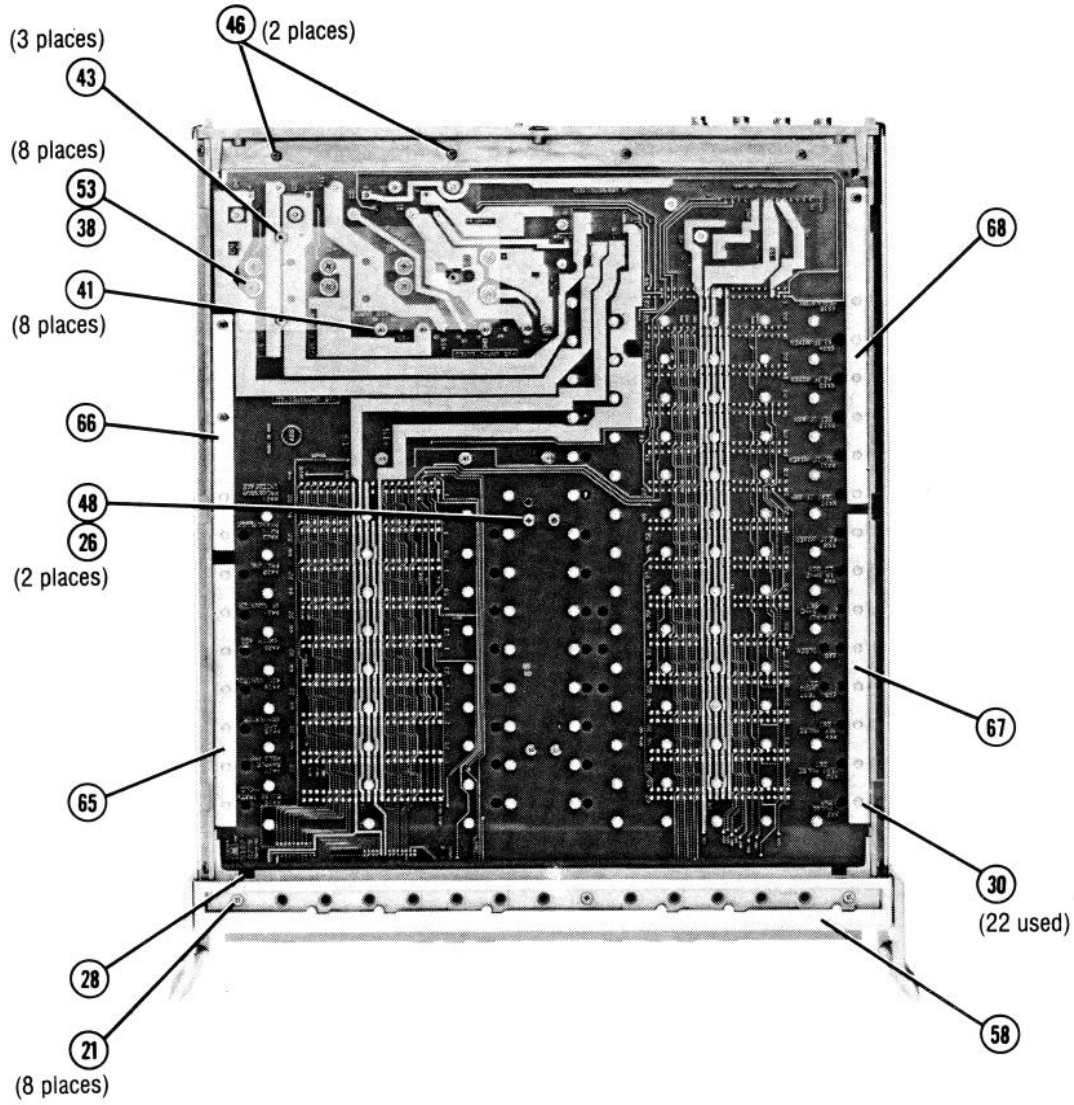


Figure 9. HP 85102 Option 008 Cable Location (1 of 2)

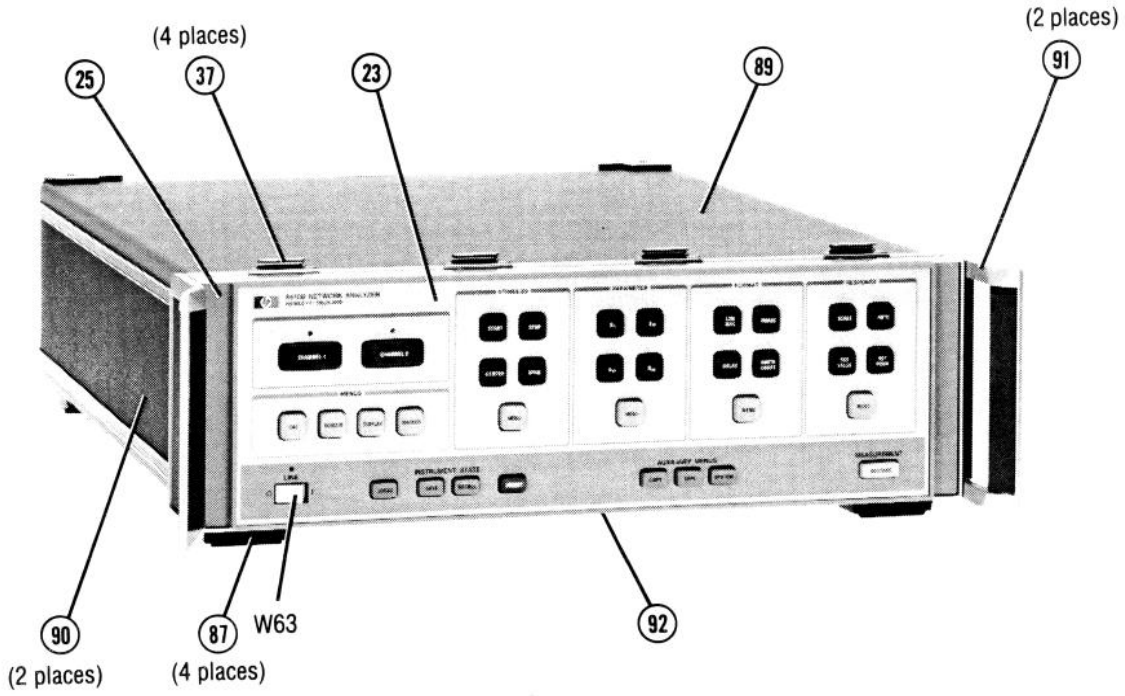
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W1	85102-60131	1	1	CA AY A8J3-A11J3	28480	85102-60131
W2	85102-60132	2	1	CA AY A8J2-A9J3	28480	85102-60132
W3	85102-60133	3	1	CA AY A8J5-A14J3	28480	85102-60133
W4	85102-60134	4	1	CA AY A8J4-A13J3	28480	85102-60134
W5	85102-60135	5	1	CA AY A6J9-A4J4	28480	85102-60135
W6	85102-60136	6	1	CA AY A6J6-A5J4	28480	85102-60136
W7	85102-60137	7	1	CA AY A6J5-A7J4	28480	85102-60137
W8	85102-60138	8	1	CA AY A11J2-A10J4	28480	85102-60138
W9	85102-60139	9	1	CA AY A9J1-A10J3	28480	85102-60139
W10	85102-60140	2	1	CA AY A13J1-A10J2	28480	85102-60140
W11	85102-60141	3	1	CA AY A6J2-A10J1	28480	85102-60141
W12	85102-60142	4	1	CA AY A11J1-A12J4	28480	85102-60142
W13	85102-60143	5	1	CA AY A14J1-A12J3	28480	85102-60143
W14	85102-60144	6	1	CA AY A13J2-A12J2	28480	85102-60144
W15	85102-60145	7	1	CA AY A6J1-A12J1	28480	85102-60145
W16	85102-60146	8	1	CA AY A6J11-A23J2	28480	85102-60146
W17	85102-60147	9	1	CA AY A21J3-A23J3	28480	85102-60147
W18	85102-60148	0	1	CA AY A14J6-A21J1	28480	85102-60148
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W20	85102-60150	4	1	CA AY A10J5-A5J3	28480	85102-60150
W21	85102-60151	5	1	CA AY A5J1-A17J2	28480	85102-60151
W22	85102-60152	6	1	CA AY A5J2-A17J1	28480	85102-60152
W23	85102-60153	7	1	CA AY A12J5-A7J3	28480	85102-60153
W24	85102-60154	8	1	CA AY A7J1-A17J4	28480	85102-60154
W25	85102-60155	9	1	CA AY A7J2-A17J3	28480	85102-60155
W26	85102-60156	0	1	CA AY A17J5-A18J1	28480	85102-60156
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W28	85102-60158	2	1	CA AY A20J1-J5	28480	85102-60158
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W37	85102-60167	3	1	CA AY A13J6-A21J2	28480	85102-60167
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W39	85102-60169	5	1	CA AY A6J4-A19J1	28480	85102-60169
W40	85102-60249	2	1	CA AY A16J6-REAR PANEL J9	28480	85102-60249
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W42	85102-60248	1	1	CA AY A16J5-A23J1	28480	85102-60248
W43	85102-60173	1	1	CA AY A4J3-A16J2	28480	85102-60173
W44	85102-60174	2	1	CA AY A6J10-A8J1	28480	85102-60174
W45	85102-60175	3	1	CA AY A14J5-A2J7	28480	85102-60175
W46	85102-60176	4	1	CA AY A13J5-A2J5	28480	85102-60176
W47	85102-60177	5	1	CA AY A3J2-A16J3	28480	85102-60177
W48	85102-60178	6	1	CA AY A3J3-A16J4	28480	85102-60178
W49	85102-60179	7	1	CA AY A6J8-A3J4	28480	85102-60179
W50	85102-60180	0	1	CA AY A2J6-A4J1	28480	85102-60180
W51	85102-60181	1	1	CA AY A2J2-A3J1	28480	85102-60181
W52	85102-60182	2	1	CA AY A8J6-A2J4	28480	85102-60182
W53	85102-60171	9	1	CA AY A9J5-A2J3	28480	85102-60171
W54	85102-60172	0	1	CA AY A4J2-A16J1	28480	85102-60172
W55	85102-60170	8	1	CA AY A11J5-A2J1	28480	85102-60170

Figure 9. HP 85102 Option 008 Cable Locations (2 of 2)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
26	0380-0018	6	2	SPACER-RND .25-IN-LG .194-IN-ID	28480	0380-0018
28	0460-0778	5	1	TAPE INDL .75-IN-W .25-IN-T POLYU-FM	00000	ORDER BY DESCRIPTION
30	0624-0100	5	26	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
38	2190-0011	8	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
41	2200-0105	4	8	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
43	2200-0165	6	3	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
46	2360-0117	6	2	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
48	2360-0202	0	2	SCREW-MACH 6-32 .625-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
53	2680-0129	8	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
58	5021-5803	2	1	FRAME FRONT	28480	5021-5803
65	85102-00033	6	1	BRACKET-R FRONT	28480	85102-00033
66	85102-00034	7	1	BRACKET-R REAR	28480	85102-00034
67	85102-00035	8	1	BRACKET-L FRONT	28480	85102-00035
68	85102-00036	9	1	BRACKET-L REAR	28480	85102-00036
73	85102-20053	2	1	COVER-SAFETY	28480	85102-20053

Figure 10. HP 85102 Option 008 Bottom Internal



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
23	85102-00001	8	1	DRESS PANEL	28480	85102-00001
25	85102-20054	3	1	FRONT BEZEL MACH	28480	85102-20054
37	1600-0367	7	4	VERTICAL LOCK (FRONT)	28480	1600-0367
87	5040-7201	8	4	FOOT-BOTTOM	28480	5040-7201
89	5061-9345	9	1	COVER TOP 18''	28480	5061-9345
90	5061-9457	4	2	COVER AY SIDE	28480	5061-9457
91	5061-9499	4	2	HANDLE AY FRONT	28480	5061-9499
92	85102-00043	8	1	BOTTOM COVER	28480	85102-00043
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193

Figure 11. HP 85102 Option 008 Front

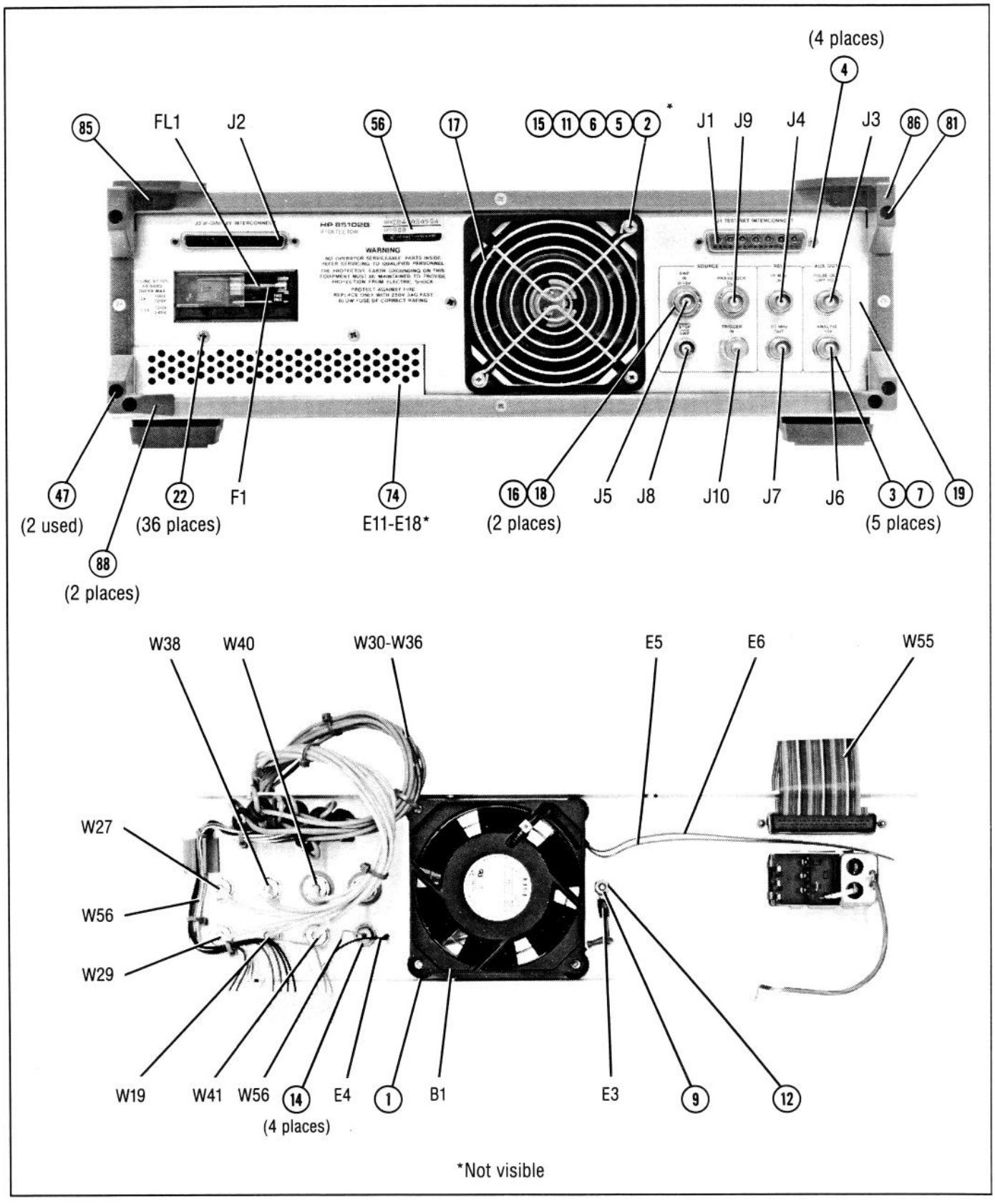
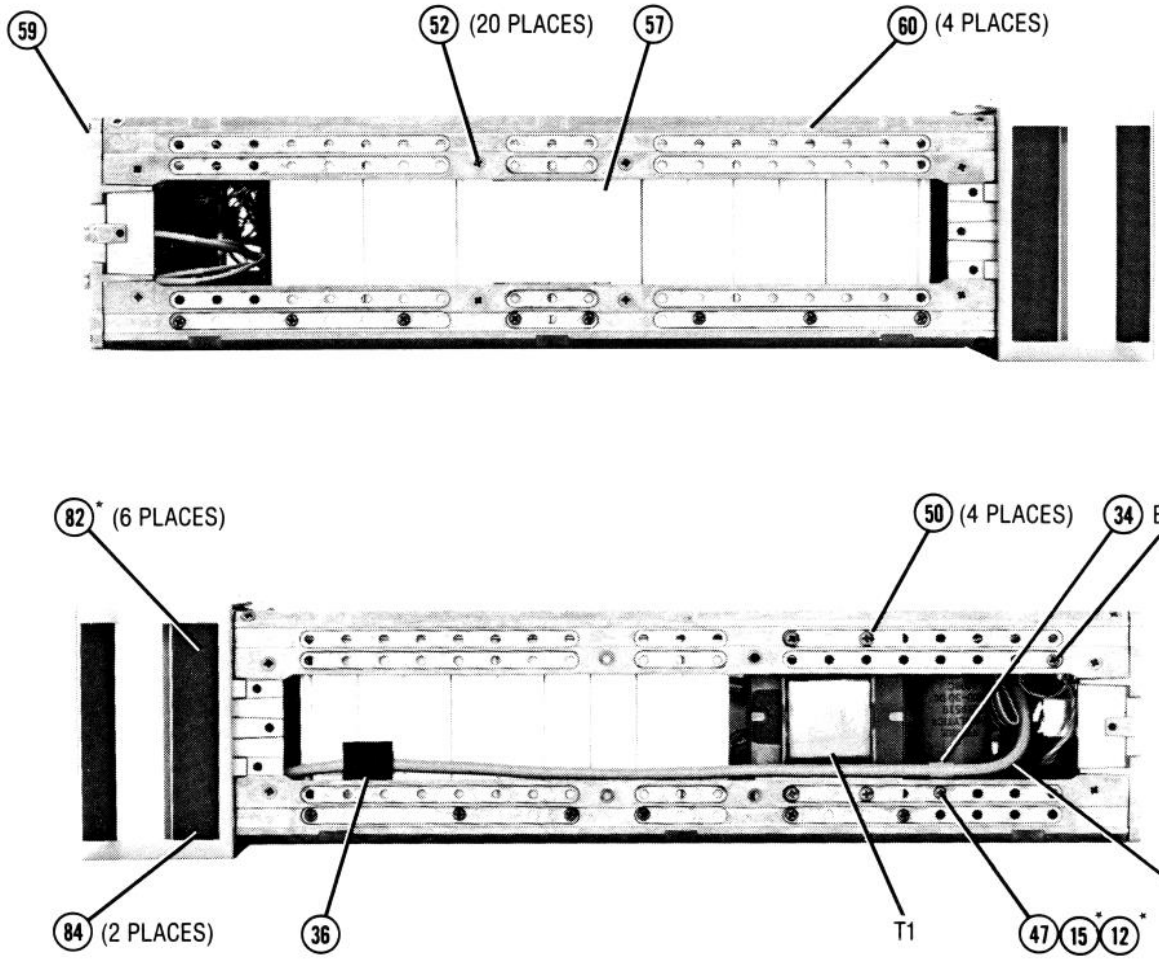


Figure 12. HP 85102 Option 008 Rear (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E3	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E4	0360-1632	0	1	TERMINAL-SLDR LUG LK-MTG FOR-fi3/8-SCR	28480	0360-1632
E5	0362-0227	1	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E6	0362-0227	1		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E11-18	1200-0147	3	8	INSULATOR-FLG-BSHG NYLON	28480	1200-0147
F1	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	2110-0002
FL1	0960-0443	7	1	LINE MODULE-FILTERED	28480	0960-0443
J1	1251-2197	4	1	CONNECTOR R&P 24F	28480	1251-2197
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
J4	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J5	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-1091
J6	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J7	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J8	1250-0083	1	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0083
J9	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-1091
J10	1250-0870	4	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0870
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W40	85102-60249	2	1	CA AY A16J9-REAR PANEL J9	28480	85102-60249
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W57	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
W56	85102-60192	4	1	CA ASSY TS CONN	28480	85102-60192
1	0400-0010	2	4	GROMMET-RND .25-IN-ID .375-IN-GRV-OD	28480	0400-0010
2	0510-0110	6	3	NUT-CAP 6-32-THD .281-IN-THK .312-A/F	00000	ORDER BY DESCRIPTION
3	0590-1251	6	5	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
4	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0006	1	2	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
6	2190-0007	2	4	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
7	2190-0102	8	5	WASHER-LK INTL T 15/32 IN .472-IN-ID	28480	2190-0102
8	2360-0113	2	9	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
10	2360-0203	1	1	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	2360-0205	3	2	SCREW-MACH 6-32 .75-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
14	2950-0043	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
16	3050-1094	4	1	WASHER-FL MTLC 1/2 IN .505-IN-ID	28480	3050-1094
17	3160-0300	6	1	FINGER GUARD	28480	3160-0300
18	00310-48801	0	2	SHOULDERED WASHER	28480	00310-48801
19	85102-00056	3	1	REAR PANEL	28480	85102-00056
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
56	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
74	85102-20057	6	1	HEAT SINK	28480	85102-20057
81	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
83	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
85	5020-8938	8	1	LOCK FOOT L LFT	28480	5020-8938
86	5020-8940	2	1	LOCK FOOT L RT	28480	5020-8940
88	5040-7221	2	2	FOOT-REAR	28480	5040-7221

Figure 12. HP 85102 Option 008 Rear (2 of 2)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-fi6-SCR	28480	0360-0009
T1	9100-4614	3	1	TRANSFORMER	28480	9100-4614
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
34	1400-0017	0	1	CLAMP-CABLE .312-DIA .375-WD NYL	28480	1400-0017
36	1400-0757	5	1	CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
50	2510-0049	2	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
52	0515-1367	7	20	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896

Figure 13. HP 85102 Option 008 Left and Right Internal

(Read First)

USING THIS MANUAL TO SERVICE YOUR HP 8510B

This manual was written for HP customers who are qualified service personnel. Previous knowledge of a network analyzer system is assumed, but specific knowledge of the HP 8510 system is not required if you read this manual thoroughly and follow the procedures carefully. The information in this manual will quickly help isolate and remedy most all of the possible failures that can occur in an HP 8510 system.

The basic service strategy is to locate the faulty board or assembly and replace it with a new or rebuilt one. When you have isolated the faulty board or assembly, you can contact your nearest HP office and order the new part or, in most cases, an exchange part – typical delivery time is 24 hours.

Because of the board level repair strategy, schematics and individual component lists are not required.

Although this instrument can be serviced by customers, HP has a field service organization that can provide you with a factory trained Customer Engineer. If you cannot repair the instrument, or if you need assistance, contact your nearest Hewlett Packard office.

Before attempting to troubleshoot the system, read this section and the following two sections titled TROUBLESHOOTING STRATEGY and TYPES OF FAILURES. Afterward, you will understand how to use this manual and how the factory service team expects you to troubleshoot the system.

In addition, HP recommends that you read the rest of this manual. For example, read PERIODIC MAINTENANCE and perform the recommended maintenance procedures – read THEORY OF OPERATION to familiarize yourself with how the system electronics work.

If you are familiar with the information in this manual and where that information is found, troubleshooting the system will be faster and easier. In addition, if you need to contact an HP Customer Engineer, you will be able to eliminate or explain all of the things in the manual that you have already done.

The remainder of this section includes the following items:

- Table of Contents.
- System Overview, including a Simplified HP 8510 Block Diagram and a description of system instruments.
- Description of the Most Used Service Diagnostics.
- Other Service and Troubleshooting Information: Service Tools, Service Kit, Adjustments, Replaceable Parts, Test Set Manuals.
- Safety Information.

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Table of Contents

The manual is divided into sections by descriptive tabs. Also, each section is paginated separately, beginning with page 1.

SECTION and TAB LABEL (shown in bold type and caps).

SERVICE OVERVIEW

Describes how to service the HP 8510B as a system and describes how to use the manual. This section should be read before attempting any repairs.

TROUBLESHOOTING STRATEGY: Describes how the factory service team expects you to troubleshoot and repair the system. Includes a troubleshooting flowchart and an overall system level troubleshooting procedure.

TYPES OF FAILURES: Lists the most common types of system failures and describes what to do about each.

PERIODIC MAINTENANCE: This section has some simple procedures that should be followed in order to maintain the system.

BUILT-IN DIAGNOSTICS

Describes the types of built-in system troubleshooting diagnostics and how to use them. They include Self Test, Running Error Messages, and the Service Program.

SELF TEST: This section describes all of the Self Tests and includes troubleshooting information. Refer to this section whenever there is a Self Test failure.

RUNNING ERROR MESSAGES: This section lists all of the Running Error Messages that are related to service. The messages are listed with troubleshooting suggestions. Refer to this section whenever an error message is displayed.

SERVICE PROGRAM: This section describes how to run the Service Program diagnostics to check the operation of the boards in the HP 85101, HP 85102, and Test Set. A menu map and other troubleshooting suggestions are also included.

TEST AND REPAIR

Describes the individual tests in this section.

UNRATIOED POWER TEST: This section has a procedure for checking the Test Set's ability to properly down-convert the separate RF signals. It is especially useful for testing the Test Set VTO and Samplers and the HP 85102 IF amplifiers.

FRONT PANEL TESTS: This section has several random tests that can be performed using only the HP 8510 front panel keys. Refer to this section to see if it contains a test that will help you isolate a suspected problem.

SOURCE TESTS: This section contains several quick tests that can be performed on the HP 8340/41 or HP 8350 sources. Refer to this section whenever you suspect a source problem.

ADDITIONAL TESTS: This section has several random tests that can be performed with little or no test equipment. Refer to this section to see if it contains a test that will help you isolate a suspected problem.

ASSEMBLY/DISASSEMBLY: This section has procedures for disassembling or re-assembling the HP 8510 whenever you have to replace a part.

BLOCK DIAGRAMS: This section contains all the block diagrams including an overall System Troubleshooting Diagram, block diagrams for the HP 85101, HP 85102, the HP 8510 Phase Lock System, HP 8510 power supplies, and wiring lists.

TEST SET TROUBLESHOOTING

This section contains the service portion of the test set manual that is shipped separately with the Test Set. You have to insert that section here. It has troubleshooting procedures for the specific Test Set(s). Refer to this section whenever you want to troubleshoot the Test Set.

ADJUSTMENTS

This section describes how to use the HP 8510 Adjustment software. Refer to this section whenever you replace a part that requires adjustment. You can also refer to this section to be sure your HP 85102 IF-Detector is properly adjusted.

REPLACEABLE PARTS

This section contains a list of all the part that can be replaced in the HP 8510. Refer to this section whenever you have determined that a part/assembly/board is defective and requires replacement.

SERVICE REFERENCE DOCUMENTS

This section of the manual contains the separate sections (tabs) described below.

SERVICE LOG/NOTES: This section is used to document all service performed on the HP 8510. It is also used to hold any special service information not shipped with this manual.

THEORY OF OPERATION: This section describes how the system operates, especially the Phase Lock System. Read this section to learn how the HP 8510 system hardware and firmware operate.

CONFIGURATION/CONNECTIONS: This section contains connection diagrams, similar to the installation information. Refer to this section to check your system cabling and connections.

MANUAL UPDATE INFORMATION

Refer to this section whenever you use the manual. It should contain any information about changes to the manual.

SERVICE TOOLS

This section has plastic holders containing the HP 8510 Adjustment Software and two separate items used for the SERVICE PROGRAM diagnostics.

System Overview

The HP 8510 system consists of several instruments. In order to troubleshoot system failures, it is necessary to have 1) a fundamental understanding of how the system works and 2) knowledge of the troubleshooting procedures and tools. The information below will help you understand the function of each instrument in the system.

Refer to the HP 8510 simplified system block diagram below. It is an overall view of how the system works. The paragraphs below describe the functions of the instruments in a typical HP 8510 system:

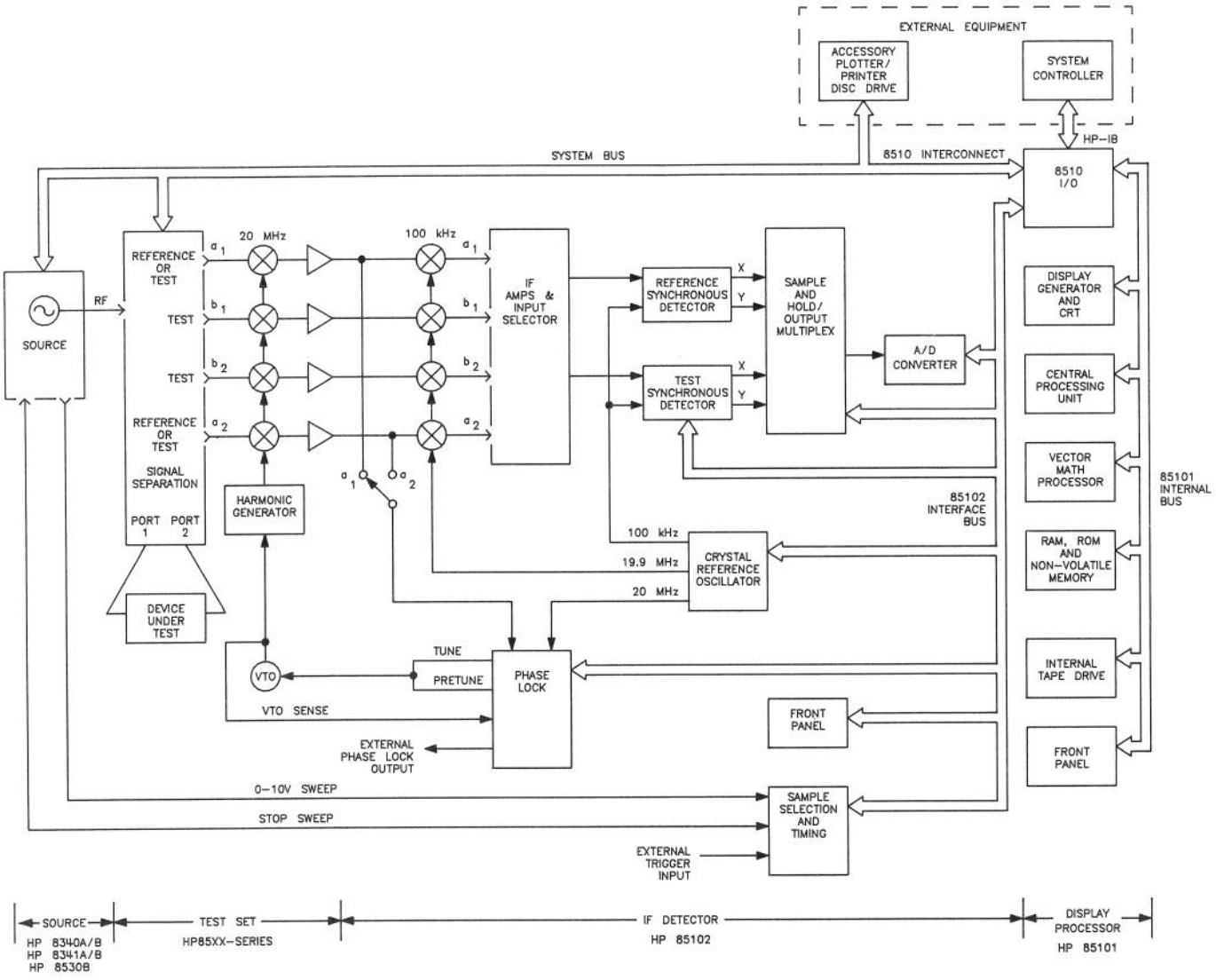


Figure 1. HP 8510B Simplified Block Diagram

INSTRUMENTS IN AN HP 8510 SYSTEM

HP Sources – Synthesizer or Sweeper

HP 8340/41 synthesized sources, HP 8350B sweepers with various bandwidth plug-ins, or other HP 8510 compatible sources as they are developed and offered by HP. Sources are used to provide RF stimulus to the test set and the device under test (DUT). The source is controlled by the HP 8510 over the system bus so that it supplies the correct frequency at the desired power level. The sources have their own service manuals that should be used whenever a problem is isolated to the source.

HP 851x-series Test Sets

The test set and associated cables provide the measurement reference planes where devices are connected. The primary job of the test set is to separate and down convert the RF signal into *test* (reflection or transmission) and *reference* (incident) signals. The test set converts these signals into separate 20 MHz IF frequencies before passing them on to the HP 85102 IF-Detector. The test set front panel test ports are critical to proper operation, calibration, and system verification.

The HP 8511, a frequency converter test set, does not have signal separation couplers/bridges. The front panel ports go directly to samplers in the frequency converter assembly. This special test set is designed for custom use.

The Service documentation for your particular test set is shipped with the test set and is intended to be put in this manual behind the tab labeled TEST SET TROUBLESHOOTING.

HP 85102 IF-Detector

This instrument is the IF-Detector half of an HP 8510 Network Analyzer. It is controlled by the other half (HP 85101 Display/Processor) and is used in conjunction with the test set to phase lock the RF signals. The HP 85102 also converts the 20 MHz IF, received from the test set, into a 100 KHz IF. It amplifies and detects both the magnitude and phase of the *test* and *reference* signals by using matched pairs of circuit boards. Finally, these detected signals are digitized and then sent to the HP 85101 Display/Processor.

HP 85101 Display/Processor

This instrument is the display and processing half of an HP 8510 Network Analyzer. It is primarily used to control the system operation, either by front panel commands or in conjunction with remote controller operation. It performs all the math operations on the down-converted and digitized magnitude and phase signals prior to displaying them as measurement data. It monitors and controls the phase lock system and the routines that detect and generate error messages, including the troubleshooting diagnostics. The HP 85101 also displays the measurement results in several formats and allows you to read or write data to or from tape cartridges or data discs. In local (front panel) operation, it controls and monitors the entire system. In remote or automatic (programmed) operation, it performs all of the HP-IB commands that it is programmed to do by the HP controller. If the HP 85101 is working properly, it can be used to troubleshoot the rest of the system instruments as explained throughout this section.

Systems in a rack

Racked systems are serviced in the same way as bench mounted systems. However, the racked system may not allow easy access to the instrument covers or rear panels. This may require using an extra table behind the rack so that an instrument can be removed from the rack for troubleshooting while remaining connected to the system.

HP acknowledges that racked systems are more difficult to service. Whenever possible, use the built-in diagnostics or front panel tests. If absolutely necessary, remove the instruments from the rack and reconnect the system on a bench — then continue troubleshooting.

Controller

A computer (also called *controller*) can be connected to the HP-IB bus to allow program control of the HP 8510 system. A controller is normally required for performance testing and generating specifications.

Peripherals

The source, test set, IF-Detector and Display/Processor make up the operating core of the HP 8510 system. Other instruments can be connected to the system bus to enhance the operation of the HP 8510. They are (1) Printer — for hard copy output of measured data, (2) Plotter — for screen dumps of measured data, (3) Disc Drive — for data storage or retrieval.

Description of the Most Used Service Diagnostics

The four most frequently used HP 8510 built-in diagnostics are explained in general below. They represent the most obvious way of troubleshooting the system using the service tools included with this volume. Read the following paragraphs before attempting to use the rest of this manual.

The four most used service diagnostics are:

1. Self Test
2. Running Error Messages
3. Service Program
4. Unratioed Power Test

In general, the Self Test is a power-up series of tests that verifies the HP 85101 is functioning properly. Running Error Messages can occur after power-up, mostly during operation, and are use to alert you to problems in the HP 85102 and test set. The Service Program is a series of menu-driven tests that you run from the front panel (using the Service Tools) to verify operation of most all of the boards in the HP 85101, HP 85102, and test set. The Unratioed Power Test is a front panel test used to check the RF/IF path of the test set and HP 85102.

The following paragraphs describe these diagnostics in more detail:

Self Test

After power ON or when the recessed TEST button is pressed, a group of 14 diagnostic tests is automatically run on the HP 85101 Display/Processor. These tests verify the operation of the digital boards in the HP 85101. If one of these tests fails, the system will display a message on the CRT that indicates which Self Test failed and what the most likely causes are. Also, the system will indicate the failure on the HP 85101 front panel by lighting up one or more numbered LEDs. The decimal sum of these numbers is equal to the number of the test that failed. Refer to the section titled SELF TEST for more information.

Running Error Messages

These messages, accompanied by the word CAUTION and a beep sound, will appear on the HP 8510 CRT whenever the system has detected a problem or when it is giving the operator a prompt. In other words, Running Error Messages are the system's way of telling the operator that something is wrong or that something has to be corrected. Most of these messages are in response to system malfunctions either in the HP 85102 IF-Detector or the Test Set. Running Error Messages are usually indications of improper connections, improper operating parameters, or improper RF power levels. However, they can also indicate an internal failure, for example, to the phase-lock system, the test set VTO, or the synchronous detectors. Refer to the section marked RUNNING ERROR MESSAGES for more information.

Service Program

The HP 8510 has a set of diagnostics that are accessed from the HP 85101 front panel. These tests should be used if the power-on Self Tests do not sufficiently diagnose a problem. These tests are designed for troubleshooting most of the boards, both analog and digital, in the HP 85101, HP 85102, and the test set. These tests are presented in menu fashion and are labeled as No. 22 RUN SERVICE PROGRAM in the TEST MENU. These tests should detect most problems caused by a faulty board. Refer to the material in the section titled SERVICE PROGRAM for more information.

Unratioed Power Test

This test is a generic test that should work for any test set, regardless of frequency range. The concept is that each of the test set channels (a1, b1, b2, and a2) can be tested to determine if adequate power and bandwidth exist. This test will determine if the single channel unratioed measurement is valid. Refer to the section titled UNRATIOED POWER TEST.

OTHER SERVICE AND TROUBLESHOOTING INFORMATION

Service Tools

The last section of the service manual contains two service tools (ordered together as HP Part No. 08510-60007), enclosed in a special anti-static plastic case. These two tools are used as follows:

1. HP 85102 Emulator board – used for one of the Service Program diagnostics. Its use is explained in the SERVICE PROGRAM section for the HP 85101 A15 Bottom Box test.

2. Service Adapter: Used for all of the HP 85102 tests in the Service Program. It takes the place of the test set because it is used to inject a 20 MHz IF frequency into the HP 85102 IF-Detector.

Service Kit

There is a special Service Kit (HP Part No. 08510-60008) that can be ordered separately. It contains such things as an extender board, a power splitter, cables, fuses, etc. Its use is reference only occasionally in this manual – it is not required for use with this manual. It is primarily a special kit for customers and HP Customer Engineers who are experienced with the system and who can perform specialized tests, where those special items are needed. Order it only if you intend to spend extra time troubleshooting the system, especially below the board or assembly level.

Adjustments

The ADJUSTMENTS section of the manual contains procedures that are used with the software discs supplied with this manual. Most of the adjustments are for circuit boards in the HP 85102. However, whenever you replace or repair a board in one of the system instruments, always check the ADJUSTMENTS section. If the board is listed in that section, it will require adjustments. Refer to that section whenever making repairs.

Replaceable Parts

The REPLACEABLE PARTS section contains a list of all the parts that can be ordered for your HP 8510 system. Refer to that list whenever you need to order a new or repaired assembly. Also, check the ASSEMBLY/DISASSEMBLY section for information on removing and replacing assemblies. Also, always check the MANUAL UPDATE section (Change Sheet) for the latest information about any changes to part numbers or types.

Most assemblies in the HP 85101, 85102, or test sets are available on the rebuilt/exchange program. If you have any questions, contact your HP Customer Engineer for the latest information about this program.

How to order parts . . . fast!

When you know which parts you need to repair the instrument, contact HP's Direct Ordering Team by calling the following the toll-free number:

(800) 227-8164
Monday through Friday, 6 am to 5 pm (Pacific Standard Time)

The parts specialists have direct online access to replacement parts inventory corresponding to the Replaceable Parts list in this manual. There is a charge for hotline one day delivery, but four day delivery time is standard. After hours and holidays, call (415) 968-2347.

This information applies to the United States only. Outside of the United States, contact your nearest HP office.

Test Set Manuals

Each test set that is currently part of the HP 8510B family of instruments has its own manual. The manual is divided into two parts as follows:

1. Operating section – documents the test set as a stand alone instrument and contains installation and operating information. This loose leaf section comes with its own tab and should be placed in the TEST SET AND ACCESSORIES MANUAL.

2. Service section – documents test set troubleshooting, including replaceable parts, disassembly, and troubleshooting procedures for the specific test set. This loose leaf section comes with its own tab and should be placed in this SERVICE MANUAL behind the section titled TEST SET TROUBLESHOOTING.

HP 8510 Safety Information

In order to maintain safe operation of the HP 8510 system, read and follow the specific instructions in the Warnings, Cautions, and Notes found in the instruments and throughout this manual.

WARNINGS: Any service or adjustment performed with the covers removed should be performed by qualified service personnel only. A shock hazard exists when the covers are removed. Also, the protective earth grounding on this equipment must be maintained to provide protection from electrical shock.

CAUTIONS: Turn off the line voltage before removing or replacing printed circuit boards. Damage to integrated circuits can occur if power is left on when printed circuit boards are removed or replaced. Whenever the HP 8510 system is serviced, an anti-static work station should be used to avoid damage incurred by static discharge into the static-sensitive circuits of the HP 8510 system.

Hazardous Areas of Instrument with Power On

Each instrument in the HP 8510 system has areas that contain lethal voltages when the instrument has AC power applied. The photographs in Figure 2 show each of the instruments and their hazardous areas.

High-Voltage Shock Hazard After Power is Removed

After the HP 8510 system is turned off, a shock hazard still exists in the display/processor until the CRT, the A3 high-voltage regulator, and the associated filter capacitors are completely discharged. Refer to the ADDITIONAL TESTS section for discharge procedure for these circuits.

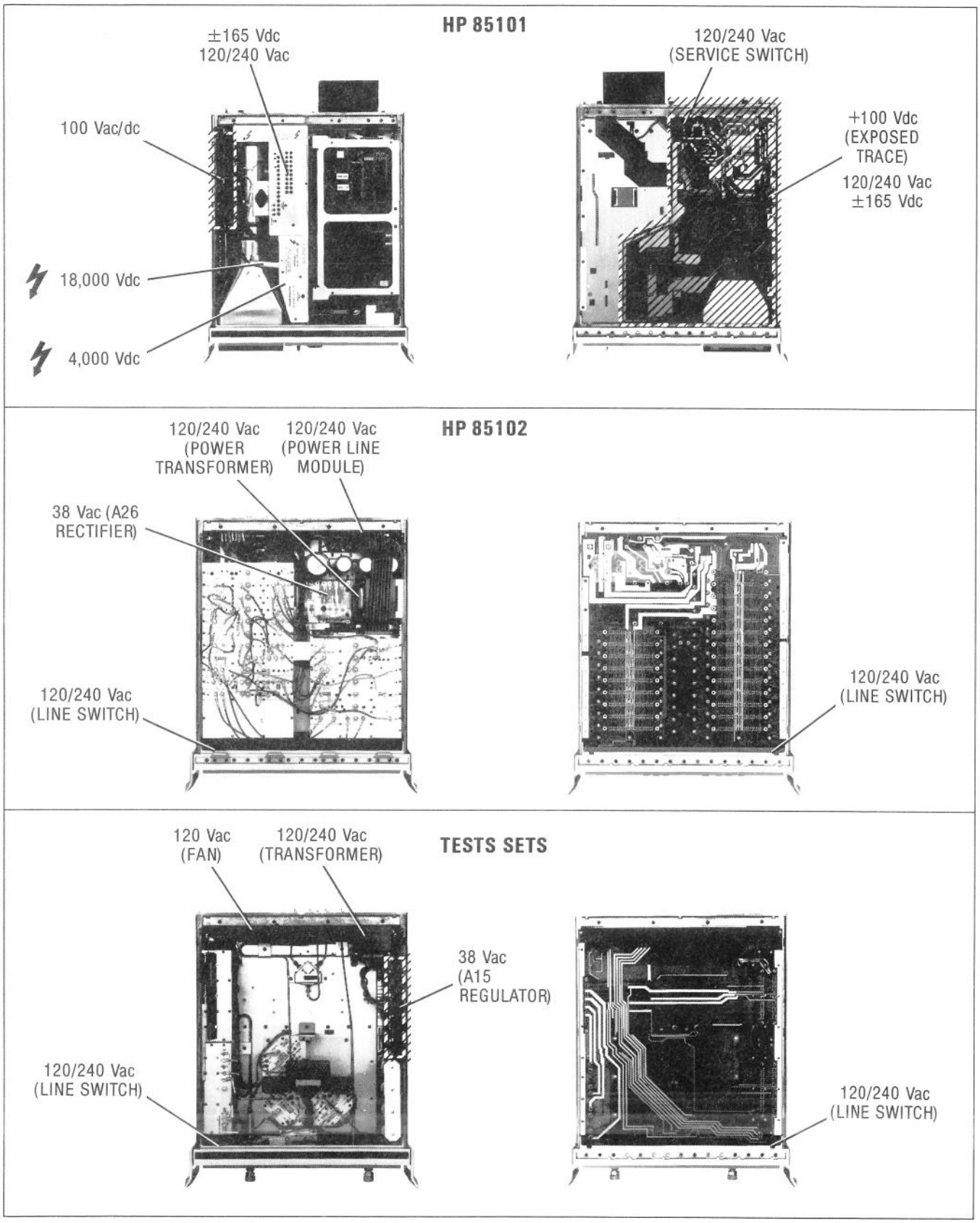


Figure 2. Location of Hazardous Voltages in HP 8510 Instruments

SAFETY CONSIDERATIONS

Safety Symbols



Instruction manual symbol: the apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.



Indicates dangerous voltages.



Earth terminal (sometimes used in manual to indicate circuit connected to grounded chassis).

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Operation

CAUTION

BEFORE APPLYING POWER make sure the instrument's ac input is set for the available ac line voltage, that the correct fuse is installed, and that all normal safety precautions have been taken.

Service

The information, cautions, and warnings in this manual must be followed to ensure safe operation and to keep the instrument safe. SERVICE AND ADJUSTMENTS SHOULD BE PERFORMED ONLY BY QUALIFIED SERVICE PERSONNEL.

Adjustment or repair of the opened instrument with the ac power connected should be avoided as much as possible and, when unavoidable, should be performed only by a skilled person who knows the hazard involved.

Capacitors inside the instrument may still be charged even though the instrument has been disconnected from its source of supply.

Make sure only fuses of the required current rating and type (normal blow, time delay, etc.) are used for replacement. Fuse requirements are indicated on the instrument's rear panel. Do not use repaired fuses or short-circuit fuse holders.

Whenever it is likely that the protection has been impaired, make the instrument inoperative and secure it against any unintended operation.

WARNING

If this instrument is to be energized through an auto-transformer (for voltage reduction), make sure the common terminal is connected to the earthed pole of the power source.

BEFORE SWITCHING ON THE INSTRUMENT, the protective earth terminal of the instrument must be connected to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with protective earth contact. The protection action must not be negated by using an extension cord (power cable) without a protective grounding conductor. Grounding one conductor of a two-conductor outlet is not sufficient protection.

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal is likely to make this instrument dangerous. Intentional interruption of the earth ground is prohibited. Whenever it is likely that the protection has been impaired, the instrument must be secured against any unintended operation.

Servicing this instrument often requires that you work with the instrument's protective covers removed and with ac power connected. Be very careful; the energy at many points in the instrument may, if contacted, cause personal injury.

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February, 1986

Troubleshooting Strategy

Troubleshooting strategy for the HP 8510B is defined as a plan of action that can be followed in a logical and consistent manner. The plan that you follow depends upon your knowledge of the system and your troubleshooting experience. This section has four troubleshooting strategies. The most basic strategy is to use the sections of this manual that apply directly to your problem. Most of the time, you will not need any test equipment other than the two Service Tools included with this manual. Voltages can be checked using a voltmeter or oscilloscope. Therefore, a required equipment list is not needed.

If you are already familiar with the HP 8510 system, you can probably use the sections of the manual that apply directly to your needs. However, if you are unfamiliar with the system, you will need to spend some time reading this manual and, possibly, the OPERATING AND PROGRAMMING MANUAL. Afterward, you can refer directly to the sections that you need.

HOW TO START TROUBLESHOOTING

Troubleshooting is only required when there is a system failure. If you know that the system has a failure, you should be able to identify the symptoms.

In general, there are some obvious failures that are easily identified and some that are not obvious or not easy to identify. For example, if there is a Self Test failure, a special failure message will appear on the CRT. This type of failure is easily identified and the symptom is obvious: Self Test number xx failed. However, failures such as intermittent Running Error Messages, Verification problems, and measurement data that you believe is incorrect are all failures that may not have obvious symptoms or solutions. Both these types of failures, and the obvious ones, are addressed in the *Step-by-Step Fundamental Troubleshooting Procedure* in this section.

After you identify the symptom, you can use one of the following strategies to troubleshoot the system. However, before you start troubleshooting, be sure to read all the information in this section and the TYPES OF FAILURES section.

1. FUNDAMENTAL STEP-BY-STEP TROUBLESHOOTING PROCEDURE – Use this procedure if you are troubleshooting the system for the first time. If you have some experience, you can also use this procedure to thoroughly troubleshoot the system. This step-by-step procedure corresponds to the Troubleshooting Flowchart and is recommended by the factory Service Engineers. The procedure begins on the following pages. In addition, you should also refer to the Troubleshooting Flowchart that follows these introductory paragraphs.

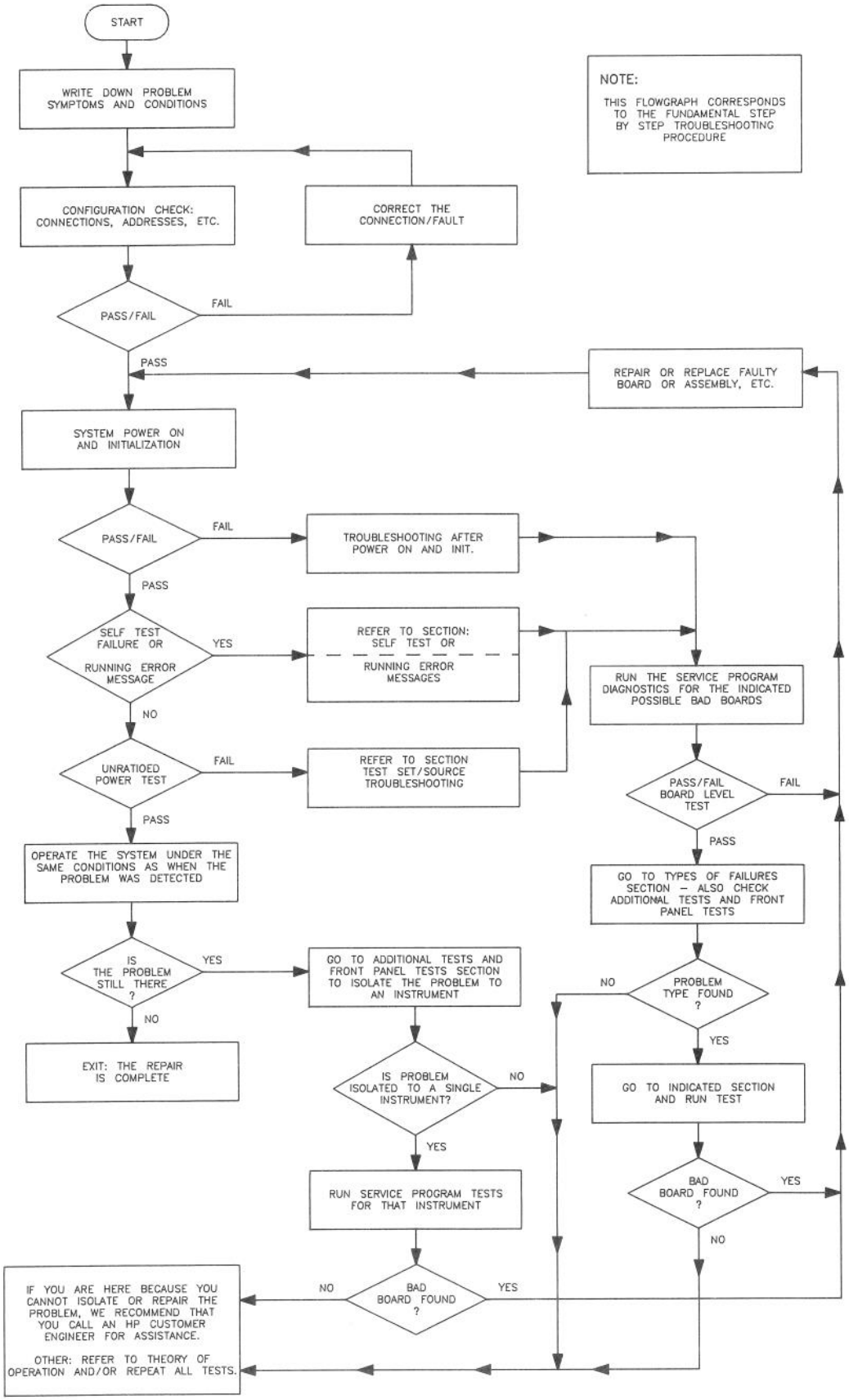
2. TROUBLESHOOTING FLOWCHART – Use the flowchart if you have already had some experience with the HP 8510 system, including having read or used the Fundamental Step-by-Step Troubleshooting Procedure. In general, the flowchart outlines basic steps that an HP Customer Engineer will take when troubleshooting problems that are not obvious. This flowchart is included on the following pages.

3. TROUBLESHOOTING BLOCK DIAGRAM — Use this block diagram as a quick reference map for troubleshooting the boards and assemblies in the system. It is located in the section titled BLOCK DIAGRAMS. If you have moderate experience with the system, this diagram may provide most of the information you need. It is an abbreviated version of much of the information in this manual.

4. USE THE MANUAL AS NEEDED — After you are very familiar with the information in this manual, you can use the sections that are appropriate to your needs. If you have an obvious failure, like a failed Self Test or Running Error Message, you can refer directly to that section.

REMEMBER, the primary troubleshooting goal is to isolate the problem to a specific board or assembly and then order the replacement part from HP.

HP 8510B TROUBLESHOOTING FLOWCHART



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Fundamental Step-By-Step Troubleshooting Procedure

This procedure is a methodical step-by-step process of elimination. It can be used for any failure because it starts from instrument power-on and continues through system initialization and then runs through all of the diagnostic tests, including any further troubleshooting instructions.

After using this procedure once or twice, you should have a good general understanding of how to troubleshoot your system. And you should also be able to isolate the problem to a specific instrument, board, or assembly in a methodical manner.

Most system failures can be detected by Self Test, Running Error Messages or use of the Service Program diagnostics. But, in order to troubleshoot an HP 8510 system, it is recommended that you understand how the system and those diagnostics work. Therefore, before you begin, you can read the THEORY OF OPERATION section to familiarize yourself with the system operation. Also, read through the OPERATING AND PROGRAMMING MANUAL to familiarize yourself with the front panel keys, methods of calibration, and how to make a simple device measurement.

START HERE: STEP-BY-STEP TROUBLESHOOTING PROCEDURE

1. RECORD THE PROBLEM in the Service Log

   Refer to the section titled SERVICE LOG/NOTES. Write down the symptoms of the failure and the sequence of keystrokes or HP-IB commands that led up to the failure. You may also want to use the SAVE INSTRUMENT STATE feature to save the current system parameters, stimulus, display, etc. Do this only if you know how to use this feature. It is not necessary to save the instrument state if you record how the instrument is currently set up. Later, this information will be useful in reconstructing the events that led up to the problem and to verify that it has been fixed. Also, by recording the failure and the solution (when found), you will have a permanent service record that will be helpful in case of future problems, especially if the same failure repeats itself.

2. CHECK THE SYSTEM CABLING AND INTERCONNECTIONS

   Shut the system power OFF by shutting off all the instruments: Network Analyzer, Source, Test Set, and all peripherals.

   Check all cabling and interconnections. Refer to the section titled CONFIGURATION/CONNECTION for a quick reference connection diagram, or refer to the INSTALLATION section to be sure you have the system properly interconnected. If you find a wrong connection or a damaged or loose connector, you can assume that you have found the problem. Record it in the log.

   When you are sure that the system is properly connected, turn the system ON and repeat the steps that led up to the failure. If the failure is no longer present, you may assume that the problem is fixed. However, if it repeats, you will need to continue.

3. DISCONNECT ALL PERIPHERALS

Remove all external devices from the bus, including the controller, printer, and plotter. The system should now consist only of the Network Analyzer, Source, and Test Set.

Remove any DUTs (Device Under Test), any cables, and any adapters from the test set ports.

NOTE: Cables and adapters can cause measurement problems if over-bent, damaged, worn, or dirty. Be sure to inspect them carefully and refer to their accompanying literature for means of detecting problems with these items.

4. TURN SYSTEM POWER ON and VERIFY PROPER INITIALIZATION

The sequence below is the recommended turn-on procedure of the HP 8510 system. Unless this sequence is followed, the system may not initialize properly. The steps below will help you verify that the instrument does not have any initialization problems.

a. Turn SOURCE power on, push source **[Instrument Preset]**, and observe the following:

Front panel LEDs go On and Off and the source indicates frequency bandwidth and a power level that corresponds to the source's Preset level or default state. For all compatible sources, check the appropriate manual for the source's default power-up state. Also, notice that the source may initiate its own self test. Refer to the source manual or the SOURCE TESTS section of this manual if you suspect the source has a problem.

b. With the source power on, turn the Test Set Power ON and observe the following:

Test set front panel power LED is ON and Active LED is ON. The active LED indicates that the test set has gone through its own self test via the HP-IB board in the test set. If it does not come on after 3 seconds, refer to the section titled TEST SET TROUBLESHOOTING and/or run the Service Program diagnostics for the test set HP-IB commands (A4) in the SERVICE PROGRAM section.

c. Turn HP 8510 (line switch located on HP 85102) Line Power ON.

Press the recessed **[TEST]** button. This will initialize the HP 8510 to its power ON state. The following things should be visible on the system front panel:

- Channel 1 and 2 front panel LEDs go ON (HP 85102).
- The { R L T S 1 2 4 8 } LEDs (HP 85101 front panel) go ON and OFF and the number of the test currently being run will briefly flash on. Also, the power-on line LED (HP 85102 front panel) stays ON.

NOTE: LEDs are defined as follows – R=Remote, L=Listen, T=Talk, S=Service request. These LEDs indicate what state the instrument is in at any given time. The 1-2-4-8 LEDs are used to indicate which Self Test is currently being run or has failed. If a Self Test fails, note which test failed and refer to the section titled SELF TEST.

Next, after Self Test passes, observe the following sequence on the CRT:

- "Testing" is displayed.
- A faint diagonal line is briefly displayed.
- "Loading Operating System" is displayed.
- "System Initialization in Progress" is displayed.
- "Recalling Instrument State" is displayed.
- "Instrument State Recalled".
- Finally, the CRT will display a graticule and a measurement trace, indicating that the system power ON state is up and running. Refer to the section titled SELF TEST (Self Test Sequence) for details.

NOTE: The graticule displayed on HP 85101 CRT, with the software revision number (only at Power-UP) and an S11 trace, depends upon what is connected to the test set port. If nothing is connected, an S11 open circuit display will show the uncorrected trace at approximately 0 dB (±5 dB) across the band. After a successful calibration is performed, the trace should be a straight line at 0 dB across the band. You may need to press the recessed TEST button again to see the entire sequence described above.

If the sequence fails or is inconsistent with the description above, you have a *power ON and Initialization failure.* If it has properly initialized, continue at step 6.

Power ON and Initialization Failure

A failure in the power ON and initialization sequence above may result in a blank CRT or a missing trace. If this is the case, one of the following HP 85101 assemblies may be the cause:

- One of the instrument(s) are not plugged in or are set to the wrong AC line voltage or have a blown line fuse.
- F1 on the A17 Motherboard.
- High voltage supply (A3)
- Nonvolatile memory board (A13)
- Display generator (A14)
- I/O board (A15)
- The firmware operating system or any RAM memory

- In the 85102, it could be the A15 +5 volt or F1 on A24.

Troubleshooting suggestions:

- Check the 85101 (A3) high voltage supply. Refer to the section titled ADDITIONAL TESTS for information about discharging the high voltage A3 board. Then refer to the BLOCK DIAGRAMS section for information about power supply test points.

- A blank display could also indicate that an interface (HP-IB) board is not working correctly in the HP 85101, the test set, or the source. Refer to the SERVICE PROGRAM section to troubleshoot the HP 85101 A15 I/O board and the test set A4 HP-IB board. Refer to the SELF TEST and ADDITIONAL TESTS section for information about display problems. Also, the source HP-IB board could be faulty – refer to the appropriate source manual for information about the source HP-IB board.

- If the graticule appears, but the trace does not, the source may not be correctly addressed or responding. Check the source address and any firmware revisions for the synthesizer or the HP 8350B/Plug-in. Refer to the SOURCE TESTS section for this information. Also, see the INSTALLATION section for a list of HP 8510 compatible sources and their firmware revision numbers. Finally, you can check the HP 8510 bus addresses to be sure they correspond to the correct instrument addresses. To do this refer to the section titled FRONT PANEL TESTS.

Troubleshooting after Power ON

5. SELF TEST: If the system is properly initialized (Preset state: CRT shows and S11 trace of an open circuit on port 1), this means that there were no Self Test failures.

   If there is a Self Test failure, the Display/Processor will display a message on the CRT that describes the failed Self Test and which board is the most likely cause of failure. Using that information, you can refer to the SELF TEST section of the manual. Typically, in that section, you will be given troubleshooting suggestions that may include running the Service Program diagnostics for that board to determine if it needs to be replaced.

6. RUNNING ERROR MESSAGES: A Running Error Message, preceeded by the word CAUTION, can appear on the upper left corner of the CRT (often with an accompanying beep sound) at any time. If a message appears, refer to the section titled RUNNING ERROR MESSAGES.

   Note that repeatable Running Error Messages imply a problem exists. A non-repeatable message usually implies a simple one-time failure that the processor has corrected or that the system recovered from. To be sure the Running Error is a true and repeatable error, press the **[ENTRY OFF]** key and then the **[MEASUREMENT RESTART]** key. If the error message does NOT repeat, it is an intermittent failure — often an intermittent loss of phase lock. However, if the message does repeat, it is a true error.

   NOTE: The TROUBLESHOOTING BLOCK DIAGRAM, located in the section titled BLOCK DIAGRAMS, can be used with Self Test and Running Error Messages. Refer to that diagram for details.

7. SERVICE PROGRAM DIAGNOSTICS: These tests can be used whenever you suspect a failure in the HP 85101, 85102, or the test set. You can run these tests at any time you suspect a failed board. However, you must read the information in the SERVICE PROGRAM section because there are some tests that requrie special procedures and/or use of the Service Tools.

   If one of the Service Program tests indicates a failed board, you can also refer to the ADDITIONAL TESTS and FRONT PANEL TESTS sections and perform any tests for that board to further ensure that the failure has been isolated. These Service Program diagnostics are usually run because a Running Error Message or other obvious problem is encountered. These tests cover about 80% of the function of each board tested. Again, be sure to read all the information in the section titled SERVICE PROGRAM to avoid misusing these tests.

8. UNRATIOED POWER TEST: This procedure allows you to check the down-converted power levels that are output from each channel of the test set frequency converter (sampler/mixer). Depending upon the type of test set and the source power (input to the rear of the test set), this test indicates two basic functions: (1) if the test set is down-converting the RF to a 20 MHz IF for each channel and (2) if the 85102 IF-Detector is down-converting the 20 MHz IF to 100 KHz. To check these levels, refer to the section titled UNRATIOED POWER TEST.

9. MEASUREMENT ACCURACY and VERIFICATION problems: Re-calibrate the system using the recommended procedures and techniques (refer to the OPERATING and PROGRAMMING manual). The FRONT PANEL TESTS section has a *Calibration Check Procedure* that you can use as a quick way to check the validity of your calibration. Also, read the Cal Kit and Verification Kit manuals for information on proper connector gauging, cleaning, torque, etc. If there is still a problem, or if the problem is a verification problem, repeat the performance verification procedure, including re-calbration. If possible, substitute *known good* devices or a good cable or adapter when there is reason to believe that the calibration or verification standards or a cable or adapter may be faulty. If the problem persists, for example, if the system repeatedly does not pass a particular verification test, recheck all your connections (including Cal and Verification devices) to be sure they are properly cleaned, torqued, and fitted together according to the recommendations in the manuals. HP recommends that these types of problems be handled by an HP Customer Engineer.

10. SYSTEM HANG-UP: A hang-up is when the instrument does not respond to front panel key presses. If that is the case, push the recessed [TEST] button. If it still hangs-up, reload the Operating system by accessing the Test Menu, number 19: Load Program Tape — the procedure is described at the end of the SELF TEST section. Also, be sure the controller is not connected. If the system hangs up only when the controller is connected, check all address switches and HP 8510 system addresses. If the system still hangs up in remote operation, try another controller to verify that the system, rather than the controller, is the problem.

NOTE: Be sure to read as much of the information in this manual as possible. In order to properly diagnose a problem and repair the system, it is necessary to understand how the system and its diagnostics work. In addition, always check the MANUAL UPDATE section for changes. Also, check the information in the ADJUSTMENTS section — adjustments may be required if you have to install another board. If you cannot solve a problem, HP recommends that you call your local HP office for customer service.

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Types of Failures

The purpose of this section is to familiarize you with the known types of HP 8510 system failures. The following list represents typical known system failures and what to do when one occurs.

Some of these failures are also documented in specific sections of the manual. For example, the failure known as *Default 15* is documented in the SELF TEST section and also in the *Fundamental Step-by-Step Troubleshooting Procedure* in the TROUBLESHOOTING STRATEGY section. This information is in both places because, in one case, it is a necessary part of a procedural step and, in the other case, it is a general symptom/solution category. In general, the failures documented here are for informational purposes.

KNOWN TYPES OF SYSTEM FAILURES

System is dead: Blank Display or Display Abnormality

A *dead* system is one that does not properly initialize and is not ready to make measurements. If this is the case, the system has probably not passed all 14 power-up Self Tests. However, if the system is attempting to initialize, but something is wrong, it is probably visible on the CRT as a blank display or display abnormality. Blank display is the condition where there is no illumination on the CRT. In some cases the system is also locked-up, in other cases the system is working normally. Display abnormality includes such things as wrong characters, bright lines radiating in all directions, etc. Also, failures that cause the *Memory Operations menu* to be automatically displayed are considered a display abnormality. The memory operations menu is identified by the following softkeys: GO, SHOW, WRITE, CSHOW, CWRITE. However, it is not recommended that you use these keys unless assisted by an HP Customer Eginneer.

TROUBLESHOOTING: Refer to SELF TEST section or the ADDITIONAL TESTS section.

Default 15

This is the condition when all eight of the front panel display/processor LEDs (R-L-T-S-1-2-4-8) located above the HP 85101 ENTRY area stay lit, the system hangs-up (does not respond to the front-panel keys), and the CRT is blank. This condition occurs at the beginning of Self Test and indicates that Self Test could not start or was unable to clear the front-panel LEDs.

TROUBLESHOOTING: Refer to the SELF TEST section and ADDITIONAL TESTS section.

Self Test Failure

This is a series of fourteen individual diagnostic tests that checks about 70% of the circuitry in the HP 85101 display/processor. Self Test is initiated automatically at power up, or can be initiated manually by pressing the [TEST] button on the HP 85101 front-panel. If a Self Test fails, the CRT will display a special failure message that describes which Self Test failed and what is the most likely cause of the failure.

TROUBLESHOOTING: If your instrument fails one of these Self Tests, refer to the section titled SELF TEST.

Initialization Failure

After the Self Test sequence has finished, the *SYSTEM INITIALIZATION IN PROGRESS* message should appear on the CRT. This message indicates that the operating system in RAM is ready to take control of the system. The first indication that the system initialized successfully is that the prompt *RECALLING INSTRUMENT STATE* will appear on the CRT. This means that the power-on instrument state (contained in instrument state 8) will be recalled: typically, an S11 log-mag display over the test set/source frequency range with the uncorrected trace at about 0 dB. If these events do not occur, meaning that the system did not properly intialize, a problem could exist with one of the boards in the HP 85101.

TROUBLESHOOTING: Refer to the Fundamental Step-by-Step Troubleshooting Procedure in the TROUBLESHOOTING STRATEGY section. If that does not work, try reloading the operating system, explained at the end of the SELF TEST section.

System Hang-up

This is the condition (after Self Test and initialization) where the system is "dead" and does not respond to any commands from the front-panel or a controller. The display will be frozen and there should be *no* Self Test error LEDs lit.

TROUBLESHOOTING: Reload the operating system, explained at end of the SELF TEST section. If that does not solve the problem, follow the procedure in the FRONT PANEL TESTS section.

Running Error Message

During the normal operation of the HP 8510 the main processor is constantly monitoring the state of the system instruments, especially the phase lock system. Whenever the processor determines that a problem exists, one of a number of possible messages is displayed on the CRT. These are called Running Error Messages because they are generated after the system is up and running – after it has passed Self Test. These messages may indicate a hardware failure or an operator error, depending upon their type and priority. This manual concentrates on the types that indicate hardware failures, especially in the HP 85102, the Test Set or the Source.

TROUBLESHOOTING: If you get a message on the CRT, refer to the RUNNING ERROR MESSAGES section. Also, refer to the System Phase Lock information in the THEORY OF OPERATION section for details on how and why these error messages are generated.

Performance Test Failure

A performance test failure occurs when the performance test data is not within the specification limits.

TROUBLESHOOTING: Repeat the verification or refer to the procedure in the ADDITIONAL TESTS section.

Measurement Error or Accuracy Problem

A measurement error is exhibited by either 1) an accuracy problem in the measurement data of a DUT or 2) the measurement trace displayed at a level equal to or below the noise floor.

If the problem is measurement accuracy, use the same troubleshooting procedure for the Performance Test Failure. Then, measure any known good device and check the results.

If the trace is down in the noise level (about −80 dB) and there are no Running Error Messages, the problem is most likely one of the IF Mixer boards in the HP 85102 IF/detector (A9, A11, A13, A14) or the *test* channel in the test set (b1 or b2, depending on which s-parameter you are looking at). To isolate the problem to the Test Set or the HP 85102, refer to the section labeled UNRATIOED POWER TEST. Perform that test and then perform the 85102 Service Program diagnostics in the *Run All* mode.

Source Failure

A source failure will usually show up as a Running Error Message. However, problems that involve source harmonics or power levels may only show up as intermittent measurement or Performance Verification problems. Refer to the section labeled SOURCE TESTS to verify source problems. That section describes HP 8340/41 and 8350B error codes, how to interpret them, the preset conditions, and troubleshooting suggestions.

TROUBLESHOOTING: Refer to the SOURCE TESTS section or, remove the source from the system and use the appropriate source manual to check its stand-alone operation.

Test Set Failure

A test set failure can cause a separate Self Test failure: the test set has its own Self Test sequence independent of the HP 85101 Self Test sequence. In addition, there are Running Error Messages that refer to the Test Set. A Test Set problem can also cause bad measurement data, performance test failure, bus error or lockup, and initialization failure.

TROUBLESHOOTING: Refer to the TEST SET TROUBLESHOOTING section.

Firmware or Software Troubleshooting

Firmware and/or software problems are defined as any problems that are not due to circuit board or mechanical failures. For HP 8510 systems, this does not include the controllers or peripherals. For problems with those items, refer to the appropriate manual.

Intermittent firmware problems can often be solved by reloading the operating system as explained at the end of the SELF TEST section. Or, they can be solved by running the HP 85101 tests described in the SERVICE PROGRAM section.

TROUBLESHOOTING: HP 8510 firmware and software problems usually have the characteristic of *repeatability* if the conditions that caused the original problem are exactly duplicated. If you can consistently produce the same error or problem, HP can help because of our software tracking and reporting system. This system is constantly geing updated with the latest reports of firmware and software problems (*bugs*) and any solutions. If you believe that you have a firmware or software problem, contact your HP Customer Engineer at the nearest HP Office.

OTHER TYPES OF FAILURES

The following list contains a number of separate failures that are not catagorized above:

1. mm-WAVE SYSTEMS – Refer to the appropriate literature or contact your HP Customer Engineer for advise.
2. KIT PROBLEMS: CAL and VERIFICATION – Refer to the appropriate manual or contact your HP Customer Engineer for advise or information about re-certification and repair.
3. CRT FAILURES – Refer to the SERVICE PROGRAM section for information about testing the HP 85101 CRT.
4. TAPE DRIVE FAILURES – Refer to the SERVICE PROGRAM section for information about testing the HP 85101 Tape Drive.
5. MECHANICAL PROBLEMS – Refer to the REPLACEABLE PARTS section and/or the ASSEMBLY/DISASSEMBLY section.
6. TEST SET VTO PROBLEMS – Refer to TEST SET TROUBLESHOOTING for information. The VTO can have problems that are not easily identified. If all else fails, replace the VTO/Driver assembly.

Periodic Maintenance

The Periodic Maintenance section on the HP8510 system is limited to the following items. Adherence to this maintenance schedule will help insure that your system continues to operate properly.

Maintain Proper Air Flow

It is necessary to maintain constant air flow in and around your HP 8510 system. If the message, "CAUTION: Test Set is Too Hot!!" is displayed, immediately check for items on the test set fan, on top of the test set or around the system that may be impeding the air flow. The test set **will not** shut down if it becomes too hot! If the HP 85101B or the HP85102B overheat the system will shutdown until the temperature drops to the operating range. Additionally it is recommended that the source fan filter (if any) be checked once a week and cleaned as necessary.

Cleaning the CRT and Glass Filter

1. Remove the bezel by removing the two small pozi-drive screws on its underside and pivoting it around its top edge until it is released.
2. Remove the glass filter being careful to handle it only by the edges. Excessive cleaning prompted by improper handling can cause damage to the thin film coating on the glass filter.
3. Clean the CRT and the display bezel glass carefully, using a soft lint free cloth and a cleaning solution recommended for optical coated surfaces. HP part number 8500-2163 is one such solution.
4. Allow all of the surfaces to dry before reassembling the instrument.

Cleaning the Tape Drive

It is recommended that you clean the tape drive after every six hours of use. The accumulation of oxides on the tape head can cause various read and write errors.

1. Using a clean foam swab and a small amount of Freon TF solvent, clean the read/write head and capstan of the tape drive. Exercise caution so that you do not scratch off the silver paint on the corner of the head or remove the lubrication on the capstan. See Figure 1.
2. Allow the tape assembly to dry thoroughly before using.

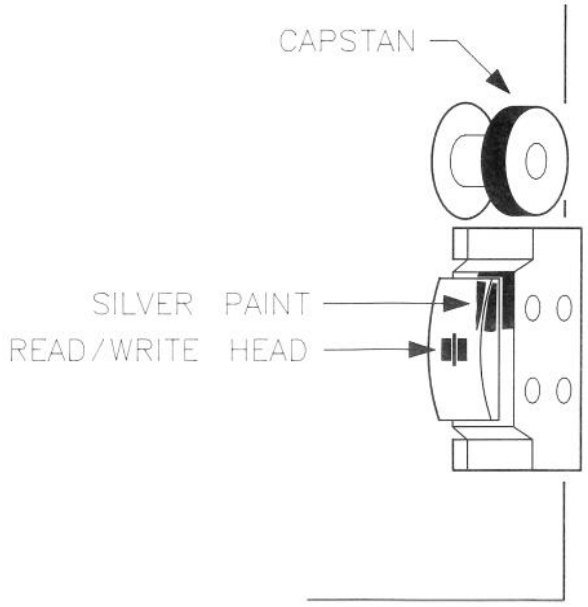


Figure 1. Cleaning Locations of Tape Transport Assembly

Cleaning the Test Set Rear Panel Extensions

Over a period of time, the test set rear extensions can affect the performance of the HP8510 system unless they and the corresponding bulkhead connectors they are connected to are kept clean. Use a foam swab and Freon TF solvent to clean the Rear Extensions and the bulkhead connectors. Be careful not to damage the center conductors of the bulkhead connectors. It is important to note that these bulkhead connectors provide a direct path to the samplers and that the appropriate static precautions, as outlined in the Microwave Connector Care Manual, should be used to prevent damage to the static sensitive samplers.

CRT Intensity

The life of the CRT screen can be greatly extended by keeping the intensity as low as possible. Additionally, the life of the CRT can be extended by turning off the cathode when use of the CRT is not needed, such as with automated testing where a controller screen is used.

1. Press **[SYSTEM]** and a menu on the CRT will be displayed.
2. Press the CRT Soft Key that corresponds to CRT OFF and the screen will go blank.

The CRT may be turned on by using either of two methods

1. Press **[PRESET]** and the instrument will reset itself to a predetermined set of parameters.
2. Recall a specific set of parameters that you have saved by pressing **[RECALL]** and the CRT softkey that corresponds to the register that you stored the information in (they are numbered 1 through 8 from the top to the bottom, respectively).

Connector Care

For accurate and repeatable measurement results, it is essential that connectors on calibration and verification devices, on test ports, cables, and other devices be cleaned and gaged regularly, that standards devices be handled and stored properly, and that all connectors be regularly inspected for signs of damage. This not only insures the best performance from the connectors, but also extends their life. Refer to the Microwave Connector Care Manual, contained in the Test Sets and Accessories binder, for a detailed description of connector care techniques. This manual also describes proper techniques for making connections.

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Built-in Diagnostics

This section of the manual describes how the built-in diagnostics are used to detect and isolate problems to the board level. In most cases, these diagnostics will be the primary troubleshooting tools.

DESCRIPTION OF BUILT-IN DIAGNOSTICS

This area of the Service manual will help you interpret Self Test failures and Running Error Messages. It will also help you run the Service Program diagnostics. Read the descriptions below and then refer to the section you need.

There are three built-in dianostic programs in the HP 8510. They are:

1. **Self Test** – These tests are automatically run when the instrument is first powered on or when the recessed front panel [TEST] button is pressed. In general, these tests verify operation of the HP 85101 Display/Processor.

2. **Running Error Messages** – These messages will appear on the CRT of the HP 8510 if there is a problem with the HP 85102 IF Detector phase-lock system, the test set, the source, or some other type of problem that can occur during operation rather than at power-on time. These messages may indicate a hardware failure or simply an intermittent operational problem, mostly for the HP 85102, the test set, or the source.

3. **Service Program** – These diagnostics are specially designed to test most of the boards in the system instruments (HP 85101, 85102, test set). Use these tests to verify a Self Test failure or to check a board that you suspect has caused a Running Error Message. These tests are run using the front panel keys described in the SERVICE PROGRAM section.

In addition; Power-On and Preset conditions are explained below. Read the explanation before using the information in this section.

HP 8510B TEST MENU

This is the menu for the Self Tests, System Commands, Tape Commands, and Service Commands. Use of the selections is explained in the SELF TEST section.

HP 8510B TEST MENU

Enter by pressing: **[SYSTEM], [MORE], [SERVICE FUNCTIONS], [TEST MENU].**

	POWER-UP SELF TESTS
1	A11 PROCESSOR EPROM
2	A11 PROCESSOR RAM
3	A15 DATA BUS
4	A14 DISPLAY RAM
5	A14 DATA
6	A15 TIMER
7	A15 SYSTEM BUS
9	INTERRUPT SYSTEM
10	A11 MULTIPLIER
11	A15 TAPE CONTROLLER
12	A13 NON VOLATILE MEMORY
13	IF DETECTOR DATA
14	KEYBOARD

	SYSTEM COMMANDS
15	RUN MAIN PROGRAM
16	MEMORY OPERATIONS
17	RERUN SELF TEST
18	REPEAT TEST LOOP
	TAPE COMMANDS
19	LOAD PROGRAM TAPE
20	RECORD PROGRAM TAPE
21	INITIALIZE TAPE
	SERVICE COMMANDS
22	RUN SERVICE PROGRAM
23	DIAGNOSE A FAILURE

ENTER SELECTION, THEN PRESS = MARKER

POWER-ON and PRESET CONDITIONS

Before using the information in this section, you should understand these two different conditions so that they do not affect your use of the diagnostics.

Power-On (Instrument State 8)

Whenever you turn-On the system instruments, the conditions or parameters are set according to the contents of the HP 8510 *Instrument State 8*. The [SAVE] and the [RECALL] keys on the front panel allow you to save or recall "system parameters" – note that instrument state 8 is labeled as the power-on state. This instrument state is set initially at the factory to include such things as: number of points, frequency range, power level, display, etc. Refer to the Operating/Programming manual for details.

Front Panel [PRESET]

Pressing this key will set the instrument to a state that is pre-defined by the HP 8510 processor and memory. You cannot change this state. When you press this key, the HP 8510 processor reads the type of source and test set and sets the system to the same parameters every time. This is called the *preset* state.

BUILT-IN DIAGNOSTICS FOR THE HP 85101 DISPLAY/PROCESSOR

The HP 8510 Self Test sequence is a series of fourteen individual diagnostic tests that sequentially test the buses and various circuits in the HP 85101 Display/Processor, including a limited number of circuits in the HP 85102 IF-Detector. The Self Test sequence is initiated automatically at power-on, or can be initiated manually by pressing the recessed [TEST] button located on the HP 85101 front panel. The main purpose of this set of built-in diagnostics is to verify proper operation of the HP 85101 Display/Processor. In general, Self Test is considered the built-in diagnostic that tests the HP 85101 Display/Processor.

If the system passes all fourteen tests in the Self Test sequence, the test program will load and run the operating system program stored in nonvolatile memory. This is the same operating system that is shipped with your HP 8510 on a cartridge tape.

The HP 8510 Self Test has three diagnostic modes or functions:

1. The system runs through the complete Self Test sequence from the beginning and stops if a failure is detected.
2. An individual test can be run in a repeating (looping) mode to provide repetitive pattern for troubleshooting.
3. The entire set of tests may be run in a repeating (loop) mode.

NOTE: You can always use the recessed [TEST] button to exit any Self Test that is looping or hung-up.

This section of the manual covers the following topics:

1. **Self Test Sequence:** Describes the power-On Self Test sequence when no failures occur. If you know the sequence, you can determine if the power-on and initialization process is correct in your system.

2. **Self Test Failures:** Describes what happens when a Self Test fails. An example of the failed Self Test 14, Keyboard Test, is shown. Also, the Self Test Menu, the Memory Operations Menu failure, and the condition DEFAULT 15 (all front panel LEDs lits 1,2,4,8) is shown and explained.

3. **Subtests**: Describes what the Self Test *Subtests* are, and how to identify the failed Subtest by the LEDs on the A11 board. The Subtest failure is lower level to the Self Test and is useful for determining which part of a Self Test failed.

4. **Using the TEST MENU to run a Self Test:** Describes how to access and use the Self Test selections in the Test Menu.

5. **Self Test Descriptions and Troubleshooting:** Provides a detailed description of the function and use of each Self Test and how to use them in troubleshooting the system. Also, the remaining SYSTEM and TAPE COMMANDS are explained.

6. **How to reload the Operating System:** Provides simple instructions for reloading the Operating System that resides in memory or for reloading it from tape.

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Self Test Sequence

The sequence starts testing with the processor-ROM circuit (the kernel) in the display/processor and then tests: RAM, the data bus, various input/output registers, math processor, IF-Detector interface, and the HP 85101 keyboard. Some of the tests are not completely exhaustive, but they do give an indication that these circuits are functional.

When no failures occur, the Self Test sequence runs as described in the steps below. This information is helpful in determining if your HP 85101 is operating properly.

1. Self Test is initiated at power-on or you can press the **[TEST]** button located on the front panel of the HP 85101 display/processor. The button is recessed: use an adjustment tool to reach it.

   The eight LEDs along the top of the front panel of the HP 85101 display/processor (R L T S 1 2 4 8) should all light. This indicates that the +5 volt supply in the display/processor is operating properly.

2. When the **[TEST]** button is released, all of the LEDs should go out within 2 seconds and the Self Test sequence will begin.

3. The four numbered LEDs (1, 2, 4, 8) along the top panel of the HP 85101 will briefly flash the number of the current test being performed, starting with Self Test number 1.

4. *TESTING* should appear on the CRT and then a diagonal line appears.

   The *TESTING* message indicates that the system has passed tests 1 and 2 and that test 3 has begun.

5. All of the numbered HP 85101 LEDs will extinguish. This indicates that all the power-on Self Tests have been successfully completed.

6. *LOADING OPERATING SYSTEM* is then displayed.

   This indicates that the system has completed the Self Test sequence (tests 1 through 14 successfully completed). It is now loading the operating system software from non-volatile memory into RAM, using a program in the Self Test ROM.

7. *SYSTEM INITIALIZATION IN PROGRESS* is displayed.

   This indicates that the Self Test ROM has turned over control to the program stored in RAM and that the initialization process is continuing.

8. Next, the display will go blank. Then it will display the prompt *RECALLING INSTRUMENT STATE* in the upper left-hand corner of the CRT.

9. Finally, the CRT will display a graticule (grid) and a measurement trace, indicating that the measurement/operating system software is now running.

   The type of display that you will see depends upon the contents of Instrument State 8. This is the Power-on state of the HP 8510 system. Initially, it is set at the factory to contain all the PARAMETER, FORMAT, and RESPONSE menu selections that will give you an S_{11} log-mag display over a typical default frequency range of 2 GHz to 18 GHz. However, instrument state 8, like instrument states 1 through 7, can be changed using the [SAVE] key and recalled using the [RECALL] key. Therefore, your display may appear different if the power-on instrument state 8 has been changed.

NOTE: The [PRESET] key recalls an instrument preset state (recalled from non-changeable memory) that is similar to the factory set Instrument State 8. Do not confuse these two instrument states: Instrument state 8 (changeable) is recalled whenever the system is powered-on, and the Preset state (non-changeable S_{11} log mag display) is recalled whenever the front panel [PRESET] key is pressed.

Self Test Failures

When a Self Test failure occurs, the CRT will display a special Self Test failure message that contains information about the failure and what to do about it. For example, if one of the HP 85101 front panel entry keys is stuck, a menu will be displayed. You can simulate this failure by keeping one of those keys pressed down and then pressing the recessed [TEST] button. Keep the entry key pressed down until the failure message appears. Shown below is an example of the failure message for that test:

```
INTERNAL SELF TESTS HAVE REPORTED A FAILURE.

THE REPORTED FAILURE WAS THE TOP KEYBOARD
SECTION OF THE KEYBOARD TEST.

TECHNICAL DETAILS:

FAILURE WAS -

   SELF TEST 14 = KEYBOARD TEST.
   SUB TEST   2 = TOP KEYBOARD SECTION.

THE MOST LIKELY CAUSES FOR THIS FAILURE ARE:

   1. A TOP KEYBOARD KEY WAS HELD DOWN DURING POWER-UP.
   2. THE KEY '9' '6' '3' '±' OR '=MARKER' IS HELD DOWN OR STUCK.
   3. A15 I/O BOARD FAILURE.
   4. KEYBOARD CONNECTING CABLE MISSING OR DAMAGED.
   5. A1 KEYBOARD FAILURE.
   6. 85101 A17 MOTHERBOARD OR CONNECTOR FAILURE.

FOR MORE INFORMATION, SEE THE SELF TEST SECTION OF THE SERVICE MANUAL.

PRESS [=MARKER] TO ENTER THE TEST MENU.
```

Troubleshooting a Self Test Failure

Whenever a Self Test does fail, a failure message for that test will be displayed on the CRT. As shown in the example above, the *most likely causes of failure* will be given. Whenever possible, refer to the Service Program and run the appropriate test. If there is no test in the Service Program, refer to the sections titled ADDITIONAL TESTS, FRONT PANEL TESTS, or BLOCK DIAGRAMS to see if there is any troubleshooting information in that section. When the *likely cause of failure* is something like a BAD CONNECTION or a MOTHERBOARD failure, you should inspect the assembly, board, or connection in question and visually inspect it.

Remember that Self Test is specifically aimed at checking the four boards in the HP 85101 card cage. Therefore, most Self Test failures will be directly related to those boards which can easily be replaced. In addition to the displayed failure message, the decimal sum of the HP 85101 front panel 1-2-4-8 LEDs should also be equal to the number of the Self Test that failed. If any case, you can always press the recessed [TEST] button to re-initiate the power-on Self Test sequence to verify the failure failure repeats.

If any of the front panel R-L-T-S (HP-IB) LEDs light along with the 1-2-4-8 LEDs, the test number is not valid. Instead, if a Self Test failure message is not displayed, use the internal LEDs located on the display/processor A11 Processor board to determine which Subtest has failed. For more information about the internal LEDs located on the A11 processor board, see the section titled SUBTESTS on the following pages.

If all eight of the Display/Processor front panel LEDs are lit (R-L-T-S-1-2-4-8), this is the Default Test 15 condition. If all eight LEDs stay on for more than 2 seconds, it will occur at the beginning of Self Test and it indicates that one of the following conditions exist: (1) Self Test could not start, or (2) the processor was unable to clear the front panel error LEDs, or (3) problems in the +12 volt or +15 volt power supplies.

SUMMARY: If there is a Self Test failure, it is most probable that replacing the failed board (A11 Processor, A13 Nonvolatile Memory, A14 Display Generator, or A15 I/O) in the 85101 will solve the problem. The following pages contain detailed information about the Self Tests and Subtests. That information can be useful in verifying the suspect board.

Self Test Menu

1	A11 PROCESSOR EPROM
2	A11 PROCESSOR RAM
3	A15 DATA BUS
4	A14 DISPLAY RAM
5	A14 DATA
6	A15 TIMER
7	A15 PUBLIC HP-IB
8	A15 SYSTEM BUS
9	INTERRUPT SYSTEM
10	A11 MULTIPLIER
11	A15 TAPE CONTROLLER
12	A13 NONVOLATILE MEMORY
13	IF DETECTOR DATA
14	KEYBOARD

Processor Errors Before or During Self Test

At power ON (before Self Test has begun) or during the running of Self Test, several instrument errors may occur. If this happens, one of the following failures will be displayed on the CRT:

```
ABORT
BREAK
INSTRUCTION ERROR
ADDRESS ERROR
PROCESSOR ERROR
```

With any of the above failures, the memory operations menu will be displayed on the CRT. If you have this problem, reload the operating system (explained at the end of this section).

If it does not solve the problem, contact an HP Customer Engineer for assistance.

Typical Example: PROCESSOR ERROR

```
THE PROCESSOR ENCOUNTERED AN ERROR
FROM WHICH IT COULD NOT RECOVER.

TECHNICAL DETAILS:

ADDRESS EXECUTED OR NEXT INSTRUCTION WAS PC = 0000 009C

STATUS REGISTER AT THAT TIME WAS SR = 2700

TOP OF MEMORY STACK AFTER THE ERROR:
0002 FFA6 2700 0000 009C FFF1 423C 016C 0002

REASON FOR THE ERROR WAS:

VECTOR OFFSET = 0010
PROCESSOR ILLEGAL INSTRUCTION ERROR
```

NOTE: The above CRT display will be accompanied by a set of softkeys. The softkeys are labeled — **[GO], [SHOW], [WRITE], [CSHOW], [CWRITE]**. Hewlett-Packard recommends that these selections only be used by qualified Hewlett-Packard service personnel.

Default Test 15 (All of the front panel LEDs stay lit)

Default test 15 is the condition when all eight of the front panel display/processor LEDs (R-L-T-S-1-2-4-8) stay lit. This condition occurs at the beginning of the Self Tests and, if it persists, it probably means that the Self Tests could not start or the processor was unable to clear the front panel LEDs.

If this condition occurs, the numbered items below should be checked using the information on the power supply test points located in the section titled ADDITIONAL TESTS or by referring to the test points on the HP 85101 Block Diagram in the BLOCK DIAGRAM section.

1. Check that all A11S1 switches are closed.
2. Check that +15V and +12V power supplies are at the correct voltages. Refer to the ADDITIONAL TESTS or BLOCK DIAGRAMS sections for information on power supply test points.
3. Check that the A15 line LSHDN (Low shut Down) is High (> +2.5V) on P2-15.
4. Check that the Post Regulator LPOP (Low Power On Pulse) is High (> +2.5V) going to the A13 board on P2-68, and the A11 board on P2-68.
5. Check all clock test points for TTL levels with changing states. Refer to the BLOCK DIAGRAMS section, if necessary.
6. Check that A11 line LHMF is High (> +2.5V) on P2-13.
7. Check that A11 line HMULBSY (High Multiplier Busy) is Low (0 to +0.7V) on P2-45.
8. Check that A11 line LGINT (Low General Interrupt Masked) is High (> +2.5V) on P2-59.
9. If *TESTING* appears on the CRT, run Self Test 2 as a troubleshooting aid.
10. Remove the A15 I/O, the A13 Memory, the A14 Display Generator, the IF Detector interconnect cable, and HP-IB cable from display/processor rear panel. Plug in the card cage and verify that Default error 15 is still present. If so, the trouble is isolated to the A11 Processor, probably address lines A12 through A20, or data lines D0 through D15.

Subtests

Most Self Tests are made up of groups of tests called Subtests. Subtests further isolate a Self Test failure by revealing which part of the Self Test failed. In many cases they reveal which bit, data line, or address line has failed. This subtest information is useful in further verifying that a particular board is faulty.

For many repair cases, Subtest information is not required or useful because of the board level repair strategy. However, for those particular cases where a schematic is available, the subtest information is useful for troubleshooting.The most common use of the Subtest information would be: if you return the board to HP, you can include the subtest failure information with the board so that the factory has that information.

Below is an example of a failed Self Test where the Subtest information is also given. This failure was due to the A13 memory board not being initialized (formatted) before the operating system was loaded. The Service Program section explains how to use the 85101 A13 test to initialize this board:

```
INTERNAL SELF TESTS HAVE REPORTED A FAILURE

THE REPORTED FAILURE WAS THE INITIALIZE
SECTION OF THE A13 NON VOLATILE MEMORY TEST.

TECHNICAL DETAILS

FAILURE WAS:
   SELF TEST 12 = A13 NON VOLATILE MEMORY TEST
   SUBTEST 49   = INITIALIZE SECTION

THE MOST LIKELY CAUSES FOR THIS FAILURE ARE:
1. A13 NON VOLATILE MEMORY BOARD FAILURE

FOR MORE INFORMATION, SEE THE SELF TEST SECTION OF THE SERVICE MANUAL.

PRESS =MARKER TO ENTER THE TEST MENU.
```

Of course, this is the Self Test section and more information is contained in the following pages under the heading *Self Test Descriptions and Troubleshooting*, Test 12.

Obtaining Self Test and Subtest information from the LEDs on the A11 board

The steps below can be used in case of a CRT failure or front panel LED failure, where the Self Test failure message or 1-2-4-8 LEDs are not displayed. You can get the number of the failed Self Test or Subtest by looking at the LEDs on the A11 board. Use the steps below to obtain either or both numbers. However, these procedures are not necessary in most cases:

1. Remove the top cover of the HP 85101 Display/Processor and locate the A11 board. It is the board, in the card cage, that has the processor on it. It is the only board with six LEDs in the center, having the label SELF TEST and the respective numbers 1, 2, 4, 8, 16, 32.

2. Obtain the subtest decimal number by adding up the binary coded values of the LEDs that are lit. This board should be visible as the top board in the card cage. If not, refer to the section titled ASSEMBLY/DISASSEMBLY for instructions on how to remove the card cage so that you can put the A11 board on top. The four boards in the card cage can be in any order for the instrument to work. After A11 is on top, repeat the steps that led you to this point and add the subtest LED values.

   At power-on or when Self Test is initiated, all six of these A11 Processor LEDs light for approximately two seconds. If a Self Test fails, the LEDs corresponding to the failed test will light for two seconds (for tests 2 through 14 only). Then the LEDs that correspond to the subtest number light and stay on. The exception is Self Test 1. It does not display a subtest number.

   Below is a table of the binary coded LEDs on the A11 Processor board:

Subtest Number	Binary Coded LEDs on A11 Processor					
	32	16	8	4	2	1
1	0	0	0	0	0	1
2	0	0	0	0	1	0
3	0	0	0	0	1	1
4	0	0	0	1	0	0
5	0	0	0	1	0	1
6	0	0	0	1	1	0
7	0	0	0	1	1	1
8	0	0	1	0	0	0
9	0	0	1	0	0	1
10	0	0	1	0	1	0
Etc.						
16	0	1	0	0	0	0
Etc.						
32	1	0	0	0	0	0
Etc.						

NOTE: In the Binary coded list, "1" = LED on, and "0" = LED off.

Using the Test Menu to Run a Self Test

This section explains how to access the Test Menu and how to run the individual tests in the repeating mode for troubleshooting.

Accessing the Test Menu

Assuming that the CRT display is operating, there are three ways the Test Menu is accessed:

(1) Turn the instrument ON while depressing any key on the HP 85101. When an error message display appears, release the key. This procedure forces Self Test keyboard error 14. Press **[= MARKER]** to exit the error display and enter the Test Menu.

(2) Press and hold down any front panel entry key on the HP 85101 display/processor and (at the same time) press and release the recessed **[TEST]** button. When the Self Test failure message is displayed, release the entry key.

Test 14 should be indicated on the error LEDs on the HP 85101 display/processor. If a fault occurred before test 14, the Self Test sequence has stopped and the LEDs will indicated the test that failed. Press **[= MARKER]** to exit the error display and enter the Test Menu.

(3) If the operating system is running properly, press the **[SYSTEM]** key. Then press the **[MORE]** softkey, the **[SERVICE FUNCTIONS]** softkey, then the **[TEST MENU]** softkey. The Self Tests will appear with the rest of the selections.

Running a single Self Test selection

Each Self Test routine may be initiated individually by first accessing the Test Menu on the CRT, then entering the number of the Self Test on the ENTRY panel, then [=MARKER]. Some of the tests will repeat continuously unless a processor error halts the test. Also, you can exit the loop by pressing any key in the entry area.

In this repeating mode, waveforms and signals may be traced through the circuits in question with external test equipment. This is typically done at the factory and not recommended for field use. However, in this repeating mode, intermittent failures can be detected. Also, if an error is found, the front panel fault LEDs will not clear until you re-run the entire Self Test sequence — even if the fault is corrected. To do this, you can select command number 17: RERUN SELF TEST. Or, you can press the recessed [TEST] button.

If test 18 (Repeat Test Loop) is selected, the entire Self Test runs continuously and a log is kept of the number of times it ran and had a failure, including the number of times it passed with no failure.

In order to avoid wearing out EEPROM memory cells, the EEPROM write test routine is only performed for the first 20 cycles of a repeat loop. This applies only to the Self Test selections 12 (Non Volatile Memory Test) and 18 (Repeat Test loop).

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Self Test Descriptions and Troubleshooting

The following paragraphs describe what each Self Test routine does, possible causes of failure, and troubleshooting suggestions. In addition, you may want to refer to the System Level Troubleshooting Block Diagram, located in the section titled BLOCK DIAGRAMS. That block diagram can be useful for identifying the board location of a Self Test failure. Also, you can refer to the section titled SERVICE PROGRAM to run any of the HP 85101 Display/Processor tests.

If the Self Test has Subtests, the subtest fault information is also provided with each Self Test description and can help isolate problems and verify failures. If the CRT is working, the failed test and subtest will be displayed. Also, remember that the previous paragraphs described how to obtain and interpret the subtest failure code on the A11 board subtest LEDs.

NOTE: Each Self Test can be *looped* (continuously repeated) by entering the number of the Self Test from the menu, then pressing [=MARKER]. In this mode, intermittent failures can be detected.

Test 1 – A11 Processor EPROM

The A11 processor (U36) sequentially addresses the Self Test ROM (U67) memory locations and adds up the number of "1"s found in each cell. The total is compared with a checksum stored in the ROM.

This procedure checks part of the processor kernel, ROM (U67), A11 PAL (programmed array logic), +5V supply, address lines A0 through A16, and data lines D8 through D15.

No subtest error information is displayed for this test.

Probable cause of failure:

- A failure in display/processor A11 Processor assembly Self Test ROM U67.
- An address error on A11 Processor address bus lines A0 through A16.
- A stuck line on A11 Processor data lines D8 through D15.
- A problem with the A11 Processor address decoder or DSACK circuits.

Troubleshooting:

- Check the seating of the A11 board in the card cage.
- Run the 85101 CPU (A11) Service Program tests.

Test 2 – A11 Processor RAM

This test checks all of the dynamic RAM (256K x 16 bits) on the A11 Processor. At each memory location (address) in RAM, the processor writes into memory, then reads it, compares, inverts, writes, reads, and compares again.

- Address lines A2 through A19 are checked by this test.
- At the end of the test, A15U23 (Test Interface), A15U16 and U41 (HP-IB Interface), and A14 Display Generator are initialized – and TESTING is displayed on the CRT.

Subtest information:

Subtest Number	Hex Number on CRT	Failed Bit
1	1	MPU D0
2	2	MPU D1
3	3	MPU D2
4	4	MPU D3
5	5	MPU D4
6	6	MPU D5
7	7	MPU D6
8	8	MPU D7
9	9	MPU D8
10	A	MOU D9
11	B	MPU D10
12	C	MPU D11
13	D	MPU D12
14	E	MPU D13
15	F	MPU D14
16	10	MPU D15
17	11	D0
18	12	D1
19	13	D2
20	14	D3
21	15	D4
22	16	D5
23	17	D6
24	18	D7
25	19	D8
26	1A	D9
27	1B	D10
28	1C	D11
29	1D	D12
30	1E	D13
31	1F	D14
32	20	D15
33	21	Address Error

Probable cause of failure:

- A11/refresh controller may be bad.
- RAM failure

Troubleshooting:

- Remove A13, A14, and A15 from the card cage and see if Test 2 still fails. If the failure is cleared, A13, A14, or A15 may be bad.
- Run the 85101 CPU (A11) Service Program tests.

Test 14 – Keyboard Test

Test 14 is run next – out of sequence. Test 14 scans the HP 85101 Display/Processor front panel keyboard (A1A1) for a key closure (stuck key).

Subtest information:

Subtest Number	Bad Key On Row	Keys in Bad Row	Data Lines (A1A1, A10, A15, A17)
1	0	G/N, M/U, K/M, X1	HIORL0
2	1	9, 6, 3, ±, =MARKER	HIORL1
3	2	8, 5, 2, ., BACKSPACE	HIORL2
4	3	7, 4, 1, 0	HIORL3
5	4	ENTRY OFF, UP, DOWN	HIORL4
6	5	PRIOR MENU	HIORL5
7	6	SOFTKEYS: F1, F2, F3, F4	HIORL6
8	7	SOFTKEYS: F5, F6, F7, F8	HIORL7

Probable cause of failure:

- Stuck key or failure on front panel board.
- A15 I/O failure.

Troubleshooting:

- Run the 85101 I/O (A15) Service Program tests.
- Run the 85101 Front Panel (A1A1) Service Program test.

Self Test 14 Selected from Menu

Select Test 14 from the Self Test menu. This is not a looping mode test. However, the test does check both the Display/Processor and the HP 85102A IF/detector pushbuttons, whereas test 14 that was run during the Self Test mode only tested the status of the display/processor pushbutton circuits.

