

## Errata

**Title & Document Type: 8514B S-Parameter and 8512A Reflection Transmission Test Sets Manual**

**Manual Part Number: 08514-90014**

**Revision Date: 1990-06-01**

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### 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, semiconductor products and chemical analysis businesses are 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.

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# **HP 8514B S-PARAMETER and HP 8512A REFLECTION/TRANSMISSION TEST SETS**

## **SERIAL NUMBERS**

This manual applies directly to HP 8514B test sets with serial prefix 2706A and to HP 8512A test sets with serial prefix 2631A.

For additional information about serial numbers, refer to INSTRUMENTS COVERED BY MANUAL in the General Information section.

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1400 FOUNTAINGROVE PARKWAY, SANTA ROSA, CA 95403 U.S.A.

MANUAL PART NO. 08514-90014  
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Printed: JUNE 1990



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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 Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.*

## **WARRANTY**

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## **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.*

**DECLARATION OF CONFORMITY**  
according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Co.  
Manufacturer's Address: 1400 Fountaingrove Parkway  
Santa Rosa, California 95403  
U.S.A.

Declares that the product:

Product Name: S-Parameter Test Set  
Model Numbers: HP 8514B  
Product Options: This declaration covers all options  
of the above product(s).

Conforms to the following product specifications:

Safety: IEC 348:1978/HD 401:1980  
CAN/CSA-22.2 No. 231 Series M89  
EMC: CISPR 11:1990 /EN 55011:1991, Group 1 Class A  
IEC 801-2:1991 /EN 50082-1:1992, 4 kV CD, 8 kV AD  
IEC 801-3:1984 /EN 50082-1:1992, 3 V/m, 27-500 MHz  
IEC 801-4:1988 /EN 50082-1:1992, 500 V signal, 1000 V AC

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

The HP 8514B was qualified as part of a product family which includes the HP 8510C, HP 8530A, HP 8511A, HP 8511B, HP 8515A, HP 8516A, HP 8517A, HP 85105A, HP 85110A, and HP 85309A.

Santa Rosa, California

Location

*May 7, 1993*  
Date

*Dixon Browder*  
Dixon Browder / Quality Manager

European Contact:

Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department ZQ/Standards Europe, Herrenberger Straße 130, D-7030 Böblingen (FAX: 549-7031-143143)

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am Arbeitsplatz (operator position)  
normaler Betrieb (normal position)  
nach DIN 45635 T. 19 (per ISO 7779)

# HP 8514B/8512A Operating and Service Manual

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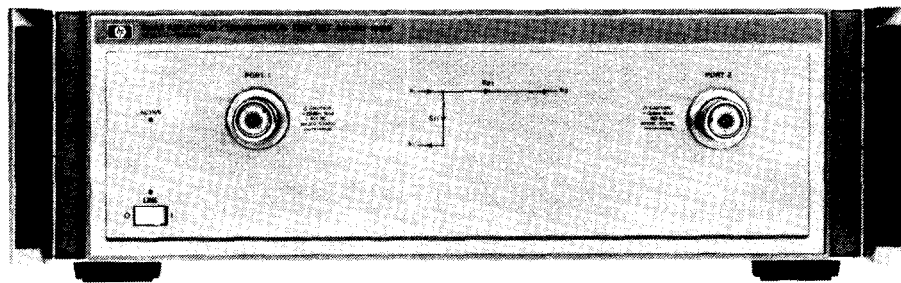
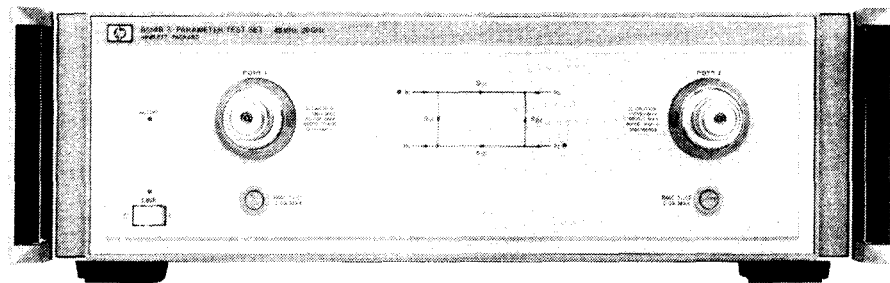


Figure 1-1. HP 8514B (upper) and HP 8512A Test Sets

# Section 1. General Information

---

## INTRODUCTION

The purpose of this manual is to enable you to use your HP 8514B S-parameter or HP 8512A reflection/transmission test set effectively and confidently. These test sets are integral components of the HP8510 measurement system. For that reason, this manual has been divided into two major portions (Operating and Service) to be an integral part of the HP8510 documentation.

- General Information
- Installation
- Operation
- Performance Tests
- Adjustments
- Backdating

The Service part consists of :

- Replaceable Parts
- Service

The major topics of this section, General *Information*, are:

- how to use the test set
- what the test set is
- operating, safety and warranty considerations
- test set specifications

## VERIFYING THE TEST SET

The HP 8514B and HP 8512A have been designed to operate specifically with the HP8510 network analyzer.

- To install the instrument, turn to the Installation section of this manual.
- To check the proper operation of the test set, see the Operator's Check in the Operation section of this manual.
- To see the specifications of the test set refer to *Specifications* in the *HP 8510B System Manual* or *General Information* in volume 1 of the HP 8510A manual set.



- To verify that the instrument meets its published specifications, turn to the *Performance Tests* section in the *HP8510B System Manual* or Volume 2 of the *HP 8510A Operating and Service Manual*. Note that the **HP 8514B** can be performance tested only to 18 GHz with the **HP 8510A** software.
- To troubleshoot the test set, refer to the *Service Overview* section and the *Test Set Troubleshooting* section of the *HP 8510B Service Manual*. Or refer to the *Service* section in Volume 4 of the *HP 8510A Operating and Service Manual*. Otherwise call your local Hewlett-Packard office.

## **INSTRUMENTS COVERED BY MANUAL**

You will find a two-part serial number on the rear panel of the instrument. The first four digits and the letter are the serial number prefix. The last five digits are the sequential suffix which is unique to each test set. The contents of this manual apply directly to test sets with the same serial number prefix as the one(s) on the title page under the heading *Serial Numbers*.

If the serial prefix of your test set is not listed on the title page, your instrument differs from those documented in this manual. The differences are documented in the yellow manual changes supplement supplied with the manual.

To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest manual changes supplement, as it may contain replacement information as well as change information. The supplement for this manual is keyed to the manual's print date and part number (on the title page) and is available on request from Hewlett-Packard.

You can order this manual in microfiche form (the part number appears on the title page). With the manual (in 4 x 6 inch microfilm transparency format) you will also receive the latest manual changes supplement.

## **DESCRIPTION AND OPERATING CHARACTERISTICS OF THE INSTRUMENT**

The combination of the HP 8514B test set with the HP8510 network analyzer and source provides a system for making S-parameter measurements over the frequency range of 45 MHz to 20 GHz. This system is suited for making measurements on two port devices when it is inconvenient or inexpedient to physically reverse the DUT (device under test) to measure all four S-parameters.

The **HP 8514B** uses two couplers for signal separation. For measurements of active devices, the standard HP 8514B includes:

- four RF to IF converters to measure all four S-parameters without reconnecting the DUT,
- two 90 dB programmable step attenuators for changing (in 10 dB steps) the incident power level at both ports,
- two bias tees for applying external dc bias to both test port center conductors.

In the “High Forward Dynamic Range Configuration” (option 003), the Port 2 coupler is reversed to optimize dynamic range in the forward measurement direction. Because the b2 sampler is connected to the coupler through path instead of the coupled arm, there is less isolation between the b2 sampler and Port 2, and the b2 power level will be higher than b1. This configuration is better for wide dynamic range or reciprocal devices or components like filters, cables, or antennas, where  $S_{12}$  is generally not measured. However, as a result of the lower isolation between the test port and the sampler, “sampler bounce,” appearing as an occasional spurious response related to the VTO frequency, can be noticeable in this “asymmetrical” test set.

The HP 8512A reflection/transmission test set uses one coupler for signal separation. The standard HP 8512A has:

- three RF to IF converters, for making reflection ( $S_{11}$ ) and transmission ( $S_{21}$ ) measurements,
- no step attenuators to internally change the incident power level,
- no bias tees to apply external DC bias to the test port center conductors.

Tables 1 and 1B list additional characteristics of the HP85148 and 8512A, respectively. Figure 1-2 shows the HP 8514B in a typical measurement set-up.

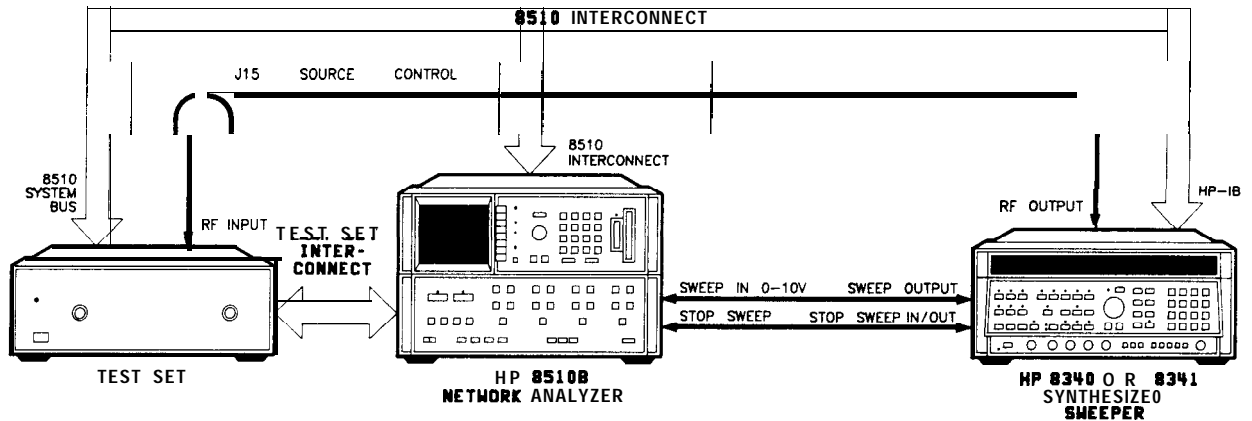


Figure 1-2. Typical HP 8514B Measurement Set-up

## **OPTIONS**

### **Option 001**

This option adds IF switching capability to allow up to four test sets to be connected to the HP8510B at the same time. The test set in use is selected from the HP85108 front panel. The 20 MHz IF signal is transmitted from the standard test set through the option 001 test set(s) to the network analyzer. IF switching is performed automatically by the option 001 test set(s), without reconnections.

### **Option 002 (HP 8514B only)**

This option deletes the 90 dB programmable step attenuators and the dc bias tees. Note that bias can be applied externally, using the HP11612A bias tee, if bias is required but attenuation not.

### **Option 003 (HP 8514B only)**

This high forward dynamic range configuration is described in detail in this section under the title *Description and Operating Characteristics of the Instrument*.

### **Option 002/003 (HP 8514B only)**

This option is a combination of option 002 and option 003, which were previously described.

### **Option 908**

This option supplies the test set with the parts required to rack mount it with handles removed. Refer to the *Installation* section of this manual for additional information.

### **Option 910**

This option provides a duplicate test set manual.

### **Option 913**

This option supplies the test set with the parts required to rack mount it with handles. Refer to the *INSTALLATION* section of this manual for additional information.

### **Option W03, Warranty Conversion**

Option W03 converts the standard one year return to Hewlett-Packard warranty to a 90 day on-site warranty. W03 can only be ordered at the time of instrument purchase. Instruments ordered with option W03 are identified on the serial number label, or on a special identification label supplied with the instrument.

### **Option W30, Extended Service**

Option W30 adds two additional years of return-to-HP service, to follow the first year of warranty. Option W30 can be ordered only at the time of purchase. Instruments ordered with option W30 are identified on the serial number label, or on a special identification label supplied with the instrument.

NOTE: additional system warranty information is included in the HP8510 manual set.

## ACCESSORIES

### Accessories Supplied

Figure 3-1 shows the accessories supplied with the HP 8514B and 8512A test sets (except as noted in Table 3-1). The accessories, with part numbers, are listed in the *Installation* section for both test sets.

### Accessories Available

**NOTE:** Additional HP8510 system accessory information is located in the HP8510 manual set.

**Calibration, Verification and Adapter Kits.** Hewlett-Packard offers several calibration kits suitable for calibrating an HP 8510/8514B or 8512A when making error corrected measurements. Each calibration kit noted below includes a set of precision standards to calibrate an HP8510 system in the indicated interface. Additional information is located in the *System and Documentation Overview* section of the *HP 8510B System Manual* and volume 1 of the HP 8510A manual set.

Connector Type	Calibration Kit	Verification Kit	Adapter Kit
3.5 mm 7mm Type-N 50Ω 3.5 to 7 mm	HP85052B/E HP85050B/C/D HP 85054B	HP85053B HP 85051 B HP 85055A	HP85130A/B <sup>1</sup>
1. These adapters attach directly to the 3.5 mm test ports.			

**RF Cables.** The HP 85131D 3.5 mm Test Port Return Cable Set is a pair of 21 inch long cables specified from DC to 26.5 GHz. Typically it is used with the HP 8514B. One of the cables has 3.5 mm (f) connectors, the other cable has one 3.5 mm (f) and one 3.5 mm (m) connector.

The HP 85132C 7 mm Test Port Return Cable is a single, 36 inch cable for measurements where the device is connected directly to one test port. It is typically used with the HP 8512A. The cable has two 7 mm connectors. Its frequency range is DC to 18 GHz.

**Transistor Test Fixture Kit.** The HP 85041A Transistor Test Fixture Kit (TTF) is a comprehensive measurement system for testing and characterizing stripline packaged microwave transistors. Although it has 7 mm connectors and a frequency range limited to 18 GHz, the TTF may be easily adapted for use with the HP 85148. Please consult with your local HP Systems Engineer for specific recommendations.

## OPERATING AND SAFETY PRECAUTIONS

### Operating



### ATTENTION Static Sensitive

Handle only at Static Safe  
Work Stations

Beware of electro-static damage (ESD). The input connectors (test ports or cables or adapters connected to the test ports) are very sensitive to ESD. Use a grounded wrist strap when attaching devices to the input connectors.

Otherwise, you need observe only normal precautions in handling and operating the test set. Do not exceed the front panel operating level power input as noted:

Maximum Operating Power Level	Test Port
+17 dBm	HP 8514B Port 1 and 2
+20 dBm	HP 8512A Port 1
-13 dBm	HP 8512A Port 2

- Do **not** torque anything to the test port connector with greater than 90 N-cm (8in.-lb.) of torque. The wrench supplied with your accessory kit is calibrated 90 N-cm (8 in.-lb.).
- Do **not** torque anything to the Source RF input, on the back of your test set, with greater than 90 N-cm (8 in.-lb.).

### Service

The voltages in this test set warrant normal caution for operator safety. Nevertheless, service should be performed only by qualified personnel. Service strategy, troubleshooting procedures, replaceable parts and similar information for the HP 8514B and 8512A test sets is in the *HP 8510B Service Manual*.

## ADDITIONAL EQUIPMENT REQUIRED

Table 2-5 lists additional equipment and accessories required for use with the HP 8514B and 8512A test sets. The table notes which items are required to verify the performance of the test sets and which are required to operate them. Other equipment may be substituted if its specifications meet or exceed the specifications listed in the critical specifications column.

# Section 2. Installation

---

## INTRODUCTION

This section explains how to install the HP 8514B and HP 8512A test sets. The topics covered include initial inspection, environmental considerations, positioning and connecting the test set for use, and packaging the instrument. Refer to the *Installation* section of the HP8510 manual for more complete system connection and turn-on instructions.

## INITIAL INSPECTION

Inspect the shipping container (including cushioning material) for damage. If it is damaged, keep it until you have checked the contents for completeness. The contents are listed and illustrated in Figure 2-1.

In addition, check the test set mechanically and electrically. If the test set and shipping container are undamaged, passing the Operator's Check (in the *Operation* section) should suffice for incoming inspection. If the test set does not pass the *Operator's Check*, refer to the troubleshooting procedures in the service portion of this manual. Alternatively, call your local HP customer engineer.

If the shipping container is damaged, perform the performance tests outlined in the HP8510 manual set. If the test set fails the performance tests, or is damaged or defective, keep the shipping materials and notify both the carrier and the nearest Hewlett-Packard office. The HP office will arrange for repair or replacement of the test set without waiting for settlement of the claim. If any of the following accessories are not received with the test set, notify your nearest HP office and the missing parts will be sent to you.

## ENVIRONMENTAL CONSIDERATIONS

### Operation and Storage

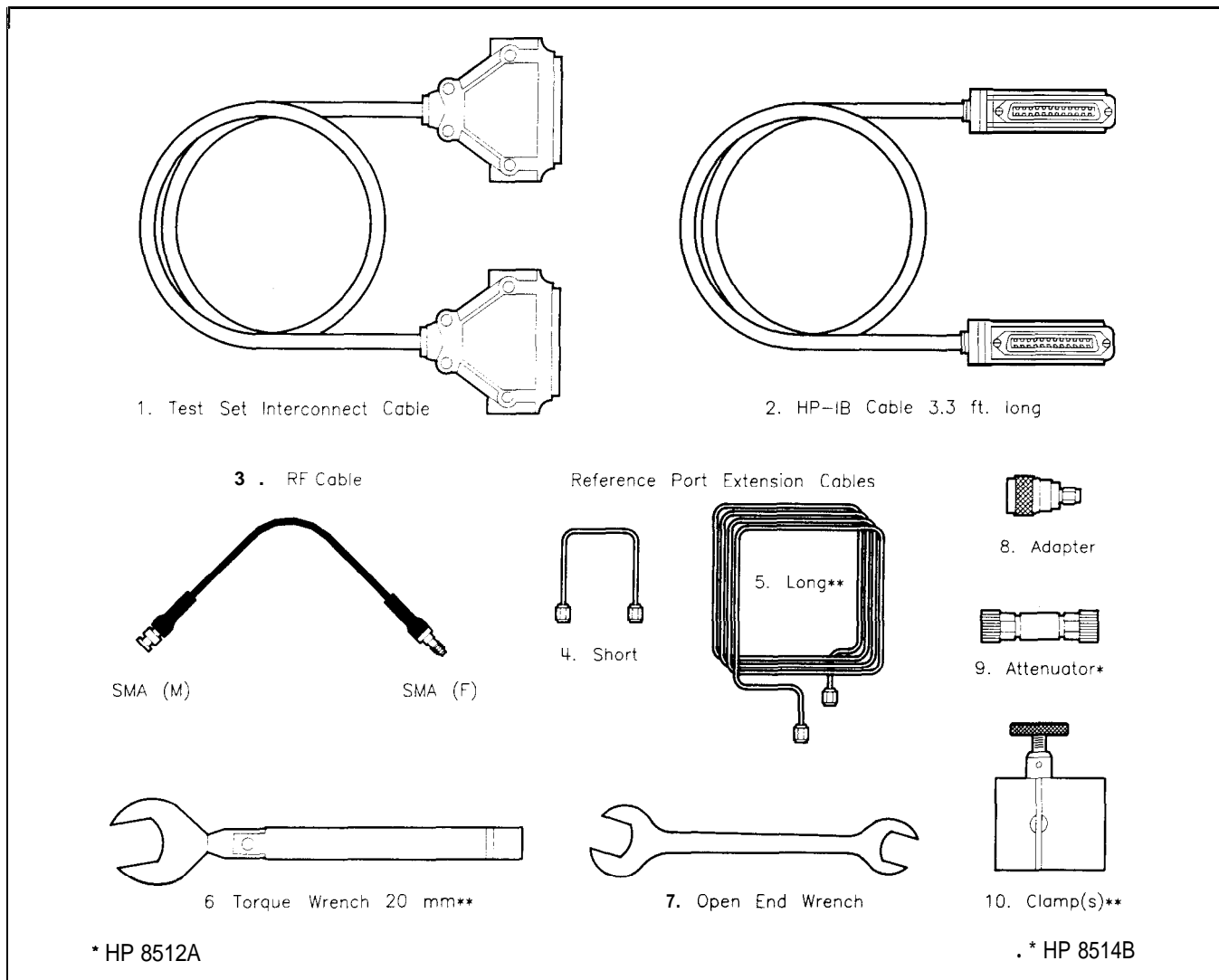
To perform within specifications, the test sets should be operated in temperatures between 0°C and +55°C with relative humidity less than 95% (at 40°C dry bulb temperature, maximum). They may be operated at altitudes up to 4,500 metres (15,000 feet).

The test sets may be stored in temperatures from -40°C to +75°C, with relative humidity up to 90% at +65° (maximum dry bulb temperature) and at altitudes up to 15,240 metres (50,000 feet).

## PREPARATION FOR USE

### Positioning the Test Set

Typically the test set is placed on a work surface whether it is rack-mounted or used on a bench. To install the flanges to rack mount the instrument (with or without handles) in a standard 19 inch rack, refer to Figure 2-2.

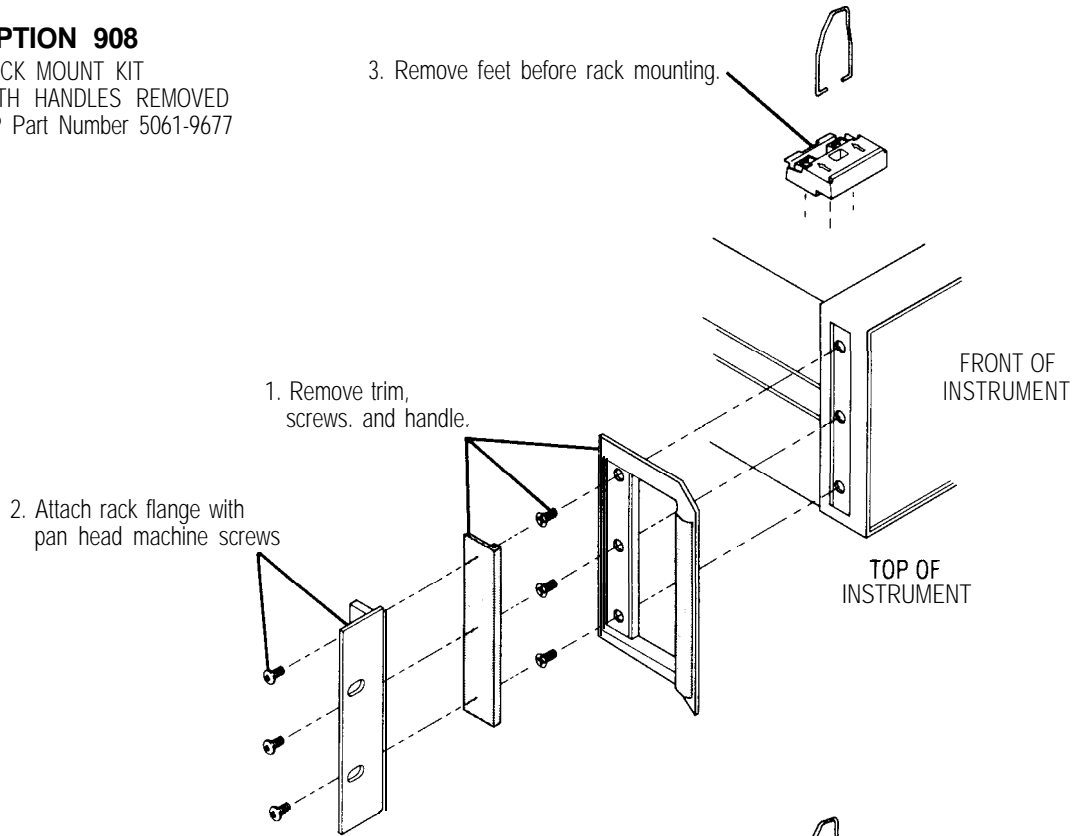


item	HP Model or Part Number	
	HP 8514B	HP 8512A
Power cord <sup>1</sup>	8120-1348	8120-1348
1. Test set IF interconnect cable	08510-60102	08510-60102
2. HP-IB cable	8120-3445	8120-3445
3. RF cable (flexible)	08513-60009	08513-60009
4. Short reference port extension cables (2)	08512-20019	08512-20019
5. Long reference port extension cables (2)	08514-20013	
6. Torque wrench	871 0-1 764	
7. Open end wrench 1/2 in. X 9/16 in.	8710-1770	
8. Type-N (m) to SMA (m) adapter	1250-1 894	1250-1894
9. Attenuator (20 dB, 7 mm)		08512-60002
10. Anti-rotation clamps (2)	08515-60003	
<b>Specifications and Performance Verification</b>		
Program and Data Disk	08510-10033	08510-10033
Operating and Service Manual <sup>1</sup>	08515-90014	08515-90014
Principles of Microwave Connector Care <sup>1</sup>	5954-1566	5954-1566

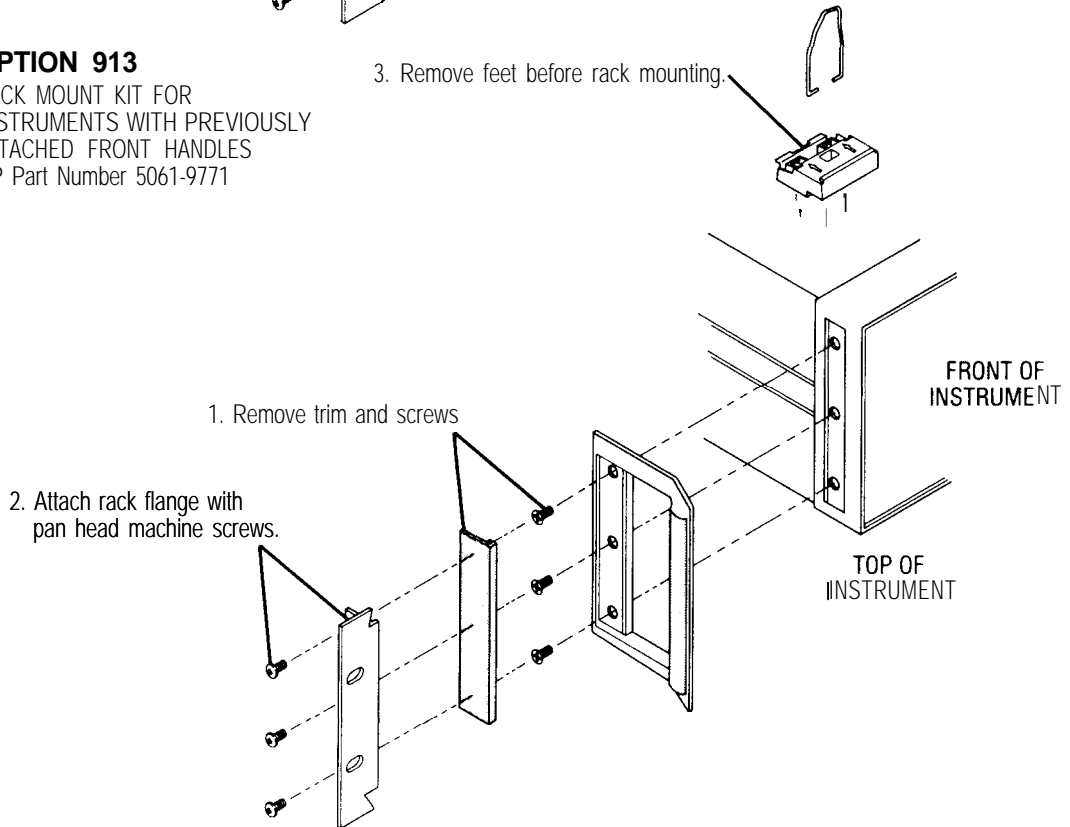
1. Not shown.  
2. Use between HP 85132C cable and Port 2 of HP 8512A for S21 measurements.

**Figure 2-1. Accessories supplied with HP 8514B and HP 8512A**

**OPTION 908**  
RACK MOUNT KIT  
WITH HANDLES REMOVED  
HP Part Number 5061-9677



**OPTION 913**  
RACK MOUNT KIT FOR  
INSTRUMENTS WITH PREVIOUSLY  
ATTACHED FRONT HANDLES  
HP Part Number 5061-9771



**Figure 2-2. Attaching Rack Mounting Hardware**



The recommended rack is the HP 85043A. Instructions for rack mounting the test set in a system configuration with the HP8510 are provided in the *HP8570 Installation* section and in the *HP 85043A System Rack Manual*.

## Static Free Workstation

When installing the test set for use on a bench, place it on a grounded anti-static work surface (Figure 2-3) to lessen the chance of ESD damage. The anti-static surface should extend far enough in front of the test set to provide effective protection at the test ports and cable ends.

If your test set is equipped with a grounding receptical, you may use that in place of a static mat.

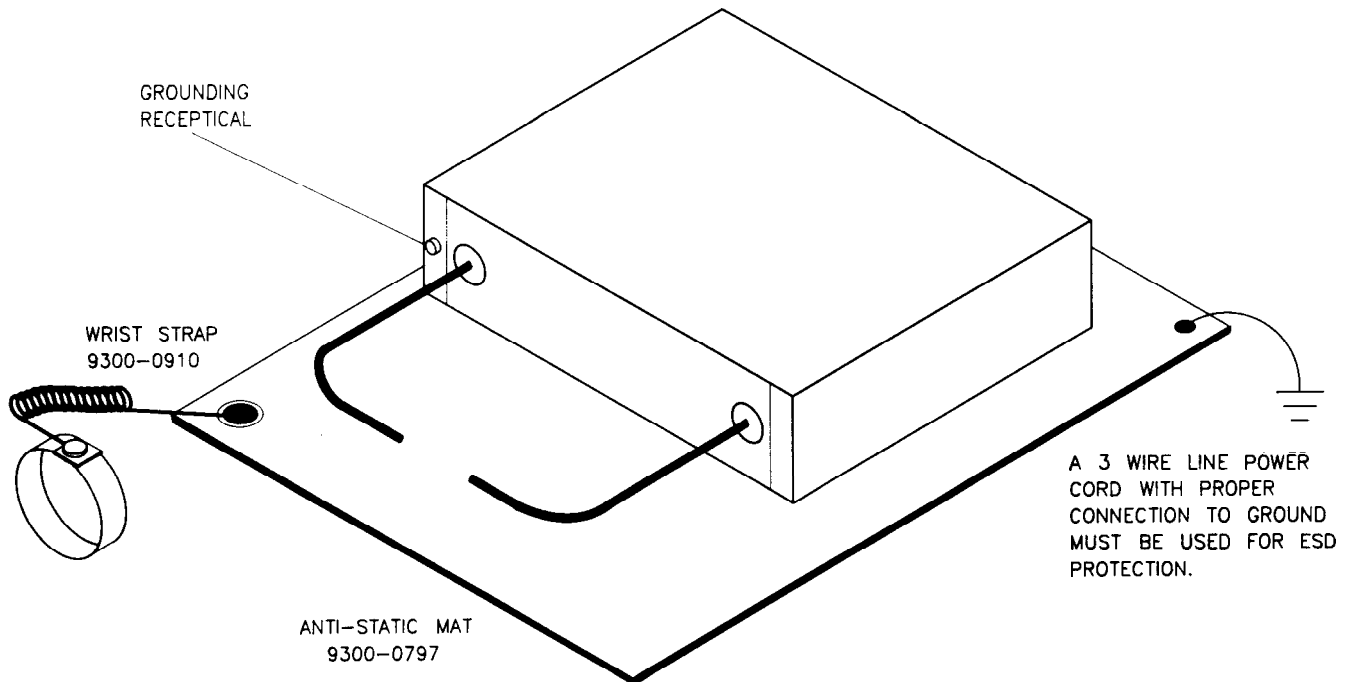


Figure 2-3. Recommended Static Free Workstation

## Connecting the Test Set

**Mating Connectors.** HP 8514B PORTS 1 and 2 are precision 3.5 mm male connectors and mate with precision 3.5 mm female connectors. The HP 8512A has 7 mm test port connectors.

The TEST SET INTERCONNECT connector is a series D subminiature female connector with 7 RF connections.

The 8510 SYSTEM BUS connector is a female HPIB type connector and mates with the corresponding male connectors of HPIB cables.

**Power and Control Connections.** Figure 2-4 shows the following connections (with the exception of line power) and the required RF source connections.

Connect the power cord to an electrical outlet and the line module to supply power to the test set.

Connect the test set IF interconnect cable from the J11 TEST SET INTERCONNECT connector on the rear panel of the test set to the J1 TEST SET INTERCONNECT connector on the rear panel of the HP85102 IF Detector.

Connect the system bus cable from the HP85148 (or 8512A) J12 8510 SYSTEM BUS connector to the 8510 INTERCONNECT connector of the HP85101 display/processor. The test set IF interconnect cable and the system bus cable transmit control signals between the test set and the network analyzer.

**Signal Path Connections.** The IF signals from the test set are transmitted to the HP 85102 IF Detector by the test set IF interconnect cable (see above).

RF signals are transmitted from the source to the test set by the 3.5 mm flexible RF cable supplied with the test set. Recommended torque is 56 N-cm (5in.-lb) for the RF cable-to-test-set/RF input connection.

**Anti-Rotation Clamps.** (HP 8514B only) Use these clamps to stabilize the test port/RF cable connection. Connect the test port cables to the test ports and tighten them as specified in the cable manual. Loosen the anti-rotation clamp thumb screw sufficiently to slip the clamp over the cable and up to the front panel. The clamp end with the flats should come to rest on the flats of the test port shoulder. Finger tighten the thumb screws to prevent further loosening or tightening of the test port/RF cable connection.

The internal O-ring is field replaceable without disassembling the anti-rotation clamp. Pry it out with fine tweezers or a similar tool when it no longer holds the RF cable securely. Insert the new O-ring by engaging one side of it in the slot of the phenolic clamp donut. Use your fingers to push the O-ring into the rest of the slot.

The HP part number of the O-ring is 0900-0007 (CD 7).

## **PACKAGING**

If reshipping is required, each test set should be repackaged in the original factory package. Containers and materials identical to those used by the factory are available through Hewlett-Packard offices.

Alternatively, comparable packaging materials may be used. Wrap the test set in heavy paper or anti-static plastic. If shipping to an HP Office or Service Center, complete and attach a service tag (in the HP 8510 manual set). Use sufficient shock absorbing material on all sides of the test set to provide a thick, firm cushion and prevent movement. Seal the shipping container securely and mark it **FRAGILE**.

In any correspondence with HP, refer to the test set by full model and serial number.

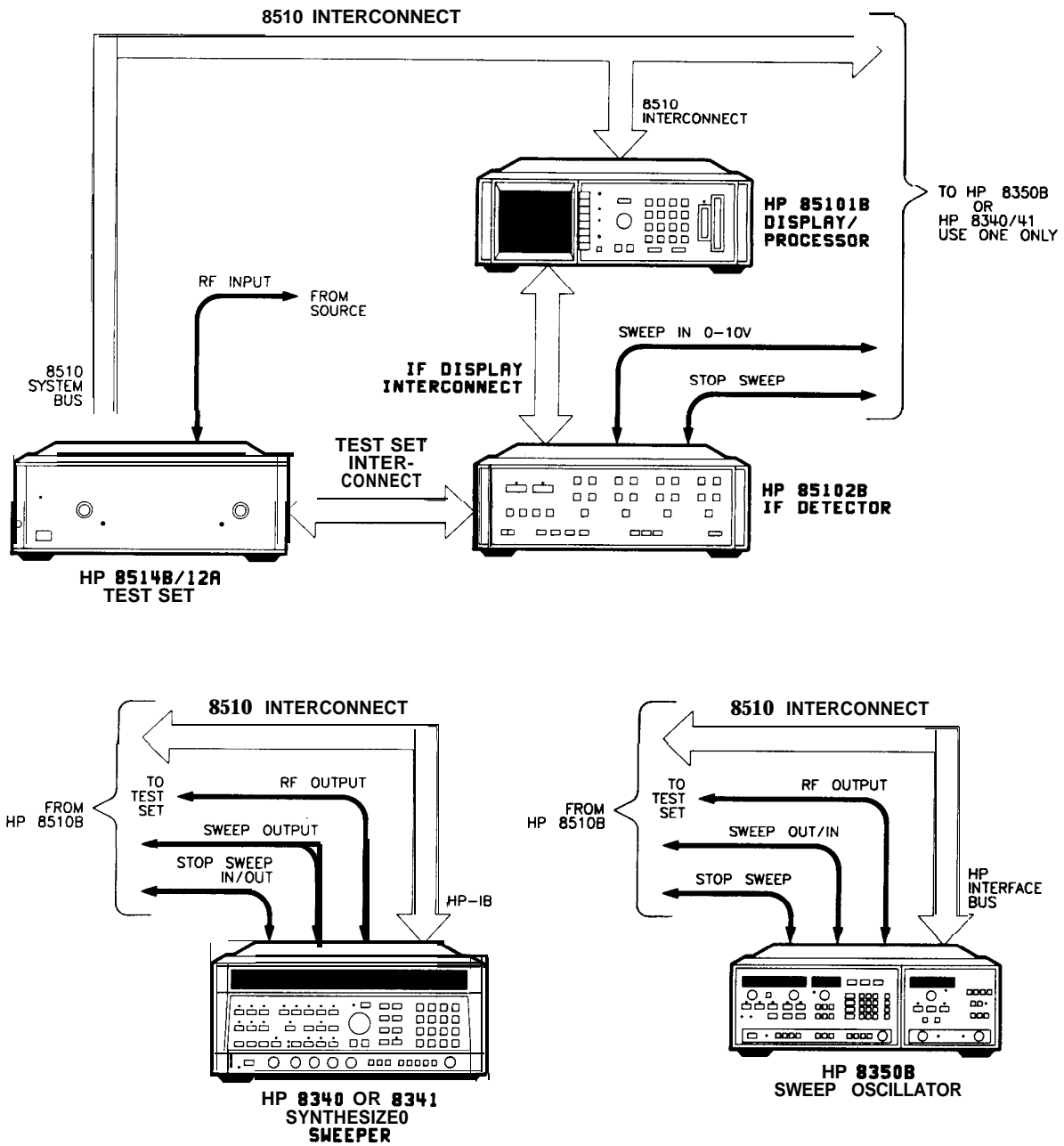


Figure 2-4. HP 8514B and 8512A System Connections

## Section 3. Operation

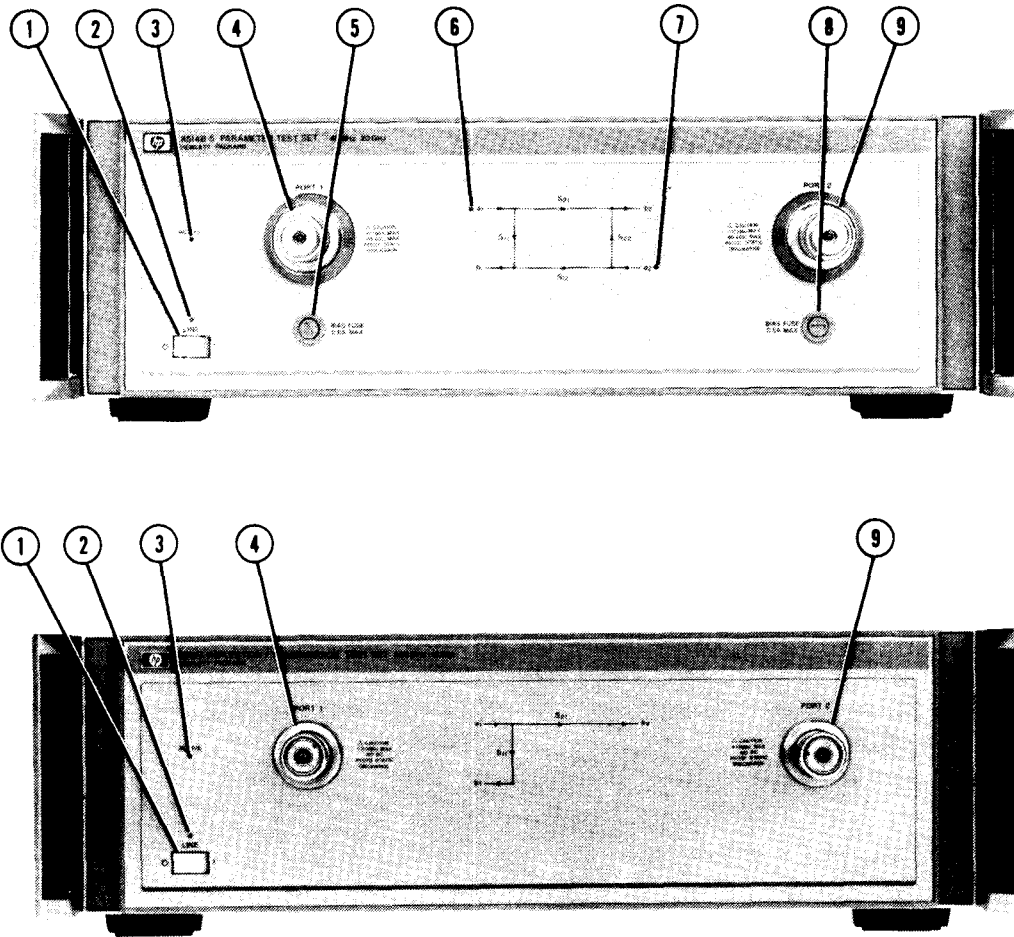
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### INTRODUCTION

This section illustrates the features and functions of the front and rear panels of the HP 8514B and 8512A test sets. It also includes an operator's check procedure. The function of the operator's check is to confirm that the HP 8514B and HP 8512A test sets function properly as part of an HP 8510 system. The performance tests documented in the *HP 8510B* System Manual and volume 2 of the **HP 8510A** manual set are a more rigorous check. Volume 2 of the **HP 8510A** manual set documents the **HP 8512A** only.

- Also included in this section: a description of the Multiple Test Set Option (Option 001).
- Instructions for connecting a cable and anti-rotation clamp to your test set test port.

## FRONT PANEL FEATURES



1. **Line Switch.** This switch turns the test set on and off. When the side of the switch labeled 0 is depressed, the test set is off; 1 is on.
2. **Line LED.** This LED goes on and off with the test set line switch.
3. **Active LED.** This LED lights about two seconds after power is turned on, following the successful conclusion of self-test.
4. **Port 1.** This test port transmits RF energy from the source to the DUT and receives reflected RF energy from the DUT. The reflected RF energy is coupled to a sampler within the instrument.
5. **Bias Fuse.** (HP 8514B only) The fuse which limits bias applied to Port 1 is within this holder (see the instrument front panel or the replaceable parts list for the value of the fuse F1).
6. **a1 LED.** (HP 8514B only) This LED indicates that the HP 8514B is internally switched to the S11 or S21 mode and source power is switched to Port 1.
7. **a2 LED.** (HP 8514B only) This LED indicates that the HP 8514B is internally switched to the S22 or S12 mode and source power is switches to Port 2.
8. **Bias Fuse.** (HP 8514B only) The fuse which limits bias applied to Port 2 is within this holder (see the instrument front panel or the replaceable parts list for the value of the fuse F2).
9. **Port 2.** In the HP 8514B, this test port transmits RF energy from the source to the DUT and receives reflected RF energy from the DUT.  
In the HP 8512A, this port only receives transmitted (from Port 1) RF energy. The received RF energy is input directly to a sampler within the instrument.

Figure 3-1. Front Panel Features of HP 8514B (upper) and HP 8512A

## REAR PANEL FEATURES

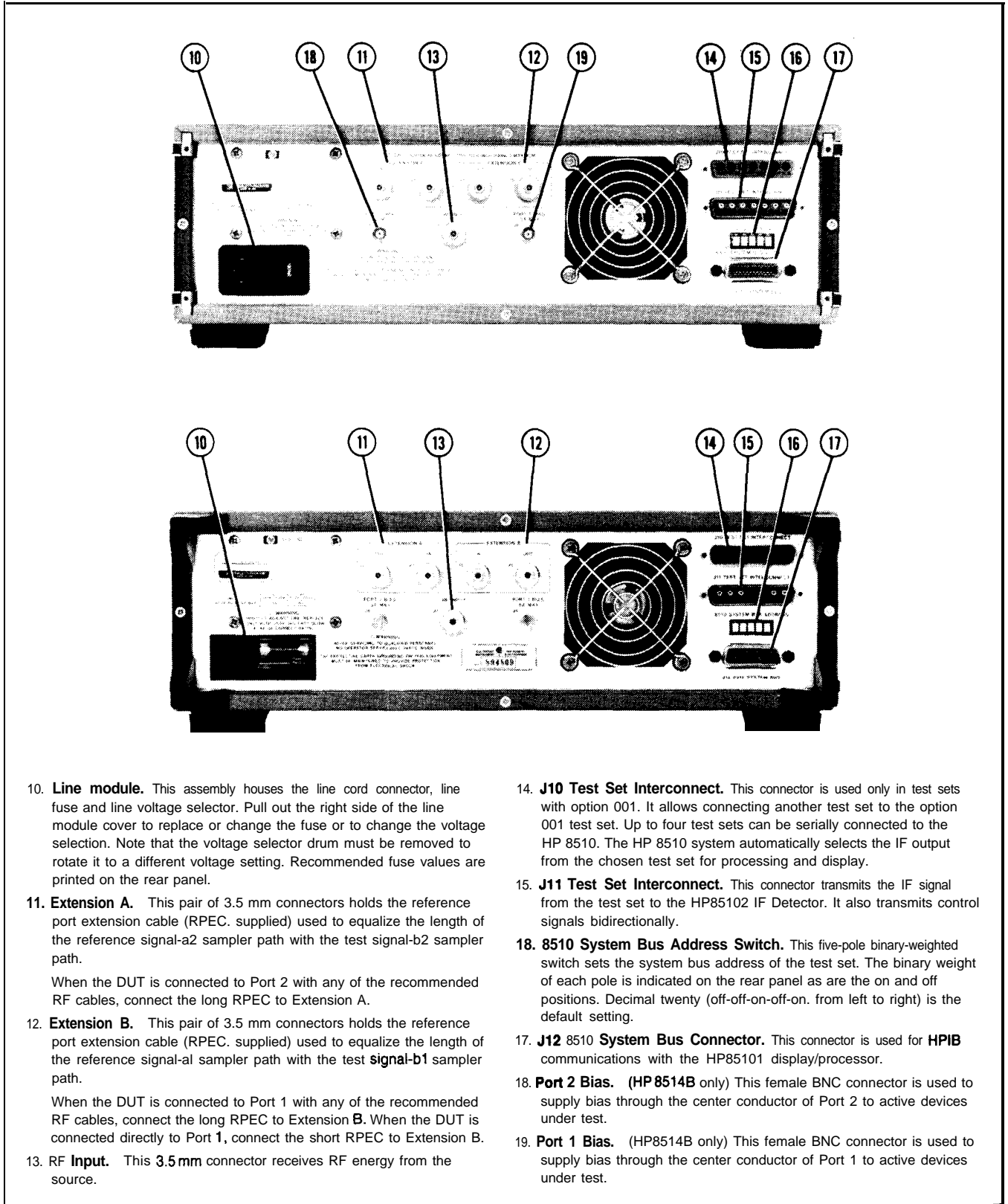


Figure 3-2. Rear Panel Features of HP 8514B (upper) and HP 8512A

## OPERATOR'S CHECK

Passing this check confirms that the HP 8514B and HP 8512A test sets function properly as part of an HP8510 system.

### Equipment

Item	HP Model or Part Number
Network analyzer system .....	HP 8510A/B
Test port return cable set .....	HP 85131D <sup>1</sup>
Test port return cable .....	85132-60005 <sup>2</sup>
20 dB attenuator (pad) .....	HP 8493C option 020 <sup>2</sup>

1. use with HP 8514B
2. use with HP 8512A

### Procedure

Plug in and turn on the test set (it should not be connected to any other instrument or device now). The line LED should light immediately and the active LED should light in about two seconds. Those indications mean that the instrument has passed its self-test. Turn off the test set and connect it to the HP8510 system as shown in Figure 3-3. Turn on all of the system instruments, network analyzer last. Let the instruments complete their self-tests.

Remove any cables or DUTs from the test set test ports. Press **[PRESET] STIMULUS [MENU]** on the HP85102 to preset the HP8510 and access the STIMULUS menu.

- a. **HP 8340/41** systems: press **[STEP]** on the HP85101 to put the source in step mode.
- b. **HP 8350B** systems: press **[SWEEP TIME] [2] [0] [0] [k/m]** to set the sweep time to 200 ms. In narrow band systems, the level of the frequency band generated should match the levels shown in Figure 3-3 for a given frequency.

Now perform either the HP8514B or 8512A Operator's Check.

In case of difficulty, refer to Test Set Troubleshooting in the *HP8510B Service Manual* or contact your local HP Service Office.

## HP 8514B OPERATOR'S CHECK

**NOTE:** All of the following HP 8514B CRT traces should decrease from  $-20 \pm 5$  dB at 2 GHz to  $-27 \pm 5$  dB at 20 GHz.

### Sampler Test

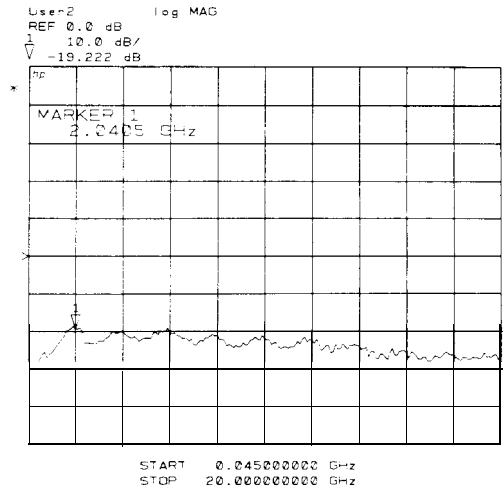
1. To check all of the samplers in the HP 85148 test set, first redefine the a2 and b2 phase lock and drive paths:

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.

2. Connect an open (or short) to port 1 and port 2.
3. Press [User 1 a1], [User 2 b2], [User 3 a2], and [User 4 b1] to check the channels indicated.

The b, and b<sub>2</sub> traces should resemble Figure 3-3. The a, and a<sub>2</sub> traces should resemble Figure 3-4.



**Figure 3-3. Typical Operator's Check CRT Power Level Trace**

### **b1 Thru Test**

4. Connect a thru (two test port return cables) from port 1 to port 2.
5. Press PARAMETER [MENU] [USER 4 b1] [REDEFINE PARAMETER] [DRIVE] [PORT 2] [PHASELOCK] [a2] [REDEFINE DONE] to observe the b1 thru power level trace. The trace should resemble Figure 3-4.

### **b2 Thru Test**

6. Leave the thru connection of step 4 connected. Press PARAMETER [MENU] [USER 2 b<sub>2</sub>] [REDEFINE PARAMETER] [DRIVE] [PORT 1] [PHASELOCK] [a1] [REDEFINE DONE] to observe the b2 power level trace. The trace should resemble Figure 3-4.

Make sure that you redefine the parameters to the original conditions for a1, b1, a2, and b2.

7. If any of the traces are not within the specified limits, check all of the connections and repeat the above procedure. If symptoms persist, refer to the Service Overview section of the **HP 8510B Service Manual** or volume 4 of the HP 8510A manual set.



## HP 8512A OPERATOR'S CHECK

**NOTE:** All of the following HP 8512A CRT traces should decrease from  $-20 \pm 5$  dB at 0.5 GHz to  $-32 \pm 5$  dB at 18 GHz.

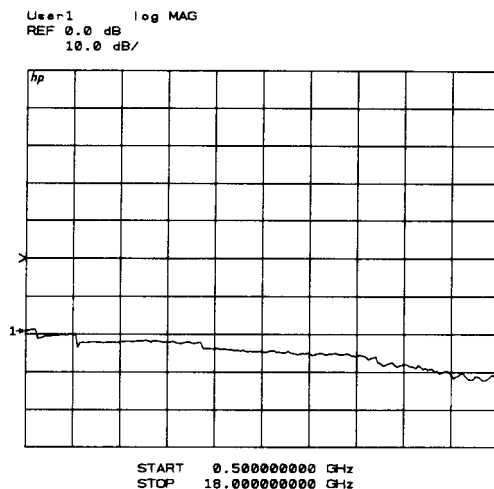


Figure 3-4. Typical Operator's Check CRT Power Level Trace

### a1 Test

1. Press PARAMETER [MENU] [USER 1 a1] to see the channel a1 power level trace.

### b1 Reflection Test

2. Connect an open (or a short) to port 1.
3. Press [USER 4 b1] to observe the b1 power level trace. The trace should resemble Figure 3-3.

### b2 Thru Test

4. Connect a thru (a 20 dB attenuator and test port return cable) between port 1 and port 2.
5. Press PARAMETER [MENU] [USER 2 b2] [REDEFINE PARAMETER] [DRIVE] [PORT 1] [PHASELOCK] [a1] [REDEFINE DONE] to observe the b2 power level trace. The trace should resemble Figure 3-4.
6. If any of the traces are not within the specified limits, check all of the connections and repeat the above procedure. If symptoms persist, refer to the *Service Overview* section of the **HP 8510B** Service Manual or volume 4 of the HP 8510A manual set.

## Controlling Multiple Test Sets

Option 001 for the HP 851X-series test sets allows an HP 8510 to alternately control up to four test sets. While a measurement is proceeding on Test Set number 1, which is equipped with option 001, test device hookup can be accomplished on Test Set number 2, which does not need to be equipped with option 001, unless another test set is to be connected. When the measurement on test set number 1 is complete, then the HP 8510 can control test set number 2. Only one HP 8516A test set may be used in a multiple test set configuration.

In a standard test set, the 20 MHz IF and control signals are applied directly to **J11 TEST SET INTERCONNECT**, which connects to the HP 8510. Option 001 adds a set of IF switches, control switches, and the **J10 TEST SET INTERCONNECT** connector. This allows the selection of 20 MHz test set IF signals. As shown in Figure 3-5, test set number 1 can apply its IF to the HP 8510 or it can switch to pass the IF from test set number 2 through the **J10 TEST SET INTERCONNECT** to the HP 8510.

## INSTALLATION

Set each test set rear panel address switch to the address listed in Figure 3-5, if using a two test set configuration and Figure 3-6, if configuring more than two test sets. Use the supplied Test Set Interconnect cable to connect test set number 1, **J11** to the HP 8510. Use the supplied Test Set Interconnect cable to connect test set number 2, **J11** to test set number 1, **J10**. You may continue this test set “daisy chain” to include up to four test sets if the total length of all Test Set Interconnect cables does not exceed 13 meters (about 40 feet). The last test set in the chain does not require option 001.