Test 14 can be used as a troubleshooting tool to test each front-panel key and its driver in both the HP 85101 Display/Processor and the HP 85102A IF-detector. As each button is pressed, the associated Hex code will be displayed on the CRT (if the switch closed and the driver circuit is working properly). The following table lists the keys pads and the associated Hex code. To exit this test, press the **[TEST]** button.

Below is a table of Keys and Hex Codes.

Display/Processor	Hex code	IF-detector keys	Hex code
G/n	00	CHANNEL 1	00
M/u	08	CAL	10
K/m	10	DOMAIN	11
X1	18	DISPLAY	12
9	01	MARKER	13
6	09	START	23
3	11	STOP	2B
±	19	CENTER	24
=MARKER	21	SPAN	2C
8	02	MENU (STIMULUS)	33
5	0A	S11	04
2	12	S12	05
.	1A	S21	0C
BACKSPACE	22	S22	0D
7	03	MENU (PARAMETER)	14
4	0B	LOG MAG	06
1	13	PHASE	07
0	1B	DELAY	0E
ENTRY OFF	0C	SMITH CHART	0F
up arrow	1C	MENU (FORMAT)	16
down arrow	14	SCALE	20
PRIOR MENU	1D	AUTO	21
softkey 1	06	REF	28
softkey 2	0E	POSN	29
softkey 3	16	MENU (RESPONSE)	30
softkey 4	1E	LOCAL	1B
softkey 5	07	SAVE	1C
softkey 6	0F	RECALL	1D
softkey 7	17	PRESET	1A
softkey 8	1F	COPY	3A
		TAPE	3B
		SYSTEM	3C
		RESTART	3E

Test 3 – A15 Data Bus

The processor writes Hex data 55 (01010101), then AA (10101010) to the A15 board. The processor then reads and compares the data.

This test checks:

- The A15 I/O latches,
- The I/O signal paths between the A11 Processor and A15 I/O board.
- A15 I/O data bus IOD0 through IOD7.

Subtest information:

Subtest Number	Hex Number on CRT	Failed Bit
1	001	D0
2	002	D1
3	003	D2
4	004	D3
5	005	D4
6	006	D5
7	007	D6
8	008	D7

Probable cause of failure:

- Most probable cause is data lines IOD0 through IOD7 – suspect A15 I/O board (specifically A15U30).
- Suspect the A11 Processor or A10 Back Plane assemblies.

Troubleshooting:

- To minimize the system: Remove the A13 Memory and A14 Display Generator boards and see if Test 3 still fails. If removing A13 or A14 appears to fix the problem, this does not necessarily indicate a bad A13 or A14 board, since the interrupt circuits are located on A15. The interrupt circuits may be bad but may not show up until the A13 or A14 is installed.
- Run the 85101 I/O (A15) Service Program test.

Test 4 – A14 Display RAM

This test runs through the entire address space (64Kx16 bits) of the A14 Display Generator RAM. The testing sequence is the same as that described in Test 2.

- A14 DGA0 through DGA7 and DGD0 through DGD15 are checked.
- Address lines A0 – A18 are used.

Subtest information:

Subtest Number	Hex Number on CRT	Failed Bit
1	001	DGD0
2	002	DGD1
3	003	DGD2
4	004	DGD3
5	005	DGD4
6	006	DGD5
7	007	DGD6
8	008	DGD7
9	009	DGD8
10	00A	DGD9
11	00B	DGD10
12	00C	DGD11
13	00D	DGD12
14	00E	DGD13
15	00F	DGD14
16	010	DGD15

Probable cause of failure:

- The most probable cause of failure is: A14 RAM, RAM Refresh Circuit, or the Display Generator RAM bits DGD0 through DGD15. If bit DGD0 fails, then the control and address circuitry may be at fault.

Troubleshooting:

- To minimize the system: Remove A13 Memory and A6 Line Generator boards and see if Test 4 still fails.
- When looping on this test, check the address and data lines for activity.
- Run the 85101 Display Gen (A14) Service Program tests.

Test 5 — A14 Data

This test exercises the processor's ability to clear "TESTING" from the display, to write vectors to the display by drawing two diagonal lines, and to compare the vectors from registers A14U43 & U44 to the data stored in display RAM.

Probable cause of failure:

- Most probable cause of failure is a faulty A14 board.
- Less posssible cause is faulty interrputs or data or address I/O failure to the boards.
- Faulty display RAM.

Troubleshooting:

- Run the 85101 Display Gen (A14) Service Program tests.

Test 6 – A15 Timer

The processor writes data word Hex 55 (0101 0101), then Hex AA (1010 1010) to timers number 0 and 2 in A15U35. The data is read and compared to the data written. This test verifies that A15U35 can communicate with the processor.

Subtest information:

Subtest Number	Hex Number on CRT	Error Indication
1	001	Counter 0 failed 55 Data
2	002	Counter 0 failed AA Data
3	003	Counter 2 failed 55 Data
4	004	Counter 2 failed AA Data

Probable cause of failure:

- Faulty A15 board.
- Faulty U35 on the A15 board.

Troubleshooting:

- Run the 85101 I/O (A15) Service Program tests.

Test 7 – A15 Public HP-IB

The processor writes two data words (55 Hex, then AA Hex) to the public HP-IB interface, A15U16. The data is read back and checked. This test verifies that the processor can communicate with A15U16. However, it does not prove that the HP-IB interface is working properly.

Subtest information:

Subtest Number	Hex Number on CRT	Failed Bit
1	001	IOD0
2	002	IOD1
3	003	IOD2
4	004	IOD3
5	005	IOD4
6	006	IOD5
7	007	IOD6
8	008	IOD7

Probable cause of failure:

- The most probable failure is A15U16 or the HP-IB control lines to A15U16.

Troubleshooting:

- Minimize the system: remove A13 Memory and all HP-IB cables and try to re-run Self Test number 8. If it does not pass, check the control lines.
- Run the 85101 I/O (A15) Service Program tests.

Test 8 — A15 Private HP-IB (HP 8510 System Bus)

The processor writes two data words (55 Hex, then AA Hex) to the private HP-IB interface A15U41. The data is read and checked. This test verifies that the processor can communicate with A15U41. However, it does not prove that the HP-IB interface is working properly.

Subtest information:

Subtest Number	Hex Number on CRT	Failed Bit
1	001	D0
2	002	D1
3	003	D2
4	004	D3
5	005	D4
6	006	D5
7	007	D6
8	008	D7

Probable cause of failure:

- The most probable failure is A15U41 or the control lines to it.

Troubleshooting:

- To minimize the system: remove A13 and all HP-IB cables.
- Run the 85101 I/O (A15) Service Program tests.

Test 9 — Interrupt System

The processor causes the interrupt vector to execute a subroutine in Self Test PROM A11U67. This test checks the system's ability to perform this interrupt as follows: When the interrupt occurs (HTEST high at A15TP1), this subroutine changes the data latched in A15U36 and A15U50. The processor then restores the interrupt vector and checks it. In some cases an interrupt error can cause a Memory Operations Menu to be displayed.

Subtest information:

Subtest Number	Hex Number on CRT	Error Indication
1	001	Test bit did not generate IRQ or I/O bus did not latch a Hex 55 during IRQ service.

Probable cause of failure:

- Faulty A15 I/O board
- Faulty A11 Processor board.
- Faulty A15 interrupt ICs.

Troubleshooting:

- Run the 85101 I/O (A15) Service Program tests.
- Check the seating of the boards in the card cage.

Test 10 — A11 Multiplier

The processor loads the accumulators with the numbers to be multiplied and initiates the complex multiply subroutine by addressing A11U11. The math state machine controls the multiplication. The results of the multiplication is compared with the correct answer stored in Self Test PROM. Only the complex multiply is verified in this test.

Subtest information:

Subtest	Error Indication
0	The CRT will be blank: multiplier control section failure.
1	Exponent failure during complex multiply operation. Should expect Hex FF.
2	Bad data from complex multiply exercise.
3	Bad data from Accumulator/Interface test.

Probable cause of failure:

- Most probable cause of failure is a faulty A11 board.

Troubleshooting:

- Run the CPU (A11) Service Program tests.

Test 11 — A15 Tape Controller Test

The processor initializes the A15U12 tape controller (TACO), and then writes Hex 5555 then Hex AAAA to the first of two registers in the TACO. The data is read and compared. This procedure is repeated for the other register. This test only checks that the processor can communicate with the TACO. It does not test the ability to write or read tapes.

Probable cause of failure:

- Most probable cause of failure is A15 I/O.
- Also suspect the A1 or A1A1 front panel.

Troubleshooting:

- Check the −5 volt power supplies to A15U12 pin 9 for any tape-related failures. If they are out of tolerance, check the supplies on the power supply board — refer to the section titled ADDITIONAl TESTS and the section titled BLOCK DIAGRAMS.
- Run the I/0 (A15) Service Program tests.
- Run the Front Panel (A1 and A1A1) Service Program tests.

Test 12 – A13 Non-Volatile Memory

The processor initializes memory then writes data into a page of memory. This data is read and checked for errors.

Probable cause of failure:

- Faulty A13 board or EEPROM memory not formatted.
- Address or data line problems.
- Faulty memory ICs.

Troubleshooting:

- Be sure the card cage boards are properly seated.
- Run the Nonvolatile memory (A13) Service Program tests – but note that these tests require a password because you must reload the operating system tape after using these tests. Be sure to read the Service Program information carefully before running these tests.

Test 13 – IF Detector Data

The processor writes data to the HP 85102A IF/Detector to verify that all 16 data lines are functioning. The processor writes data 55 Hex and then writes AA to the IF/Detector A6 Clock board buffer (A6U5), via data lines IDB0 through IDB7. Then the processor reads from A6U5 and checks the data. This checks the lower 8 data lines. The upper 8 data lines are checked in the same way: the processor writes data word Hex 55 and then writes AA to the Interface board latch, A24U10, via data lines IDB8 through IDB15. The data is read and compared.

Subtest information:

IF Detector A6U5			IF Detector A24U10		
Subtest Number	**Hex Number on CRT**	**Data Line**	**Subtest Number**	**Hex Number on CRT**	**Data Line**
1	001	IDB0	9	009	IDB8
2	002	IDB1	10	00A	IDB9
3	003	IDB2	11	00B	IDB10
4	004	IDB3	12	00C	IDB11
5	005	IDB4	13	00D	IDB12
6	006	IDB5	14	00E	IDB13
7	007	IDB6	15	00F	IDB14
8	008	IDB7	16	01	IDB15
NOTE: SUBTEST NUMBERS 17 THROUGH 32 CORRESPOND TO ADDRESS LINES.					

Probable cause of failure:

- Faulty data or address lines.
- Faulty HP 85102 A6 Clock board ICs.
- Faulty A11 Processor board.

Troubleshooting:

- Run the 85101 CPU (A11) Service Program tests.
- At the end of this test, the A22 board in the IF/Detector sets the Test Set VTO to 120 MHz if the A6 board is working properly. Check the fundamental frequency output of the VTO – refer to TEST SET TROUBLESHOOTING.

System Commands

Menu Selection 15 – Run Main Program

The processor initiates the Self Test sequence from Hex 80000 and runs all of the tests (1 through 14), disregarding any errors. Then the operating system is loaded from memory to RAM and program execution begins.

Menu Selection 16 – Memory Operations

This routine allows direct access to individual memory locations. Data in memory may be looked at, changed, added, or deleted. However, doing so could destroy the operating system in memory. If this occurs, reload the operating system using Menu Selection 19 and your operating system tape. Hewlett-Packard recommends that you do not use this selection unless assisted by a qualified Hewlett-Packard Customer Engineer.

Menu Selection 17, Rerun Self Test

This restarts the Self Test program from Address Hex 80000, and if no errors occur the main program is loaded from memory into RAM and the program is executed.

Menu Selection 18, Repeat Test Loop

This runs the Self Test sequence continuously. A counter is displayed on the CRT indicating the number of times it had failed, and the number of times it passed. This mode is helpful in troubleshooting intermittent failures because it allows you to operate in a continuous Self Test loop.

Press the recessed **[TEST]** button to exit this menu.

Tape Commands

Menu Selection 19, Load Program Tape

This selection allows you to load or reload your operating system. You insert the tape into the HP 85101 drive and press **[1] [9] [=MARKER].** After a few minutes the system will be fully loaded if the memory board is properly initialized. Refer to the section titled SERVICE PROGRAM for details about how to do this. You will use selection 4, the NONVOLATILE MEMORY BOARD (A13), under the heading marked HP 85101 Display/Processor Tests.

Menu Selection 20, Record Program Tape

Use this selection to make a copy of your HP 8510 operating system tape after a blank tape has been initialized with the selection 21 below.

Menu Selection 21, Initialize Tape

Use this selection to initialize an HP 8510 tape cartridge before writing onto it. Insert the tape you want initialized in the front panel drive with the record tab in the correct position and enter the selection number and press **[=MARKER].**

Service Commands

Menu Selection 22, Run Service Program

Refer to the section titled SERVICE PROGRAM before using this selection.

Menu Selection 23, Diagnose a Failure

This selection does not actually diagnose a failure. It is only used to show you what the diagnostic failure message would be. If you enter the number of a Self Test and Subtest, it will show you the error message that is displayed for that failure. You can use this selection to read the failure message for any combination of Self Test and Subtest, especially if the CRT goes blank.

For example, if the CRT is blank or if the failure message is not displayed, you can do the following. Look at the front panel LEDs and add the decimal sum of those displayed — this gives you the number of the failed Self Test. Then look at the A11 board's Subtest LEDs (explained above in the SUBTEST paragraphs) to get the number of the failed Subtest. Now, using this information, access the Self Test menu by pressing **[SYSTEM], [MORE], [TEST MENU].** Then select *Diagnose a Failure* by entering **[2] [3]** and pressing **[=MARKER].** Next, enter the failed test numbers and the CRT will display the failure message, indicating any possible cause of failure.

How To Reload the Operating System

You can reload the operating system that is currently residing in RAM memory by pressing the recessed **[TEST]** button. This will re-initialize your system and re-run all the Self Tests. If no failures occur, your system will display the power-on instrument state number 8.

You can also reload the operating system, stored in non volatile memory, from the tape cartridge. To do this, follow the steps below:

1. Access the TEST MENU on the CRT. Typically, you can press **[SYSTEM]**, **[MORE]**, **[SERVICE FUNCTIONS]**, **[TEST MENU]**.
2. Insert the tape in the HP 85101 drive and select number 19, LOAD PROGAM TAPE by pressing **[1] [9] [=MARKER]**.
3. After a few minutes the tape will be loaded and a graticule will be displayed: Power-On instruments state 8 will now appear.

NOTE: Reloading the operating system is only suggested for failures that cannot be isolated in any other manner. Be careful when doing this. When you do load the tape using this selection, the A13 EEPROM board will automatically be initialized (formatted). You do not have to use the Service Program selection to do this.

Running Error Messages

RUNNING ERROR MESSAGES AS BUILT-IN DIAGNOSTICS

Running Error Messages appear on the HP 8510 CRT whenever the HP 85101's processor detects an error during normal operating or running of the system. As a built-in diagnostic test, the system's processor is constantly monitoring the overall system operation, especially that of the phase-lock between the HP 85102 IF-Detector, the Test Set and the Source. Internal firmware routines are constantly checking power levels, phase relationships, frequency changes, operator commands, etc. When the processor determines that anything is wrong or not within the expected range or limit, it sends a warning message that is displayed on the HP 85101 CRT. In other words, Running Error Messages are the system's way of telling you that something is wrong while the system is running.

When an error is detected and a Running Error Message is displayed, the system will usually continue running (making measurements). Therefore, because the system is running, it has already passed the power-on Self Test diagnostics. Thus, it is not likely that a Running Error Message indicates a problem in the HP 85101 Display/Processor, unless it is the processor that has failed.

Whenever you get a Running Error Message, be sure it is a consistent and repeatable error. Press the **[ENTRY OFF]** key to remove the message from the CRT and then press the **[MEASUREMENT RESTART]** key to take another sweep. Many times, an error message like PHASE LOCK LOST is only an intermittent loss of phase lock that can be corrected on the next sweep. If the message is gone, then there is no real problem. However, if the error message repeats, look up that message in this section and note the possible causes and troubleshooting suggestions.

DIFFERENT TYPES OF RUNNING ERROR MESSAGES

There are four types of HP 8510 error messages: Cautions, Prompts, Tells, and Errors. These four types are described below. However, it is important to remember that only those error messages which are related to *service* and *repair* are documented in this manual. Some of the Cautions and all of the Prompts, Tells, and Errors are not documented because they are not service related and they are self-explanatory. For example, messages like these are not documented:

FILE NOT FOUND (Caution type)
POSITION SLIDE THEN PRESS KEY TO MEASURE (Prompt type)
RECALLING CAL SET (Tell type)
INSUFFICIENT MEMORY (Error type)

The paragraphs below describe the general characteristics of each type of error message. However, remember that only the Caution types (related to service) are documented in this manual.

Cautions: The messages are preceded with the word *CAUTION* and also have an accompanying beep sound. They usually indicate a problem with the HP 85102 IF-Detector, the test set, the source, or the disc/drive. They are the main subject of this section because they are related to hardware failures more than the other types of messages. Except for those Caution messages that are concerned with the disc or drive, most of these messages relate to the hardware phase-lock system.

For example, if you disconnect the RF source power from the test set, the message *CAUTION: NO IF FOUND* will be displayed. Immediately, the processor has determined that there is insufficient IF power and reports the error on the CRT. However, because the processor uses the information supplied by the A21 IF COUNTER board in the HP 85102, it is possible that this board (A21) is faulty and not the IF signal. Therefore, be cautious in your interpretation of these error messages. Remember, the message indicates that a problem has been detected on a certain board — but the message does NOT always indicate where the actual problem is located.

Prompts: These messages are displayed whenever the processor wants you to do something in the normal running of the instrument. These messages do not indicate a failure. For example, if you have just finished calibrating the system and you do not have enough room to store the cal, the prompt *NO SPACE FOR NEW CAL; DELETE A CAL SET* will be displayed. Here, the processor has checked the CAL SETS and knows that you have saved calibrations in all of them. Thus, it is prompting you to delete one or more CAL SETS so that you can store the one you have just finished.

Tells: These messages are displayed whenever the processor is doing something that you have requested. Actually, the processor is telling you what it is doing or has done. This type of message does not indicate a failure or a problem unless the message is telling you something that you have not requested or do not expect. For example, if you want to save the current state of the HP 8510 for any reason, you would press the INSTRUMENT STATE [SAVE] key on the HP 85102. The processor would immediately recognize your command and tell you that it is obeying by displaying the message: *SAVING INST STATE*.

Error: These messages are displayed whenever the system cannot continue running because of a programming error — they are not related to the CAUTION type of error messages. For example, if you have programmed the HP 8510 to perform a function requiring moving data to its internal memory and it does not have enough room to store the data, the message *INSUFFICIENT MEMORY* will be displayed on the CRT.

THINGS TO REMEMBER ABOUT RUNNING ERROR MESSAGES

- They may be caused by either an internal problem or an operator error.
- In many cases, they will not stop the measurement sweep.
- They can be intermittent or permanent and, in the case of Cautions, the message indicates where the failure is detected and not always where the error exists.
- They may be caused by an HP 85101 processor failure or error, not necessarily by the cause indicated in the message. However, this type of failure is rare.
- They remain on the CRT until you clear the message by correcting the problem, pressing **[PRESET]**, **[TEST]** or **[ENTRY OFF]**.

CATEGORIES OF RUNNING ERROR MESSAGES: CAUTION type.

Four types of CAUTION Running Error Messages are used for service and troubleshooting:

1. *Phase Lock Running Error Messages:*
   VTO FAILURE
   NO IF FOUND
   PHASE LOCK FAILURE
   PHASE LOCK LOST
   VTO OVER RANGE

   NOTE: Refer to the THEORY OF OPERATION section for a detailed description of how these Phase Lock error messages are generated.

2. *IF/Detector ADC Running Error Messages:*
   ADC NOT RESPONDING
   ADC CAL FAILED
   IF CAL FAILED
   IF OVERLOAD
   AUTORANGE CAL FAILED

3. *Source Sweep Running Error Messages:*
   SOURCE SWEEP SYNC ERROR
   SWEEP TIME TOO FAST

4. *Bus (HP-IB) Running Error Messages:*
   SOURCE SYNTAX ERROR
   SYSTEM BUS ADDRESS ERROR
   TEST SET SYNTAX ERROR

ADDITIONAL TROUBLESHOOTING INFORMATION

If the information in this section does not isolate your problem sufficiently, refer to the SERVICE PROGRAM, FRONT PANEL TESTS, ADDITIONAL TESTS, SOURCE TESTS or TEST SET TROUBLESHOOTING sections of this manual.

System Level Troubleshooting Block Diagram

You can use the system-level troubleshooting block diagram, located in the section titled BLOCK DIAGRAMS, as a reference guide for troubleshooting Running Error Messages. Read HOW TO READ THIS BLOCK DIAGRAM, to the left of the block diagram. The running error messages are listed to the right, and have numbers associated with each message.

Troubleshooting the Running Error Messages

Eliminating common errors

When troubleshooting a CAUTION Running Error Message, you can check the following items below to eliminate any possible problems that can be corrected or checked with a simple test. Be sure that:

- AC power is properly applied to all instruments, and all connections are correct. Refer to the CONFIGURATION/CONNECTION section if necessary.
- The source power and frequency are correct. Some phase lock errors are caused by improper source power or frequency. Refer to the appropriate source manual or the SOURCE TESTS section of this manual.
- Be sure that the test set is properly down-converting the RF source input signal to 20 MHz. Refer to UNRATIOED POWER TEST and/or TEST SET TROUBLESHOOTING.
- The Running Error Message displayed on the CRT may be the result of the processor executing a firmware instruction at the time of failure. Therefore, the displayed error message is indicating a related failure — not the actual failure. This means that the error message is indicating a failure at the wrong place or wrong board. To get the best indication of the true failure, press the [ENTER] key on the HP 8510 several times. The error message that continually repeats is the Running Error Message you want to troubleshoot.
- The system is powered-up in the proper order, to avoid a possible phase lock error. Power-on order of the instruments is:

  1. Source
  2. Test set
  3. *Others (controller, printer, etc.)
  4. HP 8510

  * When troubleshooting, it is recommended that you disconnect all other peripheral instruments.

- Before or after using the Service Program, or any other procedures to test the boards in the HP 85102 IF-Detector, you may want to check the cables on the boards. Remove the instrument top cover (use a pozidrive screwdriver) and check that all snap-on cables are connected properly to the boards. Each cable is labeled with a **J** (jack) number that corresponds to the **J** input on the board cover.

CAUTION RUNNING ERROR MESSAGES

IN ALPHABETICAL ORDER

Probable cause of the failure
with troubleshooting suggestions.

NOTE: Whenever you have a **Running Error Message,** you can try pressing the **[ENTRY OFF]** key and then pressing the **[MEASUREMENT RESTART]** key to see if the error message repeats. If it does not repeat, it is probably NOT a true error — it is probably an intermittent failure. If it does repeat, follow the troubleshooting suggestions below.

ADC CAL FAILED

In the HP 85102, the A18 A/D Converter board is calibrated by the A17 Sample/Hold board's cal DAC. The HP 85101 processor detects when the measured bits are not within the specified level and displays this message.

Possible cause of failure:

- A18 ADC board (HP 85102).
- A17 S/H board (HP 85102).
- A19 ADC control board (HP 85102).

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 1 (A19), 3 (A18), and 4 (A17).
- Refer to ADDITIONAL TESTS or FRONT PANEL TESTS.

ADC NOT RESPONDING

The HP 85102 A18 ADC board is not sending an expected interrupt service request to the HP 85101 processor.

Probable cause of failure:

- A18 ADC (HP 85102).
- A19 ADC control (HP 85102).
- A24 processor interface (HP 85102).
- HP 85101 interrupt problem.
- IF-Display Interconnect Cable.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 1 (A19) and 3 (A18).
- Run the Service Program 85101 tests: I/O A15 board (test 8,D,C).

NOTE: This message is the highest priority interrupt in the HP 8510.

AUTORANGE CAL FAILED

The processor tries to calibrate the switchable gain amplifiers (0, 12, 24, 36, and 48 dB gain steps) on the HP 85102 IF amplifier boards. If the measured values exceed the normal error limits, this message is displayed.

Probable cause of error:

- A12 or A10 IF Amplifier (HP 85102)

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 test 5 (A10/A12).
- Refer to ADDITIONAL TESTS or FRONT PANEL TESTS.

IF CAL FAILED

The HP 85102 A6 clock board provides a 100 KHz calibration signal to the IF amplifiers (A10 and A12). The processor uses this signal to calibrate the HP 85102 IF strip(s). If the calibration error exceeds a certain limit, the processor warns the user with this message.

Probable cause of error:

- 100 KHz cal signal from A6 clock (HP 85102).
- A10 or A12 IF amplifier (HP 85102).
- A5 or A7 synchronous detector (HP 85102).
- A17 sample/hold (HP 85102).
- 4 MHz from the A6 clock assembly to the A7 and A5 sync. detector assemblies (HP 85102).

NOTE: The IF CAL FAILURE message may make both test and reference channels look bad, even if only one channel has a problem. Be sure to swap the A5/A7 boards (they're the same) and the A10 and A12 boards (they're the same) when troubleshooting. This way, you can try to determine if one or both of these matched boards are faulty.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 4 (A17), 5 (A10/A12), and 6 (A5/A7).
- Refer to ADDITIONAL TESTS or FRONT PANEL TESTS.

IF OVERLOAD or O (displayed on the left side of CRT)

Both error messages indicate that the HP 85102 IF amplifier (A10 or A12) is overloaded. The processor detects the overload condition from a status bit on the A10 or A12 IF boards. The **O** is usually an intermittent failure that can disappear during a measurement sweep — do not be concerned with this type of error (see NOTE below).

Probable cause of failure:

- Operator error: HP 8510 in manual mode with source power too high — amplifiers measured without attenuation to limit RF power to samplers.
- There is no 20 dB pad on the thru cable for an R/T test set (8512).
- IF gain is too high (set gain using the SYSTEM menu service functions).

Troubleshooting:

NOTE: **O** can appear if you are measuring a device with a sharp, greater than 24 dB, change in response. This is normal and happens because the HP 85102 A10/A12 IF amp autoranging cannot respond fast enough to a step in RF power greater than 24 dB at adjacent data points. It is sometimes possible to eliminate the **O** by changing one of the following: (1) slow down the sweep time, (2) RAMP to STEP mode, (3) number of points, (4) frequency span.

- Run the Service Program 85102 tests in the Run All mode.
- Refer to ADDITIONAL TESTS or FRONT PANEL TESTS.

NO IF FOUND

This error is detected by the level detector and the counter HP 85102 A21 IF counter board, using an algorithm in the HP 85101 math processor to calculate the IF frequency. The A21 counter and the processor check if the IF is within range and has enough power. If not, the processor initiates a search mode that attempts to relocate the test set VTO harmonic to re-establish the 20 MHz IF. This message is displayed if the IF is not found, or is not within range.

Probable cause of failure:

- A21 IF counter board (HP 85102).
- Sampler assemblies (test set): Be sure test set A3 summing amplifier assembly has not biased the samplers off: Measure the voltage on the *sampler control* pin to each sampler to verify TTL levels — 0 volts turns the sampler ON and approximately 3 volts or greater turns it OFF. You can press the S-parameter front panel keys to toggle the samplers.
- RF source signal may be absent, low in power, or way off frequency.
- Defective cable in IF path.
- Weak VTO, bad power amplifier, step recovery diode, or 4-way power splitter in VTO (test set).
- HP 85101 A11 math processor.
- Stop sweep (HP 85102) not connected.
- Occasionally, the A20 sweep ADC can cause this error, accompanied by a SOURCE SWEEP SYNC error message (HP 85102).

Troubleshooting:

- Run the Service Program 85102 in the Run All mode.
- Run the Service Program 85101 test 1 (A11), and the 85102 tests 2 (A20) and A (A21).
- Check the RF source to test set cable.
- Use the UNRATIOED POWER TEST to see if samplers are working.
- Check Test Set-IF Interconnect cable.

If the test set is an HP 8514A or 8515A, compare the S11 and S22 traces. If one looks bad, but the other looks good, the HP 85102 and HP 85101 are probably working. Therefore, suspect a problem with the test set or the IF-test set interconnect cable. If both S11 and S22 look bad, first suspect a problem with the HP 85102 or the source.

NOTE: This check does not work for HP 8512A and 8513A test sets. However, you can compare the a1 and b1 channels for unratioed power levels. If necessary, refer to the section titled UNRATIOED POWER TEST.

PHASE LOCK FAILURE

Because pretune is accomplished and the IF is detected, this message usually means that the A22 pretune, samplers, A14 VTO, and A21 IF counter are functioning. A phase lock failure occurs only after a successful pretune, and the main phase lock is switched in, and is detected by the 20 MHz IF counter and HP 85101 math processor.

Probable cause of failure:

- A23 main phase lock assembly (HP 85102).
- 20 MHz reference signal from A6 clock assembly (HP 85102).
- A21 IF counter assembly (HP 85102).
- LPRTHLD line to test set A3 summing amplifier (from HP 85102, A22).
- Weak or noisy VTO (test set). For an intermittent error message, see if the error message appears as you gently torque the VTO heat sink. If it does, the VTO assembly has a problem. Also, check the screws around the frequency converter (samplers) and VTO to be sure they are tight.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 8 (A22), 9 (A23), and A (A21).
- Check the A6 clock board (20 MHz signal). Refer to ADDITIONAL TESTS or FRONT PANEL TESTS section.

PHASE LOCK LOST

This error message indicates that the HP 8510 was phase locked but lost lock. Loss of phase lock is detected by the 20 MHz IF counter (A21) and the HP 85101 math processor (A11) after pretune. Also, this error message is often intermittent – be sure to press the [ENTRY OFF] and [MEASUREMENT RESTART] keys to verify that this is a repeatable message.

Probable cause of failure:

- Power holes or frequency error in the source.
- A21 IF counter (HP 85102).
- A22 pretune phase lock assembly (HP 85102).
- A23 main phase lock (HP 85102).
- A3 VTO summing amplifier assembly (test set).
- Faulty or intermittent VTO assembly with $<$15 dB power loss.

NOTE: If this error occurs when the HP 8430/41 source is in the RAMP mode, but not in the STEP mode, the problem is most likely the source or the HP 85102 A20 sweep ADC assembly. If so, be sure to check the A20 board with the Service Program diagnostics.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 8 (A22), 9 (A23), and A (A21).
- Check the a_1 channel: UNRATIOED POWER TEST.
- Check all rear panel connections.

SOURCE HP-IB SYNTAX ERROR

The source does not respond to a known good HP-IB command.

Probable cause of failure:

- Source HP-IB assembly.
- HP 85101 A15 I/O assembly (HP-IB portion).
- HP-IB cable between the source and HP 85101.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Refer to the SOURCE TESTS section to check the sources.

SOURCE SWEEP SYNC ERROR

The HP 8510 is not synchronized with the source. Specifically, the HP 85102 A20 Sweep ADC is not properly tracking the 0-to-10 volt ramp from the source.

Probable cause of failure:

- A20 sweep ADC (HP 85102).
- Stop sweep or sweep output cables not connected.
- Defective source.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 test 2 (A20).
- Check cabling — refer to CONFIGURATION/CONNECTION section — especially the Stop Sweep and Sweep In/Out connections.
- Refer to SOURCE TESTS section to check source.
- Use the Trim Sweep procedure (OPERATING AND PROGRAMMING manual) to adjust the sweep ADC gain DAC.

SWEEP TIME TOO FAST

Too many sweep triggers or too rapid sweep triggers were sent from the HP 85102 A20 sweep ADC assembly. The A19 ADC control assembly sends a status bit indicating it did not have time to complete an A to D conversion before receiving the next sweep trigger.

Probable cause of error:

- A19 ADC control assembly (HP 85102).
- A20 sweep ADC assembly (HP 85102).
- Source sweep speed set too fast, especially in LOCAL operation.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 1 (A19) and 2 (A20).
- Refer to SOURCE TESTS section.

SYSTEM BUS ADDRESS ERROR

This message is displayed if the address of any HP 8510 system instrument is wrong or not recognized by the HP 85101 processor.

Probable cause of failure:

- Source (19), test set (20), or plotter at wrong HP-IB address, or have power off.
- HP-IB cable not connected.
- HP-IB cable or connector faulty.
- HP 85101 A15 I/O assembly (HP-IB portion).
- Test set A4 HP-IB assembly

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program HP-IB test for the Test Set A4 board.
- Check the cabling and the addresses on all instruments.
- Check the HP 8510 addresses: Press [SYSTEM], [HP-IB ADDRESSES].

SYSTEM BUS SRQ ERROR

The HP 8510 system bus SRQ line is stuck (not responding).

Probable cause of failure:

- Test set A4 HP-IB assembly.
- Source HP-IB assembly.
- A15 I/O assembly (HP 85101).
- HP-IB circuitry of any peripheral on the bus.
- Bad HP-IB cable or connector.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program test for the Test Set A4 HP-IB board.
- Check all HP-IB cables and all addresses.

TEST SET HP-IB SYNTAX ERROR

Test Set does not respond to a known good HP-IB command.

Probable cause of failure:

- Test set A4 HP-IB assembly.
- HP 85101 A15 I/O assembly (HP-IB portion).
- HP-IB cable between the test set and the HP 85101.

Troubleshooting:

- Run the Service Program 85101 test 2 (A15).
- Run the Service Program test for the Test Set A4 HP-IB board.
- Check the cables.

UNABLE TO LOCK TO EXT 10 MHZ REF

The 10 MHz external input to the A6 clock assembly is more than + 500 Hz off frequency. The level should be > 0 dBm. If the external input is off frequency or or is less than 0 dBm, the A6 assembly sets the LIFSRQ low, alerting the processor to the unlocked condition.

If this error message occurs when the external 10 MHz input is **not** used, the probable causes of failure are:

- A6 clock assembly erroneously sets LIFSRQ low (HP 85102).
- The A6 clock LIFSRQ signal is pulled low along the way to the HP 85101 A11 processor.
- +5V input in the 85102 to the A6 clock is intermittent.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Check the 10 MHz input signal frequency and amplitude that you are applying to the rear panel of the HP 85102.

NOTE: This message is not applicable unless you are locking to an external source...for example, an HP 8510 mm-Wave system.

VTO FAILURE

The lock detector on the 85102 A22 pretune control assembly indicates that the pretune cycle has not happened. The pretune cycle steers the VTO output to a frequency where one of its harmonics mixes with the RF to produce the 20 MHz IF.

Probable cause of failure:

- Test set power turned off.
- Overheated or bad VTO (test set).
- A23 main phase lock board (HP 85102).
- IF detector/test set interconnect cable.
- A22 pretune assembly (HP 85102).
- A3 VTO summing amplifier assembly (test set).
- LPRTHLD line to test set A3 summing amplifier (from HP 85102 A22 pretune assembly).

NOTE: The power from the VTO sense line must drop about 15 dB (−18 dBm) before a VTO failure message occurs. This condition could cause the VTO frequency to be noisy and low in power.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 8 (A22) and 9 (A23).
- Check test set AC power and fuses.
- Check Test Set-IF Interconnect cable.
- Refer to TEST SET TROUBLESHOOTING section to check test set.

VTO OVER-RANGE

The VTO swept beyond its normal range. It is detected by the A3 U6 VTO end of range detector on the test set A3 VTO summing amplifier.

Probable cause of error:

- VTO (test set).
- A3 VTO summing amplifier (test set).
- A23 main phase lock (HP 85102).
- A20 sweep ADC (HP 85102).
- Source off frequency.
- VTUNE line to test set A3 summing amplifier (from HP 85102 A23 main phase lock assembly).
- HP 85102 0-10V swept input is not connected (BNC).

NOTE: If this error occurs **only** when the HP 8430/41 source is in the RAMP mode, the problem is probably either the source or the HP 85102 A20 sweep ADC assembly.

Troubleshooting:

- Run the Service Program 85102 tests in the Run All mode.
- Run the Service Program 85102 tests: 2 (A20) and 9 (A23).
- Check the source, especially the 0 − 10 volt ramp linearity.
- Check the VTO and A3 Summing Amp board: refer to TEST SET TROUBLESHOOTING.

BUILT-IN DIAGNOSTICS FOR SYSTEM TROUBLESHOOTING

This group of internal diagnostics, called the Service Program, will give the fastest and most complete check of the HP 8510 system. Whenever your HP 8510 system appears to have a failure, you can use this program to check the boards in the instruments. Read this section and familiarize yourself with the Service Program and the boards that are tested.

After you know how to use this program, you can refer to the menu map on the back of this page. It is a quick reference guide to the boards that are tested. However, be sure to read all of the information in this section before you use only the menu map.

In general, the Service Program is used for the following purposes:

1. When there is a Self Test failure, run the Service Program diagnostics for the board that failed — this will verify the failure.
2. When there is a Running Error Message, refer to the section titled RUNNING ERROR MESSAGES. Write down which boards could cause the error and run the Service Program diagnostics for those boards — this will verify if the board has a detectable problem.
3. When there is any reason to suspect a board level problem, run the Service Program diagnostics to check the boards.
4. After you replace a board, run the appropriate Service Program diagnostics to verify that the board level failure has been repaired.

If a test Fails or Passes: If you have a failure and if running any of the Service Program tests does not verify or isolate the problem, you can refer to the sections titled FRONT PANEL TESTS and ADDITIONAL TESTS. These sections contain separate and different information about testing certain boards and assemblies. Also, you should be sure that you have not overlooked any fundamental problems that can disguise the failure symptom, such as: wrong connections, error messages due to boards improperly seated in their sockets, etc.

If a Service Program test does fail, indicating that the board is faulty, you can be reasonably sure that the board should be replaced. However, refer to the sections titled FRONT PANEL TESTS and ADDITIONAL TESTS. If there is another test for the board in question, you should perform the test to further verify the failure.

Required Hardware: There are two service tools especially designed for use with these diagnostics. Refer to the section tab that is titled SERVICE TOOLS. In addition, you will also need 2 BNC-to-BNC cables. When these items are required in the Service Program, the HP 8510 CRT will display a message to alert you.

Access the Service Program diagnostics by pressing:

[SYSTEM] key on the HP 85102 front panel.
[MORE] CRT softkey
[Service Functions] CRT softkey
[Test Menu] softkey and the 8510 Test Menu will appear.
[2] [2] [=MARKER] to run the Service Program which is labeled as the 8510 Test Menu on the CRT.

NOTE: All tests used to generate signature analysis patterns are for factory repair techniques and are not intended for on-site service. Also, you can always use the front panel recessed [TEST] button to exit the Service Program and reset the HP 8510 — be sure to properly reconnect the system.

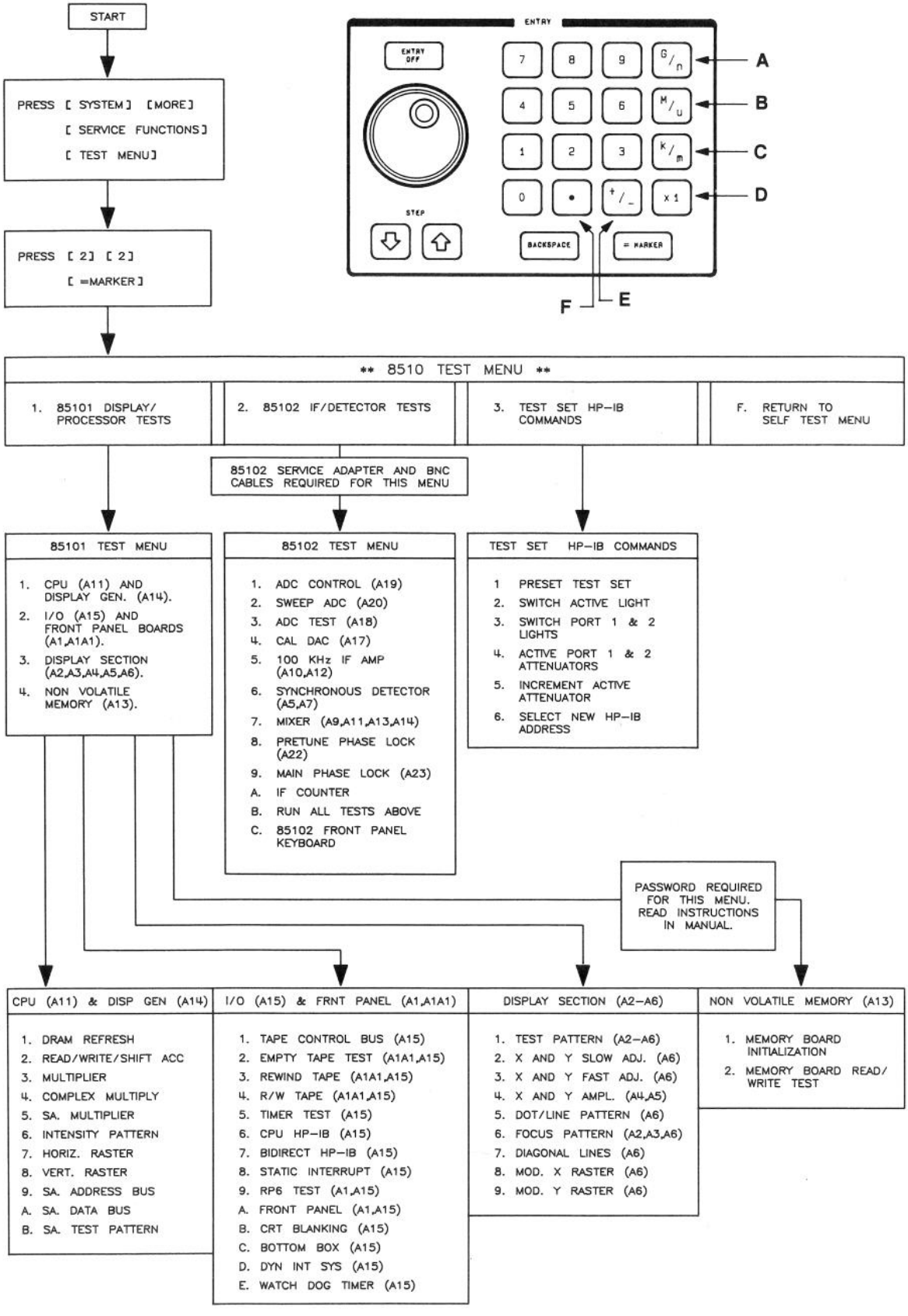


Figure 1. Service Program Menu Map

HP 8510 Test Menu

This is the main menu. From here, you can access separate menus for testing each of the three instruments: HP 85101, 85102, or test set.

```
        *** 8510 TEST MENU ***                    date

    85101 DISPLAY/PROCESSOR TESTS                  1

    85102 IF/DETECTOR TESTS                        2

    TEST SET HP-IB COMMANDS                        3

    RETURN TO SELF TEST MENU                       F

NOTES:  (1) Keys A thru F are assigned to G/n, M/u, k/m, x1, ±, and
            PERIOD respectively.
        (2) To make a selection, type the key indicated, then press
            =MARKER.
        (3) The default value on data entry is zero.
```

The drawing below shows the 0 through F hex keys on the 8510 front panel:

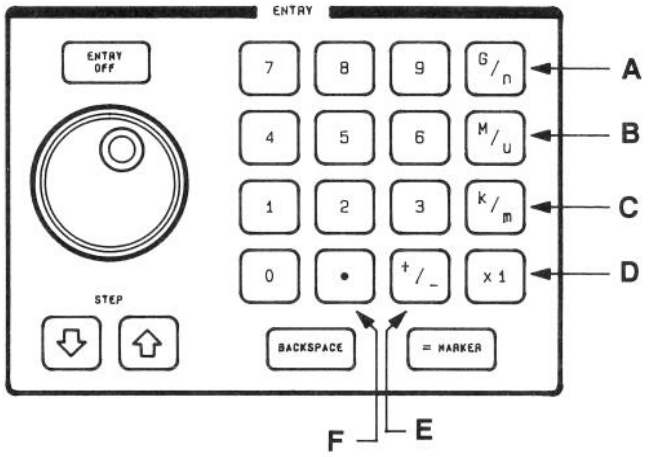


Figure 2. Entry Area Hex Keys

HP 85101 Display/Processor Tests

HP 85101 TEST MENU

This is the main 85101 menu. You can enter this menu by pressing [1] [=MARKER]. Use it to select the specific menu that you want. The four categories correspond to the four boards in the card cage — instructions for removing and replacing boards in it are given in the section titled ASSEMBLY/DISASSEMBLY. Note that the boards tested in each menu are shown in parenthesis below.

NOTE: If you disconnect the HP 85101 Display/Processor from all of the other instruments, you can verify its board level stand-alone operation. Disconnect all HP-IB cables and all other cables so that only the line voltage cord remains. Then change the position of the red **SERVICE** switch on the rear of the instrument. Because the HP 8510's line switch is on the HP 85102 IF/Detector, this SERVICE switch is used to turn the HP 85101 On and Off for stand-alone purposes. Move the switch to the ON position and DO NOT FORGET to return it to its LINE (System Controlled) position when you are finished.

*** 85101 TEST MENU ***	(date)
CPU and DISPLAY GENERATOR BOARDS (A11, A14)	1
I/O and FRONT PANEL BOARDS (A15, A1, A1A1)	2
DISPLAY SECTION BOARDS (A2 thru A6)	3
NONVOLATILE MEMORY BOARD (A13)	4
RETURN TO MAIN MENU	F

CPU AND DISPLAY GENERATOR TESTS

This menu has tests for the A11 and A14 boards. These boards are in the card cage of the HP 85101. Refer to the section titled ASSEMBLY/DISASSEMBLY for instructions about removing these boards. Also, note that the tests marked with an asterisk are intended for factory use only.

CPU Board (A11) Tests — numbers 1 through 5.

1 **DRAM REFRESH TEST:** Tests the dynamic RAM refresh controller.

2 **READ/WRITE/SHIFT ACCUMULATOR TEST:** Tests the Math Processor on the A11 board. Press [0] and [=MARKER] to run this test automatically. You can even run the test in a continuous loop to see if there are any intermittent failures. Data is written into the accumulators, shifted, and then read back and checked for proper results. This test has an option for manually entering data — this option is intended for factory use only.

3 **MULTIPLIER TEST:** Tests the Math Processor by doing multiplication in the registers. Run this test in auto mode to find any failures in the multiplier. This test has an option that allows you to manually enter data – this is intended for factory use only.

4 **COMPLEX MULTIPLY TEST:** This is the same test as Self Test 10 except for one difference. If there is an error, it displays the expected and received data rather than just the fact that it is faulty due to an error.

5 ***SIGNATURE ANALYSIS / MULTIPLIER:** This test generates a pattern that can be used to check signatures on the A11 board math processor section.

Display Generator Board (A14) Tests – numbers 6 through B.

6 **INTENSITY PATTERN:** Tests the Display Generator's ability to write or adjust various intensity levels on the HP 8510 CRT. The CRT will display a pattern of four steps leading up to a rectangle. Look for varying random degrees of intensity on the horizontal steps and constant intensity on the vertical steps. If all the steps have the same intensity, the A14 board may be faulty. There is no pass or fail indication for this test, only the CRT pattern that you inspect.

7 **HORIZONTAL RASTER:** Draws a full-height raster in the "X" direction of the display. This test is used for finding problems with the A6 board and defects in the CRT. Look closely for any dark lines, bars, or missing segments in the pattern that may indicate a problem with the A6 board (line generator DACs). Also, look for any holes or spots in the pattern that may indicate a bad CRT. Check for dirt between the CRT and the cover glass and clean if necessary. If the problem does not go away, the CRT may be defective.

8 **VERTICAL RASTER:** Draws a full-width raster in the "Y" direction of the display. This test is used for finding problems with the A6 board and defects in the CRT. This test is used for finding defects in the CRT. Look closely for any dark lines, bars, or missing segments in the pattern that may indicate a problem with the A6 board (line generator DACs). Also, look for any holes or spots in the pattern that may indicate a bad CRT. Check for dirt between the CRT and the cover glass and clean if necessary. If the problem does not go away, the CRT may be defective.

9 ***SIGNATURE ANALYSIS: ADDRESS BUS:** Provides a complete stimulus for checking signatures on the Display Generator address bus. The display rolls vertically during the test.

A ***SIGNATURE ANALYSIS: DATA BUS:** Provides a stimulus for checking signatures on the Display Generator data bus.

B ***SIGNATURE ANALYSIS: TEST PATTERN:** Provides a stimulus for checking IC signatures on the Display Generator board.

F **RETURN TO 85101 TEST MENU.**

* Signature Analysis is intended for factory use only.

I/O and FRONT PANEL

The A15 I/O board is located in the card cage. The A1 front panel board has all the keys on it and the A1A1 is the tape transport assembly. These boards work together to perform front panel commands.

1 **TAPE CONTROLLER BUS TEST (A15):** Tests the tape controller chip, called *TACO*. Data is written into the TACO registers and read from them. This test is the same as Self Test 11.

2 **EMPTY TAPE CARTRIDGE TEST (A1A1, A15):** This test should first be run with NO tape in the drive. Without a tape in the drive, the test should fail and give you a message: *tape cartridge out of the drive*. Further use of this test requires an *empty* tape in the drive (record tab in either position). However, a blank tape can be used — do not run this test more than three times because the tape may come off the spool. It tests the tape drive motor and its control circuitry by starting and stopping the tape over a short time period. The test should pass, giving you a message: *write protected,* if the tab is in the write protect position, and the message: *in gap*. If the proper message is not displayed, the board or the tape drive assembly may need replacement.

3 **REWIND TAPE (A1A1, A15):** This test requires a blank tape, with the record tab in either position, in the drive. It tests the *TACO* chip's ability to rewind a tape by hole detection: looking for the holes that identify the beginning and end of the tape. It also tests the tachometer circuitry (tape motor speed). If the test passes, the CRT message will be: *rewind completed* and *in gap*. Also, the message *tape write protected* will be displayed if the tab is in that position. If you do not get the proper messages, the tape assembly or the board may need replacement.

4 **READ and WRITE TO TAPE (A1A1, A15):** This test requires a blank tape (tab in record position) in the drive. It tests the entire tape drive system's ability to read and write to tape. If you run this test with the tab in the write-protected position, you will get a message that there is a *write problem*.

5 **TIMER TEST (A15):** Tests the timer chip and the ability of the 1/8 second timer to interrupt the CPU. This test is the same as Self Test 6. You should loop this test about 10 times to verify proper function of the A15 board.

6 **CPU to HP-IB TEST (A15):** Tests the interface from the CPU to the two HP-IB chips. The HP 8510 system bus and the HP-IB bus are tested. Be sure to disconnect any HP-IB peripherals before running this test. This test will fail if the HP-IB and the system bus are not functioning properly or if there are any improper connections or improper signals on either bus.

7 **BIDIRECTIONAL HP-IB TEST (A15):** Tests the ability of the HP-IB chips to communicate with each other in both directions (to and from). The CRT message will prompt you to connect the HP-IB bus to the SYSTEM bus. You can use the HP-IB cable that would normally connect the test set to the HP 85101 and make the connection from System bus to HP-IB on the rear panel of the HP 85101 — then run the test. If the test fails, the A15 board, the cable connection, or the cable may be faulty.

8 **STATIC INTERRUPT SYSTEM TEST (A15):** Tests the lowest level interrupt line to verify that it interrupts the CPU. This test is the same as Self Test 9.

9 **RPG TEST (A1, A15):** Test the RPG (rotary pulse generator) knob and front panel interface to the that knob. Run the test and verify that the displayed RPG count is 00 Hex. Turn the knob counter-clockwise and verify that the count increases. Then turn the knob clockwise and verify that the count decreases. You can go either way because the count wraps around from 00 Hex to FF Hex.

A FRONT PANEL TEST (A1, A15): Tests the front panel keys and LEDs and their interface to the A15 board. Run the test and first check that the HP 85101 front panel LEDs (RLTS 1248) are flashing On and Off. If they are not, the A1 or A15 board is faulty. However, if they are flashing, continue the test by pressing the key that is displayed on the CRT. After each key is displayed, press that same key on the front panel. Notice that some LEDs will flash and some tones can be heard when some of the softkeys are pressed. Note that *SOFT1,BP* is the top CRT softkey. If the test passes, the CRT will indicate it. If it fails, repeat the test. If it continues to fail, the boards may need to be replaced.

B CRT BLANKING TEST (A15): Tests the A15 board's ON/OFF control of display high voltage section. The CRT message will prompt you to press the [=MARKER] key to blank the display – it will be restored within 10 seconds to verify that it passes. If not, the A5 board is probably faulty.

C BOTTOM BOX INTERFACE TEST (A15): This test verifies that the HP 85101 can communicate with th HP 85102. It requires the 85102 Emulator board (refer to the section titled SERVICE TOOLS). This board emulates or takes the place of the HP 85102 IF/Detector. Be sure that the HP 85101 rear panel red SERVICE switch is used as the On/Off line switch for this test. This Emulator board can be connected in two different ways:

1) Connect the male end of this board directly to the IF-Display interconnect on the back of the HP 85101.

2) Connect the IF-Display interconnect cable to the IF-Display interconnect and then connect the female end to the other end of the cable. Using it this way, you can determine if there is any problem with the IF-Display interconnect cable.

D DYNAMIC INTERRUPT SYSTEM TEST (A15): This test is used in the factory only and is not intended for use in the field. It requires a different 85102 Electronic Emulator board. The routine simultaneously tests 5 system interrupt control lines under various dynamic conditions. The lines are: ADCINT (level 0), REFINT (level 1), IOSRQINT (level 9), 1/8 SEC (level 10), and TEST (level 15).

E WATCH-DOG TIMER TEST (A15): Tests the CPU watch-dog timer's ability to reset the processor. Running this test will also reset the HP 8510 as if you pressed the recessed front panel TEST button – you will have to enter the Service Program again.

F RETURN TO 85101 TEST MENU.

DISPLAY SECTION BOARDS

A2 through A6. These tests are mainly used for making adjustments to the display section. Refer to the section titled ADJUSTMENTS for detailed procedures.

1 **TEST PATTERN (A2 THROUGH A6):** Tests all aspects of the display section using a do-everything test pattern that checks the overall adjustment. The pattern below is typical of how it should look:

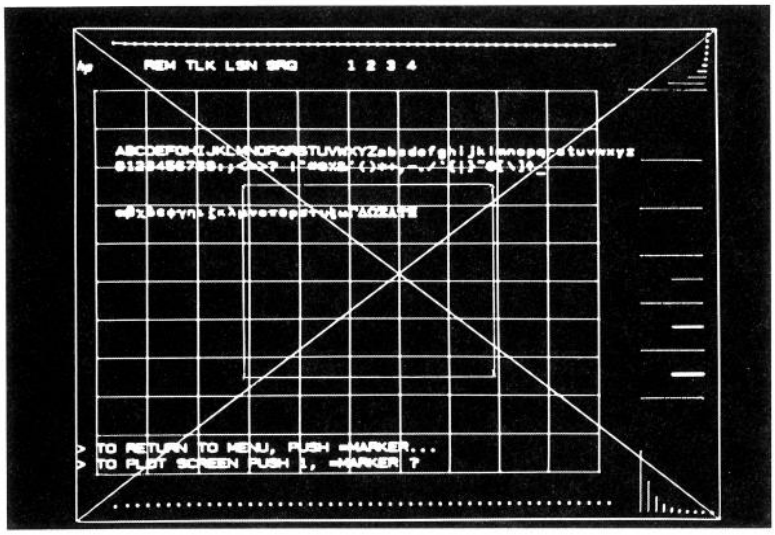


Figure 3. Test Pattern Display

2 **X AND Y SLOW LINE ADJUST (A6):** Generates a test pattern for making the SLOW line adjustment on the A6 board: refer to the ADJUSTMENTS section.

3 **X AND Y FAST LINE ADJUST (A6):** Generates a test pattern for making the FAST line adjustment on the A6 board. Refer to the ADJUSTMENTS section.

4 **X AND Y AMPLITUDE, GAIN, POSITION (A4, A5):** Generates a border and center circle for adjusting the X and Y gain and position controls on the A4 and A5 boards: refer to the ADJUSTMENTS section.

5 **DOT WITH LINE PATTERN (A6):** Generates a test pattern for checking the overlap of lines and dots in the horizontal and vertical directions. A normal pattern shows two lines, meeting at a right angle, with dots evenly superimposed on them. The CRT message is: SEE IF LINES ARE OFFSET FROM DOTS. If the dots are not on the lines (offset), then the board should be replaced.

6 **FOCUS PATTERN (A2, A3, A6):** Generates a pattern for adjusting focus. Use the front panel FOCUS adjust. Insert a small flat-head screwdriver and carefully adjust according to the instructions on the CRT.

7 **DIAGONAL LINES (A6):** Generates a pattern for checking the quality of the A6 board, including the linearity of the X and Y digital-to-analog converters (DAC). Decrease the front panel INTENSITY adjustment to minimum. Check that the diagonal line is straight, smooth, and continuous. There should not be any wavering, jaggedness, or missing parts of the line — if there is, replace the A6 board. Be sure to return the INTENSITY to the desired value when finished.

8 **MODIFIED X RASTER (A6):** Generates a pattern to investigate problems in the X DAC by drawing a maximum number of lines in the horizontal direction. The raster pattern is centered vertically and is about 1/4 of full height. If there are any holes in the display or if there are extreme light and dark areas, the board should be replaced.

9 **MODIFIED Y RASTER (A6):** Generates a pattern to investigate problems in the Y DAC by drawing a maximum number of lines in the vertical direction. The raster pattern is centered horizontally and is about 1/4 of full width. If there are any holes in the display or if there are extreme light and dark areas, the board should be replaced.

F **RETURN TO THE 85101 TEST MENU.**

NONVOLATILE MEMORY BOARD (A13)



Password Required

These tests will destroy parts of the operating system that resides in the A13 nonvolatile memory. Test 1 will clear out and initialize the memory locations that contain the operating system — Test 2 will write over the existing contents of memory which also contains the operating system. Therefore, do not run these tests unless you are sure that they are required for service and unless you can reload your operating system from the tape when finished. Also, you should run test 1, Memory Board Initialization, before loading the operating system. These tests will take a few minutes to complete.

The password is: 8515

Using These Tests

If you need to reload your operating system, or if you run the read/write test 2 below, you will need to initialize the memory board with test 1 below.

Normally, you do not need to re-iniliatize the A13 board with test 1 to load the operating system from tape. However, if you run test 2 below, you will have to re-initialize it. If you suspect a problem with the operating system, re-initialize using test 1, and re-load the tape.

1 **MEMORY BOARD INITIALIZATION:** This routine is used to initialize a new or repaired A13 board prior to loading the operating system into the EPROMs on that board. It should not be used for any other reason because it will destroy the operating system code that is currently residing in that area of memory.

When the test is run, the CRT will display the message, "Board Initialization in progress..." When it has successfully finished initializing the EPROMs, it will display the message "Initialization Completed."

2 **MEMORY BOARD READ/WRITE TEST:** Tests the ability of nonvolatile memory (EPROMs) to correctly store data. The test reports the first memory bank position where a read/write failed. If a memory chip is bad or not present in the bank socket, a failure will be reported. Typically, banks 8 and 9 do not have chips in them. Therefore, a failure at bank 8 (address 0000) is really reporting the first set of empty sockets as shown below. This is no problem because the other banks, 0 through 7, are good.

If necessary, inspect the A13 board to determine how many memory banks (2 chips per bank) are loaded on the board. Errors are traced to memory bank number and byte position, beginning with bank 0. Memory ICs are organized by bank, combining LSB and MSB (2 ICs per bank), with 32K bytes of memory per chip.

NOTE: A true failure of either of these tests could indicate failure in the control section of the board.

F **RETURN TO 85101 TEST MENU.**

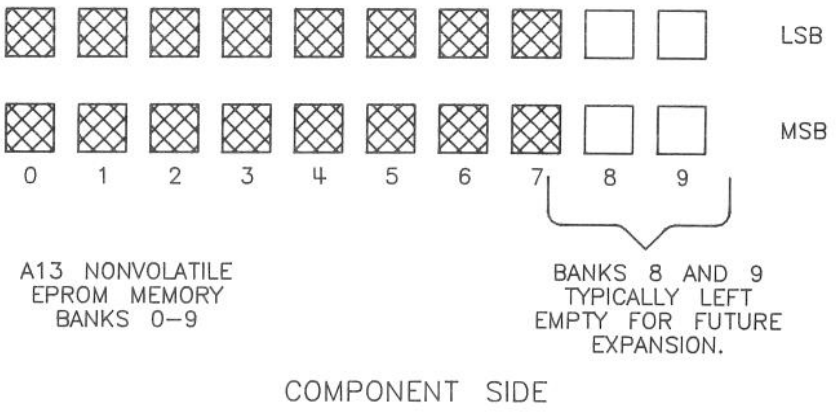


Figure 4. A13 Board Memory Banks

HP 85102 IF-Detector Tests

READ THE FOLLOWING INSTRUCTIONS BEFORE USING THE DIAGNOSTICS:

HARDWARE

These tests require that the source, test set, and all peripherals be disconnected from the system. In place of the source and test set, you connect a service tool: the 85102 Test Adapter — refer to the section titled SERVICE TOOLS.

Connect the adapter, using a BNC-to-BNC cable, from the 20 MHz output on the rear panel of the HP 85102 to the IF-Display Interconnect, also on the rear panel of the HP 85102. This Test Adapter takes a fixed 20 MHz IF reference signal from the HP 85102 and uses it in place of the 20 MHz IF from the test set. Remember that the test set down-converts the source RF to a 20 MHz IF. To verify the 20 MHz output, use an oscilloscope terminated in 50 ohms and you should see an approximate 0.7 volt p-p square wave signal with rounded corners. Or, if the scope is not terminated in 50 ohms, the 20 MHz signal is a distorted signal (like a sine-wave with a large third harmonic) of about 1.8 volts p-p.

You will also need to connect a separate BNC-to-BNC cable from the ANALOG + 10v to the SWEEP IN 0-10v, both located on the rear of the HP 85102. This connection will provide a trigger input to the sweep ADC in the HP 85102.

ORDER OF TESTING

These tests must be run in a specific order because of the relationship between the boards in the HP 85102. There is a specific signal flow that corresponds to the arrangement of the boards in this instrument. Therefore, it is recommended that you use the RUN ALL mode first whenever you suspect a problem or replace a board in this instrument. This RUN ALL mode will run all the tests in a specific order. Later, you can run the tests individually. Also, the RUN ALL or any individual tests can be looped repeatedly to look for intermittent errors.

Again, because of the interdependence of the boards, it is possible to fail a specific test although the real failure is due to a problem on a different board — this is because the other board provided a faulty signal to the board that appeared to fail. The following sequence is recommended to minimize the chance of erroneous test failures. When running the tests separately, run them in the order below:

First:	ADC control test (A19).
Second:	Sweep ADC (A20), ADC (A18), and IF Amps (A10, A12).
Third:	Cal DAC (A17), Mixers (A9, A11, A13, A14), and Synchronous Detectors (A5, A7), and all others.

IF THE TEST DOES NOT VERIFY OR ISOLATE THE FAILURE

If you suspect a single board, use the *Run All* mode first and then run the single board test afterward. If running the test does not verify the failure, refer to the section titled ADDITIONAL TESTS. That section contains additional information about some of the tests in this program. For example, if you have a Running Error Message, and you are referred to this section to run a test, but it passes, check the ADDITIONAL TESTS section to see if there is any further testing you can do.

FAILURE AFTER REPAIR

If a failure is detected after a board is replaced, the failure may be the result of a board that is indirectly related to the failed board. If this happens, you should check the following boards: A15 power supply, A6 clock board, and the A24 processor interface. Those boards affect all other boards and, if they are faulty, they can cause most other boards to fail a test. Be sure to check those boards if a replaced board still fails a test.

HP 85102 PROMPT MESSAGE

A message will appear on the CRT, prompting you to make the connections explained in the paragraph titled HARDWARE above. Be sure you make these connections or the diagnostics will not report valid results. The message reads:

```
ON THE REAR PANEL OF THE 85102, CONNECT '20 MHz OUT' TO
'J1 TEST SET INTERCONNECT' USING THE SERVICE
ADAPTER AND A BNC CABLE. ALSO, CONNECT 'ANALOG' TO
'SWEEP IN' USING ANOTHER BNC CABLE. FAILURE TO DO SO WILL
RESULT IN FALSE ERROR MESSAGES.
```

After making the connections, press [=MARKER] to get to the 85102 Test Menu. REMEMBER that you have to reconnect the proper system cables after you are finished. Refer to the section titled CONFIGURATION/CONNECTION, if necessary.

HP 85102 TEST MENU

This is the primary 85102 menu. It allows you to select any of the tests for this instrument.

1 **ADC CONTROL TEST (A19):** Tests the A18 board's ability to execute a complete set of conversions and generate an ADC interrupt request. This test verifies that the processor can trigger the ADC state machine on the A19 board. It also verifies that the A19 state machine sequences properly and that a conversion is actually completed by the closely related A18 ADC board. Also, it verifies that the A19 repeat and delay counters are working properly.

NOTE: Other causes of failure on this test may be —

1. A faulty A6 clock board.
2. A faulty 10 MHz input to the A19 board.
3. A faulty 800 KHz signal in to the A18 ADC board.

2 **SWEEP ADC TEST (A20):** This test checks the board's pulse generator, trigger generator, sweep counter, input buffer, sweep crossing detector, and staircase generator. It also tests the programability of the A21 board's analog output DAC. The A6 clock board must be working properly for this test.

3 **ADC TEST (A18):** This test verifies that the board can be operated in calibration mode. It also verifies proper operation of the offset current source, 12-bit ADC, and all data RAMS. Failure messages may indicate which data bits are faulty. This type of message is only useful for factory repair technicians.

NOTE: Other causes of failure of this test may be —

The A17 board's multiplexer is injecting a signal into A18. If it does fail, remove the W-24 cable that connects A17 to A18. If it passes after that, the A17 is probably faulty.

4 **CAL DAC TEST (A17):** This test verifies that the A17 Sample and Hold board's CAL DAC can properly calibrate the eight bit DAC on the A18 A/D Converter board. The ADC test should be run prior to this test. Additionally, the Running Error Message ADC CAL FAILED can be the result of a faulty A17 board.

NOTE: Other causes of failure of this test may be —

A faulty A18 board, primarily the 10 volt reference.

5 **100 KHz IF AMPLIFIER TEST (A10, A12)**: This test verifies the ability of the test (A10) and reference (A12) amplifier boards to pass and amplify the 100 KHz IF signals.

NOTE: Other causes of failure of this test may be —

1. Faulty A24 Processor Interface board.
2. Faulty 100 KHz IF Address Decoder on the A6 Clock board.
3. Faulty 100 KHz Cal signal on the A6 Clock board.
4. If both boards (A10, A12) fail, the A6 board is probably faulty.

6 **SYNCHRONOUS DETECTOR TEST (A5, A7):** This test verifies that both synchronous detector boards are working properly. It is also used to detect failures with the A17 Sample and Hold circuit. However, you must run the ADC Test (A18) and 100 KHz IF Amp Test (A10, A12) before running this test. If those tests pass, then you can run this test and have confidence in the results.

NOTE: Other causes of failure of this test may be —

1. Faulty ADC and/or ADC Control board.
2. Faulty IF Amplifiers (A10, A12).
3. Faulty A6 Clock board.

7 **MIXER TEST (A9, A11, A13, A14):** This test verifies the ability of the four mixer boards to down-convert the 20 MHz IF signals to 100 KHz. This test is a good example of the use the 85102's 20 MHz output. Before running this test, be sure that the 100 KHZ IF AMPLIFIER TEST (A10, A12) has passed.

NOTE: Other causes of failure of this test may be —

1. Faulty A10/A12 boards.
2. Faulty 20 MHz signal from the A6 Clock board.
3. Faulty 19.9 MHz signal from the A8 LO Generator.

8 **PRETUNE PHASE LOCK TEST (A22):** This test verifies the ability of the A22 board to count the 20 MHz signal on the VTO sense line. The test also verifies that the phase detector on the A22 is working. Refer to the THEORY OF OPERATION section for more information on how the phase-lock system operates.

9 **MAIN PHASE LOCK TEST (A23):** This test verifies the operation of the attenuator switches, lock indicator, search/offset DAC, and mode switch. Refer to the THEORY OF OPERATION section for more information on how the phase-lock system operates.

A **IF COUNTER TEST (A21):** This test verifies the operation of the following circuits: reference channel select switch, counter circuit, gate generator, and amplifier limiter.

NOTE: Other causes of failure of this test may be —

A13 and/or A14 Mixer boards that provide the 20 MHz signals to the A21 board.

B **RUN ALL THE TESTS**

C **85102 FRONT PANEL KEYBOARD (A1 and A1A1** Interface): This test allows you to check each front panel key. You press the key and the test verifies its operation. This test is not done in the RUN ALL THE TESTS selection.

F **RETURN TO MAIN MENU**

Test Set HP-IB Commands

These tests verify the ability of the A4 HP-IB board to execute certain commands. Also, these tests verify operation of the A5 Attenuator/Switch Driver board for S-parameter test sets only. These tests can be run with the test set connected to the entire system and also with the test set only connected to the HP 85101. For more troubleshooting information about the test set, refer to the sections marked TEST SET TROUBLESHOOTING and/or UNRATIOED POWER TEST.

NOTE: Tests 3 and 4 are for S-parameter test sets only.

1 **PRESET TEST SET (A4):** This test initializes the test set to its own preset state: no attenuation, power to port 1, S_{11} display, active light on port 1. The test set must be at HP-IB address 720 or just 20 on the switches. If this test FAILS, the failure message will remain on the CRT even if you run any other test or if you run this test again and it PASSES. To clear the failure message from the CRT, exit this menu and return.

2 **SWITCH ACTIVE LIGHT (A5):** Toggles the front panel ACTIVE light when the [=MARKER] key is pressed. This test verifies that the light is working properly.

3 **SWITCH PORT 1 and 2 LIGHTS (A5):** Switches the 2 front panel LEDs on an S-parameter test set to display all four possible states: 00, 01, 10, 11. This test verifies that the A5 board can switch power between the ports — separately and together. Also, the A5 ATT/SW DRIVER board has two leds that should also light as you press the [=MARKER] key to toggle the power to all four states.

4 **ACTIVATE PORT 1 and 2 ATTENUATOR (A5):** Alternately activates/deactivates port 1 and 2 attenuators. This test is used together with the following test to verify that the S-parameter test set's attenuators are functioning.

5 **INCREMENT ACTIVE ATTENUATOR:** Further tests the activated port's attenuator (selected by test 4 above) by incrementing attenuation in 10 dB steps (0 to 90dB). You may be able to hear the relays clicking as the values are changed. The value of the sum of the ON green LEDs on the A5 ATT/SW DRIVER board should equal the number indicated on the CRT.

6 **SELECT NEW HP-IB ADDRESS:** Changes the address that the HP 85101 will seek when performing future test set HP-IB commands. Remember, it does not change the address of the actual test set DIP switches. If you use this routine to change the HP 8510 test set address — remember to change the switches on the test set to match the changes you make.

F **RETURN TO THE TEST MENU**.

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Test and Repair

This section of the manual contains troubleshooting procedures, assembly/disassembly procedures, and block diagrams. Typically, some of the tests and repair procedures are used after a system failure has been isolated to one of the system instruments. However, some of the tests can be used to isolate the problem to an instrument or board.

Be sure that you have already read the preceding sections before using the information here.

The information in TEST AND REPAIR is organized by tab as follows:

- UNRATIOED POWER TEST — This section contains a procedure to check the test set frequency converter (sampler/mixer) output power levels. It can help isolate a system failure to an instrument or assembly.
- FRONT PANEL TEST — This section contains a limited number of random troubleshooting tests that can be performed using only the HP 8510 front panel keys — little or no extra equipment is required. The tests can help verify a problem or isolate a failure to the instrument.
- SOURCE TESTS — This section contains brief tests for HP 8510 compatible sources like the HP 8350 or HP 8340/41. Use this section if you suspect a source problem or want to run a quick check of your source.
- ADDITIONAL TESTS — This section contains various random troubleshooting tests that can be used to verify a failure or isolate a problem. Some of these tests require additional equipment as identified for each test. Some of these tests are were developed to supplement the built-in diagnostics. Always check this section if your problem cannot be solved by using the other parts of this manual.
- ASSEMBLY/DISASSEMBLY — This section contains procedures for removing particular assemblies from the system. Always check this section before you attempt to disassemble or assemble portions in the HP 8510 system.
- BLOCK DIAGRAMS — This section contains several types of block diagrams that can be used with most of the sections of this manual. Familiarize yourself with these diagrams and use them whenever possible. They include functional blocks, test points, voltages, fuses, etc.:
  - Overall System Troubleshooting Block Diagram
  - Phase Lock Diagram
  - HP 85101 Block Diagram
  - HP 85102 Block Diagram
  - HP 85101 Power Supply Block Diagram
  - HP 85102 Power Supply Block Diagram
  - Test Set RF Path Block Diagram
  - Test Set Control Circuit Block Diagram
  - HP 8510 Wiring List

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Unratioed Power Test

This procedure allows you to check the output power level of each test set sampler/mixer assembly and its associated IF amplifier alone. The normal power level display, S11 for example, is a ratio (in this case, b1/a1). The network analyzer automatically powers and phase-locks a predefined port or ports to make the measurement selected.

Ratioed measurements provide useful data but they can mask certain malfunctions. Assume, for example, the task is to measure an S-parameter at a specific power level. If the test set has a 20 dB power hole due to a faulty RF input connector, that deficiency would be invisible (ratioed out) in a ratioed measurement. But the data would be incorrect; it would not have been taken at the specified power level.

Similarly, troubleshooting system faults in a ratioed measurement mode can be deceptive. The solution is to check each channel singly, to check the power in an unratioed mode. To do so requires specifying which port to drive power to and which channel to achieve phase lock with. The following procedures include steps to redefine parameters as required.

Figures 1, 4 and 5 show which assemblies are parts of the signal path of each channel. Realizing that some assemblies are common to two, or all four, channels is a powerful troubleshooting tool. Figure 3, following these procedures, shows typical traces.

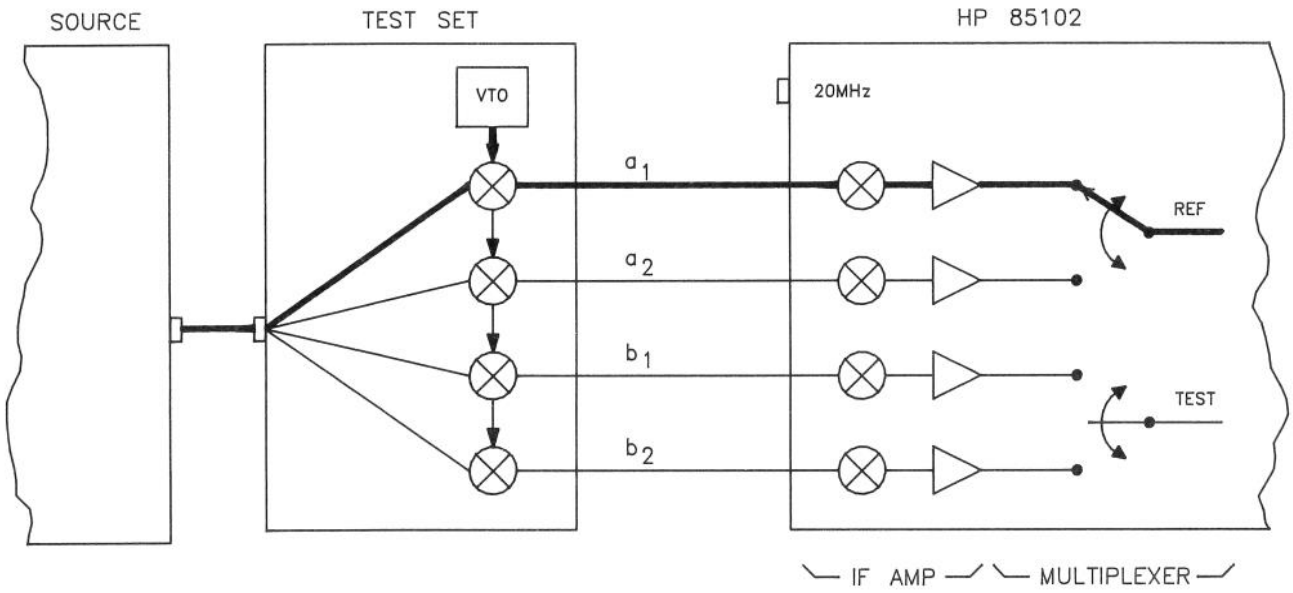


Figure 1. Simplified Signal Path of Unratioed Power Test

HP 8512A AND 8513A TEST SETS

NOTE: For an HP 8512A, check the b1 and b2 trace between **2 GHz** and **18 GHz**. Below 2 GHz the coupler response rolls off rapidly.

1. Remove any cables or DUTs from the test set input ports. Press **[PRESET]** STIMULUS **[MENU]** on the HP 85102 to access the STIMULUS menu.

2. a. HP 8340/41 systems: press **[STEP]** on the HP 85101 to set the source to step mode.

   b. HP 8350B systems: press **[SWEEP TIME]** and use the entry keys to set the sweep time to 200 ms.

a1 Test

3. Press PARAMETER **[MENU] [USER 1 a1]** to see the unratioed power trace.

   For an **HP 8512A**, the trace level should decrease from -20 ± 5 dB at low frequency to -35 ± 5 dB at high frequency.

   For an **HP 8513A**, the trace level should decrease from -20 ± 5 dB at low frequency to -40 ± 5 dB at high frequency.

b1 Reflection Test

4. Connect an open (or a short) to port 1.

5. Press **[USER 4 b1]** and check that the trace for each is within the limits described above.

b2 Thru Test

6. Connect a thru (two RF cables) and pad between port 1 and port 2.
   For an HP 8512A, use a 20 dB system pad.
   For an HP 8513A, use a 10 dB system pad.

7. Press **[USER 2 b2]** and check that the trace is within the same limits.

8. If one or more channels appear faulty, refer to the procedure titled *If Any User Channel Looks Bad* at the end of this section.

HP 8514B AND 8515A TEST SETS

NOTE: For an HP 8514B, check the b1 and b2 trace between **2 GHz** and **20 GHz**. Below 2 GHz the coupler rolls off rapidly.

1. Press **[PRESET]** STIMULUS **[MENU]** on the HP 85102 to preset the HP 8510 and access the STIMULUS menu.

   a. HP 8340/41 systems: press **[STEP]** on the HP 85101 to put the source in step mode.

   b. HP 8350B systems: press **[SWEEP TIME]** and use the entry keys to set the sweep time to 200 ms.

Sampler Test

2. To check all of the samplers in an S-parameter test set, first redefine the a2 and b2 phase lock and drive paths:

   Press PARAMETER **[MENU] [User 3 a2] [REDEFINE PARAMETER] [DRIVE] [Port 2] [PHASE LOCK] [a2] [REDEFINE DONE]** to redefine a2.

   Press **[User 2 b2] [REDEFINE PARAMETER] [DRIVE] [Port 2] [PHASE LOCK] [a2] [REDEFINE DONE]** to redefine b2.

3. Connect an open (or short) to port 1 and port 2.

4. Press **[User 1 a1]**, **[User 2 b2]**, **[User 3 a2]**, and **[User 4 b1]** to check the samplers indicated. Each trace should be within the following limits:

   For an **HP 8514B**, the traces should decrease from -20 ± 5 dB at low frequency to -27 ± 5 dB at high frequency.

   For an **HP 8515A**, the traces should decrease from -20 ± 5 dB at low frequency to -40 ± 5 dB at high frequency.

NOTE: the RF signal paths are shown in Figure 4.

b1 Thru Test

5. Connect a thru (two RF cables) from port 1 to port 2.

6. Press PARAMETER **[MENU] [USER 4 b1] [REDEFINE PARAMETER] [DRIVE] [PORT 2] [PHASELOCK] [a2] [REDEFINE DONE]** to observe the b1 power level trace through the path indicated by Figure 4.

b2 Thru Test

7. Press **[USER 2 b2]** to observe the b2 power level trace through the path indicated by Figure 4.

Next Step

If one or more channels look abnormal, refer to the procedure titled *If Any User Channels Look Bad* at the end of this section.

HP 8511A FREQUENCY CONVERTER

1. Press **[PRESET]** on the HP 85102 to preset the HP 8510B.
   a. HP 8340/41 systems: press STIMULUS **[MENU] [STEP]** to put the source in step mode.
   b. HP 8350B systems: press STIMULUS **[MENU] [SWEEP TIME]** and then use the entry keys to set the sweep time to 200 ms.

a1 Test

2. Connect a 20 dB pad to port a1. Connect the RF cable from the source to the other end of the 20 dB pad.
3. Press PARAMETER **[MENU] [User 1 a1]** to observe the a1 power level trace.
4. The trace should decrease from -15 ± 5 dB at low frequency to -35 ± 5 dB at high frequency.

a2 Test

5. Connect the 20 dB pad and RF cable to port a2. Disregard the running error message "Caution: NO IF FOUND".
6. Press **[User 3 a2] [REDEFINE PARAMETER] [PHASE LOCK] [a2]** to observe the a2 power level trace.
7. The trace should decrease from -15 ± 5 dB at low frequency to -35 ± 5 dB at high frequency.

b1 Test

NOTE: To check the b1 and b2 samplers you will need a 2-way 6 dB power splitter and two semi-rigid cables as shown below. The semi-rigid cables are supplied with the HP 8511A. Substitute cables and the power splitter are supplied with the HP 8510B Service Kit.

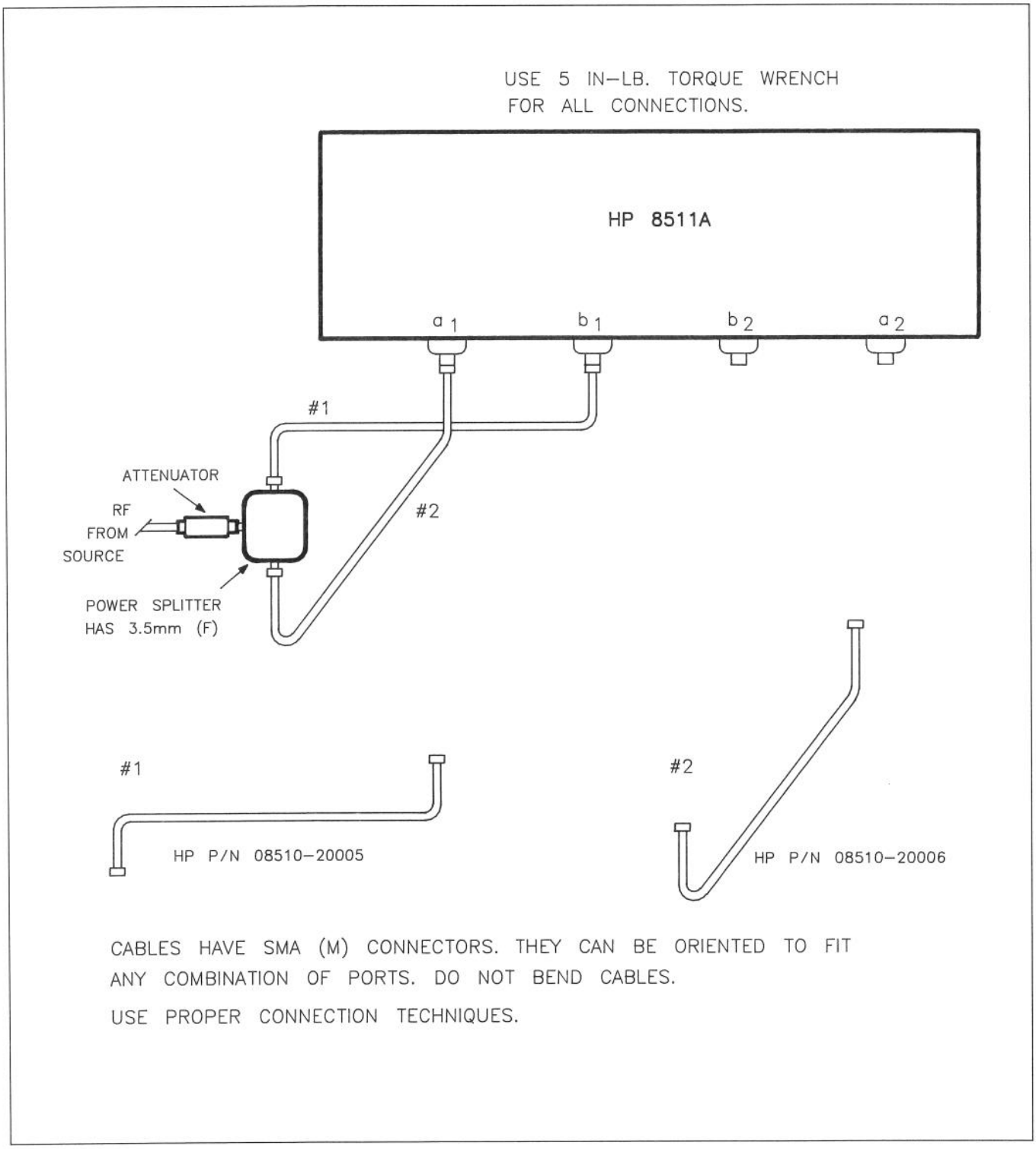


Figure 2. Hardware Configuration for HP 8511A Tests

8. Connect the 20 dB pad to the power splitter and the RF source cable to the pad as shown above. Connect the semi-rigid cables to ports a1 and b1.

9. Press **[User 4 b1]** to observe the b1 power level trace. The trace should decrease from -20 ± 5 dB at low frequency to -35 ± 5 dB at high frequency.

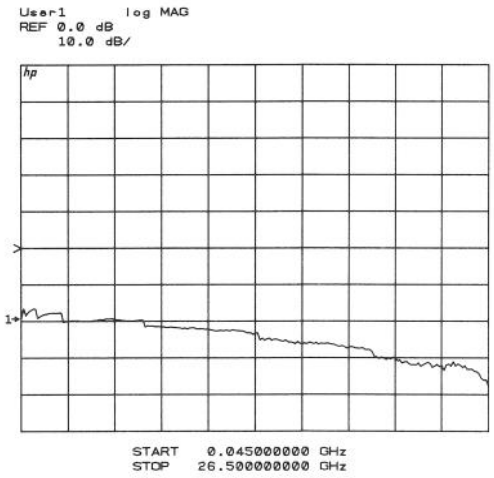
b2 Test

10. Reconnect the semi-rigid cables to ports a2 and b2. Disregard the running error message "Caution: NO IF FOUND".

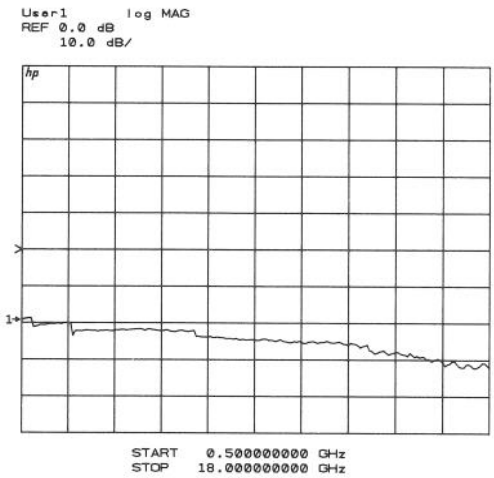
11. Press **[User 2 b2] [REDEFINE PARAMETER] [PHASE LOCK] [a2]** to see the b2 trace. The trace should decrease from -20 ± 5 dB at low frequency to -35 ± 5 dB at high frequency.

Next Step

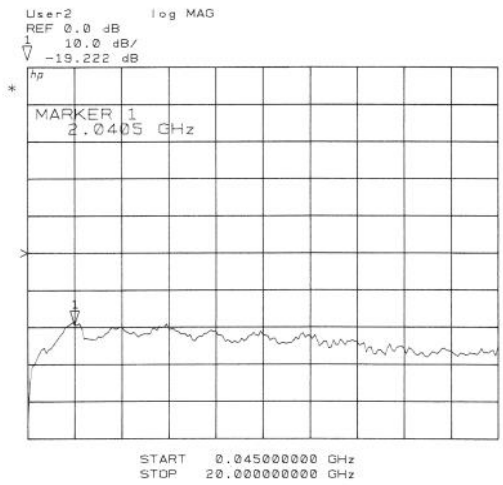
If one or more channels appear faulty, refer to the procedure titled *If Any User Channel Looks Bad*, at the end of this section.



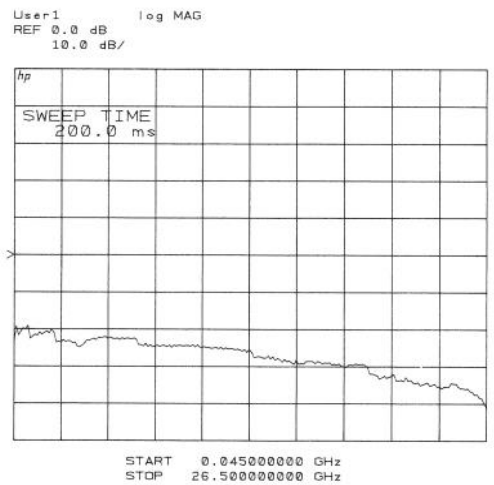
HP 8511A



HP 8512A



HP 8514B



HP 8513A and 8515A

Figure 3. Typical Test Set Unratioed Power Test Traces

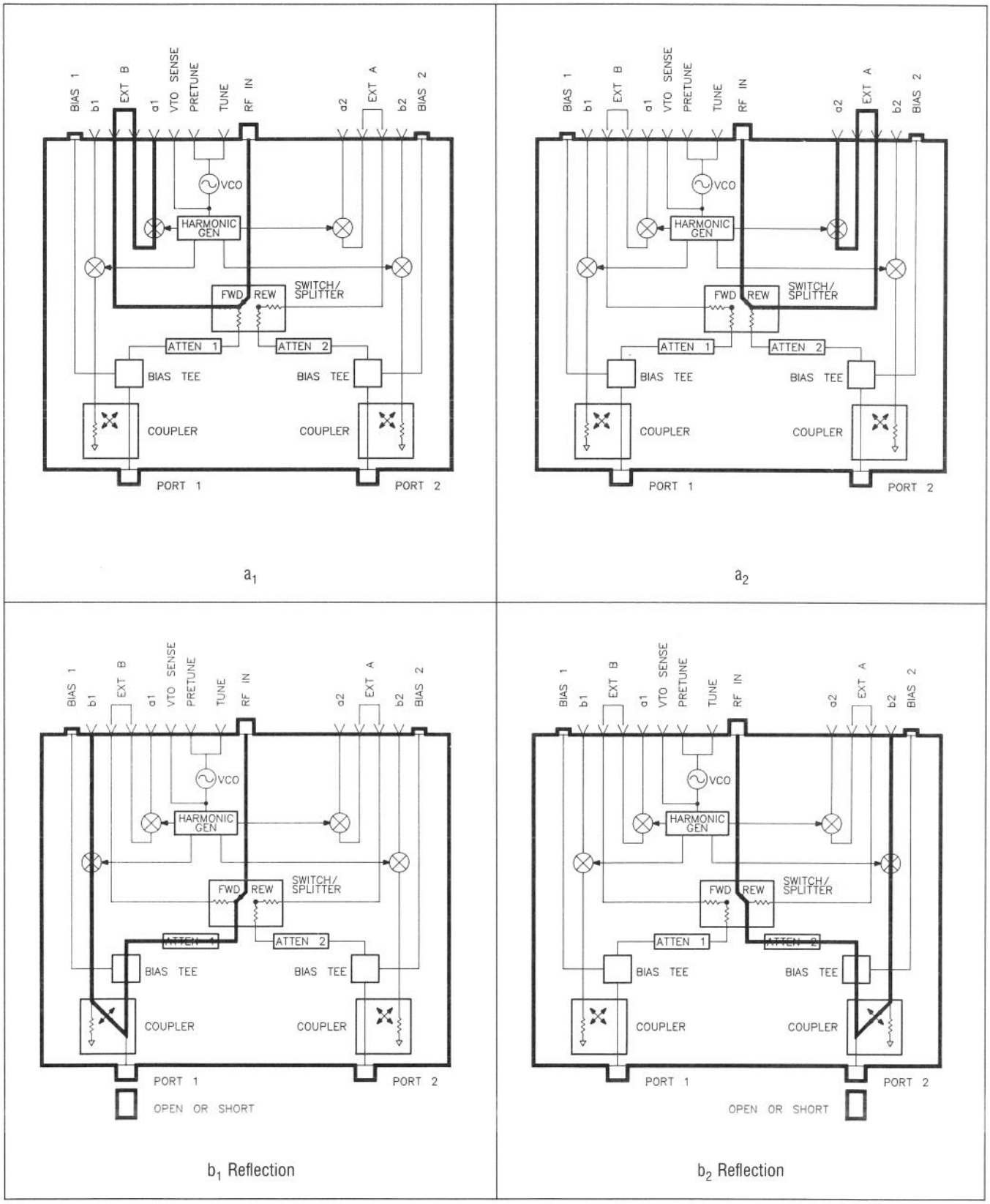


Figure 4. User Signal Paths in Test Sets (1 of 2)

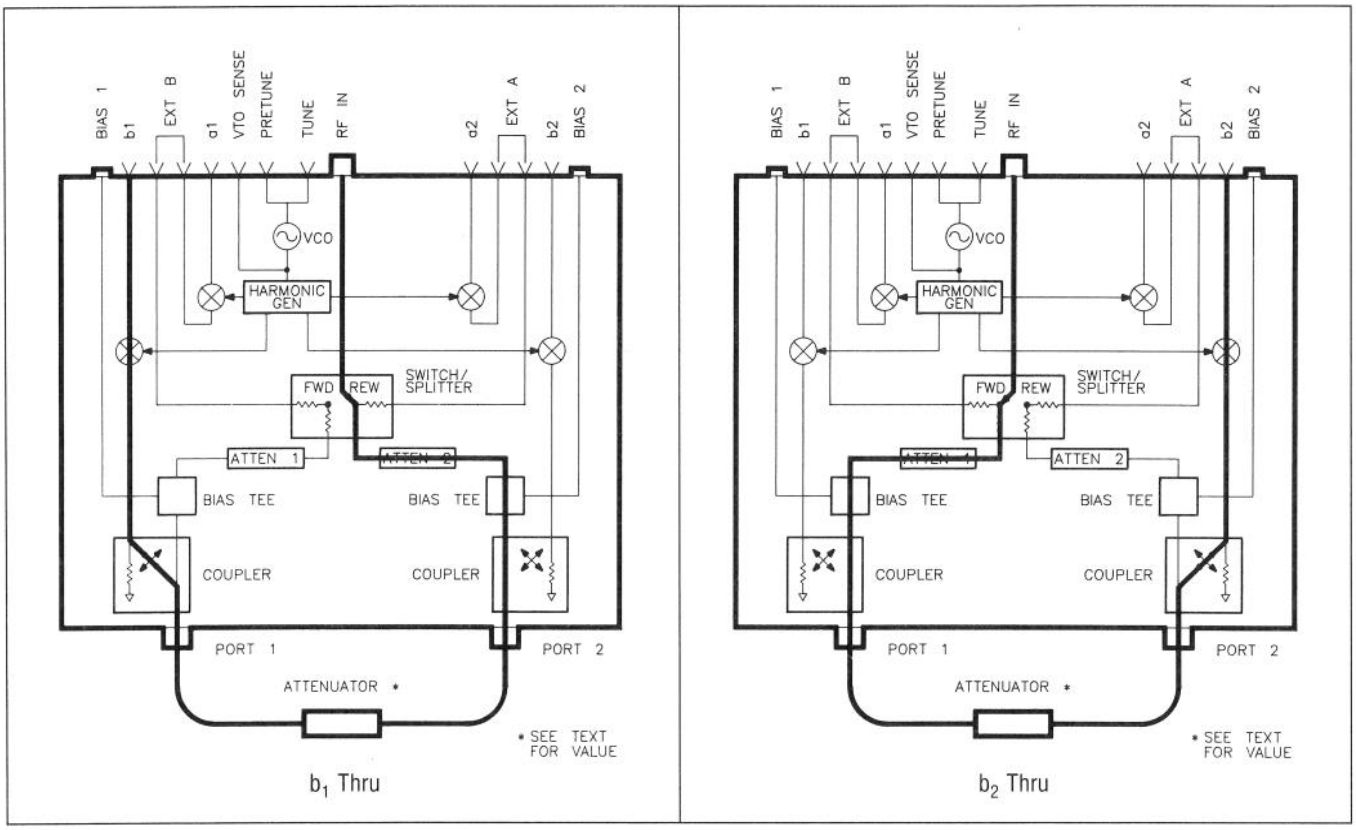


Figure 4. User Signal Paths in Test Sets (2 of 2)

IF ANY USER CHANNEL LOOKS BAD

One or more user channels appear faulty. The question is, what is at fault?, the source or test set or IF/detector (HP 85102). The service adapter is a source/test set emulator. It provides the same 20 MHz signal to the HP 85102B as the test set and source. Thus it indicates whether the problem is in the IF/detector.

Equipment

- HP 85102B service adapter (provided in the HP 8510B Service Manual, see SERVICE TOOLS)
- BNC to BNC cable

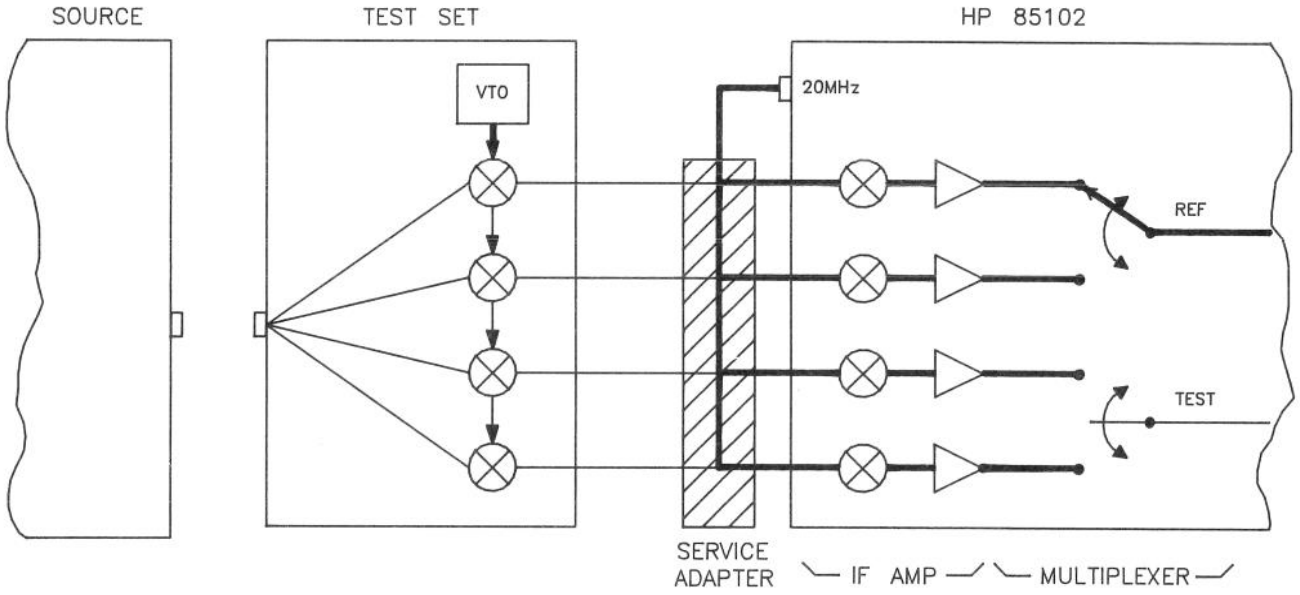


Figure 5. HP 85102 Signal Path with Service Adapter

Service Adapter Procedure

1. Connect the HP 85102B service adapter to the HP 85102B rear panel "20 MHz OUT" connector and the "J2 IF-DISPLAY INTERCONNECT" connector.

2. Press **[PRESET] [MARKER]** STIMULUS **[MENU] [STEP]** PARAMETER **[MENU]** and each User softkey to observe the unratioed power level of the User1 through User4 channels. The traces should be flat lines, quite close to each other, as indicated by the marker value (typically about -28 ± 5 dB).

Service Adapter Conclusions

- If all of the channels look good (with the service adapter) and all looked bad in the unratioed power test, the HP 85101 and 85102 are working. The problem is probably source related. Refer to the SOURCE TESTS and SERVICE PROGRAM sections of the Service Manual to continue troubleshooting the problem.

- **If all four User channels look bad** (with the service adapter), suspect the 20 MHz signal from the A6 clock board assembly. Refer to the paragraph titled *HP 85102 IF/Detector Tests* in the SERVICE PROGRAM section to verify the 20 MHz output.

- **If one or more (but not all) channels look bad**, troubleshoot the HP 85102 by refering to the SERVICE PROGRAM and BLOCK DIAGRAMS sections of the Service Manual. Then recheck the unratioed channel power levels.

  Single channel problems suggest the IF Mixer board corresponding to the User function (channel a1, b1, a1, or a2) is faulty. Refer to the Overall System Block diagram located in the BLOCK DIAGRAMS section of the Service Manual.

  Multiple channel problems indicate the problem is most likely in the circuitry after the IF Mixer boards (for example, the IF amplifiers or synchronous detectors). Refer to the HP 85102A Overall Block Diagram in the BLOCK DIAGRAMS section of the Service Manual.

  Determine whether the failure is in the reference path or the test path.

  Test the suspect board(s) using the procedures provided in the SERVICE PROGRAM section.

  Check the IF Amplifiers and Synchronous Detectors by swapping the reference and test board assemblies (since they are identical) and seeing if the problem moves.

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Front Panel Tests

This section contains several troubleshooting tests that can be run directly from the front panel of the HP 8510. The difference between the tests in this section and those in ADDITIONAL TESTS is that these tests require little or no test equipment.

Refer to this section whenever the Self Test or Service Program tests do not isolate a failure. These tests are separate from the built-in diagnostics and are in random order, including:

- SYSTEM HANG-UP TROUBLESHOOTING TEST
- HP-IB ADDRESS CHECK
- HP 8510 FIRMWARE REVISION CHECK
- MEMORY OPERATIONS MENU
- A20 (HP 85102) SWEEP ADC BOARD TEST (Peek/Poke)
- A1A2 (HP 85102) FRONT PANEL TEST
- USING KEYBOARD SELF TEST 14 to check A1A1 and A1A2
- CALIBRATION CHECK PROCEDURE
- I.F. STRIP TEST (HP 85102 A5/A7, A6 and A17)
- SERVICE SELECTIONS MENU TESTS (A6, A5/A7, A10/A12, A18, TEMPERATURE)
- **M** DISPLAYED ON CRT: RESETTING MM-WAVE OR MULTIPLE SOURCE CONFIGURATIONS

SYSTEM HANG-UP TROUBLESHOOTING TEST

This condition exists (after Self Test and initialization) where the system is *hung-up*: does not respond to any commands from the front-panel or a controller. The display will be frozen and there should be no Self Test error LEDs lit.