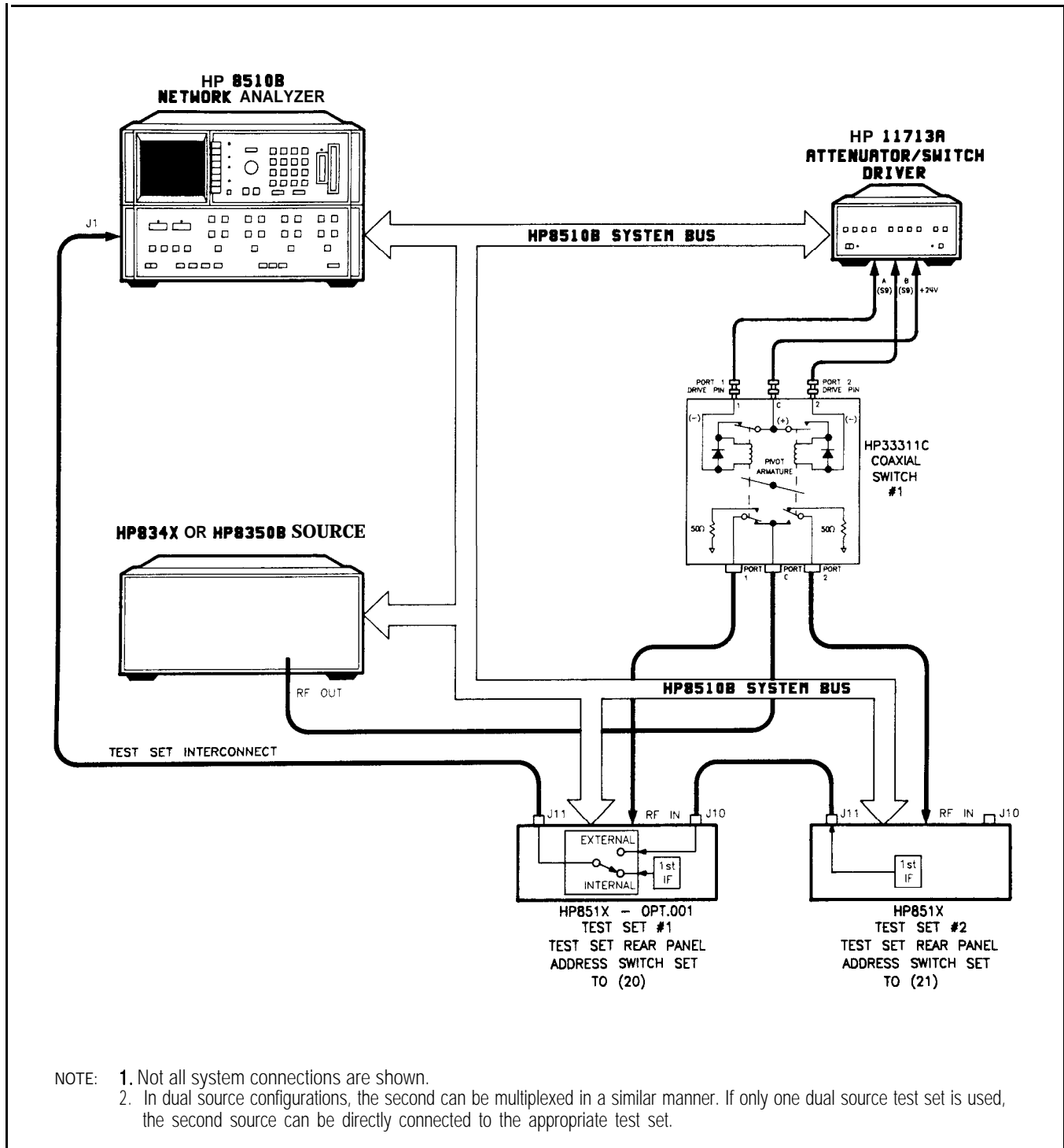
If the RF coaxial switch(s) is not incorporated into the system, then the RF input to the test set must be manually switched to the active test set.

## OPERATION

### Initialization at Power-up

Upon power-up, the IF switches must be configured so that only one system test set is active. The following procedure shows how to make one test set active.

1. Check the active lights of all system test sets.
2. Check the HP 8510's expected test set address by pressing **[LOCAL] [TEST SET]**. This should match the address of the desired test set. If not, change the address.
3. If unselected test sets are active, (active light ON), deactivate the test set by temporarily addressing it. Then return to the desired address.



**HP 33311C Coaxial Switch Positions with Two Test Sets**

New ADDRESS of Test Set	Test Set Selected	HP 33311 C Coaxial Switch Port Selected
20	1	Port 1
21	2	Port 2

**Figure 3-5. RF and IF Switching with Two Test Sets**

## Selecting a Test Set

**Test Set IF Switching.** The active test set is selected by the built-in capability of the HP 8510 to generate an addressed command to the test set. Each time the HP 8510 **ADDRESS of TEST SET** function is changed (see HP 8510 **LOCAL** Menu), the HP 8510 switches the previously addressed test set IF to external and the newly addressed test set IF to internal. The test set front panel **ACTIVE** indicator shows the test set status. When the test set is active the IF signals from the test set are applied directly to **J11** TEST SET INTERCONNECT. When the test set is inactive the IF signals appearing at **J10** are passed through to **J11** and on to the next test set or the HP 8510.

The address of the test set can be changed manually from the HP 8510 front panel by selecting the **ADDRESS of TEST SET** function then entering the address of the test set and pressing **[xl]**, or it can be changed under program control using the HP 8510 HP-IB **ADDRTESS;** command. The HP-IB address of a particular test set is set by address switches on the test set rear panel.

**RF Switch Driver Commands.** A related feature of the HP 8510 is that when the HP 8510 **ADDRESS of TEST SET** function is changed, a code sequence is automatically issued over the HP 8510 system bus to the device at the **ADDRESS of RF SWITCH**. In the recommended configuration, this device is an HP 11713A Attenuator/Switch Driver which in turn controls one or more HP 33311C Coaxial **Switches**. As shown in Figures 3-5 and 3-6, these switches are used to select which of the test sets receive the RF output of the network analyzer source. The exact command issued depends upon the new value of the **ADDRESS of TEST SET** function, also shown in Figures 3-5 and 3-6.

## Measurement Calibration

After selecting the active test set, perform the system calibration procedure as usual. When you select a different test set, make sure that you recall the Cal Set that applies to **that** test set.

Since the Cal Set Limited Instrument State does not include the number of the active test set, a Cal Set which does not apply to the current test set can be turned on without any HP 8510 caution messages appearing. This will cause errors in the displayed data because incorrect error coefficients are applied to the measured data.

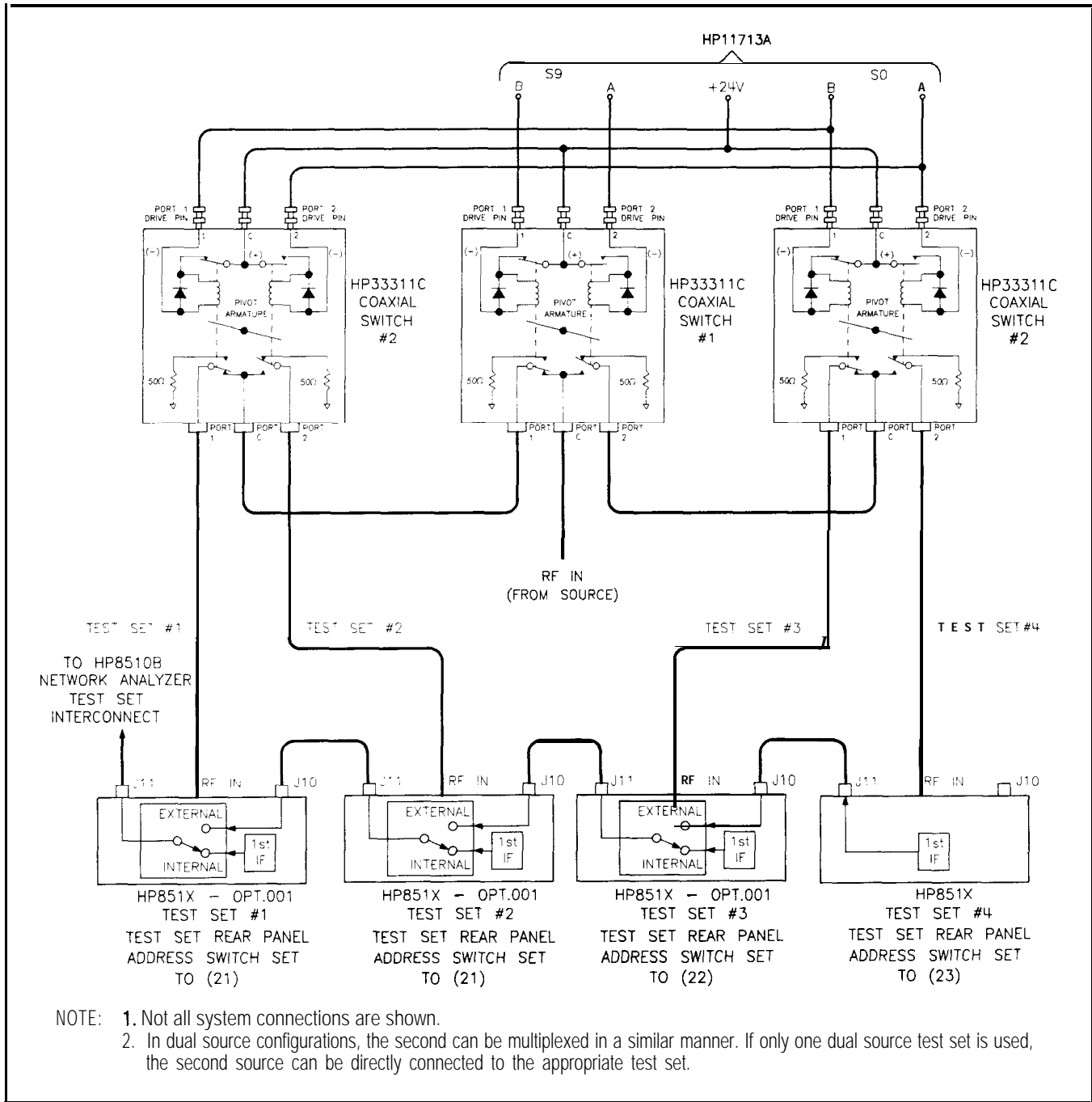
It may be convenient to store a Hardware State file and an Instrument State file for each combination of test set and cal set. You may also store your Hardware State file on a tape or disc for future use. To change the configuration, simply recall the appropriate Hardware State file, which sets the Address of Test Set and issues the RF switch command, then the appropriate Instrument State file, which recalls the Cal Set.

## Operational Checks

To check operation of a multiple test set configuration, first connect a device with a known response at test set number 1, then press HP 8510 **[LOCAL] [TEST SET], [ADDRESS of TEST SET]**, enter the address of test set number 1 (this would be **20**), then press **[xl]**. The test set number 1 measurement should appear. Press **[DISPLAY] [DATA--MEMORY] [DISPLAY: DATA and MEMORY]** to store the trace for later comparison. Now use **ADDRESS of TEST SET** to select test set number 2, then switch back to test set number 1. Observe any difference in the response between the stored trace and the result after switching back and forth between the test sets. Repeat for each of the test sets. Any difference in the data believed due to the option 001 IF switch or RF switching must be investigated.

## Performance Verification

Standard System Performance Verification procedures are used to verify the operation of the option 001 test set as test set number 1. To verify the performance of another test set in the chain, select it as the active test set and proceed as usual.



HP 33311C Coaxial Switch Positions with Four Test Sets

New ADDRESS of Test Set	Test Set Selected	HP 33311 C Coaxial Switch Port Selected	
		Switch #1	Switch #2
20	1	Port 1	Port 1
21	2	Port 1	Port 2
22	3	Port 2	Port 1
23	4	Port 2	Port 2

Figure 3-6. RF and IF Switching with Four Test Sets

## Cable and Anti-Rotation Clamp Installation

The HP 08515-60003 Anti-Rotation Clamps are used to secure the RF connections at the test ports of several Hewlett-Packard test sets. When installed, each clamp holds the large nut that secures the test set RF port connector to the front panel, and the RF cable connector or the front panel adapter mated with the port connector.

Without the clamps, the test port connections may become loose after moving the connected device and could invalidate calibrations and measurements.

### PROCEDURE

NOTE: Although the anti-rotation clamps may be used with front panel adapters, these instructions refer to an installation using the HP RF Cables. Adapter installations will be similar.

1. Two anti-rotation clamps are included in the test set accessories box. Remove one from the box and loosen the thumbscrew until it is almost out of the counter-bored hole in the clamp body.

Gently push the clamp (round-hole end first) over and past the RF cable connector you will connect to the test set RF port. The rubber O-ring in the round end of the clamp will fit tightly over the connector. Wiggle the clamp if necessary to get it over the connector.

Connect the cable to the test port and tighten as specified in the cable manual. Make sure that you do not twist the cable as you attach it to the test port. Use the torque wrench supplied with your calibration kit to tighten the cable to no more than 90 N-cm (8 in.-lb.).

2. Important! The test set RF connector is easily loosened so hold the RF cable throughout the rest of this procedure. Do not allow the cable to rotate.
3. See Figure 3-7. Turn the clamp so that the thumbscrew is pointing up. From there, turn the clamp to visually align the clamp flats with the flats on the test port connector nut. This will minimize rotating the connector in the next step.

NOTE: The flats may be in any orientation in respect to the front panel.

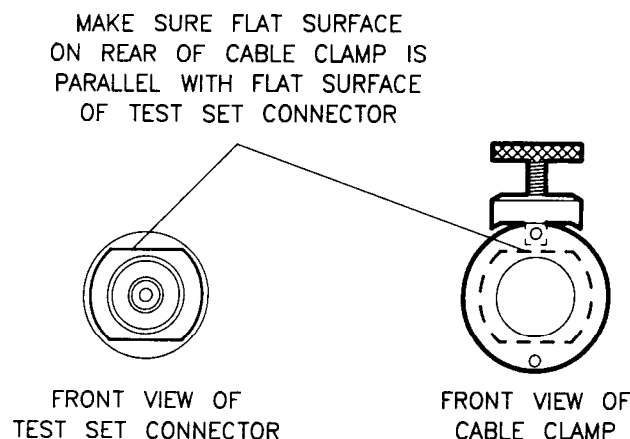
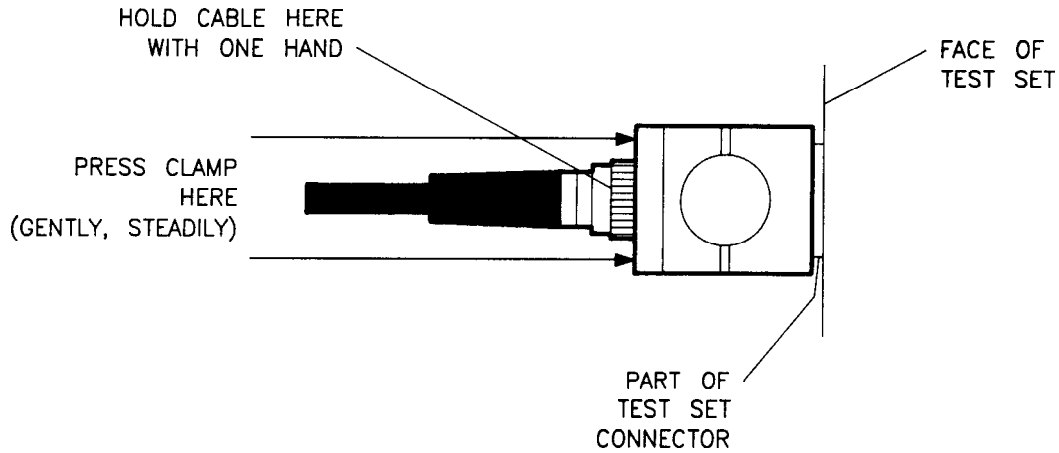


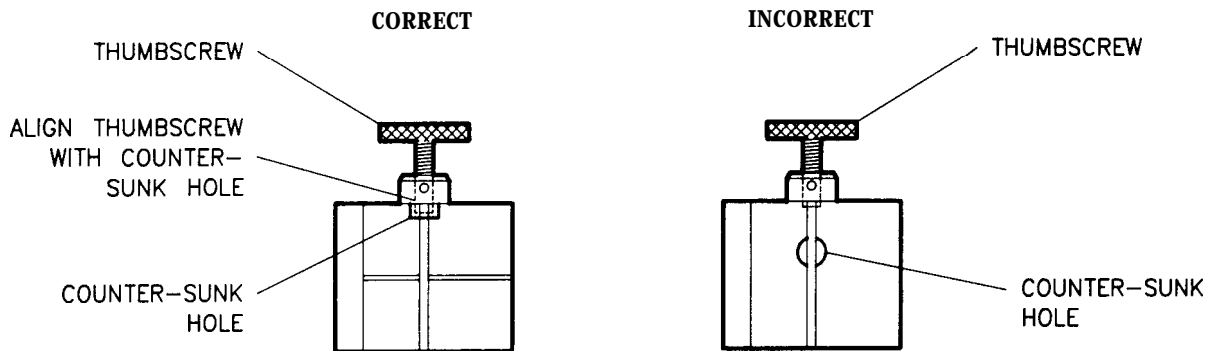
Figure 3-7. Visually Aligning Clamp and Nut Flats

- See Figure 3-8. Hold the cable with one hand and with the other, press the clamp gently and steadily while wiggling the clamp straight over the RF connector and onto the test port connector nut. The internal flats in the clamp must fit over the flats on the test port connector nut. Try not to rotate the clamp as you do this or the RF connection may be loosened.



**Figure 3-8.** *Mating the Clamp and Nut Flats*

- See Figure 3-9. Make sure that the thumbscrew is aligned with the counter-sunk hole in the clamp body. Push the clamp toward the test set front panel and then tighten the thumbscrew with your fingers. The cable cannot be damaged by tightening the thumbscrew too tightly.



**Figure 3-9.** *Aligning the Thumbscrew With the Counter-bored Hole*

- Repeat steps 1 through 5 for the other clamp.

This completes the anti-rotation clamp installation procedure. Refer to the installation section of the test set operating and service manual for instructions to replace the internal O-ring in the anti-rotation clamp.

## Section 4. Specifications

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Specifications describe the warranted performance of the instrument.

The electrical specifications of the HP8514B and HP 8512A test sets with an HP 8510B network analyzer are defined in the Specifications section of the *HP 8510B* System Manual. Specifications for HP 8510A/8512A systems are also defined in *General Information*, volume 1 of the HP 8510A manual set.

### MECHANICAL SPECIFICATIONS

*Table 4-1. HP 8510B/8514B Mechanical Specifications*

#### **Test Ports (Front Panel)**

Connector type: NMD-3.5 mm Center Pin  
Recession: 0.005 mm to 0.056 mm  
(**0.0002** in to 0.0022 in.)

NOTE: Refer to your calibration kit manual for information on how to use your gages.



## SUPPLEMENTAL CHARACTERISTICS

The supplemental characteristics listed in the following tables are intended to provide information useful in applying the instrument by giving typical, but non-warranted, performance parameters.

*Table 4-2. HP 8510B/8514B Characteristics*

<p><b>Test Ports (Front Panel)</b></p> <p>Connector type: NMD-3.5 mm male Impedance: 50 ohms nominal DC bias: 500 mA, 40 VDC, maximum Incident signal attenuation range: 0 to 90 dB in 10 dB steps Damage input level: <math>&gt; +17</math> dBm CW RF<sup>1</sup> Nominal operating power level:<sup>2</sup></p> <table><thead><tr><th>Frequency</th><th>Operating Level</th></tr></thead><tbody><tr><td><b>0.045</b> to 8 GHz</td><td>+3 dBm</td></tr><tr><td><b>8</b> to 20 GHz</td><td>0 dBm</td></tr></tbody></table> <p>Nominal connector nut size: 20 mm Recommended torque: 90 N-cm. (8 in.-lb.)</p> <p><b>RF Input Connector (Rear Panel)</b></p> <p>Connector type: precision 3.5 mm female Damage input level: <math>&gt; +23</math> dBm Source power levels for reference channel phase lock: Minimum: 0 dBm Maximum: +14 dBm Nominal connector nut size: 8 mm Recommended torque: 90 N-cm. (8 in.-lb.) for precision 3.5mm 56 N-cm. (5 in.-lb.) for SMA</p>	Frequency	Operating Level	<b>0.045</b> to 8 GHz	+3 dBm	<b>8</b> to 20 GHz	0 dBm
Frequency	Operating Level					
<b>0.045</b> to 8 GHz	+3 dBm					
<b>8</b> to 20 GHz	0 dBm					
<p>1. Do not exceed +10 dBm input for proper operation. 2. Available power in PRESET condition.</p>						

**Table 4-3. HP 8510B/8512A Characteristics**

<p><b>Test Ports (Front Panel)</b></p> <p>Connector type: 7 mm          Impedance: 50 ohms nominal          Damage input level:<sup>1</sup>          Port 1: &gt; +23 dBm Port 2: &gt; +13 dBm          Nominal operating power level:</p> <table border="0"> <tr> <td>Frequency</td> <td>Nominal Operating</td> </tr> <tr> <td><b>0.045 to 8 GHz</b></td> <td><b>+4 dBm</b></td> </tr> <tr> <td><b>8 to 18 GHz</b></td> <td><b>+2 dBm</b></td> </tr> </table> <p>Nominal connector nut size: 20 mm          Recommended torque: 90 N-cm (8 in.-lb.)</p> <p><b>RF Input Connector (Rear Panel)</b></p> <p>Connector type: precision 3.5 mm female          Damage input level: +23 dBm          Source power levels for reference channel phase lock:          Minimum: -2 dBm          Maximum: +12 dBm</p> <p>Nominal connector nut size: 8 mm          Recommended torque: Precision 3.5 mm 90 N-cm (8 in.-lb.)          SMA: 56 N-cm (5 in.-lb.)</p>	Frequency	Nominal Operating	<b>0.045 to 8 GHz</b>	<b>+4 dBm</b>	<b>8 to 18 GHz</b>	<b>+2 dBm</b>
Frequency	Nominal Operating					
<b>0.045 to 8 GHz</b>	<b>+4 dBm</b>					
<b>8 to 18 GHz</b>	<b>+2 dBm</b>					
<p>1. Do not exceed +10 dBm input to Port 1 or -10 dBm input to Port 2 for proper operation.</p>						

**Table 4-4. HP 8514B and 8512A Power Requirements and Physical Characteristics**

<p><b>Operating Temperature:</b> 0°C to 55°C</p> <p><b>Power:</b> 110, 120, 220 or 240 ± 10% Vac; 47 to 66 Hz line frequency</p> <p><b>Dimensions:</b> 460 mm X 133 mm X 609 mm (18.1 X 5.25 X 24 inches)</p> <p><b>Weight:</b> HP 8514B: 17 kg (38 lb) net          HP 8512A: 15 kg (33 lb) net</p>
--

**Table 4-5. Recommended Equipment**

Item	Critical Specifications	Recommended Model	Use <sup>1</sup>
Network analyzer	no substitute	HP 851 0A/B	O, P, T
Source <sup>2</sup>	no substitute	HP 9000 series 200 or 300 with 1 Mbyte memory	O, P, T
Controller <sup>3</sup>	compatible with controller		P
Disc drive <sup>3</sup>	range: 0 to 50V	HP 3456A	P
Multimeter	50 MHz bandwidth	HP 1740A	T
Oscilloscope			T
<p>1.0 = operation; P = performance test; T = troubleshooting                  2. HP 8340 or 8341 or 8350 with plug-in. Refer to HP8510 INSTALLATION manual for additional information.                  3. Not required for manual performance tests with HP 851 0A.</p>			

## Section 5. Test Set Troubleshooting

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The information consists of procedures for checking the following:

- Test Set Temperature
- Check All Connections
- Check Power Supply/Regulator, Fuses, and Switches
- Test Set Self-test Indicators
- Check VTO/Driver (LO)
- Test Set Troubleshooting Using Time Domain
- Test Set Assembly Replacement Procedures
- 3.5 mm RF Connector Repair
- Unratioed Power Test

The information in this section is presented as an aid in troubleshooting the HP 8512A, HP 8514A, and HP 8514B test sets. If you are not certain that the problem with your system 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.

For specific information about the HP 8514A, refer to the material in the HP 8510A manual set.

## 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.



**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 5-1. Use an oscilloscope to check AC ripple. Use chassis ground as reference.

*Table 5-1. Test Set Power Supply Tolerances*

Nominal Voltage	Test Point	Voltage Tolerance	Maximum Ripple
+15V	A15TP1	+13.7 to +15.9V	2mV
-15v	A15TP2	-13.8 to -16.2V	2mV
+5V	A15TP3	+4.5 to +5.2V	2mV
-5 v	A15TP6	-4.8 to -5.5V	2mV

### 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 5-1. (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.

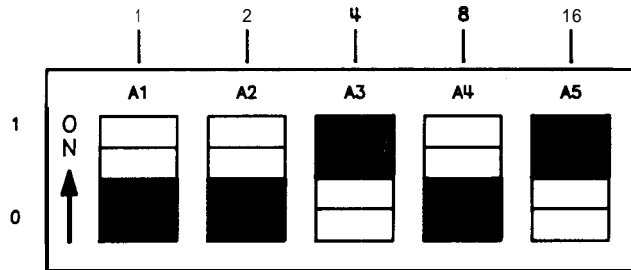


Figure 5-1. Default HP-IB Switch Setting for All Test Sets (20, Binary)

## 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-18 LEDs				Elapsed time After Turn-on (in seconds)
	LSN	TLK	SRQ	REM	
PWON	ON	ON	ON	ON	0 to 0.5
Fail ROM Test	OFF	ON	ON	ON	on briefly
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 you are using multiple test sets, the first test set in line will be the active test set until another is chosen.

### 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)

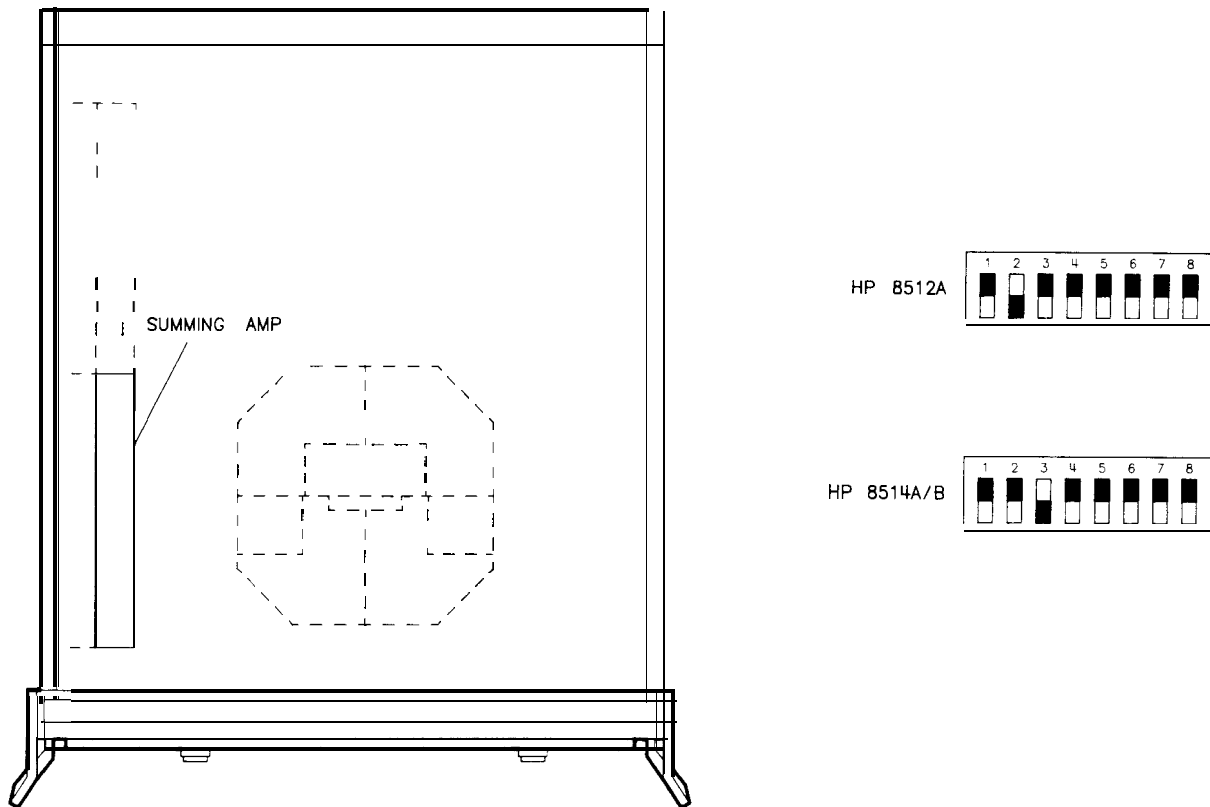


Figure 5-2. Location of A3 Assembly and A3 Configuration Switch Settings

## CONFIGURATION SWITCH

The configuration switch is on the A3 summing amplifier assembly (see Figure 5-2). 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.

## 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 150 MHz and 190 MHz. Check that A3J4 is between -5.6 and -6.8 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 5-3 illustrates the relationship of voltage at A14J2 to VTO oscillation frequency.

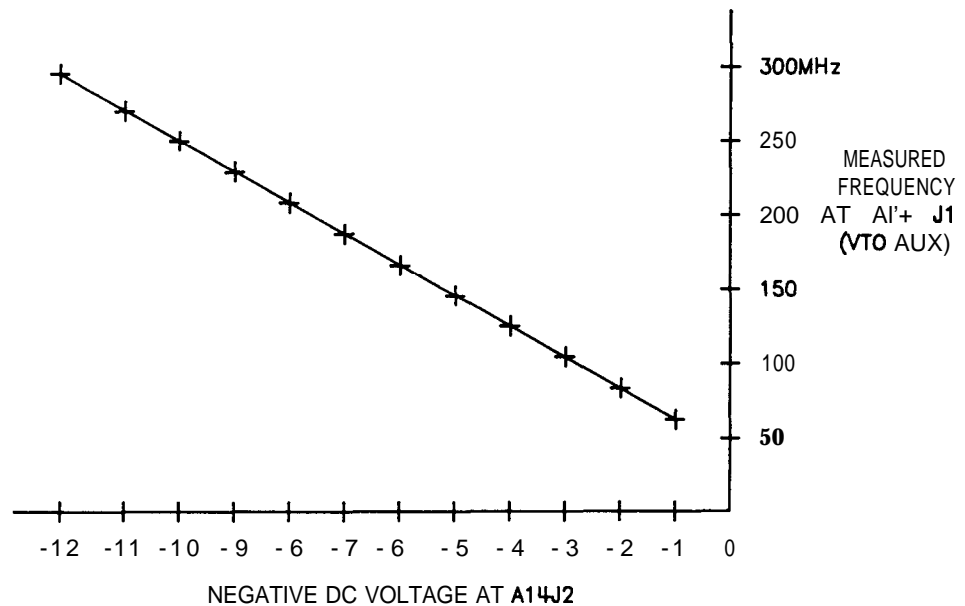


Figure 5-3. VTO Voltage/Frequency Relationship

## 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 5-3, below.

Table 5-3. Suggested Parameter Values for Time Domain Troubleshooting

Test Set	Start Time	Stop Time	Scale	REF Value	Refer to Figure #
HP8512A	-1.0 ns	11.0 ns	10 dB/	-20 dB	5-4
HP8514A/B	-6.0 ns	6.0 ns	5 dB/	-20 dB	5-5

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.

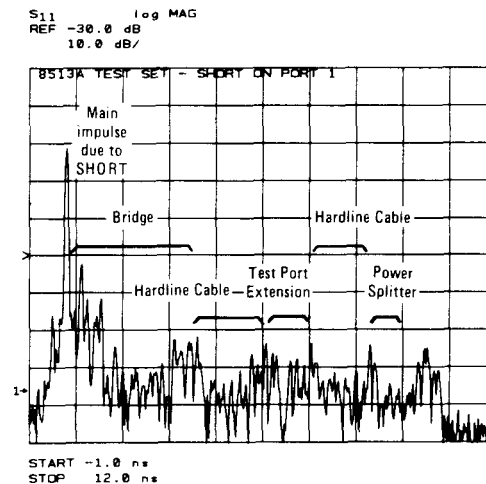


Figure 5-4. HP 8512A Typical Port 1 Response



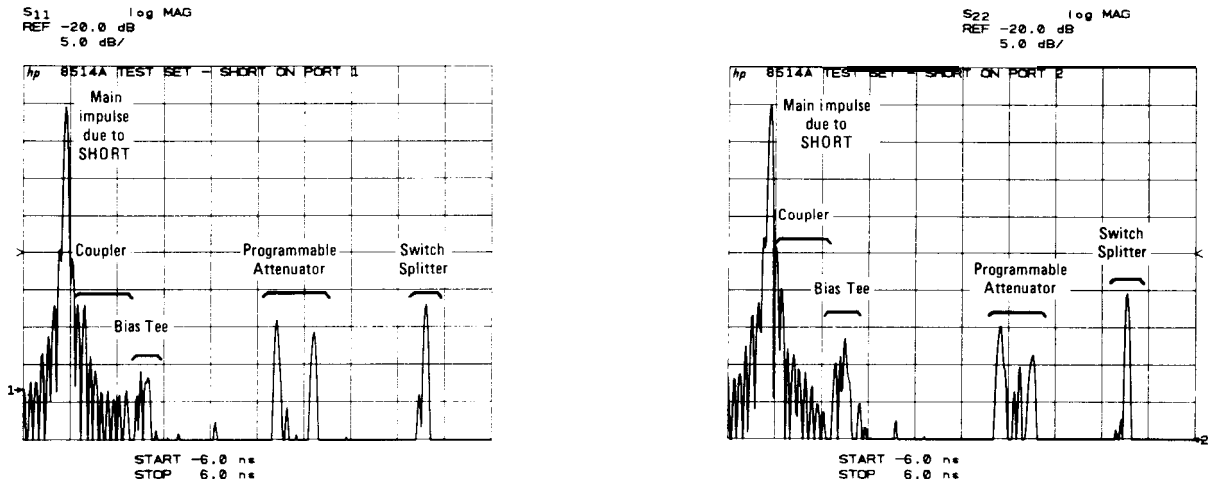


Figure 5-5. HP 8514A/B Typical Port 1 and Port 2 Response

## 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 8512A, 8514A, and 8514B. 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
- 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
- 11 Fan
- 12 Port 1 and 2 3.5 mm connectors
- 13 Power transformer

Before beginning any of the following procedures:

- Turn the test set OFF.
- Remove the top cover.
- Reverse the following procedures to install parts.



## ATTENTION Static Sensitive

### Handle only at Static Safe Work Stations

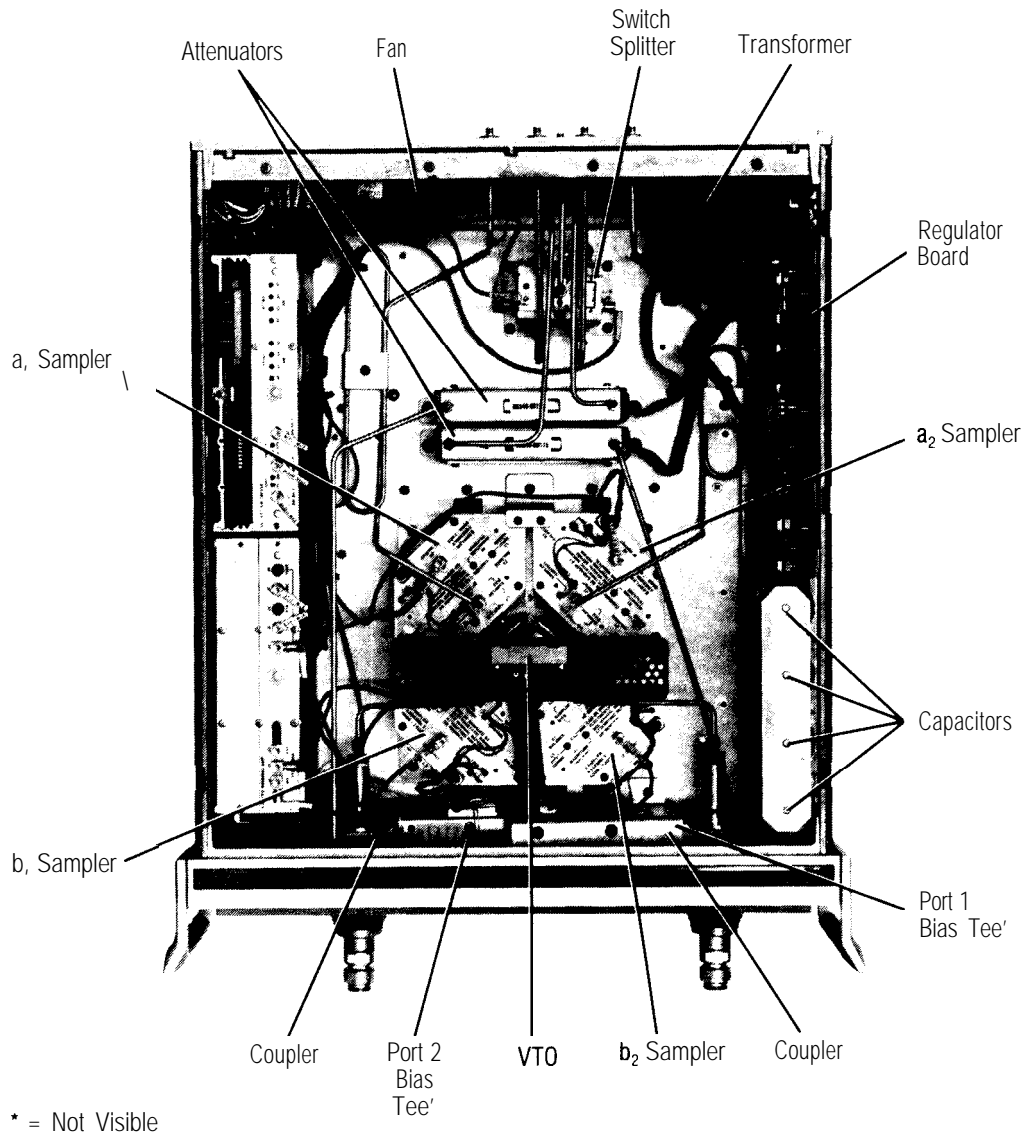
The assemblies handled in this procedure are **VERY SENSITIVE TO DAMAGE BY STATIC ELECTRICITY.**

**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.

*Table 5-4. 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 <sup>1</sup>
5/16" torque wrench, 10 lb-in	“	<b>8710-1655</b>
Clip lead	capacitors	purchase locally
9/16" nut driver	connector repair	<b>8720-0008</b>
1/2" torque wrench, 25 lb-in	connector repair	8710-1581
Microwave Connector Care Manual	all connectors	08510-90064
3.5 mm connector gage <sup>2</sup>	3.5 mm connectors	1250-1862
Connector cleaning kit <sup>3</sup>	all connectors	92193Z
1 OOR 20 watt resistor	capacitor removal	<b>0819-0019</b>
<ol style="list-style-type: none"> <li>1. Order from Mountz Company, 1080 North 11th Street, San Jose, CA 95112.</li> <li>2. Contains male and female gage and calibration block. These gages come with <b>any</b> 3.5 mm HP 8510 calibration kit. If you own a calibration kit, refer to <b>cal. kit</b> manual for information on gaging and cleaning the connector.</li> <li>3. Refer to the <i>Microwave Connector Care</i> 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.</li> </ol>		



**Figure 5-6. General 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**

1. Remove the bias tee as described in procedure **(1)**.
2. 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.
3. Disconnect the semi-rigid cable from the coupler 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 away from the front panel and lift it out of the test set.
6. Remove any brackets before sending the coupler 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.



**ATTENTION  
Static Sensitive**

**Handle only at Static Safe  
Work Stations**

**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 56 N-cm (5 in.-lb) 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 5-9 and the following text to repair 3.5 mm connectors.

### Disassembly

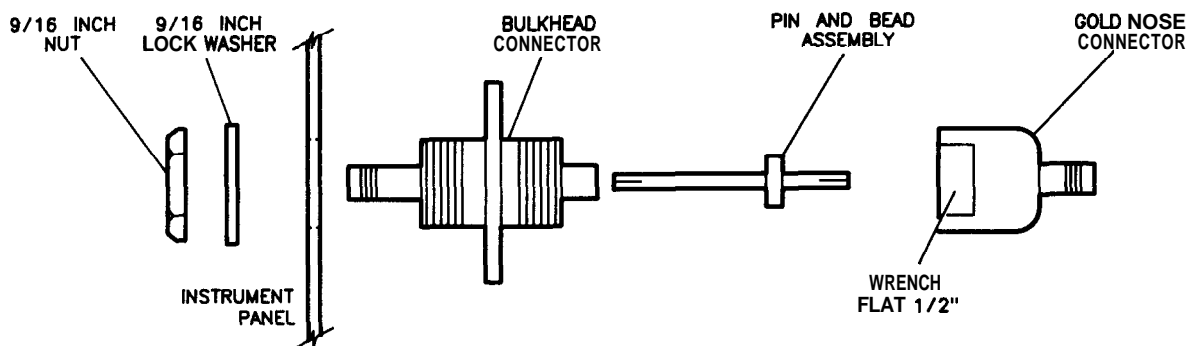


Figure 5-7. Exploded Diagram of 3.5 mm Connector

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 to 495 N-cm (45 in.-lb).
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 281 N-cm (25 in.-lb.)
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 8511 A	0.0000 to +0.0017 inch
Rear panel, HP 8512A, 8513A, 8514A, 8514B, 8515A	0.0000 to +0.003 inch

**NOTE:** 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.

## (11) FAN

**WARNING**

**Turn the test set OFF and disconnect the power cord from the mains. Electrocutation can result if power is not removed from the test set prior to this procedure.**

**NOTE:** To replace the fan, transformer T1 must be removed so that the ends of the fan wires may be unsoldered from line module FL1.

## Disassembly

1. Turn the test set on its right-hand side.
2. Use a **5/16** inch open end wrench to remove the **hardline** cables connected between couplers A7, A9 and bulkhead connectors J2 and J5.
3. Unplug the transformer connector mating with connector J2 on the A15 regulator board assembly.
4. Use a large pozi-driv screwdriver to remove the four screws and washers holding transformer **T1** onto the rear panel.
5. Use a large pozi-driv screwdriver to remove the one screw holding the transformer angle bracket to the main deck. Carefully remove the transformer from the test set and put it on the bench close to the test set. The transformer wires soldered to the FL1 line module are short, so do not pull on the transformer too much.
6. Strip the heat shrink tubing off of the two fan wires and unsolder them from line module **FL1**. Use wire cutters to cut any cable ties holding the fan wires to nearby cables.
7. Use a small pozi-driv screwdriver to remove the screw and lockwasher securing the green/yellow fan ground wire to the top of the rear panel frame.
8. Use a small pozi-driv screwdriver to remove the four screws holding fan **B1** to the rear panel and remove the fan.

## Assembly

1. Assemble the bulkhead connector, lock washer and nut. Use the **9/16** inch nut driver to tighten the nut to approximately 500 N-cm (45 in.-lb.).
2. Clean the pin and bead assembly using the procedures described in the Microwave Connector Care Manual (HP part number 08510-90064) provided with your HP 85108 manual set.
3. Clean the mating surfaces with liquid freon or alcohol and lint-free swabs.
4. Check the pin depth of the gold nose connector. The pin depth specification is 0.0000 to **+0.0030** inch.  
  
NOTE: If the pin depth is not within specification, do not shim. Instead, install another pin and bead assembly.
9. Reconnect the cables disconnected in step 1 using a **5/16** inch torque wrench rated at 56 N-cm (5 in.-lb.).

## **(12) Port 1 3.5 mm CONNECTOR Port 2 3.5 mm CONNECTOR**

Refer to Figure 5-8 and the following text to replace or repair these 3.5 mm test port connectors.



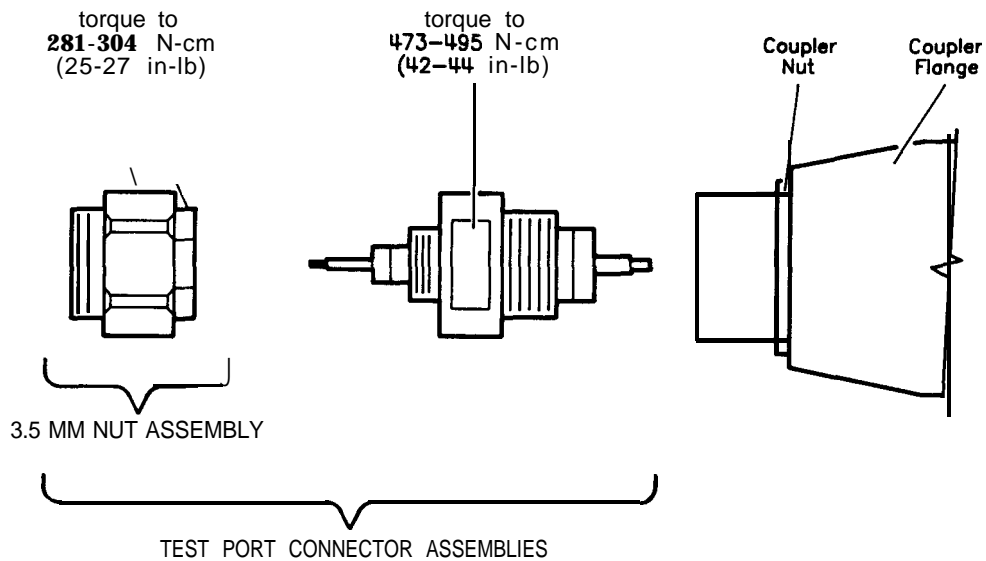


Figure 5-8. Exploded View of the 3.5 mm Port Connector

### Center Pin Repair Procedure

**NOTE:** Damaged test port center pins must be repaired by replacing the complete test port connector assembly.

1. Remove the test port connector assembly, using a **5/8** inch flat wrench.
2. Replace with a new test port connector assembly using a **5/8** inch torque wrench to the limits called out in Figure 5-8.
3. Check the test port pin depth with a 3.5 mm gage. The center pin recession specification is  $i-O.005$  to  $+0.056$  mm ( $+0.0002$  to  $+0.002$  in).

### 3.5 mm Nut Repair Procedure

1. Remove the damaged nut with a **9/16** inch flat wrench.
2. Replace with a new nut.
3. Torque with a **9/16** inch torque wrench to the limits set in Figure 5-8.

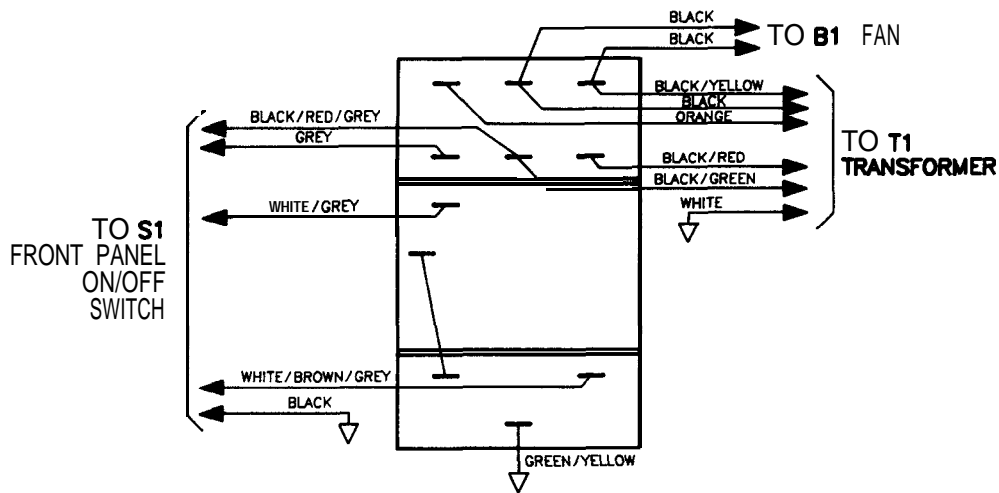
## (13) POWER TRANSFORMER

### WARNING

Turn the test set **OFF** and disconnect the power cord from the mains. Electrocutation can result if power is not removed from the test set prior to this procedure.

1. Turn the test set on its right-hand side.
2. Use a **5/16** inch open end wrench to remove the hardline cable connected between coupler A7 and bulkhead connector J2.

3. Unplug the transformer connector mating with connector J2 on the AI5 regulator board assembly.
4. Use a large pozi-driv screwdriver to remove the four screws and washers holding transformer T1 onto the rear panel.
5. Use a large pozi-driv screwdriver to remove the one screw holding the transformer angle bracket to the main deck. Carefully remove the transformer from the test set and put it on the bench close to the test set. The transformer wires soldered to line module FL1 are short, so do not pull on the transformer too much.
6. Strip the heat shrink tubing off of the transformer wires soldered to line module FL1 and unsolder them. Unsolder the transformer ground wire connected to the chassis side rail.
7. Remove transformer T1. When replacing the transformer, refer to Figure 5-9, which illustrates the locations of the various wires connected to line module FL1.



**Figure 5-9. Wire Connections to Line Module FL1**

## 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,  $b_1/a_1$ ). 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 5-13 through 5-18 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. Figures 5-11 and 5-13 through 5-18, following these procedures, show typical traces.

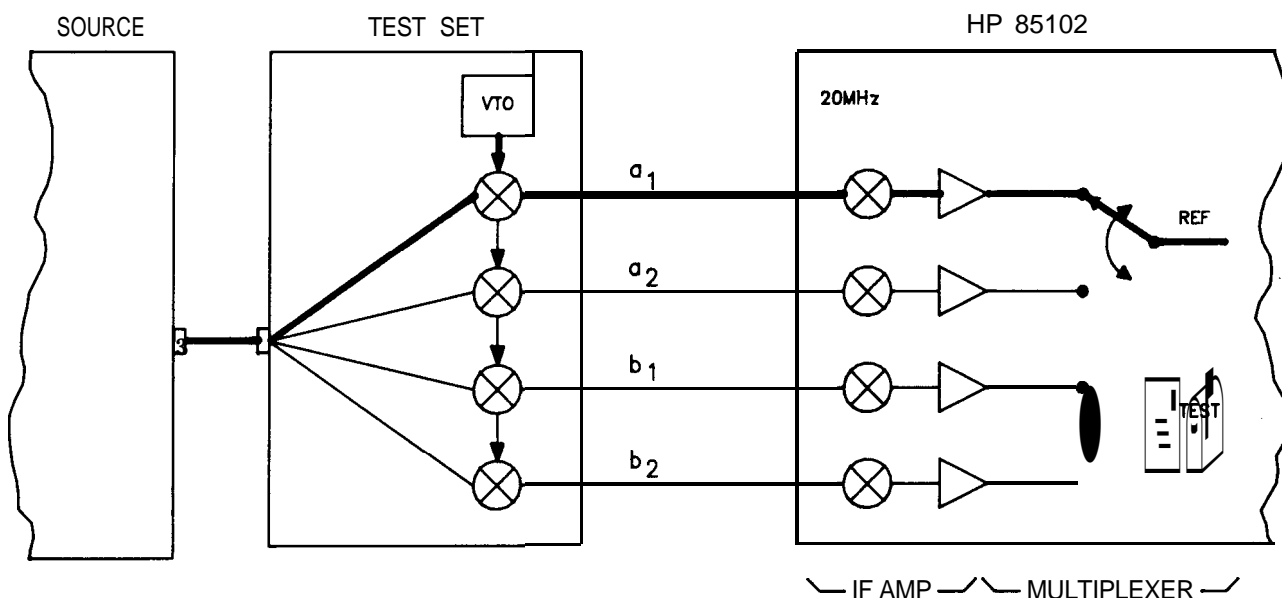


Figure 5-10. Simplified Signal Path of Unratioed Power Test

### HP 8512A TEST SET

**NOTE:** For an HP 8512A, check the  $b_1$  and  $b_2$  trace between 2 GHz and 18 GHz. Below 2 GHz the coupler response rolls off rapidly in the  $b$ , reflection trace.

1. Remove any cables or DUTs from the test set input ports. Press **[PRESET] STIMULUS [MENU]** on the HP85102 to access the STIMULUS menu.

2. a. HP 8340/41 systems: press **[STEP]** on the HP85101 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  $-20 \pm 5$  dB at low frequency to  $-35 \pm 5$  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 between port 1 and port 2 (connect pad to port 1 and test port return cable between pad and port 2).

For an **HP 8512A**, use a 20 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 TEST SET**

**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 HP85102 to preset the HP8510 and access the STIMULUS menu.
  - a. HP 8340/41 systems: press **[STEP]** on the HP85101 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] [PHASELOCK] [a2] [REDEFINE DONE]** to redefine a2.

Press **[User 2 b2] [REDEFINE PARAMETER] [DRIVE] [Port 2] [PHASELOCK] [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  $-20 \pm 5$  dB at low frequency to  $-27 \pm 5$  dB at high frequency.

**NOTE:** the RF signal paths are shown in Figure 5-12 through 5-18.

### **b1 Thru Test**

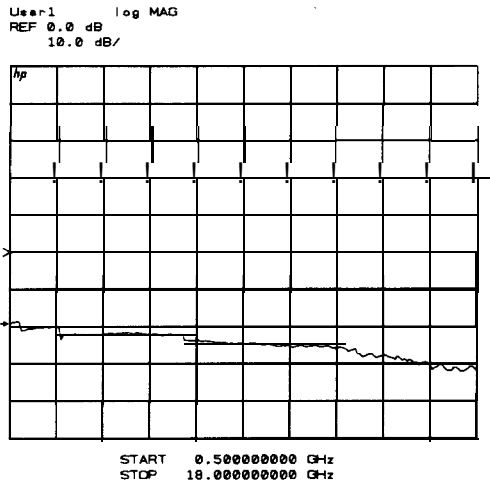
5. Connect a thru (two RF cables) from port 1 to port 2.
6. Press PARAMETER [MENU] [USER 4 b1] [REDEFINE PARAMETER] [DRIVE] [PORT 2] [PHASELOCK] [a2] [REDEFINE DONE] to observe the b1 power level trace through the path indicated by Figure 5-12 through 5-18 b1 thru.

### **b2 Thru Test**

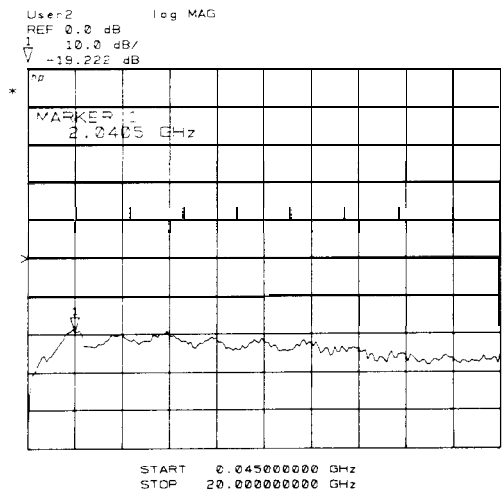
7. Press Parameter [MENU] [USER 2 b2] [REDEFINE PARAMETER] [DRIVE] [PORT 1] [PHASELOCK] [a1] [REDEFINE DONE] to observe the b2 power level trace through the path indicated by Figure 5-12 through 5-18.