TROUBLESHOOTING: Reload the operating system, explained at end of the SELF TEST section. If that does not solve the problem, follow the procedure below:

NOTE: If the system or one of its instruments is completely *dead* (power applied but not up and running), check all fuses, power cables, and IF-Display Interface Cable. If these are all good, continue:

a. Press the recessed **[TEST]** button. Repeat the function (sequence of events, keystrokes, etc.) that caused the hang-up. If this solves the problem, do not continue.

b. If the system is still **hung-up**, disconnect any peripherals (printer, plotter, controller). Press **[TEST]** again and repeat the sequence of front panel key presses or functions that first caused the hang-up. If the system is still **hung-up**, go to step **c**.

- PERIPHERAL CAUSES PROBLEM – If the system does **NOT hang-up** (with peripherals diconnected) check all cables and HP-IB addresses to be sure they are not the problem. Then reconnect the peripherals, one at a time, and press **[TEST]** after reconnecting each one to determine which one was causing the hang-up.

c. • TURN OFF SOURCE: If the system is still **hung-up** (peripherals are NOT causing problem), turn OFF the source, then press **[TEST]**. You will get a running error message SYSTEM BUS ADDRESS ERROR – this is normal. Then repeat the function that caused the hang-up.

If the system is still **hung-up**, the problem is probably not the source. Therefore, go to step **d**.

- SOURCE CAUSES PROBLEM – If system does **NOT hang-up**, the most probable cause of failure is the source HP-IB. Refer to the SOURCE TESTS section or refer to the appropriate source manual for information about testing the source HP-IB board.

d. • TURN OFF TEST SET – If the system is still **hung-up**, turn OFF the test set, then press **[TEST]**. Again you will get the running error message. Repeat the function that caused the hang-up. If the system is still **hung-up**, go to step **e.**

- TEST SET CAUSES PROBLEM – If the system does **NOT hang-up**, the most probable cause of failure is the test set HP-IB board (A4). You can check the HP-IB communication to the test set by running the Service Program Test Set HP-IB board test: refer to the SERVICE PROGRAM section and, if necessary, refer to TEST SET TROUBLESHOOTING. Also suspect an HP-IB loading problem (something on the HP-IB bus may be over-loading the bus).

e. • HP 85101 CAUSES PROBLEM – If the system is still **hung-up**, (peripherals, source, or test set are NOT causing problem) the most probable cause of failure is the HP 85101 A15 I/O assembly or the A11 Processor assembly. To test these boards, refer to the SERVICE PROGRAM section and run the diagnostic tests for the HP 85101 A15 assembly.

It is also possible that the A13 Memory board or the A14 Display Generator could cause the system to hang-up, though this is uncommon. For example, if the system hangs when trying to load something into memory (for example: an instrument state), it could be a problem on the A13 Memory board.

- FIRMWARE CAUSES PROBLEM – If all else fails, suspect a firmware problem. This type of problem is rare but possible. Often, if you reload the operating system (explained at the end of SELF TEST), a firmware problem will disappear. Finally, you can refer to the section labeled ADDITIONAL TESTS for possible information on problems related to firmware.

HP-IB ADDRESS CHECK

The HP 8510 will display system instrument address on the CRT. These addresses are where the HP 8510 expects to find system instruments – they are not the addresses set on the instruments. You must be sure the separate instruments are set to these specific addresses. To check or reset these addressess, press:

[SYSTEM] and **[HP-IB ADDRESS]**. Then press the softkey corresponding to the instrument you want to check. The address will be displayed on the CRT.

- TO CHANGE AN ADDRESS – Press the softkey corresponding to the instrument and then enter the new address on the entry area keys. You will see it displayed on the CRT. Then press the **[x1]** key to initiate the new address. Be sure that the new or changed address corresponds to the address on the insturment by setting the switches or entering the address on that instrument.
- TO VIEW ALL ADDRESSES AT ONCE – Press the following keys:

  [COPY], **[MORE]**, and **[SYSTEM PARAMETER]**.

Also, you can check the source address by pressing **[SHIFT]**, then **[LOCAL]** on the source front panel.

NOTE: Plotters and printers usually have external HP-IB switches.

The typical address settings are as follows:

HP 8510	16
Source	19
System Bus	17
Test Set	20
Plotter	5
Printer	1

HP 8510 FIRMWARE REVISION CHECK

You can check the HP 8510 operating system firmware revisions by pressing:

[SYSTEM], **[MORE]**, **[SERVICE FUNCTIONS]**, **[SOFTWARE REVISION]**.

Note the firmware revision number and, if desired, contact your nearest HP office. Ask the HP Customer Engineer if your firmware revision is current or should be udpated.

MEMORY OPERATIONS MENU

The Memory Operations Menu is displayed if the processor doesn't understand an instruction, or an address, or a numerical routine. The error messages that correspond to these problems are: INSTR ERROR, ADDRESS ERROR, and PROCESSOR ERROR. These are 85101 display/processor problems and are most likely a problem on the A11 Processor board, A14 Display Generator board, A13 Memory board, or A15 I/O board.

The more common errors are the INSTRuction ERROR and the ADDRess ERROR and can occur if an address or data line is bad, or if the processor tried to get data from the wrong address, or if there is a RAM problem. PROCESSOR ERROR is rare and occurs if the processor gets an incorrect numerical instruction.

If the MEMORY OPERATIONS MENU is displayed on the CRT, follow the procedure below:

a. Press the front panel recessed **[TEST]** button and watch to see if it passes Self Test and if the failure occurs at the same place (during the same operation).

b. If Self Test passed, and if the failure is repeatable, that is, it occurs during the same operation every time, reload the Operating System, explained at the end of the SELF TEST section and press the **[TEST]** button again. If that doesn't work, then suspect these HP 85101 boards in this order (the first one being the most probable cause of failure): A11 Processor, A14 Display Generator, A13 Memory, A15 I/O. Refer to the SERVICE PROGRAM test for those boards or, if the system will only display the Memory Operations menu, contact HP.

   If the failure is not repeatable (it occurs randomly during different operations), it is probably a RAM failure on the A11 Processor board or on the A14 Display Generator board. Refer to the SERVICE PROGRAM test for that assembly.

c. If self-test does not pass all the tests, note which test failed and refer to the SELF TEST section.

NOTE: If the Memory Operations Menu appears, **do not press** the GO, SHOW, WRITE, CSHOW, or CWRITE softkeys. These keys and the menu are not to be used for on-site repair.

HP 85102 A20 SWEEP ADC BOARD TEST (using PEEK/POKE)

Measuring TP1:

When the HP 8510 is making swept measurements in RAMP mode, it must sample the data at points equally spaced between the start and stop frequencies. The A20 assembly triggers the sample and hold amplifiers (A17) via the ADC Control assembly (A19) using the sweep voltage (0 to 10V ramp) from the source. While doing this the A20 assembly generates a staircase wave (TP1) that tracks the source ramp. This test point can be monitored with an oscilloscope as follows:

- Remove the cover of the HP 85102 and note that TP1 is visible on the A20 board cover. You do not have to remove or extend the board.
- Use an oscilloscope to measure TP1. Verify that there is a ramp voltage that goes from 0 to 10 volts, approximately equal to 0 to 10 volt source ramp. In extremely narrow bands, this ramp can have a staircase appearance.
- If the voltage is correct at TP1, continue with the instructions below. If the voltage is not at TP1, suspect the A20 board or its interconnections. Also check the source output ramp (0 to 10 volts). Then continue with the steps below.

NOTE: The A20 adjustment (ADJUSTEMENTS section) procedure partially tests the sweep counter by loading it with 801 counts for each data point and counting down until it pulls stop-sweep at the end of the count.

Checking the A20 PEEK/POKE location count:

This test uses the HP 8510 in RAMP mode to verify the A20 board's ability to count and trigger data points for A to D conversion. The A20 board's counter is always loaded with 801 equally spaced trigger points between the start frequency and the stop frequency (or source's band crossing — whichever comes first). As the source sweeps, the staircase triggers each point and the counter decrements (beginning at −1) until all the points are triggered (ending at the stopping point). Only those data points selected by the user (51, 101, 201, etc.) are actually sent for A to D conversion. Therefore, it does not matter how many points you select from the front panel — the procedure works for any number of selected points. In the procedure below, the default number is 201 points in the PRESET state.

Remember that the A20 board is only used for RAMP and not for STEP mode operation. Setting the bandwidth from 2 GHz to 3 GHz allows the HP 8340/41 or HP 8350 to be used because 2.4 GHz is a band change (stopping point) for either source. Therefore, the numbers that you see when you press the [PEEK] key, in the procedure below, will verify that the A20's counter is working for this frequency range.

PROCEDURE: The following procedure can be used to check the A20 board's counter from the HP 8510 front panel. Press the green **[PRESET]** key and then:

a. Set the HP 8510 frequency to sweep from 2 GHz to 3 GHz:

   Press: **[START] [2] [G/n] [STOP] [3] [G/n]**.

b. Set the sweep to 100 seconds: **[1] [0] [0] [x1]**.

c. Now use the HP 8510 peek/poke to read the X ADC's present position of the sweep circuit (relative to the last stop) using peek/poke location −714 by pressing:

[SYSTEM], [MORE], [SERVICE FUNCTIONS], and
[PEEK/POKE LOCATION].

d. Then press: **[+/-] [7] [1] [4] [x1]** and wait until the display cursor is at the far right hand side of the display and the sweep is about to start. As soon as that happens, perform step **e** below.

e. Repeatedly press the **[PEEK]** softkey as fast as possible and watch the peek value change. The peek value, at the start of the sweep, will be **−1** and it should instantly jump to **−3777**, and count down to **−4097** at 2.4 GHz which is the fourth graticule from the left (−3777 − 4097 = 320).

At the beginning of the sweep, the processor will load A20's sweep counter with the number of triggers required until the next stop sweep. In this case, the number will be 320 counts from 2 GHz to 2.4 GHz, at which time the low stop sweep (LSS) line will be pulled and the peek value should be: **−1**. If not, the test has failed.

If the A20 sweep counter fails this test and the Service Program test for A20, the assembly should be replaced.

USING SELF TEST, Keyboard Test 14, TO CHECK THE A1A1 FRONT PANEL and A1A2 FRONT PANEL INTERFACE

The A1A2 Front Panel Interface and A1A1 Front Panel operation can be functionally checked by using Self Test number 14, the Keyboard Test. The following procedure is similar to the information in the SELF TEST section:

1. Access the TEST MENU by holding down the **[PRIOR MENU]** key and, while keeping it pressed down, press the recessed **[TEST]** button. Keep the [PRIOR MENU] key down until a menu of test routines appears on the Display/Processor CRT. Note that error LEDs 2, 4, and 8 are indicated on the Display/Processor Front Panel. Their decimal sum (14) is equal to the failed Self Test (Keyboard Test 14).

2. From the menu, select Self Test #14 KEYBOARD TEST by entering the number 14 with the ENTRY keys. Press **[1] [4]** and **[=MARKER]** key. The CRT should respond by displaying the prompt: ENTER KEY.

This test will display a *keycode* on the CRT whenever a key on the IF Detector (or Display/Processor) is depressed.

NOTE: You can refer to the SELF TEST section (Test 14) for other information on this test, including a list of the keys on the IF Detector and their corresponding keycodes.

If it is found that all the keys do not give their correct keycode when pressed, or don't show a response at all, suspect the A1A2 Front Panel Interface. Check to see if the Keyboard Decoder (U2) is recognizing if a key is pressed by observing TP1 (Keyboard Decoder Service Request) on A1A2. This line should pulse low (TTL levels) whenever a key is pressed.

CALIBRATION CHECK PROCEDURE

This test will help you decide if a calibration (one you have already made and stored in a CAL SET) is valid. This test does not guarantee that the calibration is perfect — it only validates that an error corrected Reflection or Transmission measurement can be made. This test will help you determine if a problem is due to the calibration. You must be familiar with the HP 8510B calibration methods described in the OPERATING and PROGRAMMING manual. Also, you will need an *offset* short from the appropriate CAL Kit for this test.

REFLECTION CHECK:

a. Connect the short from the calibration kit to port 1 of the test set. For S-parameter test sets, port 1 is probably at the end of a cable connected to port 1.

b. Press: **[CHANNEL 1]**, **[S11]**, **[PHASE]**, **[DISPLAY]**, **[DISPLAY: DATA]**.

   Press**: RESPONSE [MENU]**, **[PHASE OFFSET]**, **[1] [0] [x1]**.

   Press: **[REF VALUE]**, **[1] [7] [0] [x1]**.

   Press **[SCALE]**, **[1]** and **[x1]**.

c. If the test set is an HP 8512, go to the next step. If the calibration kit has an offset short, press **RESPONSE [MENU]** and **[ELECTRICAL DELAY]**. Then enter a value equal to twice the OFFSET DELAY of the short. For example, if the offset delay is 0.03177 nano-seconds, you would enter [.] [0] [6] [3] [5] [4] [G/n]. Refer to the appropriate Cal Kit manual for information on how to get the value of the Offset Delay for your offset short.

   Then press the **MEASUREMENT [RESTART]** key.

d. If the test set is an S-parameter test set, go to the next step. If it is an R/T test set (HP 8512, HP 8513), wait for the measurement sweep to complete and the CRT to display the prompt: CONNECT DEVICE FOR REVERSE MEASUREMENT. When it does, ignore the prompt and press the key **[PRESS TO CONTINUE]** and go to step **f**.

e. For S-parameter test sets, use the front panel RPG knob to adjust the electrical delay for a flat trace across the graticlue. Try to get the trace as flat as possible across the center line of the graticule so that it is equally spaced above and below the graticule.

f. Check the CRT trace, it should be ± 1 degree (1 division). If not, the calibration or the device is probably bad. Recalibrate and check the devices for wear, damage, etc.

g. Check the magnitude trace by pressing:

   [LOG MAG], **[SCALE]**, **[.] [0] [5] [x1]** and then press **MEASUREMENT [RESTART]**.

h. If the test set is an S-parameter test set, go to the next step. Otherwise, when the measurement is complete, the prompt CONNECT THE DEVICE FOR REVERSE MEASUREMENT will be displayed. Ignore the prompt and press the **[PRESS TO CONTINUE]** key again.

i. Check that the magnitude trace is within the values listed below:

For 7mm: ± 0.05 dB (1 division)
For 3.5 mm: ± 0.1 dB (2 divsions)

If the phase and/or magnitude trace is not within the limits, the calibration is not valid. Repeat the calibration and, if possible, perform another verification. If both traces are within the limits, the calibration is valid. In either case, be sure to return the phase offset and refernece value to zero by pressing:

[CHANNEL 1], **[PHASE]**, **RESPONSE [MENU]**, **[PHASE OFFSET]**,
[0] [x1], **[REF VALUE]**, and **[0] [x1]**.

TRANSMISSION CHECK

a. Make a *thru* connection from port 1 to port 2. Of couse, this requires the proper cable(s).

b. Press: **[CHANNEL 2]**, **[DISPLAY]**, **[DISPLAY DATA]**,
[LOG MAG], **[SCALE]**, **[.] [0] [5] [x1]**, and then press the **MEASRUEMENT [RESTART]** key.

c. For an S-Parameter test set, go to the next step (step d). Otherwise, at the end of the measurement sweep, the CRT prompt will be: CONNECT DEVICE FOR REVERSE MEASUREMENT. Ignore the prompt and press the key **[PRESS TO CONTINUE]**.

d. Check the trace on Channel 2. It should be within the limits listed below. Also, you can *gently* and *cautiously* move the cable(s) while you watch the trace to see if it moves. If the trace does move, it could mean that the cable(s) or a connection is bad. Be sure the connections are good. To check the cable(s), you will have to repeat the procedure with another cable(s). Also, check the test set port connectors.

For 7mm: ± 0.05 dB (1 division)
For 3.5 mm: ± 0.1 dB (2 divisions)

If the trace is not within the limits above, the calibration is not valid. Make another calibration and check it again. Also, you may want to performance test the system.

I.F. STRIP TEST: (HP 85102) A5, A7, A6 and A17

The following test exercises the A5/A7 Synchronous Detectors, the A6 Clock assembly, and the A17 Sample and Hold assembly by sending data to these boards to verify 360 degree operation. This is done by using the PEEK and POKE functions of the HP 8510 service firmware.

A7 REFERENCE CHANNEL PROCEDURE

a. Press: **PARAMETER [MENU]**
[REDEFINE PARAMETER]
[NUMERATOR]
[SERVICE SELECTIONS]
[REF CAL]

b. Press: **FORMAT [MENU]**
[LOG MKR ON POLAR]
RESPONSE [AUTO]
[SYSTEM]
[MORE]
[SERVICE FUNCTIONS]
[PEEK/POKE LOCATION]

c. Enter the Reference Channel location (−678) on the entry area keys: **[+/-] [6] [7] [8] [x1]**.

d. Press: **[POKE]** and you should see a dot on the third circle from the center. *Slowly* rotate the RPG knob *clockwise* (to *poke* the values 0 through 40) and count the number of positions the dot moves as you rotate the knob. It should move *counter-clockwise* 40 positions to complete the circle. If the dot does not move, the A6 clock board is probably bad and should be replaced.

The magnitude should not change by more than ± 0.050 dB as the dot rotates around the circle − check the graticule. If it does, it is called an *elipse* failure. Note the axis (X or Y) that has the greatest magnitude.

A5 TEST CHANNEL PROCEDURE

a. Press: **PARAMETER [MENU]**
[REDEFINE PARAMETER]
[NUMERATOR]
[SERVICE SELECTIONS]
[TEST CAL]

b. Press: **FORMAT [MENU]**
[LIN MKR ON POLAR]
RESPONSE [AUTO]
[SYSTEM]
[MORE]
[SERVICE FUNCTIONS]
[PEEK/POKE LOCATION]

c. Enter the Reference Channel location (−684) on the entry area keys: **[+/-] [6] [8] [4] [x1]**.

d. Press: **[POKE]** and you should see a dot on the third circle from the center. *Slowly* rotate the RPG knob *clockwise* (to *poke* the values 0 through 40) and count the number of positions the dot moves as you rotate the knob — then reset when there is no movement. It should move *counter-clockwise* 40 positions to complete the circle. If the dot does not move, the A6 clock assembly is probably bad and should be replaced.

The magnitude should not change by more than ± 0.050 as it rotates around the circle. If it does, it is called an *elipse* failure. Note the axis (X or Y) that has the greatest magnitude.

HOW TO INTERPRET THE RESULTS

- **Test Passes — 40 dot circle:**

  If the dot moves 40 positions in a circle, the respective assembly is good. The dot moves 40 positions around the circle because of the following equation based on the signal frequencies:

  4 MHz / 100 KHz = 40

  NOTE: If this test passes, it also means that the A6 Cal signal is good.

- **Elipse or straight line failure**:

  To determine which assembly is defective, Sync. Detector A5/A7 or A17 Sample and Hold, do the following:

  a. Change (swap) the X and Y inputs to the A17 assembly in the defective channel (test or reference). Repeat the test procedure above with the inputs swapped and note any changes.

  b. If the greater magnitude direction changes as you repeat the test, it means that the Sync. Detector is faulty and should be replaced. If not, the A17 board is faulty and should be changed.

- If the dot moves in a vertical or horizontal line instead of a circle, the A5/A7 Synchronous Detector or A17 Sample and Hold is not working. This is because it is the X + jY values that create the circle when the A5, A7, and A17 are working properly. If either the TEST or REFERENCE channel dot moved in a line or *elipse* instead of a circle, the A5, A7 or A17 assembly is bad and should be replaced.

- If the X and jY outputs (J1 and J2) cables were reversed on the A5 board, the TEST channel dot would move in the opposite direction (clockwise). Also, the IF CAL level will be different than the normal −24.46 dB measured using the SERVICE SELECTIONS MENU TEST in this section.

SERVICE SELECTIONS MENU TESTS for HP 85102 IF strip boards

NOTE: These tests are also called **IF CAL LEVEL TESTS** and are recommended for the *IF CAL FAILURE* (Running Error Message).

These tests check the following items:

A6, A5/A7, A10/12, A17, A18 and temperature.

The following tests can be used to check several functions in the HP 85102 IF-Detector.

The SERVICE SELECTIONS MENU is accessed as follows:

Press: **[PRESET]** and wait until the system is in the preset state. Then press **[MARKER]** to get a marker on the trace for reading the values of any test key below.

Press: **[PARAMETER [MENU]**, **[REDEFINE PARAMETER]**, **[NUMERATOR]**, and **[SERVICE SLECTIONS]**.

A menu will appear with several selections. These selections appear below with a description of each:

- **[SERVICE TEST CAL]**: This selection sends the A6 100 KHz Cal signal to the TEST IF amplifier A12. The displayed trace should be at approximately −24.46 dB across the band. This is the power level of the A6 Cal signal measured at the input to the A12 assembly. If this value deviates by more than ± 0.1 dB or if it varies up and down by more than 0.02 dB peak-to-peak, the test has failed. If it fails, suspect the A6 board or the A12 board, and then the A5/A7 or A17 board. Sometimes, the REFERENCE CAL test (below) will also fail, but it is erroneous − the defective channel will have a larger deviation and will be noisier.

- **[REFERENCE CAL]**: This selection sends the A6 100 KHz Cal signal to the TEST IF amplifier A10. The displayed trace should be at approximately −24.46 dB across the band. This is the power level of the A6 Cal signal measured at the input to the A10 board. If this value deviates by more than ± 0.1 dB or if it varies up and down by more than 0.02 dB peak-to-peak, the test has failed. If it fails, suspect the A6 board or the A10 board, and then the A5/A7 or A17 board. Sometimes, the TEST CAL test (above) will also fail, but it is erroneous − the defective channel will have a larger deviation and will be noisier.

- **[DETECTOR GROUND]**: This selection grounds the input to the A10 and A12 boards. The displayed trace is the level of noise on the IF strip (A10/A12). This level should be about −100 dB or even less. If not, suspect the A10 or A12 board.

- **[ADC GROUND]**: This selection gounds the A17 board's switched input to A18. The displayed trace is the level of noise on that input with some amount of DC offset. This level will vary for different instruments but should be −55 dB or less, depending upon the amount of DC offset present. If the trace value if not −55 dB or less, suspect the A17 or A18 assembly.

- **[VCAL]**: This selection sends a calibration voltage from A17's Cal DAC to the input of A18. The level will vary depending upon the Cal routine that does a successive approximation. Typically, the trace will appear at about −40 to −50 dB across the band. If not, suspect the A17 or A18 board.

- **[VREF]**: This selection sends a 3.33 volt reference signal from A17's Cal DAC to the A18 assembly. Typically, the trace will appear at about −3 dB to −6 dB across the band. If not, suspect the A17 or A18 assembly.

- **[TEMP 1]**: There is a temperature sensor located on the motherboard of the HP 85102 that measures the temperature of the rear panel of the HP 85102. Typically, this selection should display a trace and marker value of about 0.60 mU. Be sure to convert the display FORMAT to [LIN MAG] to read the trace value in milli-Units. Also, use a marker to read the trace value. Then, convert the mU value to degrees Centigrade as follows:

  Degrees Centigrade = (mU x 500) − 273

  For example: 630 mU = 42 degrees C.

- **[TEMP 2]**: This temperature sensor is located on the A17 Sample and Hold assembly and is typically about 42 degrees C. Refer to the instructions above for TEMP 1.

M DISPLAYED ON THE CRT:

Resetting the HP 8510 from a mm-Wave or Multiple Source System

When an HP 8510 is used as a mm-Wave system or in the multiple source configuration, an **M** (multiple source) should be displayed on the lower left side of the CRT. This indicates that the multiple source mode is in use. However, if you need to service the HP 8510B, or need to reset it to the standard microwave configuration, the following procedure will work. However, after using this procedure, your hardware settings for multiple source or mm-Wave set-up will be erased from the system — these items cannot be saved in an instrument state.

- Press: **[SYSTEM]**, **[MORE]**, **[SERVICE FUNCTIONS]**.
- Press: **[EDIT MULT SRC]** and **[SAVE OFF]**.
- Press: **[PRIOR MENU]**, **[SYSTEM PHASE LOCK]** and **LOCK TYPE [INTERNAL]**.
- Check the HP 8510 Addresses for the Source and Test Set:

  Source #1 should be set to **19** and the Test Set should be **20**. Be sure to check the source HP-IB address by pressing **[SHIFT]** and **[LOCAL]**.

NOTE: The steps above removed the hardware settings and they will have to be re-entered. However, some of the instrument parameters can be saved in an instrument state. Refer to the appropriate literature for special system applications.

TROUBLESHOOTING HP 8510 SOURCES

This section contains brief information for troubleshooting either the HP 8350B source or the HP 8340/41 source. It is not meant to replace the service manual that accompanies your source. Use these procedures to quickly determine if the source has a problem that is noticeable on its front panel. If you do not find a problem, but you still believe the source is faulty, refer to the SERVICE section of the source manual.

The HP 8350B information is covered first. The HP 8340 or HP 8341 is covered after and is referred to as HP 8340/41.

Source Related Running Error Messages

The following Running Error Messages can be caused by source problems. Refer to the section titled RUNNING ERROR MESSAGES for details about these messages:

IF OVERLOAD – Too much source power into the test set.
NO IF FOUND – No source power to the test set.
PHASE LOCK LOST – Source frequency unstable, source power too low, or a power hole is present in the path.
SOURCE SWEEP SYNC ERROR – Source not responding to HP 8510 processor or Stop Sweep Output cables not connected to rear panel.
SOURCE SYNTAX ERROR – Source HP-IB board does not understand the HP 8510.
SWEEP TIME TOO FAST – Source sweep too fast, especially when source is in Local operation.
SYSTEM BUS ADDRESS ERROR – Source at wrong address – check HP 8510 address and check source address.
VTO OVER RANGE – Source frequency unstable or out of range.

HP 8350B TROUBLESHOOTING

Source Address

In an HP 8510 system, the source address = 19. To check this address, press the **[LOCAL]** key on the source, then press the following keys on the source: **[SHIFT]** and **[LOCAL]**. The source should now display the number 19. If not, press **[1]** **[9]** and **[GHz]** to change the address to 19.

Setting the Source to a Preset State

Perform the following steps, in the order shown, to release the source from HP 8510 control and set it to its Preset state:

Source preset state —

1. Disconnect the source HP-IB cable from the HP 8510 or turn off the HP 8510.
2. Turn the source power OFF and ON again.
3. Press the source **[INSTR PRESET]** key.

Checking Preset Conditions

The following Preset conditions should be displayed the main-frame source front panel after the source is set to its Preset state. In addition, whenever the HP 8350B is PRESET, some internal diagnostic tests will be run — these are the source's self tests. If there is a source self test failure, an error code will be displayed. An explanation of those error codes follows these Preset conditions.

Verify that the following Preset conditions are displayed:

SWEEP MODE: START/STOP frequencies are full range of plug-in.

SWEEP TIME: Fastest allowable for the plug-in. Refer to your plug-in manual for the exact sweep time.

MARKER: Reset/Off

MODULATION: Off

SWEEP TRIGGER/SWEEP: INT-TIME

VERNIER/OFFSET: 0 MHz

DISPLAY BLANKING: On

SAVE/RECALL: All SAVE registers remain unchanged.

All other functions: Off

HP 835XX Plug-ins

The following preset conditions should also be displayed on the plug-in:

POWER LEVEL: Maximum specified leveled value

RF: On (selected by RF Plug-in configuration switch)

ALC MODE: INT

CRYSTAL MARKERS: Off (HP 83552A and 83525A/B only)

All other functions: Off

Self Test Error Codes

The 8350B front panel [INSTR PRESET] key initiates an internal self test and then sets the HP 8350B to its own preset condition. If a self test fails, an error code will be displayed in the FREQUENCY/TIME display area or the POWER display area on the RF plug-in.

Look for any of the following displayed codes. If you find one of the codes displayed, refer to Section 8 SERVICE of your HP 8350B manual or HP 83500-series RF plug-in manual:

E001 Plug-in interface failure. Check plug-in A3 Digital Interface board and connections. Check plug-in rear connections on the mainframe and the plug-in.

E002 Sweep voltage DAC/Marker voltage DAC failure.

E003 Tuning voltage DAC/Marker voltage DAC failure.

E004 Power supply failure.

E005 Instrument bus failure.

E006 Front panel bus failure.

E007 ROM failure.

E008 ROM failure.

E009 ROM failure.

E010 ROM failure.

E011 RAM failure.

E012 RAM failure.

E013 RAM failure.

E014 RAM failure.

E015 Microprocessor failure.

E016 Insufficient cooling. Check air filter and fan. This is the only error message that will not disable the instrument.

E030 A SAVEn command has been attempted when the SAVE-lock is engaged.

E050 to
E099 Plug-in failures. Refer to appropriate plug-in manual.

NOTE: If any of the above error codes appear, refer to Section 8 SERVICE of the HP 8350B or HP 83500-series RF plug-in manual. These manuals contain information necessary to isolate and, in most cases, repair the problem to the assembly level.

For Low Band Plug-ins: 0.1-2.4 GHz — Frequency Cal Procedure

The following procedure will help improve the frequency accuracy of your plug-in. The source must be warmed-up before using this procedure:

1. On the HP 8350B front panel, press

   [INSTR PRESET
   [CW]
   [5] [0] [MHz]

2. Connect a frequency counter with a 10 dB attenuator in series to the RF OUTPUT connector.

3. Adjust the FREQ CAL control for a frequency counter indication of 50.0 MHz.

Simplified Frequency Cal Procedure for all Plug-ins

The following procedure can be done without any test equipment. It can calibrate the band 0 frequency accuracy within or near specifications. The source must be warmed up before using this procedure.

1. Press **[INSTR PRESET] [CW] [0] [MHz].**

2. Adjust the *FREQ CAL* control through its range and note when the UNLEVELED light goes On. That is, note over which part of the range the UNLEVELED light stayed on the longest.

3. Set the *FREQ CAL* control to the center of this range.

Checking HP 8350B Firmware Revisions

Sometimes an HP 8350B has an older set of firmware. In general, the revision number should be 6 or greater to properly operate with an HP 8510.

1. Press the HP 8350 **[SHIFT] [4] [9]** keys.

2. The number will be displayed in the FREQUENCY/TIME display. Refer to the INSTALLATION Section for more details.

HP 8340/41 TROUBLESHOOTING

This section contains brief information about the HP 8340 or HP 8341 source. The following list describes some of the information in this section.

Source HP-IB address
Incorrect Front Panel States
Fan Problems
Instrument Check LEDs Remain On
Oven Annunciator
UNLK Annunciator
Fault Annunciators (KICK, ADC, PESK, and TRK)
Unleveled Annunciator
Overmod Annunciator
SRQ Annunciator

Checking the Source HP-IB Address

In an HP 8510 system, the typical source address = 19. To check this address, press the **[LOCAL]** key on the source, then press the following keys on the source: **[SHIFT]** and **[LOCAL]**. The source should now display the number 19. If not, press **[1] [9]** and **[Hz]** to change the address to 19.

Setting the Source to a Preset State

The following procedures and information require that the source be operated independently from the HP 8510. That is, the source must be released from its HP 8510 controlled state — to do this, perform the steps below in this order:

Preset state procedure —

1. Disconnect the source HP-IB cable from the HP 8510 or turn off the HP 8510.
2. Press the source **[INSTR PRESET]** key.
3. Turn the source power OFF and ON again.

Checking Preset Conditions

Look at the source front panel display for the following conditions:

POWER dBm display	0.0
FREQUENCY MHz display	10.000000 (START annunciator is lit)
FREQUENCY MHz display (STOP annunciator is lit)	26 500.000000 (for HP 8340) 20 000.000000 (for HP 8341)
ENTRY display	HP-IB address and firmware revision date
SWEEP block	Green LED flashing, CONT LED On, FREE RUN LED ON.

FREQUENCY MARKER block	all LEDs Off
INSTRUMENT STATE block	all LEDs OFF
MODULATION block	all LEDs Off
ENTRY block	all LEDs Off
LEVELING block	INT LED On
RF OUTPUT block	RF LED On
EXT REF annunciator	Off (if the rear panel INT/EXT switch is in the EXT position, the EXT REF annunciator above the ENTRY DISPLAY will be On.)

Incorrect Front Panel States (After Preset)

All LEDs OFF: If all annunciators and LEDs are OFF, but the fan is operating, check the thermal shutdown switch (A62S1) in the power supply. If the switch is engaged, check that the fan is supplying proper airflow to the interior of the instrument.

If the fan is not operating, and the LEDs turn on momentarily, refer to the FAN PROBLEMS below.

If the fan is not operating and the LEDs are OFF at power on, suspect a problem that would cause complete loss of ac mains (for example: transformer, wiring, line filter module). Check the line filter module select card.

Some LEDs OFF: If some LEDs are ON and some are OFF, the front panel section is probably the cause.

All LEDs ON: If all LEDs and annunciators are ON, suspect the processor, memory or the power supply.

Character March: If the four display windows have strings of characters marching across them, suspect the processor, memory or power supplies.

HP 8340/41 Internal Diagnostics

After the source has been Preset according to the instructions above, you can run its internal diagnostics by pressing the following keys:

[SHIFT] and **[M4]**

The front panel Entry Display should indicate that the diagnostic tests are in progress. When finished, the display should indicate PASS or FAIL. If there is a failure, refer to the SERVICE section of the source manual for details about troubleshooting. If it passes, continue in this section before referring to the source manual.

Fan Problems

Fan Does Not Turn ON. If the fan does not turn on when the power switch is turned on, check the fan, power supply or K1 relay located inside the instrument near the rear panel.

If the instrument has been running without the fan, the temperature may have risen enough so that the A62S1 thermal switch has turned the instrument Off. If so, the switch will reset when the instrument cools down

Fan Does Not Turn Off: When the instrument is in the STANDBY mode, the fan should not be running. If it is, the fan Relay (K1) may be stuck or the +22V supply may have failed. The +22V supplies power to the fan relay solenoid, which turns the fan off in the STANDBY mode. If the power supply fails, the solenoid will never be activated to turn the fan Off.

Instrument Check: LEDs remain On

The INSTR CHECK LEDs I and II are located next to the [INSTR PRESET] key. These LEDs show the results of the instrument self test sequence, which is initiated when the power is turned on or when the preset key is pressed. The self test sequence takes about 3 seconds, during which the LEDs should be on. After the 3 seconds, the LEDs should turn Off.

INSTR CHECK LED I Remains On: For the HP 8341, the A60 Processor board is most likely the problem. For the HP 8340, the problem is either the A60 Processor board or the A61 Memory board (for instruments with serial number prefixes > 2506A, there is no A61 board; all the memory is on the A60 Processor board).

INSTR CHECK LED II Remains On: This indicates that the I/O data bus or I/O address bus has a problem.

OVEN Annunciator

The front panel OVEN annunciator is used to indicate the status of the internal frequency standard. When it is ON, the frequency is more that 100 Hz away from 10 MHz. It should turn OFF within one-half hour after the instrument is connected to ac main. If it stays ON, there is a problem. Note that if the instrument is using an external 10 MHz standard, the OVEN indication has no effect on the performance.

UNLK Annunciator

This annunciator is used to indicate that one or more of the six instrument phase lock loops is unlocked. To find which one is unlocked press **[SHIFT] [EXT]**. THE ENTRY DISPLAY area will show the following:

OSC: REF M/N HET YO N2 N1

The name of the unlocked phase lock loop will be flashing. The loops are listed below. Note: Some loops must be phase locked at the correct frequency before the next loop will lock.

REF or EXT REF

If this is flashing, inspect the rear panel. One of these two conditions should exist:

1. If the instrument is in the internal 10 MHz mode, make sure the INT STANDARD BNC and the EXT STANDARD BNC are connected together with a jumper cable. Also check that the rear panel REFERENCE switch is in the INT position. If it is and REF is flashing, suspect a problem in the Reference Loop.

2. If the instrument is in external 10 MHz mode, check that an external 10 MHz standard is connected to the EXT STANDARD BNC with the rear panel REFERENCE switch in the EXT position. If so, and the REF is flashing, connect the instrument as described in the step above, then press **[SHIFT] [EXT].**

   If REF is still flashing, suspect a problem in the Reference Loop.

   If REF stops flashing, the problem is caused by the external 10 MHz Reference Standard.

M/N: If this is flashing, suspect a problem in the M/N loop.

HET: If this is flashing, suspect a problem in the 3.7 GHz Oscillator in the RF section

YO: If this is flashing, suspect a problem in the YO Loop.

N1: If this is flashing, suspect a problem in the PLL1 or PLL3 loops in the 20-30 Loops.

N2: If this is flashing, suspect a problem in the PLL2 Loop in the 20-30 Loops.

FAULT Annunciator

This annunciator is used to monitor the status of 5 different internal functions. These functions are described below. If the FAULT annunciator is ON, press **[SHIFT] [MANUAL].** THE ENTRY DISPLAY area will show the following:

Fault: CAL KICK ADC PEAK TRK

The name of the fault that is detected will be flashing. Refer to the SERVICE section of the HP 8340/41 manual for details. However, the information below is a brief summary of each fault.

CAL: This refers to the calibration constants stored in memory. These calibration constants are chosen at the factory. If the CAL is flashing, the instrument has resorted to default calibration constant data and has lost the constants in RAM. This loss can be due to a depleted battery or a bad memory board (A60 or A61) in the source. Refer to the HP 8340/41 SERVICE manual for information about re-entering the calibration constants or checking the battery.

KICK: This refers to the kick pulses used to reset the YO (YIG Oscillator) and SYTM (Switched YIG-Tuned Multiplier). If this is flashing, suspect a problem in the A54 YIG Oscillator Pretune assembly or the A28 SYTM Driver board.

ADC: This refers to a check performed on the ADC (analog to digital converter) circuits on the A27 Level Control board. This check is done INSTR PRESET or power on. ADC indicates that the POWER dBm display may indicate a different power than the instrument is actually producing. Also, an ADC failure will not allow the Peak **[PEAK]** and Auto Tracking **[SHIFT] [PEAK]** functions to operate properly. If this annunciator is flashing, suspect a problem on the A27 Level Control board.

PEAK: This refers to an instrument function that peaks the RF output power at a CW frequency by fine-tuning the SYTM (the SYTM is tuned to the YO frequency). This fault can only occur if the **[PEAK]** button is pushed. If PEAK is flashing, something is wrong with the circuitry that peaks the SYTM. PEAK indicates that the instrument is not able to to optimize its output power. However, the optimum power may not be adversely affected and may still be acceptable to the operator.

TRK: This refers to an instrument function that peaks the RF output power while the instrument is sweeping. This fault can only occur if **[SHIFT] [PEAK]** has been pushed. The TRK light indicates the same things as if PEAK were flashing.

UNLEVELED Annunciator

The preset condition, [PRESET] key, for the HP 8510 sets the source power to +10 dBm. At this power level (+10 dBm), the HP 8340/41 can go unleveled above 13.5 GHz because its specified maximum leveled power is less than +10 dBm. This unleveled condition does not affect the HP 8510.

The UNLEVELED light is used to indicate the status of the RF output power. If the UNLEVELED light is off, the output power is leveled. If the light is on, the power is unleveled.

Make sure that the correct leveling mode is selected. If internal leveling is desired, the INT light should be on. If external leveling is desired, the XTAL light should be on. If power meter leveling is desired, the METER light should be on. These LEDs are located on the associated front panel keys.

The power level requested should not be greater than the maximum power specification at a given frequency. If the instrument is sweeping, make sure that the power requested does not exceed the maximum power specification for the entire band or bands that are being swept.

If the output power is unleveled at all power levels and all frequencies, suspect a problem on the A25 ALC Detector board, the A26 Linear Modulator board, A27 Level Control, or the RF path.

If the power will level at some frequencies and not others while the instrument is sweeping, the SYTM may not be tracking correctly. Try the AUTO TRACKING feature by pressing **[SHIFT] [PEAK]**.

If the power will level at some CW frequencies and not at others, press **[PEAK]** to optimize the SYTM tracking at the frequency of interest.

If the power is unleveled in Band 0 (10 MHz to 2.3 GHz) only, suspect a problem in the switching circuits on the A25 ALC Detector board, the A26 Linear Modulator board, the A12 Band 0 detector, or the associated microcircuits.

If the power is unleveled in bands 1-4 only, (the HP 8341 does not include band4), suspect a problem in the switching circuits on the A25 ALC Detector board, A26 Linear Modulator board, the A11 Band 1-4 Detector, or the associated microcircuits.

OVERMOD Annunciator

OVERMOD indicates that the RF power is turned completely off and a signal (AM or Pulse Modulation) is attempting to shut it off. Make sure an external AM signal is not exceeding specified voltage limits (the AM input allows a 0 to + Volt signal).

SRQ Annunciator

SRQ is only used when the HP 8340/41 is connected to an external controller (via HP-IB). The controller picks one or more conditions under which the HP 8340/41 will send out a service request (SRQ). The controller then programs the HP 8340/41 to send an SRQ when one of these conditions occurs.

When one of the programmed conditions occurs, the HP 8340/41 sends out an SRQ signal and activates the SRQ annunciator.

When the controller responds to the SRQ (by doing a serial poll command), the HP 8340/41 turns the SRQ annunciator off. This entire process takes a fraction of a second, so the time the SRQ annunciator stays on is normally very brief.

SRQ Annunciator stays ON: If the HP 8340/41 was connected to the HP 8510 system, and then disconnected, the SRQ and UNLEVELED LED will be lit. To clear this, press the HP 8340/41 PRESET key, then cycle the HP 8340/41 power.

If the SRQ annunciator goes on and stays on, it usually indicates that one of the following conditions exists:

1. If the HP 8340/41 is connected to an external controller, and the SRQ stays on, the computer is not able to service the SRQ interrupt. This problem is usually caused by the controller being stuck in a loop – not by a fault in the HP 8340/41,
2. If the HP 8340/41 is not connected to an external controller, and the SRQ stays ON, this usually happens when a controller has programmed the HP 8340/41 to send an SRQ and has subsequently been disconnected.

Additional Tests

This section contains additional test procedures and troubleshooting information. These tests are in random order and should be used to verify a failure. Whenever these tests require additional test equipment, it is specified in the text.

These tests include:

- Performance Test Failure Troubleshooting
- CRT Display Problems Test (Blank Display/Display Abnormalities)
- A3 High Voltage Discharge Procedure (HP 85101)
- Fuse Locations and Fuse Values (HP 85101, 85102, and Test Sets)
- A18 (HP 85102) Analog to Digital Converter Test
- IF Cal Failure Test (checks A17 and A5/A7 in the HP 85102)
- 20 Hz Sine Wave Test (checks A17, A18, A19 in the HP 85102)
- Source Emulator/Tripler Test
- HP 8510 Power Supply Troubleshooting (HP 85101 and 85102)
- Error Term Troubleshooting

PERFORMANCE TEST FAILURE TROUBLESHOOTING

A performance test failure occurs when the performance test data is not within the specification limits. Follow the steps below whenever a performance test failure occurs:

a. The measurement calibration is the first thing that you should suspect. If the failure was in an S_{11} or S_{22} measurement, suspect the sliding load connection during calibration.

b. Check the calibration devices to be sure they are clean, properly gauged, and not worn-out. If the device has a collet or slot, be sure it is not damaged, and be sure all pin depths are correct. The various kit manuals contain information about caring for the devices.

c. Check the verification devices to be sure they are clean, properly gauged, and not worn-out.

d. Perform the UNRATIOED POWER TEST to be sure the test set frequency converter is working properly. Also, print out the HP 8510 Error Terms using the Verification Program and refer to the Error Term Troubleshooting information in this section to analyze the results.

e. Check the printout of the standards data against printed data that came with the verification kit. If they do not agree, contact HP.

f. Perform the verification again. This time, do not use the same calibration, re-calibrate.

   Check that all connections are good and properly torqued. Clean and gage all connectors. If this has not already been done, check connectors for signs of damage. If a connector is out of tolerance when gauged, it may be repaired or shimmed to bring it into tolerance — refer to the appropriate kit manual. Then reconnect everything and repeat the measurement. If the connector has been shimmed or repaired, you need to do a new calibration before repeating the measurement.

   NOTE: When you connect a device, you can gently tap on it with your finger to see if the CRT trace is stable. If it is not, reconnect the device and try again.

g. If the verification still fails, check the system hardware. You can use the Fundamental Step-by-Step Troubleshooting Procedure in the TROUBLESHOOTING STRATEGY section.

CRT DISPLAY PROBLEMS TEST (Blank Display/Display Abnormalities)

A blank display is when the CRT is completely blank — there is no illumination. A display abnormality is when wrong characters are on the CRT, when lines radiating in all directions on the CRT, or when anything strange or unusual is on the display. This section also includes discharge procedures for the A3 High Voltage board.

NOTE: Whenever you want to turn the CRT off, be sure to use the **[CRT OFF]** key in the Auxiliary MENU, instead of the intensity knob — this will prolong the life of the CRT. To reset the CRT on again, you will need to press [PRESET] or recall another instrument state.

Blank Display Procedure

a. Check the HP 85101 Self Test LEDs (located above the ENTRY area). If any are lit, go to the tab labeled SELF TEST. If *all* LEDs are lit (R-L-T-S-1-2-4-8), refer to the DEFAULT 15 procedure below.

b. Press **[PRESET].** If the CRT is no longer blank after the preset, the instrument state was probably saved with the CRT OFF.

c. Turn OFF the source, the test set, and all other peripherals (plotters, printers, controllers). Press **[TEST]** button on the HP 85101. If the problem goes away, turn ON each instrument one-by-one to determine which instrument is the cause of failure. Refer to TEST SET TROUBLESHOOTING or SOURCE TEST if you isolate the problem to one of those. If the peripheral caused the problem (not likely) refer to its manual.

d. If the problem still exits, check to see if the HP 85102 power LED is ON. If the LED is OFF, go to step f. If it is ON, cycle the HP 8510 power and watch the CRT.

e. If the CRT flashed momentarily when the power was turned ON, the problem is most likely in the HP 85101 display section – A6 Line Generator, A2 Z-Axis Amplifier, or A14 Display Generator. The A11 Processor board has also been known to cause a blank display, however, this is uncommon. With an oscilloscope, check for activity at the Z-axis output connector on the HP 85101 rear panel (this signal comes from A6). If there is activity, the A6 and A14 boards are working and the problem is probably the A2 Z-Axis Amplifier board. If there is no activity, the problem is most likely A6 or A14. As a last resort, suspect the A11 or A15 board. Refer to the SERVICE PROGRAM section and run the tests for those boards.

   If the CRT did NOT flash when the power was turned ON, the problem is most likely in one of the following: A3 High Voltage*, +100V on the A8 Post Regulator, or the A2 Z-Axis Amplifier.

WARNING

The A3 High Voltage board is not safe to handle until it has been discharged. You must refer to the A3 High Voltage Discharge procedure at the end of this test.

f. Check to see if the HP 85102 channel LEDs are ON. If the LEDs are ON, the problem is most likely the HP 85101 A7 Switching Regulator or the A8 Post Regulator. If the LEDs are OFF, troubleshoot the HP 85102 power supply by referring to its test points in the BLOCK DIAGRAM section or the Fuse Locations and Values table in this section.

Display Abnormality Procedure

Below is a list of failures and the probable causes of failure. (The assemblies listed below are in the HP 85101 Display/Processor unless otherwise noted.)

FAILURE:	PROBABLE CAUSE OF FAILURE
Single Horizontal Line	A5 Y Deflection Amplifier or A6 Line Generator
Single Vertical Line	A4 X Deflection Amplifier or A6 Line Generator
Wrong Characters	Operating system firmware. Reload the operating system, explained at the end of the SELF TEST section.
Horizontal Display Jitter	A4 X Deflection Amplifier or A6 Line Generator
Vertical Display Jitter	A5 Y Deflection Amplifier or A6 Line Generator
Display Jitters Diagonally or Horizontally & Vertically	VR1 & VR2, located on the HP 85101 side rail of the chassis, next to the CRT and in front of the A2 board. They are part of the +/- 15V regulator (A8 Post Regulator board).
Entire display is reduced and located in a corner	A14 Display Generator
Lines randomly radiating in all directions	Can be caused by: peripheral, HP 85102, test set, HP 85101, or operating system. To isolate problem, turn OFF all instruments. Then turn ON one at a time, starting with HP 85101 (use Service switch on rear panel), until the problem reoccurs. If problem exists when just the HP 85101 is ON, reload the operating system described at the end of the SELF TEST section.

A3 HIGH VOLTAGE DISCHARGE PROCEDURE (HP 85101)

WARNING

The A3 high voltage assembly, and the A3U1 high voltage multiplier are not safe to handle until you perform the following discharge procedure. Also, the CRT filament voltage is connected to the −4000V cathode.

Unless you are adjusting the high voltage, perform the following procedure any time you remove the A3 cover.

a. Connect a clip lead from the shaft of a small screwdriver to the chassis ground lug inside the high voltage shield.

b. Holding the screwdriver's insulated handle, touch the grounded blade (for a few seconds) to:

- Both brown wires from A3 to the CRT (via W6).
- The W6 yellow, blue, and orange wires.
- All capacitors at the top of A3.

c. Remove the clip lead from the screwdriver.

d. Connect two more (for a total of three) clip leads to the ground lug inside the high voltage shield.

e. At A3T1, connect one grounded clip lead to the black lead from the A3U1 multiplier.

WARNING

The following step draws a large, high voltage arc.

f. With a twisting motion, slowly remove the CRT anode lead from its connection to the A3U1 multiplier. Expect an arc going to ground as the metal end of the lead clears the A3U1J1 connector.

g. Without touching the CRT anode lead, connect the free end of the second grounded clip lead to the metal CRT anode connection. Leave this connected for at least five minutes.

WARNING

The A3U1 multiplier is not yet discharged.
There is close to 20,000V at the A3U1J1 connector.

h. Connect the third grounded clip lead to a conducting tool, such as a pocket screwdriver, a scribe (2.5 inches long and not larger than 0.125 inch in diameter), or an HP PA lead assembly (HP part number 5061-0868).

i. Insert the grounded tool into the A3U1J1 connector, and leave it connected for at least one minute. At this time, the black and red leads and the CRT anode should all be grounded.

j. After discharging the circuits, remove all jumper wires.

NOTE: When reinstalling the A3 board, be careful when replacing all wires and making all connections.

FUSE LOCATIONS AND FUSE VALUES

HP 85101 DISPLAY/PROCESSOR:			
FUSE	**NAME**	**LOCATION**	**VALUE**
AC Line	F1	Rear Panel	2.5A, 250V
+9 VDC	F1	A7 Switch Reg.	0.125A, 125V
+12 VDC	F1	A8 Post Reg.	2A, 125V
−12 VDC	F2	A8 Post Reg.	2A, 125V
+100 VDC	F3	A8 Post Reg.	0.1A, 250V
+15 VDC	F4	A8 Post Reg.	2A, 125V
−15 VDC	F5	A8 Post Reg.	1A, 125V
HPON from 85102	F1	A17 Motherboard	1A, 125V
HP 85102 IF-DETECTOR:			
FUSE	**NAME**	**LOCATION**	**VALUE**
AC Line	F1	Rear Panel	2A, 250V
−15 VDC	F1	A26 Rectifier	2.5A, 250V
+15 VDC	F2	A26 Rectifier	2.5A, 250V
−5 VDC	F3	A26 Rectifier	1A, 250V
+5 VDC	F4	A26 Rectifier	8A, 250V
HPON to 85101	F1	A24 Interface	0.5A, 250V
HP 8511 through 8515 TEST SETS			
FUSE	**NAME**	**LOCATION**	**VALUE**
AC Line	F1	Rear Panel	1.5A, 250V
+5 VDC	F1	A15 Regulator	1.5A, 250V
−5 VDC	F2	A15 Regulator	1.0A, 250V
+15 VDC	F3	A15 Regulator	1.5A, 250V
−15 VDC	F4	A15 Regulator	1.0A, 250V
*Bias	Bias Fuse	Front Panel	0.5A, 250V

*NOTE: There are two DC bias fuses on the front panel of S-Parameter Test Sets only.

A18 (HP 85102) ANALOG TO DIGITAL CONVERTER TEST

Whenever the the noise on the trace is greater than 1 dB when you first turn the instrument ON, it means that the A18 board may be faulty.

If you cycle the AC power (Off then On again), the noise may go away. If this is the case, there is probably a malfunction with the A18 A/D board although no apparent symptoms are present. Also, there may be no Running Error Messages, no Self Test failures, and no Service Program test failures.

If this trace noise disappears when the power is cycled, the test has failed and the A18 board should be replaced.

IF CAL FAILURE TEST

Checks the A17 SAMPLE/HOLD and A5/A7 SYNCHRONOUS DETECTORS

When the Running Error Message IF CAL FAILURE is displayed, the A17 or A5/A7 boards may be faulty. Also, the A6, A5/A7, and A10/A12 could be faulty because they are also part of the IF section. The following test can be used whenever you get the IF CAL FAILURE Running Error Message. The tests will help you determine if the A17, A5, or A7 board is faulty.

NOTE: It is also possible that the IF CAL FAILURE message can be accompanied by spikes on the trace greater than 20 dB at bandcross points (2.4 GHz, 13.5 GHz, and 20.0 GHz), the A17 board may be faulty.

Press the green **[PRESET]** key and look for those symptoms. If the error message appears and/or spikes appear at those points, follow the steps below:

a. Run the Service Program diagnostics in the SERVICE PROGRAM section. Select the 85102 test B (Run All mode).

b. If the SYNC DETECTOR test fails, the following message will appear on the CRT:

Failed
* * * SYNC DETECTOR TEST * * *
Sample and hold line has no output. Check sample and hold (A17).
Check output amplifier on sync detector board (A7).

If this message appears as is or if it indicates the A5 board instead of A7, continue with the steps below. If another test failed, with another message, refer to the information in the SERVICE PROGRAM section for that test. If no tests fail, do not continue with this test.

c. Run the Service Program test 4 (CAL DAC) and the CRT should display: *Passed*. If it does not indicate *Passed*, you should suspect the A17 CAL DAC and not the A5 or A7 boards.

d. To determine which board is defective (the sync detector or A17), reverse the inputs to A17 as follows:

Swap cables J1 and J3.

Swap cables J2 and J4.

This exchange of cables means that the A5 or A7 board inputs to A17 are exchanged. Remember that the A5 and A7 boards are electrically and mechanically the same.

e. Run the Service Program test 6 (SYNCHRONOUS DETECTOR). If the CRT prompt indicates the same sync detector board (A5 or A7) that was in the first failure message, it means that the A17 board is defective. If the CRT prompt indicates the that the other snyc detector board is the problem, it means that the first sync detector is defective.

20 Hz SINE WAVE TEST

Checks the A17 SAMPLE/HOLD, A18 ADC, and A19 ADC CONTROL

Running error messages that are displayed for these boards include:

ADC CAL FAILED
IF CAL FAILED
ADC NOT RESPONDING
SWEEP TIME TOO FAST

Equipment Required

Function Generator

The procedure below describes how to inject a signal into A17 J1, J2, J3, and J4 in order to test the A17 sample and hold capability for each of the four synchronous detector inputs. The procedure also tests the A18 assembly's Y ADC linearity and ability to do an A-to-D conversion. If this test passes, the A19 ADC control is also functioning properly.

PROCEDURE

a. Remove the HP 85102 IF-DETECTOR top cover. Then remove all four snap-on RF cables from A17 J1, J2, J3, and J4.

b. Use the signal generator to inject a 1.5 Vp-p (approximate), 20 Hz sine wave into A17 J1. You can also use 50 or 60 Hz if your signal generator is not capable of producing 20 Hz.

c. On the HP 8510, press **[PRESET]**. Set both the start and stop frequency to 500 MHz.

d. Set one of the A17 assembly multiplex inputs by pressing the following keys:

   PARAMETER **[MENU]** and then select the appropriate **USER 1-4** keys as follows —

   [USER 1] a1 softkey for A17 J3 or J4
   [USER 2] b2 softkey for A17 J1 or J2
   [USER 3] a2 softkey for A17 J1 or J2
   [USER 4] b1 softkey for A17 J1 or J2

   Press: FORMAT **[MENU]** and select one of the following —

   [REAL] softkey for A17 J2 or J4
   [IMAGINARY] softkey for A17 J1 or J3

e. Press: STIMULUS **[MENU]**, **[MORE]**, **[SINGLE]**.

f. Press: RESPONSE **[AUTO]**

g. The HP 8510 CRT should display two cycles of the 20 Hz sine wave.

h. Repeat the procedure for each of the A17 inputs: J2, J3, and J4.

   If the CRT does not display two cycles per 20 Hz, then suspect the A17, A18, or A19 board. Perform all of the possible tests for these boards to isolate the failure. Then replace the board.

SOURCE EMULATOR/TRIPLER TEST

This test injects a 60 MHz input signal, to emulate the system source signal, into the Test Set. This signal is used in place of the source to verify system operation when the source is suspected as having a failure.

The tripler is a 60 MHz bandpass filter specially designed for the HP 8510B. It is supplied with the service kit (08510-60008). Be sure to check with your HP office in case this kit part number changes.

The tripler operates by passing the third harmonic of the HP 85102 *20 MHz Out* signal, providing a 60 MHz signal to the test set and thereby substitutes for the source. However, almost any source that has a 60 MHz signal can be used.

Procedure

a. Connect the tripler with an RF flexible cable from the HP 85102 rear panel *20 MHz Out* connector to the test set rear panel *RF Input* connector. Press **[PRESET]**. After the system is preset, set the source HPIB address to 31. Press **[SYSTEM] [HPIB ADDRESSES]** and **[SOURCE #1]**. Then enter **[3] [1]** and press **[x1]**.

b. Press: **[PRESET] [MARKER] [CENTER] [6] [0] [M/u] [SPAN] [100] [k/m]** STIMULUS **[MENU] [STEP]** to set the displayed frequency to 60 MHz.

c. Press PARAMETER **[MENU] [USER 1 a1] [SCALE] [2] [0] [x1]** to observe the channel a1 trace.

   The CRT should display a trace where the marker value is about −50 to −55 dB. This power level is typical for the output of the *20 MHz Out* when filtered with the tripler. If this value is displayed, it means that this RF path is working in the system and that the source could be faulty. Use the UNRATIOED POWER TEST in TEST SET TROUBLESHOOTING to further check the RF path. And refer to the SOURCE TEST section to further verify the source.

   Check the remaining USER PARAMETERS (RF paths). The results should be the same for each one. Remember that these user parameters are the output power levels for the incident, reflected, and transmitted signal paths from the test set frequency converter.

d. Press PARAMETER **[MENU] [USER 2 b2] [REDEFINE PARAMETER] [DRIVE] [PORT 2] [SCALE] [2] [0] [x1]** to observe the user b2 parameter.

e. Press PARAMETER **[MENU] [USER 3 a2] [REDEFINE PARAMETER] [DRIVE] [PORT 2] [SCALE] [2] [0] [x1]** to observe the user a2 parameter.

f. Press PARAMETER **[MENU] [USER 4 b1] [SCALE] [2] [0] [x1]** to observe the user b1 parameter.

NOTE: If all the user parameters (RF paths) look good, the source is probably faulty. Refer to SOURCE TESTS in this Service Manual. If they all look bad or if any one looks bad, the test set (probably the VTO or a sampler) is faulty. Refer to TEST SET TROUBLESHOOTING in this Service Manual.

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HP 8510 Power Supply Troubleshooting

Refer to the Power Supply drawings in the BLOCK DIAGRAMS section when using any the information below.

HP 85101 POWER SUPPLY TROUBLESHOOTING

HP 85101 A7 Switching Regulator Circuit

WARNING

The A7 board and portions of the A17 motherboard and A18 rear panel are at line potential. Use extreme caution when servicing the the A7 switching supply. The A9 switching transformer plugs directly into the A7 board. Any waveforms or voltages should be measured differentially or with respect to the chassis – Do not ground the neutral.

The HP 85101 uses a switching power supply in the full-wave, half-bridge configuration. The switching frequency is approximately 40 KHz. Also, come components for the A7 Switching Regulator are located on the A18 real panel, the A17 Motherboard, and the A9 Switching Transformer assembly.

Troubleshooting A7 Test Points

The following test points (TP) can be checked if a defective A7 board is suspected. The expected waveforms or voltages are listed below:

TP1: Used as a measurement reference. There is no ground on this board. Therefore, make oscilloscope measurements in the A-B mode, where channel B is connected to TP1 and channel A is connected to the test point another test point to be measured.

TP2: A slightly distorted 9V p-p square wave is present here. There may be some ringing on the signal.

TP3: 9V DC regulated.

TP4: A slightly distorted 9V p-p square wave is present here. There may be some ringing on the signal.

TP5: Approximately 16V DC with a 2V triangular ripple.

TP6: +5V DC +/- 0.2V.

TP7: With a constant load (tape drive not running), there should be between 1 and 4 volts present.

TP8: Approximately +6V DC present with some ripple. If TP8 is below 5V, the power supplies are shut down and should be checked and repaired.

TP9: +5V DC +/- 0.2V.

TP10: Digital ground − Not to be used for measurements.

TP11: TTL shutdown line where LOW is Shutdown < +1V DC and HIGH is normal > +1.4V DC.

INPUT: The input line power comes in through A18J4 and goes through F1 to C65 and to the input line filter FL1.

WARNING

The discharge resistor for C6 and FL1 is on the A17 Motherboard. If TB1 or TB3 is disconnected, a shock hazard is present (refer to Block Diagram).

LINE VOLTAGE: Line voltage is supplied to the switcher through the SERVICE ON 1 switch, S2, or through relay K1. K1 is energized with +5V supplied through the IF-DISPLAY INTERCONNECT CABLE from the HP 85102. Switch S1 is used to select 90 through 132 volt (115V position) or 198 through 264 volt (230V position) operation.

+5V RECTIFIER FILTER: The output of the transformer is rectified by CR1 and CR2 (chassis mounted) and filtered by L1 and C1. The negative lead of C1 is the ground return for digital ground and analog ground, C2 and C28 are filters for the raw +12V on A8. CR3 is the over-voltage crowbar triggered from A8. L2 and C14 supply filtered +5V to the A6 board. R5, R6, C18 and C19 are used to eliminate voltage spikes.

POWER OFF DISCHARGE: R1 and R2 discharge C3 and C4, respectively, when power is turned OFF. C5 is used primarily as an AC primary return filter.

A8 Post Regulator Troubleshooting

The A8 board supplies regulated +100V,+12V,-12V,+15V, and −15V. It also supplies +20V and −20V raw voltages for the CRT high voltage regulator and drive circuits, including power up/down operation.

Power is supplied to the post regulator from the switching transformer A9T1. The equivalent rectified DC voltage of the secondary is preregulated by regulating the +5V supply. The +5V supply must be working for the A8 post regulator to operate.

The following test points can be checked on the A8 board. These test points all have green LEDs that indicate some value of voltage is present.

TP1: 5V +/- 0.2V.

TP2: +12V +/- 0.6V.

TP3: −12V +/- 0.6V.

TP4: 100V +/- 2V.

TP5: +15V +/- 0.6V.

TP6: −15V +/- 0.6V.

NOTE: There are some components chassis mounted on the A17 Motherboard that are used with the A8 Post Regulator. Refer to drawing in the BLOCK DIAGRAM section for those components.

+15 VOLT REGULATOR: The +20V raw voltage is filtered by C10 which is mounted on the A17 Motherboard. This voltage then goes to the input of the +15V regulator, VR1, which is mounted on the chassis. The output goes through further filtering on the A17 Motherboard: C1, L7, C13, C16, and L4. The end result is +15V DC +/- 0.6V. The −15V supply is done the same way as shown on the HP 85101 Power Supply in the BLOCK DIAGRAM section.

100V FILTER on A17: L3 and C15 are used as additional filters for the 100V supply.

+5V CROWBAR on A17: CR3 is used as a crowbar for over-voltage protection.

+12V for FAN and FILTER CAPACITORS on A17: C2 and C28 are used to filter the unregulated +12V supply. This raw +12V is also used to power the fan A18B1 on the rear panel.

DRIVE CIRCUIT for HIGH VOLTAGE: Q4 functions as an oscillator whose frequency is determined by the inductance and stray capacitance of the transformer A3T1. The frequency is about 24 KHz. The output voltage from the collector of Q4 is an approximate 48V p-p sine wave (about 20V DC). The p-p voltage is determined by the amount of bias current on the base of Q4, which is controlled by circuitry on the A8 board.

HP 85102 IF-DETECTOR POWER SUPPLY TROUBLESHOOTING

A15 Power Supply Troubleshooting

The following information is used to check the A15 board. However, you must first be sure of the following:

- Line power voltage is correct.
- A26 Rectifier Board is producing the proper unreguated (raw) voltages. Refer to the HP 85102 Power Supply Diagram.

Troubleshooting

- Check each independent fuse for the unregulated A26 voltages (+15,-15,+5,-5).
- Check the A26 LEDs. They should all be ON in normal operation, indicating that there is some unregulated voltage present. If any LED is off, it means that no voltage is present and the rectifier output should be checked.
- Check the four unregulated voltages at the output of the rectifiers. These voltages are approximately +/- 22 Vdc out of the 15 volt rectifier and +/- 11 Vdc out of the 5 volt rectifier. Note that if a LED is on, it means that voltage is present, but it does not mean that the voltage is proper.

If the proper line voltage is applied and if the A26 raw voltages are correct, verify normal operation as follows:

- The A15 Regulator board green LEDs are all ON. This means that each regulated output is working.
- The A15 Regulator board red LED is OFF. This means that no output is shut-down because of overheating.

Further Troubleshooting

- If the red LED is on, and all green LEDs are off, then one of the following conditions exits 1) there has been a thermal shutdown, 2) the Thermal Protection circuit has failed, or 3) the +15V or −15V supply has failed. Try resetting the Thermal circuit by cycling power on the HP 8510.
- The thermal protection circuit will shut down the +15V supply if the heat-sink temperature is too high. When the +15V supply is shutdown, the other supplies (−15, +5, −5) are shutdown by the +15V SENSE line going low.
- If one or more of the green LEDs are out, use the table below to isolate the suspect voltage:

−5V LED	+5V LED	−15V LED	+15V LED	SUSPECT:
OFF	OFF	OFF	OFF	+15V Reg. Circuit
OFF	ON	OFF	ON	−15V Reg. Circuit
OFF	ON	ON	ON	−5V Reg. Circuit
ON	OFF	ON	ON	+5V Reg. Circuit

NOTE: Each regulator is referenced to the +15V Regulated Supply and that each regulated supply contains the series pass components directly on the Motherboard or the chassis.

Error Term Troubleshooting

Analyzing the uncorrected or residual error terms (directivity, source match, load match, isolation, reflection and transmission tracking) can be useful in finding gross problems due to bad coupler or bridge directivity, source match of the test set, crosstalk, calibration devices, and connections. This program will require a one path 2-port cal for Reflection/Transmission Test Sets or a full 2-port cal for S-parameter test sets.

The following paragraphs describe the error terms. Familiarize yourself with the descriptions and use the procedure that follows. This type of troubleshooting is especially good for determining if:

A calibration is bad or the Test Set is faulty.

The errors that are displayed on the CRT using the Verification program may be greater than the specified errors that you print-out using the Specifications program. This can be due to bad connections during calibration or verification, faulty (dirty or damaged) devices or cables or rear panel test set extension links. In addition, defective calibration devices can be the cause of degraded error term data just like careless calibration methods.

Error Terms

Directivity — Edf and Edr. These are the uncorrected forward and reverse directivity errors of the test set. These terms will vary with frequency, but values that are worse than the specifications may indicate an error or mechanical malfunction in the test set or in the devices used for the reflection calibration. The calibration devices used to characterize the directivity error term can be one of several types. For example, these devices are typically a lowband (fixed) load for frequencies below 2 to 3 GHz, a broadband (fixed) load, a sliding load for frequencies greater then 2 or 3 GHz, or an offset/short for higher frequencies. The measurements most affected by directivity errors are low reflection measurements — high reflection measurements may appear normal.

Source Match — Esf and Esr. These are the forward and reverse uncorrected source match terms. The source match, in this case, is determined by the match of the test set power splitter and main line coupler or bridge. In some test sets, the match of the bias tees and step attenuators are also included. The calibration devices used to characterize source match are the coaxial short and the shielded open. A bad connection of either of these during the calibration procedure can cause bad source match ETERM data. The measurements most affected by source match errors are high reflection measurements and transmission measurements of highly reflective DUTs. Poor source match, along with poor directivity is probably an indication of a defective coupler or bridge in the test set. Poor source match alone may be caused by a mismatch in the test set, the test set port connector, the cable between the RF source and the test set, or the RF source itself. Try inserting a 3 dB or 6 dB pad between the RF source cable and the test set rear panel to see if this improves the source match error. If it does, the problem is most likely the cable or the RF source.

Isolation (Crosstalk) — Exf and Exr. These are the uncorrected forward and reverse isolation error terms that represent the leakage between the test port paths. The fixed loads are connected to both ports when isolation error coefficients are characterized in the calibration procedure. Any signal that appears in the test channel must be coupled from the reference channel. The crosstalk vector should be very small and would affect both reflection and transmission measurements primarily where the test channel signal is at a very low level, especially transmission measurements where the insertion loss of the DUT is large (for example: $>$ 40 dB attenuation).

Load Match — Elf and Elr. Load match error terms are characterized by measuring the S11 (and S22 for S-parameter test sets) responses of a thru connection during the calibration procedure. Large variations in the forward or reverse load match error terms may indicate a bad thru cable or bad system attenuator (used with Reflection/Transmission Test Sets). The measurements most affected by load match errors are all transmission measurements and reflection measurements of a low insertion loss two-port device (for example: an airline).

Reflection Tracking — Erf and Err. Tracking is the difference between the frequency response of the reference channel and the frequency response of the test channel. Large variations in the reflection tracking ETERMS may indicate a problem in the reference or test signal path in the test set or bad connections during the calibration procedure. The calibration devices used to characterize the reflection tracking error terms are the coaxial short and the shielded open. All reflection measurements (high and low) are affected by the reflection tracking errors.

Transmission Tracking — Etf and Etr. Tracking is the difference between the frequency response of the reference channel and the frequency response of the test channel. Transmission tracking error terms are characterized from the transmission measurements of a thru connection during the calibration procedure. Large variations in the transmission tracking ETERMS may indicate a problem in the reference or test signal path in the test set or bad connections during the calibration procedure. All transmission measurements are affected by transmission tracking errors.

NOTES:

1. TRL (thru reflection line) calibration methods use a thru connection, an airline, and a short or open to obtain all twelve error terms. No one of the TRL devices is identified with any single error term using this method.

2. Be extremely cautious when interpreting the results of ETERM displays compared with specification print-outs. The error must be significantly greater (worse) than the specification to indicate a system failure.

3. The values listed for the transmission and reflection tracking refer only to the ripple of the frequency response. However, the transmission and reflection tracking ETERM includes both the tracking ETERM (ripple) *and* the frequency response roll-off. It is difficult to determine what part of the ETERM (ripple) is independent of the roll-off. Therefore, the reflection and transmission tracking ETERMS may not be as useful as the other values.

Procedure

Overview — With the software properly loaded and running and the controller connected to the HP 8510 over HP-IB, you will use the Specifications program to print-out the raw ETERM specifications (both forward and reverse). These are the maximum amount of errors that your system should have. Then you will perform a calibration and use the Verification program to allow the HP 8510 to display the level of those errors. The Verification program has a softkey selection that will allow you to view the ETERMS on the HP 8510 CRT. You will compare the Specification raw ETERM print-outs to each CRT trace. And if any ETERM is not within specification, first suspect your calibration and then suspect your Test Set and, lastly, your source. This means that you will have to re-calibrate and display the ETERMS again. If that does not solve the problem, suspect the Test Set and refer to TEST SET TROUBLESHOOTING.

a. You will need to use the HP 8510 Specification/Verification software. You will need a controller and BASIC — refer to the section titled SPECIFICATIONS for specific information about the controller, BASIC, and how to load and run the program. You will also need to have the HP 8510 properly connected and you will need your Calibration Kit and a printer.

b. With the Specification/Verification program running, select the proper configuration for your system using the program's controller softkeys.

c. Print-out the specifications for your system by selecting the SYSTEM SPECS menu. Then select the UNCORRECTED TEST SET VALUES in dB for the FORWARD direction ETERMS.

d. Print the SPECS as selected. Then repeat the procedure for the REVERSE direction ETERMS.

e. Notice that the printouts have many specifications listed. However, it is the Raw terms you will use for comparison.

f. Perform your calibration on the HP 8510.

g. Select the Verification program with the VERIFY SYSTEM selection, and then select the DISPLAY ETERM softkey.

i. Select each ETERM and compare the CRT trace to the Specification print-out. Use the marker to read the trace values.

   If there is any great difference, where the trace value is worse than the specified value, suspect the calibration or hardware as described above. If any values are close or better than the specified values, it is considered a normal situation. If any values are much worse, either the Test Set,the calibration, the devices, or the cables are probably faulty. Repeat the calibration and try again. If a problem still exists, refer to the respective manuals or sections of this manual for further troubleshooting.

   NOTE: The results of this entire procedure should be saved if you cannot solve the problem and you have to contact an HP Customer Engineer.

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HP 85101B Assembly/Disassembly Procedure

This section includes assembly and disassembly procedures for some of the printed circuit boards and components contained in the HP 85101B. Procedures are included only for the boards/components that are difficult to remove.

Before beginning any of the following procedures, turn the instrument OFF, disconnect the power cord, and ground the work area and yourself to prevent electrostatic discharge (ESD).

All SMA connections are torqued to 10 in-lbs. The recommended tightening torques for the screws are as follows:

Screw Size	Tightening Torque Value	
	N-Cm	In-Lbs
2-56	34	3
4-40	79	7
6-32	124	11
8-32	237	21
10-32	361	32
M 2	34	3
M 2.5	56	5
M 3	102	9
M 3.5	158	14
M 4	237	21
M 5	474	42

NOTE: New screws should be used for reassembly of all printed circuit boards/components.

TOOLS REQUIRED	USED ONLY ON
2 pt. pozidriv*	
1 pt. pozidriv	
.25 wd flat blade screw driver	
5/16'' nut driver	tape drive
Soldering iron	CRT
(4) insulated clip leads	CRT, capacitors
Conductive bench mat	
Grounding wrist strap	

* Registered trade name/trademark owned by Phillips International Screw Company.

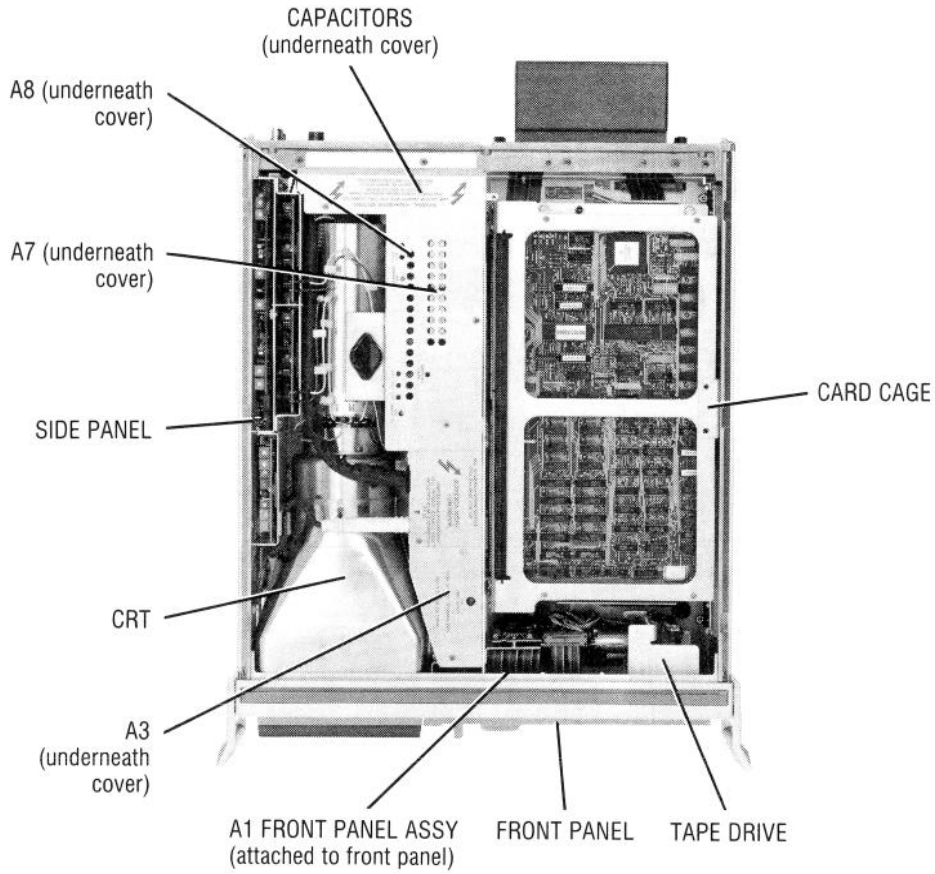


Figure 1. HP 85101B Top View

CARD CAGE

Disassembly

1. Remove the top cover from the HP 85101B.
2. Loosen the (4) captive screws that hold the card cage to the chassis.
3. Hold the card cage at both ends (toward the front of the HP 85101B and toward the rear of the HP 85101B) and gently lift the card cage straight up. Lift equally at both ends — this may require a gentle rocking motion.
4. Remove the card cage from the HP 85101B and set it on a table top with the aluminum retaining bracket facing up.

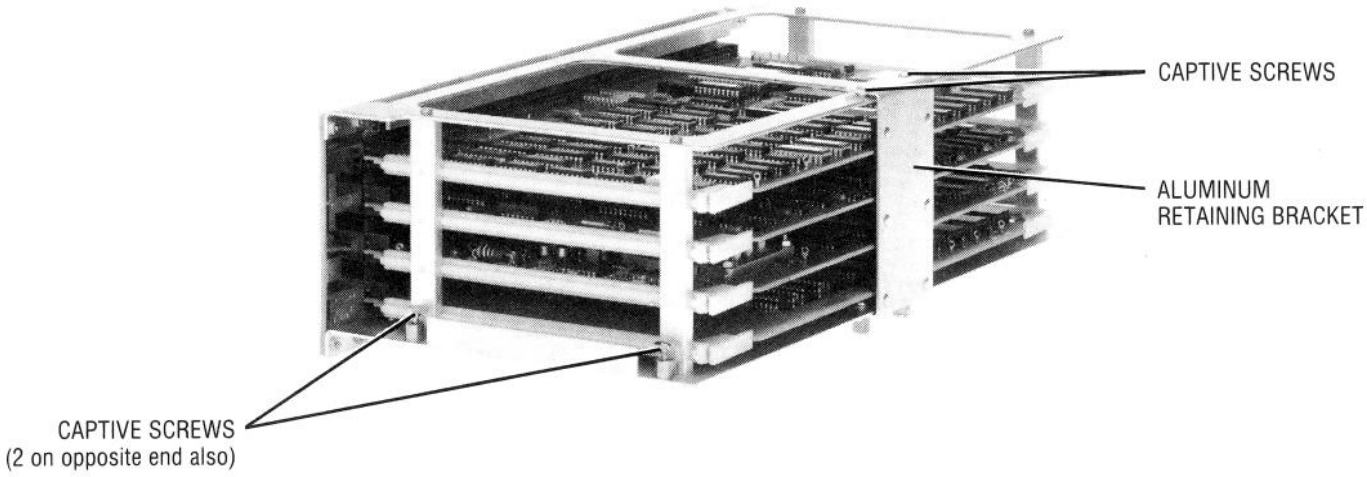


Figure 2. HP 85101B Card Cage

Removing the Boards

1. Loosen the (2) captive screws on the aluminum retaining bracket and remove it from the card cage.
2. Lift the white plastic tabs at either end of the PC board to be removed. This releases the board from the connecting socket below.
3. Lift the PC board straight up to remove it from the card cage.

Assembly

1. Lower the PC board into a slot of the card cage.
2. Carefully align the socket on the PC board with the pins in the card cage.
3. Gently press the board into place using the white plastic tabs. The tabs will resume the locked position. Press hard enough to make full contact of the socket and pins.
4. Position the retaining bracket on the card cage and tighten the (2) captive screws on the retaining bracket.
5. With the components on the PC board facing up, hold the card cage at both ends and lower it into the cavity of the HP 85101B. Use of the aligning rods on the HP 85101B chassis assures proper placement of the card cage.
6. Tighten the (4) captive screws on the card cage.
7. Replace the top cover of the HP 85101B.

FRONT PANEL

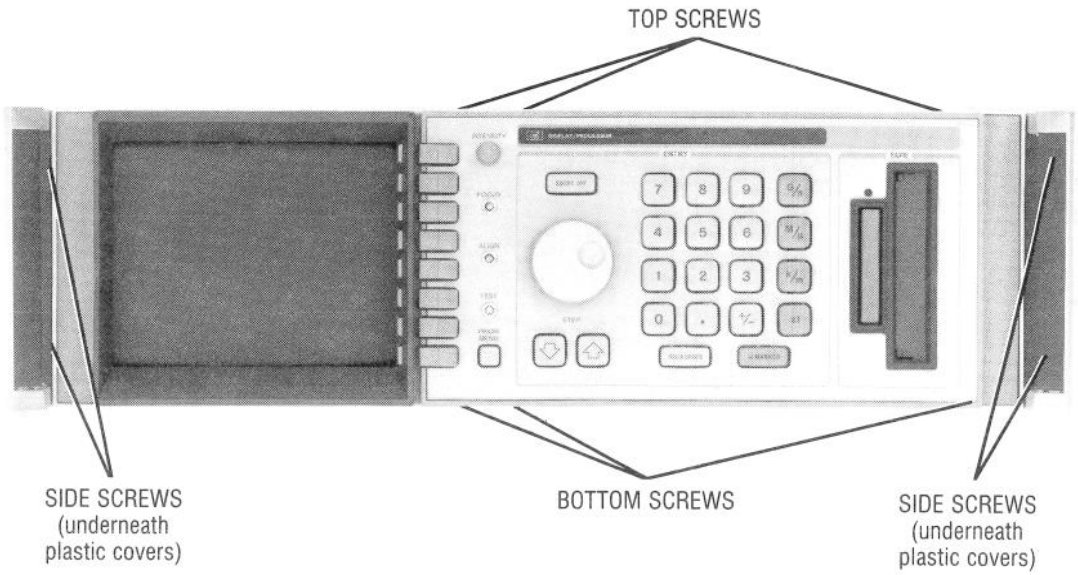


Figure 3. HP 85101B Front Panel

Disassembly

1. Remove any handles from the instruments. The screws are located under the plastic handle covers.
2. Remove the (3) pozidriv screws from the bottom of the aluminum frame.
3. Put the instrument top-side up and remove the top screws (3) and side screws (2 each side). The front panel will slide out.

Assembly

Reverse the above procedure to install the front panel.

A1 FRONT PANEL ASSEMBLY

Disassembly

1. Remove the front panel as described above.
2. Remove the (6) retainer clips from the front panel. Unplug the J2 connector from the A1 front panel assembly.
3. Unplug all connectors from the front panel board.
4. Remove the front panel board.

Assembly

Reverse the above procedure to install the A1 Front Panel Assembly. Use new retainer clips to hold the board to the front panel.

SIDE PANEL

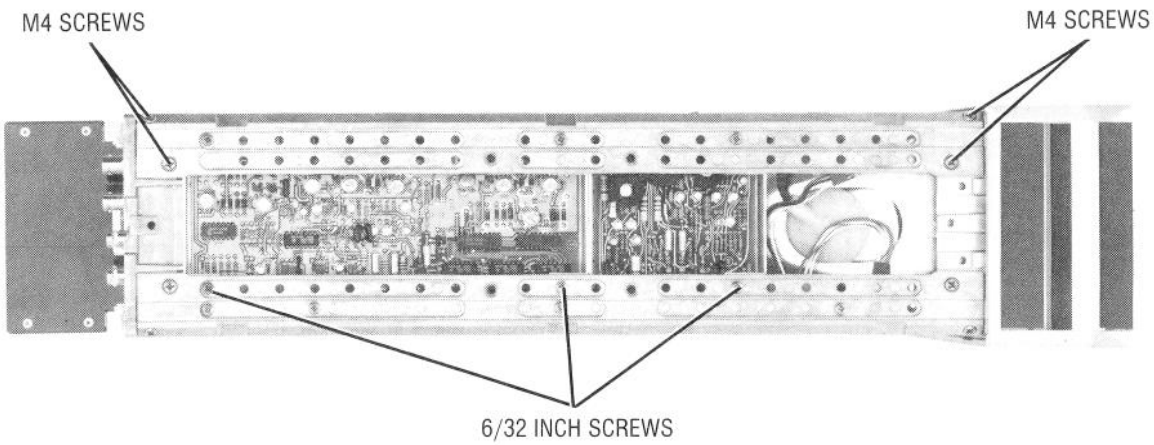


Figure 4. HP 85101B Side Panel (Left)

Disassembly

1. Remove the top cover from the instrument.
2. Remove the side cover from the instrument by loosening the attaching screw at the rear of the instrument.
3. Perform the *High Voltage Discharge Procedure* described below. Remove the (4) printed circuit boards (A2, A4, A5, and A6) from the aluminum housing near the side strut.
4. Remove the (3) 6/32'' screws from the bottom of the side strut as shown in Figure 4 and the M4 screws from the front and rear of the side strut (2 each end) to remove the side panel.

Assembly

Reverse the above procedure to install the side panel/printed circuit boards.

CRT REMOVAL

High Voltage Discharge Procedure

WARNING

Do not handle the A3 high-voltage board assembly or the A3U1 high-voltage multiplier until the following high-voltage discharge procedure has been performed.

The following high-voltage discharge procedure should be performed any time the A3 cover is removed, unless the high voltage is being adjusted.

1. Connect a clip lead from the shaft of a small screwdriver to the ground lug on the chassis inside the high-voltage shield.
2. While holding the insulated handle of the screwdriver, touch the grounded blade to the following connections:

a. Both brown wires going to the CRT from A3 via W6.

b. The yellow, blue, and orange wires in the same cable as "a." above.

c. All capacitors at the top of A3.

3. Connect three clip leads to the ground lug inside the high-voltage shield.

a. Connect one grounded clip lead to the black lead coming from the A3U1 multiplier at its connection to A3T1.

WARNING

In the following step, a large arc of high voltage should be drawn. Be careful.

b. With a twisting motion, slowly remove the CRT anode lead from its connection to the A3U1 multiplier. As the metal end of the lead clears the A3U1J1 connector, an arc to ground should occur. For the time being, ground this lead to the CRT shield.

c. Without touching the CRT anode lead, connect the free end of the second grounded clip lead to the metal CRT anode connection (Figure 5). Leave this connected for at least 5 minutes.

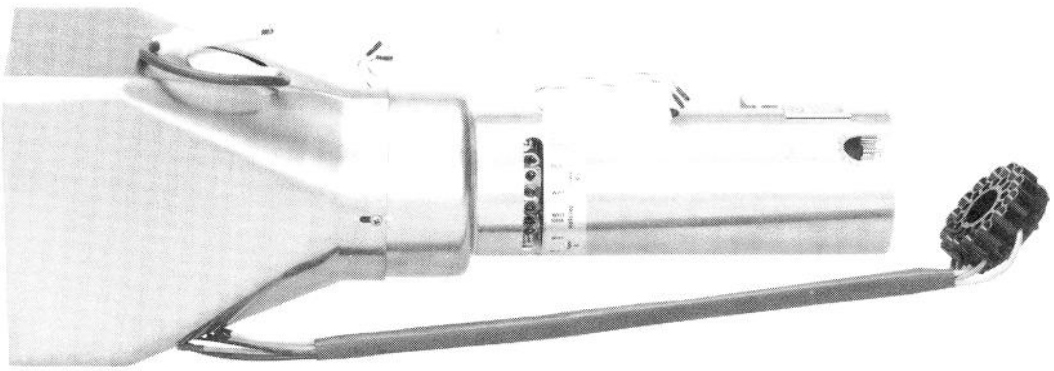


Figure 5. HP 85101B CRT

WARNING

The A3U1 multiplier is not yet discharged! It has close to 20 kV at the A3U1J1 connector.

d. Obtain a conductive tool such as a pocket screwdriver, or a scribe (2.5 inches long and not larger than 0.125 inch in diameter), or an HP 5061-0868 PA lead assembly. Connect the third grounded clip lead to this metal tool.

e. Insert the grounded tool into the A3U1J1 connector and leave it connected for at least 1 minute. The black and red leads and the CRT anode should all be grounded at this time.

f. After discharging the circuits, remove all jumper wires.

Disassembly

1. Turn the instrument on its side and remove the bottom cover.
2. From the bottom of the HP 85101B, remove the (2) pozidriv screws opposite the CRT and disconnect all wires from the CRT.
3. Lay the instrument top-side up and disconnect all wires from the CRT.
4. Remove the side panel near the CRT and the front panel, as described above, and slide the CRT out.

Assembly

1. Remove all parts from the old CRT and add them to the new CRT (start by removing the aluminum shield from the old CRT).
2. Slide the CRT into the instrument, replace the front and side panel, tighten the (2) pozidriv screws from the bottom side of the instrument and then connect the wires to the top and bottom sides of the CRT.
3. Perform the CRT adjustment procedures given in the HP 8510B Service Manual.

TAPE DRIVE

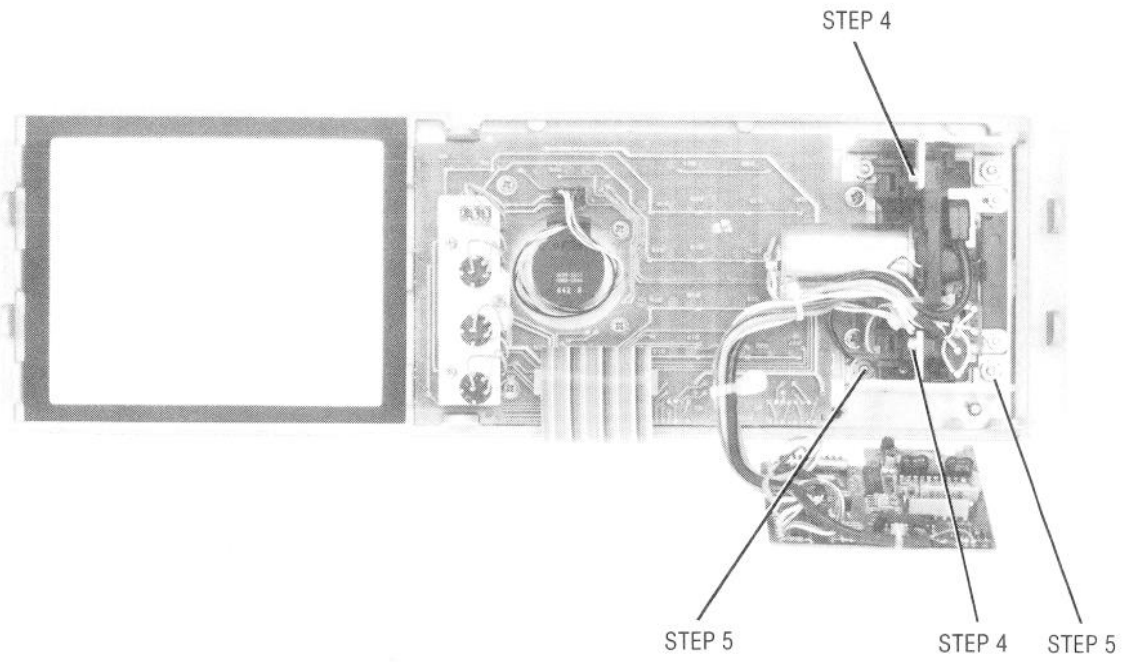


Figure 6. HP 85101B Tape Drive

Disassembly

1. Remove the card cage as described above.
2. Remove the (3) screws that attach the tape drive printed circuit board to the bracket and unplug the ribbon cable.
3. Remove the front panel as described above.
4. Remove the (2) screws that hold the tape drive bracket to the tape drive (near the rear of the tape drive).
5. Remove the (2) 5/16'' nuts from the top tape drive bracket and slide the tape drive assembly out of the front panel.

Assembly

Reverse the above procedure to install the tape drive.

A3 HIGH VOLTAGE REGULATOR

Before beginning the following procedure, perform the *High Voltage Discharge Procedure* located in the *CRT Removal* section above.

Disassembly

1. Remove all connecting wires from the A3 board.
2. Turn the instrument on its side and remove the bottom cover.
3. From the bottom side of the instrument, remove the pozidriv screw that is located opposite the bracket on the A3 board and lift the board out of the instrument.

Assembly

Reverse the above procedure to install the A3 High Voltage Regulator board.

A7 SWITCHING REGULATOR

WARNING

Disconnect power to the instrument before removing the protective cover. Line voltage is present when the line cord is connected.

Disassembly

1. Remove the protective cover from the top of the A7 and A8 boards.
2. Lift the black tabs on the A7 board and remove it from the instrument. Disconnect the transformer wires from the board when they become visible.

Assembly

Reverse the above procedure to install the A7 Switching Regulator board.

A8 POST REGULATOR

WARNING

Disconnect power to the instrument before removing the protective cover. Line voltage is present when the line cord is connected.

Disassembly

1. Remove the protective cover from the top of the A7 and A8 boards and lift the black tabs on the A8 board to remove it from the instrument.

Assembly

Reverse the above procedure to install the A8 Post Regulator board.

CAPACITORS

Disassembly

NOTE: During this procedure, connect the chassis of the instrument to earth ground.

1. Set the instrument on its side. From the bottom side of the instrument, remove the plastic shield that covers the capacitor screws.
2. Discharge the capacitors by attaching one end of a clip lead to the chassis and the other end of the clip lead to the capacitor terminal (large pozidriv screws). **Do this to every capacitor terminal.**
3. Remove the screws of the desired capacitor and remove the capacitor.

Assembly

Reverse the above procedure (except discharging) to install a capacitor.

HP 85102B Assembly/Disassembly Procedure

This section includes assembly and disassembly procedures for the front panel, the power supply capacitors, and the rectifier board that are contained in the HP 85102B.

Before beginning any of the following procedures, turn the instrument OFF, disconnect the power cord, and ground the work area and yourself to prevent electrostatic discharge (ESD).

The recommended tightening torques for the screws are as follows:

Screw Size	Tightening Torque Value	
	N-Cm	In-Lbs
2-56	34	3
4-40	79	7
6-32	124	11
8-32	237	21
10-32	361	32
M 2	34	3
M 2.5	56	5
M 3	102	9
M 3.5	158	14
M 4	237	21
M 5	474	42

TOOLS REQUIRED

2 pt. pozidriv
1 pt. pozidriv
.25 wd flat blade screw driver
Conductive bench mat
Grounding wrist strap

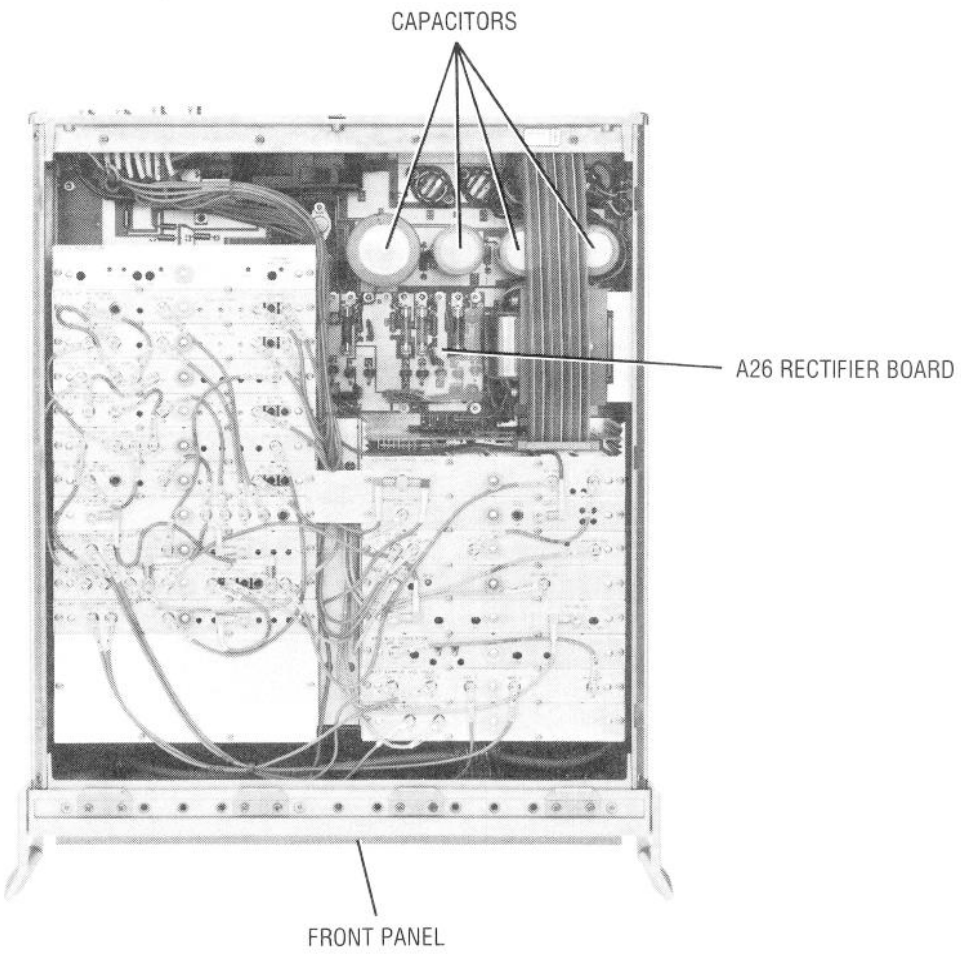


Figure 7. HP 85102B Top View

FRONT PANEL

Disassembly

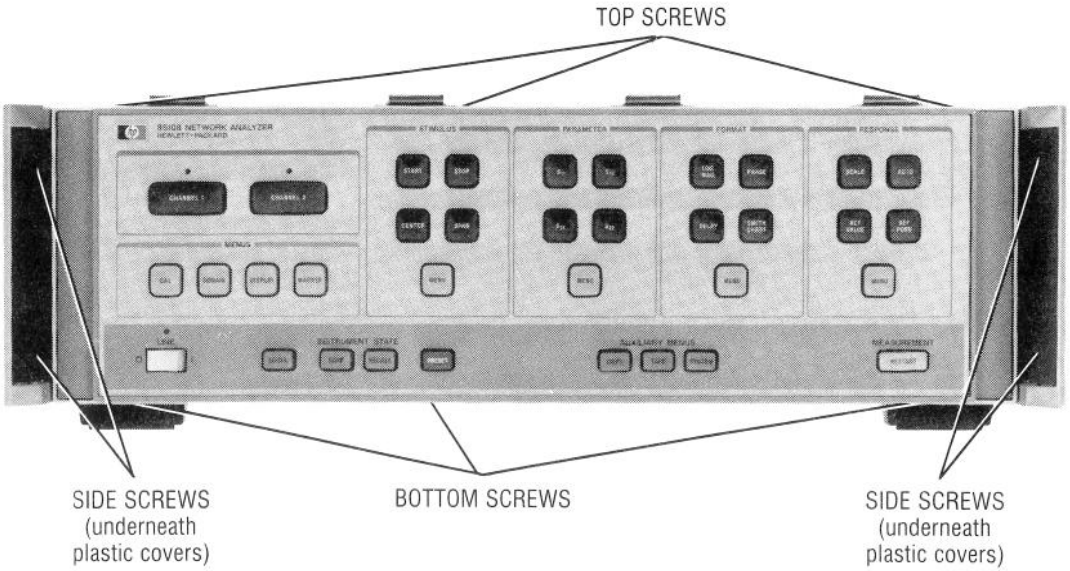


Figure 8. HP 85102B Front Panel

1. Remove any handles from the instruments. The screws are located under the plastic handle covers.
2. Remove the (3) pozidriv screws from the bottom of the aluminum frame.
3. Set the instrument top-side up and remove the top and side screws. The front panel will slide out.
4. Unplug the ribbon cable from the Front Panel Interface Board and the wires from the transformer.

Assembly

Reverse the above procedure to install the front panel.

RECTIFIER BOARD

Disassembly

1. Set the instrument on its side and remove the top and bottom covers.
2. From the bottom side of the instrument, remove the (8) pozidriv screws opposite the rectifier board.
3. From the top side of the instrument, remove the (4) plastic, slot-head screws and remove the board.

Assembly

Reverse the above procedure to install the rectifier board.

CAPACITORS

Disassembly

NOTE: During this procedure, connect the chassis of the instrument to earth ground.

1. Set the instrument on its side. From the bottom side of the instrument, remove the plastic shield.
2. Discharge the capacitors by attaching one end of an insulated clip lead to the chassis and the other end of the clip lead to the capacitor terminal (large pozidriv screws). **Do this to every capacitor terminal.**
3. Remove the screws of the desired capacitor and remove the capacitor.

Assembly

Reverse the above procedure to install a capacitor.

Test Set Troubleshooting

This sections aids in troubleshooting the HP 851X series test sets. You should have good reason to suspect the test set is faulty before using this section. If you are not certain that the problem is due to a faulty test set, read the sections titled SERVICE OVERVIEW and BUILT-IN DIAGNOSTICS in this manual. Continue with this section only if you know the test set is faulty.

The information in this section applies to these test sets:

HP 8511A HP 8512A HP 8513A HP 8514A HP 8514B HP 8515A

For specific information about the HP 8514A, refer to the material in the HP 8510A manual set. Specific test set information was supplied with each test set, and should have been placed at the end of this volume.