### **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 8512A  
a1 and b2 thru trace



HP 85146  
b1 reflection and b2 reflection trace

Figure 5-11. Typical Test Set Unratioed Power Test Traces

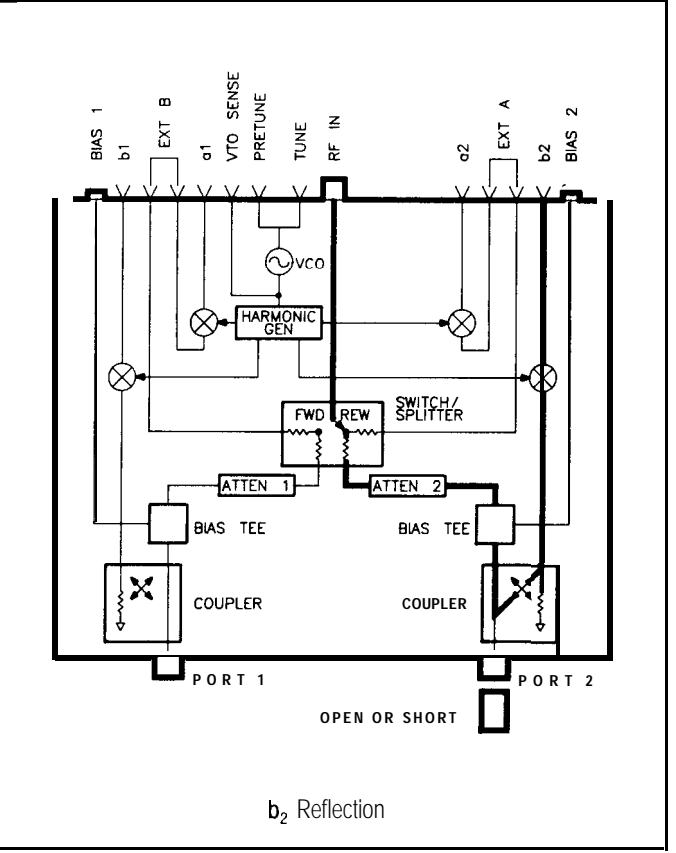
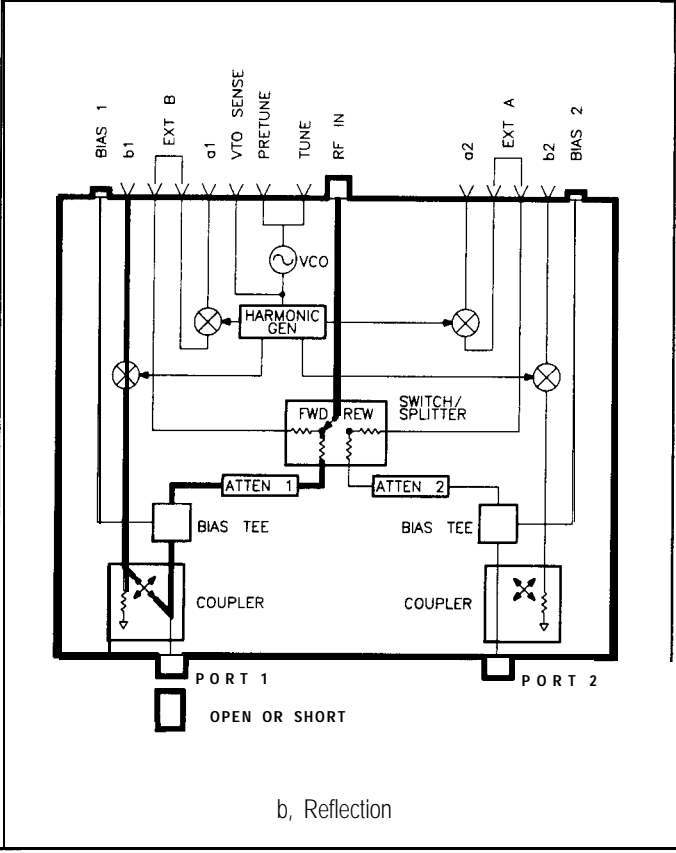
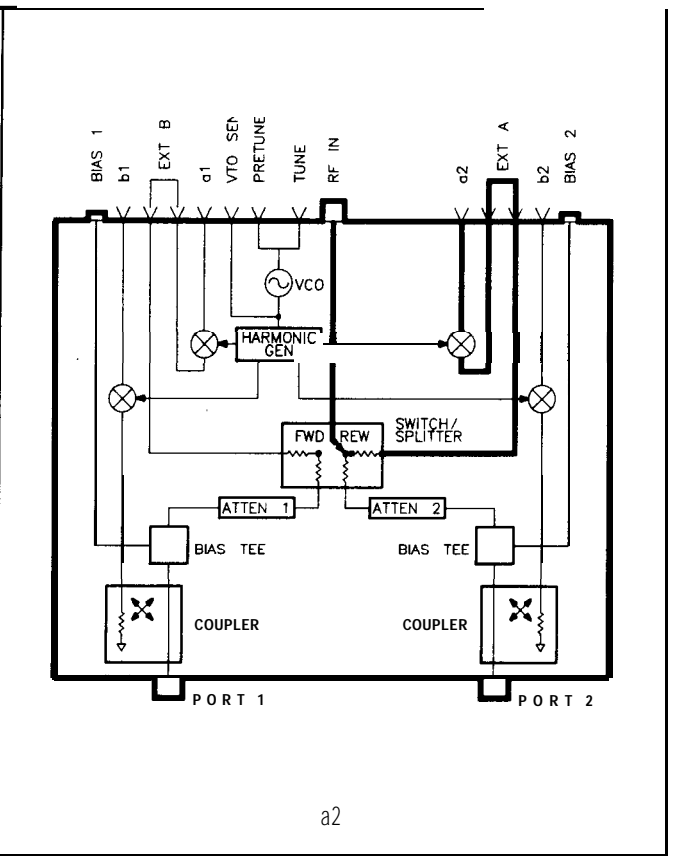
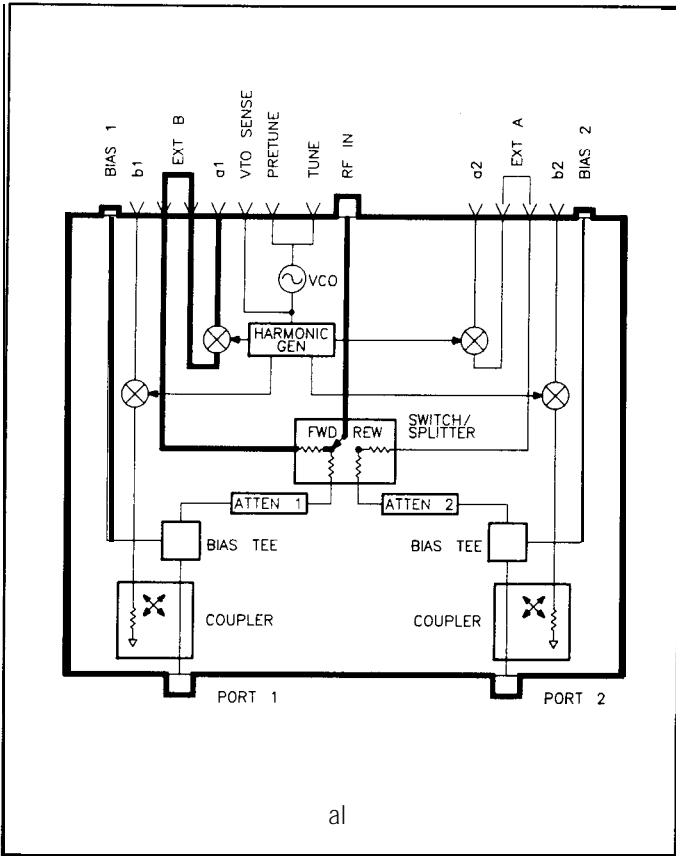


Figure 5-12. User Signal Paths in Test Sets (1 of 2)

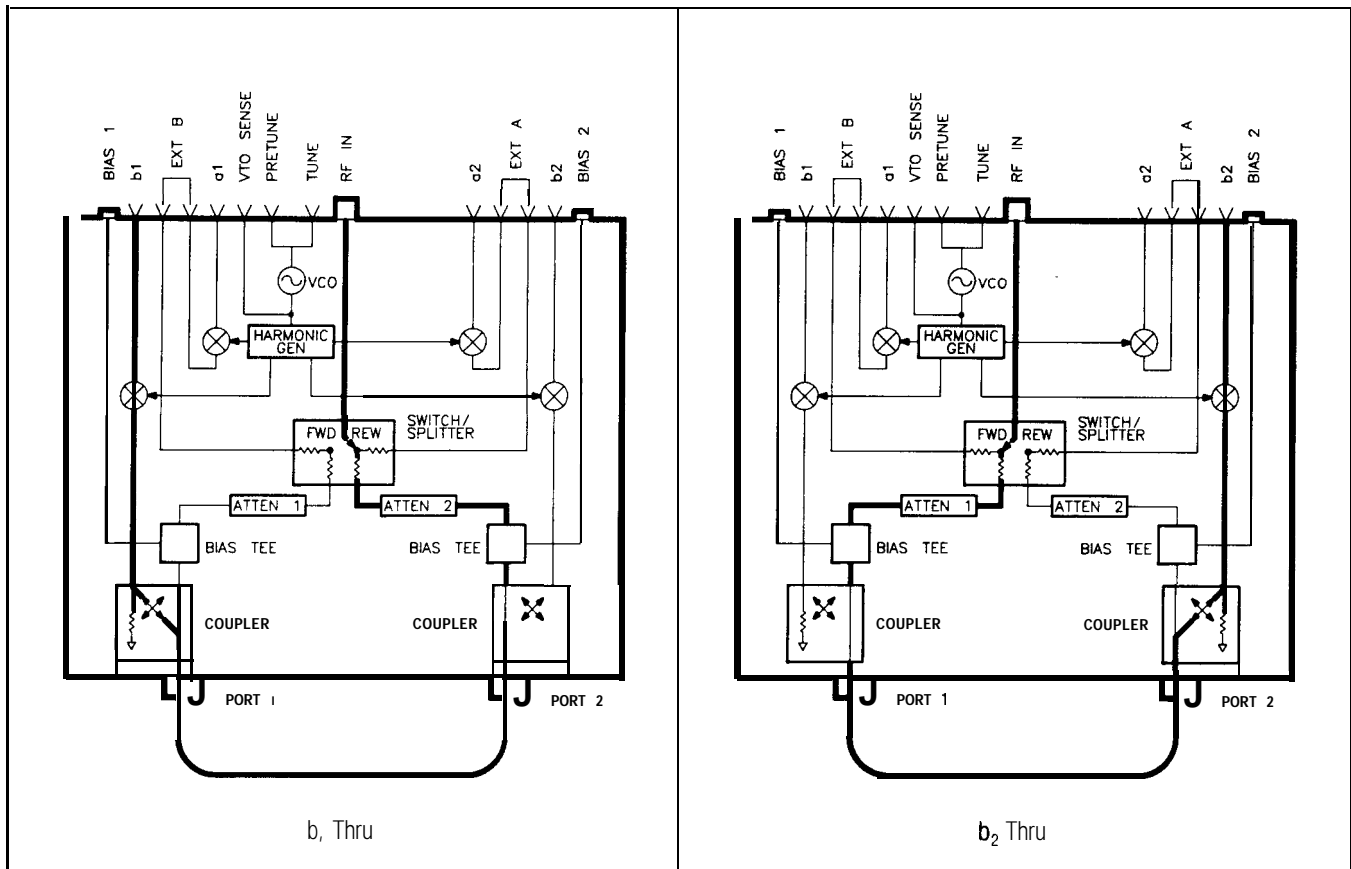


Figure 5-12. User Signal Paths in Test Sets (2 of 2)



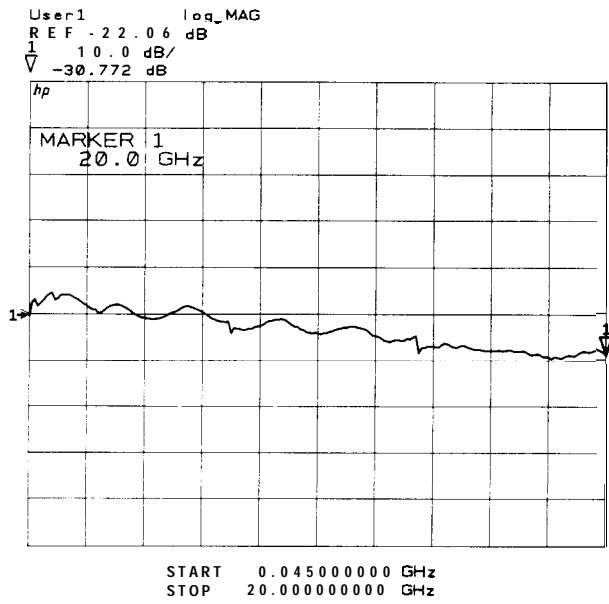


Figure 5-13. Typical HP 8514B Option 002/003 a, Reflection Trace

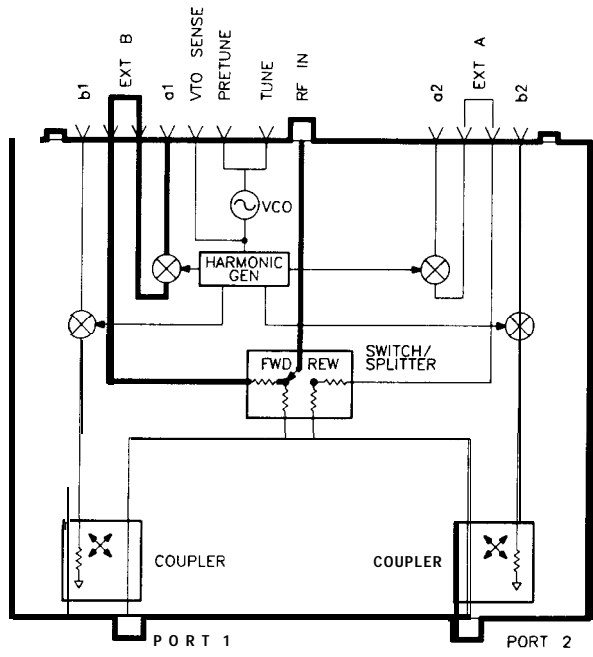


Figure 13a. HP 8514B Option 002/003 a<sub>1</sub> Reflection Signal Path

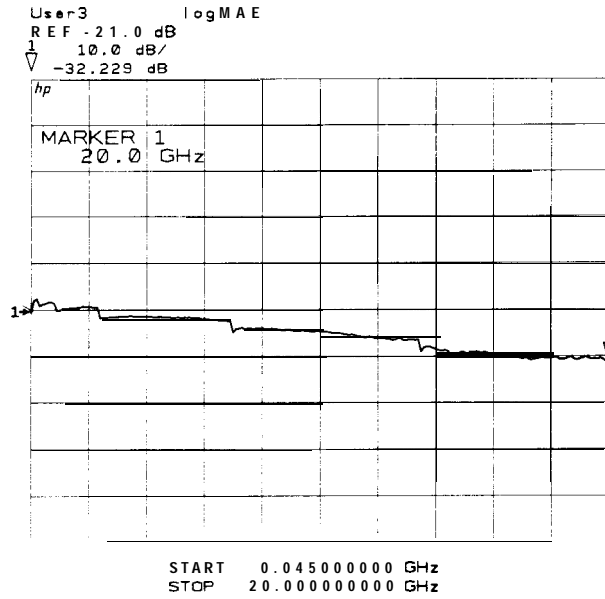


Figure 5-14. Typical HP 8514B Option 002/003  $\alpha_2$  Reflection Trace

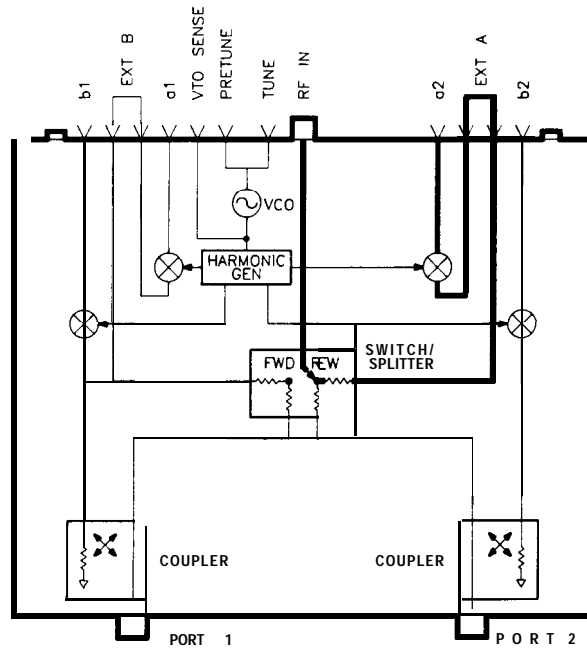


Figure 14a. HP 8514B Option 002/003  $\alpha_2$  Reflection Signal Path

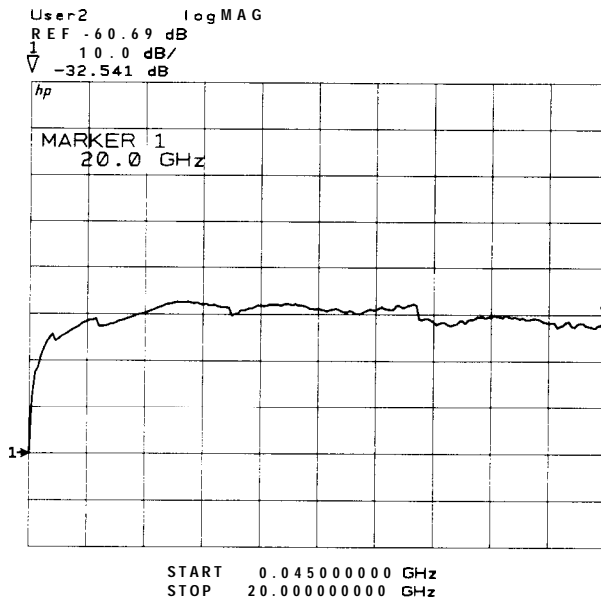


Figure 5-15. Typical HP 8514B Option 002/003 b<sub>1</sub> Reflection Trace

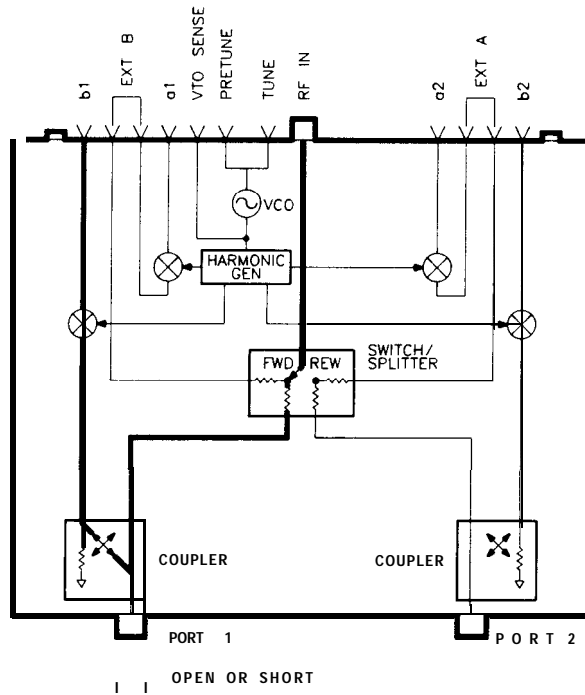


Figure 15a. HP 8514B Option 002/003 b<sub>1</sub> Reflection Signal Path

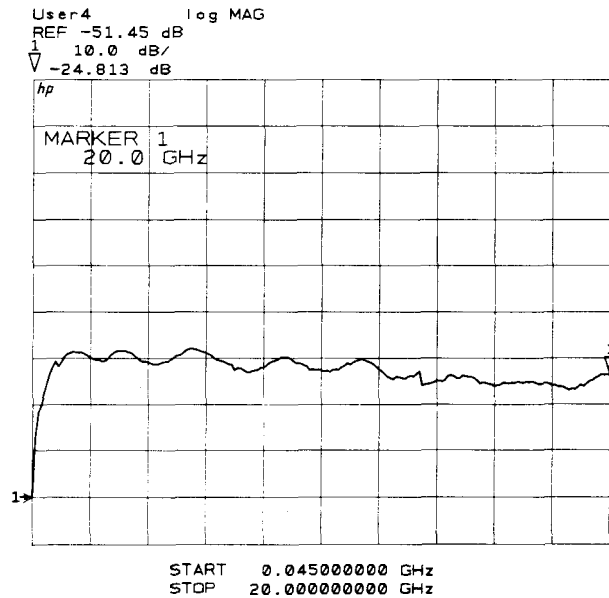


Figure 5-16. Typical HP 8514B Option 002/003  $b_2$  Reflection Trace

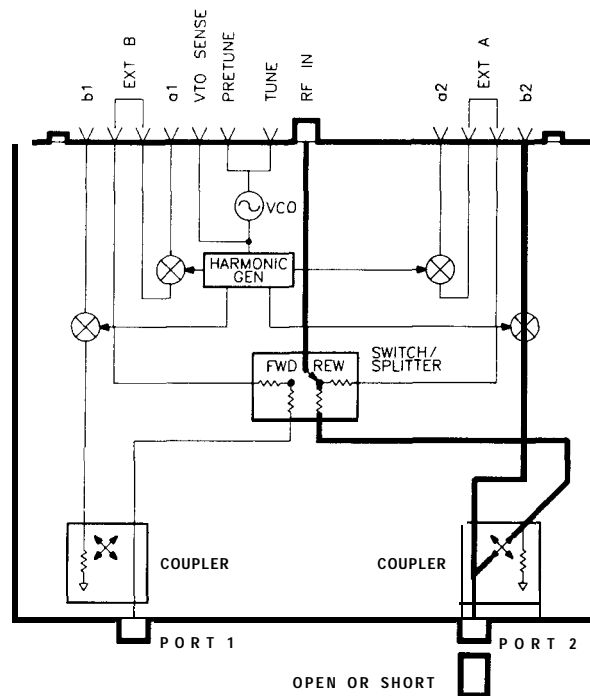


Figure 16a. HP 8514B Option 002/003  $b_2$  Reflection Signal Path

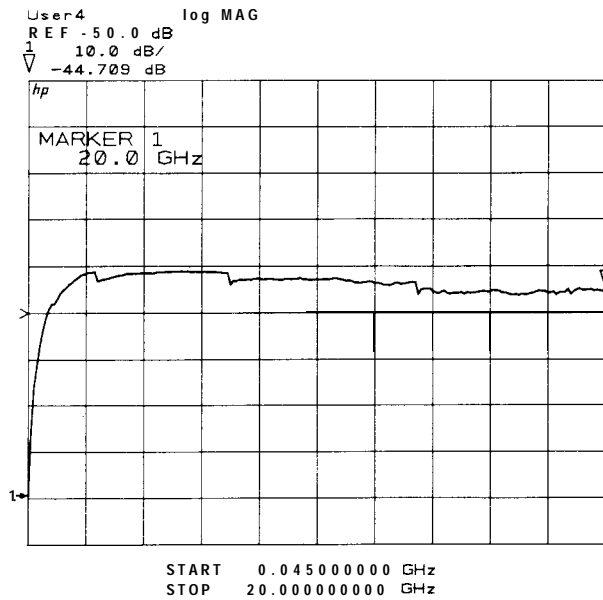


Figure 5-17. Typical HP 8514B Option 002/003 b, Thru Trace

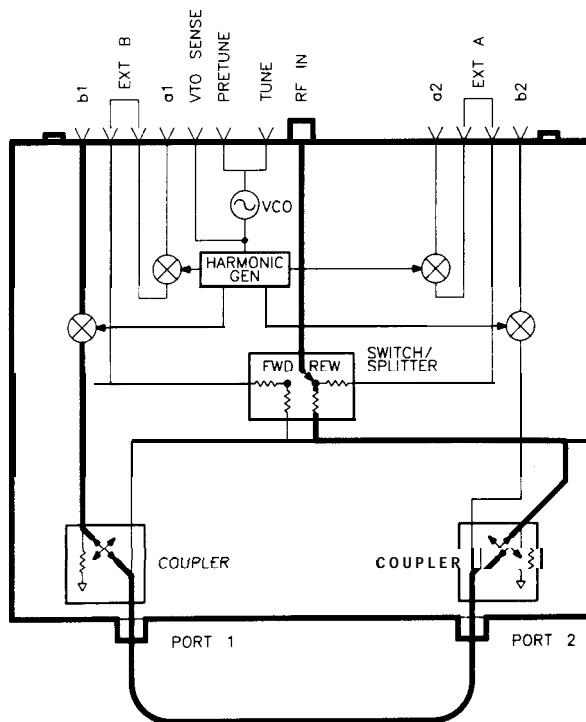


Figure 17a. HP 8514B Option 002/003 b, Thru Signal Path

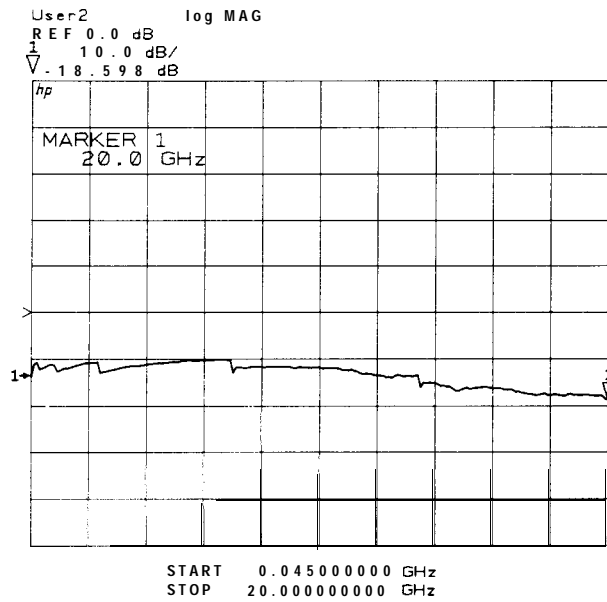


Figure 5-18. Typical HP 8514B Option 002/003  $b_2$  Thru Trace

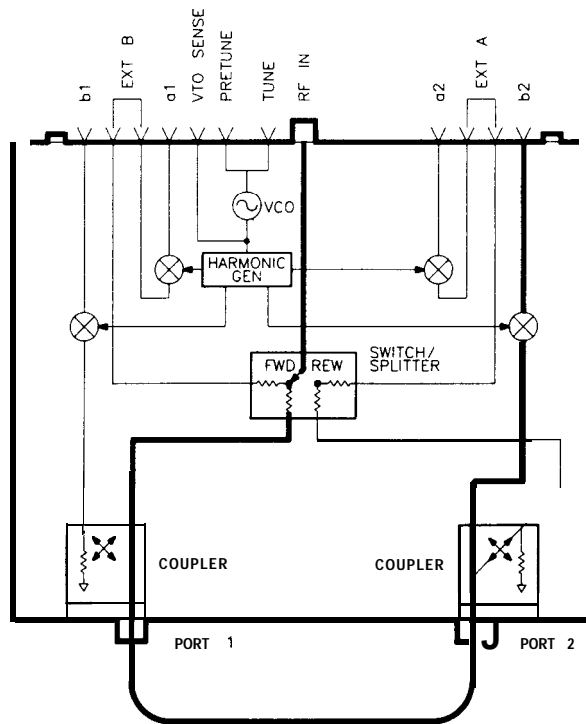


Figure 18a. HP 8514B Option 002/003  $b_2$  Thru Signal Path

## 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

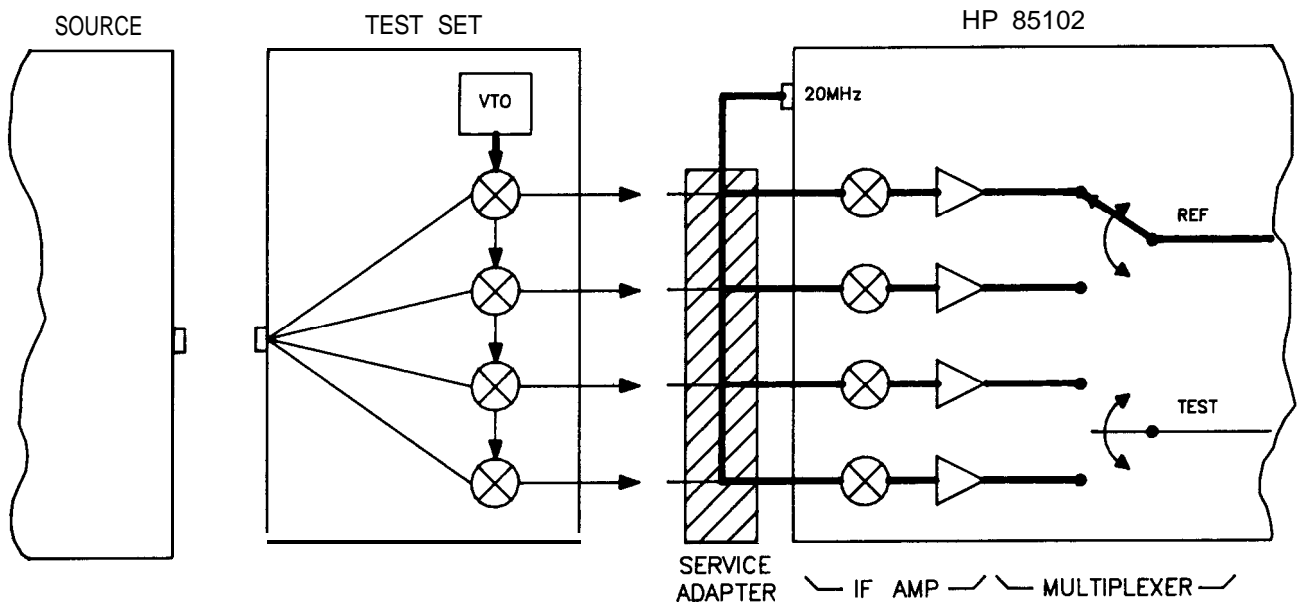


Figure 5-19. HP 85102 Signal Path with Service Adapter

## Service Adapter Procedure

1. Connect the HP 851026 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 unratiod 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  $-28 \pm 5$  dB).

## Service Adapter Conclusions

- If all of the channels look good (with the service adapter) and all looked bad in the unratiod power test, the HP85101 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 *HP85702 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 referring to the *Service Program* and *Block Diagrams* sections of the Service Manual. Then recheck the unratiod 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.



## Section 6. Replaceable Parts

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### INTRODUCTION

This section contains information for ordering parts. Exchange Assemblies Available describes how to order assemblies which are available on an exchange basis. Table 6-1 is a list of manufacturers (by code number) and reference designations.