DOCUMENT CONTENTS

Page	Title
2	Test Set Temperature
3	Check All Connections
3	Check Power Supply/Regulator, Fuses, and Switches
5	Test Set Self-test Indicators
5	Check VTO/Driver (LO)
6	Test Set Troubleshooting Using Time Domain
8	Test Set Assembly Replacement Procedures
12	3.5 mm RF Connector Repair

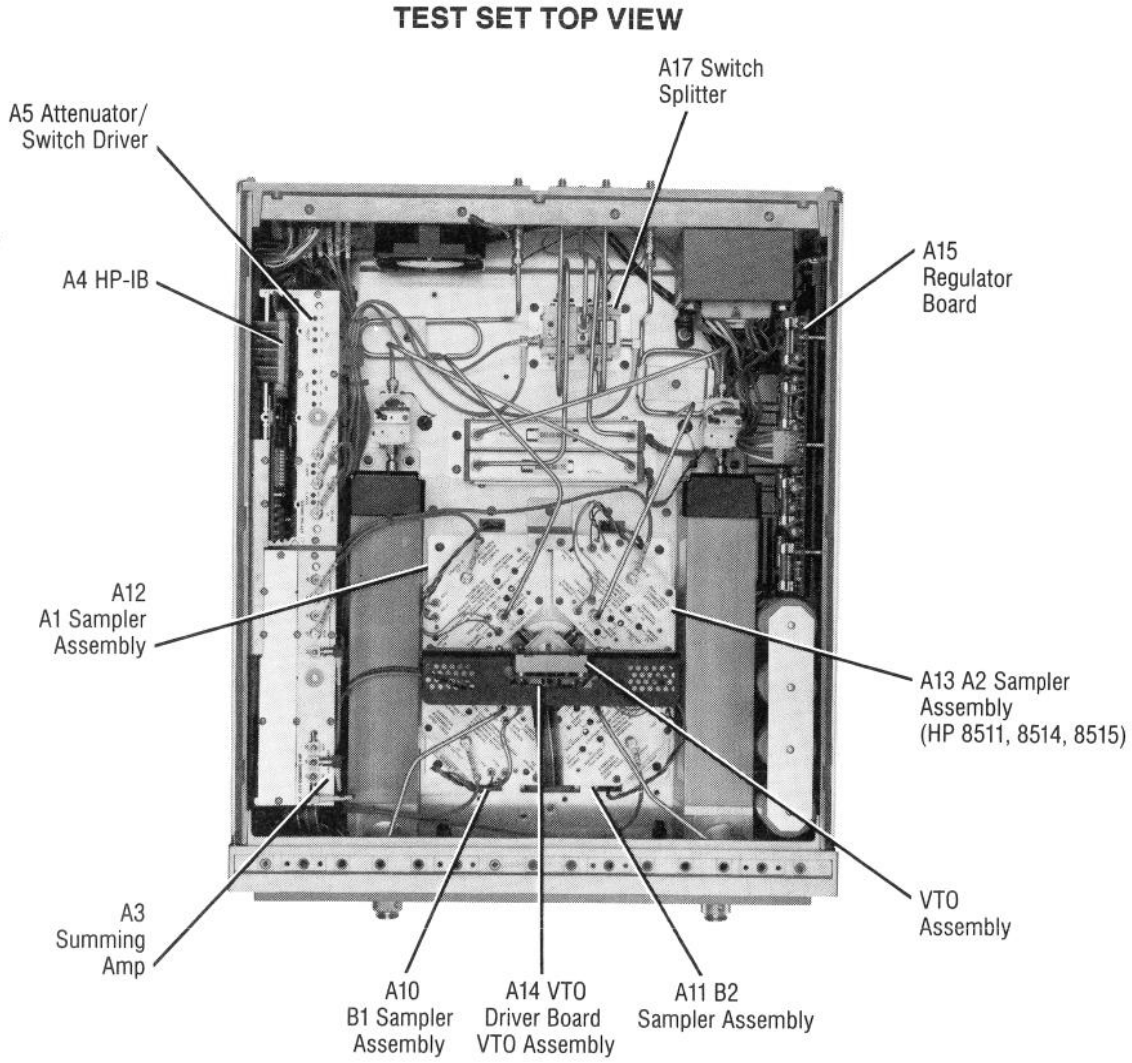


Figure 1. Test Set Major Assemblies Location Diagram

TEST SET TEMPERATURE

The processor on the A4 HP-IB assembly monitors the test set temperature with a comparator on the A3 VTO summing amplifier. The temperature sensor is located on the A14 VTO/driver assembly. If the temperature of the VTO/driver exceeds 85°C, the HP 85101 displays the "Test Set Too Hot" prompt.

CAUTION

TEST SET TOO HOT means turn off the test set immediately. This message is only a prompt. It does not turn off the test set.

Determine the reason for the prompt before again subjecting the test set to continuous use. Make sure the fan is operating properly and is not covered by a piece of paper, etc. Make sure the fan and the side panel air exhaust has at least 8 cm (about 3 inches) clearance, and top cover exhaust has at least 1.5 cm (about 0.5 inches) clearance.

CHECK ALL CONNECTIONS (loose, broken, crimped, etc.)

Power holes (power loss at a specific frequency) often result from faulty connections. Check the following connections:

- Test set rear panel (including the extension links)
- Cables connected to the A3 summing amplifier and A5 Attenuator/Switch
- Sampler cables
- RF path connections from rear panel to front panel

CHECK POWER SUPPLY/REGULATOR, FUSES, AND SWITCHES

A15 Regulator Board Assembly

Use a digital voltmeter to check the voltages given in Table 1. Use an oscilloscope to check AC ripple. Use chassis ground as reference.

Table 1. Test Set Power Supply Tolerances

Nominal Voltage	Test Point	Voltage Tolerance	Maximum Ripple
+15V	A15TP1	+13.7 to +15.9V	2 mV
−15V	A15TP2	−13.8 to −16.2V	2 mV
+5V	A15TP3	+4.5 to +5.2V	2 mV
−5V	A15TP6	−4.8 to −5.5V	2 mV

Fuses

Fuses for the regulator board assembly, rear panel, and front panel are specified in the parts list of each test set. The locations of these fuses are also given in the parts list.

Address Switches

Set the switches as indicated in Figure 2. (dark side of switch is depressed). The HP-IB address switch is on the test set rear panel. The HP-IB address switch is easy to access but need not be changed unless HP 8510 bus error messages are visible on the CRT. This switch is set to the binary number 20 at the factory.

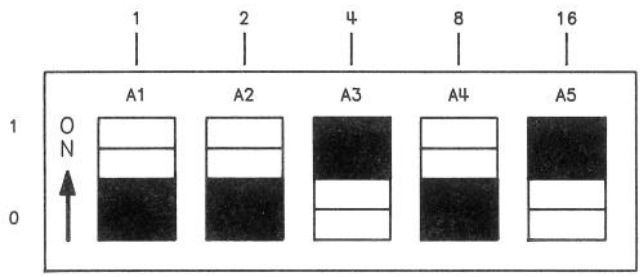


Figure 2. Default HP-IB Switch Setting for All Test Sets (20, Binary)

CONFIGURATION SWITCH

The configuration switch is on the A3 summing amplifier assembly (see Figure 3). It is not easy to access or reset (you must remove the top cover, a bracket, and the A3 assembly). Therefore, unless one of the following conditions exist, don't change it. Reasons to suspect these switches are set incorrectly include:

- HP 8510 turn-on frequencies are not those of test set.
- HP 8510 allows selection of two port S-parameters with a transmission/reflection test set.

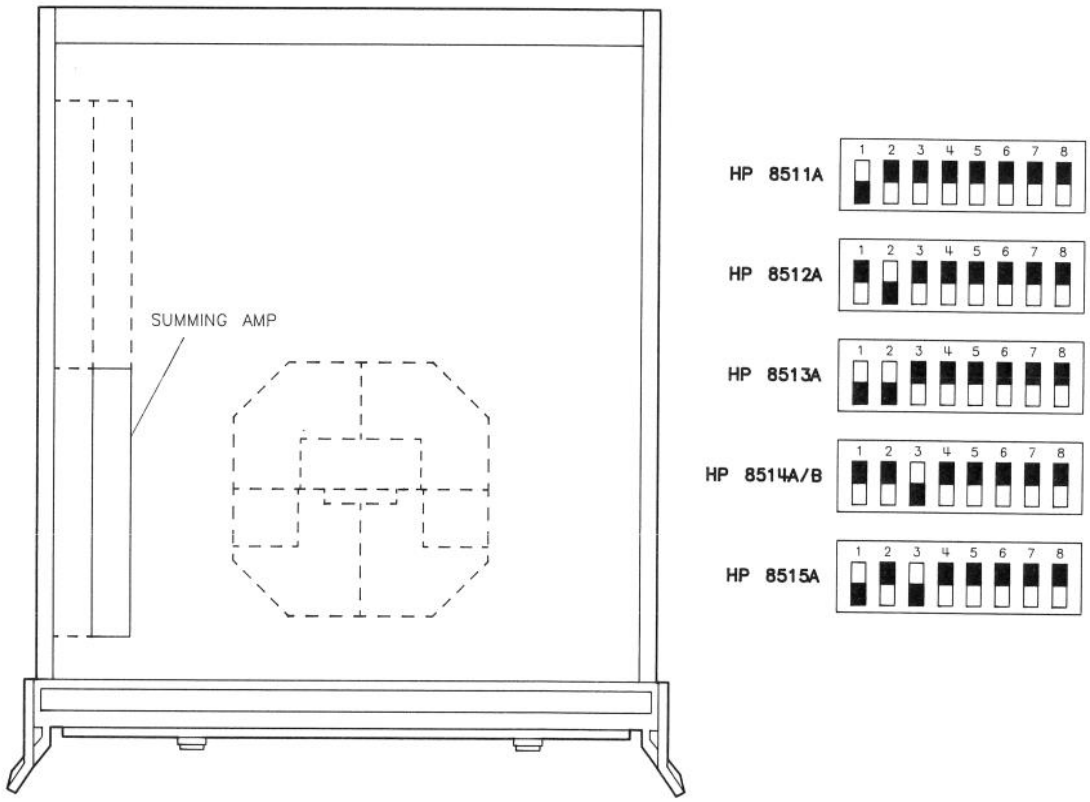


Figure 3. Location of A3 Assembly and A3 Configuration Switch Settings

TEST SET SELF-TEST INDICATORS

If the ACTIVE LED on the front panel does not light within two seconds of turn on, or lights immediately, the test set has not passed its self-test. You can determine what part of the self-test failed by determining which HP-IB LEDs on the A4 assembly are lit. The table below shows the possible self-test failures:

Self-test Indication	A4 HP-IB LEDs LSN	TLK	SRQ	REM	Elapsed Time After Turn-on (in seconds)
PWON	ON	ON	ON	ON	0 to 0.5
Fail ROM Test	OFF	ON	ON	ON	instantaneous
Pass ROM Test	OFF	OFF	ON	ON	0.52 to 2.0
Fail RAM Test	OFF	OFF	OFF	ON	
Pass RAM Test	OFF	OFF	OFF	OFF	after 2 sec

Two seconds after turn-on all four HP-IB LEDs should go off, and the front panel ACTIVE LED should light simultaneously. After going out briefly, the HP-IB LEDs will light according to the state of the test set.

If Self-test Fails to Run

If the portion of memory which contains the self-test programming is faulty, the self-test will not run properly. The following conditions indicate that the self-test ROMs are faulty:

- all LEDs flash briefly and go off
- all LEDs flash briefly and stay on
- ACTIVE LED goes on before HP-IB LEDs go out
- ACTIVE LED does not go on at all (check LED operation before proceeding)

CHECK VTO/DRIVER (LO)

There are two procedures provided to check the VTO. The first one (a) checks the VTO at two frequencies, the second one (b) is more thorough and checks the VTO at 12 frequencies throughout the VTO range.

a. Using a frequency counter and a voltmeter, check the VTO fundamental frequency and A3 summing amplifier output as follows:

   Disconnect the Test Set-IF Interconnect cable. Using a BNC-to-snap-on cable (provided in the service kit) connect the frequency counter to A14J1 (labeled VTO AUX, on the VTO board assembly). Check that A14J1 is between 165 MHz and 195 MHz.

   Disconnect the cable to A3J4. The VTO frequency should be between 18 MHz and 28 MHz. Check that A3J4 is between −5.625 and −6.875 Vdc.

   If the VTO frequency is not correct, but the voltage at A3J4 is correct, suspect a bad VTO.

   If the voltage at A3J4 is not correct, suspect a bad A3 summing amplifier assembly (assuming the HP 85102 is working).

b. Use a power supply and a frequency counter to check the VTO as follows:

   Inject a −1 to −12V DC voltage (in −1 volt steps) into the A14 VTO drive (A14J2). Monitor A14J1 to verify that the VTO steps through its range of 65 MHz to 300 MHz (about −21.3 MHz/volt). Figure 4 illustrates the relationship of voltage at A14J2 to VTO oscillation frequency.

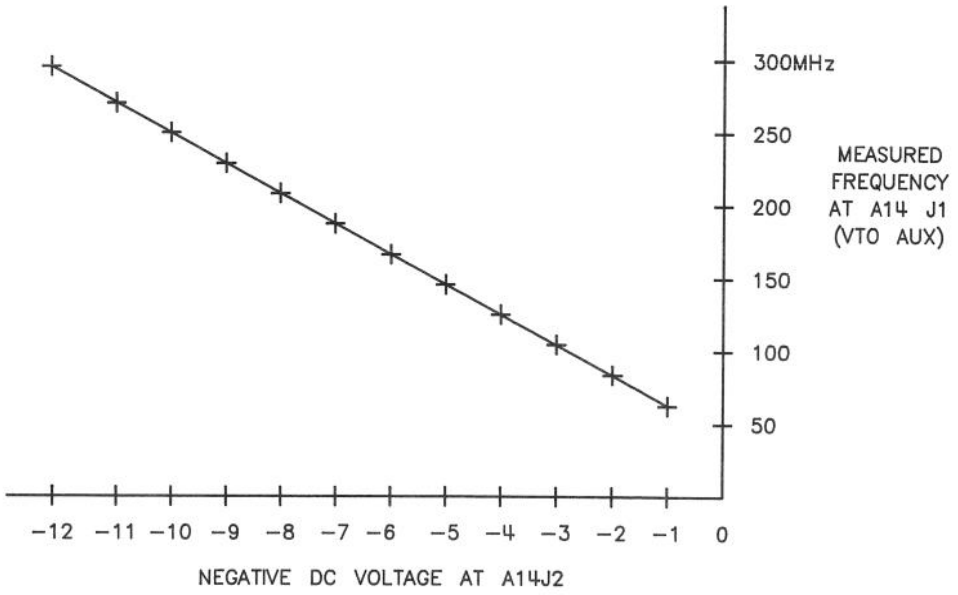


Figure 4. VTO Voltage/Frequency Relationship

TEST SET TROUBLESHOOTING USING TIME DOMAIN

Time domain response of the test set can be used to identify problems in the RF path. The plots below show typical time domain responses of the HP 8512A, 8513A, 8514A/B, and 8515A test sets. These can be used as rough standards when trying to locate a problem in the RF path. Keep in mind that the absolute location in time and absolute height of the responses will vary from test set to test set. The significant factor is the relative height of the main impulse (determined by the calibrated short) and the discontinuities. Discontinuities that may be causing a problem will usually stand out as being much greater than the typical response.

Set up the system as follows to obtain a time domain trace:

1. Connect a short or shielded open to the test set port 1.
2. Press **[PRESET] [DOMAIN] [TIME BAND PASS]** STIMULUS **[MENU] [NUMBER OF POINTS] [4] [0] [1] [S11] [LOG MAG]**.
3. Set the **START/STOP TIME**, **SCALE**, and **REF VALUE** as indicated in Table 3, below.

Table 3. Suggested Parameter Values for Time Domain Troubleshooting

TEST SET	START TIME	STOP TIME	SCALE	REF VALUE	REFER TO FIGURE #
HP 8512A	−1.0 ns	11.0 ns	10 dB/	−20 dB	5
HP 8513A	−1.0 ns	12.0 ns	10 dB/	−30 dB	6
HP 8514A/B	−6.0 ns	6.0 ns	5 dB/	−20 dB	7
HP 8515A	−1.0 ns	12.0 ns	10 dB/	−30 dB	8

4. For the HP 8514A or 8515A, you can check the port 2 responses using the same set-up as described above except connect the termination to port 2 and select S22 instead of S11. Peaks in the trace that are significantly greater than those shown indicate a possible loose or bad connection in the RF path at that location.

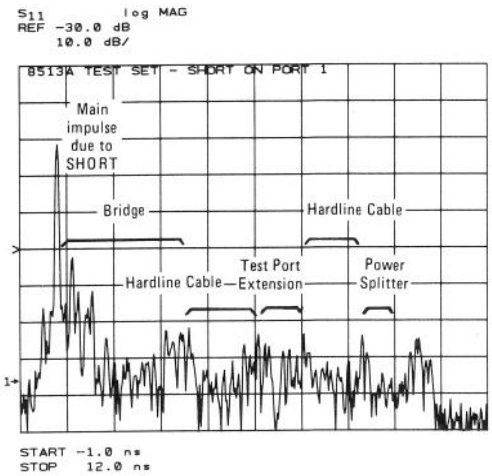


Figure 5. HP 8512A Typical Port 1 Response

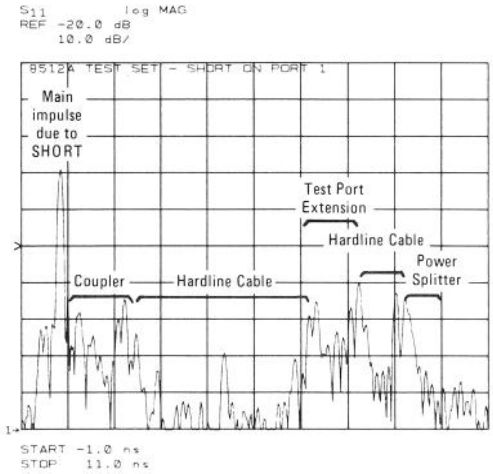


Figure 6. HP 8513A Typical Port 1 Response

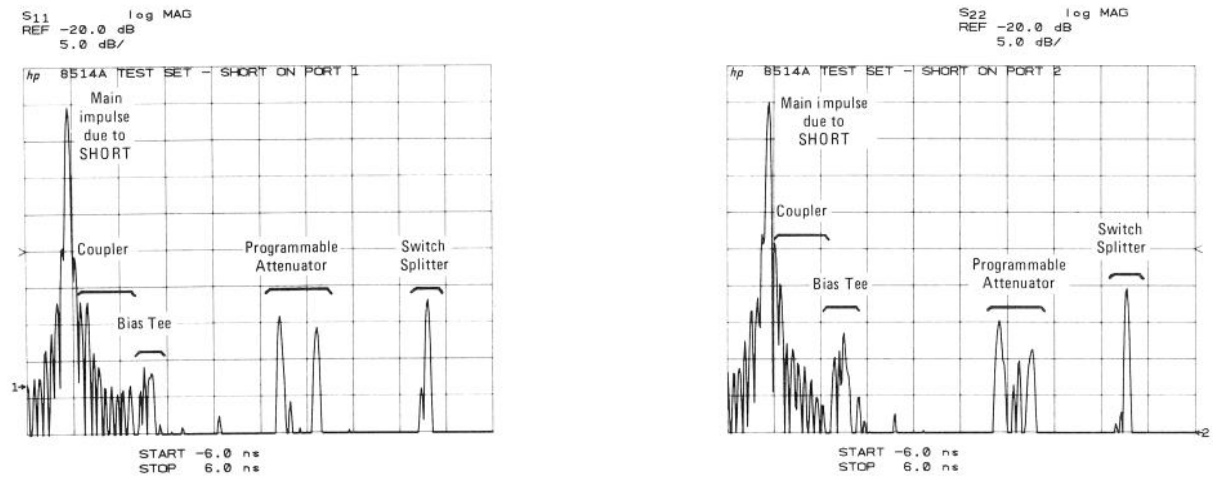


Figure 7. HP 8514A/B Typical Port 1 and Port 2 Response

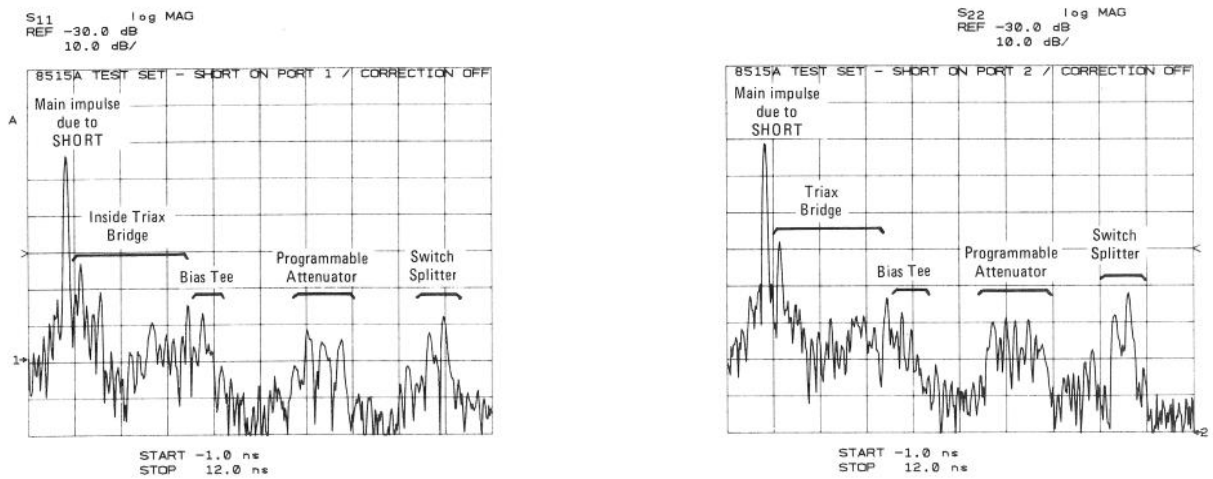


Figure 8. HP 8515A Typical Port 1 and Port 2 Response

TEST SET ASSEMBLY REPLACEMENT PROCEDURES

This section describes how to replace HP 8510 test set major assemblies and components. The HP 8510 test sets include the HP 8511A, 8512A, 8513A, 8514A, 8514B and 8515A. This procedure does not explain how to remove 7 mm connectors. If your test set has 7 mm connectors, refer to the test set manual for removal instructions.

Not all of the procedures apply to all of the test sets. Nor do all of the test sets contain all of the parts documented in the following text and figures. Use them as applicable. The procedures appear in this order:

1 Bias tee
2 Coupler or triax bridge
3 Switch/splitter
4 Frequency converter
5 Sampler

6 VTO assembly
7 Regulator board assembly
8 Step attenuator assembly
9 Capacitor
10 3.5 mm RF connectors

Before beginning any of the following procedures:

- Turn the test set OFF.
- Remove the top cover.
- Reverse the following procedures to install parts.

CAUTION

The assemblies handled in this procedure are VERY SENSITIVE TO DAMAGE BY STATIC ELECTRICITY.

PLEASE PAY ATTENTION TO THESE INSTRUCTIONS! Expensive assemblies are destroyed EVERY DAY because anti-static precautions are not taken seriously.

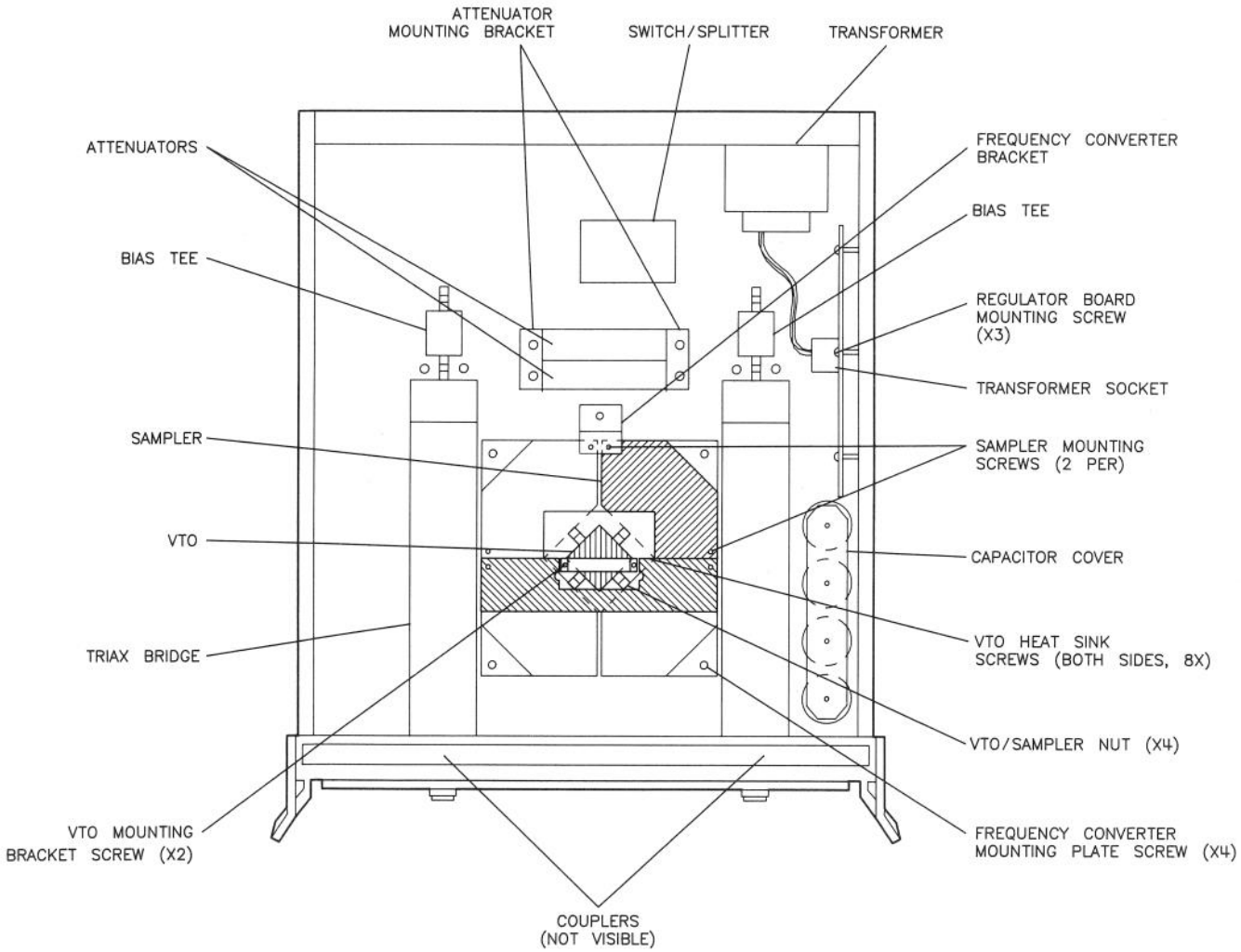
WEAR AN ANTI-STATIC WRIST STRAP THAT IS CONNECTED TO EARTH GROUND. If you ground the strap to the instrument chassis, make sure the instrument is plugged in, otherwise you are not connected to earth ground. An ungrounded instrument can not provide sufficient protection, and can even build up its own static charge.

NOTE: All SMA connections should be torqued to 10 lb-in.

Table 4. Required Tools and Supplies

TOOLS	USED ON	HP Part Number
Anti-static wrist strap	all components	9300-1257 (Medium) 9300-0970 (Large)
Anti-static mat	"	9300-0797
Small pozidriv (1 pt.)	"	8710-0899
Medium pozidriv (2 pt.)	"	8710-0900
1" torque wrench, 72 lb-in	coupler	MTB 100 72 LB-IN 10E[1]
5/16" torque wrench, 10 lb-in	"	8710-1655
Clip lead	capacitors	purchase locally
9/16" nut driver	connector repair	8720-0008
1/2" torque wrench, 25 lb-in	connector repair	8710-1581
Microwave Connector Care Manual	all connectors	08510-90064
3.5 mm connector gage[2]	3.5 mm connectors	1250-1862
Connector cleaning kit[3]	all connectors	92193Z
100Ω 20 watt resistor	capacitor removal	0819-0019

1. Order from Mountz Company, 1080 North 11th Street, San Jose, CA 95112.
2. Contains male and female gage and calibration block. These gages come with any 3.5 mm HP 8510 calibration kit. If you own a calibration kit, refer to cal. kit manual for information on gaging and cleaning the connector.
3. Refer to the *Microwave Connector Care* Manual for cleaning instructions. Note, early versions of this manual recommend cotton swabs, however, the new foam swabs provided in the connector cleaning kit should always be used instead.



NOTE: ALL ASSEMBLIES SHOWN ARE NOT IN EVERY TEST SET.

Figure 9. Typical Test Set, Component Location Diagram

(1) BIAS TEE

1. Desolder the wire connected to the bias tee.
2. Loosen the nuts on both sides of the bias tee.
3. Disconnect the semi-rigid cable from the bias tee and remove the tee from the test set.

(2) COUPLER OR TRIAX BRIDGE

1. Remove the bias tee as described in procedure **(1)**.

For HP 8512A and 8514A/B Test Sets

2. For these coupler test sets: remove the aluminum shield (which covers the couplers), disconnect any wires that cross the coupler and remove the two screws which attach the coupler to the test set chassis.

For HP 8513A and 8515A Test Sets

2. For these Triax bridge test sets: remove the two (2) screws which connect the triax bridge mounting bracket to the test set chassis.

For All Test Sets

3. Disconnect the semi-rigid cable from the coupler or bridge to the sampler.
4. Carefully loosen the nut on the front of the test set with the 1 in. torque wrench. Remove the nut and washer.
5. Move the coupler or bridge away from the front panel and lift it out of the test set.
6. Remove any brackets before sending the coupler or bridge to HP for repair.

(3) SWITCH/SPLITTER

NOTE: Reflection/transmission test sets use a splitter rather than a combination switch/splitter. Both devices are installed in the same place in the various test sets.

1. Remove the semi-rigid cables from the switch/splitter with the 5/16 in. wrench. (Reposition any other cables as required to ease removal.)
2. Remove the four (4) screws which attach the switch/splitter mounting bracket to the chassis.
3. Remove the switch/splitter and bracket from the test set.
4. Remove the bracket from the switch/splitter before sending the switch/splitter to HP for repair.

(4) FREQUENCY CONVERTER

The frequency converter consists of a VTO (voltage-tuned oscillator) assembly and three or four samplers.

CAUTION

The frequency converter is especially sensitive to electrostatic discharge. Wear a ground strap that is connected to earth ground when performing this procedure.

1. Remove the semi-rigid cables from the samplers.
2. Remove the in-line attenuators from the samplers.
3. Remove all flexible cables from the frequency converter by gently pulling on the gold connector.
4. Unplug the ribbon cable near the front panel.
5. Unplug the harnessed (multi-colored) wire and socket assemblies.
6. Remove the four (4) frequency converter mounting plate screws and the frequency converter bracket screw that fastens the frequency converter to the chassis. Lift the frequency converter out of the test set.
7. Remove the frequency converter bracket by removing the two (2) pozidriv screws before sending the frequency converter in for repair.

NOTE: Torque all SMA connections to 10 lb-in with the 5/16'' torque wrench.

(5) SAMPLER

1. Remove the frequency converter **(4)** from the test set.
2. Remove the heat sink from the VTO by removing the eight (8) screws that hold it to the VTO.
3. Remove the two (2) sampler mounting screws from the opposite ends of the sampler. Loosen the nut connecting the VTO to the sampler and remove the sampler.

(6) VTO ASSEMBLY

1. Remove the frequency converter **(4)** from the test set.
2. Remove the 2 sampler mounting screws from each sampler. (The VTO heat sink may need to be removed for access.)
3. Loosen the nuts connecting the VTO to each sampler, disconnect the samplers and remove the VTO assembly.
4. Remove the two (2) VTO mounting bracket screws to separate the bracket from the VTO before returning the VTO to HP for repair.

(7) REGULATOR BOARD ASSEMBLY

1. Unplug the transformer socket from the regulator board.
2. Remove the three (3) mounting screws from the top edge of the regulator board. (It may be necessary to disconnect some semi-rigid cables to ease removal of the screws.)
3. Remove the regulator board. (It may be necessary to partially back out one of the transformer mounting screws for clearance.)

(8) STEP ATTENUATOR ASSEMBLY

1. Unplug the ribbon cables of the step attenuator to be removed. (Remove the regulator board **(7)** to access the ribbon cable sockets if necessary.)
2. Remove the attenuator mounting bracket screws.
3. Remove the attenuator and mounting bracket from the test set.
4. Remove the mounting bracket from the attenuator before sending the attenuator to HP for repair.

(9) CAPACITOR

1. Set the test set upright and pull the metal and plastic cover off the capacitors.
2. Turn the test set upside-down and remove the bottom cover.

NOTE: It is important to plug in the test set before performing step 3.

3. Discharge each capacitor terminal (large pozidrive screw on the bottom side of the test set) through a high wattage resistor and clip lead to earth ground. Each capacitor has two (2) terminals. **Discharge every capacitor terminal for 30 seconds.**
4. To remove a capacitor, remove the corresponding pair of screws and pull the capacitor out of the test set.

(10) 3.5 mm RF CONNECTOR REPAIR

Refer to Figure 10 and the following text to repair 3.5 mm connectors. Other connector repair procedures are documented in the individual test set manuals.

Disassembly

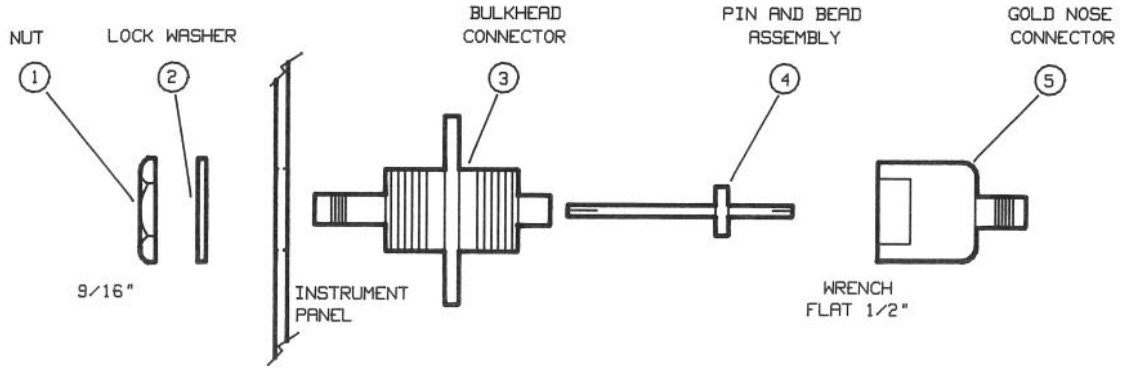


Figure 10. Exploded Diagram of 3.5 mm Connector

1. Remove any attached cables from the connector to be replaced.
2. Use a 1/2 in. wrench to loosen the gold nose connector. Remove the pin and bead assembly from the connector. If only the pin and bead assembly needs to be replaced, continue with step 6.
3. From the inside of the test set, use the 9/16 in. nut driver to loosen the 9/16 in. nut and remove the rest of the connector.
4. Use the part numbers given below for replacement purposes.

Replacement Part	HP Part Number
Nut	2950-0132
Lock washer	2190-0104
Bulkhead connector	08513-20017
Pin and bead assembly (3 pieces*)	5061-5394
Gold nose connector	08513-20016

*Assembled at the factory, not available separately

Assembly

5. Assemble the bulkhead connector, lock washer and nut. Tighten the nut using the 9/16 in. nut driver ($\cong$ 45 lb-in.).
6. Clean the pin and bead assembly as described in the *Microwave Connector Care* Manual. Insert the pin and bead assembly into the gold nose connector. Attach this assembly to the bulkhead connector. Torque the bulkhead connector to 25 lb-in.
7. Clean the mating surfaces with liquid freon or alcohol and lint-free swabs.

8. Gage the pin depth of the gold nose connector.

Location	Pin Depth Specification
Front Panel, HP 8511A	0.0000 to +0.0017 inch
Rear panel, HP 8512A, 8513A, 8514A, 8514B, 8515A	0.0000 to +0.0030 inch

   If the pin depth is out-of-specification, **do not shim**. Instead, install another pin and bead assembly.

9. Reconnect the cables disconnected in step 1.

Watch for deterioration of the gold nose connector. Replace it as needed.

Adjustments

INTRODUCTION

This section provides adjustment procedures for the HP 8510B network analyzer system. These procedures should not be performed as routine maintenance, but should be used (1) after a replacement of a part, or (2) when performance tests show that the specifications cannot be met. Table 1 lists the adjustment procedures by procedure number in the order they appear in this section. Table 2 lists all adjustable components by reference designator, name, and the function adjusted by each. Table 3 lists adjustment procedures that interact between assemblies and lists the adjustment procedures that must be checked when an assembly is replaced or repaired at the component level.

NOTE. Allow the HP 8510B network analyzer system to warm up for one hour before making any adjustments.

The HP 85101B display/processor adjustments may be performed with the HP 85102B IF detector OFF or not present. Power may be applied to the HP 85101B display/processor by (1) setting the LINE switch on the HP 85102B to ON and setting the service switch on the HP 85101B rear panel to SYSTEM CONTROLLED, or by (2) setting the service switch on the rear panel of the HP 85101B to SERVICE ON 1 with the HP 85102B OFF or not present. To remove power from the HP 85101B display/processor, set the service switch on the rear panel of the HP 85101B to SYSTEM CONTROLLED with the HP 85102B OFF or not present.

The HP 85102B IF detector adjustments are semi-automated. Each adjustment procedure requires an HP 9000 series 200 or 300 controller, associated HP-IB cables and the HP 8510B SERVICE ADJUSTMENTS SOFTWARE.

Connect the controller to the HP 8510B bus, labeled "HP-IB" on the HP 85101B rear panel. The correct address setting for each instrument on the HP-IB bus is indicated in each adjustment procedure. Additional instruments and equipment required for each adjustment are also listed.

The system source (HP 8340A/B or 41A/B or HP 8350B) must be connected to the system bus to perform these HP 85102B adjustments. A test set is not required. If a test set is not connected, however, these two cautions will be displayed on the HP 8510B CRT--both of which may safely be ignored: "CAUTION: SYSTEM BUS ADDRESS ERROR" and "CAUTION: VTO FAILURE".

The HP 85102B IF detector adjustments here are independent of one another. Only the adjustment procedure for whatever module has been replaced needs to be performed.

SAFETY CONSIDERATIONS

Although this instrument has been designed in accordance with international safety standards, this manual contains information, cautions, and warnings which must be followed to insure safe operation and to retain the instrument in safe condition. Service and adjustments should be performed only by qualified service personnel.

WARNING

Adjustments in this section are performed with power supplied to the instrument while protective covers are removed. There are voltages at many points in the instrument which can, if contacted, cause personal injury. Be extremely careful. Adjustments should be performed only by trained service personnel.

Power is still applied to the HP 85101B with the bypass switch on the rear panel in the SERVICE ON 1 position. Before removing or installing any assembly or printed circuit board in the HP 85101B, remove the power cord from the rear panel.

Capacitors inside the instrument may still be charged, even if the instrument has been disconnected from its source of supply. Use a non-metallic adjustment tool whenever possible.

EQUIPMENT REQUIRED

Table 4 lists the equipment required for the adjustment procedures. If the test equipment recommended is not available, other equipment may be used if its performance meets the "Critical Specifications" listed in the table. The test setup used for an adjustment procedure is referenced in each procedure.

ADJUSTMENT TOOLS

For safety reasons, it is recommended that a non-metallic tuning tool be used for all adjustment procedures. Never try to force any adjustment control in the instrument. This is especially critical when tuning variable slug-tuned inductors and variable capacitors.

NOTE. Many adjustment procedures require the use of various miscellaneous tools and accessories that are provided in the service kit. The tools and accessories are referenced in each adjustment procedure.

RELATED ADJUSTMENTS

Any adjustments that interact with or are related to other adjustments are listed in Table 3. It is important that adjustments listed in Table 3 are performed in the order indicated to insure the instrument meets its specifications.

RESEALING OF COMPONENTS

If it is necessary to adjust a sealed component, remove the seal to make the adjustment, then reseal using a silicone rubber compound that does not contain acetic acid.

LOADING THE CONTROLLER BASIC LANGUAGE SYSTEM

Before loading the HP 85102B adjustment software you must first load one of the controller language systems as follows:

Loading Basic 2.0

a. With the controller OFF, insert the HP 98611A BASIC 2.0 System Disc into either the right or left disc drive. Then turn the controller ON.

b. When it has finished loading, remove the disc and insert the HP 98612A Extended BASIC 2.1 Disc into the same disc drive.

c. Type LOAD BIN "AP2_1", then press **[RETURN]** or **[EXECUTE]** or **[EXEC]**.

Loading Basic 3.0 or 4.0

a. With the controller OFF, insert the HP 98613A BASIC 3.0 or 4.0 System Disc into either the right or left disc drive. Then turn the controller ON.

b. Load the Drivers and Extensions files (listed below) after the Basic 3.0 or 4.0 System disc has been loaded. To load the Drivers, first insert the Basic 3.0 or 4.0 Drivers Disc into the same disc drive used to load the BASIC System. Or load the Language Extensions and Drivers Disc if you have the double-sided micro-discs.

c. Type LOAD BIN "Filename" for each Driver filename (and each Extension filename, if you have the double-sided disc), then press **[RETURN]** or **[EXECUTE]** or **[EXEC]**. If you have the double-sided disc, you are done when all the drivers and extensions listed below are loaded. If you do not have a double-sided disc, go to the next step.

d. When all Driver files have been loaded, remove the disc.

e. To load the Extensions, insert the Basic 3.0 or 4.0 Language Extensions Disc into the same disc drive.

f. Type LOAD BIN "Filename" for each Extension filename, then press **[RETURN]** or **[EXECUTE]** or **[EXEC]**.

g. When all Extension files have been loaded, remove the disc.

Drivers	Extensions
DISC	MAT
HPIB	IO

If you have any of the following system configurations, the following driver and/or Extension files must also be loaded:

Configuration	Driver File	Extension File
SRM	DCOMM	SRM
HP 9885 Disc Drive	HP9885	
CS80 Disc Drive	CS80	
HP 9122 Disc Drive	CS80	

Table 1. Adjustment Procedures

Title	Procedure Number	Adjusted Board
Low Line Shutdown (HP 85101B)	1	A7
+100 Voltage And High Voltage (HP 85101B)	2	A3 A8
X and Y Deflection Amplifier Pulse Response (HP 85101B)	3	A4 A5
Z Axis Amplifier Pulse Response (HP 85101B)	4	A2
Focus Gain Coarse Adjustments (HP 85101B)	5	A2
Intensity Adjustments (HP 85101B)	6	A2
CRT Display Adjustments (HP 85101B)	7	A2 A3 A4 A6
Focus Gain Final Adjustment (HP 85101B)	8	A2
Sweep ADC Gain Adjustment (HP 85102B)	9	A20
IF Mixer Adjustment (HP 85102B)	10	A9 A11 A13 A14
IF Amplifier Adjustment (HP 85102B)	11	A10
Synchronous Detector Adjustment (HP 85102B)	12	A5 A7
Clock Adjustment (HP 85102B)	13	A6
Test Set Sampler Adjustment	14	A10 A11 A12 A13

Table 2. Adjustable Components In Alpha-Numeric Order (1 of 3)

HP 85101B Display/Processor			
Reference Designator	**Adjustment Name**	**Adjustment Procedure Number**	**Adjustment Function**
A2C10	HF TRIM	4	Adjusts rise and fall times of axis amplifier pulse
A2R5	INTENSITY GAIN	6	Sets adjustment range of front panel INTENSITY control
A2R9	INTENSITY LIMIT	6	Factory set. Sets adjustment range of front panel INTENSITY control
A2R22	HF GAIN	4	Adjusts rise and fall times of Z axis amplifier pulse
A2R30	FOCUS GAIN	5, 8	Adjusts for optimum focus of CRT display
A2R31	ORTHO	7	Sets orthogonality of CRT
A2R32	PATT	7	Adjusts for optimum rectangular shape of CRT display
A2R35	INTENSITY LIMIT	6	Sets adjustment range of front panel INTENSITY control
A2R36	ASTIG	7	Adjusts astigmatism of CRT
A3R14	FOCUS LIMIT	7	Coarse adjusts CRT focus
A4R7	X POSN	7	Adjusts horizontal position of trace
A4R27	X GAIN	7	Adjusts horizontal gain of trace
A4R28	HF GAIN	3	Adjusts rise and fall times of X deflection amplifier pulse
A5R7	Y POSN	7	Adjusts vertical position of trace
A5R27	Y GAIN	7	Adjusts vertical gain of trace
A5R28	HF GAIN	3	Adjusts rise and fall times of Y deflection amplifier pulse
A6R16	XS	7	Adjusts horizontal (X) slow lines on graticule information
A6R17	XF	7	Adjusts horizontal (X) fast lines on graticule information
A6R18	YS	7	Adjusts vertical (Y) slow lines on graticule information

Table 2. Adjustable Components In Alpha-Numeric Order (2 of 3)

HP 85101B Display/Processor (Cont'd)			
Reference Designator	**Adjustment Name**	**Adjustment Procedure Number**	**Adjustment Function**
A6R19	YF	7	Adjusts vertical (Y) fast lines on graticule information
A6R20	X S&H	7	Adjusts horizontal sample and hold pulse
A6R21	Y S&H	7	Adjusts vertical sample and hold pulse
A7R49	LOW LINE SHOWDOWN	1	Factory set. Adjusts low line shutdown voltage
A8R16	+100V	2	Adjusts +100 Vdc supply voltage
A8R29	HV ADJUST	2	Adjusts CRT high voltage
HP 85102B IF Detector			
A5L4	X OUTPUT FILTERING	12	Minimizes higher order products from appearing at the X-component output
A5L5	X OUTPUT FILTERING	12	Minimizes higher order products from appearing at the X-component output
A5L6	Y OUTPUT FILTERING	12	Minimizes higher order products from appearing at the Y-component output
A5L7	Y OUTPUT FILTERING	12	Minimizes higher order products from appearing at the Y-component output
A6R51	CLOCK	13	Adjusts for a clock frequency of 20MHz
A7L4	X OUTPUT FILTERING	12	Minimizes higher order products from appearing at the X-component output
A7L5	X OUTPUT FILTERING	12	Minimizes higher order products from appearing at the X-component output
A7L6	Y OUTPUT FILTERING	12	Minimizes higher order products from appearing at the Y-component output
A7L7	Y OUTPUT FILTERING	12	Minimizes higher order products from appearing at the Y-component output
A9C6	20MHZ XTAL FILTER	10	Adjusts for minimum bandpass ripple
A9C7	20MHZ XTAL FILTER	10	Adjusts for minimum bandpass ripple
A9C8	20MHZ XTAL FILTER	10	Adjusts for minimum bandpass ripple
A10L1	100KHZ TUNED FILTER	11	Tunes the filter to 100 kHz
A11C6	20MHZ XTAL FILTER	10	Adjusts for minimum bandpass ripple
A11C7	20MHZ XTAL FILTER	10	Adjusts for minimum bandpass ripple

Table 2. Adjustable Components In Alpha-Numeric Order (3 of 3)

HP 85102B IF Detector (Cont'd)			
Reference Designator	**Adjustment Name**	**Adjustment Procedure Number**	**Adjustment Function**
A11C8	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A12L1	100KHZ TUNED FILTER	**11**	Tunes the filter to 100 kHz
A13C6	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A13C7	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A13C8	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A14C6	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A14C7	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A14C8	20MHZ XTAL FILTER	**10**	Adjusts for minimum bandpass ripple
A20R26	SWEEP ADC GAIN	**9**	Compensates for component tolerances in the staircase generation circuit.

Table 3. Adjustment Interdependence between Assemblies (1 of 2)

HP 85101B Display/Processor		
Assembly Replaced or Repaired	**Adjustment Procedure Number, If Replaced**	**Adjustment Procedure Number, If Replaced**
A2 Z Axis Amplifier	**6; 7** steps 1 thru 11 and 7 thru 12; **8**	**4; 5; 6; 7** steps 1 thru 11 and 7 thru 12; **8**
A3 High Voltage Regulator	**2; 6; 7** steps 1 thru 11 and 7 thru 12; **8**	**2; 6; 7** steps 1 thru 11 and 7 thru 12; **8**
A4 X Deflection Amplifier	**7** A4 adjustments only	**3** and **7** A4 adjustments only
A5 Y Deflection Amplifier	**7** A5 adjustments only	**3** and **7** A5 adjustments only
A6 Line Generator	**7**	**7**
A7 Switching Regulator	none	**1**
A8 Post Regulator	**2**	**2**
A9 Switching Power Supply Transformer	none	none
A10 Daughter Board	none	none
A11 Processor	none	none
A12 Not Assigned		
A13 Memory Board	none	none
A14 Display Generator	none	none
A15 I.O.	none	none
CRT	**2** thru **8**	none
HP 85102B IF Detector		
Assembly Replaced or Repaired	**Adjustment Procedure Number, If Replaced**	**Adjustment Procedure Number, If Replaced**
A1 Front Panel	none	none
A1A1 Front Panel Interface	none	none
A2-A4 Not Assigned		
A5 Test Synchronous Detector	**12**	**12**
A6 Clock	**13**	**13**
A7 Reference Synchronous Detector	**12**	**12**
A8 19.9 MHz L.O.	none	none
A9 B2 IF Mixer	**10**	**10**
A10 Test IF Amplifier	**11**	**11**
A11 B1 IF Mixer	**10**	**10**
A12 Reference IF Amplifier	**11**	**11**
A13 A2 IF Mixer	**10**	**10**
A14 A1 IF Mixer	**10**	**10**
A15 Regulator	none	none

Table 3. Adjustment Interdependence between Assemblies (2 of 2)

HP 85102B Display/Processor Cont'd)		
Assembly Replaced or Repaired	**Adjustment Procedure Number, If Replaced**	**Adjustment Procedure Number, If Replaced**
A16 Remote applications	none	none
A17 Sample and Hold	none	none
A18 ADC	none	none
A19 ADC Control	none	none
A20 Sweep ADC	**9**	**9**
A21 IF Counter	none	none
A22 Pretune	none	none
A23 Main Phase Lock	none	none
A24 Interface	none	none
A25 Motherboard	none	none
A26 Rectifier	none	none
HP 8511A, 8512A, 8513A, 8514A, 8514B, 8515A Test Sets		
These Sampler-based Test Sets have only one adjustment procedure and that is to adjust the Samplers for magnitude and phase tracking.		

Table 4. Test Equipment for HP 8510B Adjustments

Instrument	HP Model	Critical Specifications
Digital Multimeter	3466A	General Purpose Volt-Ohm Meter, 32mV to 300V ac and dc
Oscilloscope	1740A	50 Mhz, Dual Channel
Computer	Model 9000 Series 200 or 300	System with BASIC 2.0, 3.0 or 4.0
High Voltage Probe	34111A	1000 to 1 Divider 30 KV
Digital Multimeter	3466A	
Pulse Generator	8013B	35 ns to 1 sec.
Dual Power Supply	6205C	Dual 0 to 15V supply
Probe	10004D	10 to 1 divider probe
Spectrum Analyzer	8566A	100 KHz to 26.5 GHz HP-IB controlled
Counter	5343A Opt. 011	500MHz to 26.5 GHz
Function Generator	3325A	Fast Sweep, less than 10 msec
RF Source	8340A or 8350B or 83595A	500 MHz to 26.5 GHz, Plug-in Option 004 is recommended but not required
HP 8510 System Service Kit	08518-80008	See Service Section for Contents

Procedure 1. Low Line Shutdown Adjustment

DESCRIPTION

The low line sense comparator of the error detector circuit on the *A7 Switching Regulator Board*, uses +5 volts (± 0.2 volts) as a reference input. The following procedure selects a resistor value for the voltage divider of the comparator low line sense input to compensate for the variation of the +5V reference input. This comparator shuts down the instrument when the potential at the error detector drops below 94Vac.

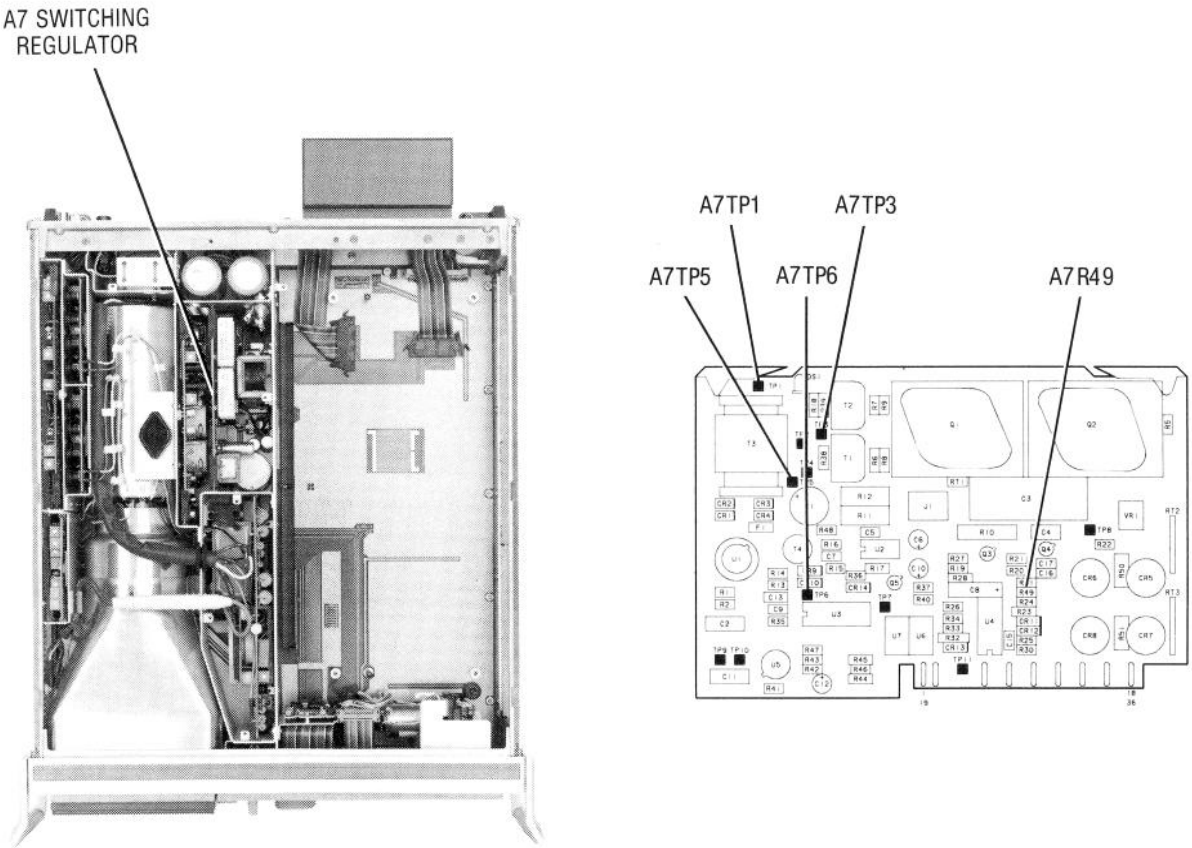


Figure 1. Location of Switching Regulator and Adjustment Points.

EQUIPMENT

Power Supply	HP 6205C
Digital Multimeter	HP 3466A

Procedure 1. Low Line Shutdown Adjustment (Cont'd)

ADJUSTMENTS

1. Turn the HP 85101B OFF and disconnect the ac line cord.
2. Wait at least one minute for capacitors to discharge to a safe level.

WARNING

Line voltages are present on the A7 assembly. Before removing the A7 assembly, be sure the ac line cord is disconnected, and to allow one minute for the capacitors to discharge to a safe level.

3. Remove top cover from the HP 85101B. Remove A7/A8 power supply safety cover. Remove the A7 assembly, disconnect the cable from A7J1, and place the A7 assembly on a non-conductive flat surface. Refer to Figure 1 for location of A7.
4. On the power supply select to use either the V1 OUTPUT (left power supply) or V2 OUTPUT (right power supply). Be sure the output is set at 0 volts. Connect the GND terminal to the negative (−) terminal.
5. Connect the power supply positive (+) terminal to A7TP5. Connect the power supply negative (−) terminal to A7TP1 (GND). Refer to Figure 1 for location of the test points.
6. Connect the digital multimeter positive lead to A7TP3 and the negative lead to A7TP1 (GND). Select dc volts.
7. Turn ON the power supply and digital multimeter. Set the power supply output voltage to 15V ±1.0V. The current should be less than 100 mA.
8. Note digital multimeter indication. It should be 9.0V ±0.4V. If it is not, refer to Section 8 for repair procedures before continuing in this section.
9. Connect digital multimeter positive (+) lead to A7TP6. Note digital multimeter indication. This is V(TP6). It should be 5.0V ±0.2V. If it is not, refer to Section 8 before proceeding.
10. Calculate the value for A7R49 using the following formula:

$$R49=[V(TP6) \times 261{,}000/(93.35 - V(TP6))] - 13{,}300$$

11. Replace R49, if necessary, with a value closest to the calculated value. Select a value from the list below. Refer to Replaceable Parts Section for HP Part Numbers.

    383 ohms, 909 ohms, 1.47k ohms, 1.96k ohms, 2.37k ohms

12. Reinstall the A7 assembly into the instrument. Replace the A7/A8 safety cover.
13. Reconnect the ac line cord to the HP 85101B.

Procedure 2. High Voltage and +100 Voltage Adjustment

DESCRIPTION

The CRT cathode voltage is adjusted in this procedure. The correct CRT cathode voltage is critical to the lifetime of the CRT filament. When the CRT cathode voltage has been properly set, the filament will also be at the correct voltage of 4.45V ± 0.05V RMS. The CRT cathode voltage is measured using the 1000:1 high-voltage divider probe. The accuracy of this high-voltage probe is checked by comparing a measurement of the +100 Vdc supply voltage using the standard probe against a measurement with the high voltage probe. Any measurement error due to use of the high-voltage probe is corrected for during the adjustment of the CRT cathode voltage. The assemblies involved are, *A3 High Voltage Regulator* and the *A8 Post Regulator*.

EQUIPMENT

Digital Voltmeter (DVM)	HP 3466
DC High-Voltage Probe (1000:1 divider)	HP 34111A

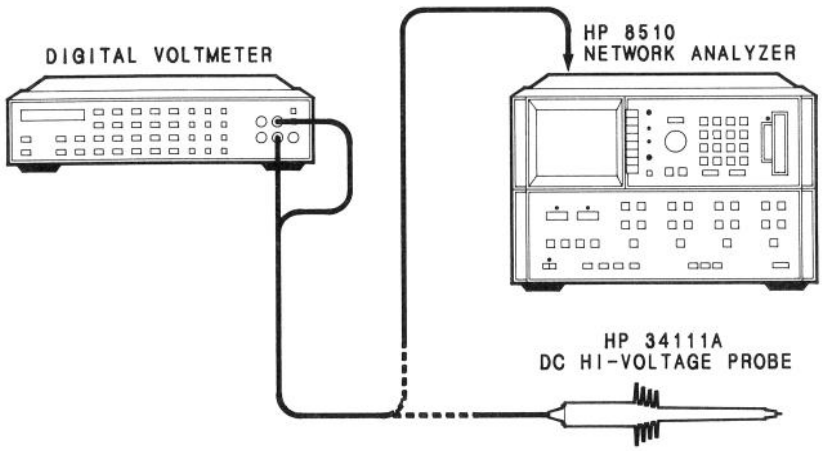


Figure 2. +100 Voltage and High Voltage Setup

Procedure 2. High Voltage and +100 Voltage Adjustment (Cont'd)

ADJUSTMENTS

1. Turn the HP 85101B display/processor OFF and disconnect the ac line cord.

WARNING

HAZARDOUS VOLTAGE! Line voltage present with line cord connected. Before removing safety cover, be sure instrument is OFF and line cord is disconnected.

2. Wait at least one minute for capacitors to discharge to a safe level.
3. Remove top cover from the HP 85101B. Remove A7/A8 power supply safety cover. Refer to Figure 3 for location).
4. Reconnect the ac line cord and turn the HP 85101B ON.
5. Hazardous voltages exist on the A7 Switching Regulator. Contact with this assembly could cause serious personal injury. Be careful. Connect the ground lead to A8TP7 (GND). Check the following five voltages at the test points indicated. If any voltage is not within the limits specified, see the Service Manual "Additional Tests" section for troubleshooting procedures before continuing in this section. Refer to Figure 3 for location of the test points.

Test Point	Voltage
A8 TP1 (+5V)	+5V ±0.2V
A8 TP2 (+12V)	+12V ±0.6V
A8 TP3 (−12V)	−12V ±0.6V
A8 TP5 (+15V)	+15V ±0.6V
A8 TP6 (−15V)	−15V ±0.6V

WARNING

In the following steps, it is necessary to probe voltages which, if contacted, could cause serious personal injury. Be extremely careful.

6. Connect the DVM with the standard probe to A8TP4 (+100V). Adjust A8R16 for a DVM indication of +100 volts ±2.0 volts. Refer to Figure 3 for location of A8TP4 and A8R16. Note DVM indication to four significant digits for use in step 10.
7. Set the DVM to 200mv range.
8. Connect the high-voltage probe to the DVM and to A8TP4 (+100V). Refer to Figure 2. Connect the ground lead to A8TP7 (GND).
9. Note DVM indication to four significant digits for use in step 10.

Procedure 2. High Voltage and +100 Voltage Adjustment (Cont'd)

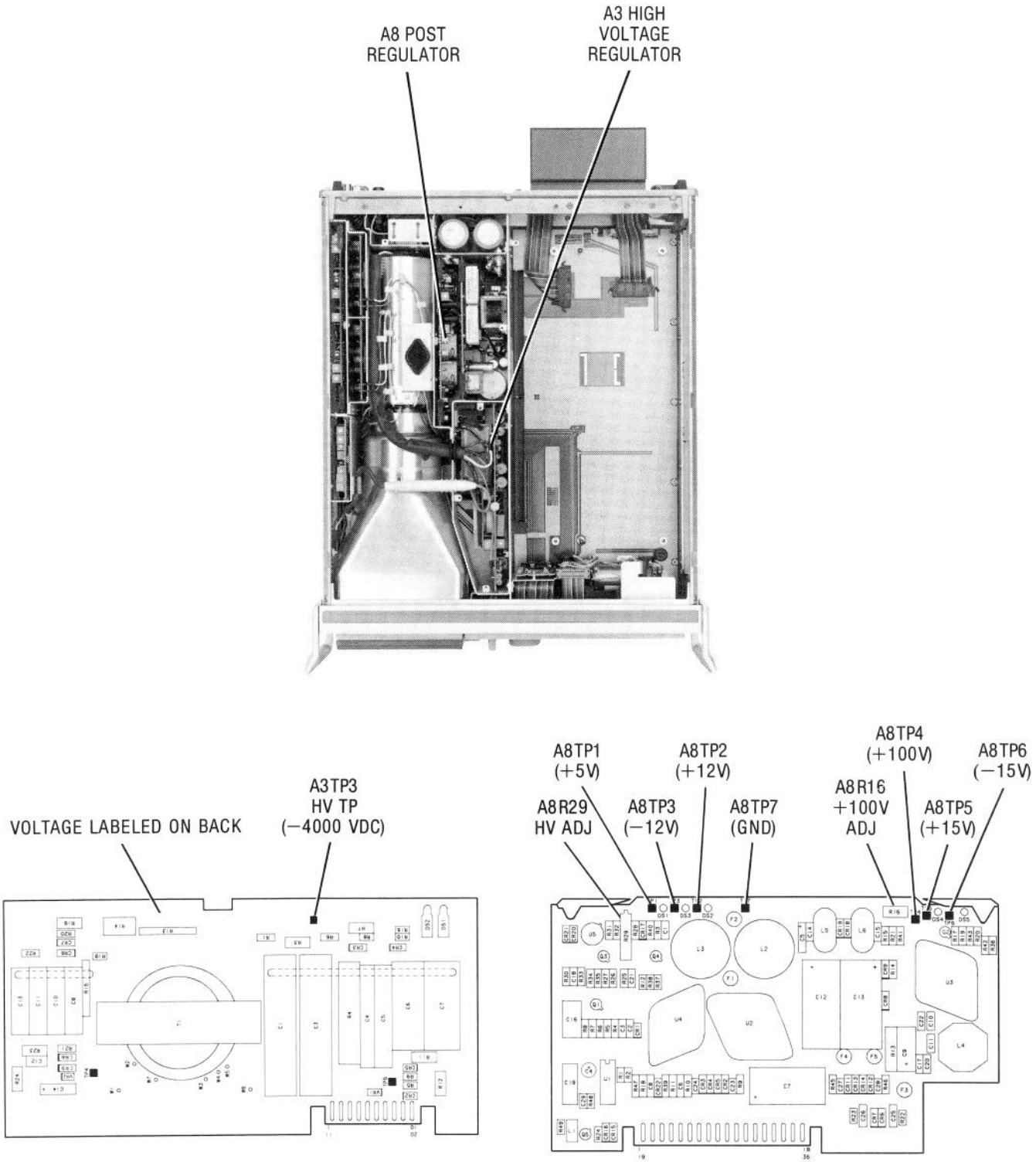


Figure 3. Location of +100 and High Voltage Adjustments

Procedure 2. High Voltage and +100 Voltage Adjustment (Cont'd)

10. Calculate the calibration factor using the following equation:

$$\text{Calibration Factor} = V_{\text{standard probe}}/(V_{\text{high voltage probe}} \times 1000)$$

The calibration factor is used to compensate for the high-voltage probe error.

11. Disconnect high-voltage probe from A8TP4.
12. Turn the HP 85101B OFF and remove the ac line cord.
13. Wait at least one minute for capacitors to discharge to a safe level.
14. Replace the A7/A8 power supply safety cover. Remove the A3 High Voltage Regulator safety cover. Refer to Figure 3 for location of A3.

WARNING

Do not, under any circumstances, remove the A3 High Voltage regulator board without referring to the discharge procedure in Service Section. Severe discharge hazard exists if the A3 board is not operating correctly and is removed from the instrument. If a problem is suspected with the A3 board, refer to the Service Section for the discharge procedure and troubleshooting before proceeding in this Section.

15. Reconnect the ac line cord and turn the HP 85101B ON.
16. Wait at least 30 seconds for the dc regulator circuits to stabilize.

WARNING

A3TP3 is at a voltage level of approximately −4000 Vdc when power is supplied to the instrument. Be extremely careful when probing A3TP3 to make the following adjustment. Be sure to connect the high-voltage probe ground lead to the instrument chassis in the following step; extreme hazard exits if the probe is not grounded.

17. Connect the high-voltage probe ground lead to the instrument chassis. While probing A3TP3 with the high-voltage probe, adjust A8R29 (High Voltage) for a DVM indication equal to the labeled voltage at the top of the A3 board, divided by the calibration factor calculated in step 10. Refer to Figure 3 for location of A3TP3 and A8R29.

$$\text{DVM indication} = \text{labeled voltage/calibration factor}$$

18. Turn the HP 85101B OFF and remove the ac line cord.
19. Wait at least one minute for capacitors to discharge to a safe level.
20. Replace the A3 High Voltage Regulator safety cover.
21. Reconnect the ac line cord and turn the instrument ON.

Procedure 3. X and Y Deflection Amplifier Pulse Response Adjustments

DESCRIPTION

This procedure adjusts the X and Y position, gain and high frequency gain resistors. This adjustment procedure should be performed only when there has been a board change of the *A4* or *A5 Deflection Amplifier Assemblies*.

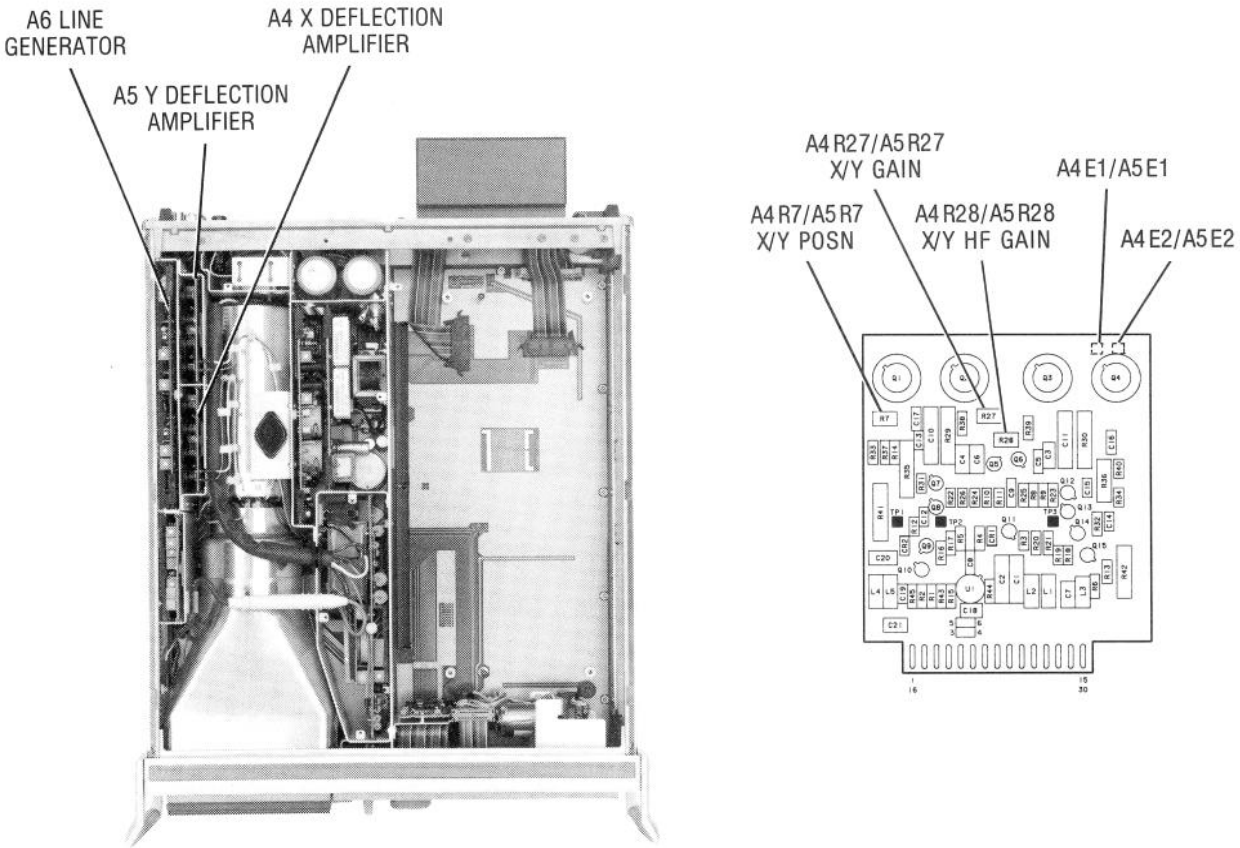


Figure 4. Location of X and Y Adjustments

CAUTION

Be sure not to allow a fixed spot of high intensity to remain on the HP 85101B display/processor CRT. A fixed spot of high intensity may permanently damage the phosphor coating of the CRT. Monitor the CRT closely during the following adjustment procedures, and if a spot occurs, move it off the screen by adjusting either the intensity or the horizontal or vertical deflection position controls.

Procedure 3. X and Y Deflection Amplifier Pulse Response Adjustments (Cont'd)

EQUIPMENT

NONE

ADJUSTMENTS

NOTE: The A4 and A5 assemblies are identical. In the following procedure, all references to the A4 can be substituted with the A5. It is necessary to perform the following procedure **only** for the board that was replaced.

1. Turn off the HP8510 line voltage and install the A4 board.
2. Preset: POS to center, GAIN to center and HFGAIN Fully counter clockwise. See Figure 4 for the location of these adjustments.
3. Turn on the HP8510 while holding down any HP85101B front panel key.
4. Press **[=Marker]** to get the HP8510 Self-test menu.
5. Press **[22] [=Marker]** to get the HP8510 Test menu.
6. Press **[1] [=Marker]** to get the HP85101 Test menu.
7. Press **[3] [=Marker]** to get the Display Section Tests menu.
8. Press **[4] [=Marker]** to get the X and Y Amplitude, Gain Position test.
   See Figure 5.
   Adjust resistors labelled "POS" and "GAIN" to properly center and expand/contract the width/height of the display, depending on whether you are adjusting an A4 or A5 board. See Figure 6.
9. Press **[=Marker] [6] [=Marker]**
   Reset the resistors labelled "HFGAIN" fully counter clockwise. Notice the "ripple" on the left or bottom half of the vertical lines (depending on whether you are adjusting an A4 or A5 board). Slowly turn the resisitor clockwise until the ripple **just** disappears. See Figure 7
10. Press **[=Marker] [1] [=Marker]**
    Check the overall display quality. Re-adjust where necessary. See Figure 8.

Procedure 3. X and Y Deflection Amplifier Pulse Response Adjustments (Cont'd)

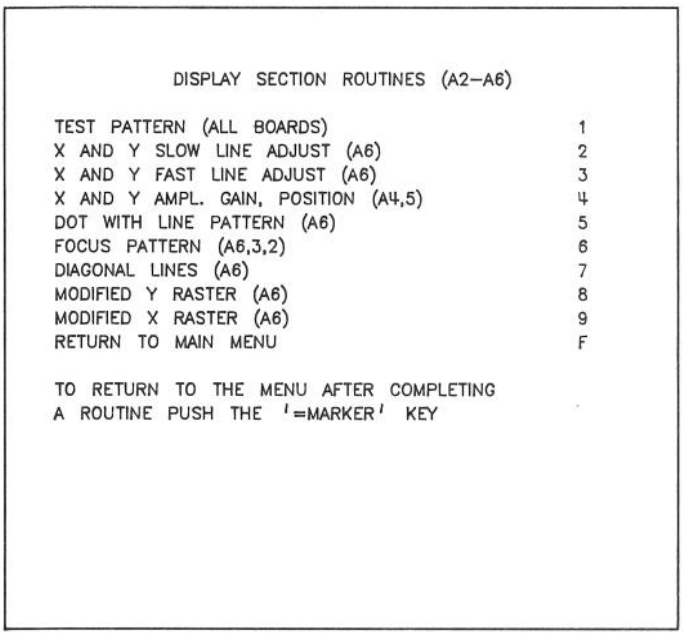


Figure 5. Test Menu

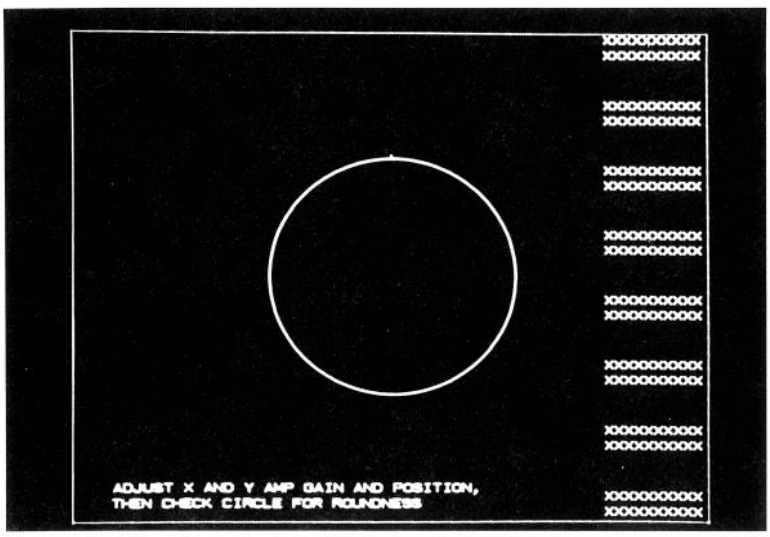


Figure 6. X and Y AMPL. GAIN, POSITION Display

Procedure 3. X and Y Deflection Amplifier Pulse Response Adjustments (Cont'd)

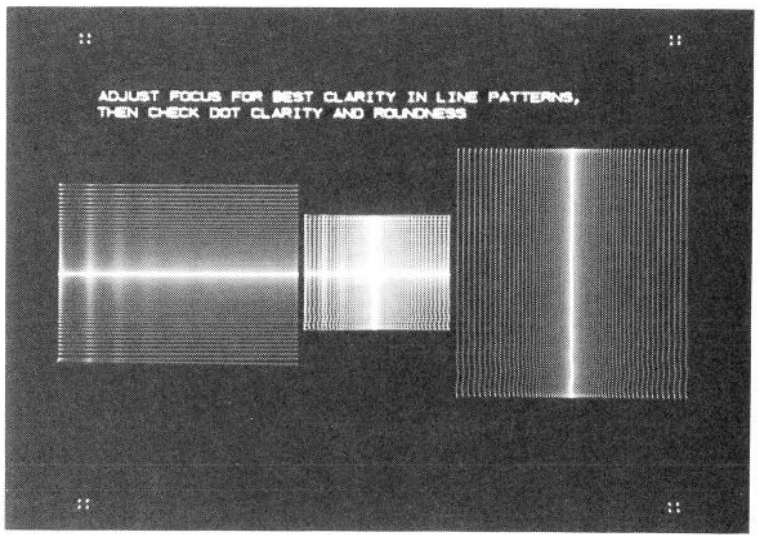


Figure 7. HF GAIN Adjustment

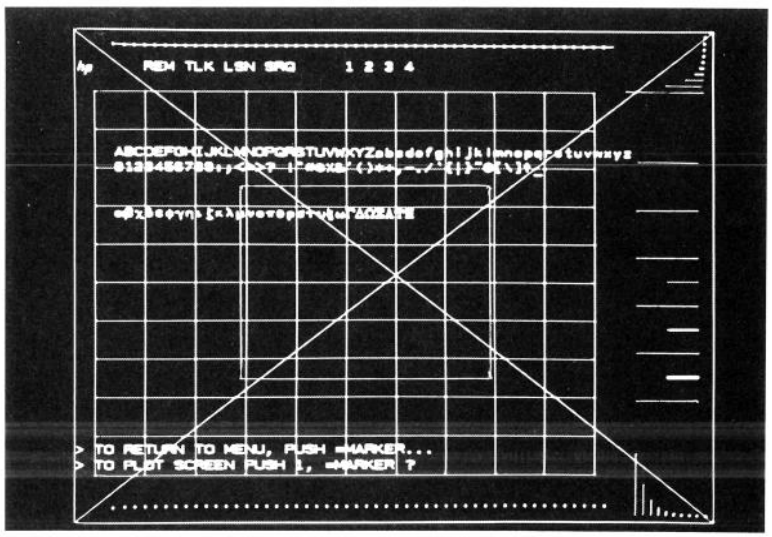


Figure 8. TEST PATTERN Display

Procedure 4. Z Axis Amplifier Pulse Response Adjustments

DESCRIPTION

This adjustment procedure minimizes the overshoot and optimizes the rise and fall times of the Control Gate Amplifier pulse. The Control Gate Amplifier blanks the CRT when its output drops to a few volts. For accuracy, it is necessary to calibrate the pulse generator, oscilloscope, and probes before making any adjustments to the *A2 Z Axis Amplifier Board.*

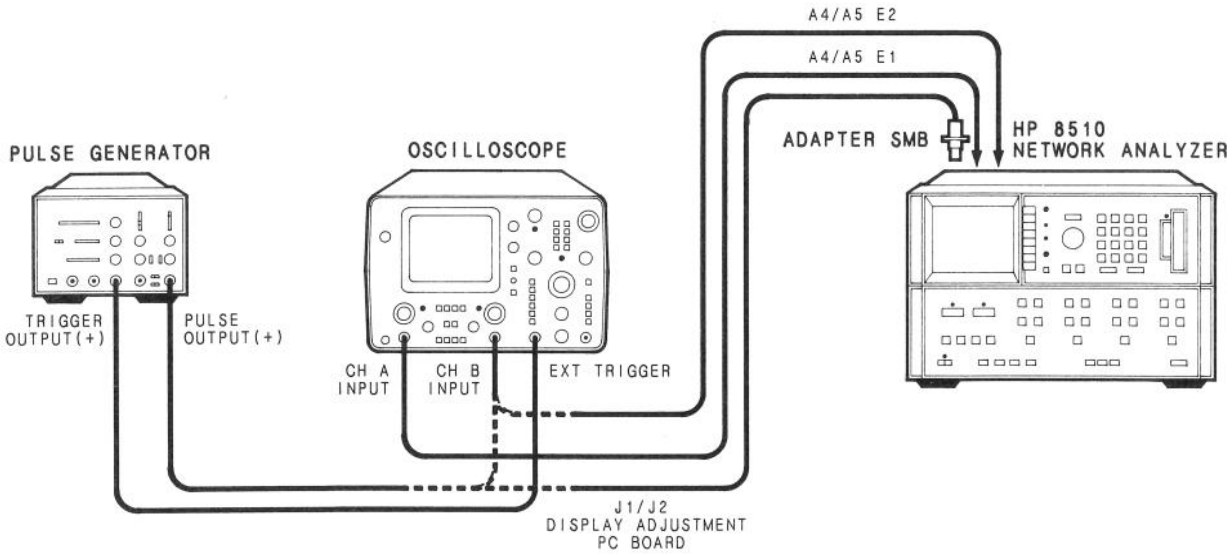


Figure 9. Z Axis Amplifier Adjustment Setup

EQUIPMENT

Oscilloscope	HP 1740A
Pulse Generator	HP 8013B
10:1 Divider Probe (2 Required)	HP 10004D
*Display Adjustment PC Board	85101-60035
*Adapter, F BNC to F Snap-On	1250-1236

*These may be found in the Service Kit

Procedure 4. Z Axis Amplifier Pulse Response Adjustments (Cont'd)

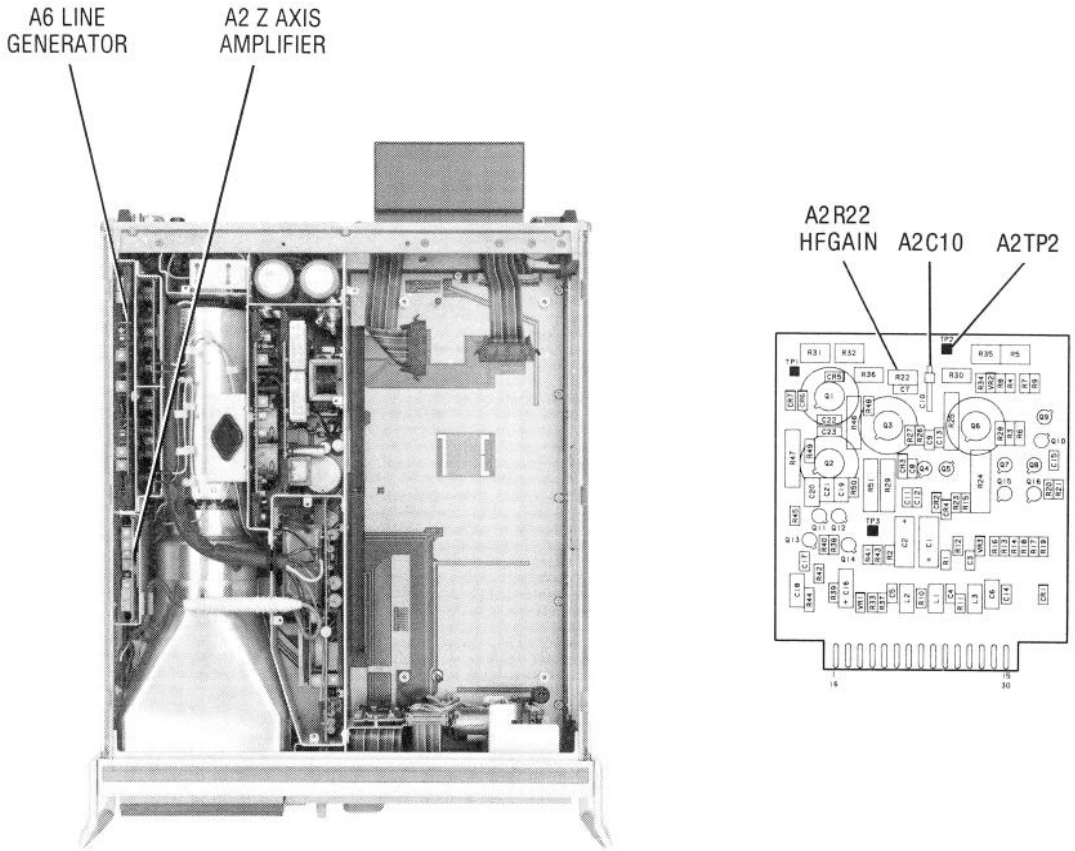


Figure 10. Location of Z Axis Amplifier Adjustments

Procedure 4. Z Axis Amplifier Pulse Response Adjustments (Cont'd)

ADJUSTMENTS

1. Connect one 10:1 divider probe to the oscilloscope Channel A input and one to the Channel B input.

2. Set oscilloscope controls as follows:

MAIN pushbutton	IN
DLY'D pushbutton	OUT
MIXED pushbutton	OUT
MAIN INT/EXT	INT
MAIN TIME/DIV	.2 msec
VOLTS/DIV	
Channel A	.02
CAL	Fully Clockwise
Channel B	.02
CAL	Fully Clockwise

3. Connect Channel A probe to the oscilloscope 1V calibrator. Select Channel A display. Adjust probe compensation for optimum square wave display on the oscilloscope CRT. Disconnect the probe from calibrator.

4. Connect Channel B probe to the oscilloscope 1V calibrator. Select Channel B display. Adjust probe compensation for optimum square wave display on the oscilloscope CRT. Disconnect the probe from calibrator.

NOTE: Each probe is now compensated for the oscilloscope input to which it is connected; do not interchange probes without recalibrating.

5. Mark the probe connected to Channel A input, and disconnect both 10:1 probes from the oscilloscope. Using two BNC cables, connect the TRIG OUTPUT (+) and OUTPUT (+) of the Pulse Generator to the EXT TRIGGER (MAIN) and CH A INPUT respectively of the Oscilloscope.

6. Set instrument controls as follows:

Pulse Generator:

Pulse Period	1 us-0.1ms
Vernier	Midrange
Pulse Delay	35 ns
Vernier	Midrange
Pulse (Switch)	Norm
Pulse Width	10 ns-1us
Vernier	Midrange
Amplitude Vernier Range (+ Output)	2-4V
Offset	OFF
INT.LOAD	OUT
NORM/COMP	NORM

Procedure 4. Z Axis Amplifier Pulse Response Adjustments (Cont'd)

Oscilloscope:

MAIN pushbutton	IN
DLY'D pushbutton	OUT
MIXED pushbutton	OUT
Delayed Trigger Level	Fully CCW
Main TIME/ DIV	1 usec
Vernier	CAL
Trigger Holdoff	Fully CCW
Main INT/EXT	EXT
Main AC/DC	DC
Delay	.05 usec
VOLTS/DIV	
Channel A	.5
Display	A
Trigger	A
All Other Pushbuttons	OUT

7. Adjust the oscilloscope Main Trigger Level for a stable display. Adjust the Pulse Period Vernier so that pulses are approximately 5 divisions (5 us) apart.

8. Adjust the Amplitude Vernier on the pulse generator for a 2V peak-to-peak signal.

9. Adjust the Delay dial for an intensified area over the center pulse. If intensified area is not visible, decrease the intensity of display.

10. Push the DLY'D pushbutton IN and MAIN pushbutton OUT.

11. Adjust the Delay dial and Horizontal position to set the rising edge of the pulse on the first vertical graticule.

12. Adjust the pulse generator Pulse Width Vernier for a pulse width of 5 divisions (250 ns). Remove BNC cables and reconnect 10:1 divider probes to the oscilloscope Channel A and Channel B inputs. At this point, the pulse generator, oscilloscope, and probes are calibrated.

13. With the HP 85101B OFF and the ac line cord disconnected, remove the A6 Line Generator from the instrument, and install the Display Adjustment PC Board in place of the A6. Set switch on the Display Adjustment PC Board to the DOWN position. Refer to Figure 10 for location of the A6 assembly.

Procedure 4. Z Axis Amplifier Pulse Response Adjustments (Cont'd)

14. Set instrument controls as follows:

Pulse Generator

Pulse Period	1 µs-0.1 ms
Vernier	Midrange
Pulse Delay	35 ns
Vernier	Midrange
Pulse (Switch)	Norm
Pulse Width	10 ns-1 µs
Vernier	Midrange
Amplitude Vernier Range(+ Output)	2-4V
Offset	OFF
INT.LOAD	OUT
NORM/COMP	NORM

Oscilloscope

MAIN pushbutton	IN
DLY'D pushbutton	OUT
MIXED pushbutton	OUT
Delayed Trigger Level	Fully CCW
Main TIME/ DIV	1 µsec
Vernier	CAL
Trigger Holdoff	Fully CCW
Main INT/EXT	EXT
Main AC/DC	DC
Delay	0.05 usec
VOLTS/DIV	
Channel A	1
Channel B	1
Trigger	A
All Other Pushbuttons	OUT

15. Reconnect the ac line cord and turn the instrument ON.

16. Adjust A4R7 X POSN and A5R7 Y POSN to place the HP 85101B CRT beam off the CRT. Refer to Figure 4 for location of A4R7 and A5R7.

17. Connect the pulse generator output to Channel B. Select Channel B on the oscilloscope. Adjust the pulse generator Amplitude Vernier for a 4V peak-to-peak output pulse shown on the oscilloscope display. Be sure the pulse generator trigger output is connected to the oscilloscope EXT TRIGGER. Refer to Figure 9.

18. Connect Channel A probe to A2TP2. Refer to Figure 10 for location of A2TP2. Connect the adapter (from the Service Kit) to J3 (Z input) on the Display Adjustment PC Board. Disconnect the output of the pulse generator from Channel B and connect to the adapter on J3. Refer to Figure 9.

19. Set the HP 85101B INTENSITY front panel control fully clockwise. Select Channel A display on the oscilloscope.

20. Note display on the oscilloscope CRT. Pulse should be at least 55V peak-to-peak.

Procedure 4. Z Axis Amplifier Pulse Response Adjustments (Cont'd)

21. **Oscilloscope**

VOLTS/DIV	
Channel A	1
Display A	
Channel A Couple	AC
TIME/DIV	0.05 µs

22. Adjust Channel A VOLTS/DIV CAL for a full eight division display.

23. Measure the rise and fall times of the pulse between the 10% and 90% points by noting where the trace crosses the first and seventh horizontal graticule lines.

24. Adjust A2R22 HF GAIN and A2C10 for minimum overshoot and minimum rise and fall times. Refer to Figure 10 for location of adjustments.

25. Rise time should be less than or equal to 50 ns. Fall times should be less than or equal to 90 ns. Overshoot should be less than 5% (0.4 divisions).

26. Connect the pulse generator output to Channel B. Select Channel B on oscilloscope. Adjust pulse generator Amplitude Vernier for a 2.5V pulse peak-to-peak.

27. Connect the pulse generator to J3 on the Display Adjustment PC Board. Select Channel A on oscilloscope. Set Channel A VOLTS/DIV to 1 and select DC COUPLE. Adjust Channel A VOLTS/DIV CAL fully clockwise. Note pulse display. Pulse should be greater than 55V peak-to-peak.

28. Set the switch on the Display Adjustment PC Board UP.

29. Connect the pulse generator output to Channel B. Select Channel B on the oscilloscope. Adjust pulse generator Amplitude Vernier for a 2V peak-to-peak pulse output.

30. Connect the pulse generator output to J3 on the Display Adjustment PC Board. Select Channel A on oscilloscope. Note oscilloscope display. The top of the pulse should be at approximately 80V, and the peak-to-peak amplitude should be greater than 40V.

31. Set Channel A VOLTS/DIV to 0.5 and select Channel A AC COUPLE. Adjust Channel A VOLTS/DIV CAL for a full eight divisions display.

32. Measure the rise and fall times of the pulse between 10% and 90% by noting where the trace crosses the first and seventh horizontal graticule lines.

33. Rise and fall times should be less than 100 ns.

34. Set Channel A VOLTS/DIV to 1 and CAL fully clockwise. Select DC COUPLE.

35. Set the HP 85101B INTENSITY front panel control fully counterclockwise. Note oscilloscope display.

36. Pulse amplitude should be less than 1V peak-to-peak. DC level of signal should be less than 45V.

37. Turn the HP 85101B OFF and disconnect the ac line cord. Remove the Display Adjustment PC Board and reinstall the A6 assembly into the instrument.

38. Perform **Procedure 3**, to readjust the X and Y position for a full screen display.

Procedure 5. Focus Gain Coarse Adjustment

DESCRIPTION

The following procedure is a preliminary coarse adjustment to bring the focus into an acceptable setting when the *A2 Z Axis Amplifier Assembly,* has been replaced. The adjustments are to the Focus Gate Amplifier, which supplies a correction voltage to the focus grid of the CRT to compensate for the defocusing effects with varying intensity levels.

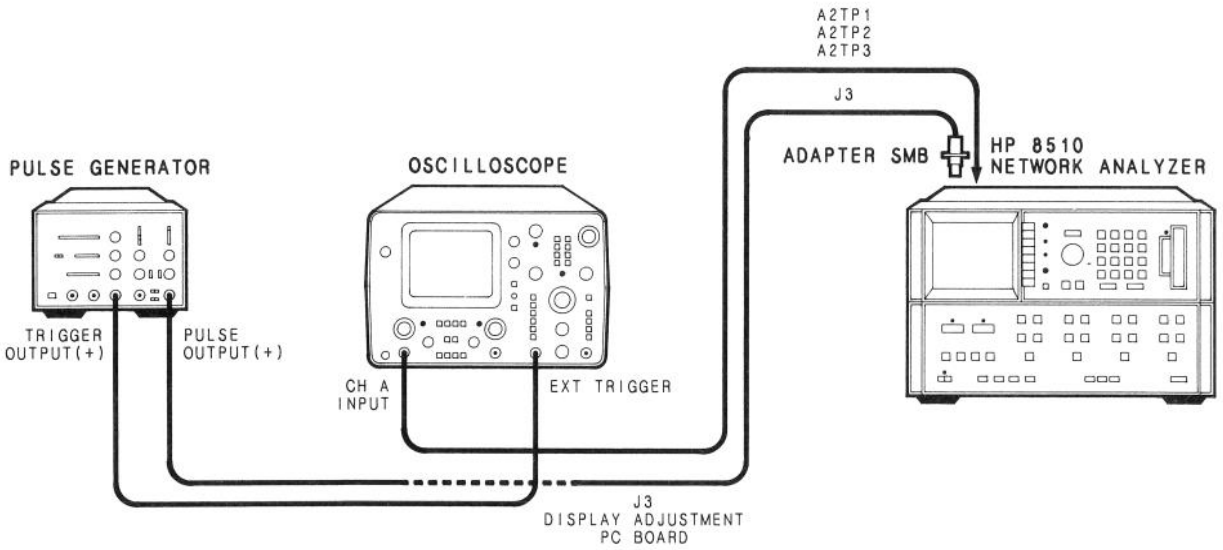


Figure 11. Focus Gain Coarse Adjustment Setup

EQUIPMENT

Oscilloscope	HP 1740A
*Service Extender Board	85101-60041
10:1 Divider Probe	HP 10004D
*Display Adjustment PC Board	85101-60035
Pulse Generator	HP 8013B
*Adapter, F BNC to F Snap-On	1250-1236

*These may be found in the Service Kit

CAUTION

Never turn the HP 85101B ON with the A2 Z Axis Amplifier not installed, or remove the A2 board while power is supplied to the instrument. Damage will occur to the instrument.

Procedure 5. Focus Gain Coarse Adjustment (Cont'd)

ADJUSTMENTS

1. Turn the HP 85101B OFF and disconnect the ac line cord. Remove the A2 Z Axis Amplifier from the instrument and install it on an extender board (from the Service Kit). Remove the A6 Line Generator and replace it with the Display Adjustment PC Board. Set the switch on the Display Adjustment PC Board UP.

2. Reconnect the ac line cord and turn the instrument ON.

3. Connect Channel A probe to A2TP1. Connect the adapter to J3 on the Display Adjustment PC Board, then connect the pulse generator output to the adapter. Refer to Figure 11. Refer to Figure 12 for location of A2TP1.

4. Set instrument controls as follows:

Pulse Generator

Pulse Period	1 μs-0.1 ms
Vernier	Midrange
Pulse Delay	35 ns
Vernier	Midrange
Pulse (Switch)	Norm
Pulse Width	10 ns-1 μs
Vernier	Midrange
Amplitude Vernier Range(+ Output)	2-4V
Offset	OFF
INT.LOAD	OUT
NORM/COMP	NORM

Oscilloscope

MAIN pushbutton	IN
DLY'D pushbutton	OUT
MIXED pushbutton	OUT
Delayed Trigger Level	Fully CCW
Main TIME/ DIV	0.05 us
Vernier	CAL
Trigger Holdoff	Fully CCW
Main INT/EXT	EXT
Main AC/DC	DC
Delay	OFF
VOLTS/DIV	
Channel A	2
A	Trigger
OUT	All Other Pushbuttons

5. Set A2R30 FOCUS GAIN and A2R35 INTENSITY LIMIT fully counterclockwise. Set A2R5 INTENSITY GAIN fully clockwise.

Procedure 5. Focus Gain Coarse Adjustment (Cont'd)

6. Adjust the HP 85101B front panel FOCUS control through its full range while monitoring oscilloscope display. DC level should vary from greater than +80V to less than +10V. Reset front panel FOCUS control to mid-range.
7. Connect Channel A probe to A2TP3. Set the HP 85101B front panel INTENSITY control fully clockwise. Set Channel A VOLTS/DIV to 0.05. Refer to Figure 12 for location of A2TP3.
8. Adjust A2R30 FOCUS GAIN to approximately 1V peak-to-peak pulse display on oscilloscope. Refer to Figure 12 for location of A2R30.
9. Connect Channel A probe to A2TP1. Set Channel A VOLTS/DIV to 1. Oscilloscope should display a pulse approximately 30 volts peak-to-peak. Refer to Figure 12 for location of A2TP1.
10. Set the HP 85101B front panel INTENSITY control fully counterclockwise.
11. Adjust the HP 85101B front panel FOCUS control for a dc level of +50V on oscilloscope.
12. Turn HP 85101B OFF and disconnect the ac line cord. Remove the extender board and reinstall the A2 assembly into the instrument. Reinstall the A6 assembly in place of the Display Adjustment PC Board.
13. Reconnect the ac line cord and turn the instrument ON.

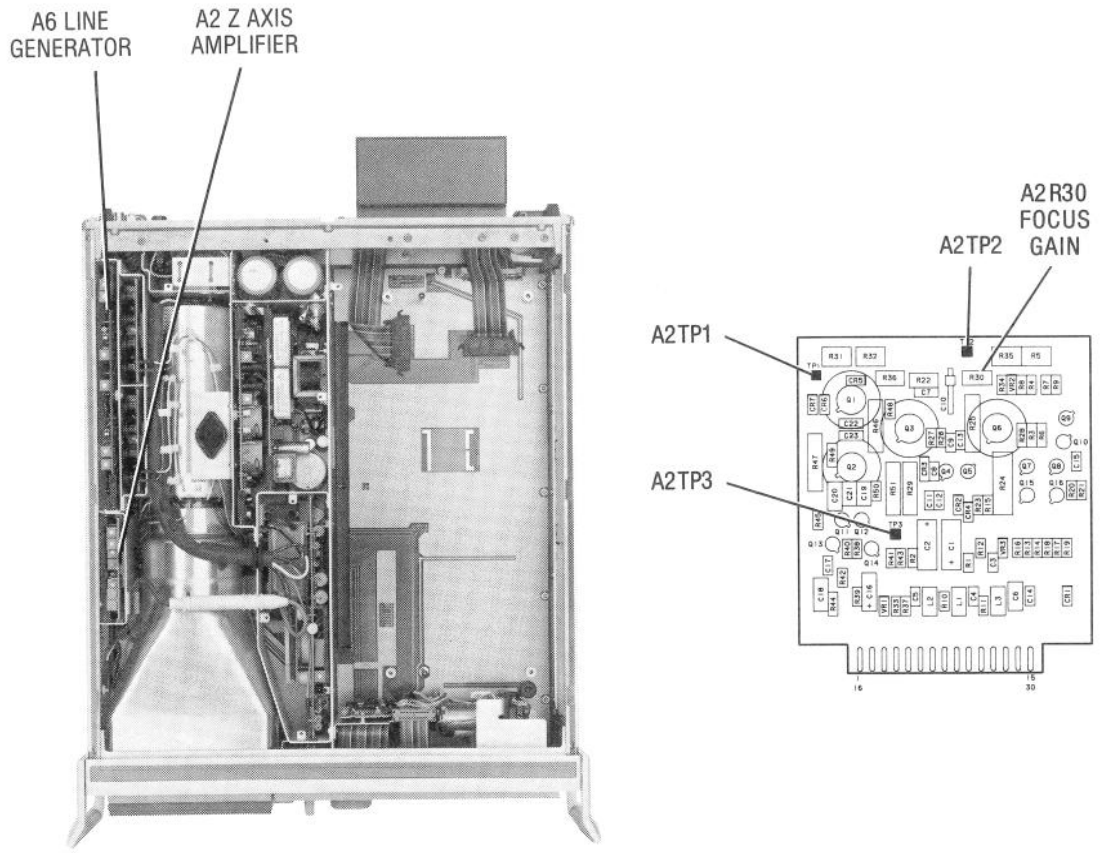


Figure 12. Location of Focus Gain Adjustment

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Procedure 6. Intensity Adjustments

DESCRIPTION

The following procedure sets the adjustment range of the HP 85101B front panel INTENSITY control, by adjusting the *A2 Z Axis Amplifier* Board, while monitoring the voltage at A3TP5. The voltage at A3TP5 should be within a specific range to insure maximum life of the CRT.

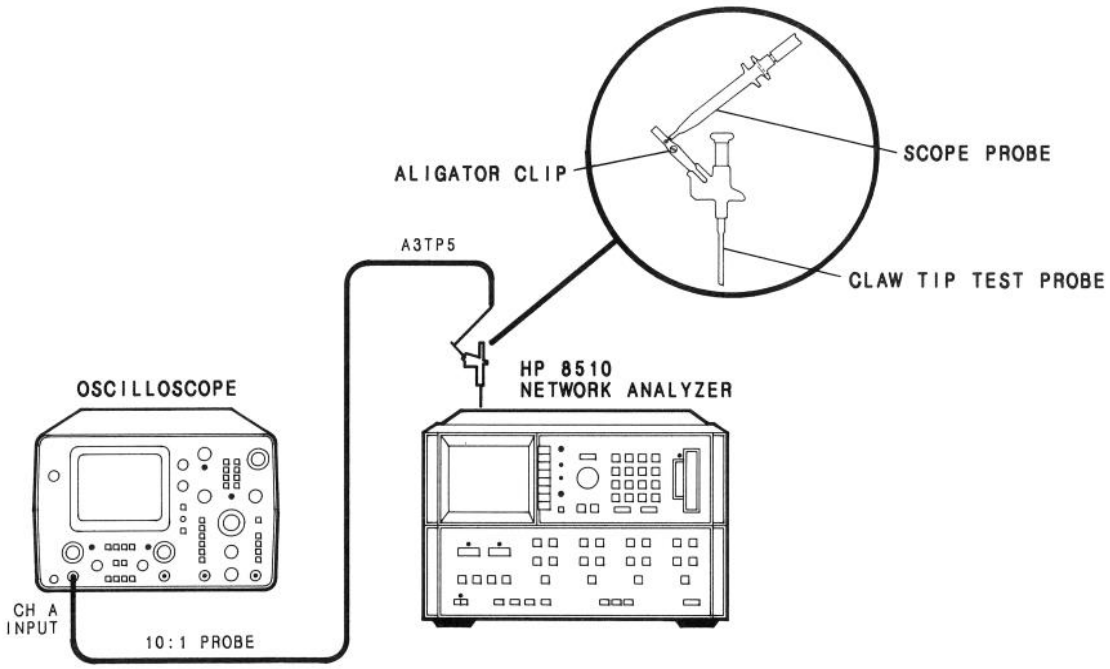


Figure 13. Intensity Adjustment Setup

EQUIPMENT

Oscilloscope	HP 1740A
10:1 Divider Probe	HP 10004D
*Claw Tip-Test Probe	1490-0025
*Alligator clip	1400-0088

*These may be found in the Service Kit

Procedure 6. Intensity Adjustments (Cont'd)

ADJUSTMENTS

1. Turn the HP 85101B OFF and remove the ac line cord.
2. Wait at least one minute for capacitors to discharge to a safe level.
3. Remove the A3 High Voltage Regulator safety cover.

WARNING

Do not, under any circumstances, remove the A3 High Voltage regulator board without referring to the discharge procedure described in the Service Section. Severe discharge hazard exists if the A3 board is not operating correctly and is removed from the instrument.

4. Do **NOT** remove the A3 assembly to perform the following procedure. Connect the Claw Tip-Test Probe to A3TP5. Refer to Figure 14 for location of A3TP5. It may be necessary to use a flashlight to locate A3TP5 in the instrument. Connect oscilloscope Channel A calibrated 10:1 probe to the Claw Tip-Test Probe using an alligator clip to make the connection. Refer to Figure 13. A3TP5 may be at a voltage level of up to +100 Vdc when power is supplied to the instrument. **Be careful.**
5. Reconnect the ac line cord and turn the instrument ON.
6. Wait at least 30 seconds for dc regulator circuits to stabilize.
7. To access the DISPLAY ADJUSTMENTS, press the **[SYSTEM]** key on the HP 85102B Auxiliary Menu.
8. Press **[MORE] [SERVICE FUNCTION]** keys on the HP 85101B screen.
9. Press the **[TEST MENU]** key on the HP 85101B screen.
10. Press the **[2]** entry key **twice** and then press **[= MARKER]** to access the SERVICE PROGRAM.
11. Press the **[1]** entry key, then press **[= MARKER]** to select the HP 85101B DISPLAY/PROCESSOR TESTS.
12. Press the **[3]** entry key, then press **[= MARKER]** to select the DISPLAY SECTION BOARDS.
13. Press the **[8]** entry key, then press **[= MARKER]** to select the MODIFIED Y RASTER on the display Section menu (refer to Figure 15).

Procedure 6. Intensity Adjustments (Cont'd)

14. Adjust the HP 85101B front panel INTENSITY control fully counterclockwise. Adjust A2R35 INTENSITY LIMIT clockwise until a display on the HP 85101B CRT is just visible. Refer to Figure 14 for location of A2R35.

NOTE: Intensity Limit should have enough range to turn the display on and off. If the display is always off, increase the value of A2R9. If the display is always on, decrease the value of A2R9. Increase or decrease A2R9 one value at a time. The range of values for A2R9 is 2.87k ohms to 6.19k ohms. Refer to the Replaceable Parts Section for specific values and HP Part Numbers. Refer to Figure 14 for location of A2R9.

15. Adjust A2R35 INTENSITY LIMIT until the display on the HP 85101B just disappears.

16. Set Channel A VOLTS/DIV to 2 and TIME/DIV to 10 μs.

17. Measure A3TP5 peak-to-valley voltage on the oscilloscope (refer to Figure 16a). This voltage is VCO and should be between 45 V_{pv} and 75 V_{pv}. This voltage should be noted for use in step 21.

18. Adjust A2R35 clockwise until the display on the HP 85101B is just visible.

19. Adjust A2R5 INTENSITY GAIN fully clockwise. Adjust A2R35 INTENSITY LIMIT until the HP 85101B display is just **not** visible. Refer to Figure 14 for location of A2R5.

20. Set oscilloscope Channel A VOLTS/DIV to 1.

Procedure 6. Intensity Adjustments (Cont'd)

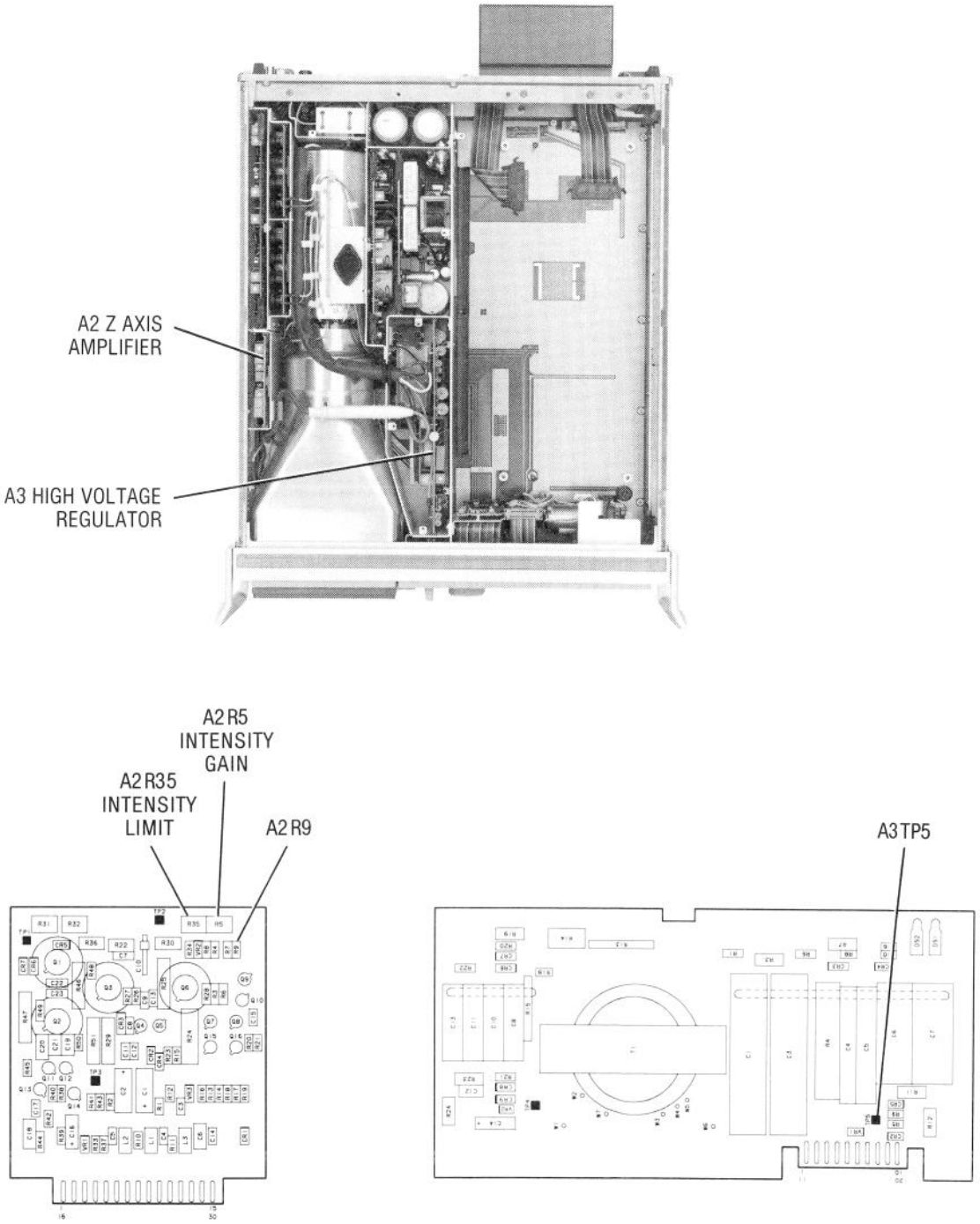


Figure 14. Location of Intensity Limit Adjustments.

Procedure 6. Intensity Adjustments (Cont'd)

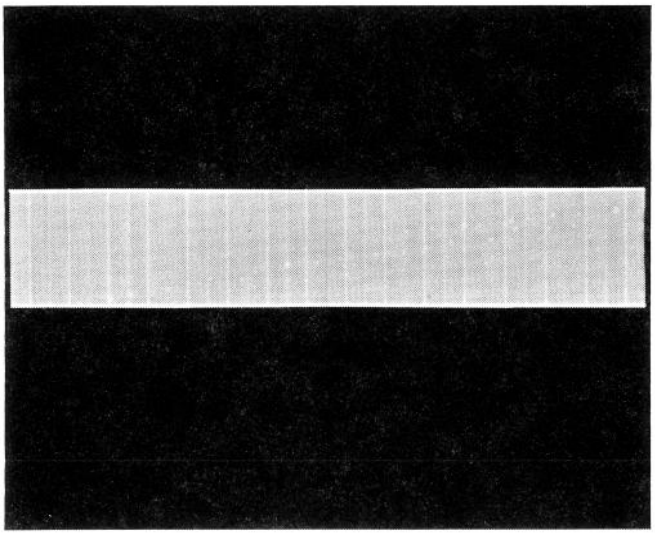


Figure 15. MODIFIED Y RASTER Display

21. Slowly adjust the HP 85101B front panel INTENSITY control through its range while monitoring A3TP5 on the oscilloscope. The minimum peak-to-valley voltage is V_{LIMIT}. Refer to Figure 16b. DO NOT allow V_{LIMIT} to drop below [(VCO) − 50V] or [12 V_{pv}], whichever is greater.

    If this limit is exceeded:
    a. Turn the HP 85101B front panel INTENSITY control fully counterclockwise.
    b. Turn instrument OFF and disconnect ac line cord.
    c. Increase the value of A2R9.
    d. Return to step 5.

22. Turn the HP 85101B OFF and disconnect the ac line cord.

23. Wait at least one minute for capacitors to discharge to a safe level.

24. Remove the Claw Tip-Test Probe from A3TP5. Replace the A3 safety cover.

25. Reconnect the ac line cord and turn the instrument ON.

Procedure 6. Intensity Adjustments (Cont'd)

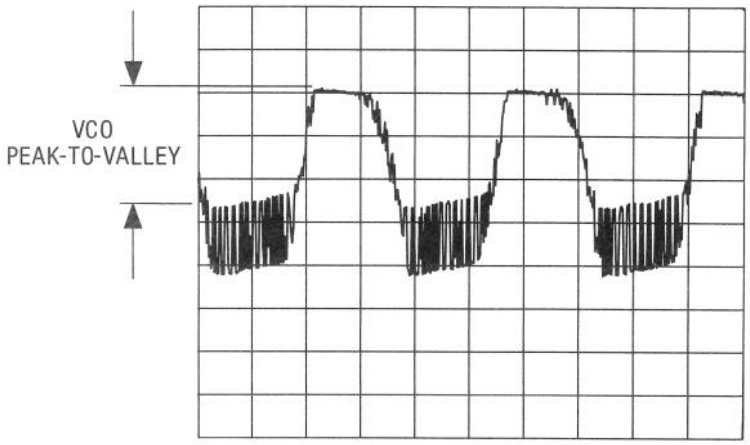


Figure 16a. Intensity Adjustment Waveform

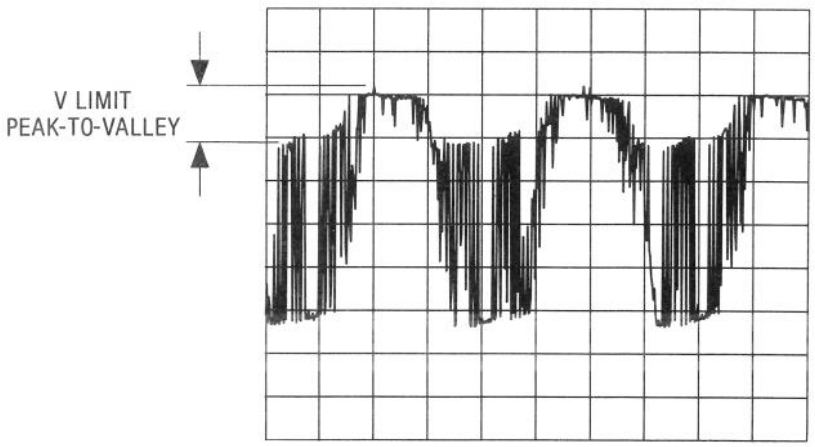


Figure 16b. Intensity Adjustment Waveform

Procedure 7. CRT Display Adjustments

DESCRIPTION

The following procedures adjust the CRT display for proper focus, horizontal, vertical, fast line, slow line and pattern characteristics. These adjustments should be performed as routine maintenance, or when a board has been replaced.

EQUIPMENT

NONE

ADJUSTMENTS

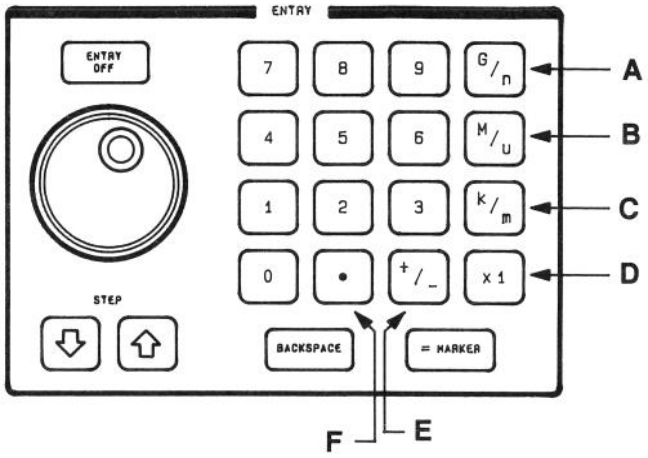
1. Access the Display Adjustment Routines as per **Procedure 6** steps 7 through 12.
2. The DISPLAY SECTION ROUTINES menu will be displayed (refer to Figure 18).

NOTE: Return to appropriate Section at this point, or continue in this Section.

Focus Adjustment

3. Press **[6]** entry key, then **[= MARKER]** to select FOCUS PATTERN on the menu. A pattern as shown in Figure 20 will be displayed.
4. Center the HP 85101B front panel FOCUS control.

Procedure 7. CRT Display Adjustments (Cont'd)



The HP 85101B front panel ENTRY keyboard is based upon a Hexadecimal format. The "A" through "F" Hexidecimal keys are shown above.

Figure 16c. HP Front Panel ENTRY Keyboard

Procedure 7. CRT Display Adjustments (Cont'd)

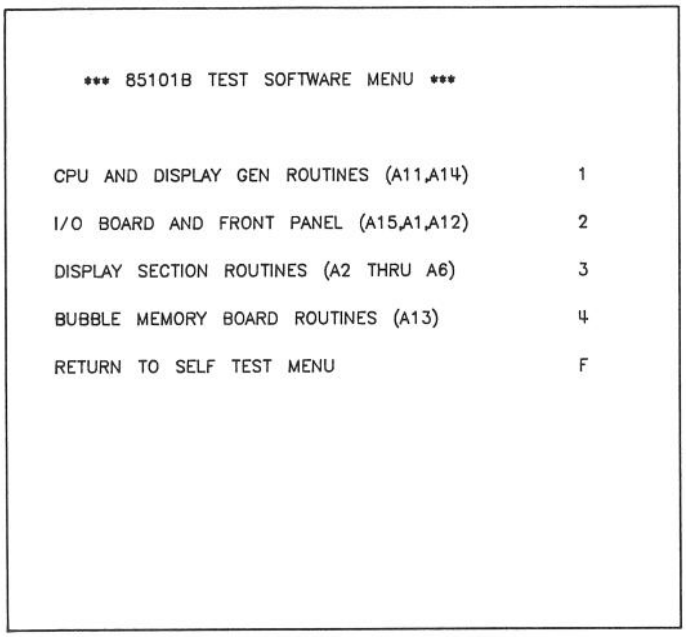


Figure 17. HP 85101B Test Software Menu

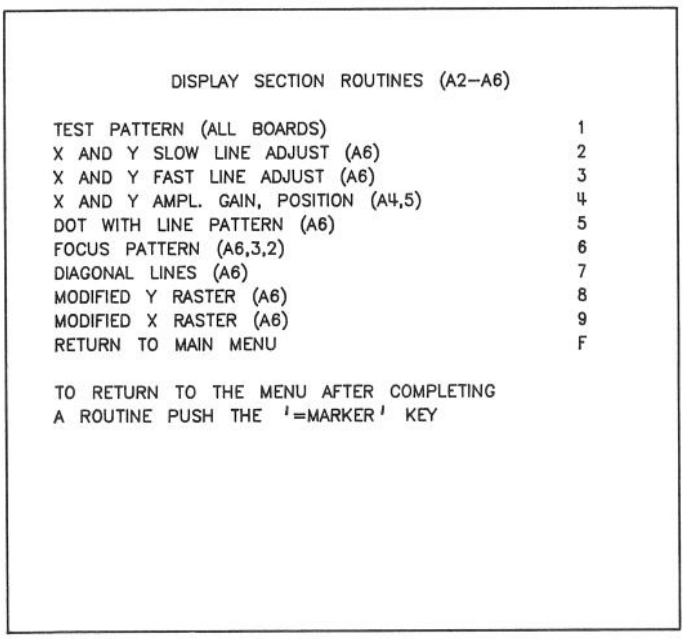
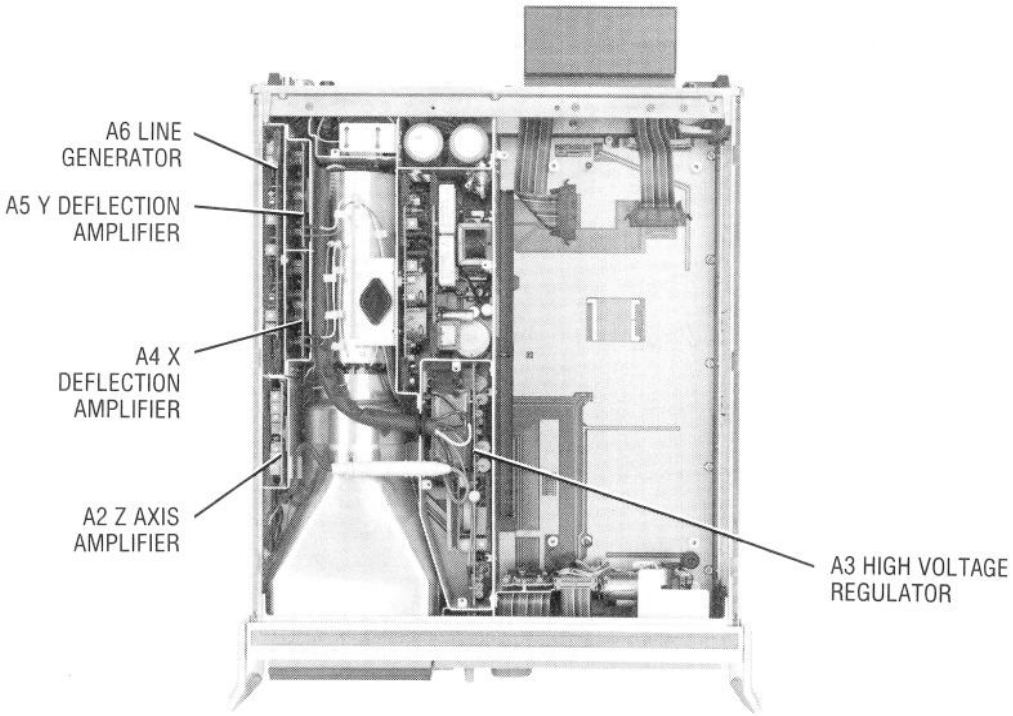


Figure 18. Display Section Routines Menu

Procedure 7. CRT Display Adjustments (Cont'd)



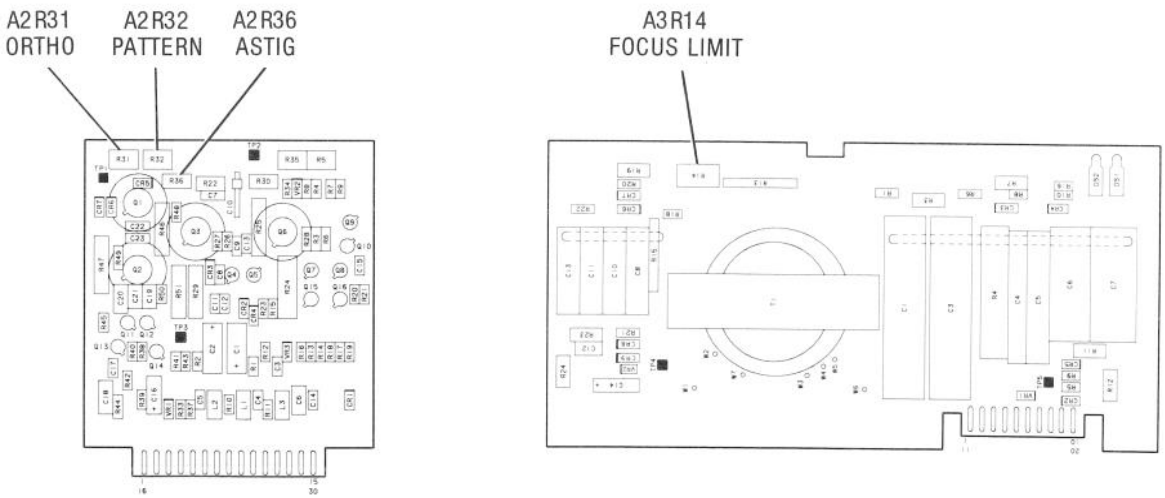


Figure 19. Location of CRT Display Adjustments (1 of 2)

Procedure 7. CRT Display Adjustments (Cont'd)

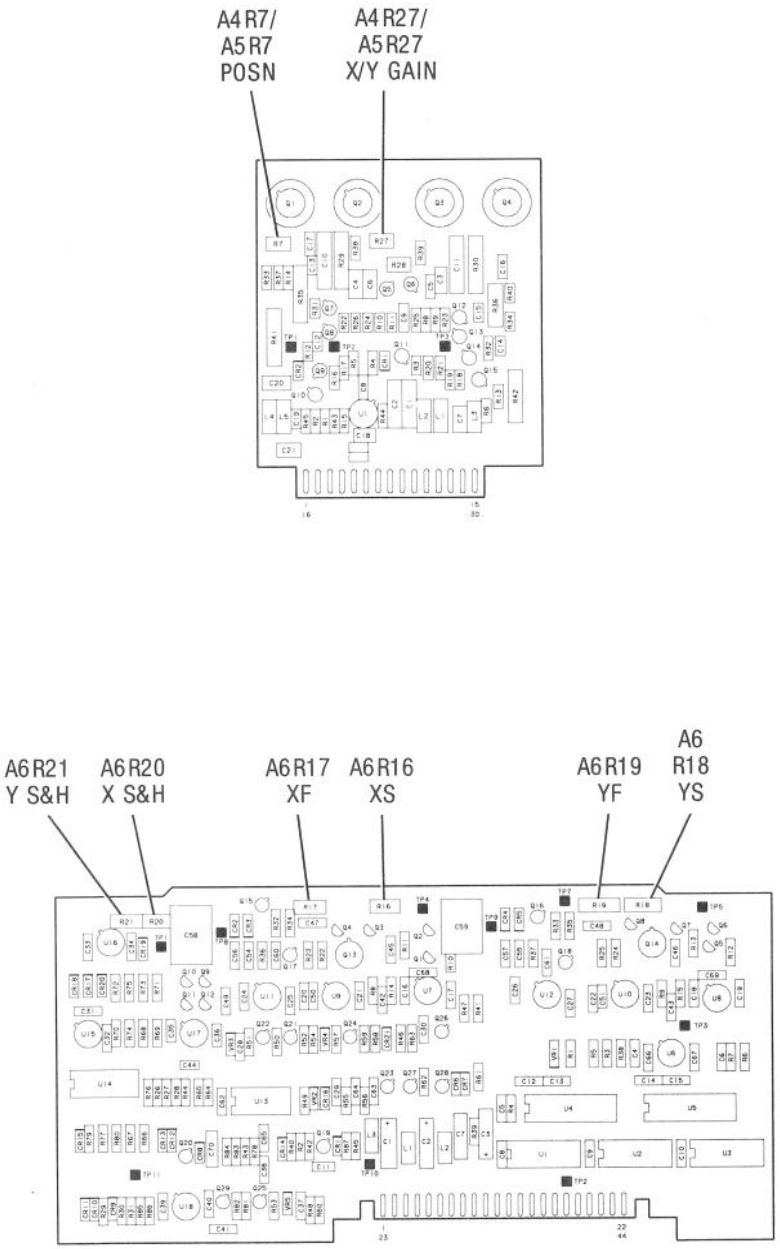


Figure 19. Location of CRT Display Adjustments (2 of 2)

Procedure 7. CRT Display Adjustments (Cont'd)

5. Adjust A2R36 ASTIG and A3R14 FOCUS LIMIT for the sharpest pattern on the HP 85101B display. Look for line and dot clarity and dot roundness. These two adjustments are interactive; you may have to alternate between the two to attain the sharpest pattern. The lower left corner dot of each set of dots will always look distorted (refer to Figure 20). Ignore that dot when making this adjustment. Refer to Figure 19 for location of A2R36 and A3R14.

6. Press **[= MARKER]** to return to menu.

X And Y Slow Line Adjustment

7. Press **[2]** entry key, then **[= MARKER]** to select X AND Y SLOW LINE ADJUST on the menu. A graticule will be displayed on the HP 85101B.

8. Center A6R20 X SAMPLE AND HOLD and A6R21 Y SAMPLE AND HOLD. Refer to Figure 19 for location of A6R20 and A6R21.

9. Adjust A6R16 XS for graticule closure. The horizontal lines should just touch the outer vertical edges of the graticule without overshoot or undershoot, as shown in Figure 21. Refer to Figure 19 for location of A6R16.

10. Adjust A6R18 YS for graticule closure. The vertical lines should just touch the outer horizontal edges of the graticule without overshoot or undershoot, as shown in Figure 21. Refer to Figure 19 for location of A6R18.

11. Press **[= MARKER]** to return to menu.

X And Y Fast Line Adjustment

12. Press **[3]** entry key, then press **[= MARKER]** to select X AND Y FAST LINE ADJUST on the menu. A small graticule in the lower left corner will be displayed.

13. Adjust A6R17 XF for graticule closure. The horizontal lines should just touch the outer vertical edges of the graticule without overshoot or undershoot, as shown in Figure 22. Refer to Figure 19 for location of A6R17.

14. Adjust A6R19 YF for graticule closure. The vertical lines should just touch the outer horizontal edges of the graticule without overshoot or undershoot, as shown in Figure 22. Refer to Figure 19 for location of A6R19.

15. Press **[= MARKER]** to return to menu.

Procedure 7. CRT Display Adjustments (Cont'd)

Vertical And Horizontal Adjustments

16. Press **[4]** entry key, then press **[= MARKER]** to select X AND Y AMPL. GAIN, POSITION on the menu. The pattern shown in Figure 23a will be displayed.

17. Adjust A4R7 POSN so that the display is horizontally centered on the CRT. Refer to Figure 19 for location of A4R7.

18. Adjust A5R7 POSN so that the display is vertically centered on the CRT making sure the rows of X's on the display are lined up with the softkeys. Refer to Figure 19 for location of A5R7.

19. Adjust A4R27 X GAIN and A5R27 Y GAIN to the point just before the corners of the outer box begin to curve with the envelope of the CRT. Also check to be sure the circle is round (not oval). Refer to Figure 23a. Refer to Figure 19 for location of A4R27 and A5R27.

Orthogonality And Pattern Adjustments

20. Press **[1]** entry key, then press **[= MARKER]** to select TEST PATTERN on the menu. Adjust A2R32 PATT for best squareness of the display. Look at outer box of the display pattern (refer to Figure 23) and insure that the box does not exhibit pincushioning or barreling. Refer to Figure 24 for examples of pincushioning and barreling. Refer to Figure 19 for location of A2R32.

21. Adjust A2R31 ORTHO and front panel ALIGN for best squareness of the TEST PATTERN display, insuring that the vertical and horizontal lines are perpendicular. Refer to Figure 19 for location of A2R31. A2R32 PATT, A2R31 ORTHO and front panel ALIGN are interactive; therefore, it may be necessary to iterate these adjustments to obtain best squareness of the display.

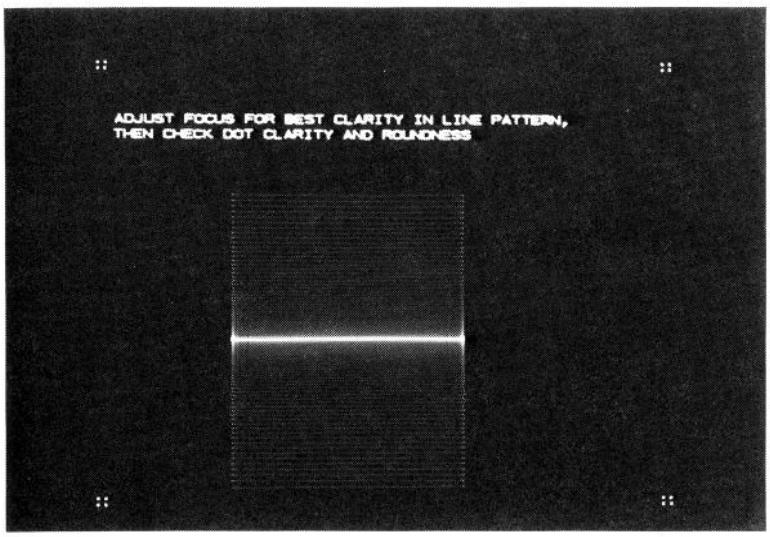


Figure 20. FOCUS PATTERN Display

Procedure 7. CRT Display Adjustments (Cont'd)

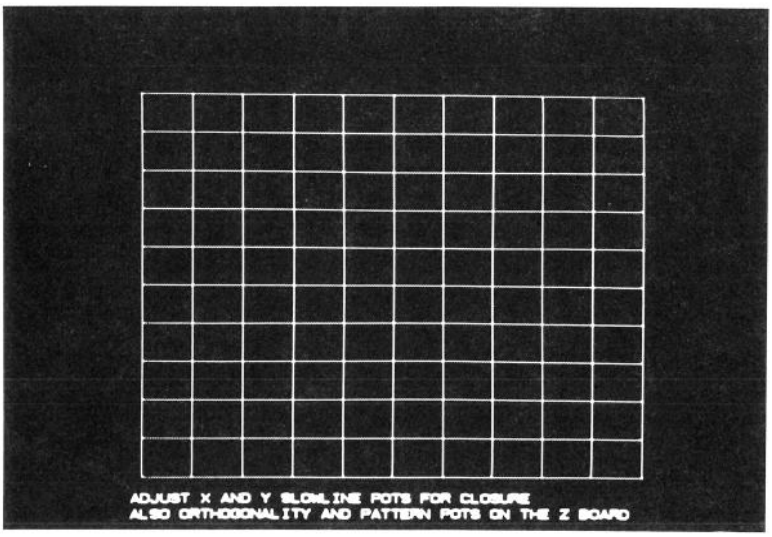


Figure 21. X AND Y SLOW LINE ADJUST Display

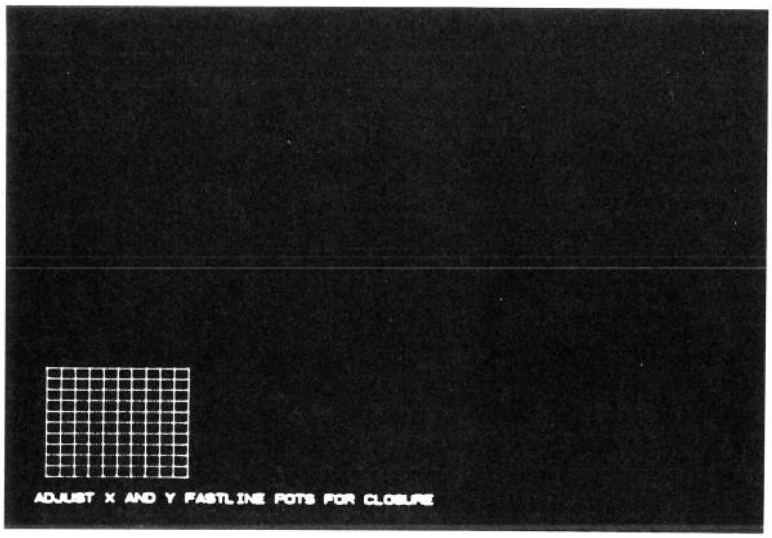


Figure 22. X AND Y FAST LINE ADJUST Display

Procedure 7. CRT Display Adjustments (Cont'd)

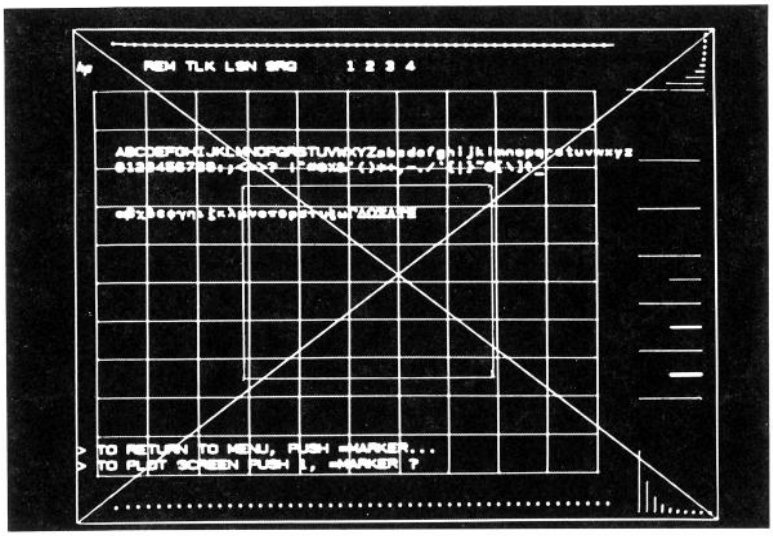


Figure 23. TEST PATTERN Display

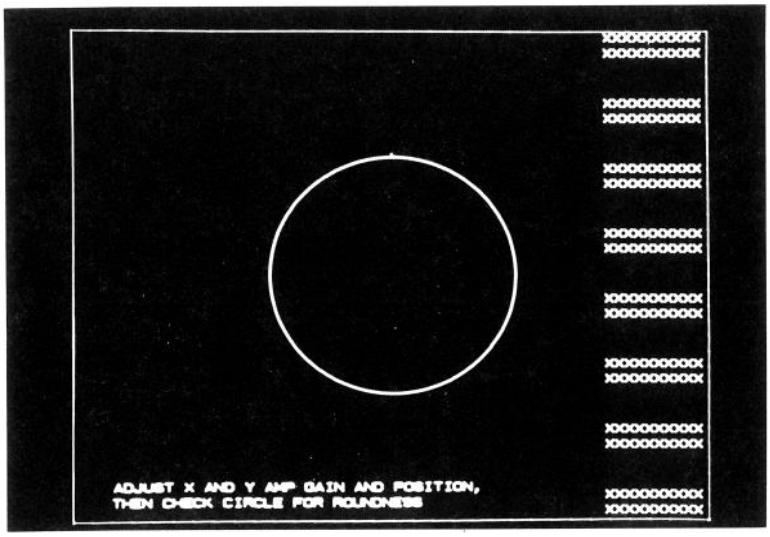


Figure 23a. X AND Y AMPL. GAIN, POSITION Display

Procedure 7. CRT Display Adjustments (Cont'd)

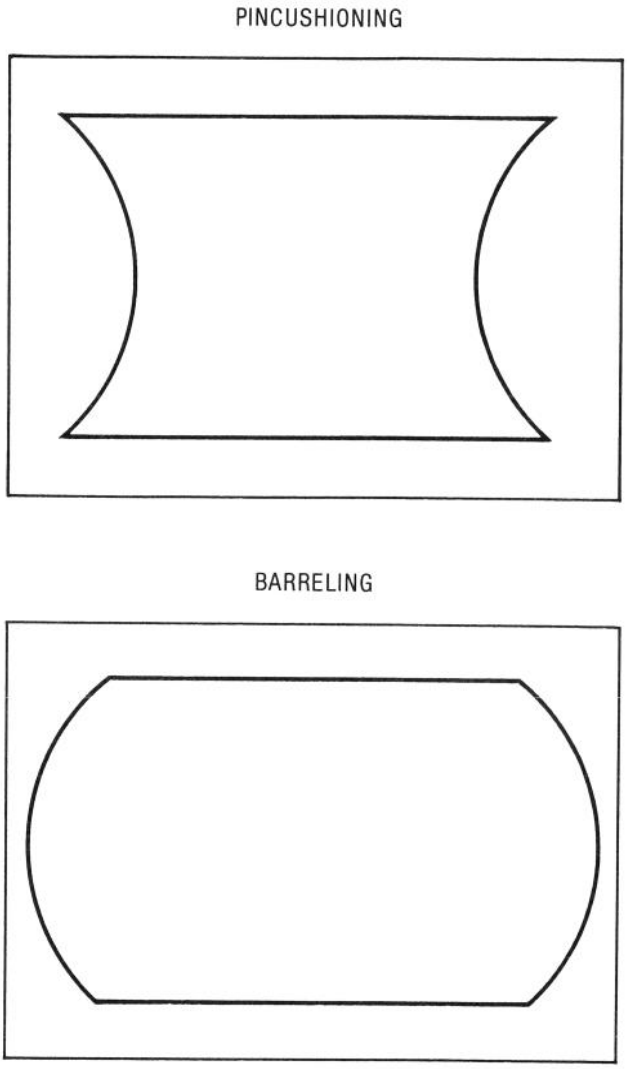


Figure 24. Examples of Pincushioning and Barreling

Procedure 8. Focus Gain Final Adjustment

DESCRIPTION

The following procedure is used to fine tune the focus of the CRT display. The gain of the focus gate amplifier is adjusted so that both the characters and the lines of the display are in focus. This procedure should be performed after the the FOCUS COARSE ADJUSTMENT (Procedure 5), and after any other adjustments that must be made in the case of a board replacement, or routine maintenance.

EQUIPMENT

Oscilloscope	HP 1740A
10:1 Divider Probe	HP 10004D

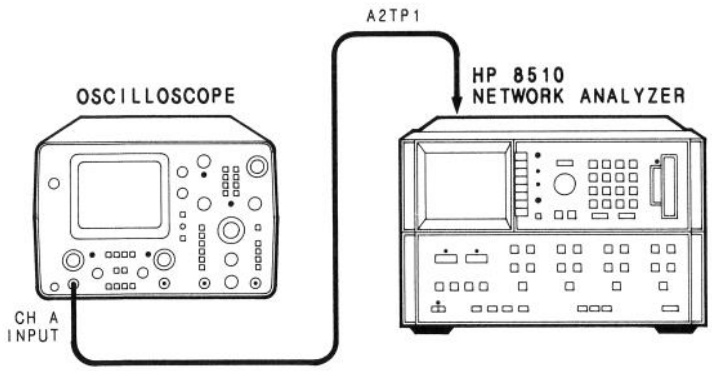


Figure 25. Focus Gain Final Adjustment Setup

Procedure 8. Focus Gain Final Adjustment (Cont'd)

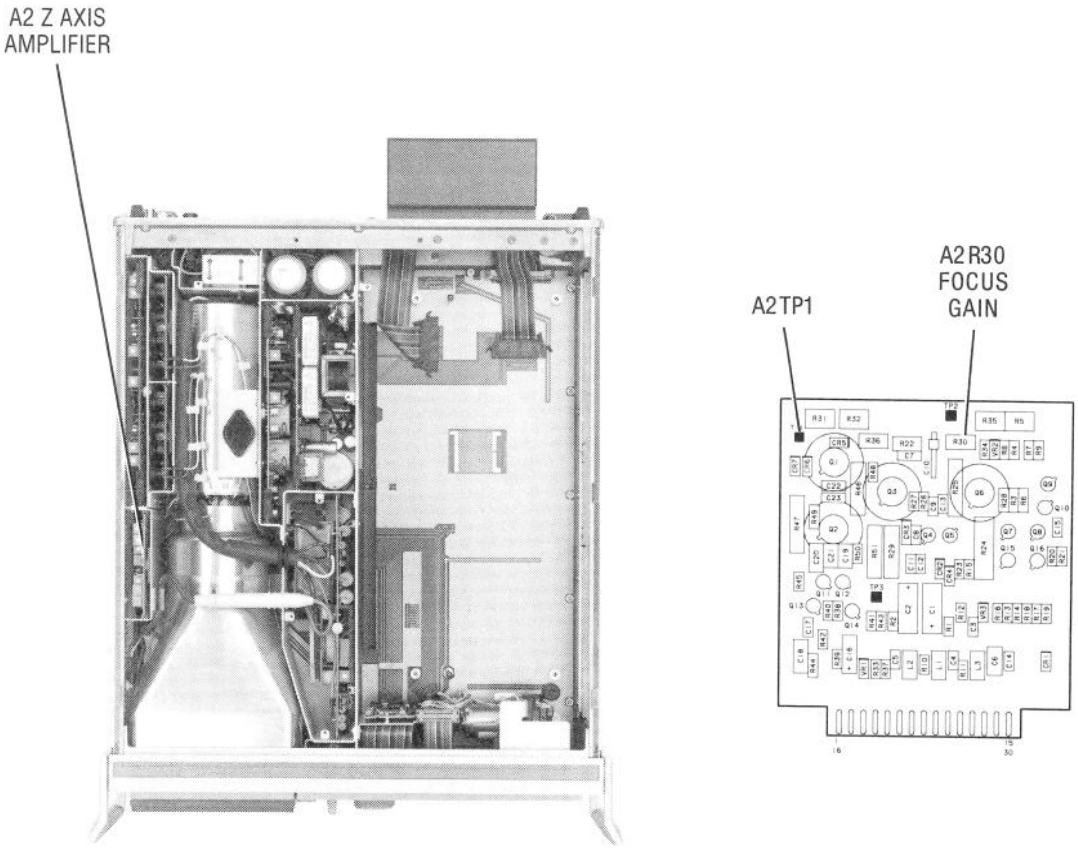


Figure 26. Location of FOCUS GAIN Final Adjustment

ADJUSTMENTS

1. Access the DISPLAY ADJUSTMENT ROUTINES as per the instructions in Procedure 6, steps 7-12.
2. Press **[1]** entry key, then press **[= MARKER]** to select TEST PATTERN on the menu.
3. Adjust front panel FOCUS for clear, sharp characters on the display.
4. If the lines on the display appear to be out of focus, connect oscilloscope Channel A 10:1 probe to A2TP1. Refer to Figure 26 for location of A2TP1.
5. Set oscilloscope VOLTS/DIV to .5 and TIME/DIV to .5ms.
6. Oscilloscope display should be similar to that shown in Figure 27.

Procedure 8. Focus Gain Final Adjustment (Cont'd)

7. Note dc level and peak-to-peak offset of waveform.
8. Adjust A2R30 FOCUS GAIN for a larger peak-to-peak offset pulse on oscilloscope display (refer to figure 27). Refer to Figure 26 for location of A2R30.
9. Adjust front panel FOCUS control to reset dc level of oscilloscope display to the value noted in step 7.
10. Display characters should be in focus. If not, adjust front panel FOCUS control to focus characters.
11. Note focus of display lines. If the lines appear to be more in focus than they were in step 4, then the adjustment of A2R30 FOCUS GAIN in step 8 was in the proper direction. If so, repeat steps 7 through 10 until both the characters and lines are in focus.
12. If the lines appear to be less in focus than they were in step 5, then the adjustment of A2R30 FOCUS GAIN in step 8 was in the wrong direction. Repeat steps 7 through 10, adjusting A2R30 FOCUS GAIN for a smaller peak-to-peak offset pulse on oscilloscope, until both the characters and lines are in focus.
13. Turn instrument OFF. Disconnect oscilloscope from A2TP1 and reinstall HP 85101B top cover.

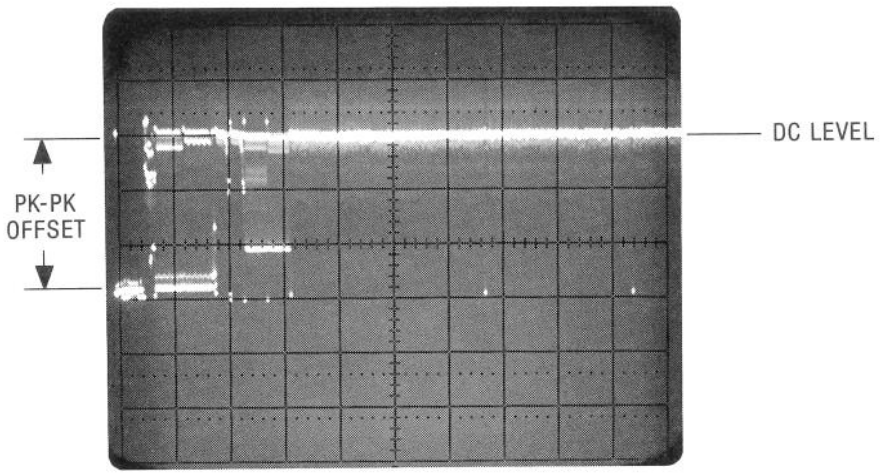


Figure 27. FOCUS GAIN Adjustment Waveform

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Procedure 9. Sweep ADC Gain Adjustment

DESCRIPTION

When the HP 8510B system is making a swept frequency measurement, it must sample the data at points equally spaced between the start and stop frequencies. The sweep ADC decides when to trigger the sample and hold amplifiers so that the data will be taken at the correct frequencies. The *A20 Sweep ADC Board* generates the staircase waveform, that tracks the sweep voltage from the source. The following procedure adjusts the SWEEP ADC gain to compensate for component tolerance in the staircase generation circuit.

EQUIPMENT

*12'' Snap-On Cable Assy	5061-1022
*F-M-M Snap-On Tee	1250-1391
HP 8510B SERVICE ADJUSTMENTS SOFTWARE	08510-10001

*These may be found in the Service Kit

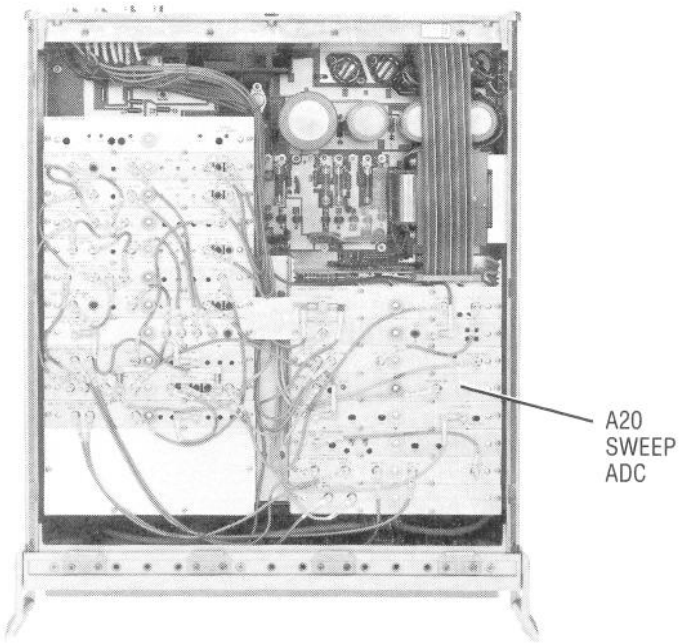
ADJUSTMENTS

1. Insert the disc containing the HP 8510B SERVICE ADJUSTMENTS SOFTWARE into controller as per instructions in the HP 9000 series 200 or 300 manual. Make sure that you have previously loaded your BASIC operating system, as per the instructions at the beginning of the adjustments section.
2. Type **LOAD "ADJ_85102"**. Press **[EXECUTE].**
3. When the program is loaded, press **[RUN]**.
4. A menu will be displayed on the controller CRT.
5. Press the appropriate softkey to select SWEEP ADC Adjustment.
6. Turn the HP 8510B OFF. Configure equipment as shown on the controller display.
7. Turn all instruments ON. Turn the HP 8510B ON last to avoid system ''lock up''.
8. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press ''CONTINUE'' softkey on the controller.
9. The prompt will be displayed:

   ADJUST GAIN (R26) FOR 300 ±0.3 mUnits.

10. Adjust A20R26 so that the mUnit displayed on the HP 85101B CRT reads 300 ±0.3 (see Figure 29). Refer to Figure 28 for location of A20R26.

Procedure 9. Sweep ADC Gain Adjustment (Cont'd)



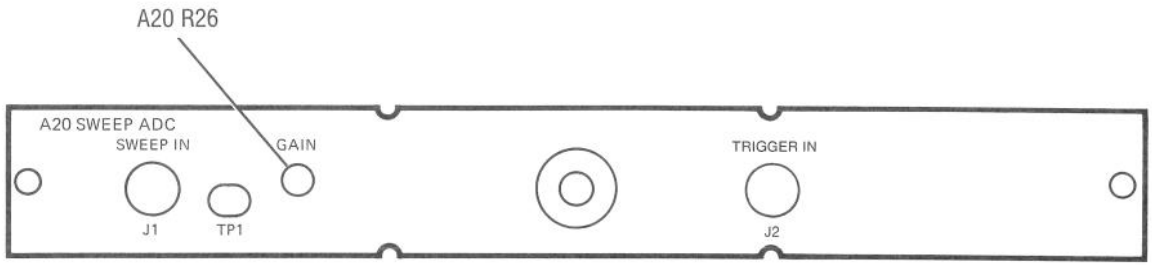


Figure 28. Location of Sweep ADC Gain Adjustment

Procedure 9. Sweep ADC Gain Adjustment (Cont'd)

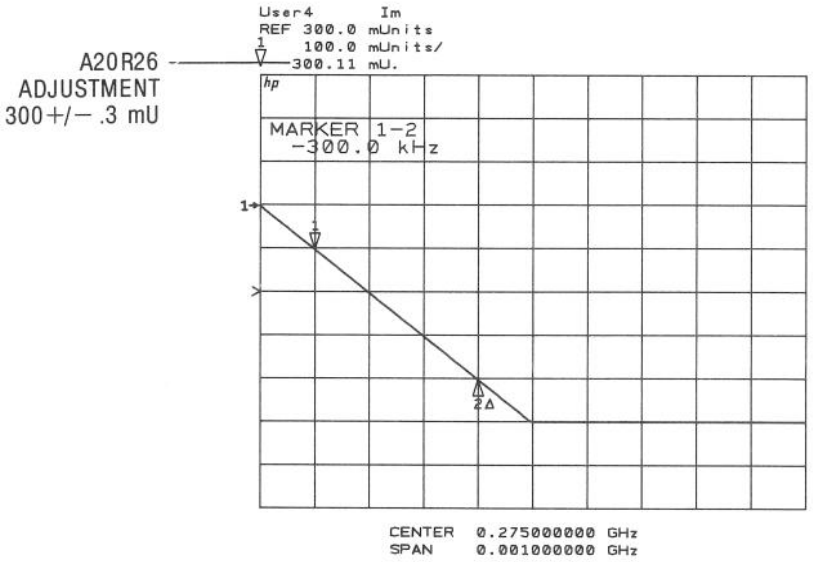


Figure 29. Display of Sweep ADC Gain Adjustment

11. When adjustment is completed, press "CONTINUE" softkey to return to menu.

12. If unable to adjust A20R26 within the given specification, and if the following prompt is displayed, refer to the Service Section for troubleshooting:

    ADC CONTROL GAIN is beyond limit

    press CONTINUE

13. Turn the HP 8510B OFF and return all equipment to original configuration. Be sure to reconnect all HP 85102B cables to the original configuration.

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Procedure 10. IF Mixer Adjustment

DESCRIPTION

The IF mixers convert the 20 MHz first IF signals from the test set to 100 KHz second IF signals, which go to the IF amplifiers. The 20 MHz IF signals are mixed with the 19.9 MHz signals from the 19.9 MHz L.O. board (A8). The 20 MHz IF signals are also buffered and sent to the IF counter (A21). All four IF mixers are identical. In the following procedure, the signal generator simulates the test set. The signal is fed into the mixer board while the output of the mixer is monitored on the spectrum analyzer. The following adjustments optimize the matching of the crystal filter to the IF thereby minimizing the test set noise appearing at the mixer output.

EQUIPMENT

Spectrum Analyzer	HP 8566A or 8568A
Function Generator	HP 3325A
*(2) 4' bnc-snap On Cbl Assy	85680-60093
*Adapter, Male N to Female BNC	1250-0780
HP 8510B SERVICE ADJUSTMENTS SOFTWARE	08510-10001

* These may be found in the Service Kit

ADJUSTMENTS

1. Load HP 8510B SERVICE ADJUSTMENTS SOFTWARE menu. Refer to procedure 9,steps 1-4, for procedure.
2. Press the appropriate softkey to select IF MIXER adjustment.
3. The prompt will be displayed:

   Model number of spectrum analyzer being used. Select a softkey.

4. Press the appropriate softkey.
5. Turn the HP 8510B OFF. Configure equipment as shown on the controller display. Make sure that the address of the test equipment agrees with the addresses of the controller screen.
6. Turn all instruments ON. Turn the HP 8510B ON last to avoid system "lock-up".

Procedure 10. IF Mixer Adjustment (Cont'd)

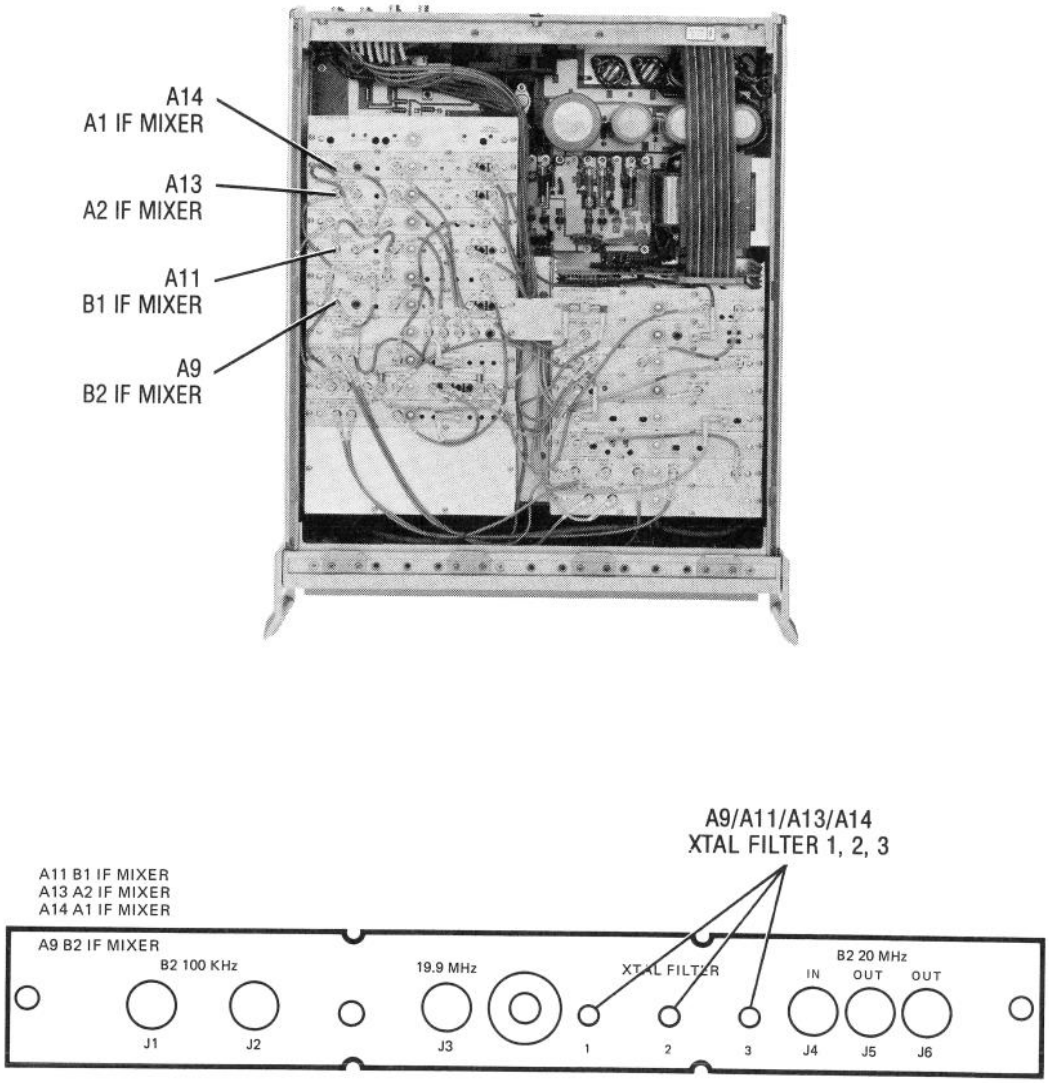


Figure 30. Location of the IF Mixer Adjustments

7. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press "CONTINUE" softkey on the controller.

8. The prompt will be displayed:

ADJUST XTAL FILTER 1, 2 AND 3 FOR MINIMUM RIPPLE < 1/2 dB (20KHZ BW)

Procedure 10. IF Mixer Adjustment (Cont'd)

9. To achieve minimum ripple of the RF envelope seen on the spectrum analyzer, iterate Xtal filter adjustments 1, 2, and 3. Adjust for minimum ripple at 100 kHz ±10 kHz (see Figure 31). Refer to Figure 30 for location of the Xtal filter adjustments.

10. If unable to adjust Xtal Filter within specification, or if the following prompt is displayed, check equipment setup for configuration errors, or refer to the Service Section for troubleshooting.

100 kHz LEVEL TOO LOW (<-20dbm)

11. When adjustment is completed, press "CONTINUE" softkey to return to menu.

12. Turn the HP 8510B OFF and return equipment to original configuration. Be sure to reconnect all the HP 85102B cables to the original configuration.

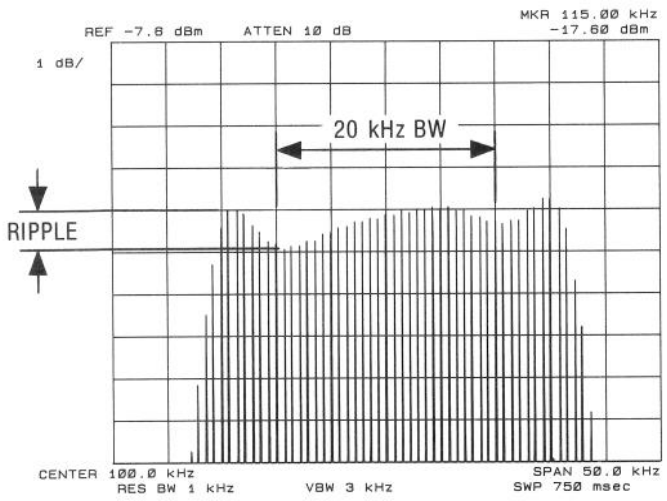


Figure 31. IF Mixer Adjustment Waveform

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Procedure 11. IF Amplifier Adjustment

DESCRIPTION

The 100 KHz IF amplifiers provide port selection, switchable IF gain and autoranging for the 100 KHz IF signal. The 100 kHz IF mixer output is passed through a single section Bandpass filter. The following procedure peakes the *A10 and A12 IF Amplifiers* by adjusting the circuit bandwith to a center frequency of 100kHz.

EQUIPMENT

*Service Extender Board	85102-60030
*(2) Adapter, Snap-On M-M	1250-0669
*(2) 12'' Snap-On Cable Assy	5061-1022
HP 8510 SERVICE SOFTWARE	08510-10001

* These may be found in the Service Kit

ADJUSTMENTS

1. Load the HP 8510B SERVICE ADJUSTMENTS SOFTWARE menu. Refer to procedure 9, steps 1-4, for procedure.
2. Press the appropriate softkey to select IF AMPLIFIER adjustment.
3. The prompt will be displayed:

   Adjustment on which IF AMPL module? Select a softkey.

4. Press the appropriate softkey.
5. Turn the HP 8510B OFF. Remove board (A10 or A12) from HP 85102B and install it on an extender board. Reconnect cables as shown on controller display. Cables in the instrument will not be long enough; use adapters and extra cables provided in the service kit. It is necessary to only reconnect the cables that are noted in the setup on the display.
6. Turn instrument ON. Turn the HP 8510B ON last to avoid system ''lock-up''.
7. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press ''CONTINUE'' softkey on the controller.

Procedure 11. IF Amplifier Adjustment (Cont'd)

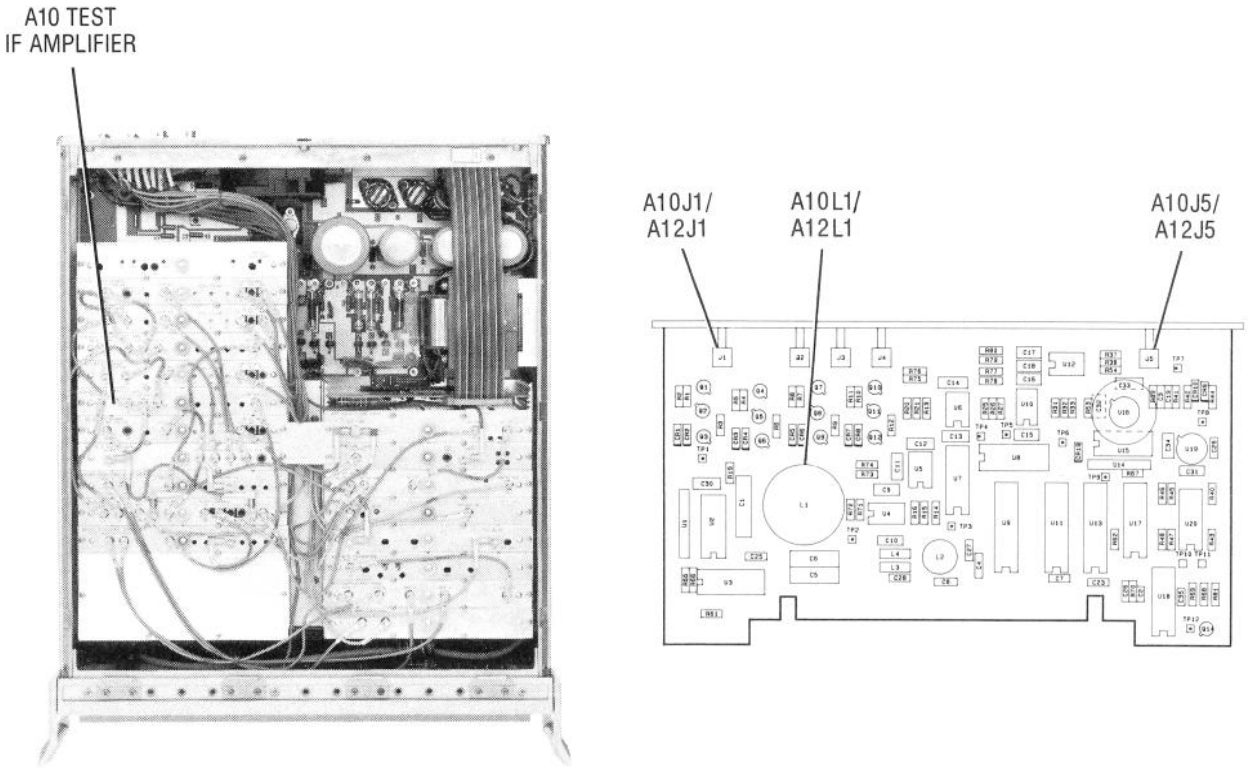


Figure 32. Location of IF Amplifier Adjustments

8. The prompt will be displayed:

COARSE ADJUST.

ADJUST L1 TO PEAK TRACE ON 8510 CRT.

9. Adjust L1 so that the horizontal line on the HP 85101B CRT is at its maximum vertical location. Refer to Figure 32 for location of L1.

10. Press "CONTINUE" softkey.

11. The prompt will be displayed:

FINE ADJUST.

RE-ADJUST L1 TO PEAK TRACE ON 8510 CRT
(re-center trace with '= marker' key if necessary)

Procedure 11. IF Amplifier Adjustment (Cont'd)

12. Repeat step 9. Press **[= MARKER]** on the 85101B to recenter the trace if necessary.
13. When the adjustment is completed, press "CONTINUE" softkey to return to menu.
14. If either of the following prompts are displayed, check equipment setup for configuration errors, or refer to Service Section for troubleshooting:

    AMPLIFIER OUTPUT $<$ −30 dBm $\geq$ TOO LOW. REPAIR BOARD OR TEST-SETUP.

    or

    AMPLIFIER OUTPUT $>$ −20 dBm $\geq$ TOO HIGH. REPAIR BOARD OR TEST-SETUP.

15. Turn the HP 8510B OFF and return equipment to original configuration. Be sure to tighten screws when reinstalling the board into the mainframe; loose screws can cause crosstalk in the instrument. Also be sure to reconnect all HP 85102B cables to the original configuration.

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Procedure 12. Synchronous Detector Adjustment

DESCRIPTION

The *A5 and A7 Synchronous Detector* assemblies provides two voltages that are equal to the real and imaginary components of the vector representing the input signal to the Sample and Hold assembly. The following procedure adjusts the two output filters of the Synchronous Detector to equalize the delay through them.

EQUIPMENT

Function Generator	HP 3325A
*Service Extender Board	85102-60030
*4' bnc-snap On Cable Assy	85680-60093
*(2) 12'' Snap-On Cable Assy	5061-1022
*(2) Adapter, Snap-On M-M	1250-0669
HP 8510 SERVICE SOFTWARE	08510-10001

* These may be found in the Service Kit

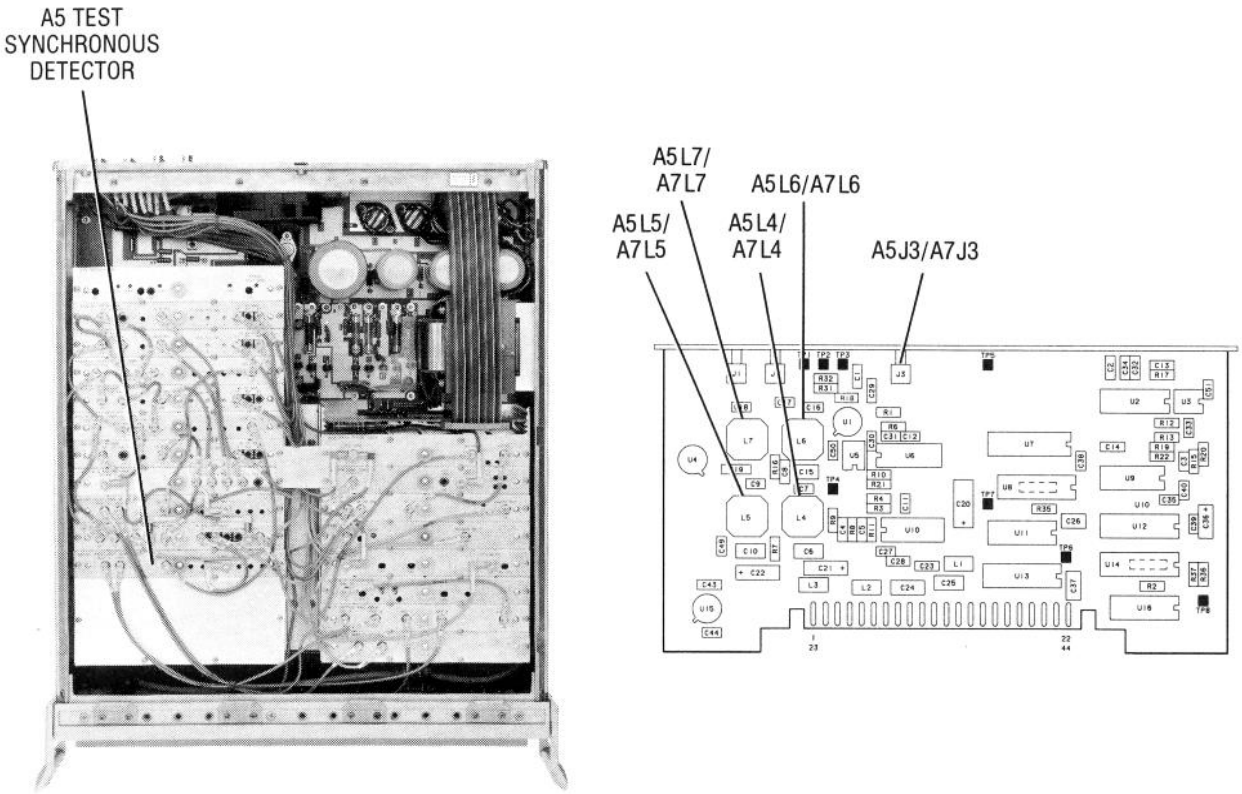


Figure 33. Location of Synchronous Detector Adjustments

Procedure 12. Synchronous Detector Adjustment (Cont'd)

ADJUSTMENTS

1. Load HP 8510B SERVICE ADJUSTMENTS SOFTWARE menu. Refer to procedure 9, steps 1-4, for procedure.
2. Press the appropriate softkey to select SYNCHRONOUS DETECTOR adjustment.
3. The prompt will be displayed:

   Adjustment on which SYNC DET module? Select a softkey.

4. Press the appropriate softkey.
5. Turn the HP 8510B OFF. Remove board (A5 or A7) from the HP 85102B and install it on the extender board. Configure equipment as shown on controller display. Cables in the HP 85102B will not be long enough to reconnect to the board; use the adapters and cables provided in the service kit. If the A6 CLOCK cables were disconnected, be sure to reconnect them.
6. Turn all instruments ON. Turn the HP 8510B ON last to avoid system "lock-up".
7. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press "CONTINUE" softkey on the controller.
8. If the following prompt is displayed, check equipment setup for configuration errors, or refer to Section 8 for troubleshooting:

   SIGNAL LEVEL IS TOO LOW

   IT MEASURES XXX dB BUT SHOULD BE >-15 dB

   CHECK SETUP OR REPAIR BOARD

9. The prompt will be displayed:

   CENTER THE CORES IN L4 & L5.

   USING THE 8510 DISPLAY, ADJUST L6 & L7 FOR MINIMUM RIPPLE (minimize the high frequency ripple).

   THEN ADJUST L4 & L5 TO FURTHER REDUCE RIPPLE

10. To center L4 and L5 adjustable inductors, rotate each inductor fully counterclockwise (until the core is as far out as it will go), then three turns clockwise. Refer to Figure 33 for location of L4 and L5.

CAUTION

Be careful not to rotate the inductors too far clockwise. Damage may occur to the inductors.

Procedure 12. Synchronous Detector Adjustment (Cont'd)

11. Alternately adjust L6 and L7 to achieve minimum ripple seen on the HP 8510B display (see Figure 34). Refer to Figure 33 for location of L6 and L7.
12. Alternately adjust L4 and L5 to further minimize the ripple. Typically the ripple is less than 0.01 db.
13. When the adjustment is completed, press "CONTINUE" softkey to return to menu.
14. Turn the HP 8510B OFF and return equipment to original configuration. Be sure to tighten screws when reinstalling the board into the mainframe; loose screws can cause crosstalk in the instrument. Also be sure to reconnect the HP 85102B cables to the original configuration.

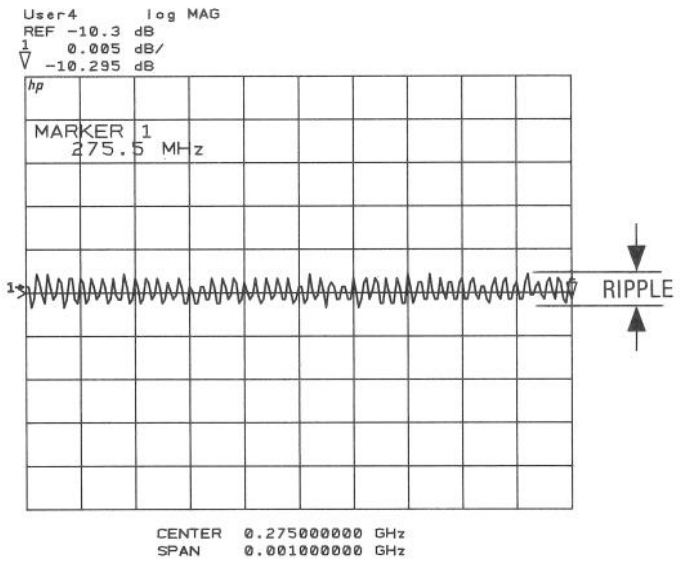


Figure 34. Synchronous Detector Adjustment Waveform

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Procedure 13. Clock Adjustment

DESCRIPTION

The clock assembly generates the reference signals for the main phase lock loop, the 19.9 MHz L.O. generator, and the YADC. It also provides timing and L.O. signals for the 100 KHz synchronous detectors and a sinusoidal signal that is used to calibrate the 100 KHz IF system.

The 20 MHz L.O. oscillator, is composed of an integrated circuit in a phase lock loop whose VCO is crystal controlled to run at 20.0MHz. By adjusting R51, the free running frequency of the VCO can be fine tuned to 20.0 MHz. The following procedure adjusts the dc voltage input to the VCO, on the *A6 Clock Board,* to fine tune the free-running frequency to 20 MHz.

EQUIPMENT

Frequency Counter	HP 5343A
*4' bnc-snap On Cable Assy	85680-60093
HP 8510 SERVICE SOFTWARE	08510-10001
*Alignment Tool	8710-0630

* These may be found in the Service Kit

ADJUSTMENTS

1. Load HP 8510B SERVICE ADJUSTMENTS SOFTWARE menu. Refer to procedure 9, steps 1-4, for procedure.
2. Press the appropriate softkey to select CLOCK adjustment.
3. Turn the HP 8510B OFF. Configure equipment as shown on the controller display.

NOTE: For this procedure, the frequency counter input impedance switch may be set to either 50 ohms or 1M ohms.

4. Turn all equipment ON. Turn the HP 8510B ON last to avoid system "lock-up".
5. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press "CONTINUE" softkey.
6. The prompt will be displayed:

ADJUST R51 FOR 20 MHz ± 50 Hz

7. Adjust A6R51 for a frequency counter indication of 20 MHz ±50 Hz. Refer to Figure 35 for location of A6R51.
8. When adjustment is complete, press "CONTINUE" softkey to return to menu.

Procedure 13. Clock Adjustment (Cont'd)

9. If either of the following prompts is displayed, refer to Section 8 for troubleshooting:

20MHz FREQUENCY COUNTS

LIMIT: 20 MHz ± 50 Hz; Freq Delta <10 Hz

FIRST COUNT = XXXXXXXX
SECOND COUNT = XXXXXXXX

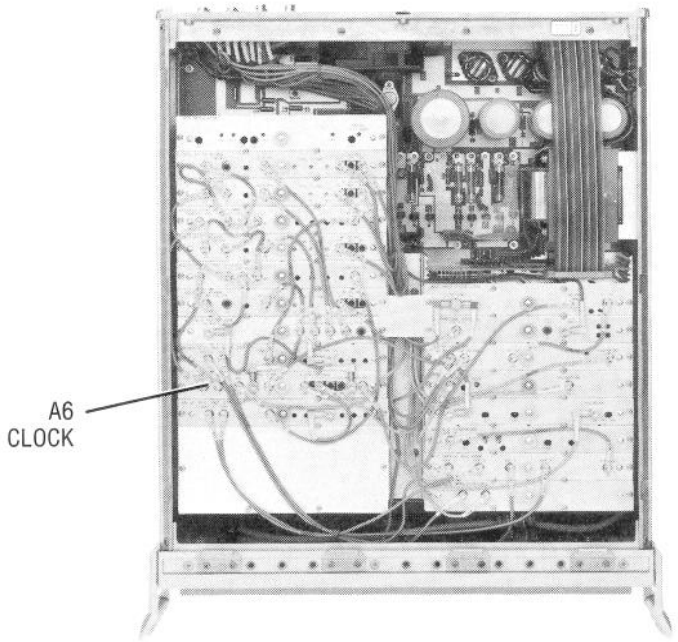
FREQUENCY IS OUT OF LIMIT

or

FREQUENCY UNSTABLE, COUNT_1-COUNT_2 TOO LARGE

10. Turn the HP 8510B OFF and return equipment to original configuration. Be sure to reconnect HP 85102B cables to the original configuration.

Procedure 13. Clock Adjustment (Cont'd)



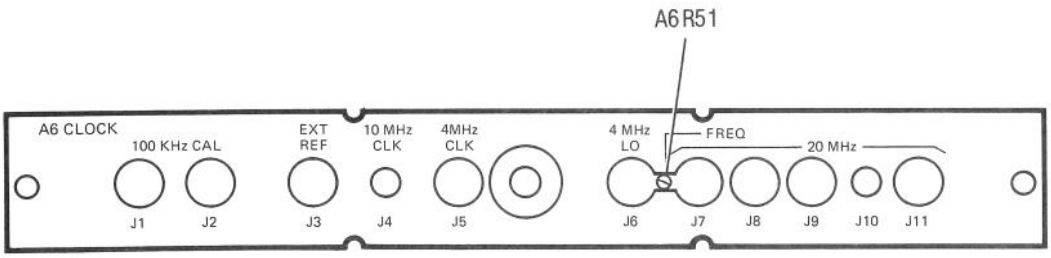


Figure 35. Location of Clock Adjustment

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Procedure 14. Test Set Sampler Adjustments

DESCRIPTION

The following procedure measures the magnitude and phase tracking of the sampler assemblies (b1, b2, a1 and a2) and aides in the adjustment of the replacement sampler. This minimizes errors due to sampler mismatch when making S-parameter measurements. These procedures are semi-automated and require a HP 9000 series 200 or 300 controller and the HP 8510 SERVICE SOFTWARE, in addition to the HP 8510B and the source (HP 8340A/B, HP 8341A/B or 8350B with 83592A or 83595A plug-in). The controller is connected to the HP 8510B HP-IB bus (labeled "HP-IB" on the HP 85101B rear panel).

NOTE: While performing this adjustment procedure, CAUTION: NO IF FOUND will be displayed on the HP 8510B CRT, and may be ignored.

EQUIPMENT

*Power Splitter	HP 11667B or 5086-7408
*Semi-Rigid M-M SMA Cbl Assy	08510-20001
*Semi-Rigid M-M SMA Cbl Assy	08510-20002
*Flex. Source Cable	08513-60009
*10 dB Attenuator	HP 8593C or 08513-60153
HP 8510 SERVICE SOFTWARE	08510-10001
Torque Wrench	8710-1765

*These may be found in the Service Kit

ADJUSTMENTS

1. Insert the HP 8510 SERVICE SOFTWARE disc into the controller as described in the HP 9000 series 200 or 300 manual. Be sure that you have first loaded BASIC as instructed at the beginning of this Adjustment Section.
2. Type **LOAD "ADJTESTSET".** Press **[EXECUTE]** to load the program.
3. Then press **[RUN]** to see a number of softkey prompts and choose the softkey that represents your source.

Procedure 14. Test Set Sampler Adjustments (Cont'd)

Table 5. Adjustments That Must Be Made for the **Replaced** *Sampler Assembly*

HP 8512A, 8513A		
Replaced Sampler Assembly	**Adjustments**	
	1st	**2nd**
a1	b1 vs a1 (S11)	b2 vs a1 (S21)
b1	b1 vs a1 (S11)	none
b2	b2 vs a1 (S21)	none

HP 8511A, 8514A/B, 8515A		
Replaced Sampler Assembly	**Adjustments**	
	1st	**2nd**
a1	b1 vs a1 (S11)	b2 vs a1 (S21)
b1	b1 vs a1 (S11)	b1 vs a2 (S12)
a2	b2 vs a2 (S22)	b1 vs a2 (S12)
b2	b2 vs a2 (S22)	b2 vs a1 (S21)

4. The first menu screen is for entering your system configuration. Press the appropriate softkey to toggle the model number or designator to the correct one for your system source, testset and replaced sampler assembly.
5. Press the continue softkey when all the numbers are correct.
6. The prompt will be displayed:

   Replaced sampler assembly: xx

   The recommended adjustment order is:

   1st – adjust xx vs xx

   2nd – adjust xx vs xx or **2nd – adjust (none)**

   Select a softkey
7. Press the softkey corresponding to the adjustment that must be made.
8. The required equipment setup will be displayed.
9. Turn the test set LINE switch to OFF.

Procedure 14. Test Set Sampler Adjustments (Cont'd)

10. Connect the two semi-rigid cables to the power splitter as shown in Figure 36. Disconnect the cables to J2 (RF INPUT) on the sampler assemblies and connect the semi-rigid cables to J2 (RF INPUT) on the sampler assemblies as shown in the setup on the controller display.

CAUTION

The sampler assemblies are extremely static discharge sensitive. It is necessary for any person connecting cables to the sampler assemblies to be grounded. Be sure to ground the cable center conductor before connecting.

Do not bend the semi-rigid cables. To accomodate the different sampler assembly configurations, loosen cable connections at the power splitter, and pivet the cables about the vertical axis to the appropriate position. Refer to Figure 36.

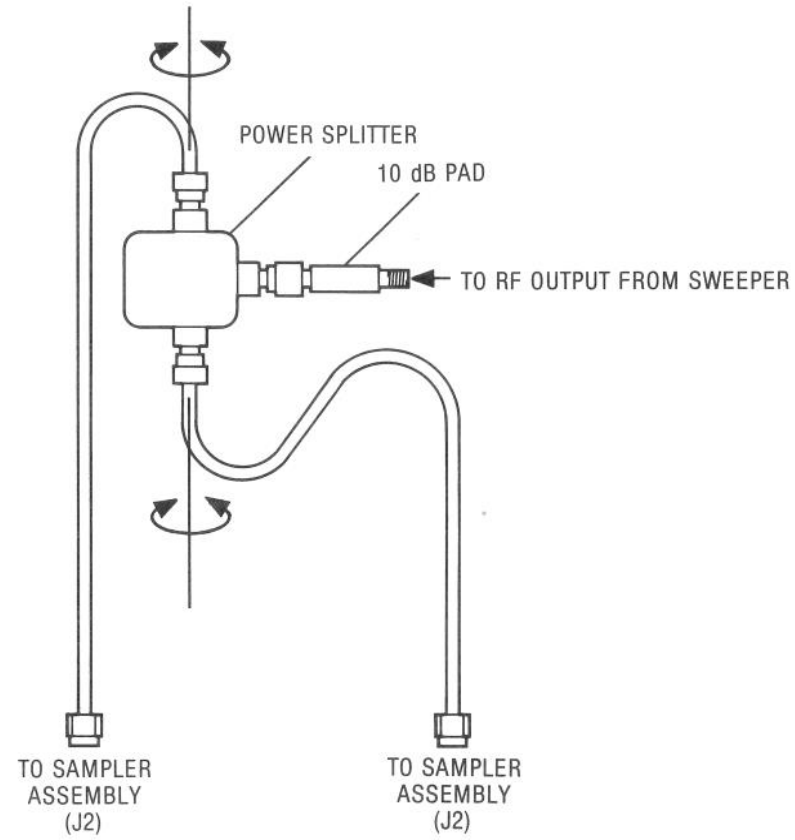


Figure 36. Power Splitter and cables Configuration

Procedure 14. Test Set Sampler Adjustments (Cont'd)

11. Disconnect the RF cable (from the sweeper) from the test set rear panel and connect the RF cable(from the sweeper) to the flexible source cable. Connect the other end of the flexible source cable to the 10 db pad, then connect the pad to the power splitter as shown in the setup on the controller display.

12. Set the test set LINE switch to ON. Cycle the 8510B power OFF then ON again to reset the HP 8510B.

13. When a graticule appears on the HP 85101B CRT, the instrument has finished initializing. Press the CONTINUE softkey.

At this time, the controller takes the first measurement and displays the **Tracking Data Summary**. Press the CONTINUE softkey. If all of the tests passed, three options will be made available to you in the form of softkeys, AGAIN, 2nd ADJ and DONE. AGAIN runs the test again, 2nd ADJ allows you to set-up the second sampler adjustment configuration and DONE returns you to the beginning of the adjustments. At this time, press 2nd ADJ. You will see the set-up diagram, press the CONTINUE softkey and the controller will take the second measurement and display the **Tracking Data Summary**. If all of the tests passed, the sampler adjustments are completed. If there was a failure at any time, the adjustment software would automatically position you at step 15 of this procedure. Also, a Hardcopy of the data may be produced by pressing the HARDCOPY softkey and following the screen prompts.

14. If the following prompt is displayed:

Electrical length mismatch is too large!
Check cables between splitter and sampler assemblies.

Select a softkey

AGAIN : to repeat same measurement
2ND ADJ : to 2nd adjustment setup
DONE : to return to main menu.

Check the cables and connections and press AGAIN softkey. If that is not the problem, press DONE softkey to return to the main menu. Repeat the procedures being sure to select the correct adjustment softkey in step 7. Then press CONTINUE softkey.

CAUTION

Only adjust R1 and L1 on the replaced sampler assembly. If any of the other components are adjusted, the sampler assembly must be sent back to the factory; these adjustments can only be performed in the factory.

Procedure 14. Test Set Sampler Adjustments (Cont'd)

15. The prompt will be displayed:

Adjustment procedure:

Adjust only the replaced sampler

*** Adjust L1 and R1 to minimize the steps at 250 MHz and 840 MHz in both traces.**

*** It is not necessary to completely eliminate the steps.**

Note: Marker 2 is at 230 MHz
Marker 3 is at 820 MHz

The reference value is updated periodically to keep trace on screen.

NOTE: The phase trace and the magnitude trace can be viewed at the same time, by pressing the OVERLAY or SPLIT softkeys, or individually by pressing the MAG. or PHASE softkey.

Adjust R1 to minimize the steps in the trace. Then adjust L1 so that the steps in the phase trace are minimized. Refer to Figure 37. Refer to Figure 38 for location the of L1 and R1.

16. When adjustments are completed, press MEASURE softkey.

17. **TRACKING DATA SUMMARY** will be displayed. If any test has failed after adjusting L1 and R1, refer to the Troubleshooting Section. Otherwise choose one of the following:
    a. To repeat the same measurement, or if the 2nd adjustment has a test failure, press CONTINUE softkey. Wait for the next prompt then press AGAIN softkey. Repeat steps 15 through 18.

    b. To obtain a hardcopy of the data summary, press HARDCOPY softkey. The screen will prompt you for the date and how you have your printer configured.

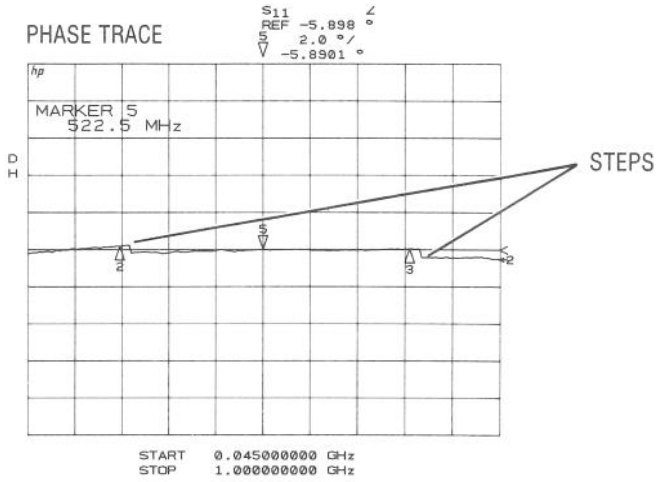
    c. To perform the 2nd adjustment, press 2nd Adj softkey. Repeat steps 6 through 14.

    d. If the adjustments are completed return to the main menu by pressing CONTINUE softkey. Wait for the next prompt and press the DONE softkey. Then press the EXIT softkey.

NOTE: If the 2nd adjustment needed to be adjusted, repeat the 1st adjustment to make sure the tracking is still within specification. If it is not, repeat adjustments. It may be necessary to alternate between the 1st and 2nd adjustments so they are both within specification.

18. Turn the test set OFF and return the equipment to its original configuration.

Procedure 14. Test Set Sampler Adjustments (Cont'd)



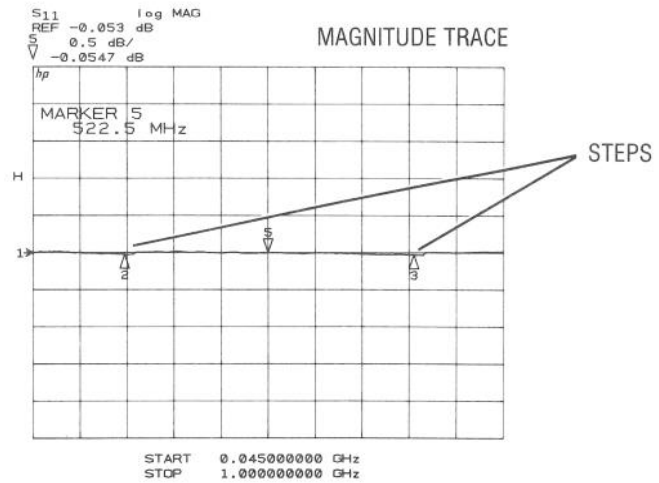
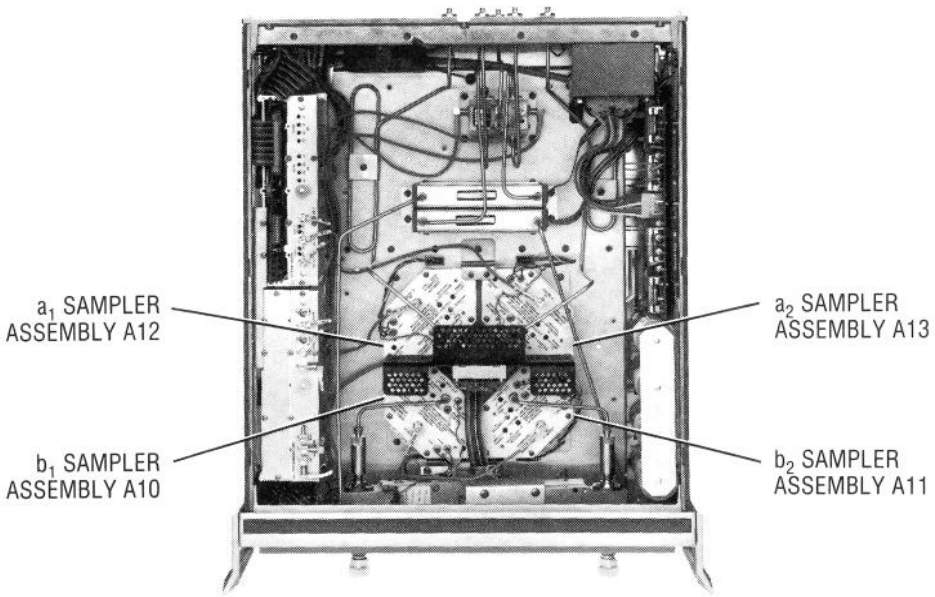


Figure 37. Sampler Assembly Adjustment Waveforms

Procedure 14. Test Set Sampler Adjustments (Cont'd)

TEST SET TOP VIEW



SAMPLER ASSEMBLY

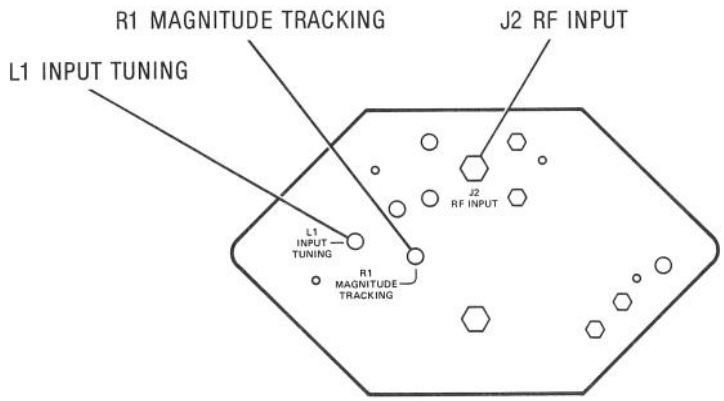


Figure 38. Location of Sampler Assembly Adjustments

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Replaceable Parts

INTRODUCTION

This section contains information about ordering replaceable parts for the HP 85101B and the HP 85102B. Figure 1 explains the module exchange procedure. Table 1 contains reference designations, abbreviations, multipliers, and manufacturers' codes used in the parts list. Table 2 lists replaceable parts and rebuilt parts (exchange modules) in reference designator order. Parts tables for individual test sets are in their respective manuals.

EXCHANGE ASSEMBLIES

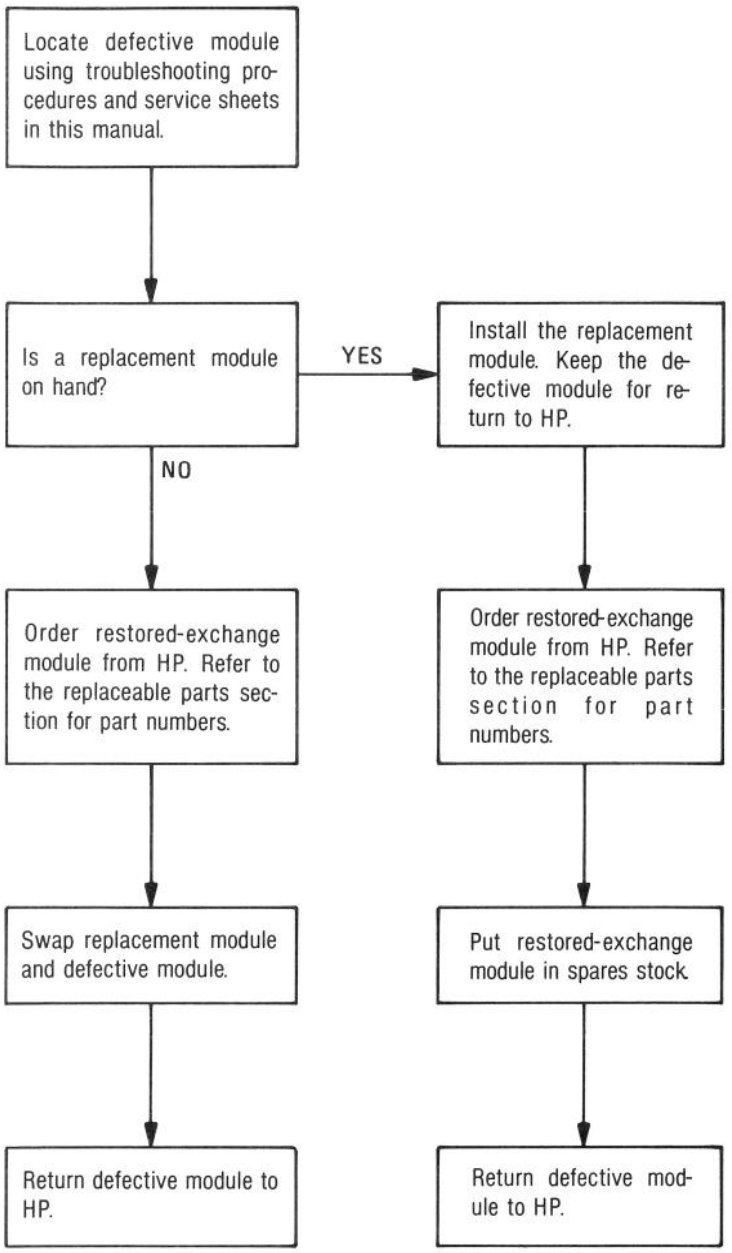
Table 2 lists the HP 85101B and HP 85102B rebuilt assemblies that may be replaced on an exchange basis. Exchange, factory-repaired and tested assemblies are available only on a trade-in basis; the defective assemblies must be returned for credit, within 30 days. For this reason, assemblies required for spare parts stock must be ordered by the new assembly part number. Figure 1 explains the rebuilt module exchange procedure.

ORDERING INFORMATION

To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number (with the check digit), indicate the quantity required, and address the order to the nearest Hewlett-Packard office. The check digit will ensure accurate and timely processing of your order.

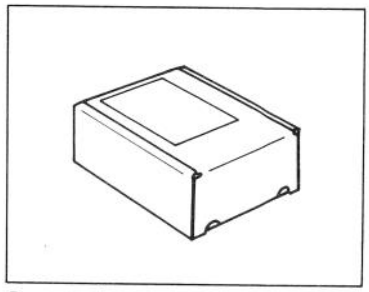
To order a part not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

The module exchange program described here is a fast, efficient, economical method of keeping your Hewlett-Packard instrument in service.



*HP pays postage on boxes mailed in U.S.A.

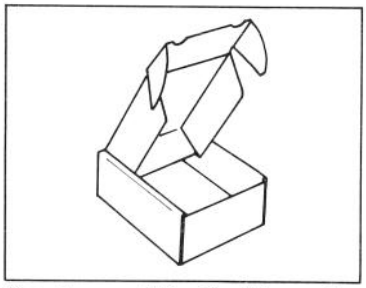
A.



Restored-exchange modules are shipped individually in boxes like this. In addition to the circuit module, the box contains:

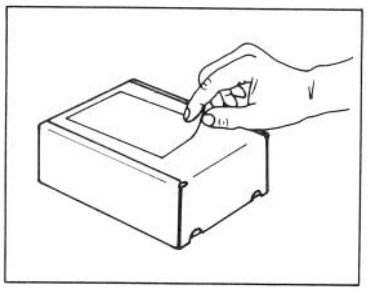
Exchange assembly failure report
Return address label

B.



Open box carefully - it will be used to return defective module to HP. Complete failure report. Place it and defective module in box. Be sure to remove enclosed return address label.

C.



Seal box with tape. Inside U.S.A.*, stick preprinted return address label over label already on box, and return box to HP. Outside U.S.A., do not use address label: instead address box to the nearest HP office.