HP8514B replaceable parts are identified by Table 6-2 and Figures 6-1 through 6-7.

HP 8512A replaceable parts are identified by Table 6-3 and Figures 6-3, 6-4 and 6-8 through 6-10.

### EXCHANGE ASSEMBLIES AVAILABLE

The items below are replaceable on a rebuilt exchange basis at a cost saving. They are not field-repairable. Defective assemblies must be returned for credit to realize the cost savings. Thus, assemblies required for spare parts stock should be ordered by the new assembly part number which is included in the replaceable parts list of this section. See the parts list for the orderable part numbers.

- A2 IF multiplexer board assembly
  - A3 VTO summing amplifier board assembly
  - A4 HPIB board assembly
  - A5 attenuator/switch driver assembly\*
  - A6 coupler
  - A7 bias tee\*
  - A8 coupler\*
  
  - A9 bias tee\*
  - A10 sampler assembly (input b1)
  - A11 sampler assembly (input b2)
  - A12 sampler assembly (input a1)
  - A13 sampler assembly (input a2)\*
  - A14 VTO/driver assembly
  
  - A15 regulator board assembly
  - A16 step attenuator\*
  - A17 step attenuator\*
  - A18 switch/splitter\*
- HP 8514B only

## REPLACEABLE PARTS LISTS

The replaceable parts lists consist of illustrations and tables. Use the illustrations to identify the part to be ordered; use the tables to determine the ordering information. Each table is arranged in **alpha-numerical** order by reference designator. The reference designator keys the part listed to the illustration. The first part number listed is HP's part number and may differ from the manufacturer's part number. The check digit serves as an error check of the part number and should be used when ordering a part. Quantity refers to the total number of that part in the instrument. The description is a brief written description of the part and may be used for ordering purposes. Manufacturers code is a five digit number assigned to each manufacturer (identified in Table 6-1). The manufacturer part number may or may not be the same as the HP part number.

The replaceable parts of ports 1 and 2 of the HP 8514B are identified in Figure 6-6.

The replaceable parts of ports 1 and 2 of the **HP 8512B** are identified in Figure 6-10. Additional center conductor and outer nut replacement information is in *Service Note 8512A-4A*.

For information concerning the repair of 3.5 mm rear panel connectors, refer to the *Test Set Troubleshooting* section of the *HP 8510B Service Manual* or *Service Note 8511A-1*.

*Table 6-1. Manufacturer Codes and Reference Designations*

MANUFACTURER'S CODES			
Mftr's Code	Manufacturer Name	Address	Zip Code
00000	ANY SATISFACTORY SUPPLIER		
00853	SANGAMO ELEC CO S CAROLINA DIV	PICKENS SC	29671
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	94304
56289	SPRAGUE ELECTRIC COMPANY	NORTH ADAMS MA	01247
REFERENCE DESIGNATIONS			
	A	assembly	
	AT	attenuator	
	B	fan	
	C	capacitor	
	E	miscellaneous electrical part	
	F	fuse	
	FL	filter	
	J	electrical connector, jack	
	MP	miscellaneous part	
	R	resistor	
	T	transformer	
	W	cable, wire	
	X	socket	
More comprehensive tables of manufacturer codes, reference designators, and abbreviations are behind the REPLACEABLE PARTS tab of the HP8510B Service Manual.			

Table 6-2. HP 8514B Replaceable Parts (1 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1	08513-60005	3	1	BOARD ASSEMBLY, FRONT PANEL	28460	08513-60005
A1DS1	1990.0658	6	2	LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	19904656
AI DS2	1990-0858	6		LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858
A2				SEE FIGURE 4		
A3	08513-60008	6	1	VTO SUMMING AMPLIFIER BD ASSY (NEW)	26460	08513-60008
A4	08514-60029	2	1	BOARD ASSEMBLY, HP IB (NEW)	28480	08514-60029
A5	08513-60011	1	1	ATTENUATOR/SWITCH DRIVER (NEW)	28480	08513-60011
A6	5180.2749	5	1	DIRECTIONAL COUPLER (NEW)	28460	5180-2749
A7	5086-7322	0	2	BIAS TEE, PORT 2 (NEW)	28480	5086-7322
A7	5086-6322	8	2	BIAS TEE, PORT 2 (REBUILT)	28480	5086-6322
A0	5180-2749	5	1	DIRECTIONAL COUPLER	28460	5180-2749
A9	5086-7322	0		BIAS TEE, PORT 1 (NEW)	28480	5086.7322
A9	5086-6322	8		BIAS TEE, PORT 1 (REBUILT)	28480	5086-6322
A10	5086-7402	7	1	B1 SAMPLER ASSY (NEW)	28480	5086-7402
A10	5086-6402	5	1	B1 SAMPLER ASSY (REBUILT)	28480	5086-6402
A11	5086-7402	7	1	B2 SAMPLER ASSY (NEW)	28480	5086-7402
A11	5086.6402	7	1	B2 SAMPLER ASSY (REBUILT)	28480	5086-6402
A12	5086.7402	7	1	AI SAMPLER ASSY (NEW)	28480	5086-7402
A12	5086-6402	7	1	AI SAMPLER ASSY (REBUILT)	28480	5086-6402
A13	5086-7402	7	1	A2 SAMPLER ASSY (NEW)	26480	5086.7402
A13	5086.6402	7	1	A2 SAMPLER ASSY (REBUILT)	28460	5086-6402
A14	5086.7231	0	1	VTO/DRIVER (NEW)	28480	5086-7231
A14	5086-6231	8	1	VTO/DRIVER (REBUILT)	26480	5086-6231
A15	38513-60007	5	1	BOARD ASSEMBLY, REGULATOR	28480	085 13-60007
A16	38340-60175	9	2	STEP ATTENUATOR, PORT 1	28480	08340-60175
A17	38340-60175	9		STEP ATTENUATOR, PORT 2	28480	08340-60175
A18	5086-7324	2	1	SWITCH/SPLITTER (NEW)	28480	5086-7324
A18	5086-6324	0	1	SWITCH/SPLITTER (REBUILT)	26480	5086-6324
A19	38513-60001	9	1	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A19 IS ORDERED: A19C1, A19C2, A19C3, A19C4	26460	08513-60001
A19C1	3180.2671	7	4	CAPACITOR-FXD .012F +75-10% 30VDC AL	00853	500123U030AC2A
A19C2	3180-2671	7		CAPACITOR-FXD .012F +75-10% 30VDC AL	00653	500123U030AC2A
A19C3	3180-2671	7		CAPACITOR-FXD .012F +75-10% 30VDC AL	00853	500123U030AC2A
A19C4	1180.2671	7		CAPACITOR-FXD .012F +75-10% 30VDC AL	00853	500123U030AC2A
A19C5	3160-4834	6	2	CAPACITOR-FXD .047UF ± 10% 100VDC CER	28460	0160-4834
A19C6	3160-4834	6		CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	0160-4834
A19J1	1251-5745	4		CONNECTOR 20-PIN M POST TYPE (A19J1 DOES NOT INCLUDE A19MP1 & A19MP2)	28480	1251-5745
A19J2	1251-6866	4	4	CONNECTOR 5-PIN M POST TYPE	28480	1251-6866
A19J3	1251-7939	2	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT (A19J3 DOES NOT INCLUDE A19MP3)	26480	1251-7939
A19J4	1251-6868	4		CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J5	1251-6666	4		CONNECTOR 5-PIN M POST TYPE	26480	1251-6666
A19J6	1251-6868	4		CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J7	1251-3825	7	1	CONNECTOR 5-PIN M POST NPE	28480	1251-3825
A19J8	1200-1304	6	2	IC SOCKET 14 PIN	28480	1200-1304
A19J9	1200-1304	6	2	IC SOCKET 14 PIN	28480	1200-1304
A19R1	3764-0015	7	2	RESISTOR 560 5% 2W MO TC=0±200	28480	07644015
A19R2	3764-0015	7		RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
A19R3	1764-0016	8	2	RESISTOR 1K 5% 2W MO TC=0±200	28460	0764-0016
A19R4	3764-0016	8		RESISTOR 1 K 5% 2W MO TC=0±200	28460	0764-0016
A19R5	3757-0394	0		RESISTOR51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A19R6	3757-0394	0		RESISTOR51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A19XA2	1251-7882	4	5	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
AI 9XA3	1251-7882	4		CONNECTOR-PC EDGE P-ROWS	28480	1251-7662
AI 9XA4	1251-7002	4		CONNECTOR-PC EDGE P-ROWS	28480	1251-7662
AI 9XA5	1251-7882	4		CONNECTOR-PC EDGE P-ROWS	28480	1251-7882
AI 9XA6-						
A19XA14				NOT ASSIGNED		
A19XA15	1251-7882	4		CONNECTOR-PC EDGE P-ROWS	28480	1251-7882
A20	18513-60006	4	1	BOARD ASSEMBLY, HP1B INTERCONNECT	28480	08513-60006
				MISCELLANEOUS ELECTRICAL PARTS		
AT1	3493C		1	3.5 MM 20 DB ATTENUATOR	28480	8493C
AT2	3493C		1	3.5 MM 20 DB ATTENUATOR	28460	8493C
AT3				SEE FIGURE 7		
B1	38513-20031	2	1	FAN-TBAX 34-CFM 115V 50/60-HZ 1.5KV-DIEL	4N833	08513-20031
31	3160-4311	4	1	CAPACITOR-FXD .022UF +80-20% 100VDC CER	56289	C023B101H223Z-CDH
DS1	1990-0858	5	2	LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858

Table 6-2. HP 8514B Replaceable Parts (2 of 4)

Reference Designation	HP Part Number	Quantity	Description	Mfr Code	Mfr Part Number
DS2	1990-0858	6	LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	<b>1990-0858</b>
E1	0360-0009	3	TERMINAL-SLDR LUG PL-MTG FOR-#6-SCR	28480	03604009
E2	0360-0031	1	TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E3	0360-0031	1	TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	<b>0360-0031</b>
E4	0362-0265	7	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E5	0362-0265	7	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	03620265
E6	<b>08513-00018</b>	2	INSULATOR-BRACE	28480	08513-00018
E7	0360-1673	9	TERMINAL STRIP 6-TERM PHEN 1.5-IN-L	28480	0380-1 673
E8	5021-3510	4	CONTACT-FEMALE	28480	5021-3510
E9	5021-3510	4	CONTACT-FEMALE	28480	5021-3510
E10	5021.3510	4	CONTACT-FEMALE	28460	5021-3510
E11	5021-3510	4	CONTACT-FEMALE	28460	5021-3510
E12	5021-3510	4	CONTACT-FEMALE	28480	5021-3510
E13	5061-5301	9	<b>3.5MM</b> BEAD-R AY	28480	<b>5061-5301</b>
E14	5061-5301	9	<b>3.5MM</b> BEAD-R AY	28480	5061-5301
E15	5061.5301	9	<b>3.5MM</b> BEAD-R AY	28480	5061-5301
E16	5061-5301	9	<b>3.5MM</b> BEAD-R AY	28480	5081.5301
E17	5061-5301	9	<b>3.5MM</b> BEAD-R AY	28480	5061-5301
E18	08513-20016	2	CONNECTOR NOSE-F	28480	<b>08513-20016</b>
E19	<b>08513-20016</b>	2	CONNECTOR NOSE-F	28480	<b>08513-20016</b>
E20	<b>08513-20016</b>	2	CONNECTOR NOSE-F	28480	<b>08513-20016</b>
E21	08513.20016	2	CONNECTOR NOSE-F	28480	<b>08513-20016</b>
E22	06513.20016	2	CONNECTOR NOSE-F	28480	<b>08513-20016</b>
E23	<b>08513-20017</b>	3	CONN-BULKHEAD	28480	<b>08513-20017</b>
E24	08513-20017	3	CONN-BULKHEAD	28480	<b>08513-20017</b>
E25	06513.20017	3	CONN-BULKHEAD	28460	<b>08513-20017</b>
E26	08513.20017	3	CONN-BULKHEAD	28460	<b>08513-20017</b>
E27	06513-20017	3	CONN-BULKHEAD	28480	<b>08513-20017</b>
E28	06513-20016	4	CENTER CNDCT-BHD	28460	08513-20018
E29	08513-20016	4	CENTER CNDCT-BHD	28480	08513-20018
E30	06513-20016	4	CENTER CNDCT-BHD	28480	08513-20018
E31	38513.20016	4	CENTER CNDCT-BHD	28460	08513-20018
E32	08513-20018	4	CENTER CNDCT-BHD	28480	08513-20018
E33	2110-0797	9	FUSEHOLDER	28480	2110-0797
E34	2110-0797	9	FUSEHOLDER	28480	2110-0797
E35	<b>85050-20001</b>	7	CONTACT CTR COND	28480	85050-20001
E36	<b>85050-20001</b>	7	CONTACT CTR COND	28480	85050-20001
E37	2110-0565	9	FUSEHOLDER CAP 12A MAX FOR UL	28480	211 0-0565
E38	2110-0565	9	FUSEHOLDER CAP 12A MAX FOR UL	28480	211 0-0565
E39	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28460	1251-3720
E40	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E41	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E42	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E43	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E44	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E45	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28460	1251-3720
E46	1251.3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E47	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
E48	1251-3720	1	CONNECTOR-SGL CONT SKT .04-IN-BSC-SZ RND	28480	1251-3720
F1	211 0-001 2	1	FUSE .5A 250V NTD 1.25X.25 UL	28480	2110-0012
F2	<b>2110-0012</b>	1	FUSE .5A 250V NTD 1.25X.25 UL	28480	<b>2110-0012</b>
F3	211 0-0002	8	FUSE 2.0A 250V NTD 1.25X.25 UL	28460	2110-0002
FL1	<b>3135-0217</b>	7	LINE MODULE-FILTERED	28480	<b>3135-0217</b>
J6	1250-0083	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	<b>1250-0083</b>
J8	<b>1250-0083</b>	1	CONNECTOR-RF BNC FEM SGL-HOLE-FR 50-OHM	28480	<b>1250-0083</b>
R1	1757-0394	0	RESISTOR 51.1 1% .125W F TC=0±100	24546	<b>C4-1/8-T0-51R1-F</b>
T1	<b>3100-4616</b>	5	POWER XFMR	28480	31 W-461 6
W1-W12			SEE FIGURE 6-4		
w13	<b>38513-60133</b>	8	CA AY A3J1-A14J1	28480	<b>3851 3-60133</b>
w14	<b>38513-60134</b>	9	CA AY A3J2-J11A7	28480	<b>38513-60134</b>
w15			SEE FIGURE 6-4		
w16	<b>38513-60136</b>	1	CA AY A3J5-J11A5	28480	<b>38513-60136</b>
w17			SEE FIGURE 6-4		
w18	<b>38513-60138</b>	3	CA AY A3J7-J11A6	28480	<b>38513-60138</b>
w19			SEE FIGURE 6-4		
w20	<b>38513-60140</b>	7	"A AY A3J4-A14J2	28480	<b>38513-60140</b>
w21	<b>38513-60141</b>	8	CA AY A5J2-A18J4	28480	<b>38513-60141</b>
w22	18513-60142	9	CA AY A5J1-A18J3	28480	<b>38513-60142</b>
w23	<b>38513-60143</b>	0	:A AY A5J3-A18J6	28480	<b>38513-60143</b>
w24	18513-60144	1	CA AY A12J3-J11A1	28480	<b>38513-60144</b>
w25	<b>38513-60145</b>	2	CA AY A13J3-J11A4	28480	<b>38513-60145</b>
w26	<b>38513-60146</b>	3	CA AY A10J3-J11A2	28480	<b>38513-60146</b>

Table 6-2. HP 8514B Replaceable Parts (3 of 4)

Reference Designator	HP Part Number	U	Qty	Description	Mfr Code	Mfr Part Number
W27	08513-60147		1	CA AY A11J3-J11A3	28480	08513-60147
W28				NOT ASSIGNED		
W29				NOT ASSIGNED		
W30				NOT ASSIGNED		
W31	08514-20028		1	CA RF A8J3-A11J2	28480	08514-20028
W32	08514-20027		1	CA RF A6J3-A10J2	28480	08514-20027
W33	08514-20013		2	CA RF J2-J3	28480	08514-20013
W34	08514-20014		2	A18J1J3	28480	08514-20014
W35	08514-20015		1	CA RF A18J7-A17J2	28480	08514-20015
W36	08514-20016		1	CA RF A7J1-A16J1	28480	08514-20016
W37	08514-20017		1	CA RF A18J8-A16J2	28480	08514-20017
W38	08514-20018		1	CA RF A9J1-A17J1	28480	08514-20018
W39	08514-20019		1	CA RF A18J5-J7	28480	08514-20019
W40	08514-20026		1	CA RF A13J2-J2	28480	08514-20026
W41	08514-20025		1	CA RF A12J2-J5	28480	08514-20025
W42				NOT ASSIGNED		
W43	08514-20013			CA RF J4-J5	28480	08514-20013
W44	08514-20014		1	A18J2J4	28480	08514-20014
W45-W49				SEE FIGURE 6-7		
W50-						
W56				NOT ASSIGNED		
W57	08513-60014		1	CBL AY RP-MB	28480	08513-60014
W58	08513-60036		1	CBL AY RP-HPIB	28480	08513-60036
W59	35102-60226		1	CA ASSY LINE SW	28480	85102-60226
W60	08513-60013		1	CA AY FRPNL-MBD	28480	08513-60013
W61	08510-60102		1	CBL AY TEST SET	28480	08510-60102
W62	3120-1348		1	CABLE ASSY 18AWG 3-CNDCT BLK-JKT	28480	8120-1348
W63	3120-3445		1	HP-IB CABLE 1 METER	28480	8120-3445
W64	3120-4396		1	CBL C AY-SMA	28480	8120-4396
W65	08514-20001		1	CA RF A9J1-A18J7	28480	08514-20001
W66	08514-20002		1	CA RF A7J1-A18J8	28480	08514-20002
W67	08512-20019		2	CA AY J2J3 & J4J5	28480	08512-20019
W68	08512-20019		4	CA AY J2J3 & J4J5	28480	08512-20019
				<b>MISCELLANEOUS MECHANICAL &amp; CHASSIS PARTS</b>		
	0380-0643		2	STANDOFF-HEX .255-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
	0400-0002		4	BROMMET-RND .188-IN-ID .312-IN-GRV-OD	28480	0400-0002
	0590-0926		4	THREADED INSERT-STD F 6-32 .188-IN-LG SST	28480	0590-0926
	251-2942		4	LOCK-SUBMIN D CONN	28480	1251-2942
	0360-0113		1	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	0360-0123		7	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	0420-0001		4	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
	0420-0022		2	NUT-SPCLY 6-32-THD .23-IN-THK .354-OD	28480	2420-0022
	0510-0138		3	SCREW-MACH 8-32 3-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
10	0510-0270		1	SCREW-MACH 8-32 3.25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	0580-0004		4	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
12	0050-0139		9	WASHER-FL MTLC NO. 8 .172-IN-ID	28480	3050-0139
13	0050-0152		4	WASHER-SHLDR NO. 8 .172-IN-ID .438-IN-OD	28480	3050-0152
14	0050-0227		4	WASHER-FL MTLC NO. 6 .149-IN-ID	28480	3050-0227
15	0050-0692		3	WASHER-FL MTLC NO. 10 .202-IN-ID	28480	3050-0692
16	0160-0309		1	FINGER GUARD	28480	3160-0309
17	08514-00011		1	REAR PANEL	28480	08514-00004
18	0624-0099		37	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
19	0624-0100		8	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
20	0400-0757		2	LAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
21	0190-0011		8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	0190-0011
22	200-0105		13	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
23	200-0165		14	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
24	0360-0115		62	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	0360-0119		6	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
26	0360-0333		12	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	0360-0333
27	0510-0192		16	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
28	0680-0129		8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	0021-8403		1	RAME FRONT	28480	0021-8403
30	0021-5804		1	RAME REAR	28480	0021-5804
31	0021-5837		4	TRUT CORNER 18"	28480	0021-5837
32	08505-20132		2	IND PLATE ENCL	28480	08505-20132
33	08513-60156		2	ENCLOSURE CKT	28480	08513-60156
34	08512-20005		1	IFI GASKET	28480	08512-20005
35	08513-00001		1	HECK	28480	08513-00001
36	08513-00002		1	RANSFORMER BRKT	28480	08513-00002
37	08513-00005		1	MTG BRACKET-LH	28480	08513-00005
38	08513-00006		1	MTG BRACKET-RH	28480	08513-00006
39	08513-00015		1	TOP SPRT PLATE	28480	08513-00015
40	08513-00037		1	BRACKET-CKT ENCL	28480	08513-00016
41	08513-20013		1	BRACE-DECK	28480	08513-20013
42	08513-20015		1	MOUNTING BAR	28480	08513-20015

Table 6-2. HP 8514B Replaceable Parts (4 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Yfr Part Number
43	5021-8747	2	1	FRONT BEZEL MACH	28480	5021-8747
44	0460-0100	7	1	TAPE-INDL 1-IN-W .002-IN-T ACRLC-XFR-ADH	28480	0460-0100
45	0520-0174	3	1	SCREW-MACH 2-56 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
46	0624-0589	4	8	SCREW-TPG 4-40 .25-IN-LG UNCT 62 DEG	28480	06244589
47	1400-1209	4	1	CLP CA .69D 1 .0W	28480	1400-1209
49	1450-0615	9	2	RETAINER-LED 0.75 IN LG; 0.36 IN WD	28480	1450-0615
50				NOT ASSIGNED		
50	21 10-0569	3	2	FUSEHOLDER COMPONENT NUT; THREAD M12.7	20480	2110-0569
51	2190-0016	3	2	WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
52	2190-0104	0	5	WASHER-LK INTL T 7/16 IN .439-IN-ID	28480	2190-0104
53	2200-0109	8	2	SCREW-MACH 4-40 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
54	2200-0164	5	4	SCREW-MACH 4-40 .188-IN-LG UNCT 62 DEG	00000	ORDER BY DESCRIPTION
55	2260-0009	3	8	NUT-HEX-W/LKWR 4-40-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
56	2360-0121	2	1	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
57	2510-0043	6	4	SCREW-MACH 8-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
58	2510-0141	5	4	SCREW-MACH 8-32 .562-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
59	2950-0001	8	2	NUT-HEX-DEL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
60	2950-0132	6	5	NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
61	7121.2360	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
62	5021-0906	6	7	SLEEV RF PIN POS	28480	5021-0906
63	5021-3427	2	2	WSHR-TS PORT CON	20480	5021-3427
64	5021-3428	3	2	NUT-FLG TS PORT	28480	5021-3428
65	08340-40002	9	2	MOUNT-LED	28480	08340-40002
66	08512-00008	9	1	CLAMP A	28480	08512-00008
67	08512-00009	0	1	CLAMP B	28480	08512-00009
68	08512-00010	3	1	CLAMP C	28480	08512-00010
69	08512-00011	4	1	CLAMP D	28480	08512-00011
70	08514-00005		2	ATTENUATOR BRACKET	28480	08514-00005
71	08513-00017	1	2	BRACKET-CONV AY	28480	08513-00017
72	35102-00041	6	1	COVER-I.F. MUX	28480	85102-00041
73	08513-00022	8	1	CVR-ATTEN DRVR	28480	08513-00022
74	35102-00041	6	1	CVR BLANK-IF MUX	26480	85102-00041
75	08514-00028	5	1	FRONT PANEL	28480	08514-00028
76	08514-00014	9	1	SUB PANEL	28480	08514-00014
77	08514-00008		1	MOUNTING BRACKET	28480	08514-00008
78	08514-00007	0	1	SW MNTG PLATE	28480	58514-00007
79	08514-20005	0	1	BLOCK-MTG CPLR	28480	38514-20005
80	151 0-01 95	9	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	2510-0195
31	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
32	7121-2527	5	1	LABEL-WARNING 1-IN-WD 7-IN-LG PPR	28480	7121.2527
33	0201-8496	7	2	TRIM FRNT HNDL	28480	0201-8496
34	0400-7201	5	4	FOOT-BOTTOM	28480	0400-7201
35	0401-8802	3	1	STRIP TRIM TOP	28480	0401-8802
36	0400-7221	2	4	FOOT-REAR	28480	0400-7221
37	0602-3747	3	1	COVER BTM 18" FM	28480	0602-3747
38	0601-9457	4	1	COVER AY SIDE	28480	0601-9457
39	0601-9499	4	2	HANDLE AY FRONT	28480	0601-9499
30	08513-00040	5	1	TEST SET CVR TOP	28480	08513-00040
31	08513-00041	7	1	COVER-SIDE PERF	28480	08513-00041
32	0500-0105	3	3	WASHER-FL MTL C NO. 4 .125-IN-ID	28480	0500-0105
33	0380-0010	3	4	SPACER-RND .625-IN-LG .18-IN-ID	28480	0380-0010
34	0360-0127	3	1	SCREW-MACH 6-32 .875-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
35	08513-00017	1	1	CONV-ASSEY BRACKET	28480	08513-00017
36	08514-20024	3	2	PORT FLANGE	28480	08514-20024