Figure 1. Module Exchange Program

Table 1. Reference Designations, Abbreviations, Multipliers and Manufacturer's Code List (1 of 4)

REFERENCE DESIGNATIONS

A . . . . . Assembly
AT . . . . . Attenuator, Isolator, Limiter, Termination
B . . . . . Fan, Motor
C . . . . . Capacitor
CP . . . . . Coupler
CR . . . . . Diode, Diode Thyristor, Step Recovery Diode (SCR), Varactor
DC . . . . . Directional Coupler
DS . . . . . Annunciator, Lamp, Light Emitting Diode (LED), Signaling Device (Audible or Visible)
E . . . . Miscellaneous Electrical Part
F . . . . . Fuse
FL . . . . . Filter
H . . . . . Hardware
J . . . . . Electrical Connector (Stationary Portion), Jack
K . . . . . Relay
L . . . . . Coil, Inductor
M . . . . . Meter
MP . . . . . Miscellaneous Mechanical Part
P . . . . . Electrical Connector (Movable Portion), Plug
Q . . . . . Silicon Controlled Rectifier (SCR), Transistor, Triode Thyristor
R . . . . . Resistor
RT . . . . . Thermistor
S . . . . . Switch
T . . . . . Transformer
TB . . . . . Terminal Board
TP . . . . . Test Point
U . . . . . Integrated Circuit, Microcircuit
V . . . . . Electron Tube
VR . . . . . Breakdown Diode (Zener), Voltage Regulator
W . . . . . Cable, Transmission Path, Wire
X . . . . . Socket
Y . . . . . Crystal Unit (Piezoelectric, Quartz)
Z . . . . . Tuned Cavity, Tuned Circuit

ABBREVIATIONS

A

A . . . . . Across Flats, Acrylic, Air (Dry Method), Ampere
ADJ . . . . . Adjust, Adjustment
AL . . . . . Aluminum
ALC . . . . . Alcohol, Automatic Level Control
AMP . . . . . Amperage
AMPL . . . . . Amplifier
ANDZ . . . . . Anodized
ANLG . . . . . Analog
ASSY . . . . . Assembly
ASTBL . . . . . Astable
ATTEN . . . . . Attenuation, Attenuator
AWG . . . . . American Wire Gauge

B

BCKT . . . . . Bracket
BD . . . . . Board, Bundle
BE . . . . . Baume, Beryllium
BFR . . . . . Before, Buffer
BLK . . . . . Black, Blank, Block
BNC . . . . . Type of Connector
BSC . . . . . Basic
BVR . . . . . Reverse, Breakdown Voltage

C

C . . . . . Capacitance, Capacitor, Center Tapped, Centistoke, Ceramic, Cermet, Circular Mil Foot, Closed Cup, Cold, Compression
CBL . . . . . Cable
CER . . . . . Ceramic
CH . . . . . Center Hole
CHAM . . . . . Chamfer
CHAN . . . . . Channel
COAX . . . . . Coaxial
COM . . . . . Commercial, Common
CONN . . . . . Connect, Connection, Connector
CONT . . . . . Contact, Continuous, Control, Controller
CONV . . . . . Converter
CP . . . . . Cadmium Plate, Candle Power, Centipoise, Conductive Plastic, Cone Point
CRP . . . . . Crepe, Crimp
CTR . . . . . Center
CURRNT . . . . . Current

D

D . . . . . Deep, Depletion, Depth, Diameter, Direct Current
D/A . . . . . Digital-to-Analog
DAP . . . . . Diallyl Phthalate
DB . . . . . Decibel, Double Break
DC . . . . . Direct Current, Double Contact
DBL . . . . . Double
DCDR . . . . . Decoder
DEG . . . . . Degree
DIA . . . . . Diameter
DIFF . . . . . Differential
DIP . . . . . Dual In-Line Package
DO . . . . Package Type Designation
DRVR . . . . . Driver

E

E . . . . . Enamel (Insulation, Enhancement, Extension)
E-MODE . . . . . Enhancement Mode
EPROM . . . . . Eraseable Programmable Read Only Memory
EXCL . . . . . Excluding, Exclusive
EXT . . . . . Extended, Extension, External, Extinguish

F

F . . . . . Fahrenheit, Farad, Female, Film, (Resistor), Fixed, Flange, Flint, Flourine, Frequency
FDTHRU . . . . . Feed Through
FEM . . . . . Female
FF . . . . . Flange, Female Connection; Flip Flop
FL . . . . . Flash, Flat, Fluid
FLEX . . . . . Flexible
FLG . . . . . Flange
FLTR . . . . . Filter, Floater
FT . . . . . Current Gain Bandwidth
FM . . . . . Flange, Male Connection; Foam, Frequency Modulation Product (Transition Frequency); Feet, Foot
FXD . . . . . Fixed

G

GEN . . . . . General, Generator
GHZ . . . . . Gigahertz
GP . . . . . General Purpose Group
GL . . . . . Glass
GRN . . . . . Green
GRV . . . . . Grooved

Table 1. Reference Designations, Abbreviations, Multipliers, and Manufacturer's Code List (2 of 4)

H

H . . . . . Henry, Hermaphrodite, High, Hole Diameter, Hot, Hub Inside Diameter, Hydrogen
HD . . . . . Hand, Hard, Head, Heavy Duty
HEX . . . . . Hexadecimal, Hexagon, Hexagonal
HGT . . . . . Height

I

IC . . . . . Collector Current, Integrated Circuit
ID . . . . . Identification, Inside Diameter
IF . . . . . Forward Current, Intermediate Frequency
IMPD . . . . . Impedance
IN . . . . . Inch, Indium
INP . . . . . Input
INS . . . . . Insert, Inside, Insulation, Insulator
INT . . . . . Integral, Intensity, Internal
INTL . . . . . Internal, International
INV . . . . . Invert, Inverter

J

JFET . . . . . Effect Transistor

K

K . . . . . Kelvin, Key, Kilo, Potassium
KB . . . . . Knob

L

LED . . . . . Light Emitting Diode
LG . . . . . Length, Long
LIN . . . . . Linear, Linear Taper, Linearity
LK . . . . . Link, Lock
LKG . . . . . Leakage, Locking
LKWR . . . . . Lockwasher
LS . . . . . Loudspeaker, Low Power Schottky, Series Inductance
LUM . . . . . Luminous

M

M . . . . . Male, Maximum, Mega, Mil, Milli, Mode, Momentary, Mounting Hole Centers, Mounting Hole Diameter
MA . . . . . Milliampere
MACH . . . . . Machined
MAX . . . . . Maximum
MCD . . . . . Millacandela
MICPROC . . . . . Microprocessor
MIN . . . . . Miniature, Minimum, Minor, Minute
MLD . . . . . Mold, Molded
MM . . . . . Magnetized Material (Restricted Articles Code), Millimeter
MO . . . . . Metal Oxide, Milliounce, Molybdenum
MOD . . . . . Model, Modified Modular, Modulated, Modulator
MOM . . . . . Momentary, Motherboard
MTG . . . . . Mounting
MTLC . . . . . Metallic
MTR . . . . . Meter
MULTIPLXR . . . . . Multiplexer
MULTR . . . . . Multiplier
MUW . . . . . Music Wire
MW . . . . . Milliwatt

N

N-CHAN . . . . . N-Channel Metal Oxide Semiconductor
NB . . . . . Niobium
NCH . . . . . Notched
NEG . . . . . Negative
NH . . . . . Nanohenry
NM . . . . . Nanometer, Nonmetallic
NO . . . . . Normally Open, Number
NPN . . . . . Negative Positive Negative (Transistor)
NS . . . . . Nanosecond, Non-Shorting, Nose
NYL . . . . . Nylon (Polyamide)

O

OCTL . . . . . Octal
OD . . . . . Olive Drab, Outside Diameter
OP . . . . . Operational
OPT . . . . . Optical, Option, Optional
OXD . . . . . Oxide

P

PAN-HD . . . . . Pan Head
PC . . . . . Picocoulomb, Piece, Printed Circuit
P.C. . . . . Printed Circuit
PCB . . . . . Printed Circuit Board
PD . . . . . Pad, Palladium, Pitch Diameter, Power Dissipation
PF . . . . . Picofarad; Pipe, Female Connection; Power Factor
PKG . . . . . Package
PL . . . . . Phase Lock, Plain, Plate, Plug
PL-MTG . . . . . Plate Mounting
PLSTC . . . . . Plastic
PN . . . . . Part Number
PNP . . . . . Positive Negative Positive (Transistor)
POLYC . . . . . Polycarbonate
POLYE . . . . . Polyester
POLYI . . . . . Polyimide
POS . . . . . Position, Positive
POZI . . . . . Pozidrive Recess
PRCN . . . . . Precision
PRIM . . . . . Primary
PRL . . . . . Parallel
PRP . . . . . Purple, Purpose
P/S . . . . . Power Supply
PT . . . . . Part, Pint, Platinum, Point, Pulse Time
PVC . . . . . Polyvinyl Chloride
PW . . . . . Power Wirewound, Pulse Width

Q

QUAD . . . . . Set of Four

R

RBN . . . . . Ribbon
RCVR . . . . . Receiver
RECT . . . . Rectangle, Rectangular, Rectifier
RES . . . . . Research, Resistance, Resistor, Resolution
RET . . . . . Retaining
RF . . . . . Radio Frequency
RFI . . . . . Radio Frequency Interference
RFLTR . . . . . Regulator
RKR . . . . . Rocker
RND . . . . . Round
RPG . . . . . Rotary Pulse Generator
RR . . . . . Rear
RVT . . . . . Rivet, Riveted

S

SCR . . . . . Screw, Scrub, Silicon Controlled Rectifier
SEC . . . . . Secondary
SER . . . . . Serial, Series
SGL . . . . . Single
SHFT . . . . . Shaft
SHLDR . . . . . Shoulder
SI . . . . . Silicon, Square Inch
SIG . . . . . Signal, Significant
SIP . . . . . Single In-Line Package
SKT . . . . . Skirt, Socket
SLDR . . . . . Solder
SM . . . . . Samarium, Seam, Small, Square Meter, Sub Modular, Subminiature
SMB . . . . . Subminiature, B Type (Snap-On Connector)

Table 1. Reference Designations, Abbreviations, Multipliers, and Manufacturer's Code List (3 of 4)

SNP . . . . . Snap
SPCL . . . . . Special
SQ . . . . . Square
SST . . . . . Stainless Steel
STDF . . . . . Standoff
SZ . . . . . Size

T

T . . . . . Tab Width, Taper, Teeth, Temperature, Tera, Tesla, Thermoplastic (Insulation), Thickness, Time, Timed, Tooth, Turns Ratio, Typical
TA . . . . . Ambient Temperature, Tantalum
TC . . . . . Thermoplastic
TFE . . . . . Polytetrafluro - ethylene, Teflon
THD . . . . . Thread, Threaded
THK . . . . . Thick
TO . . . . . Package Type
TPL . . . . . Triple
TRIG . . . . . Trigger, Triggerable, Triggering, Trigonometry
TRMR . . . . . Trimmer
TRN . . . . . Turn, Turns
TTL . . . . . Tan Translucent, Transistor, Transistor Logic

U

UCD . . . . . Microcandela
UNCT . . . . . Undercut
UF . . . . . Microfarad

V

V . . . . . Vanadium, Variable, Violet, Volt, Voltage
VA . . . . . Volt Ampere
VDC . . . . . Volts, Direct Current
VID . . . . . Video

W

W . . . . . Watt, Wattage, White,
WB . . . . . Wide Band Wide, Width, Wire
WD . . . . . Width, Wood

X

XSTR . . . . . Transistor

Y

YIG . . . . . Yytrium-iron-garnet
YTM . . . . . YIG Tuned Multiplier

Z

ZN-P . . . . . Zinc Plate
ZNR . . . . . Zener

MULTIPLIERS

Abbreviation	Prefix	Multiple	Abbreviation	Prefix	Multiple	Abbreviation	Prefix	Multiple
T	tera	10^{12}	da	deka	10	n	nano	10^{-9}
G	giga	10^{9}	d	deci	10^{-1}	n	pico	10^{-12}
M	mega	10^{6}	c	centi	10^{-3}	f	femto	10^{-15}
k	kilo	10^{3}	m	milli	10^{-3}	a	atto	10^{-18}
			μ	micro	10^{-6}			

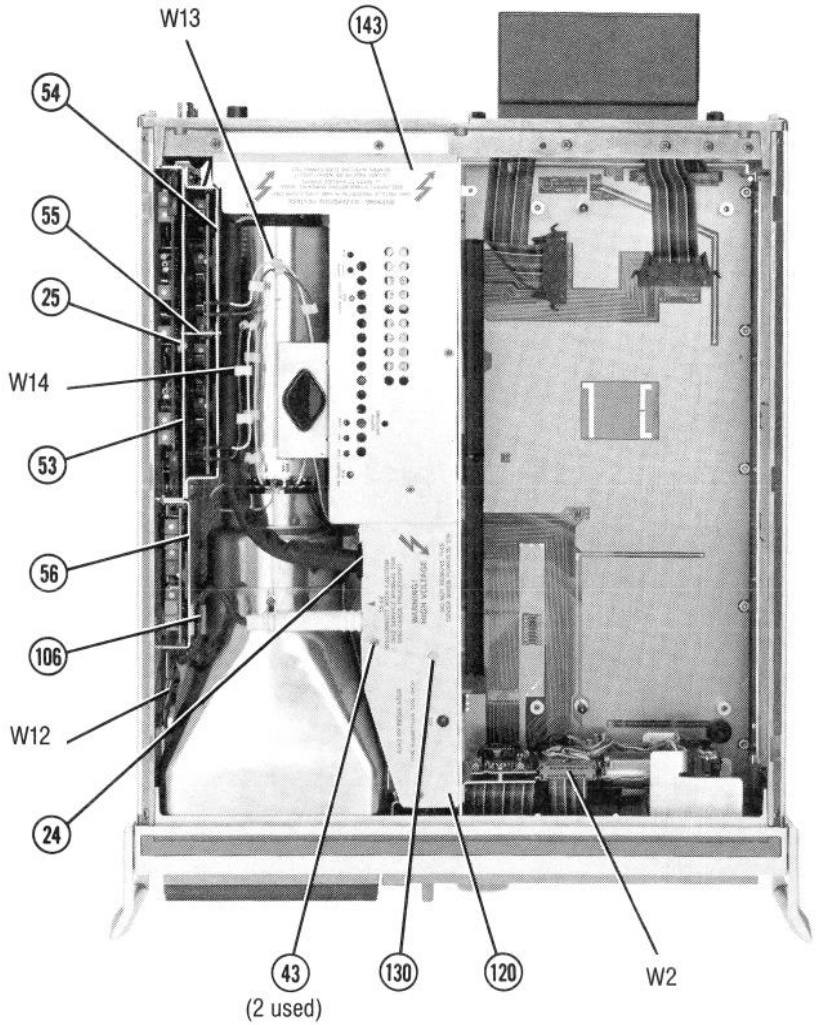
Table 1. Reference Designations, Abbreviations, Multipliers, and Manufacturer's Codes (4 of 4)

MANUFACTURER'S CODE LIST

Mfr. No.	Manufacturer Name	Address		Zip Code
00000	ANY SATISFACTORY SUPPLIER			
00853	SANGAMO ELEC CO S CAROLINA DIV	PICKENS	SC	29671
01121	ALLEN-BRADLEY CO	MILWAUKEE	WI	53204
01281	TRW INC SEMICONDUCTOR DIV	LAWNDALE	CA	90260
01295	TEXAS INSTR INC SEMICON CMPNT DIV	DALLAS	TX	75222
02111	SPECTROL ELECTRONICS CORP	CITY OF IND	CA	91745
02114	FERROXCUBE CORP	SAUGETIES	NY	12477
02768	ILLINOIS TOOL WORKS INC FASTEX DIV	DES PLAINES	IL	60016
03888	K D I PYROFILM CORP	WHIPPANY	NJ	07981
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX	AZ	85008
06383	PANDUIT CORP	TINLEY PARK	IL	60477
06665	PRECISION MONOLITHICS INC	SANTA CLARA	CA	95050
06915	RICHCO PLASTIC CO	CHICAGO	IL	60646
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW	CA	94042
17856	SILICONIX INC	SANTA CLARA	CA	95054
19701	MEPCO/ELECTRA CORP	MINERAL WELLS	TX	76067
20932	EMCON DIV ITW	SAN DIEGO	CA	92129
22526	BERG ELEK DIV DUPONT	NEW CUMBERLAND	PA	17070
24355	ANALOG DEVICES INC	NORWOOD	MA	02062
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD	PA	16701
25088	SIEMENS CORP	ISELIN	NJ	08830
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA	CA	95051
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO	CA	94304
3L585	RCA CORP SOLID STATE DIV	SOMERVILLE	NJ	08876
34335	ADVANCED MICRO DEVICES INC	SUNNYVALE	CA	94086
34649	INTEL CORP	MOUNTAIN VIEW	CA	95051
52063	EXAR INTEGRATED SYSTEMS INC	SUNNYVALE	CA	94086
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS	MA	01247
74970	JOHNSON E F CO	WASECA	MN	56093
75042	TRW INC PHILADELPHIA DIV	PHILADELPHIA	PA	19108
75915	LITTELFUSE INC	DES PLAINES	IL	600016
84411	TRW CAPACITOR DIV	OGALLALA	NE	69153
9N171	UNITRODE COMPUTER PRODUCTS CORP	METHUEN	MA	01844
91637	DALE ELECTRONICS INC	COLUMBUS	NE	68601
C0633	RIFA	BROMMA	SE	
H9027	SCHURTER A G H	LUZERN	SW	
00471	DOW KEY	PICKENS	SC	80020
01961	PULSE ENGINEERING INC	SAN DIEGO	CA	92111
03508	GE COSEMICONDUCTOR PROD DEPT	AUBURN	NY	13201
03911	CLAIREX CORP	MT VERNON	NY	10050
11236	CTS OF BERNE INC	BERNE	IN	46711
18324	SIGNETICS CORP	SUNNYVALE	CA	94086
30161	AAVID ENGINEERING INC	LACONIA	NH	03246
34344	MOTOROLA INC	FRANKLIN PARK	IL	60131
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS	MO	63107
72136	ELECTRO MOTIVE CORP	FLORENCE	SC	06226
72982	ERIE TECHNOLOGICAL PRODUCTS INC	ERIE	PA	16512
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON	CA	92634
9M011	INTERNATIONAL RECTIFIER SEMICON DIV	EL SEGUNDO	CA	90054
12969	UNITRODE CORP	WATERTOWN	MA	02172
29832	TELEDYNE PHILBRICK NEXUS	DEDHAM	MA	02026

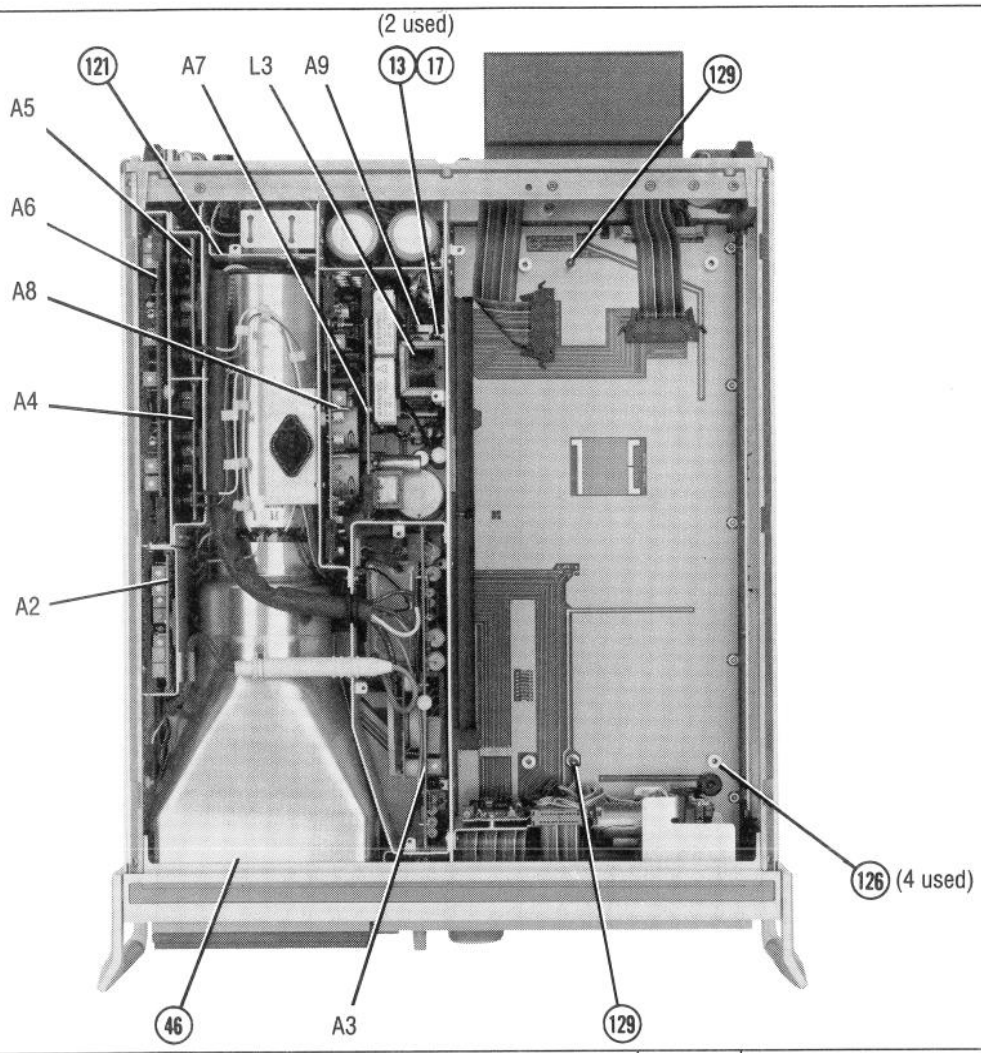
Table 2. Miscellaneous Replaceable Accessories

HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
			SERVICE TOOLS		
08510-60008	3	1	HP 8510 SERVICE KIT	28480	08510-60008
08510-60007	2	1	SERVICE ADAPTER / EMULATOR KIT	28480	08510-60007
			SOFTWARE		
85101-80070	8	1	OPERATING SYSTEM FIRMWARE	28480	85101-80070
85101-80069	5	1	OPERATING SYSTEM FIRMWARE with TIME DOMAIN OPTION 010	28480	85101-80069
			NOTE-PLEASE GIVE THE SERIAL NUMBER OF THE HP85101 WHEN ORDERING THE OPERATING SYSTEM FIRMWARE		
85101-60040	0	1	CIRCUIT MODELING PROGRAM: BOOT REVISION A.02.01 and CIRCUIT MODELING PROGRAM: PROG REVISION A.02.01	28480	85101-60040
			NOTE - THESE DISCS ARE AVAILABLE ONLY AS A SET		
08510-10006	9	1	HP 8511A FREQUENCY CONVERTER PERFORMANCE TESTS	28480	08510-10006
08510-10030	1	1	TEST SET SPECIFICATIONS AND PERFORMANCE TESTS, TWO DISC SET	28480	08510-10030
08510-10031	2	1	PROGRAM DISC	28480	08510-10031
08510-10032	3	1	DATA DISC	28480	08510-10032
			NOTE - THESE TESTS ARE USED FOR ALL TEST SETS EXCEPT THE HP 8511A		
08510-10024	5	1	ADJUSTMENTS HP85102 AND TEST SETS	28480	08510-10024
			DOCUMENTATION		
08510-90067	7	1	HP 8510B OPERATING MANUAL SET OPTION 915 adds SERVICE MANUAL AND ADAPTER EMULATOR KIT	28480	08510-90067
			THE FOLLOWING VOLUMES ARE INCLUDED IN THE OPERATING MANUAL SET AND ARE AVAILABLE SEPARATELY.		
08510-90070	2	1	OPERATING AND PROGRAMMING	28480	08510-90071
08510-90072	4	1	KEYWORD DICTIONARY	28480	08510-90072
08510-90102	1	1	QUICK REFERENCE GUIDE	28480	08510-90102
08510-90074	1	1	SYSTEM MANUAL	28480	08510-90074
08510-90076	8	1	TEST SET AND ACCESSORIES MANUAL	28480	08510-90076
			THE FOLLOWING MANUAL IS ADDED WITH OPTION 915 and IS AVAILABLE SEPARATELY		
08510-90078	6	1	SERVICE MANUAL	28480	08510-90078



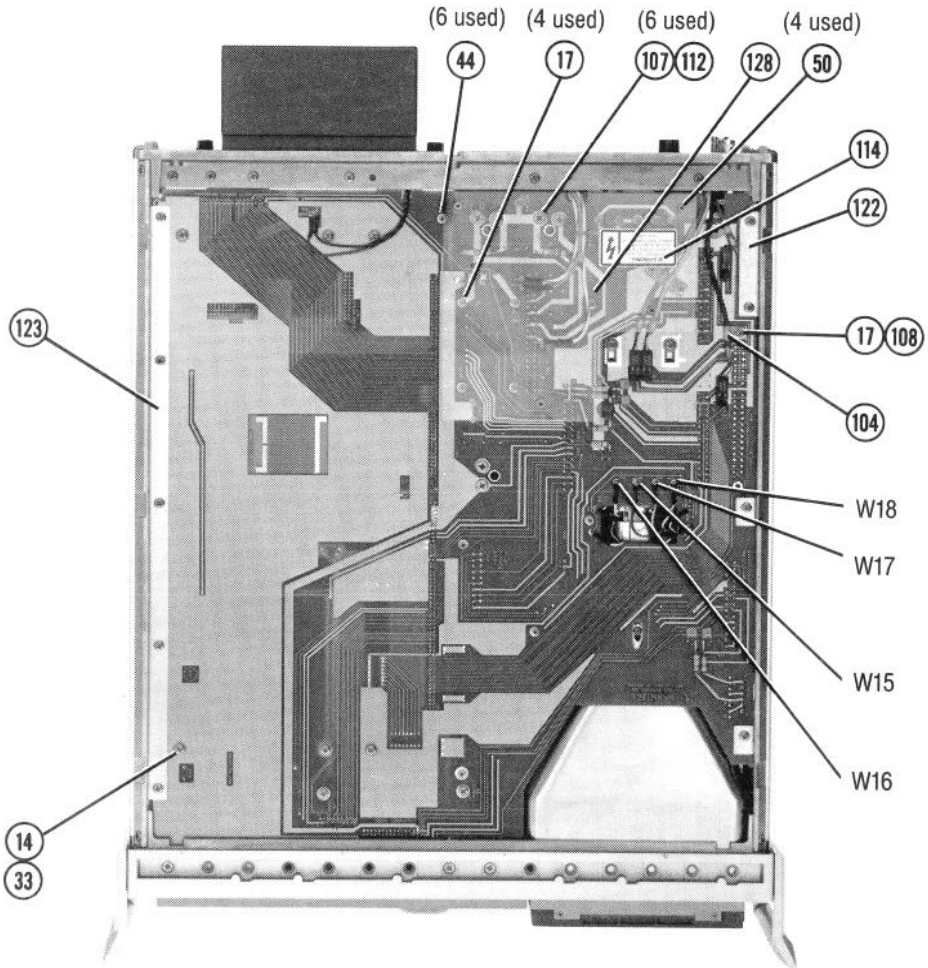
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W2	85101-60102	5	1	CABLE ASSY TAPE	28480	85101-60102
W12	85101-60113	8	1	CBL AY 15V REG	28480	85101-60113
W13	85101-60114	9	2	CBL AY X-Y AMP	28480	85101-60114
W14	85101-60114	9		CBL AY X-Y AMP	28480	85101-60114
24	0400-0001	1	2	GROMMET-RND .562-IN-ID .75-IN-GRV-OD	28480	0400-0001
25	0403-0026	6	2	PLUG-HOLE BDR-HD FOR .187-D-HOLE NYL	02768	207-120241-03-0101
43	2200-0101	0	4	SCREW-MACH 4-40 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
53	85101-00017	5	1	SHIELD-LINE GEN	28480	85101-00017
54	85101-00018	6	1	SHIELD X-Y BDS	28480	85101-00018
55	85101-00019	7	1	BOARD SUPPORT	28480	85101-00019
56	85101-00020	0	1	SHIELD-PC BOARD	28480	85101-00020
106	1400-0755	3	3	CLIP-CMPNT .25-DIA .75-WD PVC	06915	KKU-4
120	85101-00011	9	1	COVER H.V.	28480	85101-00011
130	85662-20042	6	1	GUIDE HV	28480	85662-20042
143	85101-00013	1	1	COVER-PWR SPLY	28480	85101-00013

Figure 2. HP 85101 Top Internal



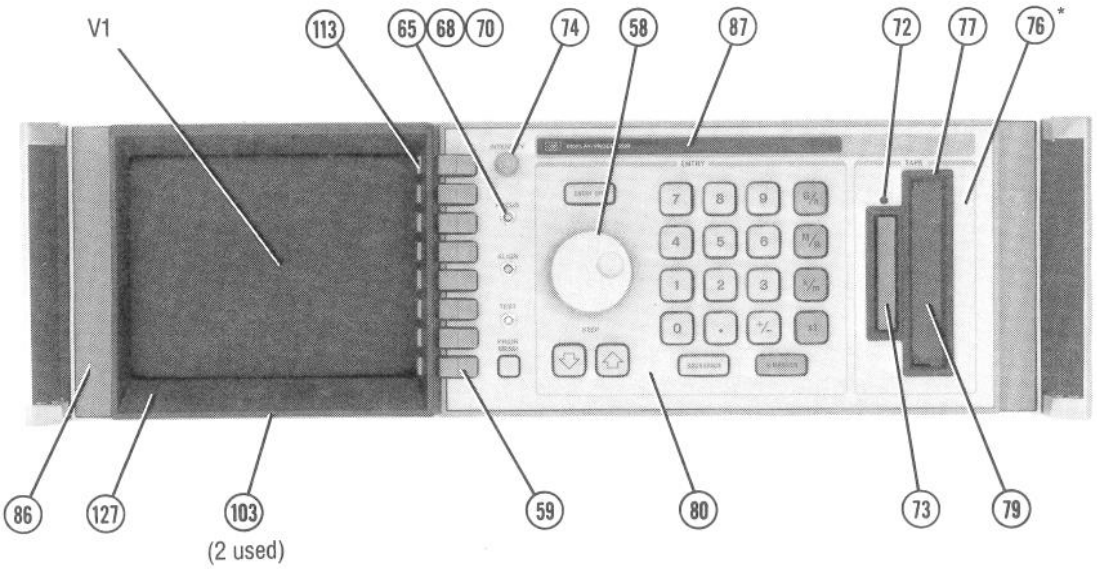
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	85101-60002	4	1	BOARD ASSEMBLY, Z AXIS (NEW)	28480	85101-60002
A2	85101-69002	2	1	BOARD ASSEMBLY, Z AXIS (REBUILT)	28480	85101-69002
A3	85101-60225	3	1	BOARD ASSEMBLY, HIGH VOLTAGE (NEW)	28480	85101-60225
A3	85101-69225	1	1	BOARD ASSEMBLY, HIGH VOLTAGE (REBUILT)	28480	85101-69225
A4	85101-60226	6	1	BOARD ASSEMBLY, X DEFLECTION AMP (NEW)	28480	85101-60226
A4	85101-69226	4	1	BOARD ASSEMBLY, X DEFLECTION AMP (REBUILT)	28480	85101-69226
A5	85101-60226	6		BOARD ASSEMBLY, Y DEFLECTION AMPLIFIER (SAME AS A4; USE PREFIX A5). (NEW)	28480	85101-60226
A5	85101-69226	4	1	BOARD ASSEMBLY, Y DEFLECTION AMPLIFIER (SAME AS A4; USE PREFIX A5). (REBUILT)	28480	85101-69226
A6	85101-60006	8	1	BOARD ASSEMBLY, LINE GENERATOR (NEW)	28480	85101-60006
A6	85101-69006	6	1	BOARD ASSEMBLY, LINE GENERATOR (REBUILT)	28480	85101-69006
A7	85101-60216	2		BOARD ASSEMBLY, SWITCHING REG (NEW)	28480	85101-60216
A7	85101-69216	0	1	BOARD ASSEMBLY, SWITCHING REG (REBUILT)	28480	85101-69216
A8	85101-60218	4	1	BOARD ASSEMBLY, POST REGULATOR (NEW)	28480	85101-60218
A8	85101-69218	2	1	BOARD ASSEMBLY, POAT REGULATOR (REBUILT)	28480	85101-69218
A9	9100-4392	4	1	ASSEMBLY, SWITCHING TRANSFORMER (NEW)	28480	9100-4392
L3	9140-0809	4	1	INDUCTOR 65UH 1.5WX1.12LG	28480	9140-0809
T1	5180-2636	9	1	POWER XFORMER	28480	5180-2636
13	2260-0009	3	14	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
17	3050-0105	6	14	WASHER-FL MTLC NO. 4 .125-IN-ID	28480	3050-0105
46	01332-60602	3	1	SHIELD CRT FRONT	28480	01332-60602
121	85101-00016		1	SHIELD-LINE	28480	85101-00016
126	85101-20029		4	SPACER-STANDOFF	28480	85101-20029
129	85101-20033		2	GUIDE Pln-CD CGE	28480	85101-20033

Figure 3. HP 85101 Top Internal Card Cage Removed



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W15	85101-60115	0	1	JUMPER WIRE AY	28480	85101-60115
W16	85101-60116	1	1	JUMPER WIRE AY	28480	85101-60116
W17	85101-60117	2	1	JUMPER WIRE AY	28480	85101-60117
W18	85101-60118	3	1	JUMPER WIRE AY	28480	85101-60118
14	2360-0115	4	67	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
17	3050-0105	6	14	WASHER-FL MTLC NO. 4 .125-IN-ID	28480	3050-0105
33	3050-0227	3	12	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
44	2200-0103	2	16	SCREW-MACH 4-40 .25-IN-LG PAN-HD-POZI	28480	2200-0103
50	2200-0165	6	4	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
104	1400-0082	9	4	CLAMP-CABLE .125-DIA .375-WD NYL	28480	1400-0082
107	2190-0011	8	6	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
108	2200-0107	6	4	SCREW-MACH 4-40 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
112	2680-0129	8	6	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
114	7120-4295	6	1	LABEL-WARNING 1-IN-WD 2-IN-LG AL	28480	7120-4295
122	85101-00034	6	1	BRKT-MOTHER BD L	28480	85101-00034
123				NOT ASSIGNED		
128	85101-20032	6	1	SAFETY SHIELD	28480	85101-20032

Figure 4. HP 85101 Bottom Internal

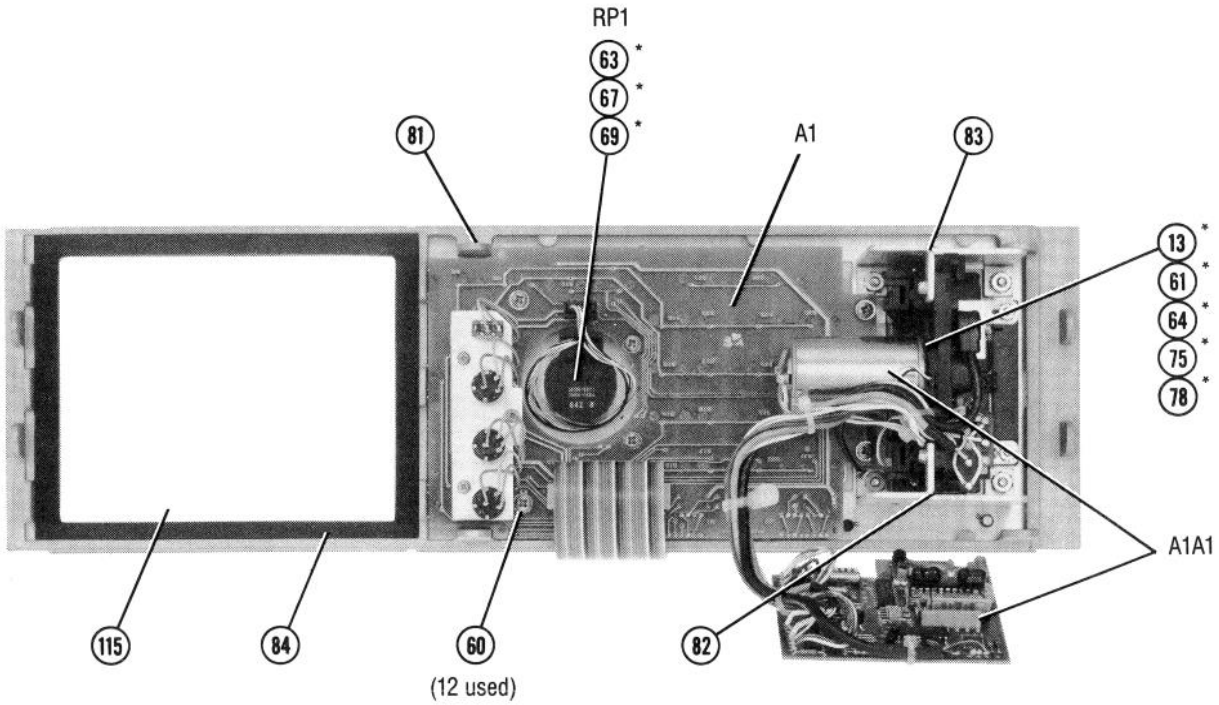


*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
58	0370-3033	0	1	KNOB-BASE 1-1/2 JGK .25-IN-ID	28480	0370-3033
59	0371-3319	7	8	KEY CAP ABS PGK	28480	0371-3319
65	1490-0968	9	2	BUSHING-PNL .14-ID .3-LG 1/4-32-THD	28480	1490-0968
68	2190-0067	4	3	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0067
70	2950-0072	3	1	NUT-HEX-DBL-CHAM 1/4-32-THD .062-IN-THK	00000	ORDER BY DESCRIPTION
72	4040-2169	6	1	LIGHT PIPE	28480	4040-2169
73	5040-8190	6	1	BUTTON-EJECT	28480	5040-8190
74	5040-8806	1	1	KNOB 5/16" SERIES	28480	5040-8806
76	1460-2166	0	1	SPRING	28480	1460-2166
77	05441-40000	3	1	BEZEL-TAPE	28480	05441-40000
79	05441-40004	7	1	DOOR	28480	05441-40004
80	85101-00001	7	1	FRONT PANEL-DRS	28480	85101-00001
85	85101-20025	7	1	SWITCH PLUNGER	28480	85101-20025
86	85101-20027	9	1	FRONT-BEZEL MACH	28480	85101-20027
87	85101-40001	1	1	WINDOW-DISPL	28480	85101-40001
103	0520-0164	1	2	SCREW-MACH 2-56 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
113	4040-2172	1	8	MENU TAB	28480	85101-40003
127	85101-20031	5	1	BEZEL-CRT MACH	28480	85101-20012
146	1410-0069	3	1	BUSHING-PNL .128-ID .343-LG 1/4-32-THD	28480	1410-0069
V1	5083-5791	7	1	CRT P31	28480	5083-5791

Figure 5. HP 85101 Front View

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Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	85101-60034	2	1	BOARD ASSEMBLY, FRONT PANEL (NEW)	28480	85101-60001
A1	85101-69034	0	1	BOARD ASSEMBLY, FRONT PANEL (REBUILT)	28480	85101-69034
A1A1	5061-3002	3	1	ASSEMBLY, TRANSPORT (NEW)	28480	5061-3002
A1A1	98075-69900	3	1	ASSEMBLY, TRANSPORT (REBUILT)	28480	98075-69900
RP1	85101-60229		1	ROTARY PULSE GEN	28480	85101-60229
13	2260-0009	3	14	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
60	0510-1148	2	12	RETAINER-PUSH ON KB-TO-SHFT EXT	28480	0510-1148
61	0624-0099	1	2	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
63	1251-7761	8	1	CONN-POST TYPE .100-PIN-SPCG	28480	1251-7761
64	1460-2007	8	1	STAMPING-BE-CU SPRING-GROUND	28480	1460-2007
67	2190-0016	3	1	WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
69	2950-0001	8	3	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
75	05441-00024	7	2	RETAINER-HINGE	28480	05441-00024
78	05441-40003	6	1	HINGE	28480	05441-40003
81	85101-60220	8	1	SUB-PANEL	28480	85101-00002
82	85101-00029	9	1	MTG PLATE-TOP-TP	28480	85101-00029
83	85101-00030	2	1	MTG PLATE-BOT-TP	28480	85101-00030
84	85101-20024	6	1	SHOCK MT .10 HGT	28480	85101-20024
115	9135-0052	8	1	RFI CRT FACEPLATE 4.235-IN-WD	28480	9135-0052

Figure 6. HP 85101 Front Internal

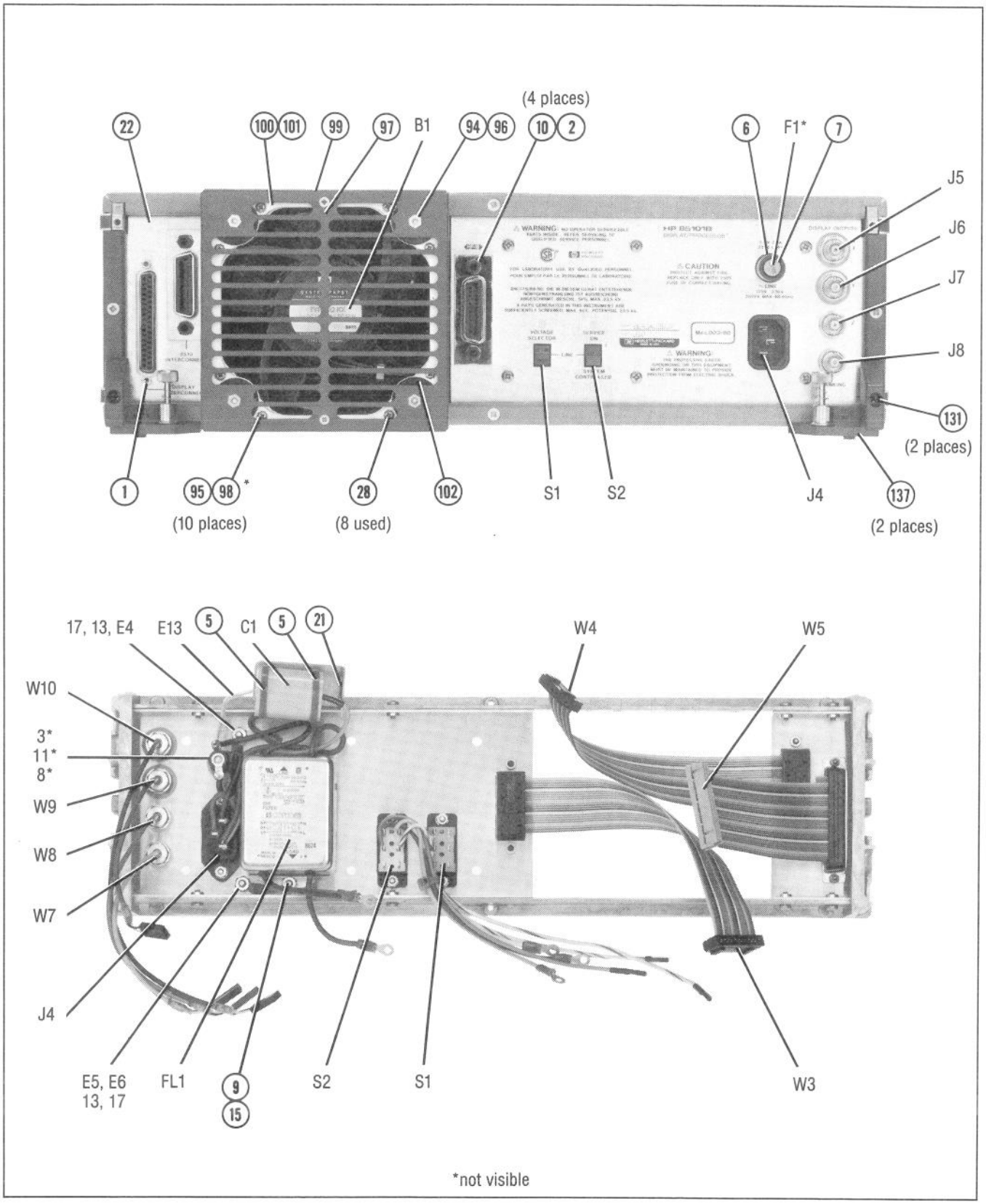
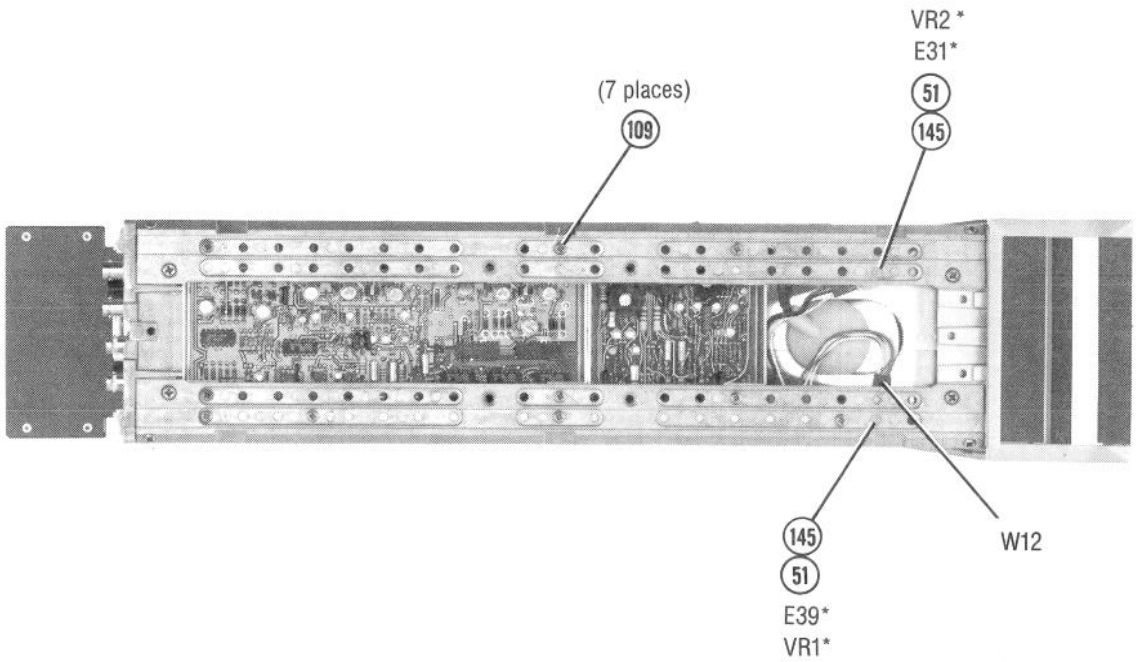


Figure 7. HP 85101 Rear External/Internal (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1251-2942	7	2	LOCK-SUBMIN D CONN	28480	1251-2942
2	1251-7002	0	2	SCREW KIT-AMP CHAMP CONN	28480	1251-7002
3	1400-0090	9	1	FUSEHOLDER COMPONENT FOR USE ON	28480	1400-0090
5	1400-0493	6	2	CABLE TIE .062-1.25-DIA .14-WD NYL	06383	PLT1.5-MP8
6	2110-0564	8	1	FUSEHOLDER BODY 12A MAX FOR UL	H9027	031.1657
7	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
8	2110-0569	3	1	FUSEHOLDER COMPONENT NUT; THREAD M12.7	28480	2110-0569
9	2190-0007	2	6	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
10	2190-0034	5	4	WASHER-LK HLCL NO. 10 .194-IN-ID	28480	2190-0034
11	2190-0037	8	1	WASHER-LK INTL T 1/2 IN .512-IN-ID	28480	2190-0037
13	2260-0009	3	14	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	2420-0001	5	8	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
17	3050-0105	6	14	WASHER-FL MTLC NO. 4 .125-IN-ID	28480	3050-0105
21	85101-00027	7	1	CAPACITOR MOUNT	28480	85101-00027
22	85101-00032	4	1	PANEL-REAR-LEFT	28480	85101-00032
28	2200-0105	4	28	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
45	4320-0311	0	1	SHOCK MOUNT SIL-RBR	28480	4320-0311
94	1520-0205	2	4	SHOCK MOUNT .47-EFF-HGT	28480	1520-0205
95	2200-0138	3	10	SCREW-MACH 4-40 .188-IN-LG 100 DEG	28480	2200-0138
96	2360-0196	1	4	SCREW-MACH 6-32 .375-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
97	85660-00043	3	1	FAN HOUSING GRL	28480	85660-00043
98	85660-00044	4	1	FAN HOUSING BOT	28480	85660-00044
99	85660-00045	5	1	FAN HOUSING TOP	28480	85660-00045
100	85660-00046	6	1	BASE PLATE	28480	85660-00046
101	85660-00047	7	1	SUPPORT PLATE	28480	85660-00047
102	85660-20092	4	4	RUBBER SHKMT	8480	5660-20092
131	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
137	5020-8939	9	1	LOCK FOOT U LFT	28480	5020-8939
B1	3160-0377	7	1	FAN-TBAX 122-CFM 9.5-14VDC 16.5KV-DIEL	28480	3160-0377
C1	0160-5835	9	1	CAPACITOR-FXD 2UF ±20% 330VAC(RMS)	28480	0160-5835
E4	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E5	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E6	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E13	0890-0094	9	1	TUBING-FLEX .051-ID TFE .016-WALL	00000	ORDER BY DESCRIPTION
F1	2110-0083	6	1	FUSE 2.5A 250V NTD 1.25X.25 UL	28480	2110-0083
FL1	9135-0084	6	1	LINE MOD FLTR	28480	9135-0084
J1-J3				NOT ASSIGNED		
J4	1251-2357	8	1	CONNECTOR-AC PWR HP-9 MALE FLG-MTG	28480	1251-2357
J5	1250-1091		2	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J6	1250-1091			CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J7	1250-0870		2	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J8	1250-0870			CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
S1	3101-2299	2	1	SWITCH-SL DPDT STD 5A 250VAC SLDR-LUG	28480	3101-2299
S2	3101-2405	2	1	SWITCH-SL DPDT STD 2A 250VAC QCON	28480	3101-2405
W3	85101-60103	6	1	CABLE AY HPIB	28480	85101-60103
W4	85101-60104	7	1	CA AY SYS BUSS	28480	85101-60104
W5	85101-60105	8	1	CA AY INTERCONN	28480	85101-60105
W7	85101-60108		1	CA AY X OUTPUT	28480	85101-60108
W8	85101-60109		1	CA AY Y OUTPUT	28480	85101-60109
W9	85101-60110		1	CA AY Z OUTPUT	28480	85101-60110
W10	85101-60111		1	CA AY BLANKING	28480	85101-60111

Figure 7. HP 85101 Rear External/Internal (2 of 2)

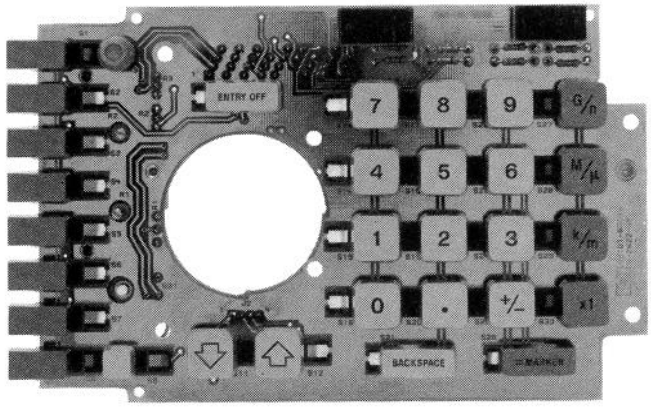


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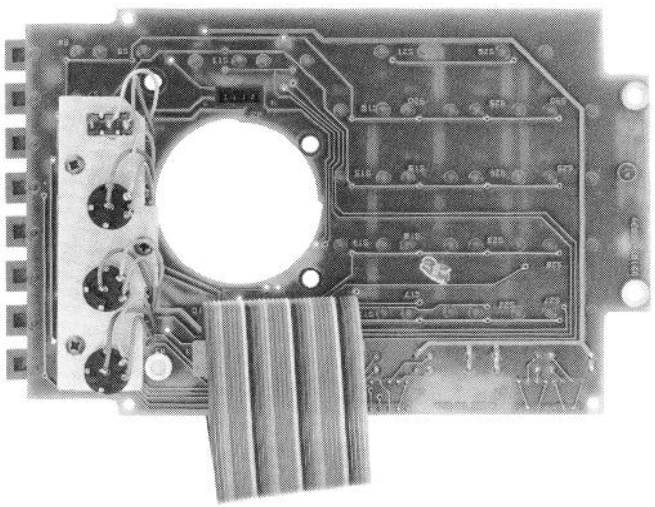
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E31	0340-0949	8	2	INSULATOR-XSTR THRM-CNDCT	28480	0340-0949
E39	0340-0949	8		INSULATOR-XSTR THRM-CNDCT	28480	0340-0949
VR1	1826-0106		1	IC +15V RGLTR TO-220	04713	MC7815CP
VR2	1826-0214		1	IC -15V RGLTR TO-220	04713	MC7915CT
51	2420-0014	0	2	NUT-HEX-DBL-CHAM 6-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
109	2360-0113	2	7	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
145	0570-0111	3	2	SCREW-MACH 6-32 .375-IN-LG RD-HD-SLT	00000	ORDER BY DESCRIPTION

Figure 8. HP 85101 Left Internal

FRONT VIEW



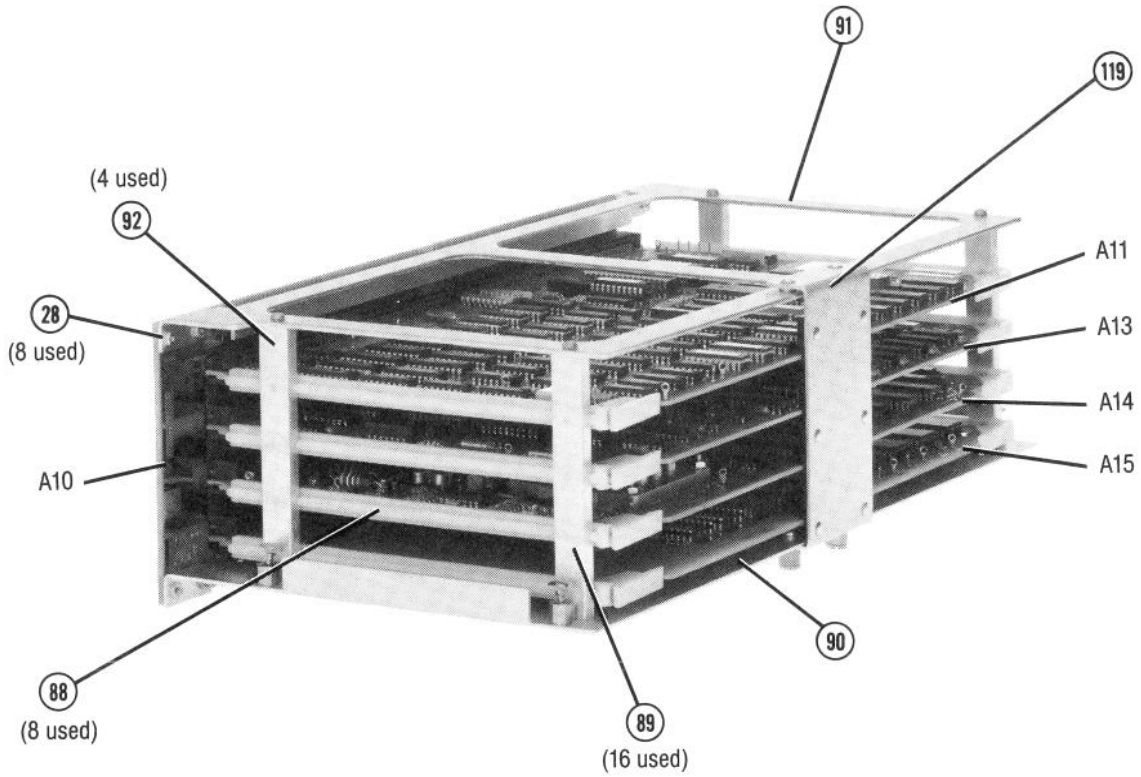
BACK VIEW



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	85101-60034	6	1	BOARD ASSEMBLY, FRONT PANEL (NEW)	28480	85101-60034
A1	85101-69034	8	1	BOARD ASSEMBLY, FRONT PANEL (REBUILT)	28480	85101-69034

Figure 9. HP 85101 Front Panel Board

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Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10	85101-60010	4	1	BOARD ASSEMBLY, DAUGHTER	28480	85101-60010
A11	85101-60211	7	1	BOARD ASSEMBLY, PROCESSOR (NEW)	28480	85101-60211
A11	85101-69211	5	1	BOARD ASSEMBLY, PROCESSOR (REBUILT)	28480	85101-69211
A12				NOT ASSIGNED		
A13	85101-60212	8	1	BOARD ASSEMBLY, MEMORY (NEW)	28480	85101-60212
A13	85101-69212	6	1	BOARD ASSEMBLY, MEMORY (REBUILT)	28480	85101-69212
A14	85101-60221	9	1	BOARD ASSEMBLY, DISPLAY GEN (NEW)	28480	85101-60221
A14	85101-69221	7	1	BOARD ASSEMBLY, DISPLAY GEN (REBUILT)	28480	85101-69221
A15	85101-60222	0	1	BOARD ASSEMBLY, IO (NEW)	28480	85101-60222
A15	85101-69222	8	1	BOARD ASSEMBLY, IO (REBUILT)	28480	85101-69222
A16				NOT ASSIGNED		
28	2200-0105	4	28	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
88	0403-0442	0	8	GUIDE-PC BD WHT NYL .062-IN-BD-THKNS	28480	0403-0442
89	4040-0771	2	16	LOCKING TAB 0.312 IN DIA; 0.040 IN	28480	4040-0771
90	85101-00007	3	1	CARD CAGE BOTTOM	28480	85101-00007
91	85101-00008	4	1	CARD CAGE-TOP	28480	85101-00008
92	85101-20026	8	4	CARD GUIDE SPRT	28480	85101-20026
119	85101-00009	5	1	PC BOARD LOCK	28480	85101-00009

Figure 10. HP 85101 Card Cage Assembly

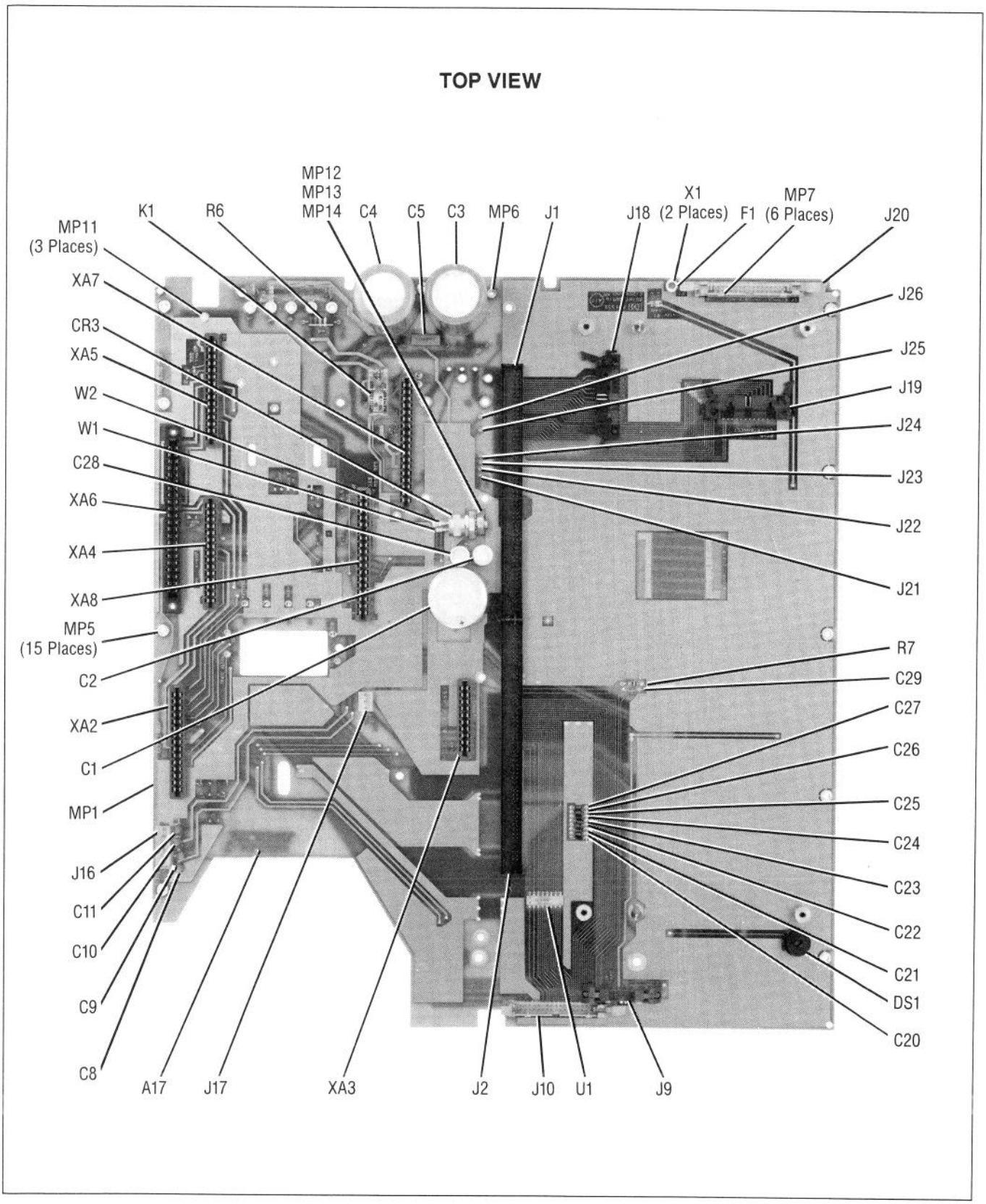


Figure 11. HP 85101 Mother Board Assembly (1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A17	85101-60016	0	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A17 IS ORDERED: C1, C3, C4	28480	85101-60016
C1				NOT ASSIGNED		
C2	0180-0582	5	1	CAPACITOR-FXD 270UF + 100-10% 40VDC AL	00853	301EN271U040B
C3				NOT ASSIGNED		
C4				NOT ASSIGNED		
C5	0160-4048	4	1	CAPACITOR-FXD .022UF ±20% 250VAC(RMS)	C0633	PME 271 M 522
C8	0180-0630	4	4	CAPACITOR-FXD 4.7UF ± 20% 50VDC TA	28480	0180-0630
C9	0180-0630	4		CAPACITOR-FXD 4.7UF ± 20% 50VDC TA	28480	0180-0630
C10	0180-0630	4		CAPACITOR-FXD 4.7UF ± 20% 50VDC TA	28480	0180-0630
C11	0180-0630	4		CAPACITOR-FXD 4.7UF ± 20% 50VDC TA	28480	0180-0630
C20-27	0160-4801	7	8	CAPACITOR-FXD 100PF ±5% 100VDC CER	28480	0160-4801
C28	0180-0582	5	1	CAPACITOR-FXD 270UF + 100-10% 40VDC AL	00853	301EN271U040B
C29	0160-4790	3	1	CAPACITOR-FXD 10PF ±5% 100VDC CER 0 ± 30	28480	0160-4790
CR3	1884-0046	9	1	THYRISTOR-SCR VRRM = 50	03508	C230F
DS1	0960-0561	4	1	AUDIO TRANSDUCER 1-3VDC; 85DB AT 1.5V	28480	0960-0561
F1	2110-0047	3	1	FUSE 1A 125V	28480	2110-0047
J1	1251-7472	8	2	CONN-POST TYPE .100-PIN-SPCG 110-CONT	28480	1251-7472
J2	1251-7472	8		CONN-POST TYPE .100-PIN-SPCG 110-CONT	28480	1251-7472
J9	1251-5745	4	1	CONNECTOR 20-PIN M POST TYPE (A17J9 DOES NOT INCLUDE A17MP6 & A17MP7)	28480	1251-5745
J10	1251-7169	0	2	CONNECTOR 34-PIN M POST TYPE	28480	1251-7169
J16	1251-3638	0	1	CONNECTOR 6-PIN M POST TYPE	28480	1251-3638
J17	1251-4246	8	1	CONNECTOR 3-PIN M POST TYPE	28480	1251-4246
J18	1252-0693	3	2	CONN-POST TYPE .100-PIN-SPCG 24-CONT (A17J18 DEOS NOT INCLUDE A17MP12&A17MP13	28480	1251-7758
J19	1252-0693	3		CONN-POST TYPE .100-PIN-SPCG 24-CONT (A17J19 DEOS NOT INCLUDE A17MP14&A17MP15	28480	1251-7758
J20	1251-7169	0	1	CONNECTOR 34-PIN M POST TYPE (A17J20 DEOS NOT INCLUDE A17MP10&A17MP11	28480	1251-7169
J21	0360-0124	3	6	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J22	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J23	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J24	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J25	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
J26	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
K1	0490-1433	4		RELAY	25088	8031S
MP1	0520-0174	3	2	SCREW-MACH 2-56 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP5	86701-20036	8	1	MTG BLOCK DIODE	28480	86701-20036
MP6	1251-5595	2	6	POLARIZING KEY-POST CONN	28480	1251-5595
MP7	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP11	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP12	1251-7970	1	4	LATCH-AMP-LATCH CONN	28480	1251-7970
MP13	1251-7970	1		LATCH-AMP-LATCH CONN	28480	1251-7970
MP14	1251-7970	1		LATCH-AMP-LATCH CONN	28480	1251-7970
R6	0690-6841	2	1	RESISTOR 680K 10% 1W CC TC = 0 + 882	01121	GB6841
R7	0698-3442	9	1	RESISTOR 237K 1% .125W F TC = 0 ± 100	24546	C4-1/8-T0-237R-F
U1	1810-0037	3		NETWORK-RES 16-DIP1.0K OHM X 8	11236	761-3-R1K
W1	8151-0013	2	2	WIRE 22 1X22	00000	ORDER BY DESCRIPTION
W2	8151-0013	2		WIRE 22 1X22	00000	ORDER BY DESCRIPTION
X1	1251-2313	1	1	CONN SGL CONT.04	28480	1251-2313
XA2	1251-2035	9	3	CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA3	1251-2034	8	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	28480	1251-2034
XA4	1251-2035	9		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA5	1251-2035	9		CONNECTOR-PC EDGE 15-CONT/ROW 2-ROWS	28480	1251-2035
XA6	1251-7882	4	1	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
XA7	1251-2026	8	2	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	28480	1251-2026
XA8	1251-2026	8		CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	28480	1251-2026

Figure 11. HP 85101 Mother Board Assembly (2 of 4)

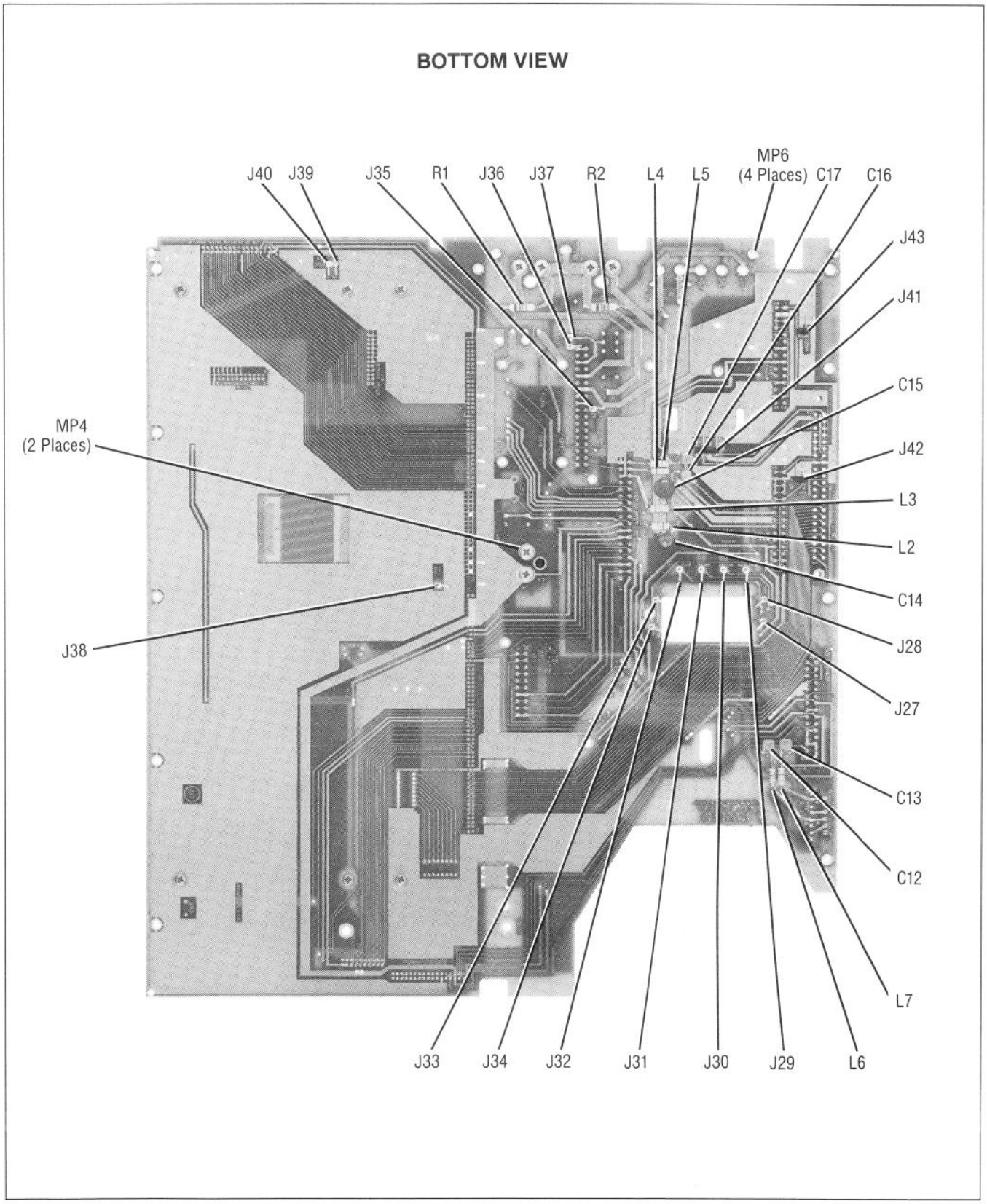
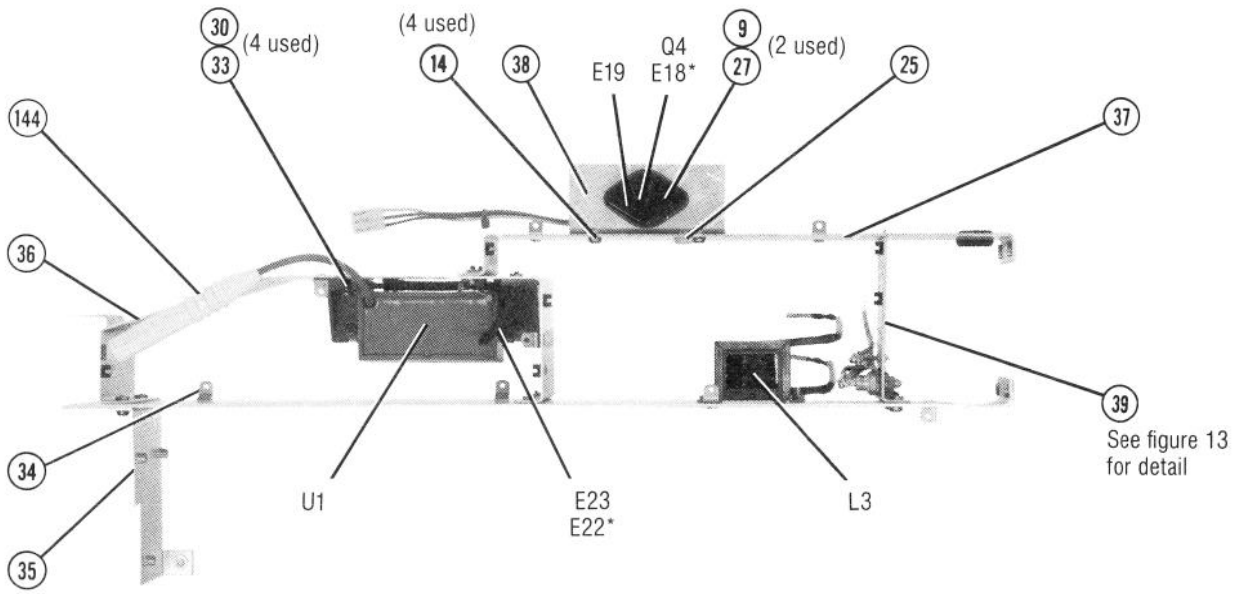


Figure 11. HP 85101 Mother Board Assembly (3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C12	0160-4535	4	4	CAPACITOR-FXD 1UF ±10% 50VDC CER	28480	0160-4535
C13	0160-4535	4		CAPACITOR-FXD 1UF ±10% 50VDC CER	28480	0160-4535
C14	0160-2055	9	1	CAPACITOR-FXD .01UF +80-20% 100VDC CER	28480	0160-2055
C15	0160-4298	6	1	CAPACITOR-FXD 4700PF ±20% 250VDC CER	56289	C067F251H472MS22-CDH
C16	0160-4535	4		CAPACITOR-FXD 1UF ±10% 50VDC CER	28480	0160-4535
C17	0160-4535	4		CAPACITOR-FXD 1UF ±10% 50VDC CER	28480	0160-4535
J27-40	0360-1788	5	14	TML STUD SGL-PIN	28480	0360-1788
J41	1251-5816	4	1	CONN PST 4M 1R	28480	1251-5816
J42-43	1251-5817	5	2	CONN PST 2M 1R	28480	1251-5817
L2	9140-0452	3	1	INDUCTOR RF-CH-MLD 2.7UH 5% .166DX.385LG	28480	9140-0452
L3	9140-0400	1	3	INDUCTOR RF-CH-MLD 8.2UH 5% .166DX.385LG	28480	9140-0400
L4	9140-0400	1		INDUCTOR RF-CH-MLD 8.2UH 5% .166DX.385LG	28480	9140-0400
L5	9140-0400	1		INDUCTOR RF-CH-MLD 8.2UH 5% .166DX.385LG	28480	9140-0400
L6	9100-3560	6	2	INDUCTOR RF-CH-MLD 5.6UH 5% .166DX.385LG	28480	9100-3560
L7	9100-3560	6		INDUCTOR RF-CH-MLD 5.6UH 5% .166DX.385LG	28480	9100-3560
MP4	2950-0051	8	1	NUT-HEX-DBL-CHAM 1/4-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
MP6	1251-5595	2	6	POLARIZING KEY-POST CONN	28480	1251-5595
R1	0757-0854	7	2	RESISTOR 56.2K 1% .5W F TC=0±100	28480	0757-0854
R2	0757-0854	7		RESISTOR 56.2K 1% .5W F TC=0±100	28480	0757-0854

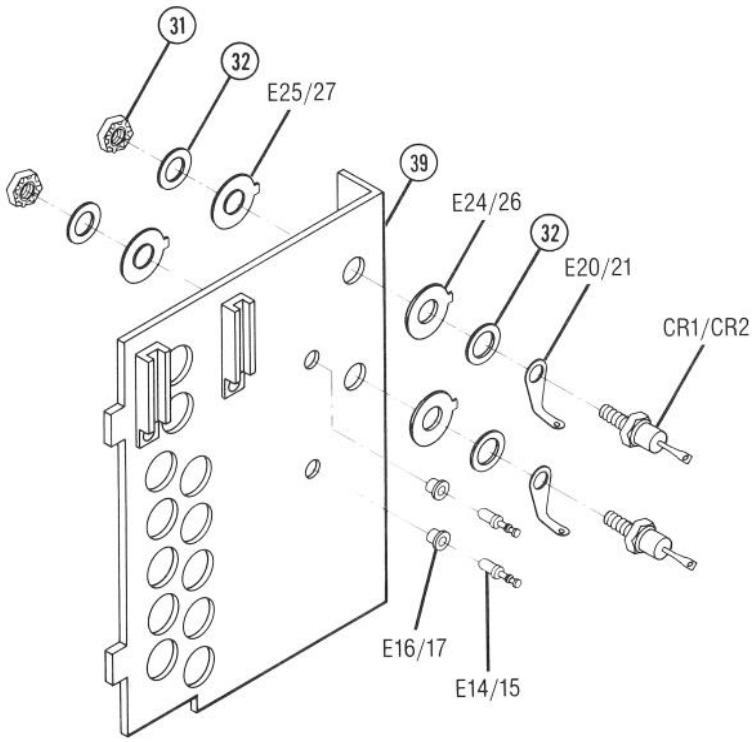
Figure 11. HP 85101 Mother Board Assembly (4 of 4)

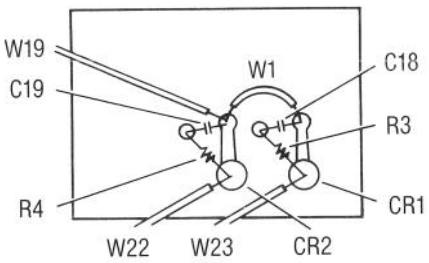


*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
9	2190-0007	2	6	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
14	2360-0115	4	67	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	0403-0026	6	2	PLUG-HOLE BDR-HD FOR .187-D-HOLE NYL	02768	207-120241-03-0101
27	0626-0002	0	2	SCREW-TPG 6-20 .5-IN-LG PAN-HD-SLT	00000	ORDER BY DESCRIPTION
30	0515-1244	9	4	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
33	3050-0227	3	12	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
34	85101-00005	1	1	CENTER DIVIDER	28480	85101-00005
35	85101-00006	2	1	BRACKET-TAPE BD	28480	85101-00006
36	85101-00010	8	1	SHIELD-H.V.	28480	85101-00010
37	85101-00012	0	1	PWR SPLY SHIELD	28480	85101-00012
38	85101-00014	2	1	HEAT SINK	28480	85101-00014
39	85101-00015	3	1	SHIELD CAPACITOR	28480	85101-00015
144	1400-0755	3		CLIP-CMPNT .25-DIA .75-WD PVC	06915	KKU-4
E18	0340-0486	8	1	INSULATOR-COVER NYLON	28480	0340-0486
E19	0340-0664	4	1	INSULATOR-XSTR THRM-CNDCT MICA	28480	0340-0664
E22	0360-0009	3	2	TERMINAL-SLDR LUG PL-MTG FOR-fi6-SCR	28480	0360-0009
E23	0362-0227	1	3	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
L3	9140-0809		1	INDUCTOR 65UH 1.5WX1.12LG	28480	9140-0809
Q4	1854-0518	7	1	TRANSISTOR NPN 2N5877 SI TO-3 PD=150W	04713	2N5877
U1	0960-0383	3	1	MULTIPLIER, HIGH VOLT 20 KV	28480	0960-0383

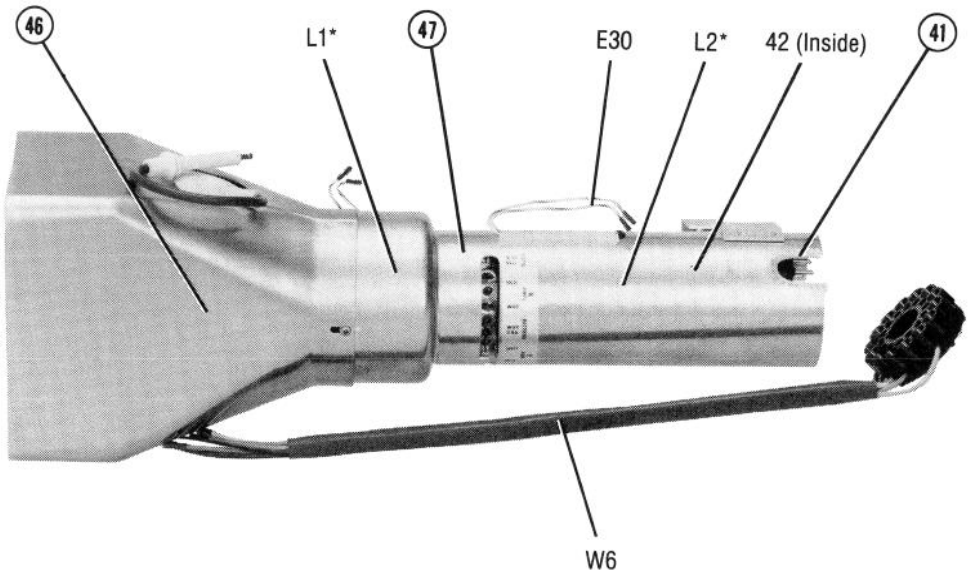
Figure 12. High Voltage Can





Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C18	0160-4835	7	2	CAPACITOR-FXD .1UF ±10% 50VDC CER	28480	0160-4835
C19	0160-4835	7		CAPACITOR-FXD .1UF ±10% 50VDC CER	28480	0160-4835
CR1	1901-0833	0	2	DIODE-SCHOTTKY 1N6096 40V 25A	01281	1N6096
CR2	1901-0833	0		DIODE-SCHOTTKY 1N6096 40V 25A	01281	1N6096
E14	0340-0037	5	4	TERMINAL-STUD DBL-TUR PRESS-MTG	28480	0340-0037
E15	0340-0037	5		TERMINAL-STUD DBL-TUR PRESS-MTG	28480	0340-0037
E16	0340-0039	7		TERMINAL-STUD DBL-TUR PRESS-MTG	28480	0340-0039
E17	0340-0039	7		TERMINAL-STUD DBL-TUR PRESS-MTG	28480	0340-0039
E20	0360-0007	1	2	TERMINAL-SLDR LUG PL-MTG FOR-fi10-SCR	28480	0360-0007
E21	0360-0007	1		TERMINAL-SLDR LUG PL-MTG FOR-fi10-SCR	28480	0360-0007
E24	1200-0080	3	4	INSULATOR-DIO ALUMINUM HD-ANDZ	28480	1200-0080
E25	1200-0080	3		INSULATOR-DIO ALUMINUM HD-ANDZ	28480	1200-0080
E26	1200-0080	3		INSULATOR-DIO ALUMINUM HD-ANDZ	28480	1200-0080
E27	1200-0080	3		INSULATOR-DIO ALUMINUM HD-ANDZ	28480	1200-0080
R3	0757-0984	4	2	RESISTOR 10 1% .5W F TC=0±100	28480	0757-0984
R4	0757-0984	4		RESISTOR 10 1% .5W F TC=0±100	28480	0757-0984
W19	8150-0225	8	1	WIRE 18AWG W/Y/GY 600V PVC 19X30 105C	28480	8150-0225
W22	8150-1497	8	2	WIRE 18AWG W/R/GY 600V PVC 19X30 105C	28480	8150-1497
W23	8150-1497	8		WIRE 18AWG W/R/GY 600V PVC 19X30 105C	28480	8150-1497
31	2740-0003	5	2	NUT-HEX-W/LKWR 10-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
32	3050-0226	2	4	WASHER-FL MTLC NO. 10 .203-IN-ID	28480	3050-0226
39	85101-00015	3	1	SHIELD CAPACITOR	28480	85101-00015

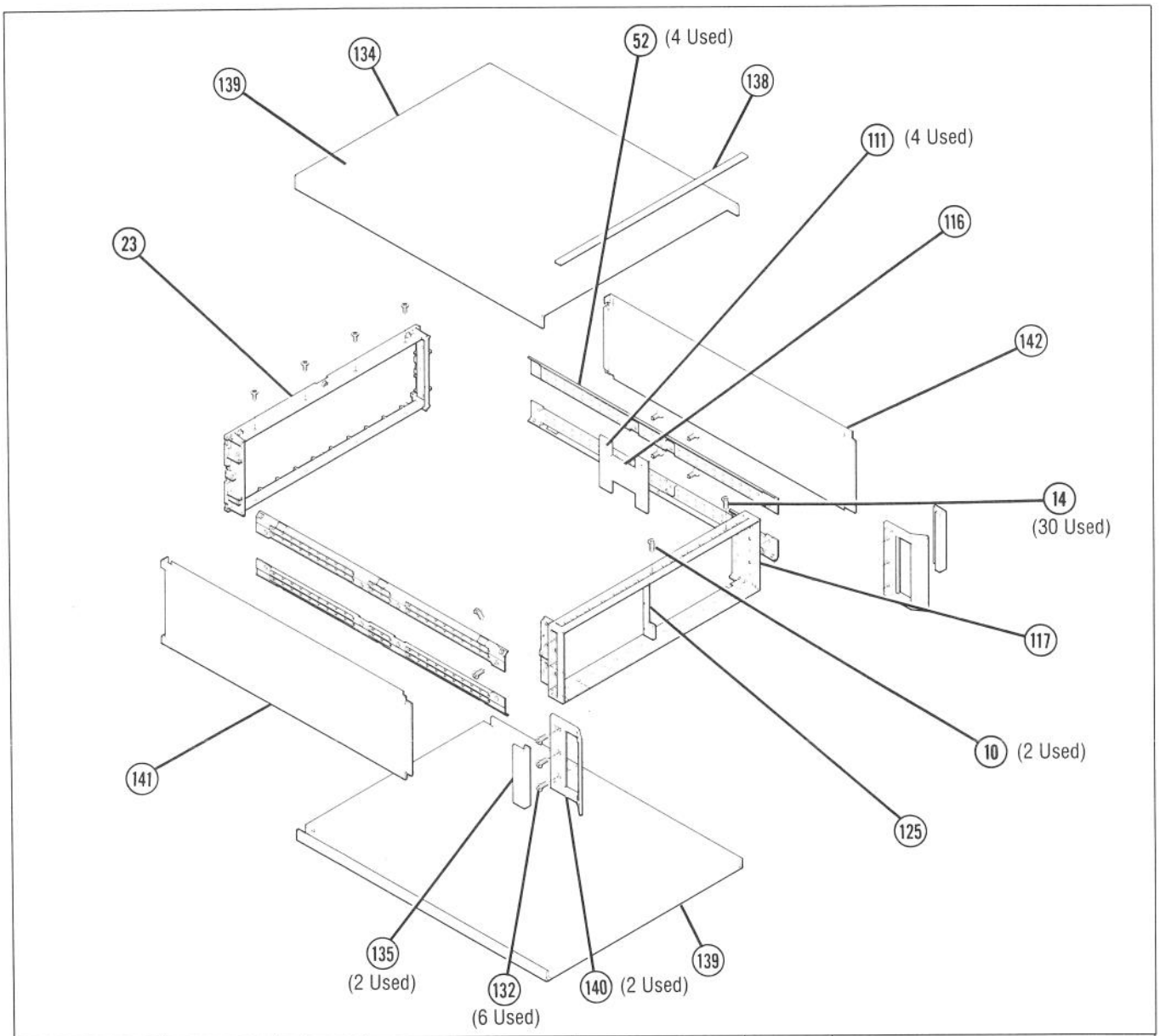
Figure 13. Details of High Voltage Can



*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E30	0460-0042	6	1	TAPE ELE .75-IN-W .0025-IN-T POLYE-FLM	00000	ORDER BY DESCRIPTION
L1	01332-66001	8	1	COIL TRACE ALIGN	28480	01332-66001
L2	01701-66001	5	1	COIL-ASSY-ALIGN	28480	01701-66001
W6	85101-60106	9	1	CABLE ASSY CRT	28480	85101-60106
41	0400-0018	0	1	GROMMET-CHAN NCH .052-IN-THK-PNL	28480	0400-0018
42	0905-0944	1	1	GASKET RND NPRN-FM 1-THK 2.875-OD	28480	0905-0944
46	01332-60602		1	SHIELD CRT FRONT	28480	01332-60602
47	85101-60023	9	1	CRT SHIELD AY	28480	85101-60023

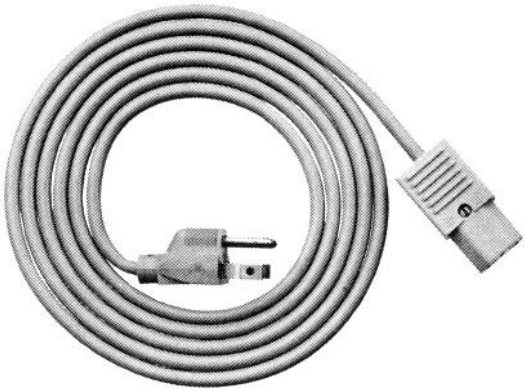
Figure 14. CRT Assembly



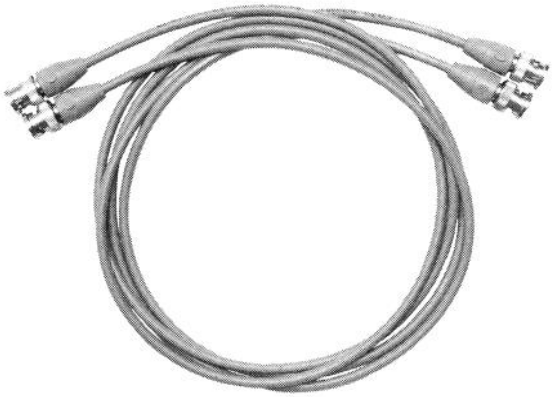
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
14	2360-0115	4	67	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
23	85101-20042	8	1	REAR FRAME	28480	85101-20030
52	5021-5837	2	4	STRUT CORNER 18"	28480	5020-8837
110	2360-0333	8	10	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
111	0515-1367	7	16	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
116	5001-8232	5	1	GUSSET SIDE	28480	5001-0432
117	5020-8803	6	1	FRAME FRONT	28480	5020-8803
125	85101-20028	0	1	CENTER STRUT	28480	85101-20028
132	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	2510-0195
134	7120-5911	5	1	LABEL-WARNING 1-IN-WD 7-IN-LG PPR	28480	7120-5911
135	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896
138	5040-7202	9	1	STRIP TRIM TOP	28480	5040-7202
139	5061-9345	9	2	COVER TOP 18"	28480	5060-9835
140	5061-9499	6	2	HANDLE AY FRONT	28480	5060-9899
141	5061-9512	2	1	SIDE COVER PERF	28480	5060-9912
142	5061-5361	1	1	SIDE COVER	28480	5061-1909

Figure 15. HP 85101 Cabinet Parts

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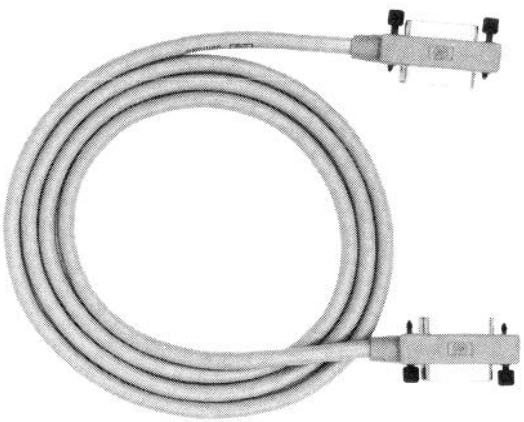
Power Cord 2 ea.



BNC Cables 2 ea.



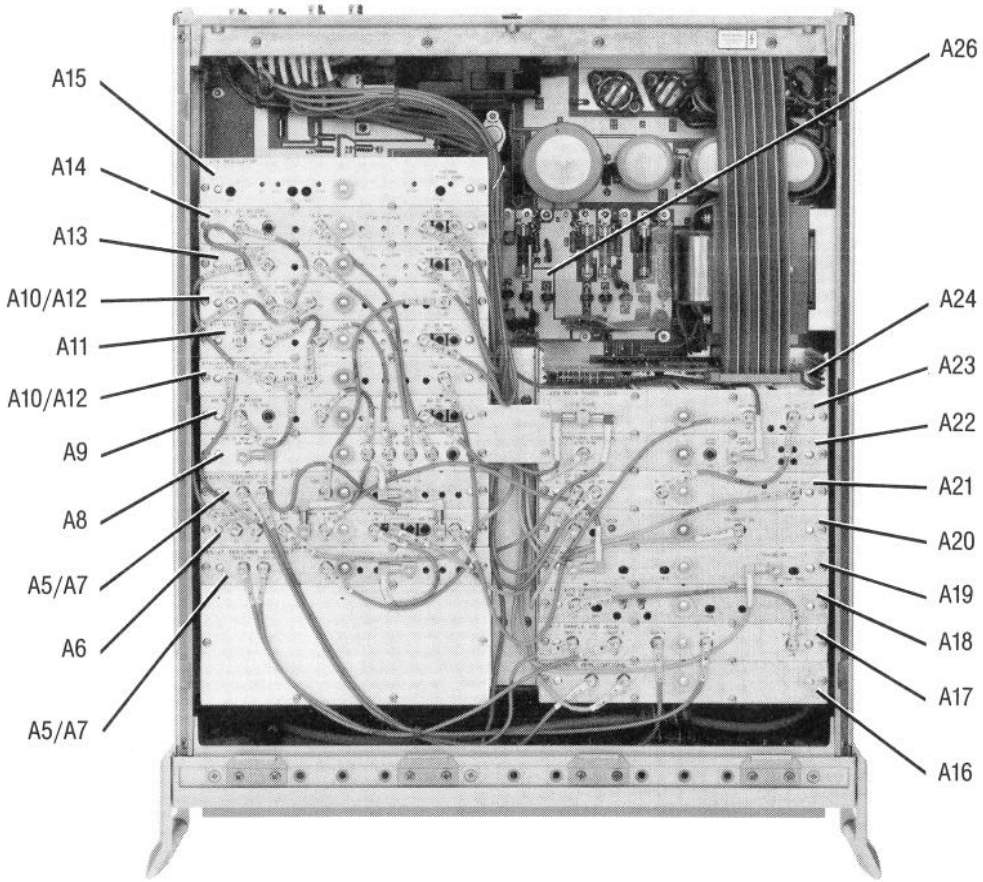
IF Display Cable 1 ea.



HP IB Cable 1 ea.

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W27	8120-1348		1	CABLE ASSY 18 AWG 3-CNDCT BLK-JKT	28480	8120-1348
W28	8120-3445		1	HP-IB CABLE 1 METER	28480	8120-3445
W29	08510-60101		1	CBL AY IF DISPLY	28480	08510-60101
W30	8120-2582		2	CBL AY BNC 1 METER	28480	8120-2582

Figure 16. Cable Assemblies



Boards are located under the covers.

Figure 17. HP 85102 Board Location (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2				NOT ASSIGNED		
A3				NOT ASSIGNED		
A4				NOT ASSIGNED		
A5	85102-60203	8	1	BOARD ASSY, TEST SYNCHRONOUS DET. (NEW)	28480	85102-60203
A5	85102-69203	6	1	BOARD ASSY, TEST SYNCHRONOUS DET. (REBUILT)	28480	85102-69203
A6	85102-60006	9	1	BOARD ASSEMBLY, CLOCK (NEW)	28480	85102-60006
A6	85102-69006	7	1	BOARD ASSEMBLY, CLOCK (REBUILT)	28480	85102-69006
A7	85102-60203	8	1	BOARD ASSY, REF SYNCHRONOUS DET (NEW) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXITING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-60203
A7	85102-69203	6	1	BOARD ASSY, REF SYNCHRONOUS DET (REBUILT) (SAME AS A5 EXCEPT FOR MP1; USE PREFIX A7. REPLACE THE EXITING A5MP1 ENTRY WITH THE FOLLOWING A7MP1 ENTRY).	28480	85102-69203
A8	85102-60008	1	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (NEW)	28480	85102-60008
A8	85102-69008	9	1	BOARD ASSEMBLY, 19.9 MHZ L.O. (REBUILT)	28480	85102-69008
A9	85102-60206	1	1	BOARD ASSEMBLY, B2 IF MIXER (NEW)	28480	85102-60206
A9	85102-69206	9	1	BOARD ASSEMBLY, B2 IF MIXER (REBUILT)	28480	85102-69206
A10	85102-60010	5	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (NEW)	28480	85102-60010
A10	85102-69010	3	1	BOARD ASSEMBLY, TEST IF AMPLIFIER (REBUILT)	28480	85102-69010
A11	85102-60206	1	1	BOARD ASSEMBLY, B1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A11).	28480	85102-60206
A11	85102-69206	9		BOARD ASSEMBLY, B1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A11).	28480	85102-69206
A12	85102-60010	5	1	BOARD ASSEMBLY, REF IF AMPLIFIER (NEW) (SAME AS A10; USE PREFIX A12).	28480	85102-60010
A12	85102-69010	3	1	BOARD ASSEMBLY, REF IF AMPLIFIER (REBUILT) (SAME AS A10; USE PREFIX A12).	28480	85102-69010
A13	85102-60206	1	1	BOARD ASSEMBLY, A2 IF MIXER (NEW) (SAME AS A9; USE PREFIX A13).	28480	85102-60206
A13	85102-69206	9	1	BOARD ASSEMBLY, A2 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A13).	28480	85102-69206
A14	85102-60206	1	1	BOARD ASSEMBLY, A1 IF MIXER (NEW) (SAME AS A9; USE PREFIX A14).	28480	85102-60206
A14	85102-69206	9	1	BOARD ASSEMBLY, A1 IF MIXER (REBUILT) (SAME AS A9; USE PREFIX A14).	28480	85102-69206
A15	85102-60015	0	1	BOARD ASSEMBLY, REGULATOR (NEW)	28480	85102-60015
A15	85102-69015	8	1	BOARD ASSEMBLY, REGULATOR (REBUILT)	28480	85102-69015
A16	85102-60216	3	1	REMOTE APPLICATIONS BOARD (NEW)	28480	85102-60216
A16	85102-69216	1	1	REMOTE APPLICATIONS BOARD (REBUILT)	28480	85102-69216
A17	85102-60212	9	1	BOARD ASSEMBLY, SAMPLE AND HOLD (NEW)	28480	85102-60212
A17	85102-69212	7	1	BOARD ASSEMBLY, SAMPLE AND HOLD (REBUILT)	28480	85102-69212
A18	85102-60208	3	1	BOARD ASSEMBLY, A/D CONVERTER (NEW)	28480	85102-60208
A18	85102-69208	1	1	BOARD ASSEMBLY, A/D CONVERTER (REBUILT)	28480	85102-69208
A19	85102-60019	4	1	BOARD ASSEMBLY, ADC CONTROL (NEW)	28480	85102-60019
A19	85102-69019	2	1	BOARD ASSEMBLY, ADC CONTROL (REBUILT)	28480	85102-69019
A20	85102-60215	2	1	BOARD ASSEMBLY, SWEEP ADC (NEW)	28480	85102-60215
A20	85102-69215	0	1	BOARD ASSEMBLY, SWEEP ADC (REBUILT)	28480	85102-69215
A21	85102-60021	8	1	BOARD ASSEMBLY, IF COUNTER (NEW)	28480	85102-60021
A21	85102-69021	6	1	BOARD ASSEMBLY, IF COUNTER (REBUILT)	28480	85102-69021
A22	85102-60204	9	1	BOARD ASSEMBLY, PRETUNE CONTROL (NEW)	28480	85102-60204
A22	85102-69204	7	1	BOARD ASSEMBLY, PRETUNE CONTROL (REBUILT)	28480	85102-69204
A23	85102-60227	6	1	BOARD ASSEMBLY, MAIN PHASE LOCK (NEW)	28480	85102-60227
A23	85102-69227	4	1	BOARD ASSEMBLY, MAIN PHASE LOCK (REBUILT)	28480	85102-69227
A24	85102-60024	1	1	BOARD ASSY, PROCESSOR INTERFACE (NEW)	28480	85102-60024
A24	85102-69024	7	1	BOARD ASSY, PROCESSOR INTERFACE (REBUILT)	28480	85102-69024
A26	85102-60026	3	1	BOARD ASSEMBLY, RECTIFIER (NEW)	28480	85102-60026
A26	85102-69026	1	1	BOARD ASSEMBLY, RECTIFIER (REBUILT)	28480	85102-69026

Figure 17. HP 85102 Board Location (2 of 2)

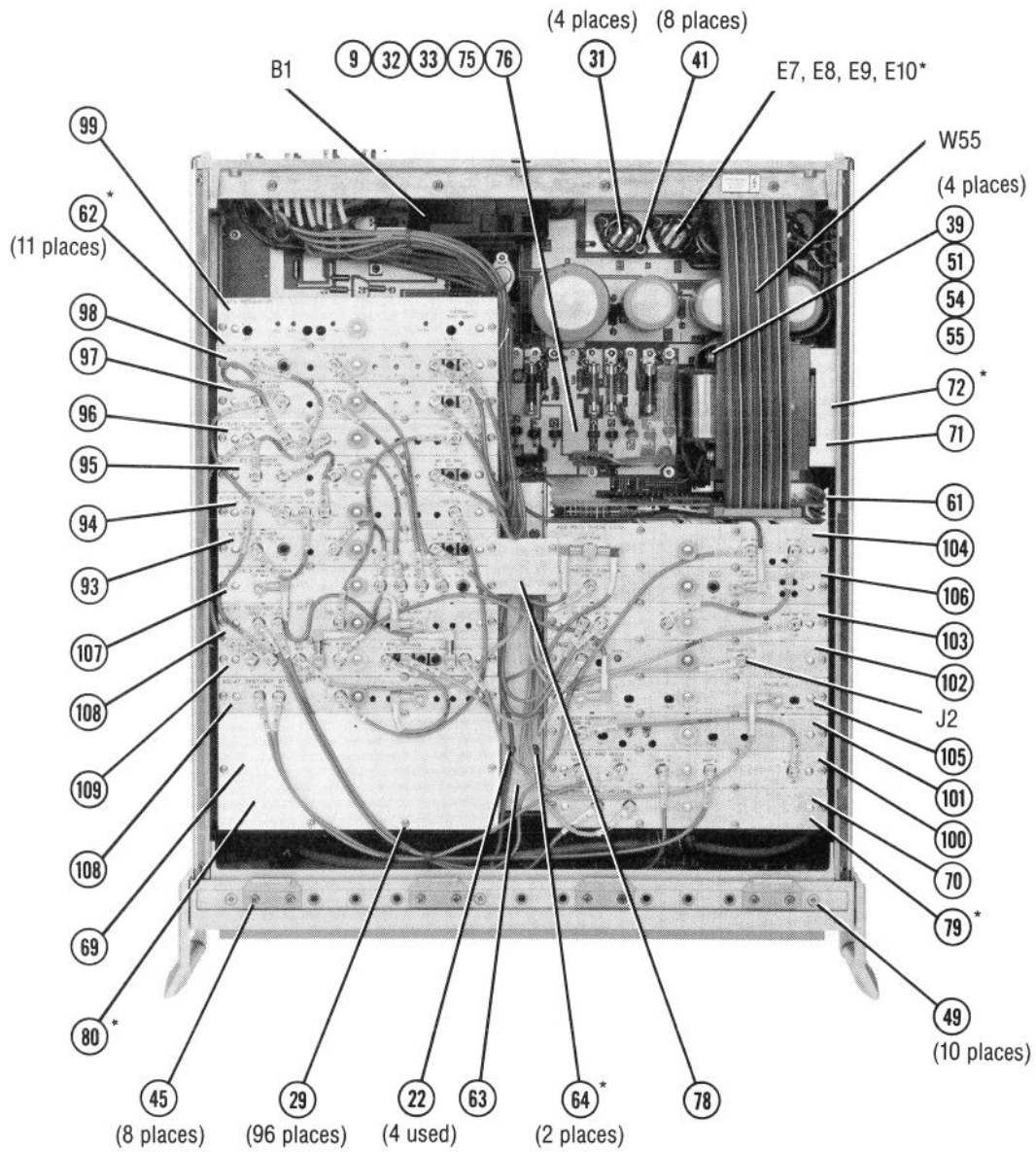


Figure 18. HP 85102 Top Internal (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E7	0340-0596	1	4	INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E8	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E9	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
E10	0340-0596	1		INSULATOR-XSTR THRM-CNDCT	28480	0340-0596
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
W55	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	0624-0099	1	16	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
31	1205-0399	7	4	HEAT SINK SGL TO-3-CS	28480	1205-0399
32	1390-0104	3	1	FASTENER-SNAP-IN GROM PANEL THKNS	28480	1390-0104
33	1390-0281	7	1	FASTENER-SNAP-IN PLGR PANEL THKNS	28480	1390-0281
39	2190-0017	4	4	WASHER-LK HLCL NO. 8 .168-IN-ID	28480	2190-0017
42	2200-0113	4	8	SCREW-MACH 4-40 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
45	0515-0887	4	8	SCREW-MACH 6-32 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
49	2360-0333	8	10	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
51	2510-0138	0	4	SCREW-MACH 8-32 3-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
54	3050-0005	5	4	WASHER-SHLDR NO. 6 .14-IN-ID .375-IN-OD	28480	3050-0005
55	3050-0139	6	4	WASHER-FL MTLC NO. 8 .172-IN-ID	28480	3050-0139
61	08505-20133	4	1	ENCLOSURE CKT	28480	08505-20133
62	08505-20163	0	1	ENCLOSURE CKT	28480	08505-20163
63	85102-00028	9	1	BRACKET-WIREWAY	28480	85102-00028
64	85102-00029	0	2	BRACKET	28480	85102-00029
69	85102-00040	5	1	CVR-BLANK A2-3-4	28480	85102-00040
70	85102-00053		1	CVR-RF REMOTE APPLICATIONS		
71	85102-20051	0	1	MOUNT-TOP-TRANS	28480	85102-20051
72	85102-20052	1	1	MOUNT-BOT-TRANS	28480	85102-20052
75	85102-20058	7	1	SAFETY COVER	28480	85102-20058
76	85102-20059	8	1	SAFETY COVER	28480	85102-20059
78	85102-00037	0	1	CLIP	28480	85102-00037
79	85102-20060	1	1	GASKET-RF COVER	28480	85102-20060
80	85102-20061	2	1	GASKET-RF COVER	28480	85102-20061
93	85102-00009	6	1	CVR-RF B2 IF MXR	28480	85102-00009
94	85102-00010	9	1	CVR-TEST IF AMP	28480	85102-00010
95	85102-00011	0	1	CVR-RF B1 IF MXR	28480	85102-00011
96	85102-00012	1	1	CVR-REF IF AMP	28480	85102-00012
97	85102-00013	2	1	CVR-RF A2 IF MXR	28480	85102-00013
98	85102-00014	3	1	CVR-RF A1 IF MXR	28480	85102-00014
99	85102-00015	4	1	COVER-REGULATOR	28480	85102-00015
100	85102-00017	6	1	CVR-RF SMPL/HLD	28480	85102-00017
101	85102-00018	7	1	COVER-A/D CONVTR	28480	85102-00018
102	85102-00020	1	1	CVR-RF SWP ADO	28480	85102-00020
103	85102-00021	2	1	CVR-RF IF CNTR	28480	85102-00021
104	85102-00023	4	1	CVR-RF MAIN P/L	28480	85102-00023
105	85102-00019	8	1	CVR-RF ADC	28480	85102-00019
106	85102-00022	3	1	CVR-RF PRETUNE CONTROL	28480	85102-00022
107	85102-00008	5	1	CVR-RF 19.9 MHZ LO	28480	85102-00008
107	85102-00005	2	1	CVR-RF SYNC DET	28480	85102-00005
109	85102-00006	3	1	CVR A6 CLOCK	28480	85102-00006

Figure 18. HP 85102 Top Internal (2 of 2)

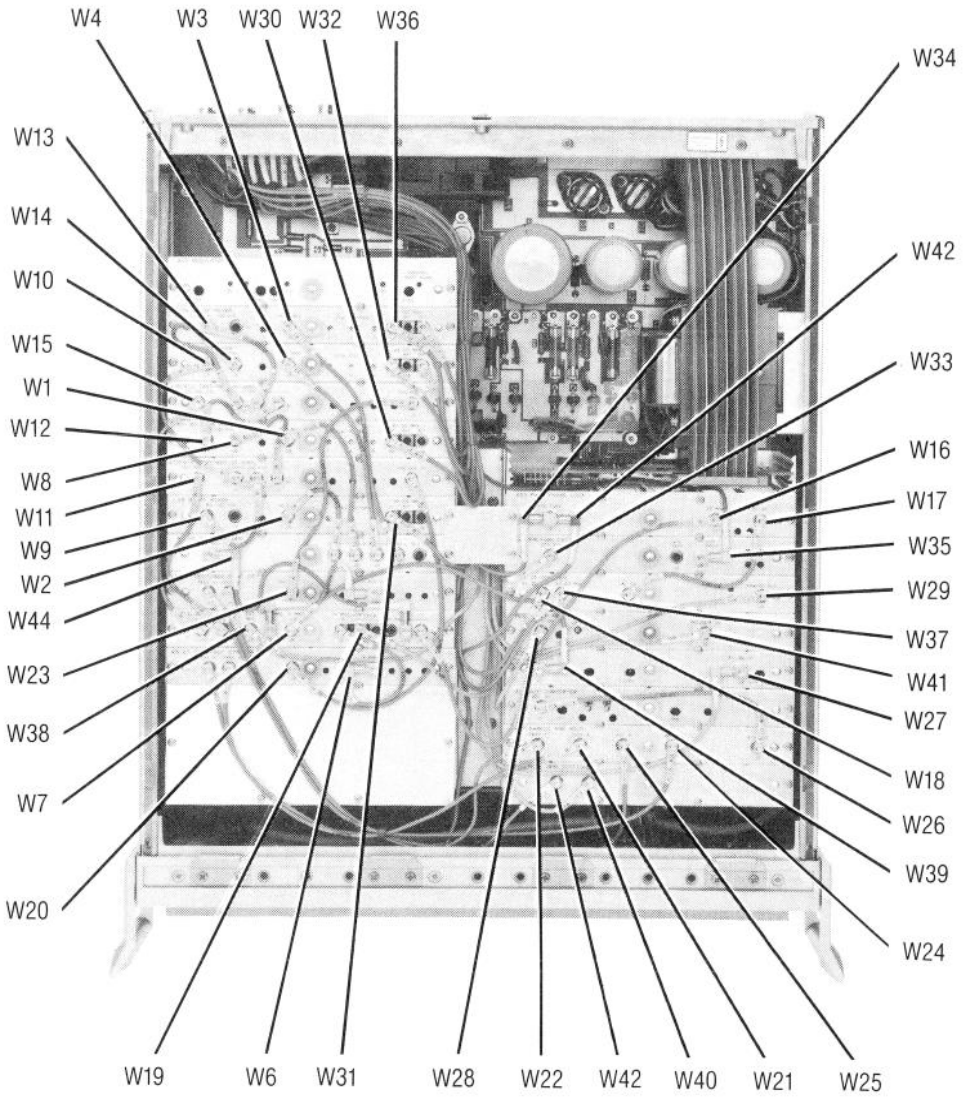
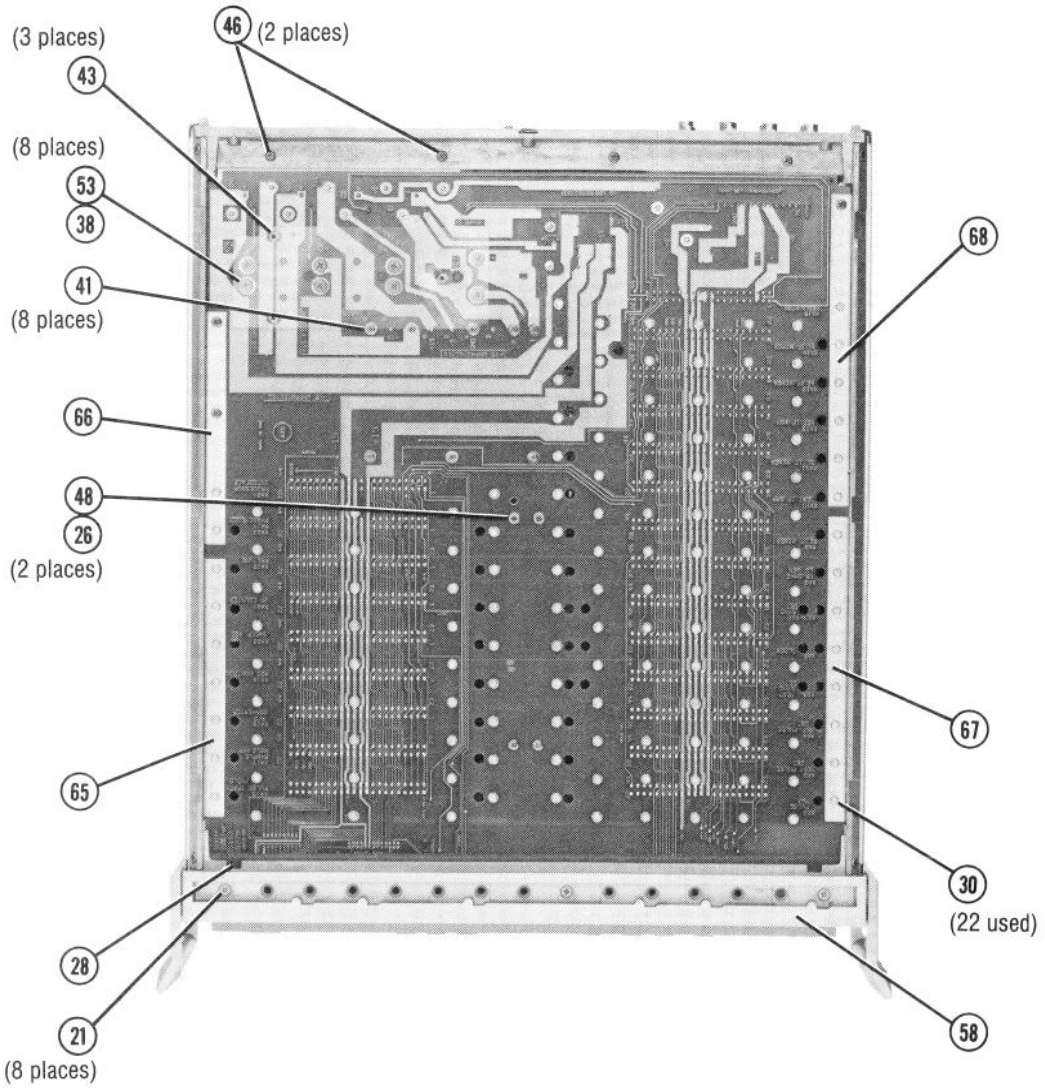


Figure 19. HP 85102 Cable Location (1 of 2)

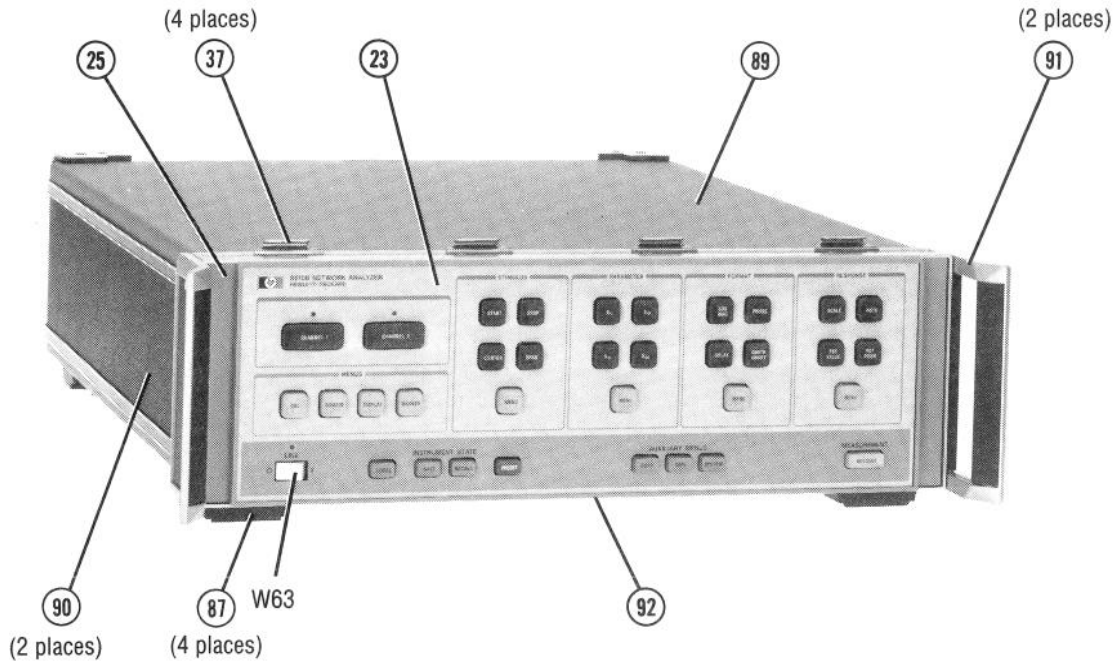
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W1	85102-60131	1	1	CA AY A8J3-A11J3	28480	85102-60131
W2	85102-60132	2	1	CA AY A8J2-A9J3	28480	85102-60132
W3	85102-60133	3	1	CA AY A8J5-A14J3	28480	85102-60133
W4	85102-60134	4	1	CA AY A8J4-A13J3	28480	85102-60134
W5				NOT ASSIGNED		
W6	85102-60136	6	1	CA AY A6J6-A5J4	28480	85102-60136
W7	85102-60137	7	1	CA AY A6J5-A7J4	28480	85102-60137
W8	85102-60138	8	1	CA AY A11J2-A10J4	28480	85102-60138
W9	85102-60139	9	1	CA AY A9J1-A10J3	28480	85102-60139
W10	85102-60140	2	1	CA AY A13J1-A10J2	28480	85102-60140
W11	85102-60141	3	1	CA AY A6J2-A10J1	28480	85102-60141
W12	85102-60142	4	1	CA AY A11J1-A12J4	28480	85102-60142
W13	85102-60143	5	1	CA AY A14J1-A12J3	28480	85102-60143
W14	85102-60144	6	1	CA AY A13J2-A12J2	28480	85102-60144
W15	85102-60145	7	1	CA AY A6J1-A12J1	28480	85102-60145
W16	85102-60146	8	1	CA AY A6J11-A23J2	28480	85102-60146
W17	85102-60147	9	1	CA AY A21J3-A23J3	28480	85102-60147
W18	85102-60148	0	1	CA AY A14J6-A21J1	28480	85102-60148
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W20	85102-60150	4	1	CA AY A10J5-A5J3	28480	85102-60150
W21	85102-60151	5	1	CA AY A5J1-A17J2	28480	85102-60151
W22	85102-60152	6	1	CA AY A5J2-A17J1	28480	85102-60152
W23	85102-60153	7	1	CA AY A12J5-A7J3	28480	85102-60153
W24	85102-60154	8	1	CA AY A7J1-A17J4	28480	85102-60154
W25	85102-60155	9	1	CA AY A7J2-A17J3	28480	85102-60155
W26	85102-60156	0	1	CA AY A17J5-A18J1	28480	85102-60156
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W28	85102-60158	2	1	CA AY A20J1-J5	28480	85102-60158
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W37	85102-60167	3	1	CA AY A13J6-A21J2	28480	85102-60167
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W39	85102-60169	5	1	CA AY A6J4-A19J1	28480	85102-60169
W40	85102-60223	2	1	CA AY A16J2-REAR PANEL J9	28480	85102-60223
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W42	85102-60222	1	1	CA AY A16J1-A23J1	28480	85102-60222
W43				NOT ASSIGNED		
W44	85102-60174	2	1	CA AY A6J10-A8J1	28480	85102-60174

Figure 19. HP 85102 Cable Locations (2 of 2)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
26	0380-0018	6	2	SPACER-RND .25-IN-LG .194-IN-ID	28480	0380-0018
28	0460-0778	5	1	TAPE INDL .75-IN-W .25-IN-T POLYU-FM	00000	ORDER BY DESCRIPTION
30	0624-0100	5	26	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
38	2190-0011	8	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
41	2200-0105	4	8	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
43	2200-0165	6	3	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
46	2360-0117	6	2	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
48	2360-0202	0	2	SCREW-MACH 6-32 .625-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
53	2680-0129	8	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
58	5021-5803	2	1	FRAME FRONT	28480	5021-5803
65	85102-00033	6	1	BRACKET-R FRONT	28480	85102-00033
66	85102-00034	7	1	BRACKET-R REAR	28480	85102-00034
67	85102-00035	8	1	BRACKET-L FRONT	28480	85102-00035
68	85102-00036	9	1	BRACKET-L REAR	28480	85102-00036
73	85102-20053	2	1	COVER-SAFETY	28480	85102-20053

Figure 20. HP 85102 Bottom Internal



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
23	85102-00001	8	1	DRESS PANEL	28480	85102-00001
25	85102-20054	3	1	FRONT BEZEL MACH	28480	85102-20054
37	1600-0367	7	4	VERTICAL LOCK (FRONT)	28480	1600-0367
87	5040-7201	8	4	FOOT-BOTTOM	28480	5040-7201
89	5061-9345	9	1	COVER TOP 18"	28480	5061-9345
90	5061-9457	4	2	COVER AY SIDE	28480	5061-9457
91	5061-9499	4	2	HANDLE AY FRONT	28480	5061-9499
92	85102-00043	8	1	BOTTOM COVER	28480	85102-00043
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193

Figure 21. HP 85102 Front

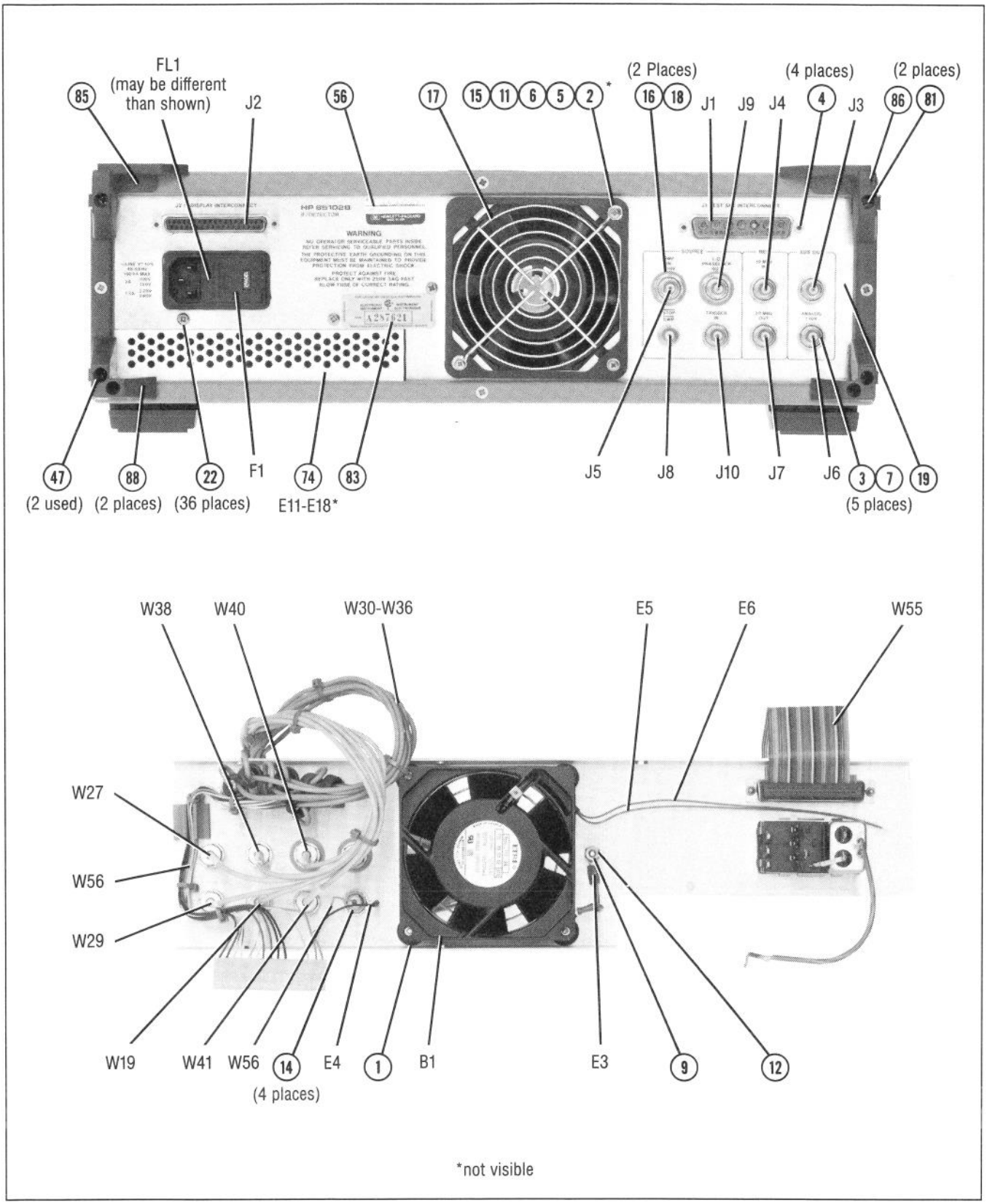
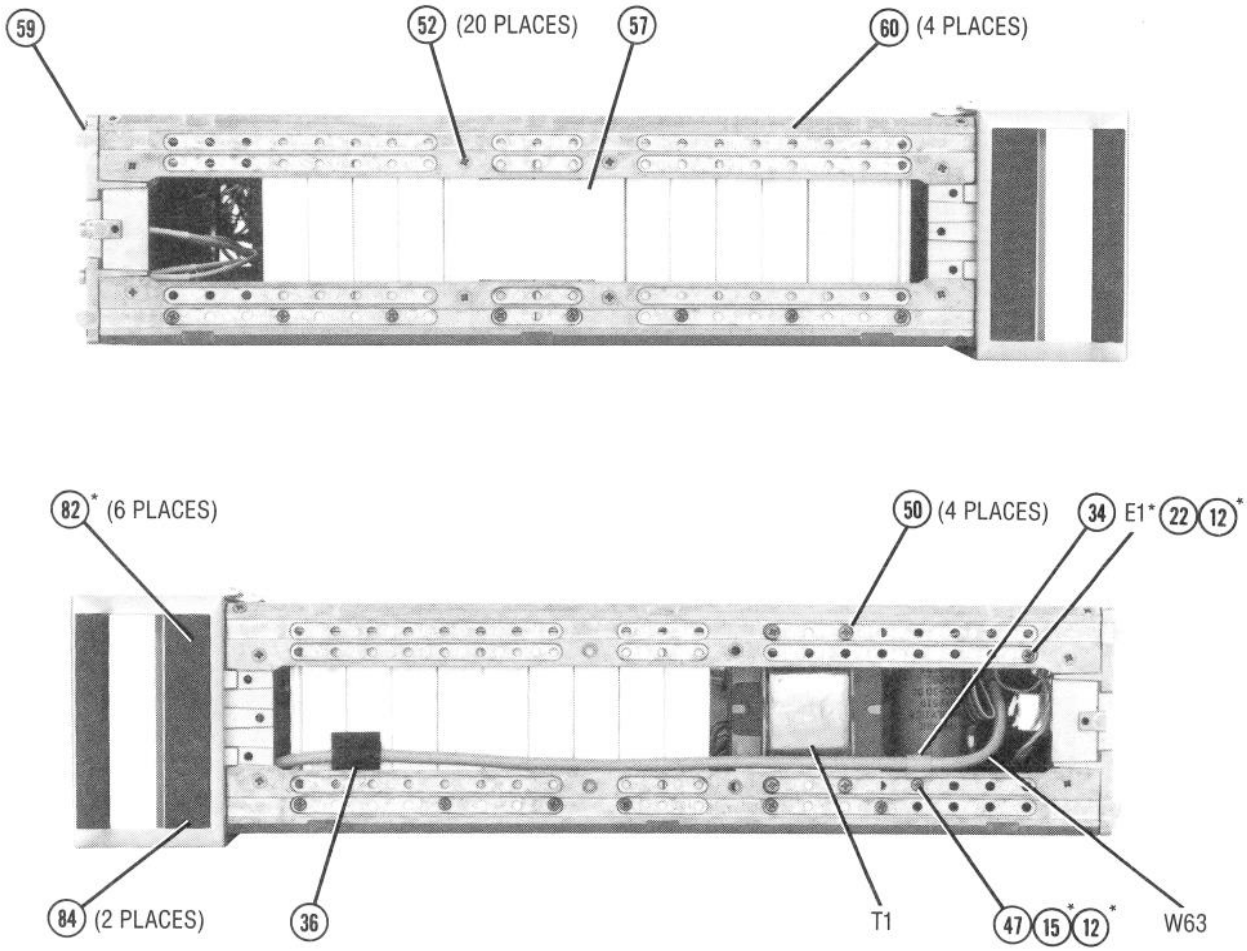


Figure 22. HP 85102 Rear (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E3	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E4	0360-1632	0	1	TERMINAL-SLDR LUG LK-MTG FOR-fi3/8-SCR	28480	0360-1632
E5	0362-0227	1	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E6	0362-0227	1		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E11-18	1200-0147	3	8	INSULATOR-FLG-BSHG NYLON	28480	1200-0147
F1	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	2110-0002
FL1	0960-0443	7	1	LINE MODULE-FILTERED	28480	0960-0443
J1	1251-2197	4	1	CONNECTOR R&P 24F	28480	1251-2197
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
J4	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J5	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-1091
J6	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J7	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J8	1250-0083	1	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0083
J9	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-1091
J10	1250-0870	4	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0870
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W40	85102-60223	2	1	CA AY A16J2-REAR PANEL J9	28480	85102-60223
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W55	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
W56	85102-60192	4	1	CA ASSY TS CONN	28480	85102-60192
1	0400-0010	2	4	GROMMET-RND .25-IN-ID .375-IN-GRV-OD	28480	0400-0010
2	0510-0110	6	3	NUT-CAP 6-32-THD .281-IN-THK .312-A/F	00000	ORDER BY DESCRIPTION
3	0590-1251	6	5	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
4	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0006	1	2	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
6	2190-0007	2	4	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
7	2190-0102	8	5	WASHER-LK INTL T 15/32 IN .472-IN-ID	28480	2190-0102
8	2360-0113	2	9	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
10	2360-0203	1	1	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	2360-0205	3	2	SCREW-MACH 6-32 .75-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
14	2950-0043	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
16	3050-1094	4	1	WASHER-FL MTLC 1/2 IN .505-IN-ID	28480	3050-1094
17	3160-0300	6	1	FINGER GUARD	28480	3160-0300
18	00310-48801	0	2	SHOULDERED WASHER	28480	00310-48801
19	85102-00056	3	1	REAR PANEL	28480	85102-00056
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
56	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
74	85102-20057	6	1	HEAT SINK	28480	85102-20057
81	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
83	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
85	5020-8938	8	1	LOCK FOOT L LFT	28480	5020-8938
86	5020-8940	2	1	LOCK FOOT L RT	28480	5020-8940
88	5040-7221	2	2	FOOT-REAR	28480	5040-7221

Figure 22. HP 85102 Rear (2 of 2)

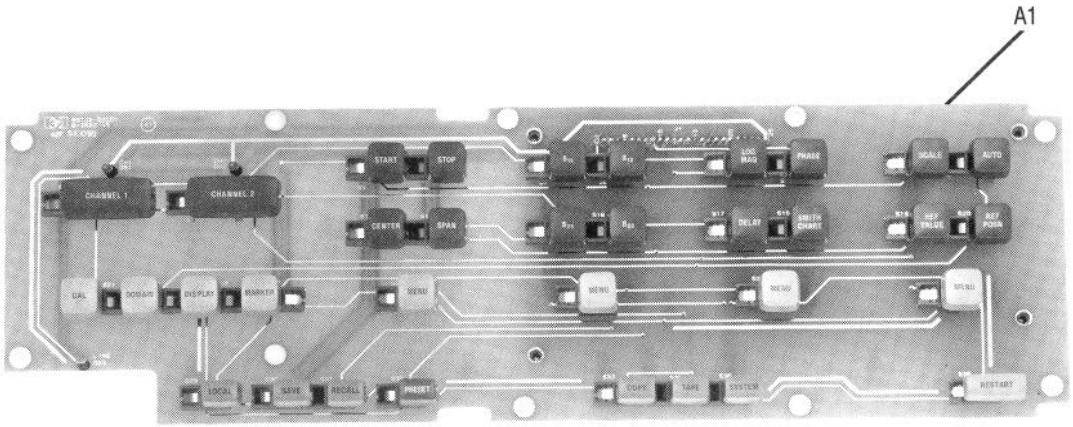


*NOT VISIBLE

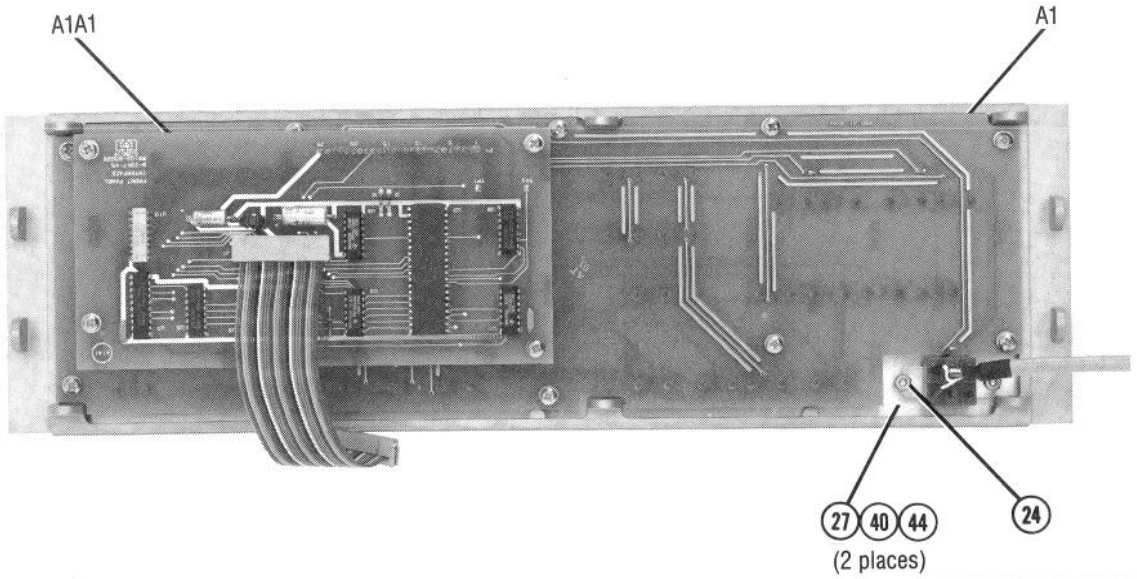
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-fi6-SCR	28480	0360-0009
T1	9100-4614	3	1	TRANSFORMER	28480	9100-4614
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
34	1400-0017	0	1	CLAMP-CABLE .312-DIA .375-WD NYL	28480	1400-0017
36	1400-0757	5	1	CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
50	2510-0049	2	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
52	0515-1367	7	20	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896

Figure 23. HP 85102 Left and Right Internal

FRONT



BACK



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	85102-60001	4	1	BOARD ASSEMBLY, FRONT PANEL (NEW)	28480	85102-60001
A1	85102-69001	2	1	BOARD ASSEMBLY, FRONT PANEL (REBUILT)	28480	85102-69001
A1A1	85102-60029	6	1	BOARD ASSY, FRONT PANEL INTERFACE (NEW)	28480	85102-60029
A1A1	85102-69029	4	1	BOARD ASSY, FRONT PANEL INTERFACE (REBUILT)	28480	85102-69029
20	0510-1148	2	16	RETAINER-PUSH ON KB-TO-SHFT EXT	28480	0510-1148
24	85102-60214	1	1	SUB PANEL	28480	85102-60214
27	0380-0020	0	2	SPACER-RND .25-IN-LG .128-IN-ID	00000	ORDER BY DESCRIPTION
40	2190-0019	6	2	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0019
44	2260-0001	5	2	NUT-HEX-DBL-CHAM 4-40-THD .094-IN-THK	28480	2260-0001

Figure 24. Front Panel Board Assembly

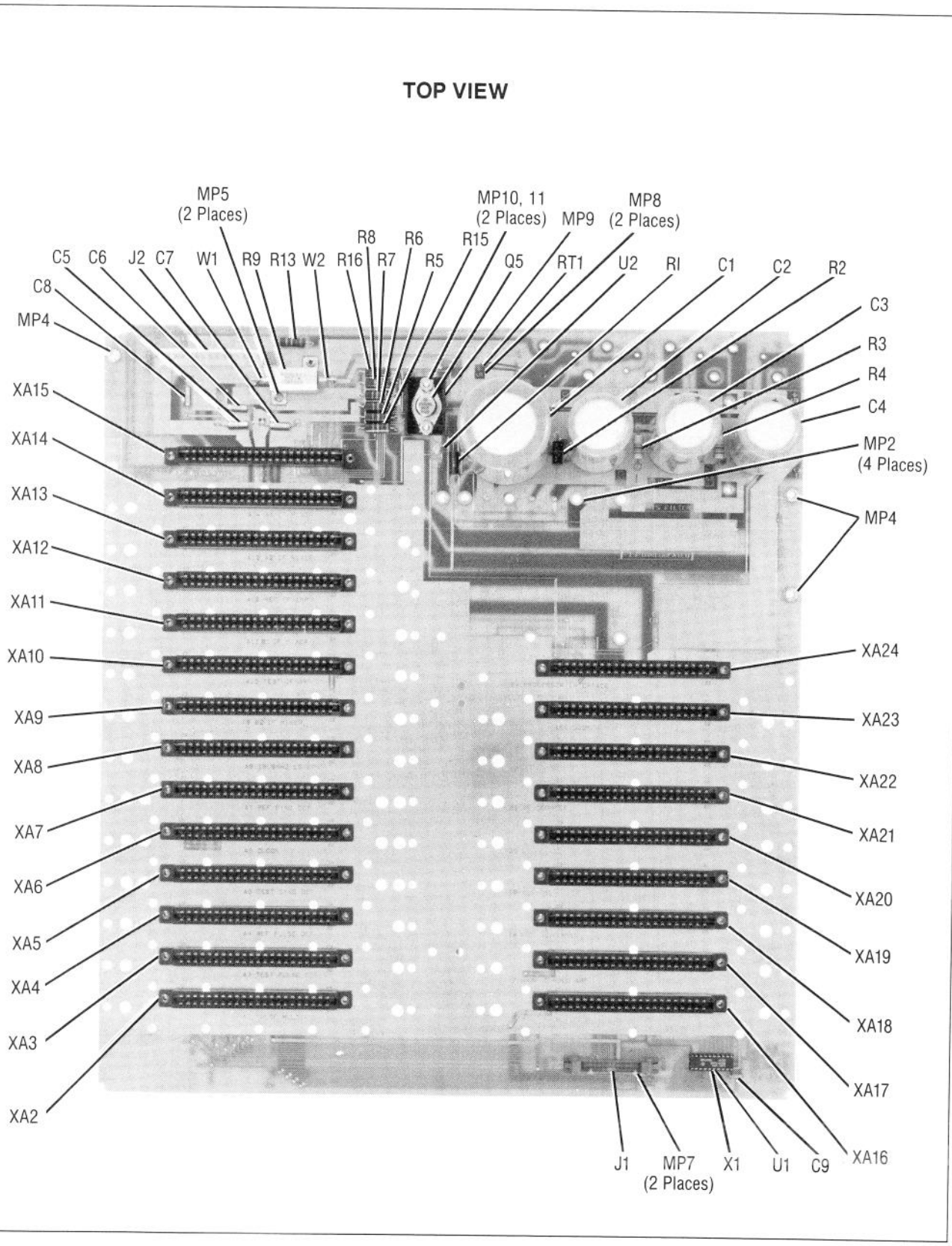


Figure 25. HP 85102 Mother Board (1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C1	0180-3017	7	1	CAPACITOR-FXD .045F+75-10% 25VDC AL	28480	0180-3017
C2	0180-0453	9	1	CAPACITOR-FXD 8700UF+75-10% 40VDC AL	28480	0180-0453
C3	0180-2671	7	2	CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
C4	0180-2671	7		CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
C5	0180-1731	8		CAPACITOR-FXD 4.7UF ± 10% 50VDC TA	56289	150D475X9050B2
C6	0180-0116	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2
C7	0180-1731	8		CAPACITOR-FXD 4.7UF ± 10% 50VDC TA	56289	150D475X9050B2
C8	0180-0116	1		CAPACITOR-FXD 6.8UF ± 10% 35VDC TA	56289	150D685X9035B2
C9	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
J1	1251-5800	2	1	CONNECTOR 26-PIN M POST TYPE	28480	1251-5800
J2	1251-3901	0	1	CONNECTOR 15-PIN M POST TYPE	28480	1251-3901
MP2	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP4	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP5	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP7	2200-0105	4	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP8	2200-0105	4		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP9	1205-0421	3	1	HT SK TO66	28480	1205-0421
MP10	2420-0001	2	2	NUT HEX 6-32	28480	2420-0421
MP11	0570-0111	2	2	SCREW MACHINE 6-32	28480	0570-0111
Q5	1854-0441	5	1	TRANSISTOR NPN SI PD=5.8W FT=800KHZ	28480	1854-0441
R1	0764-0016	8	2	RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
R2	0764-0016	8		RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
R3	0764-0015	7	2	RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
R4	0764-0015	7		RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
R5	0811-1672	5	6	RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R6	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R7	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R8	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R9	0811-2048	1	1	RESISTOR .25 1% 25W PW TC=0±90	91637	RH25-T2-1/4-F
R13	0811-1667	8	1	RESISTOR 1.2 5% 2W PW TC=0±400	75042	BWH2-1R2-J
R15	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R16	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
RT1	0837-0126	6	1	THERMISTOR DISC 1K-OHM TC=-4.4%/C-DEG	28480	0837-0126
U1	1820-2075	4		IC MISC TTL LS	01295	SN74LS245N
U2	1826-0661	2		IC TEMP XDCR TO-52 PKG	24355	AD590KH
W1-2	8151-0013	5	2	WIRE 22 1X22	28480	8151-0013
X1	1200-0639	8	1	SOCKET-IC 20-CONT DIP DIP-SLDR	28480	1200-0639
XA2-XA24	1251-7882	4	23	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882

Figure 25. HP 85102 Mother Board (2 of 4)

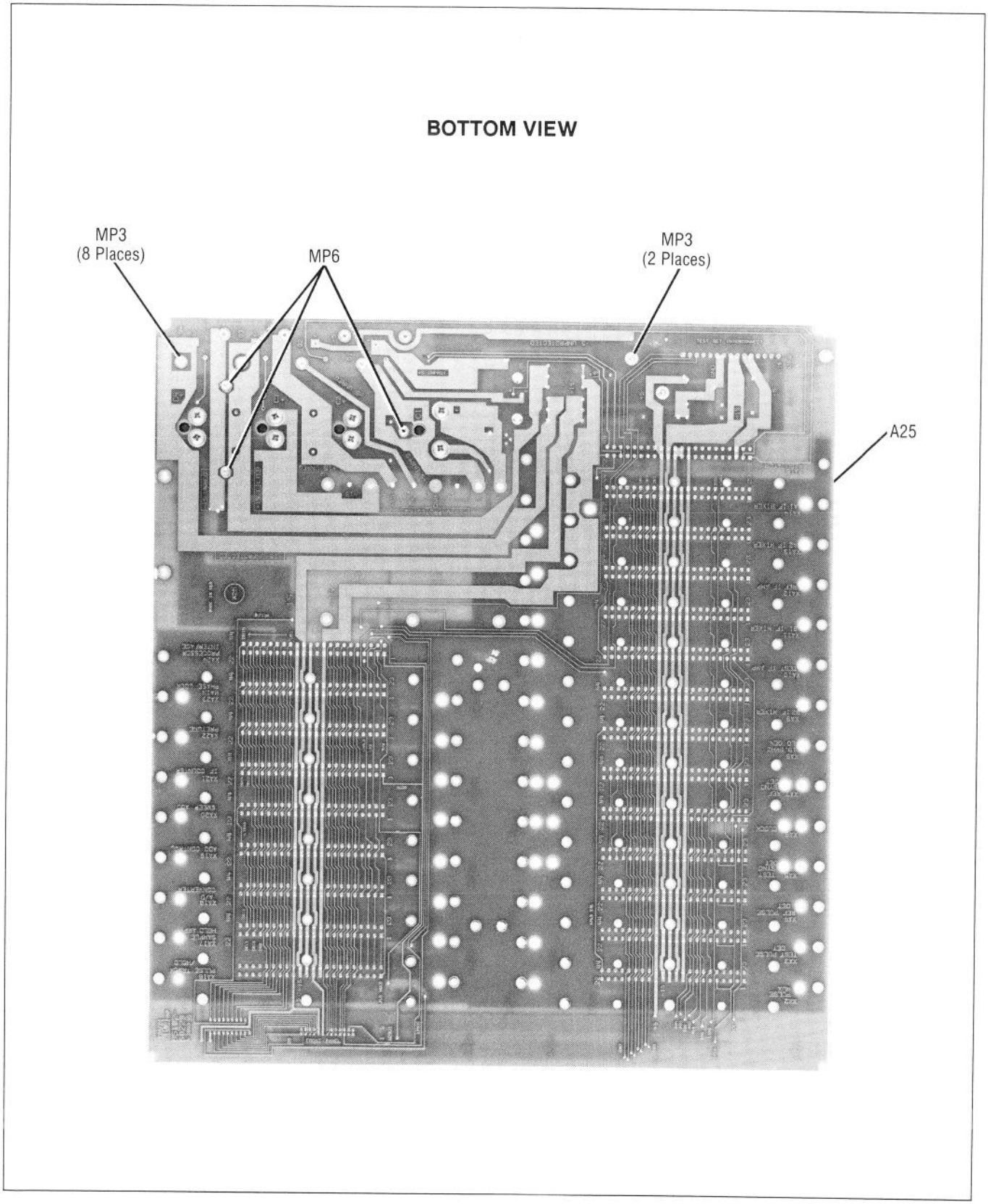
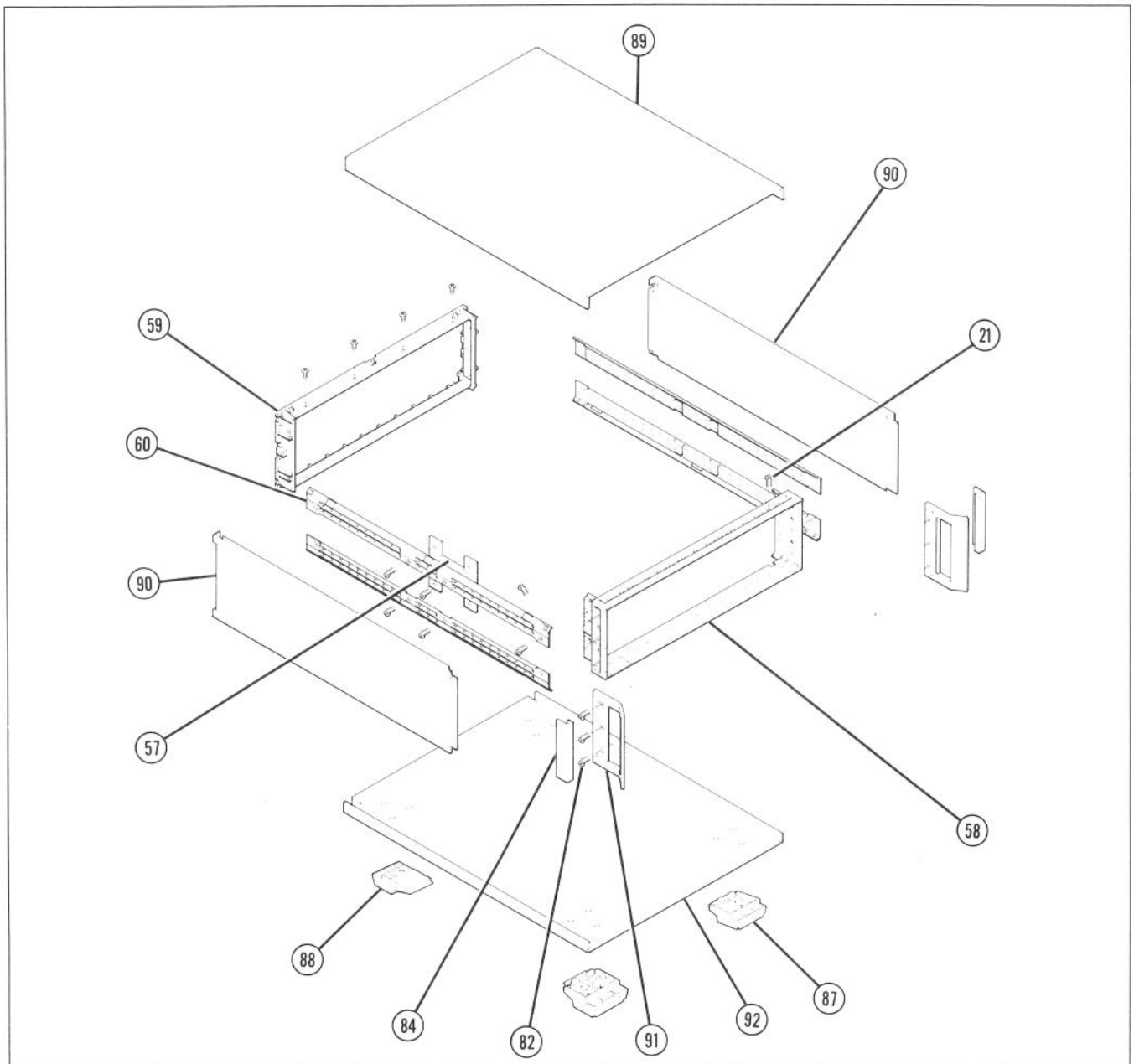


Figure 25. HP 85102 Mother Board (3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A25	85102-60229	8	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A25 IS ORDERED: A25C1, A25C2, A25C3, A25C4, A25Q1, A25Q2 A25Q3, A25Q4	28480	85102-60229
MP3	0360-0124		4	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP6	0360-0124			CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124

Figure 25. HP 85102 Mother Board (4 of 4)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
58	5021-5803	2	1	FRAME FRONT	28480	5021-5803
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896
87	5040-7201	8	4	FOOT-BOTTOM	28480	5040-7201
88	5040-7221	2	2	FOOT-REAR	28480	5040-7221
89	5061-9345	9	1	COVER TOP 18"	28480	5061-9345
90	5061-9457	4	2	COVER AY SIDE	28280	5061-9457
91	5061-9499	4	2	HANDLE AY FRONT	28480	5061-9499
92	85102-00043	8	1	BOTTOM COVER	28480	85102-00043

Figure 26. HP 85102 Cabinet Parts

Service Log and Service Notes

This section of the manual has two purposes:

1) **Keeping a record of the service performed on the HP 8510 system in a SERVICE LOG.**

2) **Keeping HP 8510B customer SERVICE NOTES in one place.**

Service Log

On the back of this page is a suggested sample of how to keep a log of the service performed on the system. Use your own 3 hole punched paper and write neatly. Whether or not you use the sample format for the service log, you should always include the following information:

1. NAMES/DATES: Name of person making the entry, time and date that the failure occurred

2. SYMPTOMS: Record what happened. For example: Self Test failure and number, the specific Running Error Message, or the repeated Performance Test failure. Describe the sequence of events (keystrokes or HP-IB program commands) that led up to the failure. This information will be helpful in recreating the failure.

3. TROUBLESHOOTING: Record what you did to isolate the problem, what sections of the manual you used, what tests you ran, and the results of each procedure. Include any contact with HP: If you called the Customer Engineer and you received help over the phone — record what it was.

4. REPAIR: Record how the failure was repaired, how much time it took, when it was repaired, who did it, the cost, etc.

Service Notes

Hewlett-Packard Product Support Engineers and Technical Writers sometimes produce small service related documents called *Service Notes*. They are written at the factory after the manual has been published. They contain service information that is not part of the manual: new service information/ procedures developed as a result of field experience.

Contact your nearest Hewlett-Packard office for information about the availability of Service Notes for your system. Reference the model number HP 8510B and any other instrument model number in your system. Keep these documents behind the Service Log in this section.

SAMPLE: SERVICE LOG

1. 2-15-87 (12:15 P.M.) Dan Jones, Ext. 429

SYMPTOM: "IF CAL FAILED" error message on CRT every few minutes.

TROUBLESHOOTING: Referred to section RUNNING ERROR MESSAGES - noted that all probable causes were 85102 boards. Used the Service Program tests in the "Run All" mode for the 85102, and got a failure on the SYNC DETECTOR test. The failure message indicated the S/H board (A17) and the SYNC DETECTOR board (A7) should be checked. Referred to ADDITIONAL TESTS section and read that the inputs to A17, from A5 and A7, should be swapped to determine if A17 or A7 is defective. I swapped the inputs and re-ran the tests. The same failure message appeared - since it didn't change by swapping inputs to indicate A17 or A5 (not A7), the failure must be A17. Called HP and requested a new A17 board.

REPAIR: Received board next afternoon, installed it and re-ran tests (85102 Run-All). Problem gone - no error messages either. Cost about #350. HP Customer Engineer helped over phone - his name: Sam Smith (555-2111). Fixed ≈ 24 hrs.

Theory of Operation

The purpose of this section is to describe how the system works and how the HP 8510 core instruments operate. However, before reading this section, it is recommended that you read, or read again, the explanation of the system instruments in the SERVICE OVERVIEW section. That section also has a simplified block diagram of a typical HP 8510 system.

When reading this section, you can refer to any of the diagrams in the BLOCK DIAGRAM section, especially the Phase Lock drawing. If you understand how the system operates, you will be better prepared to troubleshoot the system.

This section contains the following:

- **HP 8510 TYPICAL MEASUREMENT SEQUENCE** – This section describes how, under processor control, the system makes S-parameter measurements. This includes a description of how the source is swept from the start to the stop frequency, how the signals are separated in the test set, and how the down-converted signals are then sent to the HP 85102 IF-Detector and onto the HP 85101 Display/Processor where they are displayed as measurement data.
- **SYSTEM PHASE LOCK OPERATION** – This section describes how the system instruments work together in a special phase-locked loop. This section describes how the test set and HP 85102 IF-Detector work together to keep the incident and reflected/transmitted signals matched for accurate data measurements. This section also has information about how and why the Running Error Messages are generated.
- **HP 85101 DISPLAY/PROCESSOR THEORY OF OPERATION** – This section is a brief description of the assemblies (boards) in this instrument.
- **HP 85102 IF-DETECTOR THEORY OF OPERATION** – This section is a brief description of the assemblies (boards) in this instrument.
- **TYPICAL HP 85xx-series TEST SET THEORY OF OPERATION** – This section is a general description of how a typical test set operates.

NOTE: To troubleshoot the HP 8510, you must have some knowledge of the system front panel operation. If necessary, refer to the *HP 8510 Operating and Programming Manual*. Also, Hewlett-Packard offers a basic network measurements course for the HP 8510 – contact your nearest HP office for details.

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HP 8510 Typical System Measurement Sequence

In a typical measurement sequence, the system operates as follows:

1. The source sweeps from the START to the STOP frequency in a linear ramp or *step* mode. If the source is a synthesizer (HP 8340/41) it can be used in *step* mode: it is stepped from frequency point to frequency point, for the number of points selected. At each point, it takes one or more measuremets, depending upon the number of averages you selected. The *ramp* mode, on the other hand, sweeps through the frequency range as many times as the averaging factor is selected for.

2. The HP 8510's processor controls the source frequency and the test set VTO fundamental harmonic frequency so that the system can be phase locked. The 0 – 10 volt source output voltage is used by the HP 8510 to determine what frequency the source is at. Thus, the processor knows when to take measurements at the correct frequency. The *stop sweep* output on the HP 85102 is used in ramp mode ONLY. The voltage from this output is used to control the source sweep so that it stops at its band crossing. When it stops, the HP 8510 can readjust and re-establish phase lock to the correct frequency.

3. Splitters and couplers (or triax bridges) in the test set separate the incident and reflected components of the test signal. These are the a1 (incident) and a2 (incident for S-parameter test sets) signals. The b1 and b2 signals can indicate reflected or transmitted power depending upon which port is receiving RF power.

4. The microwave test and reference signals are down-converted, by the frequency converter in the test set, into separate 20 MHz IF frequencies.

5. The system uses a phase-locked loop to track the source frequency:

   a. Under microprocessor control, a harmonic of the test set voltage tuned oscillator (VTO) is pretuned to a frequency approximately 20 MHz greater than that of the source input frequency at the beginning of its ramp.

   b. The 20 MHz IF frequency is phase locked to a crystal reference.

   c. The source begins its sweep.

   d. The VTO tracks the source frequency, holding the IF at 20 MHz, until either the VTO or the source must change bands in its sweep process (the microprocessor determines when this is necessary).

   e. At the band change, the microprocessor stops the sweep, allowing the VTO or source to make the change, then relocks the phase-lock loop so the sweep can continue in the new band. The processor constantly monitors the VTO harmonic to prevent harmonic skip.

6. A second frequency conversion of the test and reference signals produces 100 KHz IF signals, which are used in the detection and data processing elements of the HP 85102.

7. Because the frequency conversions are phase coherent, and the IF signal paths are carefully matched, the magnitude and phase relationships of the input RF signals are maintained throughout the frequency conversion and detection steps. Also, automatic and fully calibrated autoranging IF gain steps maintain the IF signals at optimum levels for detection over a wide dynamic range.

8. After the autoranging steps, each IF signal is applied to a synchronous detector in the HP 85102 which generates DC voltages proportional to the magnitude and phase of each input signal.

   The synchronous detectors develop outputs equal to the real (X) and imaginary (Y) parts of the signal using digital techniques that practically eliminate drift as a source of measurement uncertainty.

   During the sweep, the output of the synchronous detectors is sampled in proportion to the number of data points specified by the operator; the measurement interval is derived from the 0 to 10V source ramp or stepped CW equivalent DC voltage.

9. After the samples (X,Y pairs) are digitized, they are read by the HP 85101 CPU for processing, and display on the CRT.

System Phase Lock Operation

Various components of the phase lock system exist in each of the HP 8510 system instruments: HP 85101 Display/Processor, HP 85102 IF-Detector, HP 85xx-series test set, and compatible source HP 8340/41 or HP 8350B source. Therefore, it is possible that a malfunction or bad connection in any of the instruments can appear as a phase lock problem — usually resulting in a Running Error Message. The information under this heading is the most extensive in the Theory of Operation section and contains the following topics in this order:

- Overview of Phase Lock system
- Tracking the RF input
- VTO and Test Set electronics
- Monitoring the VTO
- Pretune Phase Lock Sequence
- Pretune IF Count Sequence
- Check Step Sequence
- Main Phase Lock Sequence
- Other Phase Lock Problems
- Phase Lock Learn Mode
- IF Search Mode
- HP 8340 and HP 8350 Phase Lock performance
- Summary of a Phase Lock cycle (including Running Error Messages)

OVERVIEW OF THE PHASE LOCK SYSTEM

Refer to the Phase Lock Block diagram in the BLOCK DIAGRAMS section as you read the following paragraphs.

The four main boards that make-upd the system phase lock are:

A22 Pretune (HP 85102)
A23 Main Phase Lock (HP 85102)
A21 IF Counter (HP 85102)
A3 VTO Summing Amp (test set)

The IF Mixer boards (HP 85102) A9, A11, A13, A14, also have the phase locked signals passing through them but they are not as important in determining loop operation. And the HP 85101 processor and memory boards are also involved in controlling and monitoring the phase lock system.

The HP 8510 uses two separate phase lock loops: a pretune loop and a main phase lock loop. The pretune phase lock is a low bandwidth, synthesized, high accuracy loop that ensures that the proper harmonic is used to produce the necessary 20 MHz IF. The pretune loop also has input requirements such as input power level and RF frequency tolerance that must be met. If those conditions are met, the main phase lock circuit is switched in and locks to the 20 MHz IF. In a sense, the pretune loop tries to steer the VTO so that a resulting harmonic is placed approximately 20 MHz away from the source RF input. The main loop locks the IF to exactly 20 MHz after having been steered close enough in frequency by the pretune loop (see description on block diagram).

The system uses a sampler that samples the incoming RF signal at a rate determined by the frequency of the VTO (voltage tuned oscillator). The VTO fundamental has a range of 50 MHz to 300 MHz. The fundamental drives an SRD (step recovery diode) that produces a very fast pulse (fast rise time).

This pulse has frequency harmonic components (comb lines) extending beyond 26.5 GHz. One of these comb lines can be placed 20 MHz higher than the RF input. Therefore, as the sampler is turned on and off at the VTO frequency, the rich SRD harmonics are mixing with the incoming RF signal so that one of the frequencies produced is a 20 MHz IF. This IF signal can be monitored by the processor, filtered, down-converted a second time to 100 KHz, and finally detected, digitized and displayed as the measurement data.

The main phase lock loop locks to 20 MHz and has enough bandwidth to track the fast sweeping ramp. However, at each source or VTO band crossing, a new pretune cycle is initiated and the system allows time for the sweeper and the VTO frequency to settle down before a sweep in the new band is initiated. Then, prior to main lock, the IF is counted to determine if it is approximately 10 MHz to 30 MHz. If it is, a check-step is performed to ensure that the proper harmonic is present and phase locked. If the proper harmonic is not present, the processor can steer the VTO frequency closer and the process is repeated. After proper phase lock is established, sweep in the band is allowed to continue.

During the entire sequence of pretune and main phase lock, the processor is constantly monitoring the phase lock sequence. If one of the steps in the sequence cannot be accomplished, a Running Error Message will appear on the CRT of the HP 85101. However, it is important to remember that the error messages indicate that a fault was detected at a particular place in the phase lock sequence, not that the fault is located there. For example, the message may be, PHASE LOCK LOST (detected at U7, A23, HP 85102A), but the problem may be that the VTO is not working. Therefore, it may be necessary to enter a new START frequency value, or press the MEASUREMENT [RESTART] key several times in order to get the message to repeat. This will assure that the problem is real and not an intermittent interruption. Be cautious in your interpretations and always refer to the RUNNING ERROR MESSAGES section when the CRT displays one. These error messages will remain on the CRT even though the error has cleared itself or proper operation is re-established. Therefore, be sure to clear the message manually with the [ENTRY OFF] and MEASUREMENT [RESTART] key.

TRACKING THE RF INPUT

The system cannot accomplish a single uninterrupted sweep from 45 MHz to 26.5 GHz. This is because both the source (sweeper) and the test set VTO have limited sweep ranges. The HP 8510 controls the band crossings of the source and the VTO. For example, due to the limited VTO fundamental range (65 MHz to 300 MHz), the first sweep of the source is stopped twice in its first band: at 250 MHz and at 840 MHz. This break allows the VTO to use its fundamental and then its third harmonic in order to track the source. From then on, the band crossings coincide with those of the source. The default harmonics used for typical HP 85xx-series Test Sets are:

Table of default band crossings

Source Frequency Range	VTO Harmonic
45 MHz – 250 MHz	(fundamental) 1
250 MHz – 840 MHz	3
840 MHz – 2.4 GHz	9
2.4 GHz – 7.0 GHz	25
7.0 GHz – 13.5 GHz	48
13.5 GHz – 20.0 GHz	68
20.0 GHz – 26.5 GHz	90

VTO AND TEST SET ELECTRONICS

The VTO frequency is the very heart of the HP 8510 phase lock system. In fact, the system cannot make a measurement unless the VTO is operating perfectly. The VTO is a hybrid microcircuit that mounts in the center of the test set and and drives up to four samplers, depending upon the test set model.

The VTO is tuned from the VTO summing amp board (A3) in the test set. This amp sums the pretune voltage and main lock voltage in order to control the VTO frequency.

There is a pretune sample and hold (S/H) circuit on the summing amp board (A3). It is controlled by the pretune board (A22) in the HP 85102. While the VTO is sweeping, during the main phase lock, it is holding. When the pretune loop is adjusting to a new start frequency, it is tracking or sampling. The natural frequency of the VTO, without any input at the summing amp, is about 180 MHz. Also, looping on Self Test number 13 (see SELF TEST section) will cause the VTO frequency to go to 120 MHz.

MONITORING THE VTO

The VTO signal can be monitored at the VTO Aux Out terminal (on the VTO) at a minimum of −3dBm (use a spectrum analyzer or power meter). Or, after the signal is buffered on the summing amp, it can be monitored at J2 (VTO Sense line) at about +2dBm. After the signal is buffered, it is sent to the HP 85102 where another test or monitor point exists: J2 TEST MONITOR (A22). It is a small circuit on the pretune board (A22) with 12 dB of attenuation at 50 ohms. The signal will be the VTO fundamental (65 MHz to 300 MHz) at greater than −12dBm (use a scope with a 50 ohm input switch). This test point is only used to give an indication of the approximate power that is delivered to the pretune board. There is some roll-off in power using this technique: an accurate measurement of the absolute power requires a calibrated network analyzer or power meter.

PRETUNE PHASE LOCK SEQUENCE

Each pretune cycle begins under processor control. The start frequency and all the necessary programming information are computed by the processor at the beginning of every sweep and at each band crossing. For example, if the start frequency entered on the HP 85101A front panel is 1.8 GHz, the processor will calculate the frequency required to produce a 20 MHz IF. In this case, the processor will send information over the data bus to the A22 pretune board and also to a DAC on the A23 main phase lock board so that the VTO can be driven to about 202.2 MHz. However, the actual IF frequency is really a function of the source RF and the VTO frequencies. The result of the pretune is that the 9th harmonic of the comb line will be equal to 1.82 GHz, or 20 MHz (+5 MHz) greater than the 1.8 GHz start frequency.

During pretune, the main phase lock loop is switched away from the phase detector to the DAC that drives the tuning output voltage to a fixed DC level. The pretune board tunes the VTO by putting the sample-and-hold into the *track-always* mode. The A22 pretune board can then synthesize the VTO frequency to the correct multiple of 50KHz (reference from the A6 clock) with a divide by *N* circuit. *N* is chosen by the processor such that the resulting VTO comb frequency is placed 20 MHz above the incoming RF.

When the pretune has settled to the correct frequency, lock can be detected using a comparator (U22) on the A22 pretune board. The processor can then read that bit from the comparator and determine if an error has occurred. If an error has occurred, the CRT message will be VTO FAILURE.

Up to this point in the pretune sequence, all that has been attempted is to steer the VTO to a fundamental sampling rate and lock the pretune loop, based on the *N* number chosen by the processor. If the pretune is locked, it is an indication that:

- the pretune board is good
- the interconnect cable is good and properly connected
- part of the VTO summing amp is good
- the VTO oscillator is working
- the software interface from HP 85101 to the HP 85102 is working

However, it is NOT an indication that:

- the source is properly connected and working
- the VTO SRD and pulse drive are good
- the sampler preamps are working
- the IF chain is working properly

PRETUNE IF COUNT SEQUENCE

The next step in the pretune cycle is to determine if the comb line is near the RF input frequency. The IF counter board A21 (HP 85102) does this by checking the presence and frequency of the IF. The processor chooses the active IF (sampler) it will monitor: the default is a1 but it can also choose a2, depending upon the measurement and the test set model. This choice is implemented by the PIN switch on the IF Counter board.

There are many reasons why an IF count may or may not be present on the board. And this is where any malfunction or bad connection in the system can result in a very complex problem. Because the system operation is different with each source, the cycle is easier to understand if you assume an ideal sweeper that has enough flat power, no sweep time problems, and no power holes caused by cabling or any other reason. Therefore, this ideal sweeper would be set up so that at the start of the sweep, or at each band crossing, the new frequency is synthesized and is accurate within a few Hertz.

The HP 8510 pretune synthesizer is accurate enough to pretune the comb line within +5 MHz of the desired frequency. Therefore, with the ideal situation, an IF will be created at 20 MHz (+5 MHz) and the IF counter will detect that there is enough power to lock to and it will count the IF. If the count is outside of the range of approximately 10 MHz to 30 MHz, or if the counter has over-ranged, or if there is not enough power to lock to, the processor will ignore the count and go into a search routine in order to find the IF. If there is enough power and the frequency is correct, the IF is counted to within 10 KHz resolution.

CHECK STEP SEQUENCE

This is an algorithm that the processor uses to determine if a valid IF count has been created on the desired harmonic and if the correct side band (high side) is present so that phase lock can take place.

This is accomplished by doing a second pretune to a new frequency that should move the IF towards 20 MHz by approximately 5 MHz. For example, if the first count is 23 MHz, the second count (after check step) should be 18 MHz. If, however, the comb line is on the low side of the RF, a 23 MHz IF could still be generated, but the check step would increase the IF to 28 MHz. In other words, if the comb line is on the high side, the IF is decreased; if the comb line is on the low side, the IF is increased. If a wrong side band is detected, the processor causes the pretune to move the IF 40 MHz so that it is above the RF, and then it repeats the check step.

If the IF is not detected, if the check step fails, or if the IF is out of range after several searches, the warning message will be, NO IF FOUND. Ideally, the IF would be found on the first check step and would never enter the search loop. Again, if the message appears on the CRT, it could be an indication of any of these problems listed below:

- the sweeper is not working or not properly connected
- the VTO is not producing the proper comb lines
- the sampler preamps are not working
- any of the interconnect cables are absent or not working
- the IF mixer board is not buffering the IF correctly
- the A21 IF counter board (HP 85102) is not working

MAIN PHASE LOCK SEQUENCE

The next step in the phase lock sequence is to switch from pretune to main phase lock. The processor does this immediately after a successful pretune sequence. Although the processor is extremely fast, timing is very important. It is possible that any drift in source frequency, any decrease in power, or any fluctuation during the pretune loop could prevent the IF from being present when the main phase lock is allowed to acquire and lock on to the IF.

As the pretune voltage is held constant by the sample-and-hold on the test set VTO summing amp (A3), the IF remains close to the frequency it was when pretuned. The main phase lock is taken out of the DC offset mode and allowed to track the error signal of the phase detector and acquire the IF in order to lock it to the 20 MHz reference. Once this is accomplished, the processor can release the sweep and the phase lock loop will remain locked while holding the IF at a zero phase error (for the ramp output of the main phase lock board). If the loop cannot lock before the sweep is released, the error message on the CRT will be, PHASE LOCK FAILURE. Some of the possible causes are:

- the RF (HP 85102) internal cables to the main phase lock (A23) are not properly connected or are intermittent
- the main phase lock board is not working
- any of the other phase lock boards are not working

OTHER PHASE LOCK PROBLEMS

The loop will unlock in the middle of a sweep if any of the interconnections are broken or intermittent. It can also unlock if the VTO is driven to the end of its range before bandcrossing; if this is the case, the messages will be, VTO OVER-RANGE. And this can only happen when the VTO over-ranges before the loop falls out of lock. For example, if the sweeper's ramp is not calibrated to the HP 8510 Sweep ADC gain adjustment, the VTO will over-range. The HP 8510 *Trim Sweep* adjustment (HP 85101: front panel – Push CAL, MORE, TRIM SWEEP) can be used to adjust the HP 8510 to the source (refer to the OPERATING AND PROGRAMMING manual).

During the sweep, phase lock is often lost because of a loss of power (in the cabling) to the reference channel (commonly called a *power hole*). This can be checked by monitoring the the a1 or a2 power that is output from the test set frequency converter (sampler) – refer to the UNRATIOED POWER TEST section.

Once lock is lost, the system attempts to lock one more time during the sweep. Then, if lock is not acheived, the loop stays unlocked until the next bandcrossing and the processor sends the error message, PHASE LOCK LOST, even if lock has been recovered. A bad main phase lock board (A23) can cause loss of lock even during the middle of a sweep.

PHASE LOCK LEARN MODE

The processor can determine if the phase lock has been maintained through a complete sweep through all of the band crossings. It does so because it calculates where band crossing should occur, based on the default values or the values it calculates after the operator sets the start and stop frequency.

Whenever the start frequency, stop frequency, or sweep time is changed, the processor begins the new sweep with one of the values previously listed in the Table of Default Band Crossings. These values correspond to the new start frequency and all the band crossings necessary to complete the sweep. Therefore, the first pretune point is 20 MHz above the new start frequency and the next band crossing is the default value previously listed.

This is required because the sweep linearity of the 8350B (and associated plug-in) is approximately ±50 MHz. Due to this wide range, the Search Mode will automatically search to find the IF because the RF is not perfectly accurate. The processor can then calculate and remember the new value of actual start or bandpass frequency; that frequency needs to be used to do a successful phase lock on the first attempt during the next sweep. Thus, the processor remembers the new values until the start frequency is changed or re-entered. Re-entering the start frequency always causes the processor to use the default values, therefore, the processor is in a known state or mode.

IF SEARCH MODE

The IF may not be at the default location for many reasons. The IF count could be rejected because it is out of range, there is not enough power, or it has the wrong check step value. If any of these are the case, the processor begins a search mode. The search mode is a series of ever widening steps of approximately 10 MHz that attempts to find the IF. After several attempts, if a valid count is found, the check step is performed and, if successful, the main phase lock is released. If the check step is not successful, the search continues several times.

There are many circumstances that can prevent an IF from being present or cause the IF to go out of range. The band pass filtering on the sampler preamps in the test set limit the available search window to about 20 MHz (±10 MHz). The filter is down about 15 dB at the edges.

There are two major sources of error in the location of the IF: source linearity (including band cross locations) and sweep point quanitzation errors on the sweep ADC board (due to point limitiations). The difference in the phase lock sequence is due to the type of sweeper used and the sweep span. The worst case occurs for the widest measurement sweeps. In these cases, the maximum number of bands are used and the sweep time should accordingly be slowed down to >200 mS. Also, the accuracy requirement at each band cross is very critical, although it is less important as the sweep span is decreased.

Once a successful sweep is achieved, the updated pretune values at each band crossing are then computed and used as the new starting points for all successive sweeps, unless the start/stop frequency is changed. If it is changed, the sweep table is recalculated with default values and a new learn mode is initiated. A new learn mode is also initiated if failures are detected during the sweep and updating is necessary.

The first sweep, following a change that updates the sweep table, may be slower than the current sweep because the processor needs time to recalculate. Also, restarting a new sweep with new start/stop frequencies will depend on the current sweep time. If the sweep time is slow (>0.3 sec for the HP 8340/41 and >0.15 sec for the HP 8350) the new sweep frequencies are used immediately in the current sweep. If the sweep time is fast (<0.3 sec for the HP 8340 and <0.15 sec for the HP 8350B) the current sweep is allowed to finish before the new sweep is started.

PHASE LOCK PERFORMANCE WITH AN HP 8340 OR HP 8341

Because the HP 8340 is a synthesized sweeper, the start frequency is as accurate as possible. Therefore, the HP 8510 can obtain an almost perfect phase lock except at the first two VTO band crossings. There may be some discrepancy in the stop frequency of each band that can appear as a discontinuity in S11 phase response for Devices Under Test (DUTs) with long electrical delay. Discontinuities can be almost eliminated, for any one band, by adjusting the *Trim Sweep* in the Cal Menu of the HP 8510. The most important difference between the HP 8340 and the HP 8350 is that, at band crossings, the HP 8340 synthesizes the next band's start frequency almost perfectly. This means that the default pretune frequencies for all the band crossings will be nearly perfect, and the search mode should never be initiated.

NOTE: HP 8341 is considered to have similar performance as HP 8340.

PHASE LOCK PERFORMANCE WITH AN HP 8350B

The search mode is different when using an HP 8350B. Because there are only a limited number of points, the accuracy of the stop frequency is equal to the frequency span divided by the number of points (typically, 801). For test sets that go to 18 GHz, this is +11 MHz. For test sets that go to 26.5 GHz, this is +16.5 MHz. Although the accuracy of the stop frequency is the same as the HP 8340, the HP 8350 does not synthesize the start frequency of the next band crossing. It simply resumes the sweep from wherever it left off. This does not cause greater discontinuites in phase measurements, but it may cause default pretune frequency errors. And these errors are a combination of the sweep ADC quantization accuracy and the HP 8350 sweep linearity. The sweep linearity is specified at +50 MHz, and the sweep ADC can be off by as much as 16.5 MHz. Therefore, the default pretune values and the final values may be quite different. This is because the processor will have to search higher and lower than the default values in order to find the IF.

The first two band crossings, at 250 MHz and 840 MHz, are due to the test set VTO's need to change harmonics. The accuracy of the HP 8350 at those band crossings can be corrected using the frequency adjustment on the front panel of the HP 8350 plug-in. Phase lock problems on those two band crossings require making that adjustment along with re-entering the start frequency in order to re-set the sweep table.

The accuracy of the other band crossings can be adjusted together with the gain adjustment DAC using the HP 8510 *Trim Sweep* adjustment (refer to section III Operating and Programming). Adjust it so that the phase measurement (S11) of a zero span sweep, at the highest frequency desired (set to the reference level), is the same as the phase measurement of the last measurement point in a full band sweep. The full band sweep should be set up with an airline and electrical delay adjusted to vary the phase over less than 360 degrees. It is also possible that the phase lock may not find the RF frequency when the DAC is near the end points of its range (+2047 through −2048). This is because the range is wide enough to slip over and onto an undesired comb line. Therefore, be cautious when adjusting *Trim Sweep* with the Rotary Pulse Generator (RPG).

SUMMARY OF A PHASE LOCK CYCLE (Including Running Error Messages)

The phase lock cycle occurs at every start frequency, at every band crossing, and at every point in *step* mode as follows:

1) Pretune phase lock — Pretune a harmonic to the start frequency +20 MHz and lock and check for proper lock. If unsuccessful, the message is VTO FAILURE.

2) Check harmonic and side band — Pretune 5 MHz towards the 20 MHz IF. Count the IF and if its on the wrong side band, pretune 40 MHz higher and count again. Next, search to see if the IF is out of range. If in range, continue. If out of range, the message is NO IF FOUND.

3) Acquire main phase lock — Hold the pretune frequency. Lock the main phase lock loop. Check for 20 MHz and if the IF is 20 MHz, continue. If not, the message is: PHASE LOCK FAILURE.

4) Monitor phase lock — While making the measurement sweep, the processor monitors the IF count and power. If phase lock is lost during the sweep, the message is: PHASE LOCK LOST.

If the VTO is at the end of its range before band crossing but loop is still locked, the message is: VTO OVER-RANGE.

HP 85101 Theory of Operation

The HP 85101 Display/Processor is the system controller, data processor, and display unit for the HP 8510 system. It consists of the processor, EEPROM non-volitile memory, a vector display, and all I/O ports necessary to communicate with the rest of the HP 8510 system. Refer to the corresponding block diagram in the BLOCK DIAGRAMS section.

The HP 85101 controls the HP 85102 IF-Detector via a dedicated interface bus (labeled IF-DISPLAY INTERCONNECT, on the HP 85101 rear panel). It controls the test set, the source, a printer, and a plotter via a dedicated HP-IB (labeled 8510 SYSTEM BUS on the HP 85101 rear panel). Another HP-IB is available (labeled HP-IB on the HP 85101 rear panel) to interface with an external controller, printer, or plotter.

FUNCTIONAL GROUPS

The HP 85101 consists of the following functional groups:

Display Section:

- The CRT.
- The X (A4), Y (A5), and Z (A2) amplifiers.
- The HV power supply (A3).
- The line generator (A6).

This is a vector display (it draws the lines from point to point), rather than a raster scan display (which scans the entire CRT and turns the beam on and off as needed). The display generator (A14) calculates the beam position digitally, and the line generator (A6) converts the digital information to analog signals. The analog signals are amplified by the X, Y, and Z amplifiers, and fed into the CRT. The HV power supply provides the CRT with all necessary voltages.

Switching Power Supply

The 85101 power supply is distributed between the switcher assembly (A7), the post regulator assembly (A8), and the mother board (A16). A switching power supply rectifies the raw line voltage, then alternately switches the half-wave bridge FETs on and off at a fast rate. The resulting chopped DC voltage is applied to a transformer primary. The rectifier DC output controls the pulse width of the chopped DC voltage, providing a +5V regulated output.

Along with the +5V regulated output from the switcher, there are several other windings on the switcher transformer. Voltages from these windings are rectified and regulated on the A8 post regulator assembly. The resulting outputs are +12, +15, and +100V.

Processor Assembly

All system control and computation functions are performed on the A11 processor assembly. This assembly contains:

- The main processor, or CPU (a 68020, 32 bit microprocessor).
- A seperate math processor.
- The main processor memory RAM (128 K words).
- The system ROM.

The main processor data, address, and control buses are routed throughout the HP 85101 via the back-plane (A10).

I/O Assembly

The I/O assembly has a variety of functions, which include:

- The HP 85101 interrupt system.
- Two HP-IB ports.
- The HP 85102 interface.
- The front panel interface.
- The RPG counters.
- The programmable timer.
- The tape controller.

Display Generator Assembly

This assembly performs all computations necessary for a vector display. The display generator is state machine driven. 64K words of dynamic RAM resides on this board, 16K of which is dedicated to the display generator; the remaining 48K is available to the CPU. Besides computing vector positions and lengths, the display generator also provides:

- Several different intensity levels.
- Blinking.
- Dotted lines.
- A few visual patterns to verifiy proper operation of the display generator.

HP 85102 Theory of Operation

The HP 85102 IF/detector, controlled to a large extent by the HP 85101 processor, is an integral part of the HP 8510 phase lock system (HP 85102 and test set), IF detection, and signal digitizing. The HP 85101 processor communicates with the HP 85102 so the phase lock system can:

1. Track the RF measurement signal.
2. Down convert the measurement signal.
3. Detect the down converted signal.
4. Digitize and multiplex the detected signal X and Y (real and imaginary) measurement pairs.
5. Send the digitized, multiplexed pairs to the HP 85101 for processing and display.

The 20 MHz IF signals from the test set enter the HP 85102, are buffered, filtered (to remove image and upper sideband noise), and mixed to 100 kHz on the IF mixer assemblies – there are four of them, one for each channel. The local oscillator, from the local oscillator generator assembly, is fully derived from a 20 MHz reference so that no frequency uncertaincies enter the detection path.

So that the detectors that follow operate in their optimal range, each of two IF amplifiers select one of four possible inputs and autorange in 12 dB steps. The synchronous detector assemblies mix the autoranged 100 kHz IF with 100 kHz derived from the reference clock. The real part is derived by mixing with reference having no phase shift; the imaginary part is derived using the reference with a 90 degree phase shift.

The DC output is sampled and converted by the ADC and sent to the HP 85101 processor. The XADC provides the ADC with evenly spaced (with respect to the sweep ramp) triggers for the number of data points.

HP 85102 ASSEMBLIES

A1 Front Panel and Front Panel Interface

- The keyboard matrix
  Enables the front panel keys.
- The keyboard decoder
  Detects pushed front panel keys and, when required, interrupts the HP 85101.
- The front panel LEDs
  Distinguish power on/off, and the channel (1 or 2) in use.

A5 Test and A7 Reference Synchronous Detectors. These assemblies are electrically and mechanically identical. They detect the X and Y pairs (test and reference) that are mixed down to 100 kHz IF.

A6 Clock. This assembly provides:

- Reference IF signals for the main phase lock loop.
- Timing signals for the synchronous detectors.
- Timing signals for the 19.9 MHz local oscillator.
- The 100 kHz Cal signal for the IF.

A8 19.9 MHz Local Oscillator. This assembly provides the LO signals for the IF mixer assemblies.

A9, A11, A13, A14 IF Mixers. These assemblies are electrically and mechanically identical. Each is used in conjuction with a particular sampled test or reference signal to convert the 20 MHz IF to 100 kHz.

A10 Test and A12 Reference IF Amplifier. These assemblies are electrically and mechanically identical, and provide the gain and auto ranging.

A15 Regulator. This assembly provides the following regulated voltages:

- +15V
- −15V
- +5V
- −5V

A17 Sample and Hold. This assembly provides the multiplexing for the X and Y pairs (from the synchronous detectors).

A18 Analog-to-Digital Converter. This assembly converts the X and Y (test and reference) pairs from the analog IF to digital bits that the HP 85101 processes for display.

A19 ADC Control. Under HP 85101 control, this assembly, in conjunction with the A20 sweep ADC assembly, provides the control for the A17 sample and hold, and the A18 analog-to-digital converter.

A20 Sweep ADC. As the HP 8510 system sweeps, data points are taken at processor-controlled intervals. This assembly triggers the sample and hold assembly to take data at the proper frequency intervals.

A24 Processor Interface. This assembly lets the HP 85101 communicate with the HP 85102.

A25 Motherboard. This assembly properly interconnects all other assemblies.

A26 Rectifier. This assembly provides AC to DC rectification for the HP 85102.

Phase Lock Assemblies

A21 IF Counter. This assembly counts the 20 MHz IF signal and checks for the power level and valid frequency count for both pretune and main lock.

A22 Pretune Phase Lock. This assembly lets the system initiate a pretune phase lock based on the start frequency input to the HP 85101. It also counts the VTO fundamental frequency while the LPTHLD line holds the pretune frequency in the A3 assembly sample and hold circuit.

A23 Main Phase Lock. This assembly is used:

- During pretune, when the VTO is steered toward the necessary frequency (controlled by the HP 85101).
- As the main loop that locks the 20 MHz IF.

The rear panel LO PHASE LOCK OUT signal, which comes from this assembly, is the same signal that drives the 85102 VTO. This signal may possible used for mm-wave system to drive an HP 8350B sweep oscillator's FM input to enhance frequency accuracy. However, consult your local HP office for details.

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Test Set Theory of Operation

There are several test sets designed to work with the HP 8510 system. They are commonly referred to as HP 85xx-series test sets and include the HP 8511, 8512, 8513, 8514, 8515. The difference between these test sets is due to their operating frequency range, front panel test port connectors, and internal RF path mechanics. However, the HP 8510 can recognize each type of test set by reading its configuration switches at power-up. Therefore, the HP 8510 processor can operate the system regardless of test set type. Remember that the test set has two main functions:

1. The test set separates the RF signals into incident, reflected, and transmitted signals through a series of couplers or triax bridges, *hard-line* cables, and attenuators. Because of the balanced (equal electrical distance and attenuation) paths, the RF signals are phase coherent and can therefore be kept in ratioed pairs after calibration.

2. The test set down-converts the RF signals after they are separated. The frequency converter assembly is driven by the VTO (voltage tuned oscillator) to produce a 20 MHz IF for each signal. This is typically accomplished by samplers that are used for to down convert or sample each signal. The signals are kept separate and referred to as a1 (incident), b1 (reflected), b2 (transmitted or reflected for S-parameter test sets), and a2 (incident for S-parameter test sets).

After the down conversion process, the signals are sent to the HP 85102 IF-Detector for further down converion to 100 KHz before being sent to the HP 85101 for processing and display. Thus, because the HP 8510 is a vector network analyzer, the test set's operation is critical for making accurate and repeatable ratioed measurements.

Each of the HP 85xx-series test sets has the same core of assemblies, except for the HP 8511. The HP 8511 is basically a four channel frequency converter – its front panel test ports (4 of them) connect directly to four samplers. It does not contain any built-in signal separation components (coupler or bridge) but its assemblies are identical to other test sets. Therefore, it does not use couplers or bridges to separate the signals. This test set has special applications documented in its manual and in some HP application notes.

Assemblies Common To All Current HP 85xx Test Sets:

A1 Front Panel board
A3 VTO Summing Amp board
A4 HP-IB board
A10 a1 Sampler assembly
A11 B1 Sampler assembly
A12 b2 Sampler assembly
A14 VTO/Driver assembly
A15 Regulator board
A19 Motherboard
A20 HP-IB Interface board

NOTE: All four sampler assemblies are identical and interchangeable.

Additional Assemblies Required To Make Other Models:

Refer to the separate manuals for each test set. Those manuals have a Replaceable Parts section that lists the assemblies for that test set.

Test Set Control Logic

The control logic provices the test sets with programability as controlled by the A4 HP-IB board. It provides the signals that allow the test set to communicate with the HP 85101 processor over the HP 8510 system bus. The control logic also provides conmmand and control of several assemblies with the test set via a separate data/address bus internal to the test set.

The internal data/address bus allows the A4 processor to do the following:

- Turn the VTO/Dirver assembly ON and OFF.
- Select (turn on) the sampler(s) required to measure the desired signal.
- Operate the front panel *active* LED.
- Operate the front panel a1 or a2 LEDs.
- Read the configuration switches.
- Program the switch/splitter and any programmable attenuatorson the S-paramter test sets.

The A4 HP-IB board is the heart of the logic control. It contains an 8-bit microprocessor and has sufficient memory to allow the tet set flexibility. ROMs on this board contain code for initializing the test set and identifying its exact type to the HP 85101 processor. This identification code is used in conjunction with the configuration switches. The A4 board also contains an HP-IB chip (IC) that allows the test set to communicate with the HP 85101 processor.

When power is applied to the test set, the A15 regulator board produces a power ON reset signal (PWON) that resets the control logic of the test set. After the power supply voltages are up to their required levels, the PWON signal transistion (goes low to high) resets the processor, the HP-IB chip, and a data latch on the A3 Summing Amp board. Resetting this data latch turns ON all of the samplers in the test set. The general effect of PWON is to put the test set in a default stat at power-up time. This allows the test set to function even if the A4 HP-IB board is defective or if there is no communication between the HP 85101 and the test set. When the processor on the HP-IB board is reset by the PWON signal, it runs a test set Self Test program that checks the integrity of the ROM and RAM located on the A4 board. In addition, the A4 processor monitors the temperature of the test set via a comparator on the A3 board and, if the test set gets too hot, it sends a service request to the HP 85101 processor to display the appropriate Running Error Message.

Typical RF Path Theory of Operation for an S-Parameter Test Set

The RF signal enters the rear panel (J7) of the test set from the source. The RF is then applied to the A18 switch/splitter: a combination of two power splitters and a solid state switch. This switch selects the power splitter to be used, therefore selecting the port that will receive incident RF power.

The switch/splitter receives its control signals fron the A5 attenuator/switch driver. The LEDs on the front panel indicate which test port is active. Source power is applied to port 1 for S11 or S21 measurements and port 2 for S22 or S12 measurements: Remember that the S-parameter measurement is an out/in ratio.

When port 1 is selected, the reference signal (a1) is routed through the rear panel reference extension B, attenuated to balance out the coupling factor or loss through the bridge, and then sent to the frequency converter (sampler) for down-conversion to 20 MHz. Because RF power is applied to port 1, the a1 IF signal is used to phase lock the HP 8510 to the source.

The test signal (also a1) exits the switch/splitter, is routed through the port 1 programmable attenuator, passed through the port 1 bias tee (used to apply DC bias along with the RF signal to the DUT), and routed to the coupler or bridge where the incident RF power is applied to the DUT (device under test).

The signal reflected from the DUT is separated from the incident signal by the coupler or bridge and then applied to the A10 b1 sampler for down conversion to 20 MHz IF. Also, the transmitted test signal (b2) is applied to the A11 b2 sampler for down conversion to 20 MHz IF. A similar process occurs when RF power is applied to port 2 of the test set.

The samplers have the ability to be turned ON and OFF depending upon which port is selected and which S-parameter is currently being measured. This switching action is under processor control on the A4 board. The LO (local oscillator) signal generated by the VTO/Driver is phase locked to the source so that the desired VTO harmonic is 20 MHz greater than the source frequency.

The A3 VTO Summing Amp board provides the control voltages that the VTO needs to tune to the correct LO frequency. Should the VTO ever go out of range, the processor will generate an error message: VTO OVER-RANGE.

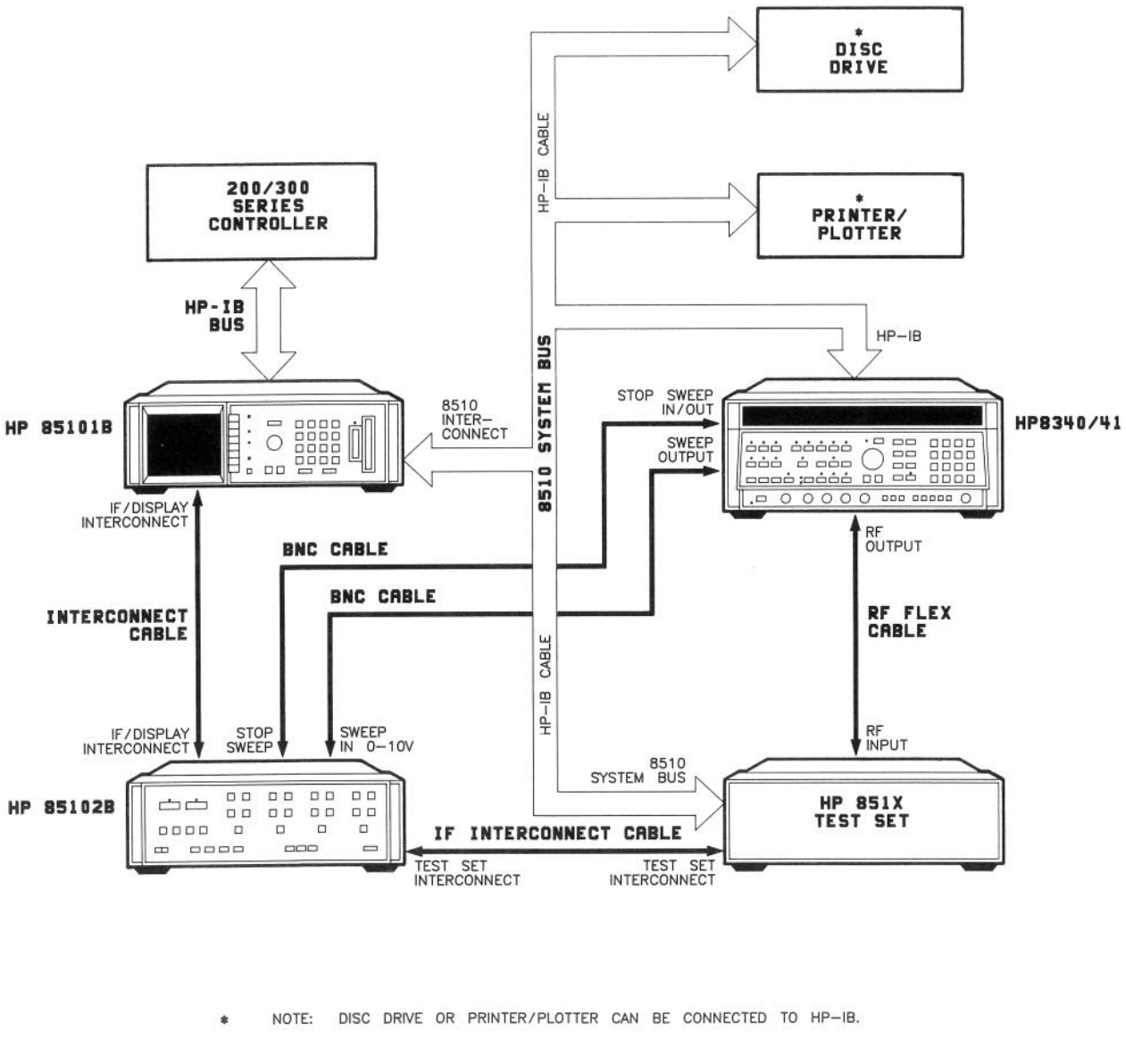
The phase lock loop process is described in the PHASE LOCK portions of this theory section of the manual. The loop includes portions of the test set, including the A3 Summing Amp board, the A14 AVO/Driver, the A12 a1 Sampler, and the HP 85101 processor and related phase lock assemblies in the HP 85102.

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Configurations/Connections

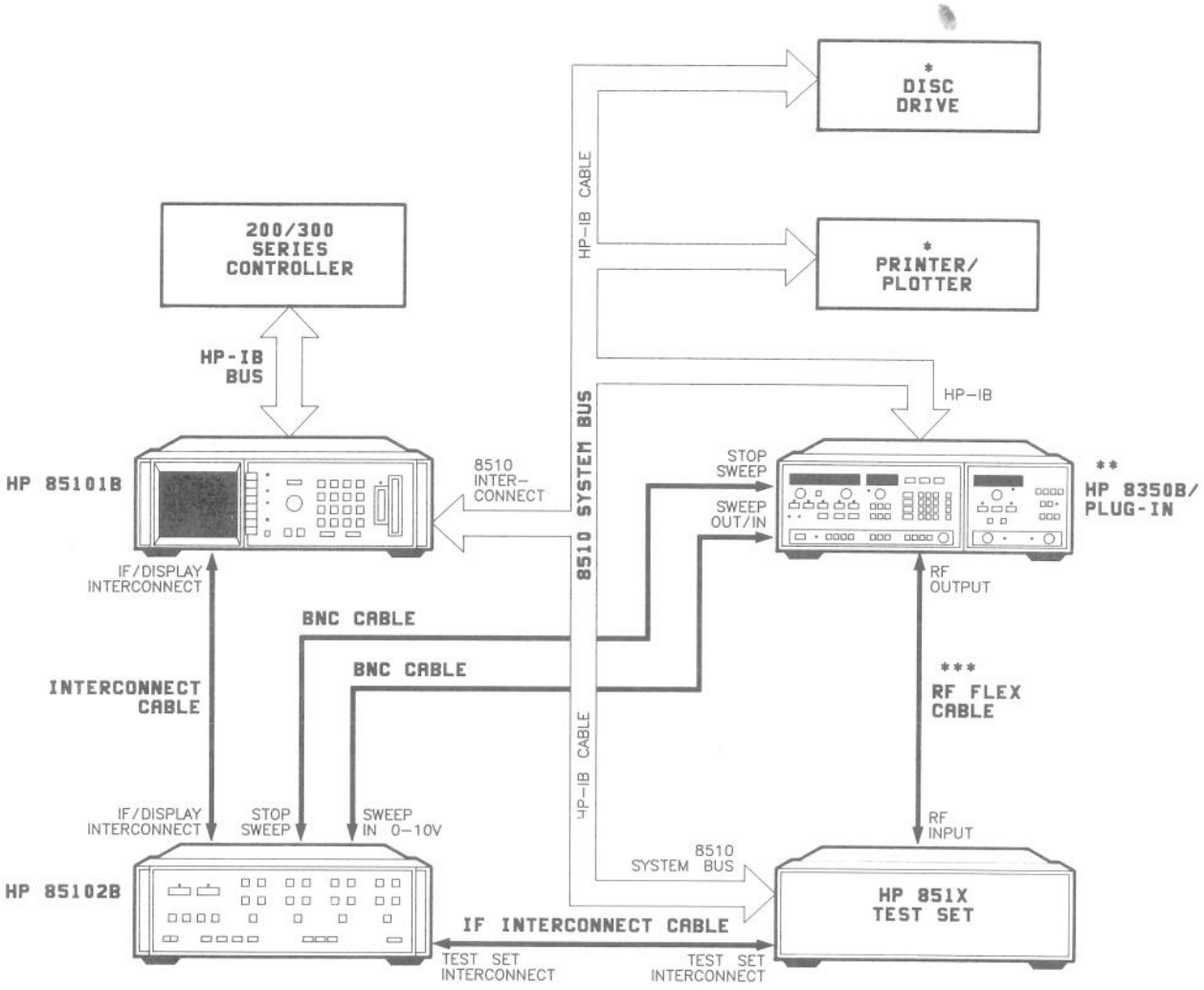
This section of the manual contains HP 8510B system connection diagrams, similar to those in the INSTALLATION section. They are included here as a quick reference. Whenever you want to check the cabling between the system instruments, you can refer to the drawings in this section.

The drawings show only the basic system interconnections. Peripherals, fixtures, waveguide systems, etc., are not covered.



* NOTE: DISC DRIVE OR PRINTER/PLOTTER CAN BE CONNECTED TO HP-IB.

Figure 1. HP 8510B Configuration A: 8340/41 Source and 851X Test Set



* NOTE: DISC DRIVE OR PRINTER/PLOTTER CAN BE CONNECTED TO HP-IB.

** NOTE: 8350B PLUG-IN BANDWIDTH MUST BE COMPATIBLE WITH TEST SET BANDWIDTH.'

*** NOTE: REAR PANEL OF 8350B: TYPE N-TO-SMA (FE).

Figure 2. HP 8510B Configuration B: 8350B Source and 851X Test Set

Service Manual Update: HP 8510B

New Information and changes to this manual

At the time of printing, no new information or changes were required. However, if new information becomes available or if changes are required, this page will be updated by a package of new information.

New information will be made available in the form of a Manual Update or Manual Changes supplement. This supplement, commonly called a Change Sheet, will be produced at the factory and shipped with the instrument. If you receive a Change Sheet package with your HP 8510B, follow the instructions on its cover page. After you do, this page (and others) will be replaced or superseded by a page that identifies the changes made to your manual.

Remember, this section of the manual is used to keep a history of any changes made to this manual set. Always refer to it to be sure that you have the latest information incorporated in your manual.

Contact the nearest Hewlett-Packard office for information about the availability of a Manual Changes Supplement for this manual.

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MANUAL CHANGES SUPPLEMENT

HP 8510B NETWORK ANALYZER
SERVICE MANUAL

NOTE

Manual Change Supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically order the latest edition of this supplement. Copies are available through any HP office. When ordering copies, quote the supplement part number from the bottom of this page, or the model number and print date from the title page of the manual.

MANUAL IDENTIFICATION

Manual Part Number: 08510-90078
Date Printed: July 1987

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

TO USE THIS SUPPLEMENT: Make all changes applicable to the serial prefix or number of your instrument as indicated in the following reference table.

Note that there may be more than one Title Page and/or Reference Table included in this supplement. The last changes applicable to your instrument will contain the most current information for these specific pages.

■ = NEW ITEM, CHANGED ITEM

REFERENCE TABLE

	Serial Prefix or Number	Make Manual Changes
	2643A	1
	2728A	1
	2750A	1
	2812A	1
	2820A	1
	2825A	1
	2844A04500	1,2
■	2825A04357	1,2,3

HP Part Number 08510-91144 (For HP Internal Use Only)
Part of HP Part Number 08510-90144
Microfiche Part Number 08510-90158

1 FEBRUARY 1989

Printed in U.S.A.

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MANUAL IDENTIFICATION

HP Model Number: HP 8510B
Manual Part Number: 08510-90078
Date Printed: July 1987

CHANGE 2

Change 2 documents HP 85102B IF Detectors having serial number 2844A04500 and above.

INSTRUCTIONS

There are two types of information included in this change:

Replacement pages – these pages supersede the existing pages in the manual, provided the serial number prefix of your HP 85102B IF Detector is the same as or higher than the one indicated on this page.

Additional pages – these pages update your manual to include the latest information regarding new applications of your instrument.

Replace the following pages:

Title Page
Service Overview, pages 3/4.
Running Error Messages, pages 9/10, 11/12.
Replaceable Parts, pages 19/20, 21/22, 31/32.
Service Manual Update, pages 1/2.

Add the following pages:

Pulsed-RF Measurement Capability tab
Pulsed-RF Measurement Capability, pages 1 through 29.

MANUAL IDENTIFICATION

Manual Part Number: 08510-90078
Date Printed: July 1987

CHANGE 3

Change 3 documents all HP 85101B Display/Processors and all HP 85102B IF Detectors having serial number 2825A04537 and higher.

INSTRUCTIONS

Replace the existing manual pages with the pages provided in this change. These pages supersede the existing pages in the manual, provided that the serial number prefix of your HP 85101B Display/Processor is the same or higher than the one indicated on this page.

Replace the following pages:

Title Page
Replaceable Parts, pages 7/8, 11 through 16, 19/20, 27/28, 35 through 40, 45/46
Pulsed-RF Service Information, pages 17/18, 25 through 28

Add the following pages:

Pulsed-RF Service Information, pages 29 through 35

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Errata

Title & Document Type: 8510B Service Manual

Manual Part Number: 08510-90078

Revision Date: February 1989

HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement business is now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

Support for Your Product

Agilent no longer sells or supports this product. You will find any other available product information on the Agilent Test & Measurement website: www.tm.agilent.com.

Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.



Agilent Technologies

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SERVICE MANUAL

HP 8510B
NETWORK ANALYZER

This manual applies directly to HP 8510B network analyzers having an HP 85101B Display Processor or HP 85102B IF Detector with serial number 2825A04357 or higher.

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MANUAL PART NO. 08510-90078
Microfiche Part No. 08510-90079

Printed: July 1987
Revised: February 1989

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CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (NIST, formerly NBS), to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of delivery. 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 HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

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

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HP SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

ASSISTANCE

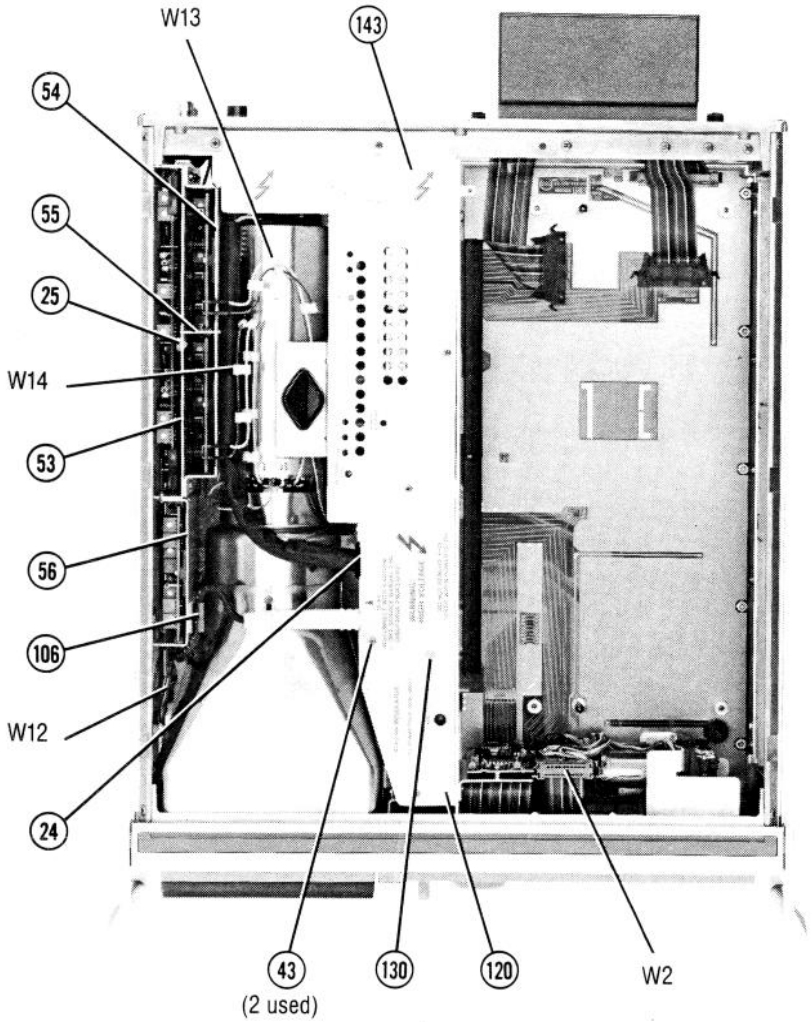
Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

BP21.2

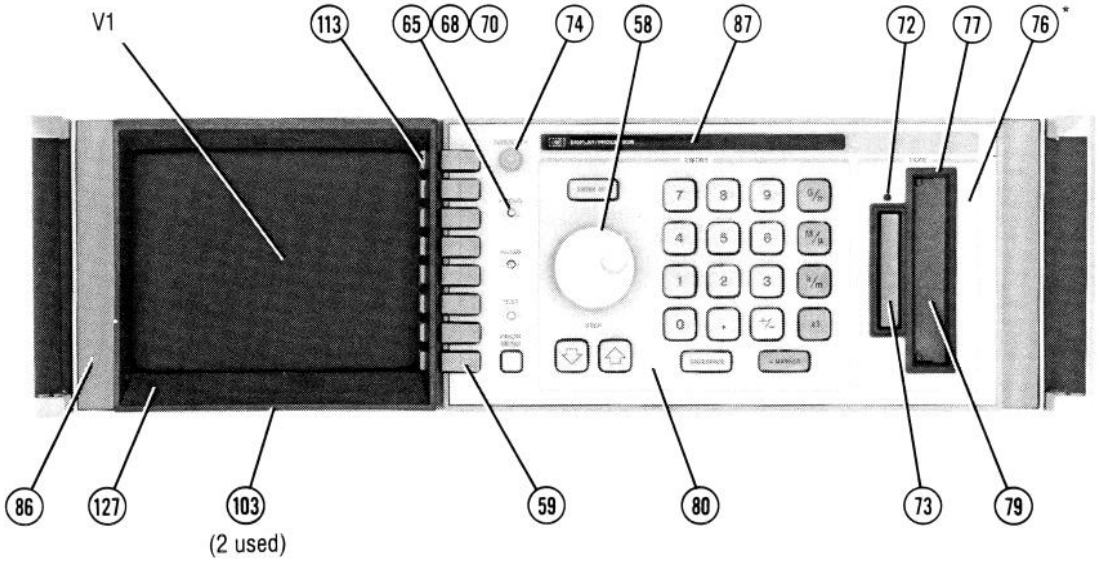
Table 2. Miscellaneous Replaceable Accessories

HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
			SERVICE TOOLS		
08510-60008	3	1	HP 8510 SERVICE KIT	28480	08510-60008
08510-60007	2	1	SERVICE ADAPTER / EMULATOR KIT	28480	08510-60007
			SOFTWARE		
85101-80081	1	1	OPERATING SYSTEM FIRMWARE (revision B.03.00 or B.03.11)	28480	85101-80081
85101-80082	2	1	OPERATING SYSTEM FIRMWARE with TIME DOMAIN OPTION 010 (revision B.03.00 or B.03.11)	28480	85101-80082
85101-80078	6	1	OPERATING SYSTEM FIRMWARE (revision B.04.00)	28480	85101-80078
85101-80079	7	1	OPERATING SYSTEM FIRMWARE with TIME DOMAIN OPTION 010 (revision B.04.00)	28480	85101-80079
			NOTE-PLEASE GIVE THE SERIAL NUMBER OF THE HP85101 WHEN ORDERING THE OPERATING SYSTEM FIRMWARE		
85101-60040	0	1	CIRCUIT MODELING PROGRAM: BOOT REVISION A.02.01 and CIRCUIT MODELING PROGRAM: PROG REVISION A.02.01	28480	85101-60040
			NOTE - THESE DISCS ARE AVAILABLE ONLY AS A SET		
08510-10006	9	1	HP 8511A FREQUENCY CONVERTER PERFORMANCE TESTS	28480	08510-10006
08510-10030	1	1	TEST SET SPECIFICATIONS AND PERFORMANCE TESTS, TWO DISC SET	28480	08510-10030
08510-10031	2	1	PROGRAM DISC	28480	08510-10031
08510-10032	3	1	DATA DISC	28480	08510-10032
			NOTE - THESE TESTS ARE USED FOR ALL TEST SETS EXCEPT THE HP 8511A		
08510-10024	5	1	ADJUSTMENTS HP85102 AND TEST SETS	28480	08510-10024
			DOCUMENTATION		
08510-90067	7	1	HP 8510B OPERATING MANUAL SET OPTION 915 adds SERVICE MANUAL AND ADAPTER EMULATOR KIT	28480	08510-90067
			THE FOLLOWING VOLUMES ARE INCLUDED IN THE OPERATING MANUAL SET AND ARE AVAILABLE SEPARATELY.		
08510-90070	2	1	OPERATING AND PROGRAMMING	28480	08510-90071
08510-90072	4	1	KEYWORD DICTIONARY	28480	08510-90072
08510-90102	1	1	QUICK REFERENCE GUIDE	28480	08510-90102
08510-90074	1	1	SYSTEM MANUAL	28480	08510-90074
08510-90076	8	1	TEST SET AND ACCESSORIES MANUAL	28480	08510-90076
			THE FOLLOWING MANUAL IS ADDED WITH OPTION 915 and IS AVAILABLE SEPARATELY		
08510-90078	6	1	SERVICE MANUAL	28480	08510-90078



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W2	85101-60102	5	1	CABLE ASSY TAPE	28480	85101-60102
W12	85101-60113	8	1	CBL AY 15V REG	28480	85101-60113
W13	85101-60114	9	2	CBL AY X-Y AMP	28480	85101-60114
W14	85101-60114	9		CBL AY X-Y AMP	28480	85101-60114
24	0400-0001	1	2	GROMMET-RND .562-IN-ID .75-IN-GRV-OD	28480	0400-0001
25	0403-0026	6	2	PLUG-HOLE BDR-HD FOR .187-D-HOLE NYL	02768	207-120241-03-0101
43	2200-0101	0	4	SCREW-MACH 4-40 .188-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
53	85101-00017	5	1	SHIELD-LINE GEN	28480	85101-00017
54	85101-00018	6	1	SHIELD X-Y BDS	28480	85101-00018
55	85101-00019	7	1	BOARD SUPPORT	28480	85101-00019
56	85101-00020	0	1	SHIELD-PC BOARD	28480	85101-00020
106	1400-0755	3	3	CLIP-CMPNT .25-DIA .75-WD PVC	06915	KKU-4
120	85101-00011	9	1	COVER H.V.	28480	85101-00011
130	85662-20042	6	1	GUIDE HV	28480	85662-20042
143	85101-00013	1	1	COVER-PWR SPLY	28480	85101-00013

Figure 2. HP 85101 Top Internal

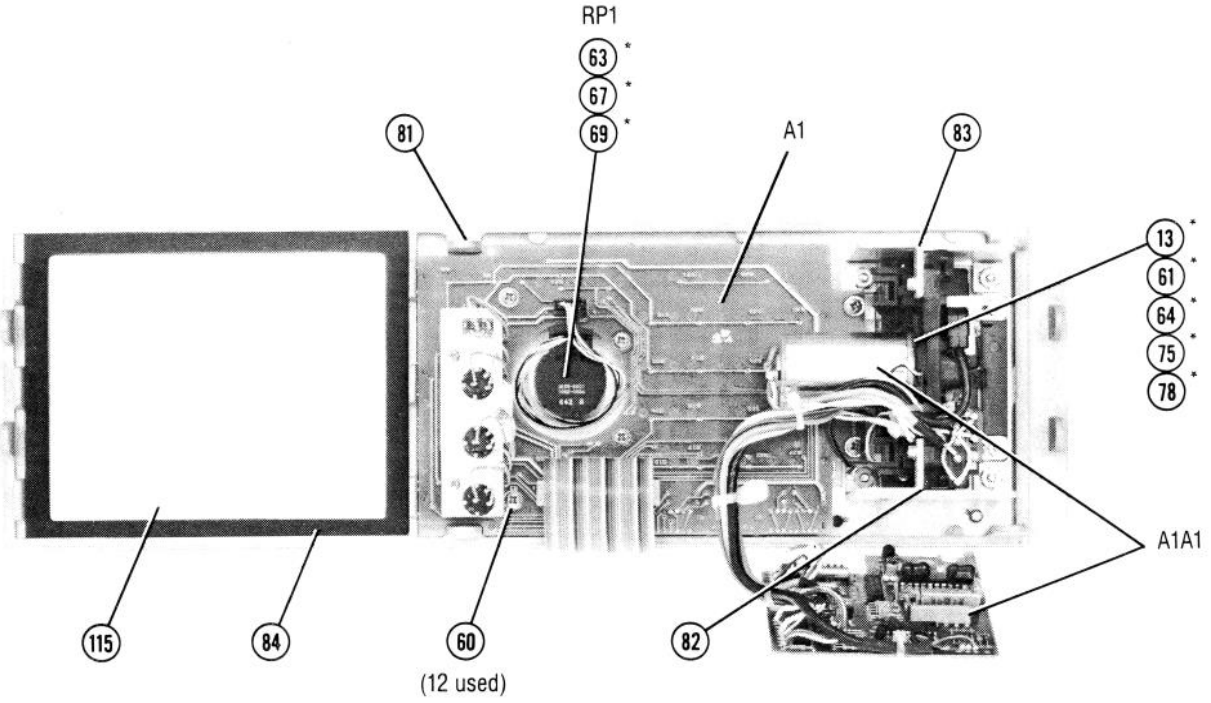


*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
58	0370-3033	0	1	KNOB-BASE 1-1/2 JGK .25-IN-ID	28480	0370-3033
59	85101-40009	9	8	KEY CAP ABS PGK	28480	85101-40009
65	1490-0968	9	2	BUSHING-PNL .14-ID .3-LG 1/4-32-THD	28480	1490-0968
68	2190-0067	4	3	WASHER-LK INTL T 1/4 IN .256-IN-ID	28480	2190-0067
70	2950-0072	3	1	NUT-HEX-DBL-CHAM 1/4-32-THD .062-IN-THK	00000	ORDER BY DESCRIPTION
72	4040-2169	6	1	LIGHT PIPE	28480	4040-2169
73[1]	85101-60232	2	1	BUTTON-EJECT	28480	85101-60232
74	5040-8806	1	1	KNOB 5/16" SERIES	28480	5040-8806
76	1460-2166	0	1	SPRING	28480	1460-2166
77[1]	85101-60232	2	1	BEZEL-TAPE	28480	85101-60232
79[1]	85101-60232	2	1	DOOR	28480	85101-60232
80	85101-00041	5	1	FRONT PANEL-DRS	28480	85101-00041
85	85101-20025	7	1	SWITCH PLUNGER	28480	85101-20025
86	85101-20046	2	1	FRONT-BEZEL MACH	28480	85101-20046
87	85101-40001	1	1	WINDOW-DISPL	28480	85101-40001
103	0520-0164	1	2	SCREW-MACH 2-56 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
113	85101-40008	8	8	MENU TAB	28480	85101-40008
127	85101-20045	1	1	BEZEL-CRT MACH	28480	85101-20045
146	1410-0069	3	1	BUSHING-PNL .128-ID .343-LG 1/4-32-THD	28480	1410-0069
V1	5083-5791	7	1	CRT P31	28480	5083-5791

Figure 5. HP 85101 Front View

[1] Tape drive door replacement kit includes eject button, tape bezel and door.