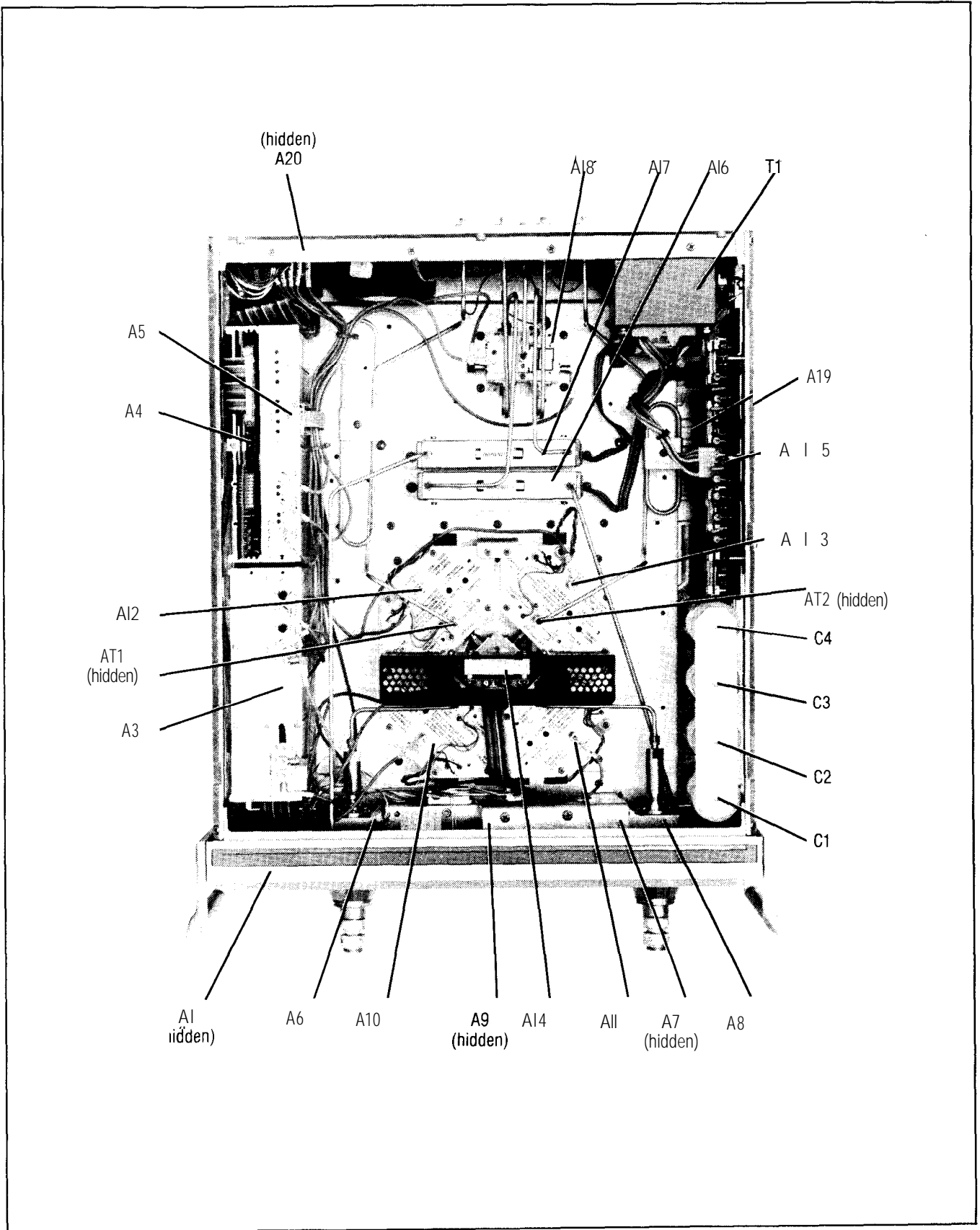


Figure 6-1. HP 8514B Top View Showing Locations of Major Assemblies

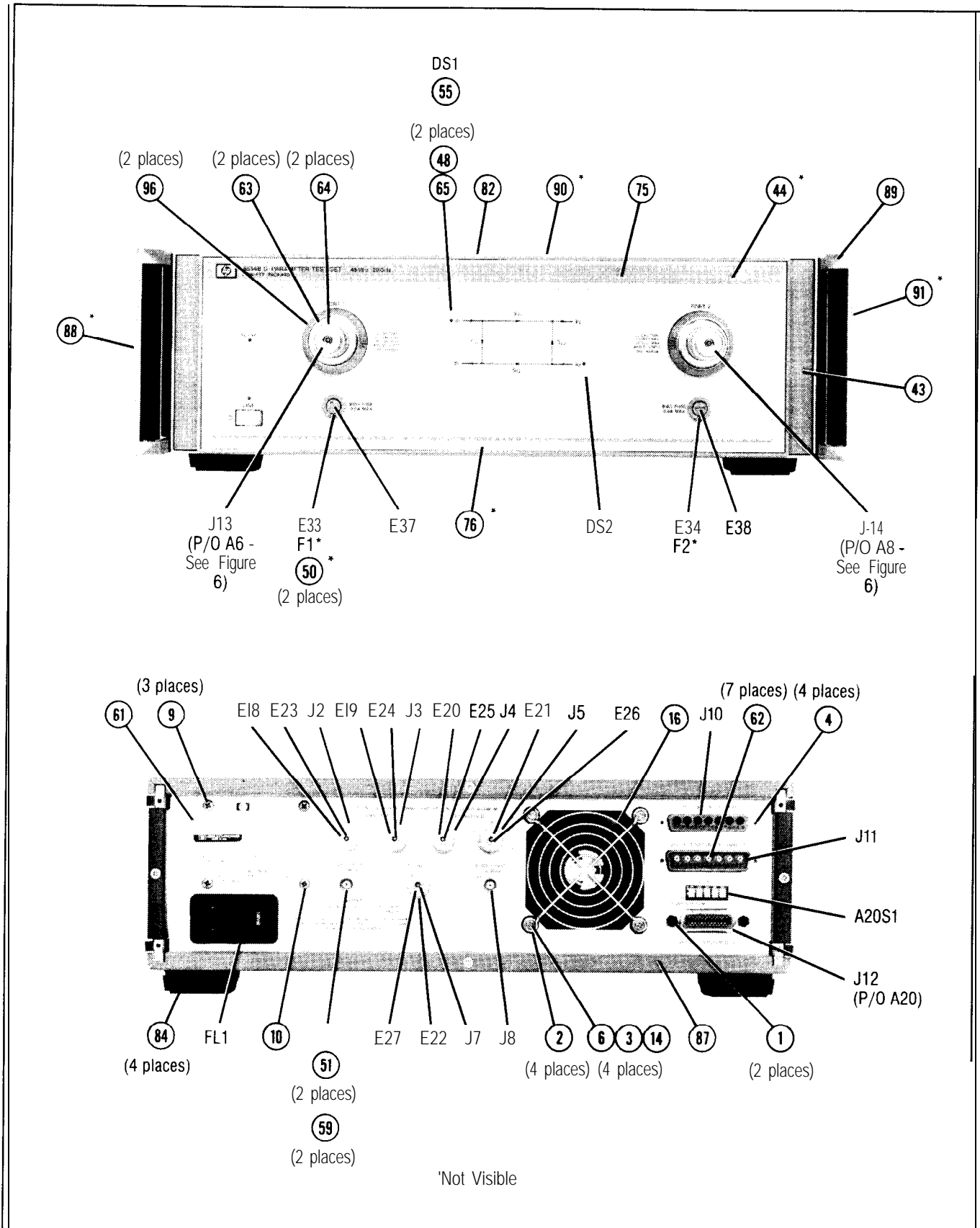
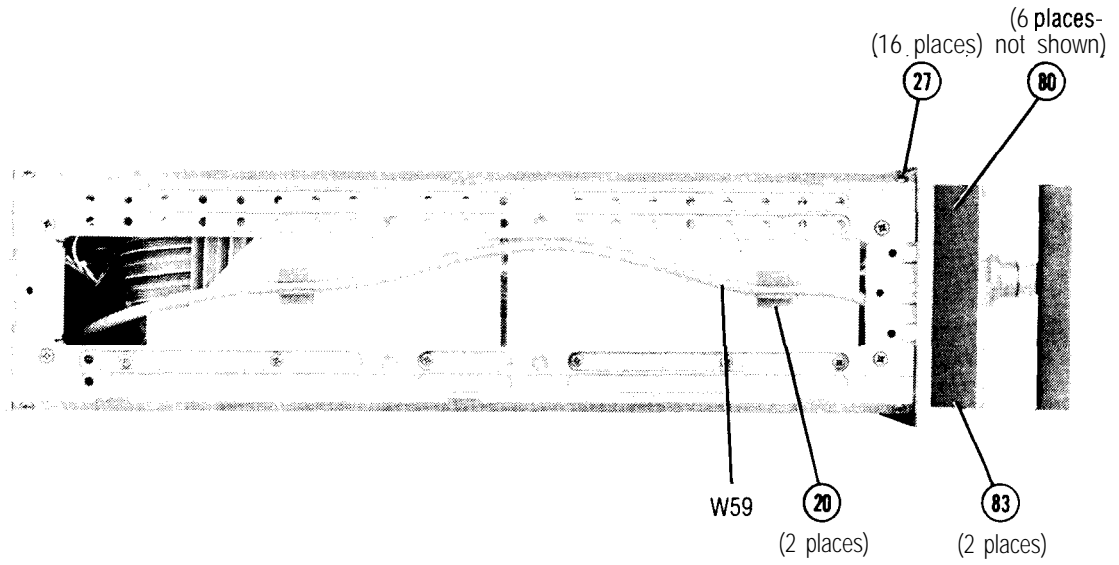


Figure 6-2. HP 8514B Miscellaneous Mechanical, Chassis, and Electrical Parts (1 of 5)



LEFT SIDE



RIGHT SIDE

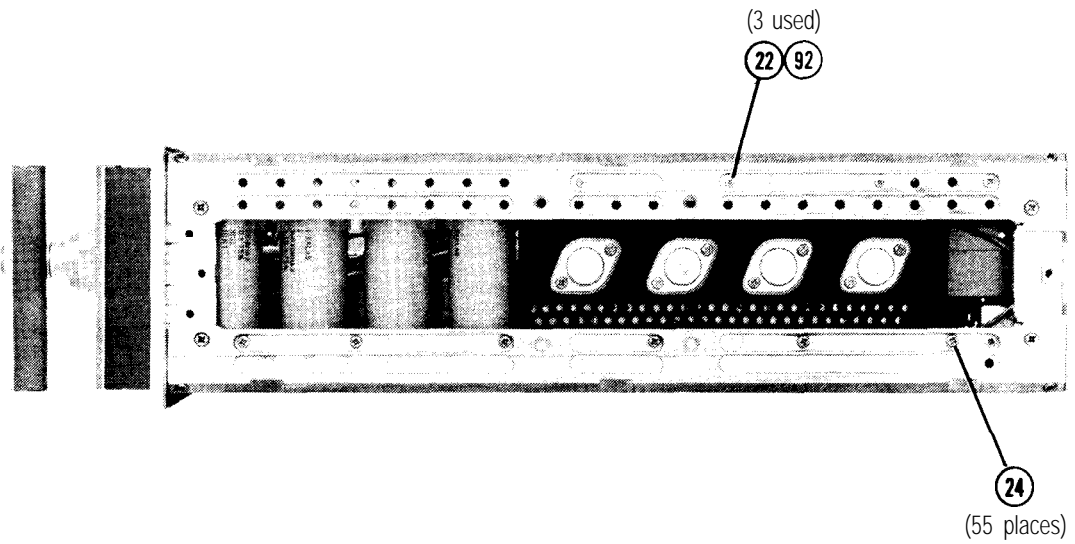


Figure 6-2. HP 8514B Miscellaneous Mechanical, Chassis, and Electrical Parts (2 of 5)

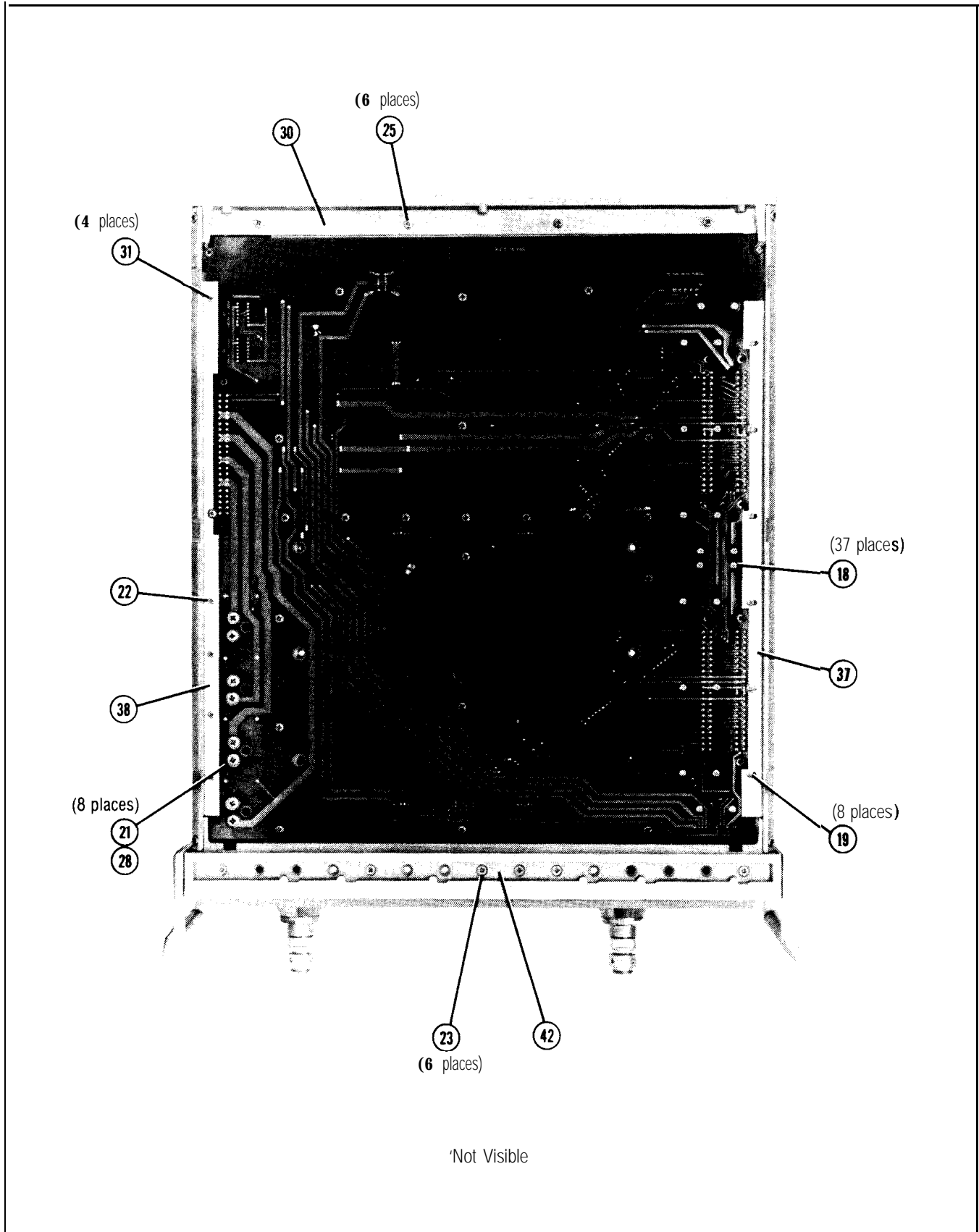


Figure 6-2. HP 8514B Miscellaneous Mechanical, Chassis, and Electrical Parts (3 of 5)

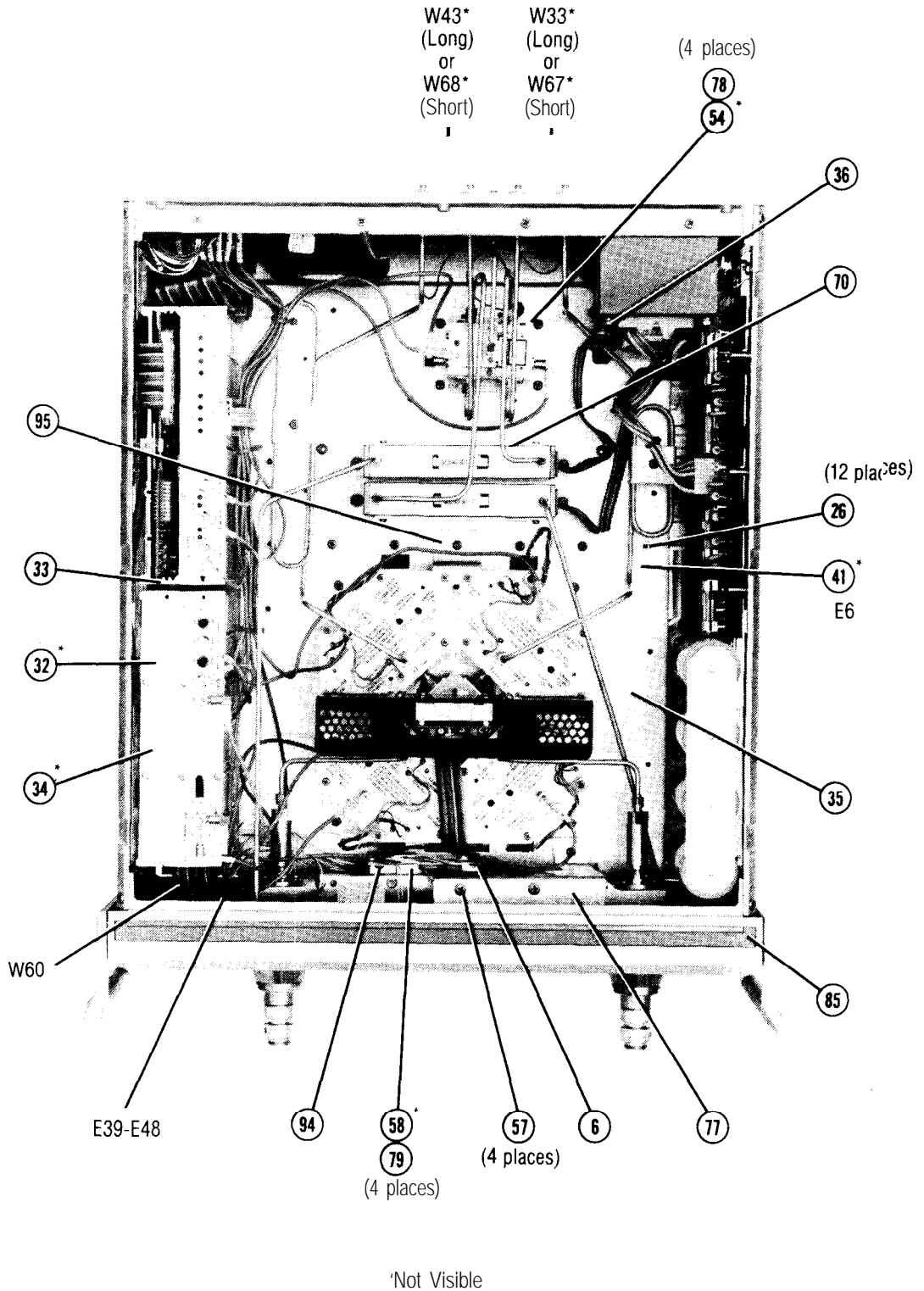
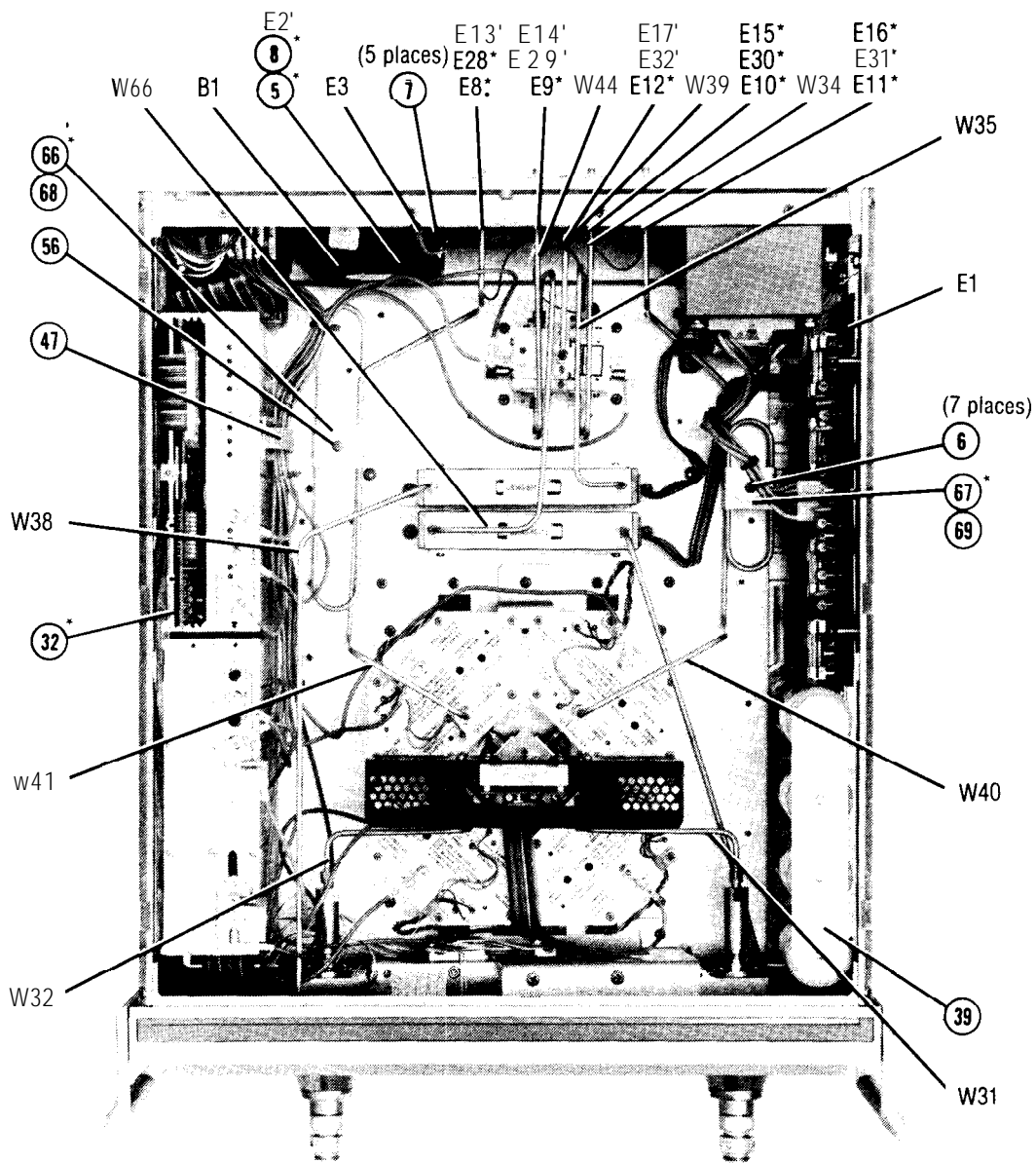


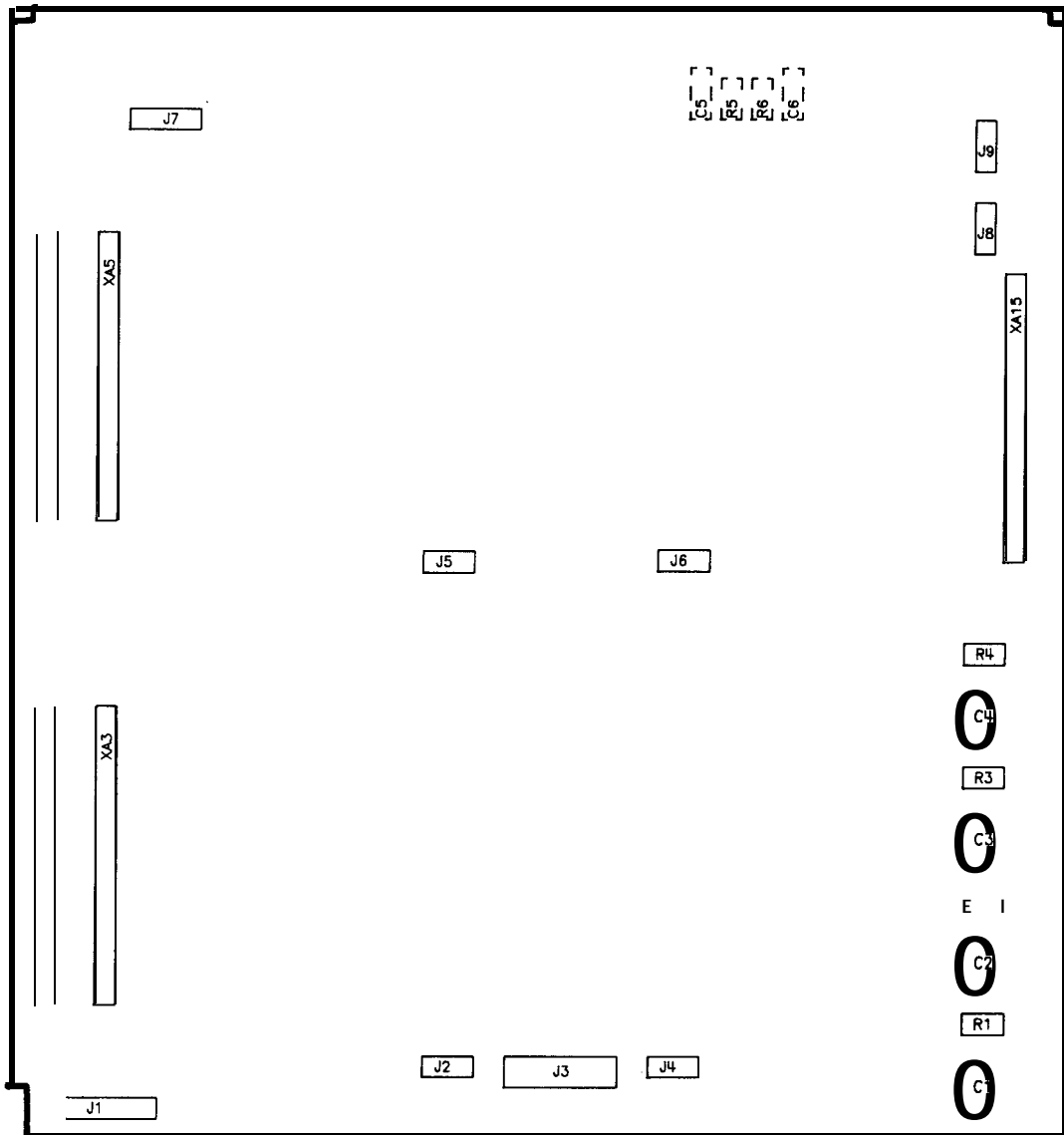
Figure 6-2. HP 8514B Miscellaneous Mechanical, Chassis, and Electrical Parts (4 of 5)



'Not Visible

Figure 6-2. HP 8514B Miscellaneous Mechanical, Chassis, and Electrical Parts (5 of 5)

A19



Refer to Table 2 for additional information.