*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	85101-60034	2	1	BOARD ASSEMBLY, FRONT PANEL (NEW)	28480	85101-60001
A1	85101-69034	0	1	BOARD ASSEMBLY, FRONT PANEL (REBUILT)	28480	85101-69034
A1A1	5061-3002	3	1	ASSEMBLY, TRANSPORT (NEW)	28480	5061-3002
A1A1	98075-69900	3	1	ASSEMBLY, TRANSPORT (REBUILT)	28480	98075-69900
RP1	85101-60229		1	ROTARY PULSE GEN	28480	85101-60229
13	2260-0009	3	14	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
60	0510-1148	2	12	RETAINER-PUSH ON KB-TO-SHFT EXT	28480	0510-1148
61	0624-0099	1	2	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
63	1251-7761	8	1	CONN-POST TYPE .100-PIN-SPCG	28480	1251-7761
64	1460-2007	8	1	STAMPING-BE-CU SPRING-GROUND	28480	1460-2007
67	2190-0016	3	1	WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
69	2950-0001	8	3	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
75	85101-00040	4	2	RETAINER-HINGE	28480	85101-00040
78	85101-40006	6	1	HINGE	28480	85101-40006
81	85101-60220	8	1	SUB-PANEL	28480	85101-00002
82	85101-00029	9	1	MTG PLATE-TOP-TP	28480	85101-00029
83	85101-00030	2	1	MTG PLATE-BOT-TP	28480	85101-00030
84	85101-20024	6	1	SHOCK MT .10 HGT	28480	85101-20024
115	9135-0052	8	1	RFI CRT FACEPLATE 4.235-IN-WD	28480	9135-0052

Figure 6. HP 85101 Front Internal

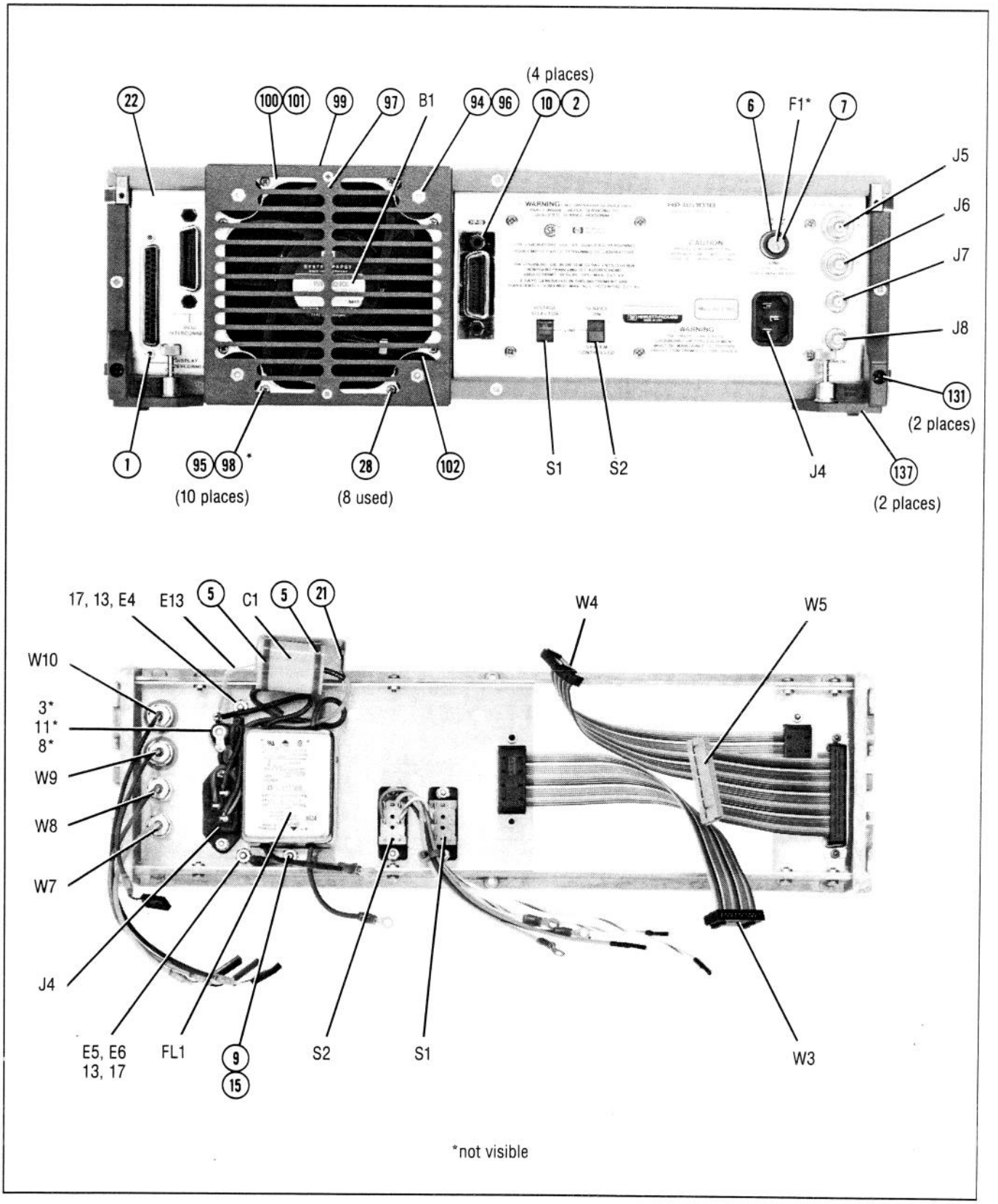
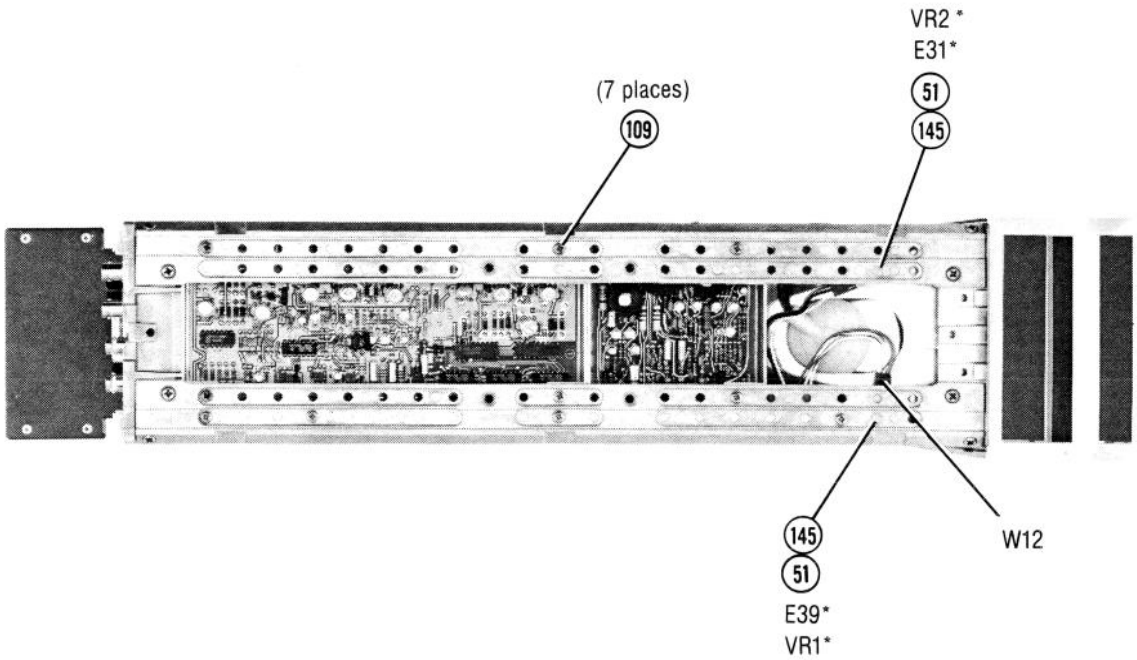


Figure 7. HP 85101 Rear External/Internal (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1251-2942	7	2	LOCK-SUBMIN D CONN	28480	1251-2942
2	1251-7002	0	2	SCREW KIT-AMP CHAMP CONN	28480	1251-7002
3	1400-0090	9	1	FUSEHOLDER COMPONENT FOR USE ON	28480	1400-0090
5	1400-0493	6	2	CABLE TIE .062-1.25-DIA .14-WD NYL	06383	PLT1.5-MP8
6	2110-0564	8	1	FUSEHOLDER BODY 12A MAX FOR UL	H9027	031.1657
7	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
8	2110-0569	3	1	FUSEHOLDER COMPONENT NUT; THREAD M12.7	28480	2110-0569
9	2190-0007	2	6	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
10	2190-0034	5	4	WASHER-LK HLCL NO. 10 .194-IN-ID	28480	2190-0034
11	2190-0037	8	1	WASHER-LK INTL T 1/2 IN .512-IN-ID	28480	2190-0037
13	2260-0009	3	14	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	2420-0001	5	8	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
17	3050-0105	6	14	WASHER-FL MTLC NO. 4 .125-IN-ID	28480	3050-0105
21	85101-00027	7	1	CAPACITOR MOUNT	28480	85101-00027
22	85101-00032	4	1	PANEL-REAR-LEFT	28480	85101-00032
28	2200-0105	4	28	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
45	4320-0311	0	1	SHOCK MOUNT SIL-RBR	28480	4320-0311
94	1520-0205	2	4	SHOCK MOUNT .47-EFF-HGT	28480	1520-0205
95	2200-0138	3	10	SCREW-MACH 4-40 .188-IN-LG 100 DEG	28480	2200-0138
96	2360-0196	1	4	SCREW-MACH 6-32 .375-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
97	85660-00043	3	1	FAN HOUSING GRL	28480	85660-00043
98	85660-00044	4	1	FAN HOUSING BOT	28480	85660-00044
99	85660-00045	5	1	FAN HOUSING TOP	28480	85660-00045
100	85660-00046	6	1	BASE PLATE	28480	85660-00046
101	85660-00047	7	1	SUPPORT PLATE	28480	85660-00047
102	85660-20092	4	4	RUBBER SHKMT	8480	5660-20092
131	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
137	5021-8539	7	1	LOCK FOOT U LFT	28480	5021-8539
B1	85101-20048	4	1	FAN-TBAX 122-CFM 9.5-14VDC 16.5KV-DIEL	28480	85101-20048
C1	0160-5835	9	1	CAPACITOR-FXD 2UF ±20% 330VAC(RMS)	28480	0160-5835
E4	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E5	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E6	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E13	0890-0094	9	1	TUBING-FLEX .051-ID TFE .016-WALL	00000	ORDER BY DESCRIPTION
F1	2110-0083	6	1	FUSE 2.5A 250V NTD 1.25X.25 UL	28480	2110-0083
FL1	9135-0084	6	1	LINE MOD FLTR	28480	9135-0084
J1-J3				NOT ASSIGNED		
J4	1251-2357	8	1	CONNECTOR-AC PWR HP-9 MALE FLG-MTG	28480	1251-2357
J5	1250-1091		2	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J6	1250-1091			CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J7	1250-0870		2	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
J8	1250-0870			CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM		
S1	3101-2299	2	1	SWITCH-SL DPDT STD 5A 250VAC SLDR-LUG	28480	3101-2299
S2	3101-2405	2	1	SWITCH-SL DPDT STD 2A 250VAC QCON	28480	3101-2405
W3	85101-60103	6	1	CABLE AY HPIB	28480	85101-60103
W4	85101-60104	7	1	CA AY SYS BUSS	28480	85101-60104
W5	85101-60105	8	1	CA AY INTERCONN	28480	85101-60105
W7	85101-60108		1	CA AY X OUTPUT	28480	85101-60108
W8	85101-60109		1	CA AY Y OUTPUT	28480	85101-60109
W9	85101-60110		1	CA AY Z OUTPUT	28480	85101-60110
W10	85101-60111		1	CA AY BLANKING	28480	85101-60111

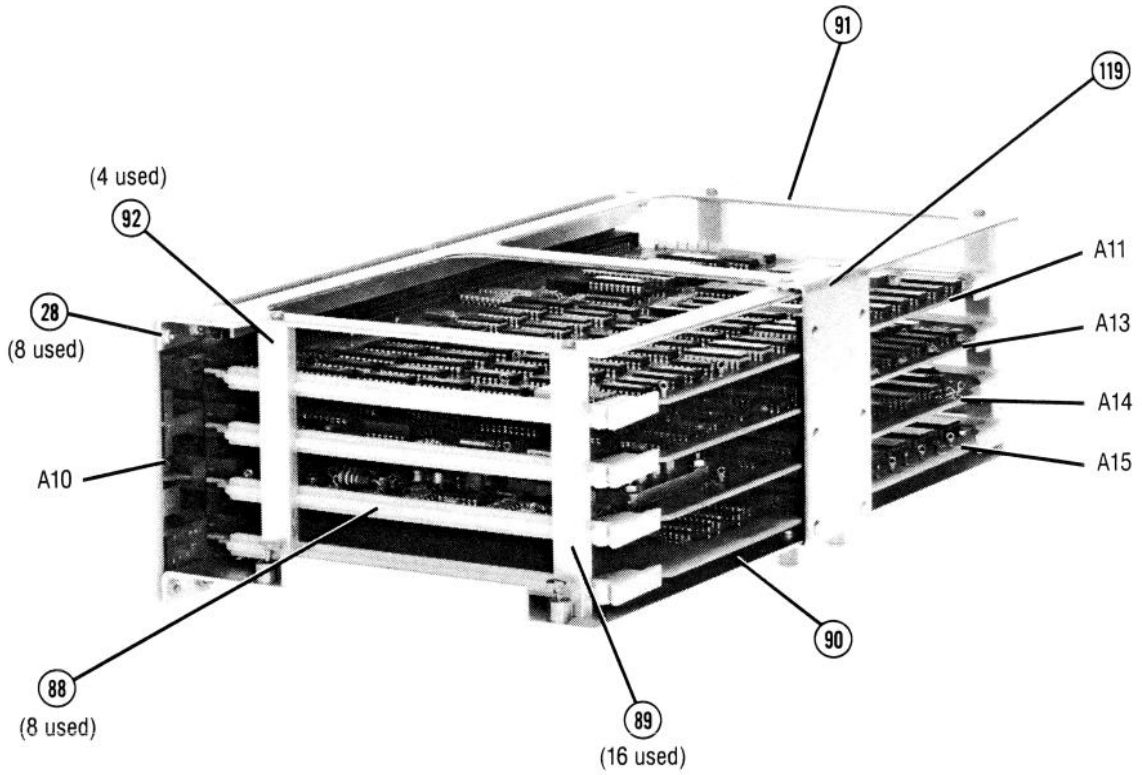
Figure 7. HP 85101 Rear External/Internal (2 of 2)



*not visible

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E31	0340-0949	8	2	INSULATOR-XSTR THRM-CNDCT	28480	0340-0949
E39	0340-0949	8		INSULATOR-XSTR THRM-CNDCT	28480	0340-0949
VR1	1826-0106		1	IC +15V RGLTR TO-220	04713	MC7815CP
VR2	1826-0214		1	IC -15V RGLTR TO-220	04713	MC7915CT
51	2420-0014	0	2	NUT-HEX-DBL-CHAM 6-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
109	2360-0113	2	7	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
145	0570-0111	3	2	SCREW-MACH 6-32 .375-IN-LG RD-HD-SLT	00000	ORDER BY DESCRIPTION

Figure 8. HP 85101 Left Internal



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A10	85101-60010	4	1	BOARD ASSEMBLY, DAUGHTER	28480	85101-60010
A11	85101-60211	7	1	BOARD ASSEMBLY, PROCESSOR (NEW)	28480	85101-60211
A11	85101-69211	5	1	BOARD ASSEMBLY, PROCESSOR (REBUILT)	28480	85101-69211
A12				NOT ASSIGNED		
A13[1]	85101-60212	8	1	BOARD ASSEMBLY, MEMORY (NEW)	28480	85101-60212
A13[1]	85101-60231	1	1	BOARD ASSEMBLY, (NEW) (FIRMWARE REVISION 4.0 OR HIGHER)	28480	85101-60231
A13[1]	85101-69231	9	1	BOARD ASSEMBLY, (REBUILT) (FIRMWARE REVISION LOWER THAN 4.0)	28480	85101-69231
A13[1]	85101-69212	6	1	BOARD ASSEMBLY, MEMORY (REBUILT)	28480	85101-69212
A14	85101-60221	9	1	BOARD ASSEMBLY, DISPLAY GEN (NEW)	28480	85101-60221
A14	85101-69221	7	1	BOARD ASSEMBLY, DISPLAY GEN (REBUILT)	28480	85101-69221
A15	85101-60222	0	1	BOARD ASSEMBLY, IO (NEW)	28480	85101-60222
A15	85101-69222	8	1	BOARD ASSEMBLY, IO (REBUILT)	28480	85101-69222
A16				NOT ASSIGNED		
28	2200-0105	4	28	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
88	0403-0442	0	8	GUIDE-PC BD WHT NYL .062-IN-BD-THKNS	28480	0403-0442
89	4040-0771	2	16	LOCKING TAB 0.312 IN DIA; 0.040 IN	28480	4040-0771
90	85101-00007	3	1	CARD CAGE BOTTOM	28480	85101-00007
91	85101-00008	4	1	CARD CAGE-TOP	28480	85101-00008
92	85101-20026	8	4	CARD GUIDE SPRT	28480	85101-20026
119	85101-00009	5	1	PC BOARD LOCK	28480	85101-00009

Figure 10. HP 85101 Card Cage Assembly

[1] Replacement of A13 requires ordering a replacement operating system tape if you have option 010 (time domain). See page 7 of this section for part numbers.

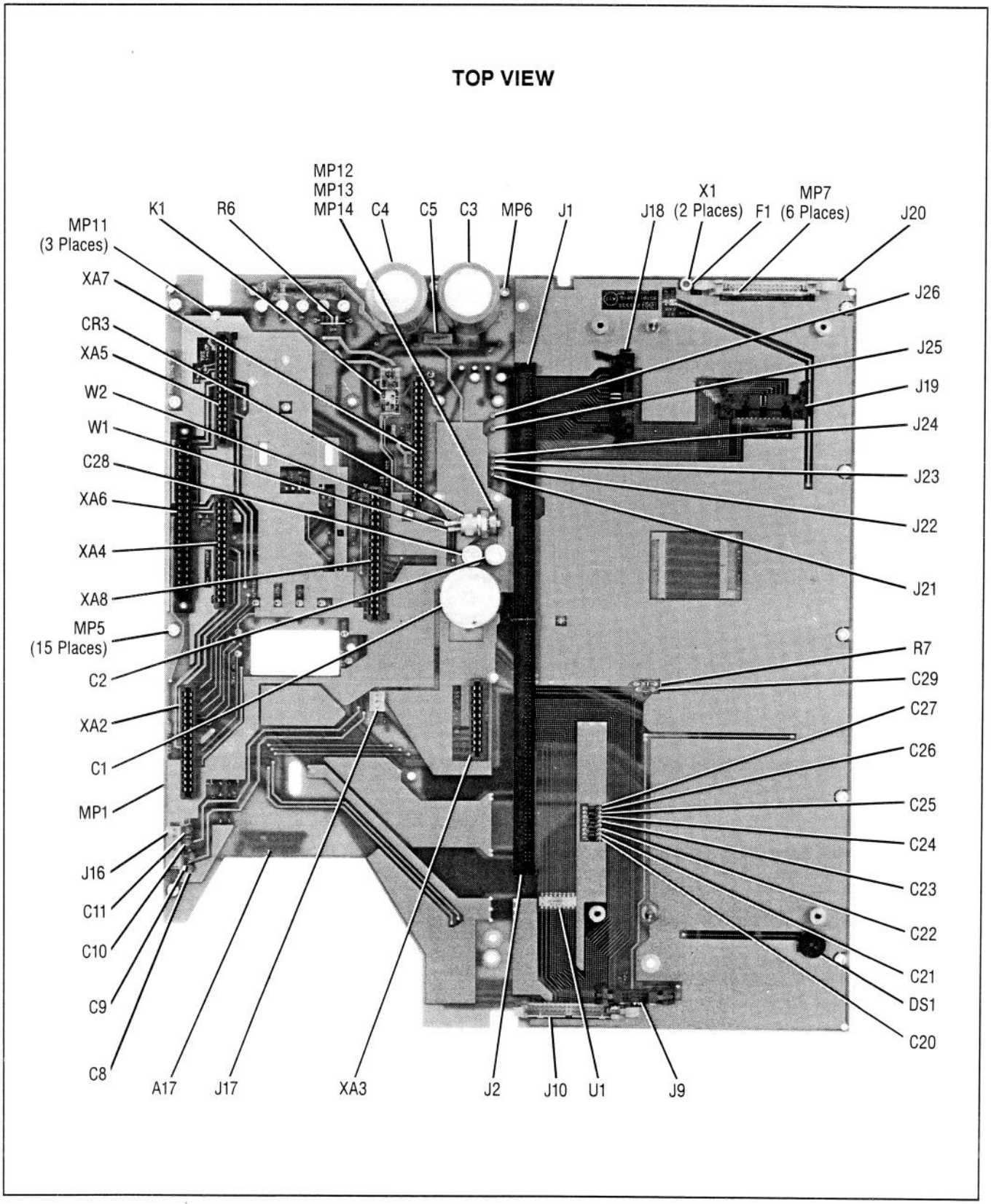
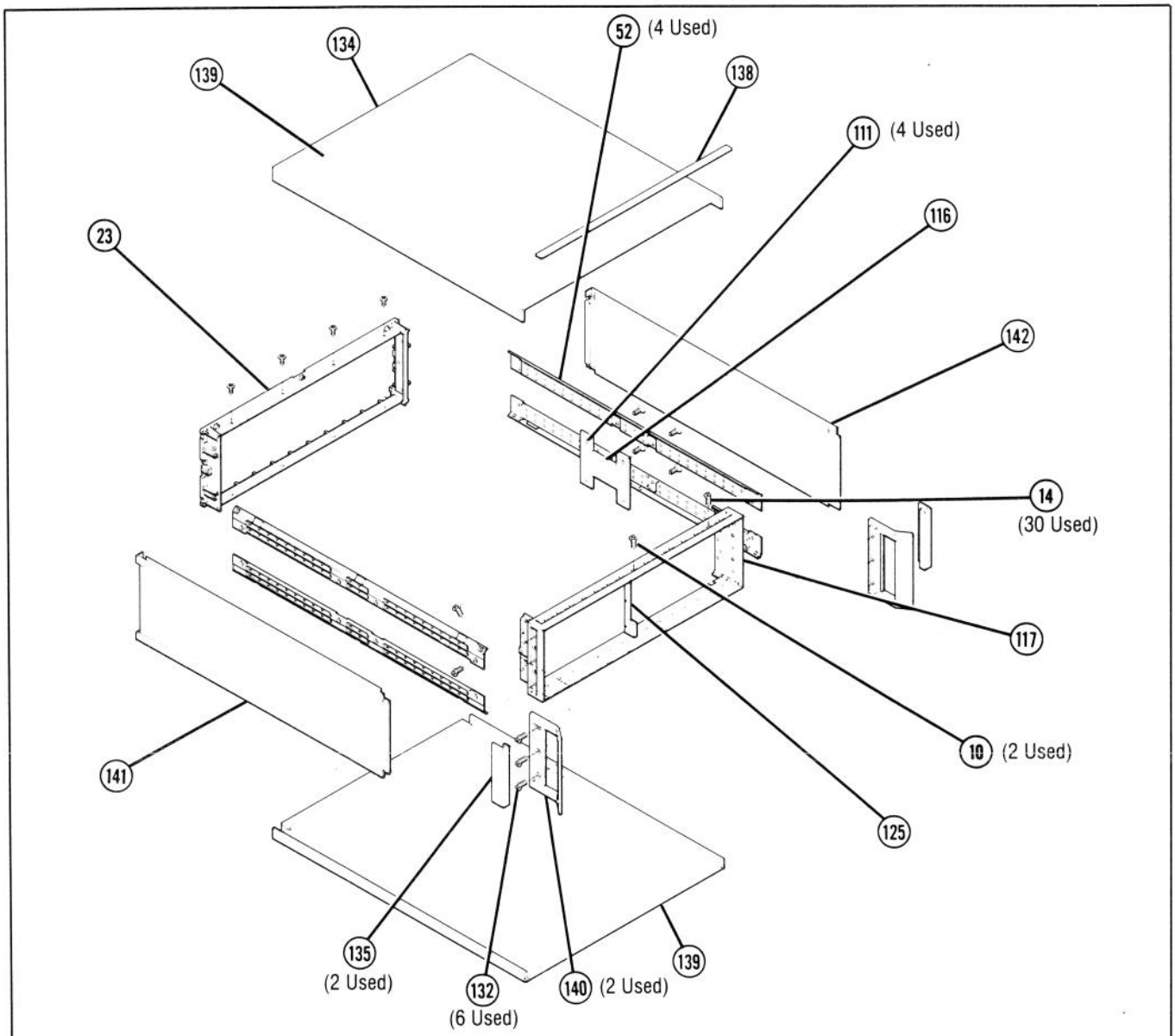


Figure 11. HP 85101 Mother Board Assembly (1 of 4)

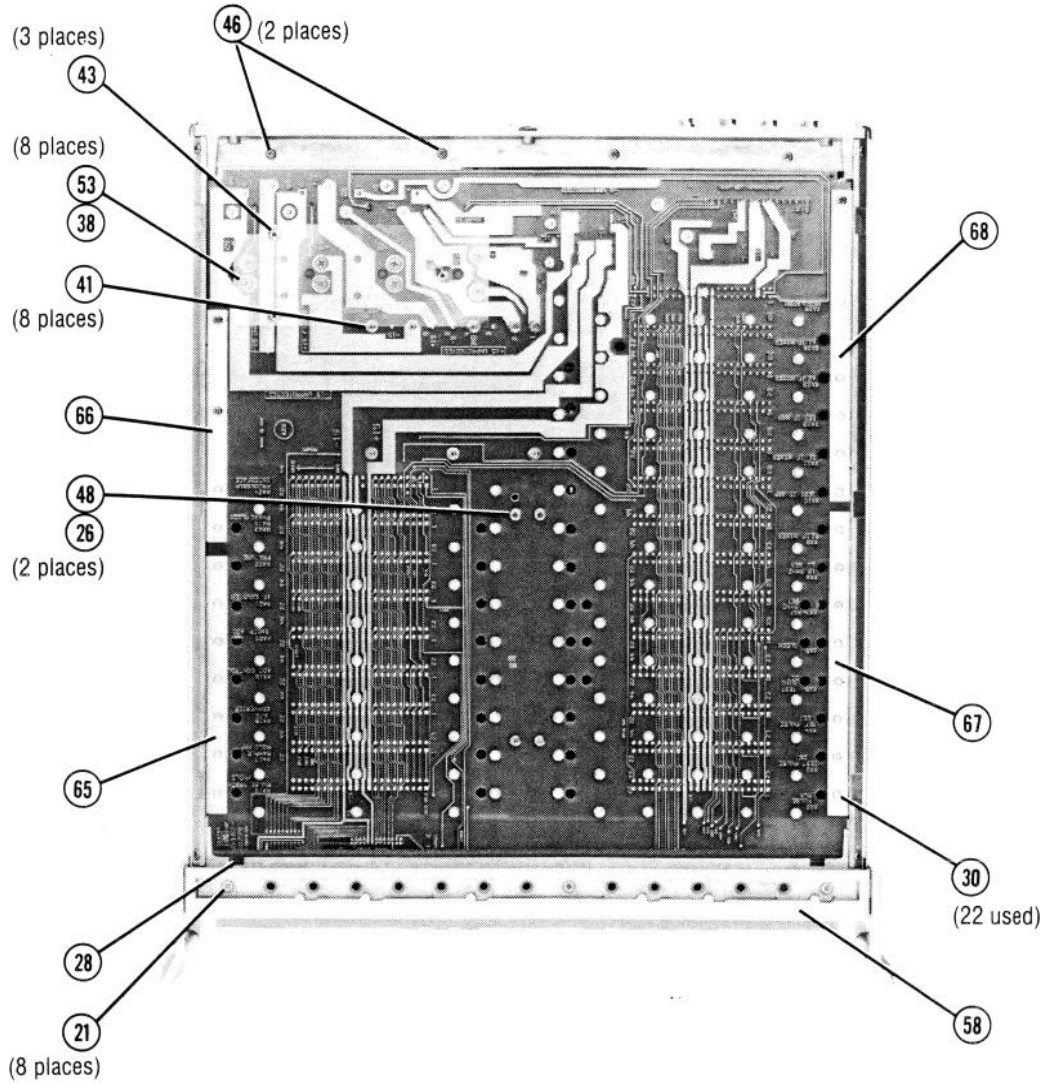


Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
14	2360-0115	4	67	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
23	85101-20042	8	1	REAR FRAME	28480	85101-20030
52	5021-5837	2	4	STRUT CORNER 18"	28480	5020-8837
110	2360-0333	8	10	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
111	0515-1367	7	16	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
116	5001-8232	5	1	GUSSET SIDE	28480	5001-0432
117	5020-8803	6	1	FRAME FRONT	28480	5020-8803
125	85101-20028	0	1	CENTER STRUT	28480	85101-20028
132	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	2510-0195
134	7120-5911	5	1	LABEL-WARNING 1-IN-WD 7-IN-LG PPR	28480	7120-5911
135	5021-8496	5	2	TRIM FRNT HNDL	28480	5021-8496
138	5041-8802	9	1	STRIP TRIM TOP	28480	5041-8802
139	5062-3735	1	2	COVER TOP 18"	28480	5062-3735
140	5062-3799	7	2	HANDLE AY FRONT	28480	5062-3799
141	5062-3812	5	1	SIDE COVER PERF	28480	5062-3812
142	5001-3937	7	1	SIDE COVER	28480	5001-3937

Figure 15. HP 85101 Cabinet Parts

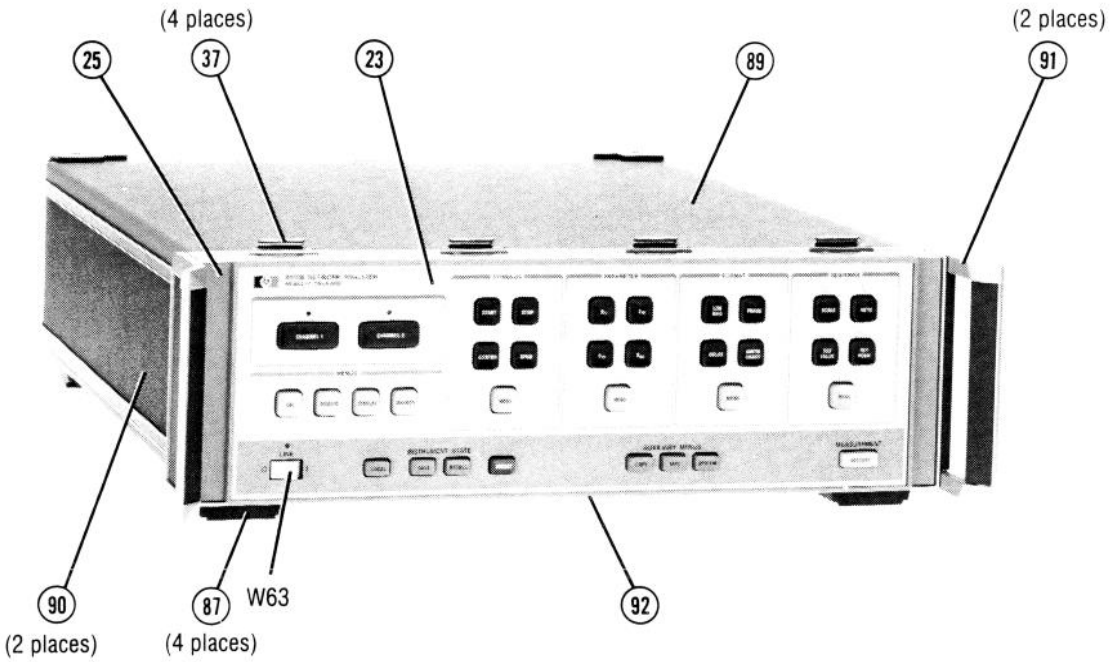
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W1	85102-60131	1	1	CA AY A8J3-A11J3	28480	85102-60131
W2	85102-60132	2	1	CA AY A8J2-A9J3	28480	85102-60132
W3	85102-60133	3	1	CA AY A8J5-A14J3	28480	85102-60133
W4	85102-60134	4	1	CA AY A8J4-A13J3	28480	85102-60134
W5				NOT ASSIGNED		
W6	85102-60136	6	1	CA AY A6J6-A5J4	28480	85102-60136
W7	85102-60137	7	1	CA AY A6J5-A7J4	28480	85102-60137
W8	85102-60138	8	1	CA AY A11J2-A10J4	28480	85102-60138
W9	85102-60139	9	1	CA AY A9J1-A10J3	28480	85102-60139
W10	85102-60140	2	1	CA AY A13J1-A10J2	28480	85102-60140
W11	85102-60141	3	1	CA AY A6J2-A10J1	28480	85102-60141
W12	85102-60142	4	1	CA AY A11J1-A12J4	28480	85102-60142
W13	85102-60143	5	1	CA AY A14J1-A12J3	28480	85102-60143
W14	85102-60144	6	1	CA AY A13J2-A12J2	28480	85102-60144
W15	85102-60145	7	1	CA AY A6J1-A12J1	28480	85102-60145
W16	85102-60146	8	1	CA AY A6J11-A23J2	28480	85102-60146
W17	85102-60147	9	1	CA AY A21J3-A23J3	28480	85102-60147
W18	85102-60148	0	1	CA AY A14J6-A21J1	28480	85102-60148
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W20	85102-60150	4	1	CA AY A10J5-A5J3	28480	85102-60150
W21	85102-60151	5	1	CA AY A5J1-A17J2	28480	85102-60151
W22	85102-60152	6	1	CA AY A5J2-A17J1	28480	85102-60152
W23	85102-60153	7	1	CA AY A12J5-A7J3	28480	85102-60153
W24	85102-60154	8	1	CA AY A7J1-A17J4	28480	85102-60154
W25	85102-60155	9	1	CA AY A7J2-A17J3	28480	85102-60155
W26	85102-60156	0	1	CA AY A17J5-A18J1	28480	85102-60156
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W28	85102-60158	2	1	CA AY A20J1-J5	28480	85102-60158
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W37	85102-60167	3	1	CA AY A13J6-A21J2	28480	85102-60167
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W39	85102-60169	5	1	CA AY A6J4-A19J1	28480	85102-60169
W40	85102-60223	2	1	CA AY A16J2-REAR PANEL J9	28480	85102-60223
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W42	85102-60222	1	1	CA AY A16J1-A23J1	28480	85102-60222
W43				NOT ASSIGNED		
W44	85102-60174	2	1	CA AY A6J10-A8J1	28480	85102-60174

Figure 19. HP 85102 Cable Locations (2 of 2)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
26	0380-0018	6	2	SPACER-RND .25-IN-LG .194-IN-ID	28480	0380-0018
28	0460-0778	5	1	TAPE INDL .75-IN-W .25-IN-T POLYU-FM	00000	ORDER BY DESCRIPTION
30	0624-0100	5	26	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
38	2190-0011	8	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
41	2200-0105	4	8	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
43	2200-0165	6	3	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
46	2360-0117	6	2	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
48	2360-0202	0	2	SCREW-MACH 6-32 .625-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
53	2680-0129	8	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
58	5021-8403	4	1	FRAME FRONT	28480	5021-8403
65	85102-00033	6	1	BRACKET-R FRONT	28480	85102-00033
66	85102-00034	7	1	BRACKET-R REAR	28480	85102-00034
67	85102-00035	8	1	BRACKET-L FRONT	28480	85102-00035
68	85102-00036	9	1	BRACKET-L REAR	28480	85102-00036
73	85102-20053	2	1	COVER-SAFETY	28480	85102-20053

Figure 20. HP 85102 Bottom Internal



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
23	85102-00001	8	1	DRESS PANEL	28480	85102-00001
25	85102-20054	3	1	FRONT BEZEL MACH	28480	85102-20054
37	1600-0367	7	4	VERTICAL LOCK (FRONT)	28480	1600-0367
87	5041-8801	8	4	FOOT-BOTTOM	28480	5041-8801
89	5062-3735	1	1	COVER TOP 18"	28480	5062-3735
90	5062-3757	7	2	COVER AY SIDE	28480	5062-3757
91	5062-3799	7	2	HANDLE AY FRONT	28480	5062-3799
92	85102-00043	8	1	BOTTOM COVER	28480	85102-00043
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193

Figure 21. HP 85102 Front

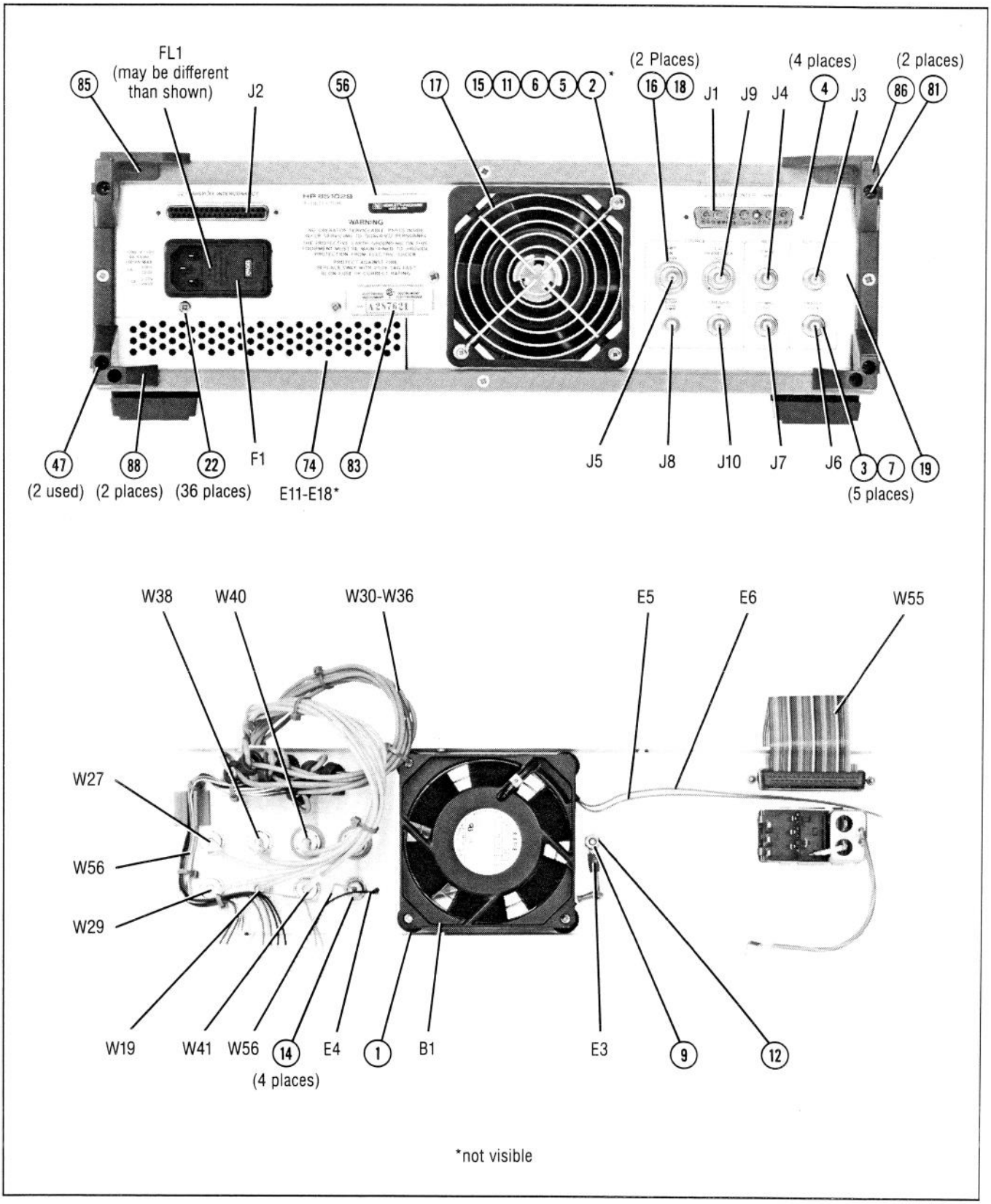
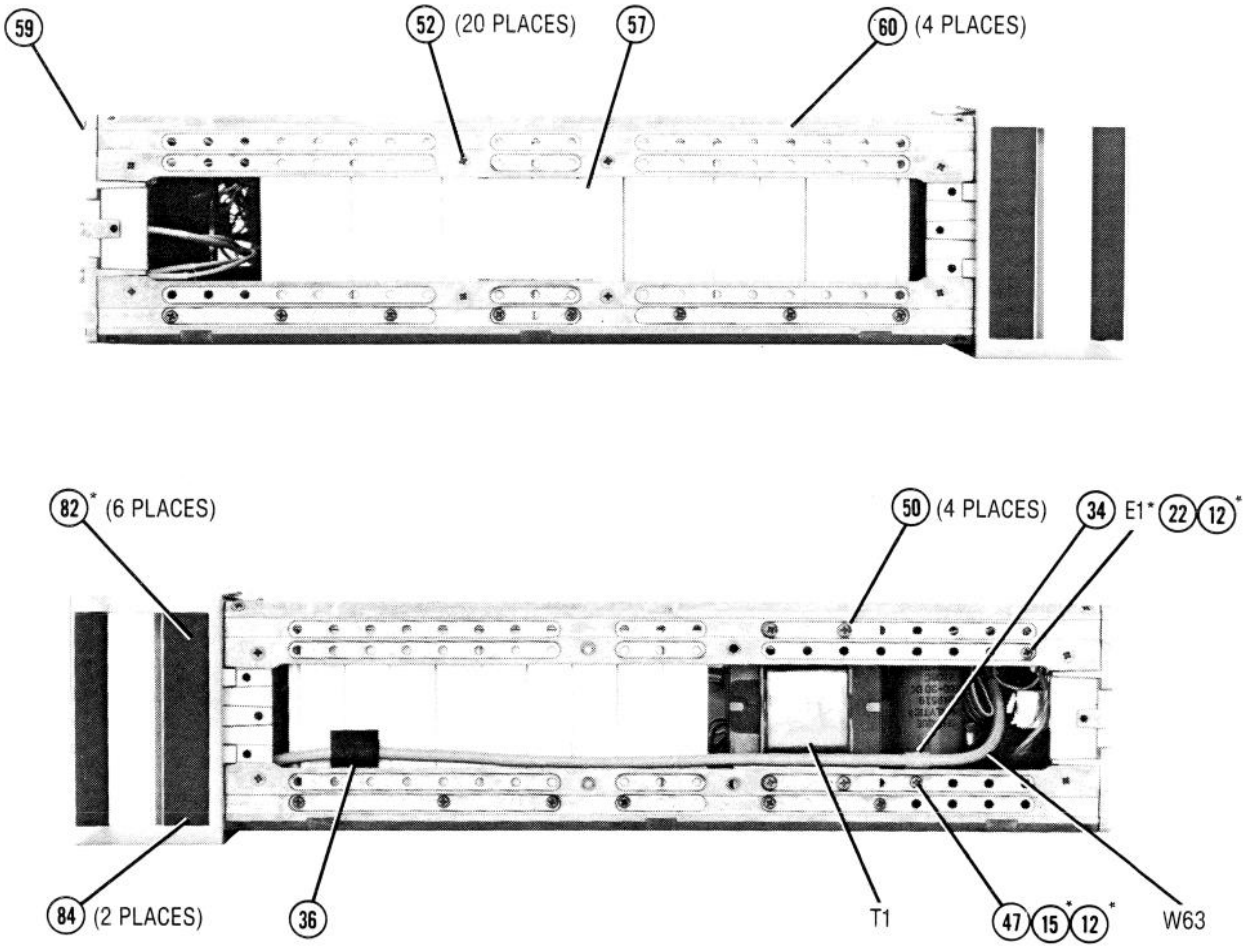


Figure 22. HP 85102 Rear (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E3	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E4	0360-1632	0	1	TERMINAL-SLDR LUG LK-MTG FOR-fi3/8-SCR	28480	0360-1632
E5	0362-0227	1	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E6	0362-0227	1		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E11-18	1200-0147	3	8	INSULATOR-FLG-BSHG NYLON	28480	1200-0147
F1	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	2110-0002
FL1	0960-0443	7	1	LINE MODULE-FILTERED	28480	0960-0443
J1	1251-2197	4	1	CONNECTOR R&P 24F	28480	1251-2197
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
J4	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J5	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-1091
J6	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J7	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J8	1250-0083	1	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0083
J9	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-1091
J10	1250-0870	4	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0870
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W40	85102-60223	2	1	CA AY A16J2-REAR PANEL J9	28480	85102-60223
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W55	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
W56	85102-60192	4	1	CA ASSY TS CONN	28480	85102-60192
1	0400-0010	2	4	GROMMET-RND .25-IN-ID .375-IN-GRV-OD	28480	0400-0010
2	0510-0110	6	3	NUT-CAP 6-32-THD .281-IN-THK .312-A/F	00000	ORDER BY DESCRIPTION
3	0590-1251	6	5	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
4	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0006	1	2	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
6	2190-0007	2	4	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
7	2190-0102	8	5	WASHER-LK INTL T 15/32 IN .472-IN-ID	28480	2190-0102
8	2360-0113	2	9	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
10	2360-0203	1	1	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	2360-0205	3	2	SCREW-MACH 6-32 .75-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
14	2950-0043	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
16	3050-1094	4	1	WASHER-FL MTLC 1/2 IN .505-IN-ID	28480	3050-1094
17	3160-0300	6	1	FINGER GUARD	28480	3160-0300
18	00310-48801	0	2	SHOULDERED WASHER	28480	00310-48801
19	85102-00056	3	1	REAR PANEL	28480	85102-00056
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
56	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
74	85102-20057	6	1	HEAT SINK	28480	85102-20057
81	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
83	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
85	5021-8538	6	1	LOCK FOOT L LFT	28480	5021-8538
86	5021-8540	0	1	LOCK FOOT L RT	28480	5021-8540
88	5040-7221	2	2	FOOT-REAR	28480	5040-7221

Figure 22. HP 85102 Rear (2 of 2)



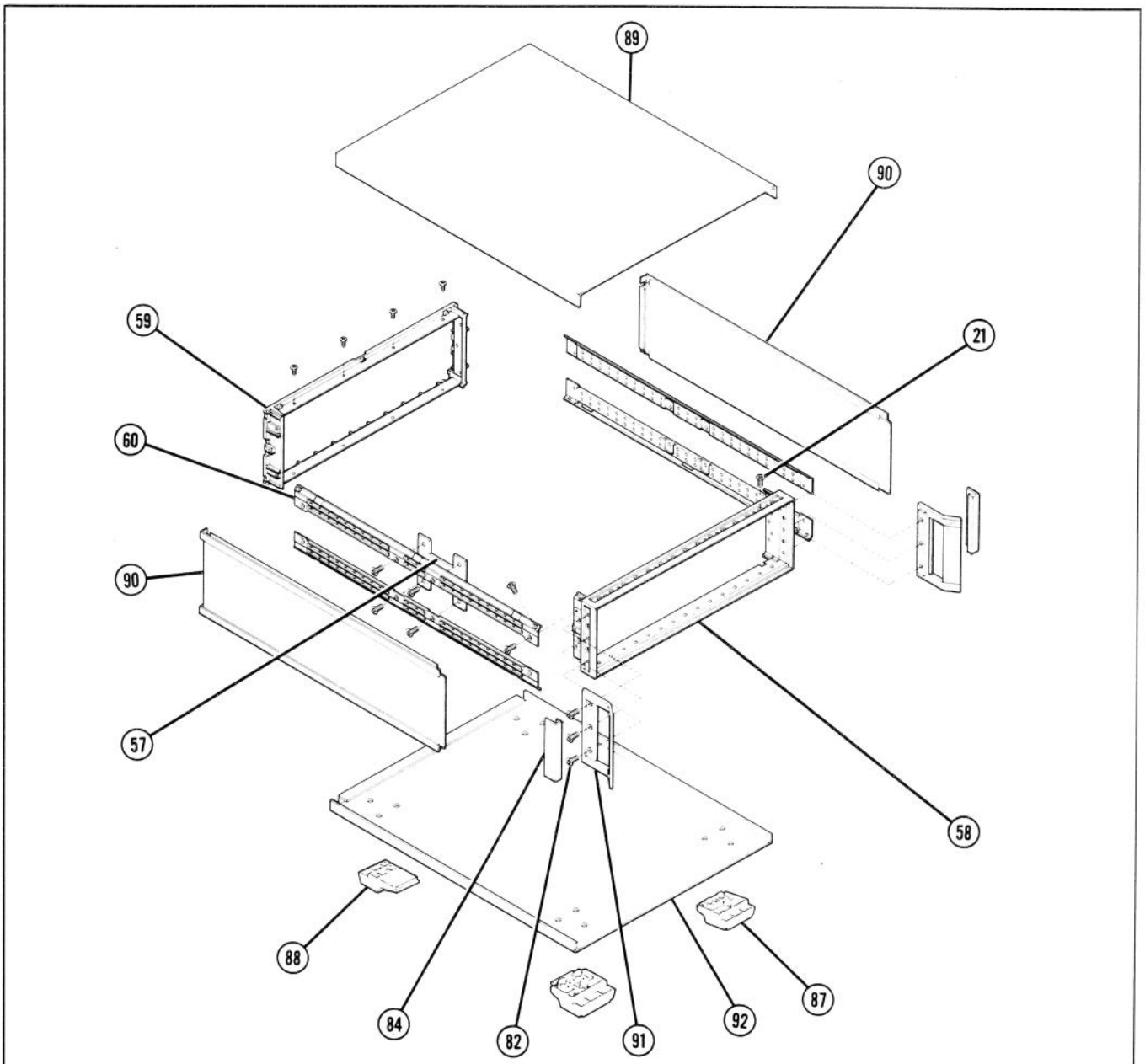
*NOT VISIBLE

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-fi6-SCR	28480	0360-0009
T1	9100-4614	3	1	TRANSFORMER	28480	9100-4614
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
34	1400-0017	0	1	CLAMP-CABLE .312-DIA .375-WD NYL	28480	1400-0017
36	1400-0757	5	1	CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
50	2510-0049	2	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
52	0515-1367	7	20	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896

Figure 23. HP 85102 Left and Right Internal

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A25	85102-60229	8	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A25 IS ORDERED: A25C1, A25C2, A25C3, A25C4, A25Q1, A25Q2 A25Q3, A25Q4	28480	85102-60229
MP3	0360-0124		4	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP6	0360-0124			CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124

Figure 25. HP 85102 Mother Board (4 of 4)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
58	5021-8403	4	1	FRAME FRONT	28480	5021-8403
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18''	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5021-8496	5	2	TRIM FRNT HNDL	28480	5021-8496
87	5041-8801	8	4	FOOT-BOTTOM	28480	5041-8801
88	5041-8821	2	2	FOOT-REAR	28480	5041-8821
89	5062-3735	1	1	COVER TOP 18''	28480	5062-3735
90	5062-3757	7	2	COVER AY SIDE	28280	5062-3757
91	5062-3799	7	2	HANDLE AY FRONT	28480	5062-3799
92	85102-00061	0	1	BOTTOM COVER	28480	85102-00061

Figure 26. HP 85102 Cabinet Parts

9. Return to step 5 but substitute **[USER 3 a2]** where applicable. Move the test cable to J5 on the A2 IF MUX board (refer to Figure 5) and replace the original cable on J3. Repeat this procedure from step 6 for the A4 board.

When the boards have been adjusted, turn the instruments OFF, remove the test cable and replace the original cable on J5. Replace the top cover on the HP 85102. The system can be reconfigured with the HP 85101 on top of the HP 85102 if desired.

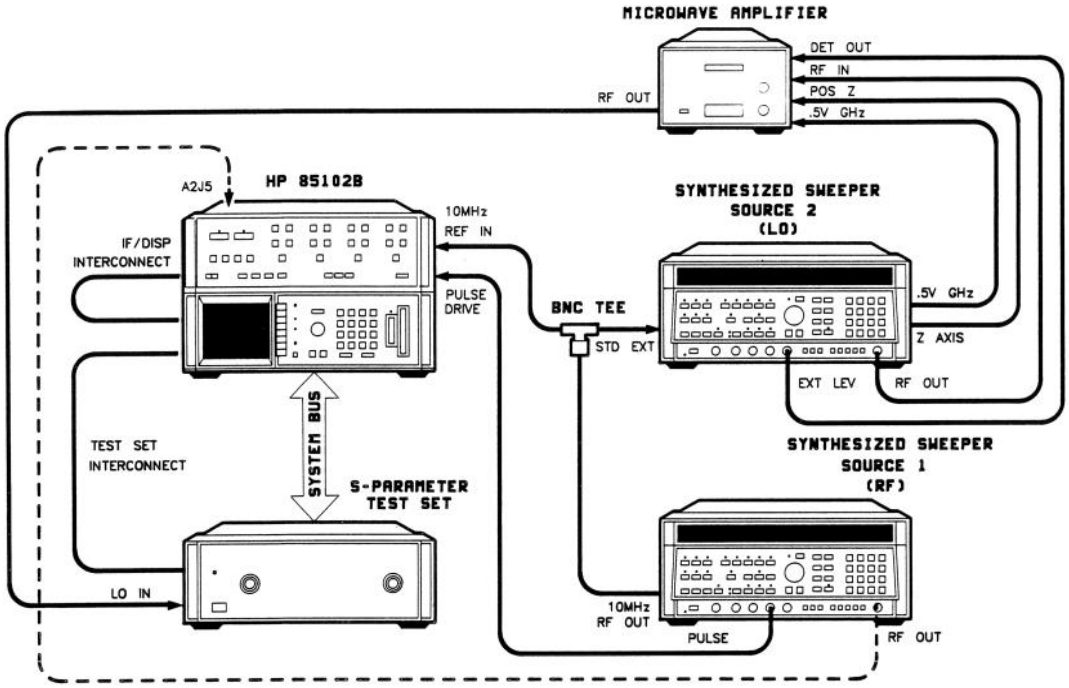


Figure 5. A4 Adjustment Procedure Setup

When the adjustments are complete, perform the settling time test later in this section to verify pulsed-RF system operation.

SETTLING TIME

Settling time is the time required for a ratioed, high-level measurement to reach within 0.1 dB of its final value when the system is in pulse profile mode. For the pulsed-RF system, the settling time is 1 μsecond.

The following procedure checks the settling time of the pulsed-RF system and indirectly checks the bandwidth of the system.

1. Connect the equipment as shown in Figure 3.
2. Turn the system on and load the system configuration tape for the pulsed-RF configuration (refer to the HP 8510 Introductory Pulsed-RF Measurements User's Guide).

3. On the HP 8510B press:

   DOMAIN **[PULSE PROFILE]**
   RESPONSE **[MENU] [AVERAGING ON/restart] [1] [2] [8] [x1]**
   STIMULUS **[MENU] [NUMBER of POINTS] [101]**

4. On the HP 8510B press:

   [MARKER] [1] [5] [.] [7] [M/μ] The trace should be settled at this time, so a magnitude reference can be taken here.

   [MARKER] [2] [1] [M/μ] The time at which the trace should be within 0.1 dB of its final value.

   [MARKER] [ΔMODE MENU] [ΔREF =2] [MARKER 1] The Δmarker value, shown in the upper left corner of the CRT, should be <0.1 dB. This shows that within 1 μsecond, the trace had settled to within 0.1 dB of it final value, as specified. Refer to Figure 6.

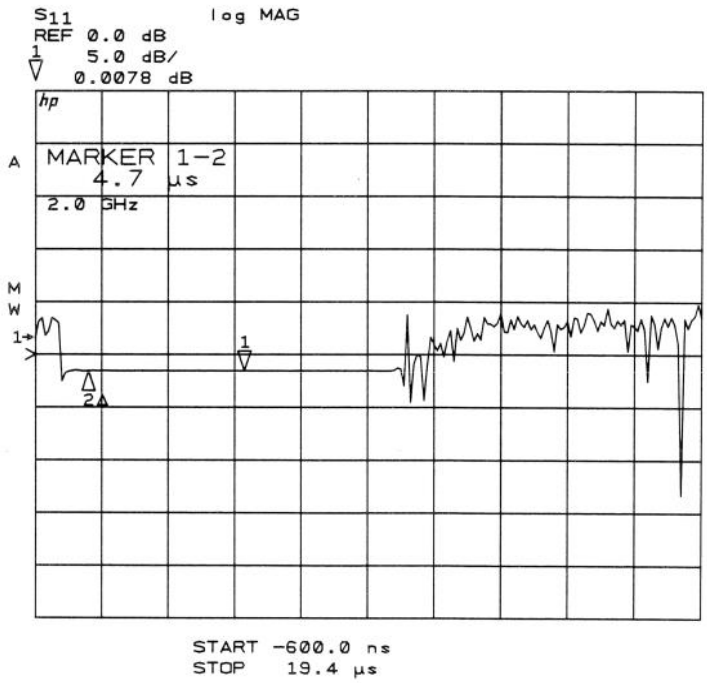
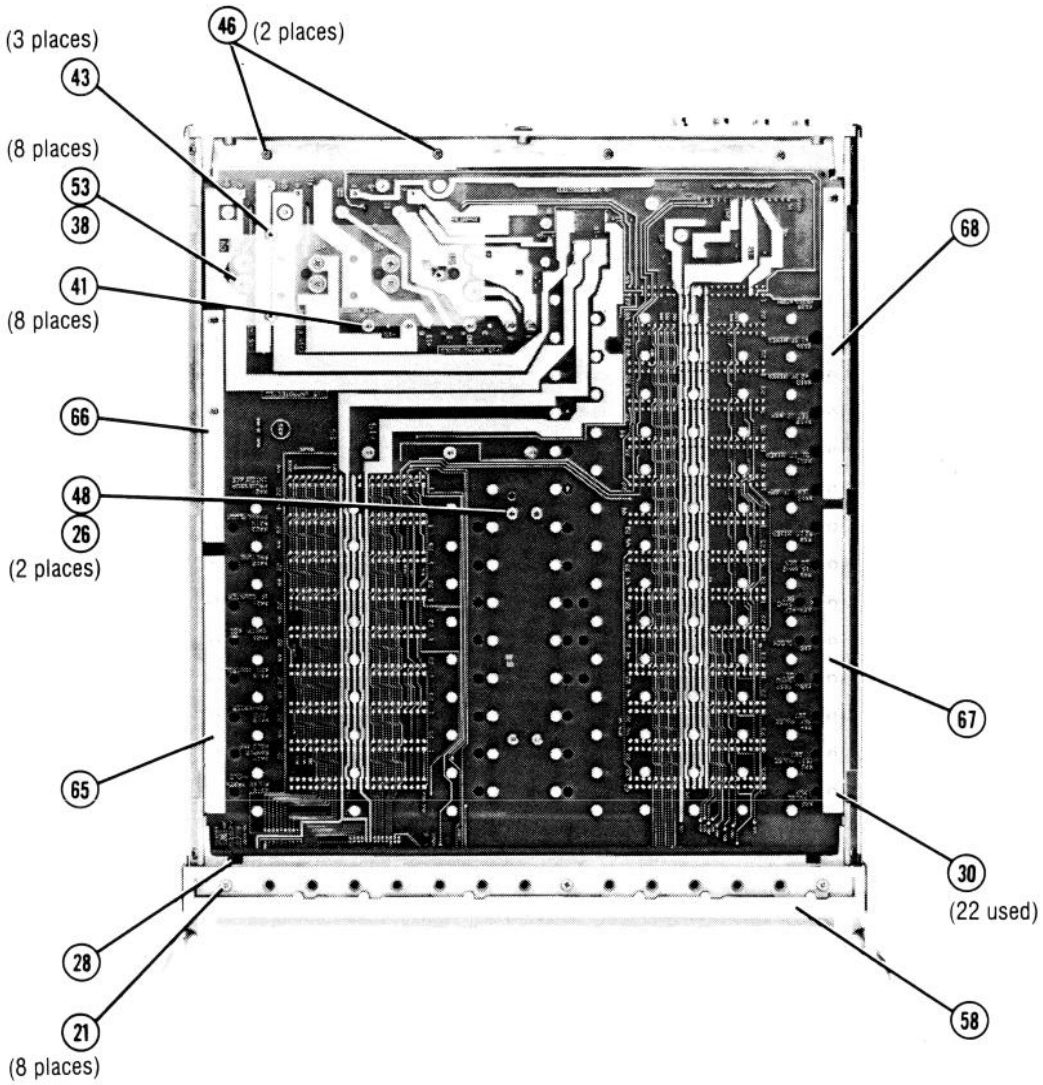


Figure 6. Settling Time Response

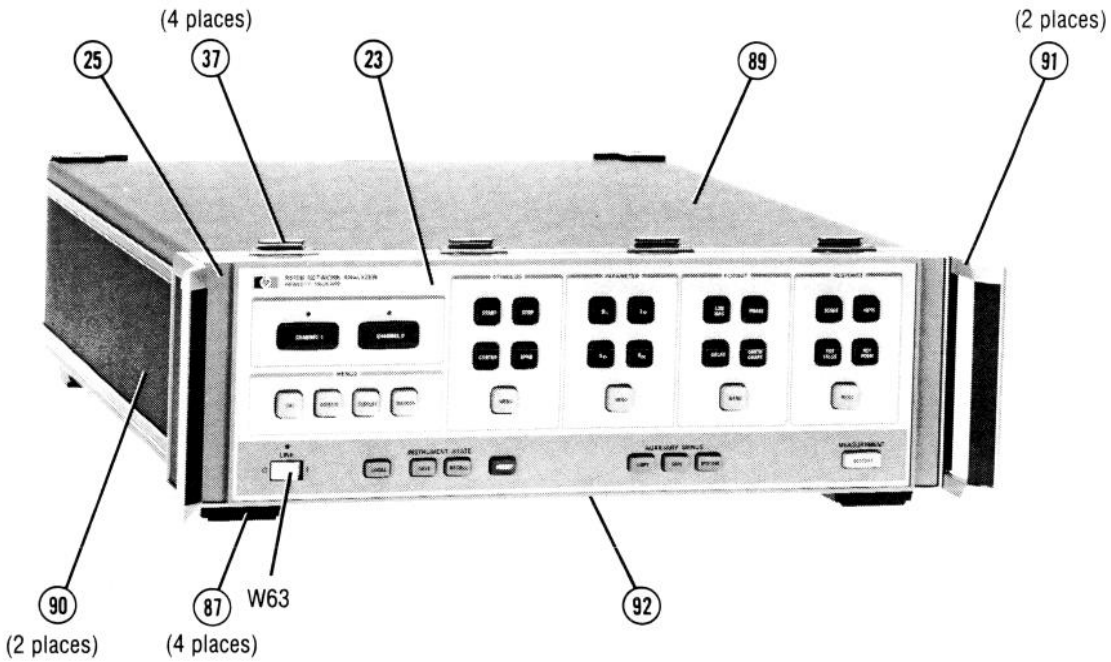
Replaceable Parts

Figures 7 thru 16 show the new replaceable parts list for the HP 85102B Option 008 IF Detector. Option 008 changes the HP 85102B only; all other replaceable parts are the same as for the standard HP 8510B.



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
26	0380-0018	6	2	SPACER-RND .25-IN-LG .194-IN-ID	28480	0380-0018
28	0460-0778	5	1	TAPE INDL .75-IN-W .25-IN-T POLYU-FM	00000	ORDER BY DESCRIPTION
30	0624-0100	5	26	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
38	2190-0011	8	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
41	2200-0105	4	8	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
43	2200-0165	6	3	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
46	2360-0117	6	2	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
48	2360-0202	0	2	SCREW-MACH 6-32 .625-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
53	2680-0129	8	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
58	5021-8403	4	1	FRAME FRONT	28480	5021-8403
65	85102-00033	6	1	BRACKET-R FRONT	28480	85102-00033
66	85102-00034	7	1	BRACKET-R REAR	28480	85102-00034
67	85102-00035	8	1	BRACKET-L FRONT	28480	85102-00035
68	85102-00036	9	1	BRACKET-L REAR	28480	85102-00036
73	85102-20053	2	1	COVER-SAFETY	28480	85102-20053

Figure 10. HP 85102 Option 008 Bottom Internal



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
23	85102-00001	8	1	DRESS PANEL	28480	85102-00001
25	85102-20054	3	1	FRONT BEZEL MACH	28480	85102-20054
37	1600-0367	7	4	VERTICAL LOCK (FRONT)	28480	1600-0367
87	5041-8801	8	4	FOOT-BOTTOM	28480	5041-8801
89	5062-3735	1	1	COVER TOP 18"	28480	5062-3735
90	5062-3757	7	2	COVER AY SIDE	28480	5062-3757
91	5062-3799	7	2	HANDLE AY FRONT	28480	5062-3799
92	85102-00043	8	1	BOTTOM COVER	28480	85102-00043
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193

Figure 11. HP 85102 Option 008 Front

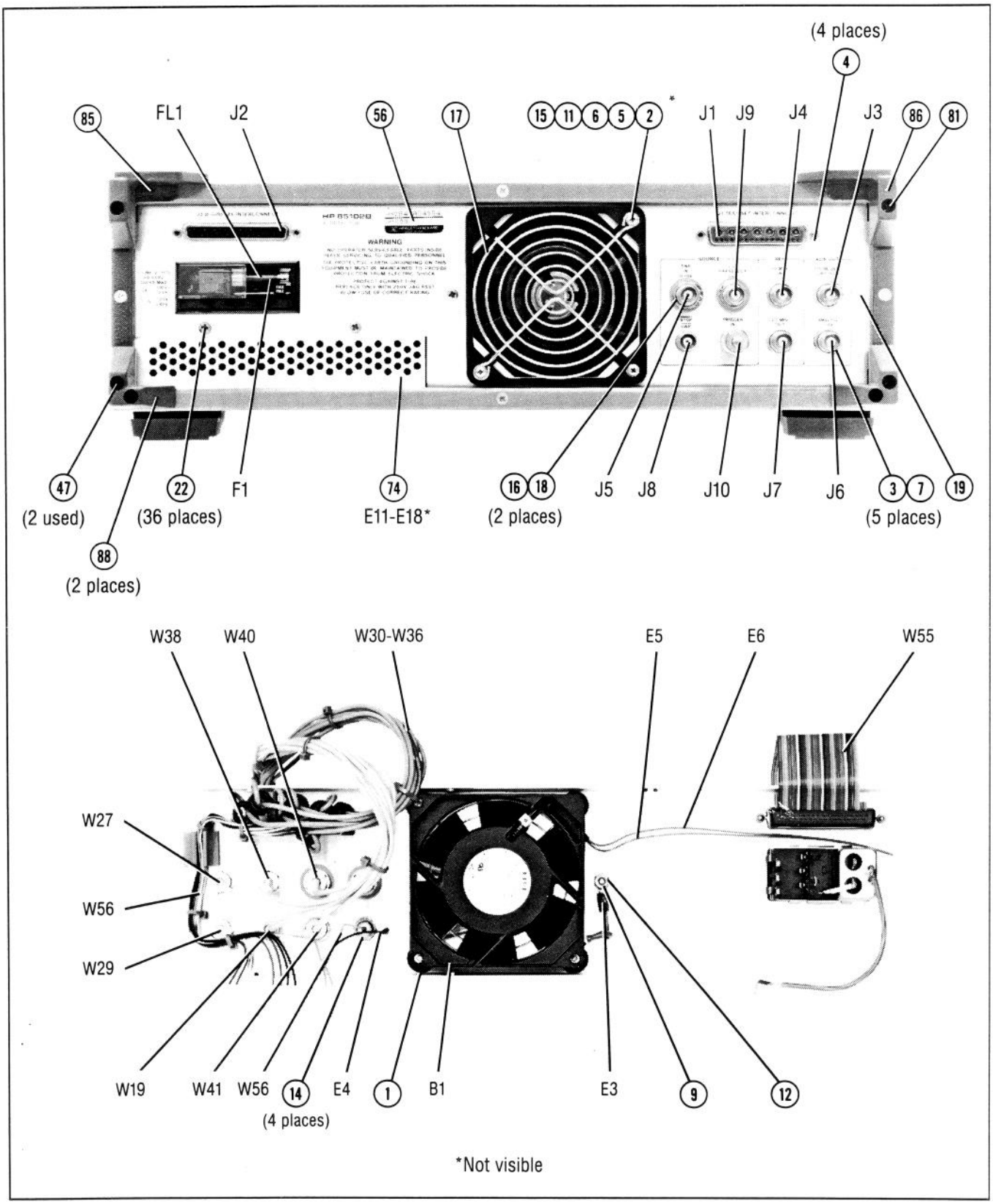
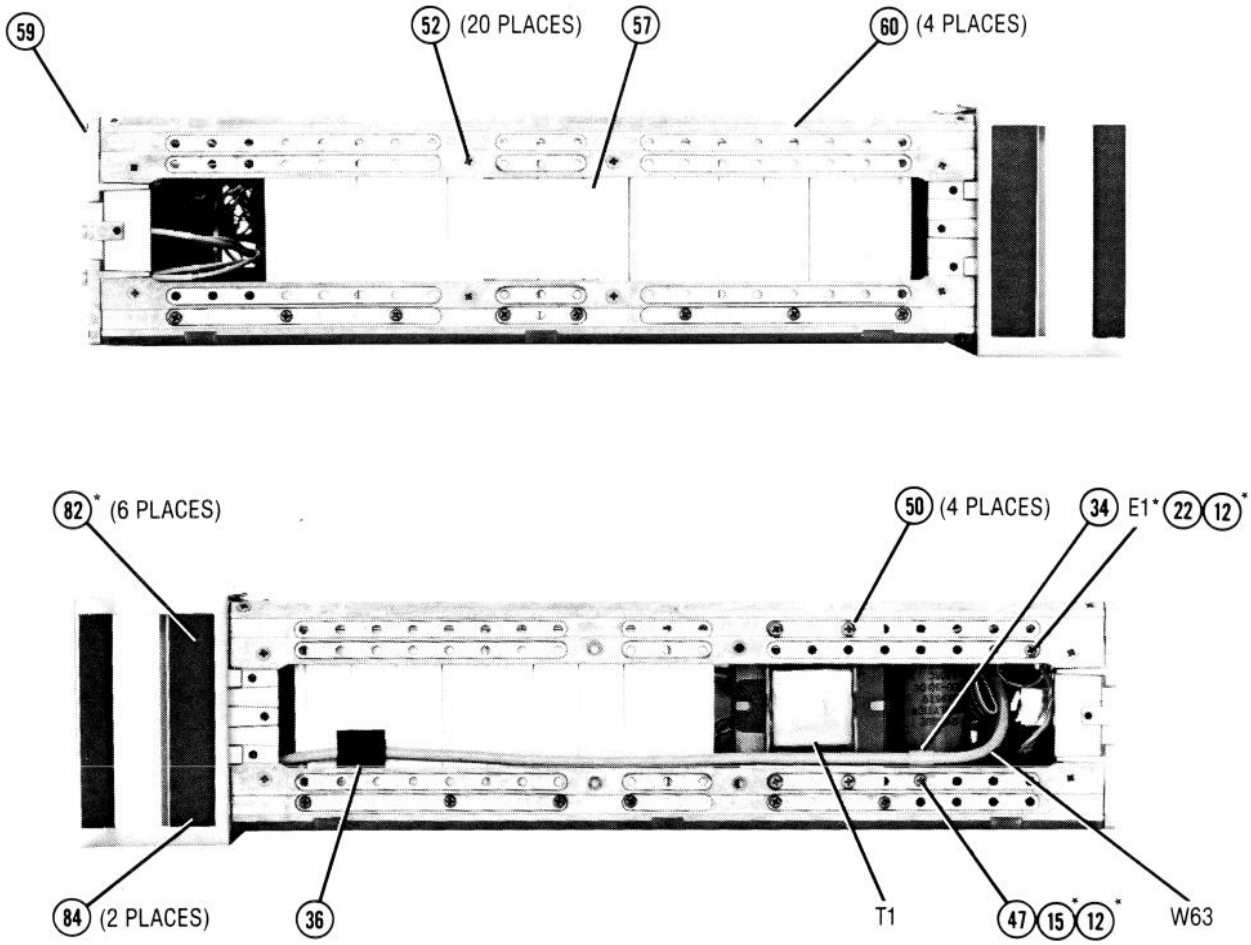


Figure 12. HP 85102 Option 008 Rear (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
B1	85102-20056	5	1	FAN ASSEMBLY	28480	85102-20056
E3	0360-0031	1		TERMINAL-CRIMP R-TNG fi6 22-16-AWG RED	28480	0360-0031
E4	0360-1632	0	1	TERMINAL-SLDR LUG LK-MTG FOR-fi3/8-SCR	28480	0360-1632
E5	0362-0227	1	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E6	0362-0227	1		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0227
E11-18	1200-0147	3	8	INSULATOR-FLG-BSHG NYLON	28480	1200-0147
F1	2110-0002	9	1	FUSE 2A 250V NTD 1.25X.25 UL	75915	2110-0002
FL1	0960-0443	7	1	LINE MODULE-FILTERED	28480	0960-0443
J1	1251-2197	4	1	CONNECTOR R&P 24F	28480	1251-2197
J2	1250-1391	6	1	ADAPTOR TEE MFM SMB	28480	1250-1391
J4	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J5	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-1091
J6	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J7	1250-0870	4		CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM	28480	1250-0870
J8	1250-0083	1	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0083
J9	1250-1091	3	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-1091
J10	1250-0870	4	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	1250-0870
W19	85102-60149	1	1	CA AY A6J7-J7	28480	85102-60149
W27	85102-60157	1	1	CA AY A19J2-J3	28480	85102-60157
W29	85102-60159	3	1	CA AY A21J4-J6	28480	85102-60159
W30	85102-60160	6	1	CA AY J1A2-A11J4	28480	85102-60160
W31	85102-60161	7	1	CA AY J1A3-A9J4	28480	85102-60161
W32	85102-60162	8	1	CA AY J1A4-A13J4	28480	85102-60162
W33	85102-60163	9	1	CA AY J1A5-A22J1	28480	85102-60163
W34	85102-60164	0	1	CA AY J1A6-A23J1	28480	85102-60164
W35	85102-60165	1	1	CA AY J1A7-A22J3	28480	85102-60165
W36	85102-60166	2	1	CA AY J1A1-A14J4	28480	85102-60166
W38	85102-60168	4	1	CA AY A6J3-J4	28480	85102-60168
W40	85102-60249	2	1	CA AY A16J9-REAR PANEL J9	28480	85102-60249
W41	85102-60224	3	1	CA AY A20J2-REAR PANEL J10	28480	85102-60224
W57	85102-60191	3	1	CBL AY INTER CON	28480	85102-60191
W56	85102-60192	4	1	CA ASSY TS CONN	28480	85102-60192
1	0400-0010	2	4	GROMMET-RND .25-IN-ID .375-IN-GRV-OD	28480	0400-0010
2	0510-0110	6	3	NUT-CAP 6-32-THD .281-IN-THK .312-A/F	00000	ORDER BY DESCRIPTION
3	0590-1251	6	5	NUT-SPCLY 15/32-32-THD .1-IN-THK .562-WD	00000	ORDER BY DESCRIPTION
4	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0006	1	2	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
6	2190-0007	2	4	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
7	2190-0102	8	5	WASHER-LK INTL T 15/32 IN .472-IN-ID	28480	2190-0102
8	2360-0113	2	9	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
9	2360-0193	8	5	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	28480	2360-0193
10	2360-0203	1	1	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	2360-0205	3	2	SCREW-MACH 6-32 .75-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
14	2950-0043	8	1	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
16	3050-1094	4	1	WASHER-FL MTLC 1/2 IN .505-IN-ID	28480	3050-1094
17	3160-0300	6	1	FINGER GUARD	28480	3160-0300
18	00310-48801	0	2	SHOULDERED WASHER	28480	00310-48801
19	85102-00056	3	1	REAR PANEL	28480	85102-00056
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
56	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
74	85102-20057	6	1	HEAT SINK	28480	85102-20057
81	0515-1244	9	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
83	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
85	5021-8538	6	1	LOCK FOOT L LFT	28480	5021-8538
86	5021-8540	0	1	LOCK FOOT L RT	28480	5021-8540
88	5040-7221	2	2	FOOT-REAR	28480	5040-7221

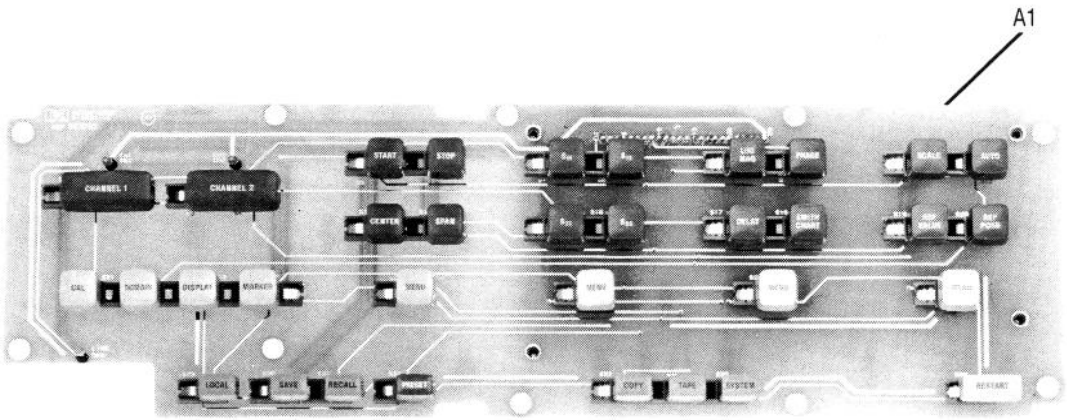
Figure 12. HP 85102 Option 008 Rear (2 of 2)



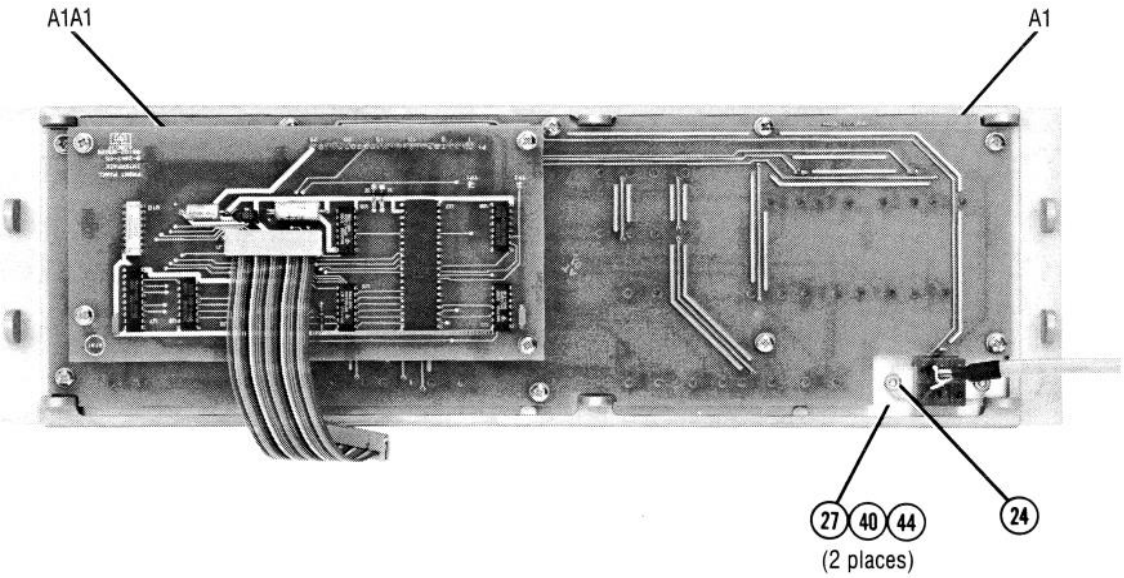
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-fi6-SCR	28480	0360-0009
T1	9100-4614	3	1	TRANSFORMER	28480	9100-4614
W63	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193
12	2420-0001	5	3	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
15	3050-0227	3	4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
22	2360-0115	4	36	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
34	1400-0017	0	1	CLAMP-CABLE .312-DIA .375-WD NYL	28480	1400-0017
36	1400-0757	5	1	CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
47	0515-1244	4	3	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
50	2510-0049	2	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
52	0515-1367	7	20	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896

Figure 13. HP 85102 Option 008 Left and Right Internal

FRONT



BACK



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	85102-60001	4	1	BOARD ASSEMBLY, FRONT PANEL (NEW)	28480	85102-60001
A1	85102-69001	2	1	BOARD ASSEMBLY, FRONT PANEL (REBUILT)	28480	85102-69001
A1A1	85102-60029	6	1	BOARD ASSY, FRONT PANEL INTERFACE (NEW)	28480	85102-60029
A1A1	85102-69029	4	1	BOARD ASSY, FRONT PANEL INTERFACE (REBUILT)	28480	85102-69029
20	0510-1148	2	16	RETAINER-PUSH ON KB-TO-SHFT EXT	28480	0510-1148
24	85102-60214	1	1	SUB PANEL	28480	85102-60214
27	0380-0020	0	2	SPACER-RND .25-IN-LG .128-IN-ID	00000	ORDER BY DESCRIPTION
40	2190-0019	6	2	WASHER-LK HLCL NO. 4 .115-IN-ID	28480	2190-0019
44	2260-0001	5	2	NUT-HEX-DBL-CHAM 4-40-THD .094-IN-THK	28480	2260-0001

Figure 14. Front Panel Board Assembly

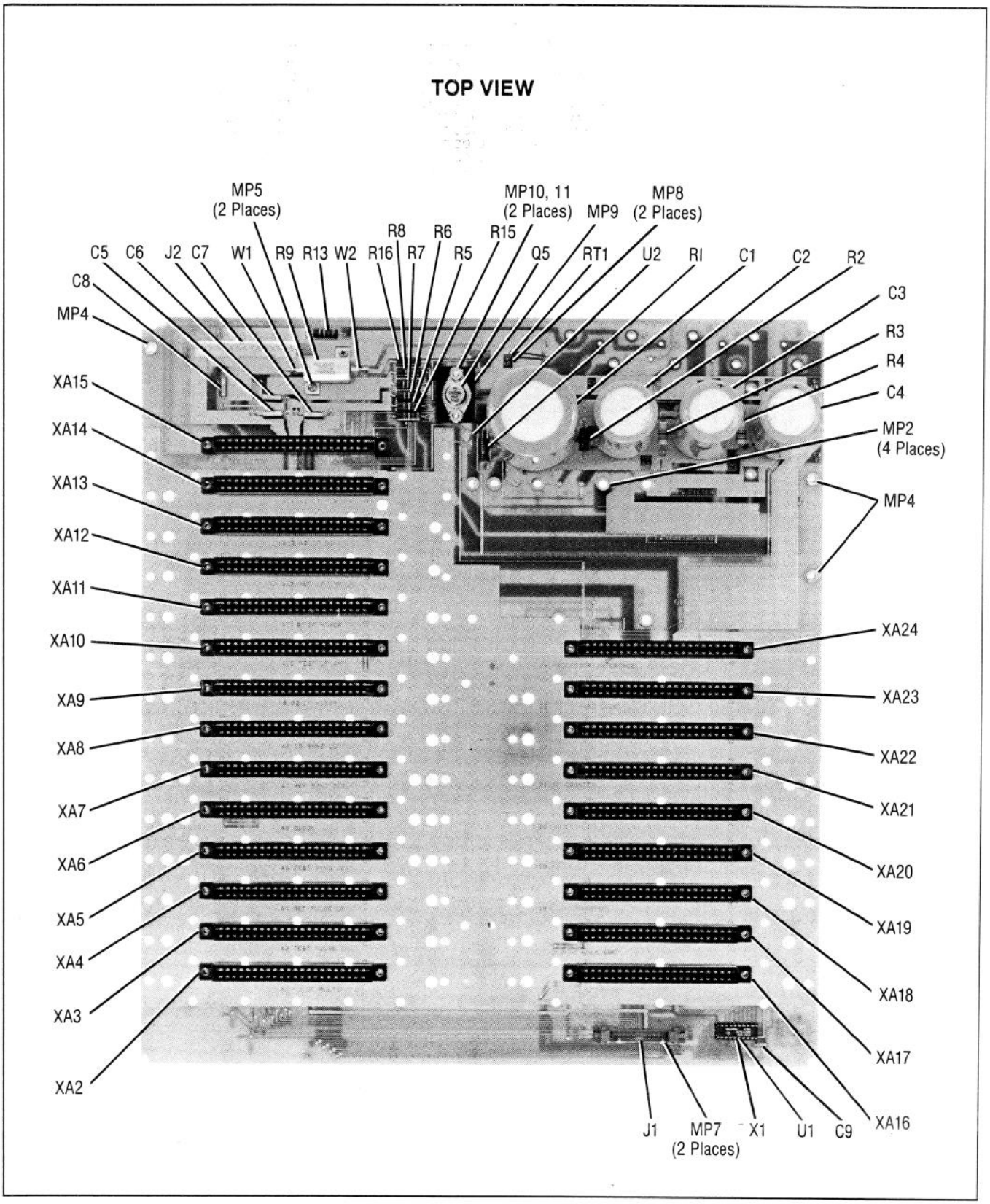


Figure 15. HP 85102 Mother Board (1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
C1	0180-3017	7	1	CAPACITOR-FXD .045F+75-10% 25VDC AL	28480	0180-3017
C2	0180-0453	9	1	CAPACITOR-FXD 8700UF+75-10% 40VDC AL	28480	0180-0453
C3	0180-2671	7	2	CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
C4	0180-2671	7		CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
C5	0180-1731	8		CAPACITOR-FXD 4.7UF±10% 50VDC TA	56289	150D475X9050B2
C6	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
C7	0180-1731	8		CAPACITOR-FXD 4.7UF±10% 50VDC TA	56289	150D475X9050B2
C8	0180-0116	1		CAPACITOR-FXD 6.8UF±10% 35VDC TA	56289	150D685X9035B2
C9	0160-4084	8		CAPACITOR-FXD .1UF ±20% 50VDC CER	28480	0160-4084
J1	1251-5800	2	1	CONNECTOR 26-PIN M POST TYPE	28480	1251-5800
J2	1251-3901	0	1	CONNECTOR 15-PIN M POST TYPE	28480	1251-3901
MP2	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
MP4	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP5	0360-0124	3		CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP7	2200-0105	4	2	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP8	2200-0105	4		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
MP9	1205-0421	3	1	HT SK TO66	28480	1205-0421
MP10	2420-0001	2	2	NUT HEX 6-32	28480	2420-0421
MP11	0570-0111	2	2	SCREW MACHINE 6-32	28480	0570-0111
Q5	1854-0441	5	1	TRANSISTOR NPN SI PD=5.8W FT=800KHZ	28480	1854-0441
R1	0764-0016	8	2	RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
R2	0764-0016	8		RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
R3	0764-0015	7	2	RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
R4	0764-0015	7		RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
R5	0811-1672	5	6	RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R6	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R7	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R8	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R9	0811-2048	1	1	RESISTOR .25 1% 25W PW TC=0±90	91637	RH25-T2-1/4-F
R13	0811-1667	8	1	RESISTOR 1.2 5% 2W PW TC=0±400	75042	BWH2-1R2-J
R15	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
R16	0811-1672	5		RESISTOR 3.3 5% 2W PW TC=0±400	75042	BWH2-3R3-J
RT1	0837-0126	6	1	THERMISTOR DISC 1K-OHM TC=-4.4%/C-DEG	28480	0837-0126
U1	1820-2075	4		IC MISC TTL LS	01295	SN74LS245N
U2	1826-0661	2		IC TEMP XDCR TO-52 PKG	24355	AD590KH
W1-2	8151-0013	5	2	WIRE 22 1X22	28480	8151-0013
X1	1200-0639	8	1	SOCKET-IC 20-CONT DIP DIP-SLDR	28480	1200-0639
XA2-XA24	1251-7882	4	23	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882

Figure 15. HP 85102 Mother Board (2 of 4)

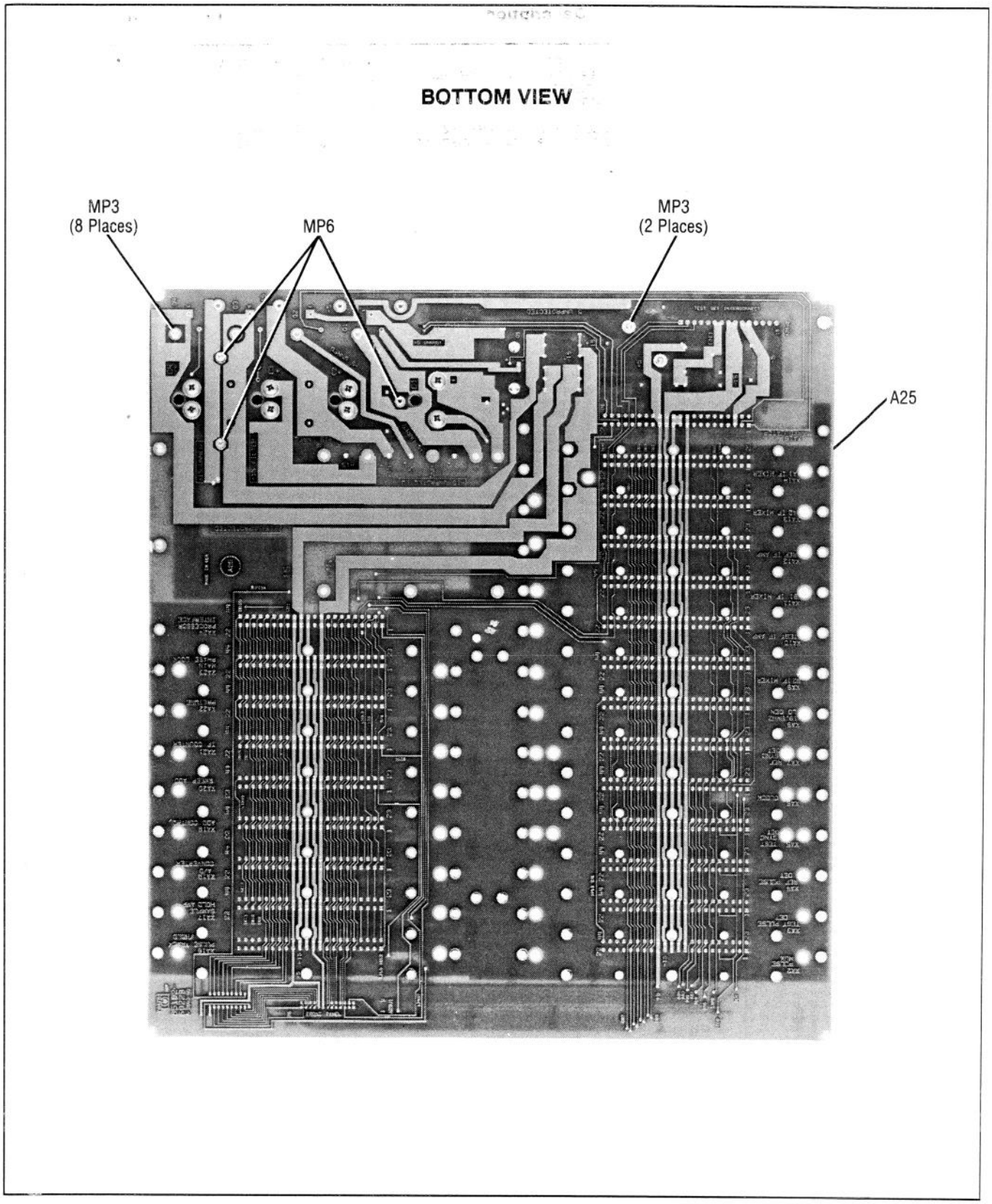
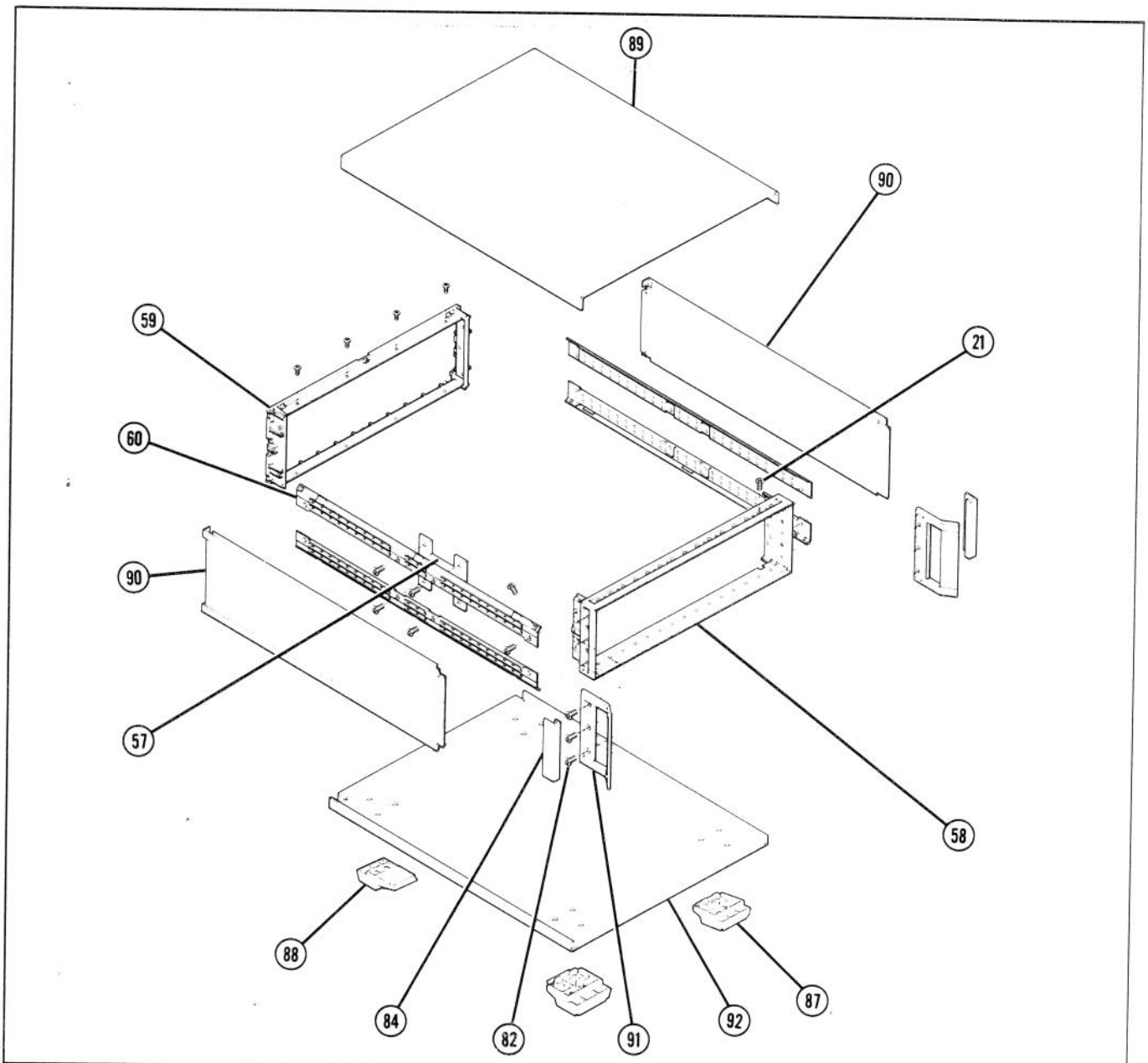


Figure 15. HP 85102 Mother Board (3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A25	85102-60229	8	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A25 IS ORDERED: A25C1, A25C2, A25C3, A25C4, A25Q1, A25Q2 A25Q3, A25Q4	28480	85102-60229
MP3	0360-0124		4	CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124
MP6	0360-0124			CONNECTOR-SGL CONT PIN .04-IN-BSC-SZ RND	28480	0360-0124

Figure 15. HP 85102 Mother Board (4 of 4)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
21	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 82 DEG	28480	0624-0589
57	5001-8232	3	1	GUSSET SIDE	28480	5001-8232
58	5021-8403	4	1	FRAME FRONT	28480	5021-8403
59	5021-5804	3	1	FRAME REAR	28480	5021-5804
60	5021-5837	2	4	STRUT CORNER 18"	28480	5021-5837
82	0515-0396	0	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0396
84	5021-8496	5	2	TRIM FRNT HNDL	28480	5021-8496
87	5041-8801	8	4	FOOT-BOTTOM	28480	5041-8801
88	5041-8821	2	2	FOOT-REAR	28480	5041-8821
89	5062-3735	1	1	COVER TOP 18"	28480	5062-3735
90	5062-3757	7	2	COVER AY SIDE	28280	5062-3757
91	5062-3799	7	2	HANDLE AY FRONT	28480	5062-3799
92	85102-00061	0	1	BOTTOM COVER	28480	85102-00061

Figure 16. HP 85102 Cabinet Parts

Service Manual Update: HP 8510B

NEW INFORMATION AND CHANGES TO THIS MANUAL

The pages below were replaced with pages supplied in this manual changes supplement. The revision date appears in the lower right or left corner of each updated page.

Service Manual:

Title Page
Service Overview, pages 3/4
Running Error Messages, pages 9/10, 11/12
Replaceable Parts, pages 19/20, 21/22, and 31/32
Service Manual Update, page 1/2
Pulsed-RF Measurement Capability, pages 1 through 29