Figure 6-3. HP 8514B and HP 8512A Motherboard Component Location Diagram

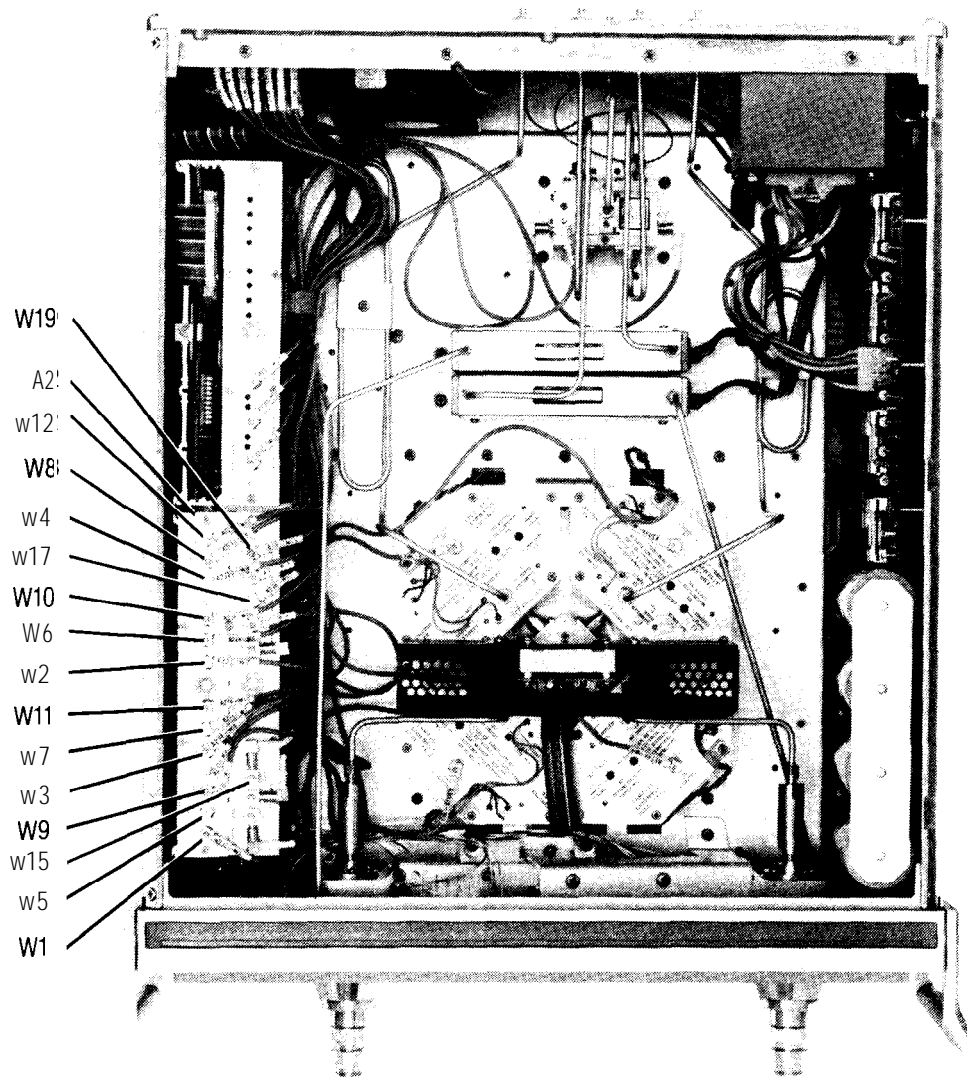
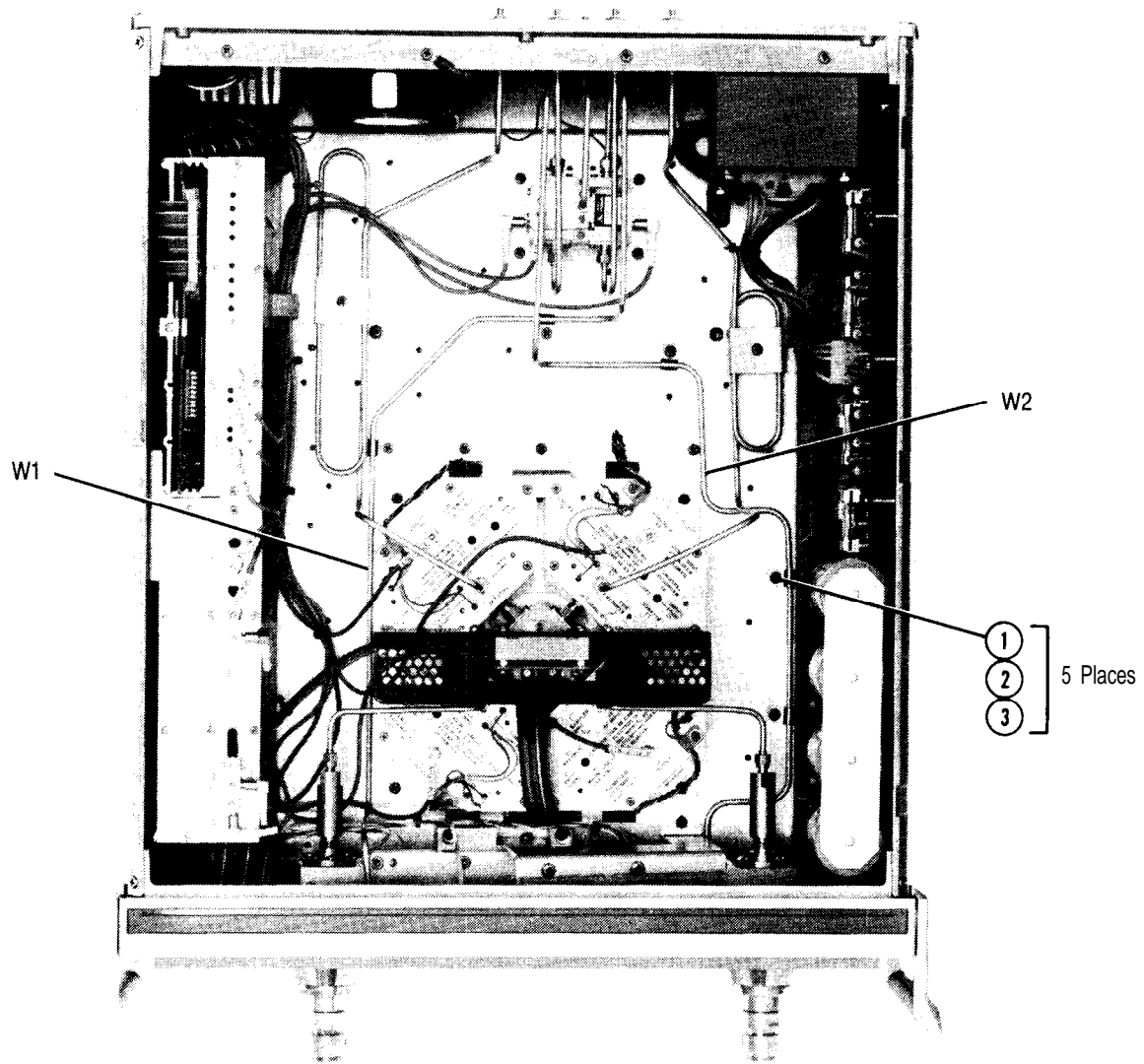


Figure 6-4. Parts Unique to HP 8514B and 8512A Option 001 (1 oj2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A2	08513-60004	2	1	IF MULTIPLEXER BD AY (NEW)	28480	08513-60004
A2	08513-69004	.		IF MULTIPLEXER BD AY (REBUILT)	28480	08513-60004
W1	08513-60121	4	1	A12J3-A2J1 CABLE AY	28480	08513-60121
W2	08513-60122	5	1	A13J3-A2J7 CABLE AY	28480	08513-60122
W3	08513-60123	6	1	A10J3-A2J4 CABLE AY	28480	08513-60123
W4	08513-60124	7	1	A11J3-A2J10 CABLE AY	28480	08513-60124
W5	08513-60125	8	1	A2J2-J11 A1 CABLE AY	28480	08513-60125
W6	08513-60126	9	1	A2J8-J11 A4 CABLE AY	28480	08513-60126
W7	08513-60127	0	1	A2J5-J11 A2 CABLE AY	28480	08513-60127
W8	08513-60128	1	1	A2J11-J11A3 CABLE AY	28480	08513-60128
W9	08513-60129	2	1	A2J3-J10A1 CABLE AY	28480	08513-60129
W10	08513-60130	5	1	A2J9-J10A4 CABLE AY	28480	08513-60130
W11	08513-60131	6	1	A2J6-J10A2 CABLE AY	28480	08513-60131
W12	08513-60132	7	1	A2J12-J10A3 CABLE AY	28480	08513-60132
W13				SEE TABLE 6-2		
W14				SEE TABLE 6-2		
W15	08513-60135	0	1	A3J3-J10A7 CABLE AY	28480	08513-60135
W16				SEE TABLE 6-2		
W17	08513-60137	2	1	A3J6-J10A5 CABLE AY	28480	08513-60137
W18				SEE TABLE 6-2		
W19	08513-60139	4	1	A3J8-J10A6 CABLE AY	28480	08513-60139

Figure 6-4. Parts Unique to HP 8514B and HP 8512A Option 001(2 of 2)

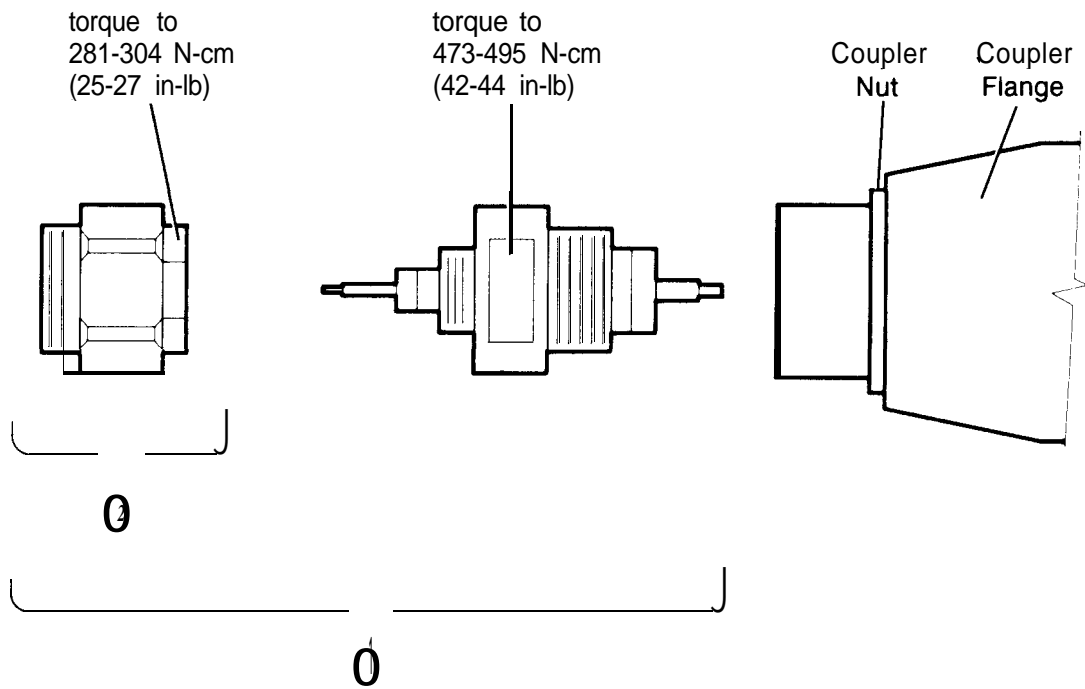


NOTE: Insert flat washer (3) under cable clamp (2) as a spacer.

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W1	08514-20022	1	1	A18J1-A6J2 CABLE ASSY	28480	08514-20022
W2	08514-20023	2	1	A18J7-A8J2 CABLE ASSY	28480	08514-20023
	2360-0113	2	5	MACHINE SCREW, 5/32 X 0.25	28480	2360-0113
>	1400-0054	5	5	OPTION 002 CABLE CLAMP	28480	1400-0054
}	3050-0139	3	5	FLAT WASHER, 0.172 ID	28480	3050-0139

Figure 6-5. Parts Unique to HP 8514B Option 002





NOTE: Center pin is not replaceable by itself.

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	5062-1272	7	2	TEST PORT CONNECTOR ASSY	28480	5062-1272
2	5062-1245	3	2	3.5 mm NUT ASSEMBLY	28480	5062-1245

Figure 6-6. HP 8514B Ports 1 and 2 Replaceable Parts

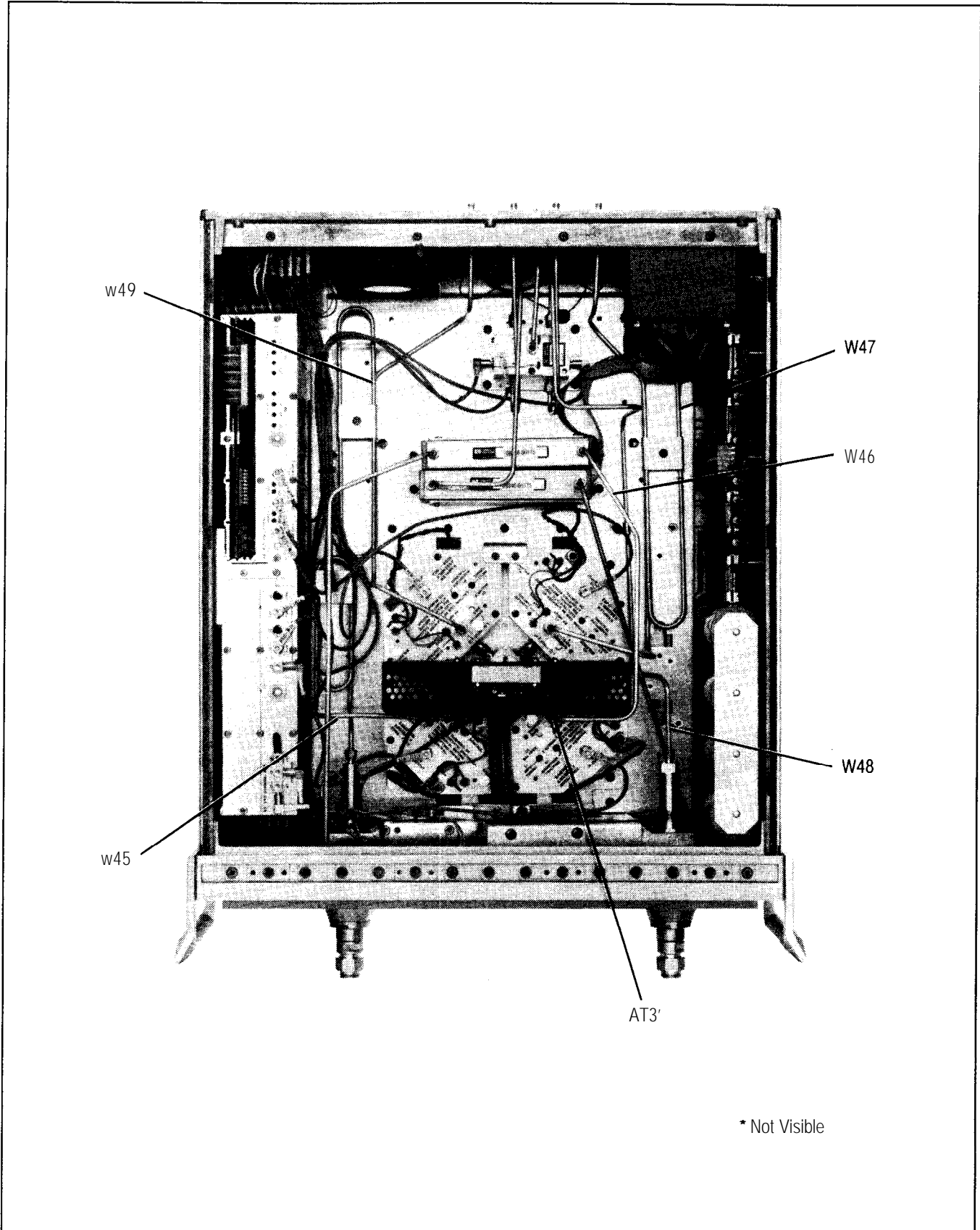


Figure 6-7. Parts Unique to HP 8514B Option 003 (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W45	08514-20057	2	1	CABLE RF A6J3-A10J2	28480	08514-20057
W46	08514-20058	3	1	CABLE RF A11J2-A17J2	28480	08514-20058
W47	08514-20059	4	1	CABLE RF A13J2-J2	28480	08514-20059
W48	08514-20060	5	1	CABLE RF A8J3-A18J7	28480	08514-20060
W49	08514-20061	6	1	CABLE RF A12J2-J5	28480	08514-20061
AT3	33340CZ	1	1	3.5 MM SHAPED PAD	28480	3340CZ

*Figure 6-7. Parts Unique to HP 8514B Option 003 (2 oj2)*

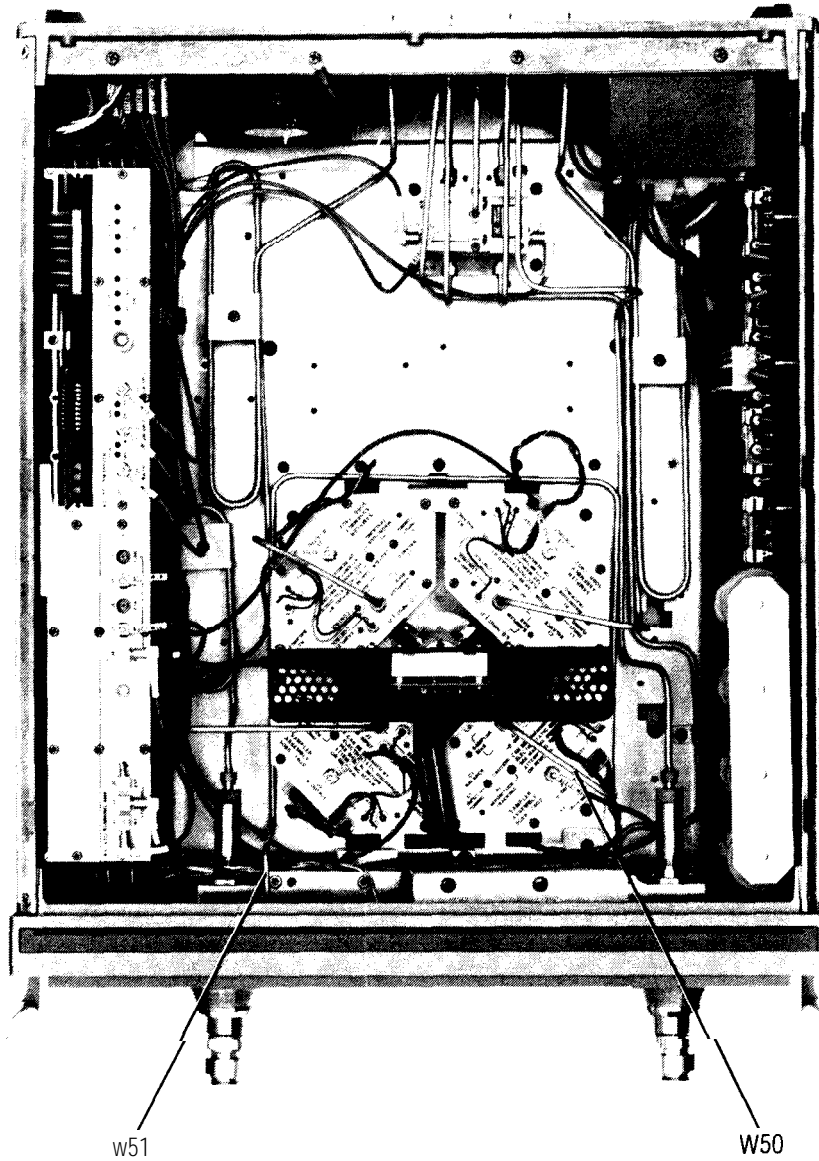


Figure 6-8. HP 8514B Option 002/003 Parts (1 of 2)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
W45 W47 W48 W49 W50 W51 AT3	08514-20090 08514-20091	3 4	1 1	SEE FIGURE 6-7 SEE FIGURE 6-7 SEE FIGURE 6-7 SEE FIGURE 6-7 CABLE RF A8 TO A11 CABLE RF A6 TO A18 SEE FIGURE 6-7	28480 28480	08514-20090 08514-20091

**Figure 6-8. Option 002/003 Ports (2 of 2)**

Table 6-3. HP 8512A Replaceable Parts (1 of 4)

Reference Designation	HP Part Number	U	Qty	Description	Mfr Code	Mfr Part Number
A1	08513-60005		1	BOARD ASSEMBLY, FRONT PANEL	28480	08513-60005
AIDS1	1990.0858	€	2	LED-LAMP LUM-INT = 15UCD IF = 25MA-MAX	28480	1990-0858
A1DS2	1990.0858	€		LED-LAMP LUM-INT = 15UCD IF = 25MA-MAX	28480	1990.0858
A2				SEE FIGURE 4		
A3	08513-60008	€		BOARD ASSEMBLY, VTO SUMMING AMPLIFIER	28480	08513-60008
A4	08513.60002	C	1	BOARD ASSEMBLY, HP IB	28480	08513-60002
A5				NOT ASSIGNED		
A6	5080.0351		9	DIRECTIONAL COUPLER (7mm connector is replaceable: see Figure 9)	28480	5080-0351
A7				NOT ASSIGNED		
A8				NOT ASSIGNED		
A9				NOT ASSIGNED		
A10	5086.7402		7	B1 SAMPLER ASSEMBLY (NEW)	28480	5086-7402
A10	5086.6402		5	B1 SAMPLER ASSEMBLY (REBUILT)	28480	5086-6402
A11	5086.7402		7	B2 SAMPLER ASSEMBLY (NEW)	28480	5086.7402
A11	5086.6402		5	B2 SAMPLER ASSEMBLY (REBUILT)	28480	5086-6402
A12	5086.7402		7	AI SAMPLER ASSEMBLY (NEW)	28480	5086.7402
A12	5086.6402		5	AI SAMPLER ASSEMBLY (REBUILT)	28480	5086.6402
A13				NOT ASSIGNED		
A14	5086.7231		0	VTO/DRIVER (NEW)	28480	5086.7231
A14	5086-6231		8	VTO/DRIVER (REBUILT)	28480	5086-6231
A15	38513.60007		5	REGULATOR BOARD ASSEMBLY	28480	38513-60007
A15	38515-69007		5	REGULATOR BOARD ASSEMBLY	28480	38515.69007
A16				NOT ASSIGNED		
A17				NOT ASSIGNED		
A18	5086-7408		3	POWER SPLITTER	28480	5086-7408
A19	38513-60001		9	BOARD ASSEMBLY, MOTHER THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A19 IS ORDERED:	28480	38513-60001
A19C1	1180-2671		7	A19C1, A19C2, A19C3, A19C4	00853	500123U030AC2A
A19C2	1180-2671		7	CAPACITOR-FXD .012F + 75-10% 30VDC AL	00853	500123U030AC2A
A19C3	1180-2671		7	"APACITOR-FXD .012F + 75-10% 30VDC AL	00853	500123U030AC2A
A19C4	1180-2671		7	"APACITOR-FXD .012F + 75-10% 30VDC AL	00853	500123U030AC2A
A19C5	1160-4834		5	CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	1160-4834
A19C6	1160-4834		5	CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	1160-4834
A19J1	1251.5745		4	CONNECTOR 20-PIN M POST TYPE	28480	1251-5745
A19J2	1251-6868		4	A19J1 DOES NOT INCLUDE A19MP1 & A19MP2)	28480	1251-6868
A19J3	1251.7939		2	CONNECTOR 5-PIN M POST TYPE	28480	1251.7939
A19J4	1251-6868		4	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-6868
A19J5	1251-6868		4	A19J3 DOES NOT INCLUDE A19MP3)	28480	1251-6868
A19J6	1251-6868		4	CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J7	1251-3825		7	CONNECTOR 5-PIN M POST TYPE	28480	1251-3825
A19J8	200-0508		2	CONNECTOR 5-PIN M POST TYPE	28480	200-0508
A19J9	200-0508		2	SOCKET-IC 14-CONT DIP-SLDR	28480	200-0508
A19MP1	251-5595		2	SOCKET-IC 14-CONT DIP-SLDR	28480	251-5595
A19MP2	251-5595		2	POLARIZING KEY-POST CONN	28480	251-5595
A19MP3	251-5595		2	POLARIZING KEY-POST CONN	28480	251-5595
A19R1	1764-0015		7	RESISTOR 560 5% 2W MO TC = 0 ± 200	28480	1764-0015
A19R2	1764-0015		7	RESISTOR 560 5% 2W MO TC = 0 ± 200	28480	1764-0015
A19R3	1764-0016		7	RESISTOR 1K 5% 2W MO TC = 0 ± 200	28480	1764-0016
A19R4	1764-0016		7	RESISTOR 1K 5% 2W MO TC = 0 ± 200	28480	1764-0016
A19R5	1757-0394		7	RESISTOR 51.1 1% .125W F TC = 0 ± 100	24546	14-1/8-T0-51R1-F
A19R6	1757-0394		7	RESISTOR 51.1 1% .125W F TC = 0 ± 100	24546	14-1/8-T0-51R1-F
A19XA2	251.7882		1	RESISTOR 51.1 1% .125W F TC = 0 ± 100	28480	251.7882
A19XA3	251.7882		1	CONNECTOR-PC EDGE P-ROWS	28480	251-7882
A19XA4	251-7882		1	CONNECTOR-PC EDGE P-ROWS	28480	251-7882
A19XA5	251-7882		1	CONNECTOR-PC EDGE P-ROWS	28480	251-7882
A19XA6-				CONNECTOR-PC EDGE P-ROWS	28480	251-7882
A19XA14	251.7882		1	NOT ASSIGNED	28480	251-7882
A19XA15	8513.60006		1	CONNECTOR-PC EDGE P-ROWS	28480	8513-60006
A20				BOARD ASSEMBLY, HP/IB INTERCONNECT	28480	

Table 6-3. HP 8512A Replaceable Parts (2 of 4)

Reference Designation	HP Part Number	C	Qty	Description	Mfr Code	Mfr Part Number
<b>MISCELLANEOUS ELECTRICAL PARTS</b>						
B1	3160-0273	2	1	FAN-TBAX 34-CFM 115V 50/60-HZ 1.5KV-DIEL	4N833	126LF-182
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-#6-SCR	28480	0360-0009
E2	0360-0031	1	2	TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E3	0360-0031	1	1	TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E4	0362-0265	7	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E5	0362-0265	7	1	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E6	08513-00018	2	1	INSULATOR-BRACE	28480	08513-00018
E7	1250-0816	8	2	CONTACT-RF CONN CONTACT ASSY	9D949	131-1054
E8	1250-0816	8	1	CONTACT-RF CONN CONTACT ASSY	9D949	131-1054
E9	1531-0278	2	1	MACHINED PART-SST OUTER FLANGE-COUPLER	28480	1531-0278
E10	5021-3510	4	5	CONTACT-FEMALE	28480	5021-3510
E11	5021-3510	4	1	CONTACT-FEMALE	28480	5021-3510
E12	5021-3510	4	1	CONTACT-FEMALE	28480	5021-3510
E13	5021-3510	4	1	CONTACT-FEMALE	28480	5021-3510
E14	5021-3510	4	1	CONTACT-FEMALE	28480	5021-3510
E15	5040-0306	0	2	INSULATOR	28480	5040-0306
E16	5040-0306	0	1	INSULATOR	28480	5040-0306
E17	08512-20001	4	1	CTR BDY PNL CONN	28480	08512-20001
E18	08512-20002	5	1	INR CNDCT-PNL	28480	08512-20002
E19	08513-20016	2	5	CONNECTOR NOSE-F	28480	08513-20016
E20	08513-20016	2	1	CONNECTOR NOSE-F	28480	08513-20016
E21	08513-20016	2	1	CONNECTOR NOSE-F	28480	08513-20016
E22	08513-20016	2	1	CONNECTOR NOSE-F	28480	08513-20016
E23	08513-20016	2	1	CONNECTOR NOSE-F	28480	08513-20016
E24	08513-20017	3	5	CONN-BULKHEAD	28480	08513-20017
E25	08513-20017	3	1	CONN-BULKHEAD	28480	08513-20017
E26	08513-20017	3	1	CONN-BULKHEAD	28480	08513-20017
E27	08513-20017	3	1	CONN-BULKHEAD	28480	08513-20017
E28	08513-20017	3	1	CONN-BULKHEAD	28480	08513-20017
E29	08513-20018	4	5	CENTER CNDCT-BHD	28480	08513-20018
E30	08513-20018	4	1	CENTER CNDCT-BHD	28480	08513-20018
E31	08513-20018	4	1	CENTER CNDCT-BHD	28480	08513-20018
E32	08513-20018	4	1	CENTER CNDCT-BHD	28480	08513-20018
E33	08513-20018	4	1	CENTER CNDCT-BHD	28480	08513-20018
E34	35040-20015	1	1	CENTER CONDUCTOR	28480	85040-20015
E35	35050-20001	7	2	CONTACT CTR COND	28480	85050-20001
E36	35050-20001	7	1	CONTACT CTR COND	28480	85050-20001
E37	1250-1466	5	1	CONNECTOR-RF APC-7 HERMAPHR UNMTD 50-OHM	28480	1250-1466
E38	0661-5301	3	5	3.5MM BEAD-R AY	28480	5061-5301
E39	0661-5301	3	1	3.5MM BEAD-R AY	28480	5061-5301
E40	0661-5301	3	1	3.5MM BEAD-R AY	28480	5061-5301
E41	0661-5301	3	1	3.5MM BEAD-R AY	28480	5061-5301
E42-E43				SEE FIGURE 6-10		
F1-F2				NOT ASSIGNED		
F3	2110-0043	3	1	USE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
FL1	0960-0443	1	1	LINE MODULE-FILTERED	28480	0960-0443
F1	1180-1233	1	1	POWER XFMR	28480	5180-1233
N1	08513-60121	4	1	CA AY A12J3-A2J1	28480	08513-60121
N2				NOT ASSIGNED		
N3	08513-60123	3	1	CA AY A10J3-A2J4	28480	08513-60123
N4	08513-60124	7	1	CA AY A11J3-A2J10	28480	08513-60124
N5	08513-60125	3	1	CA AY A2J2-J11A1	28480	08513-60125
N6	08513-60126	3	1	CA AY A2J8-J11A4	28480	08513-60126
N7	08513-60127	3	1	CA AY A2J5-J11A2	28480	08513-60127
N8	08513-60128	1	1	CA AY A2J11-J11A3	28480	08513-60128
N9	08513-60129	3	1	CA AY A2J3-J10A1	28480	08513-60129
N10	08513-60130	3	1	CA AY A2J9-J10A4	28480	08513-60130
N11	08513-60131	3	1	CA AY A2J6-J10A2	28480	08513-60131
N12	08513-60132	7	1	CA AY A2J12-J10A3	28480	08513-60132
N13	08513-60133	3	1	CA AY A3J1-A14J1	28480	08513-60133
N14	08513-60134	3	1	CA AY A3J2-J11A7	28480	08513-60134
N15	08513-60135	3	1	CA AY A3J3-J10A7	28480	08513-60135
N16	08513-60136	1	1	CA AY A3J5-J11A5	28480	08513-60136
N17	08513-60137	3	1	CA AY A3J6-J10A5	28480	08513-60137
N18	08513-60138	3	1	CA AY A3J7-J11A6	28480	08513-60138
N19	08513-60139	1	1	CA AY A3J8-J10A6	28480	08513-60139
N20	08513-60140		1	CA AY A3J4-A14J2	28480	08513-60140
N21				NOT ASSIGNED		
N22				NOT ASSIGNED		
N23				NOT ASSIGNED		
N24				NOT ASSIGNED		
N24	8513-60144		1	CA AY A12J3-J11A1	28480	8513-60144
N25				NOT ASSIGNED		
N26	8513-60146	1	1	CA AY A10J3-J11A2	28480	8513-60146
N27	8513-60147	1	1	CA AY A11J3-J11A3	28480	8513-60147
N28				NOT ASSIGNED		
N29				NOT ASSIGNED		
N30				NOT ASSIGNED		

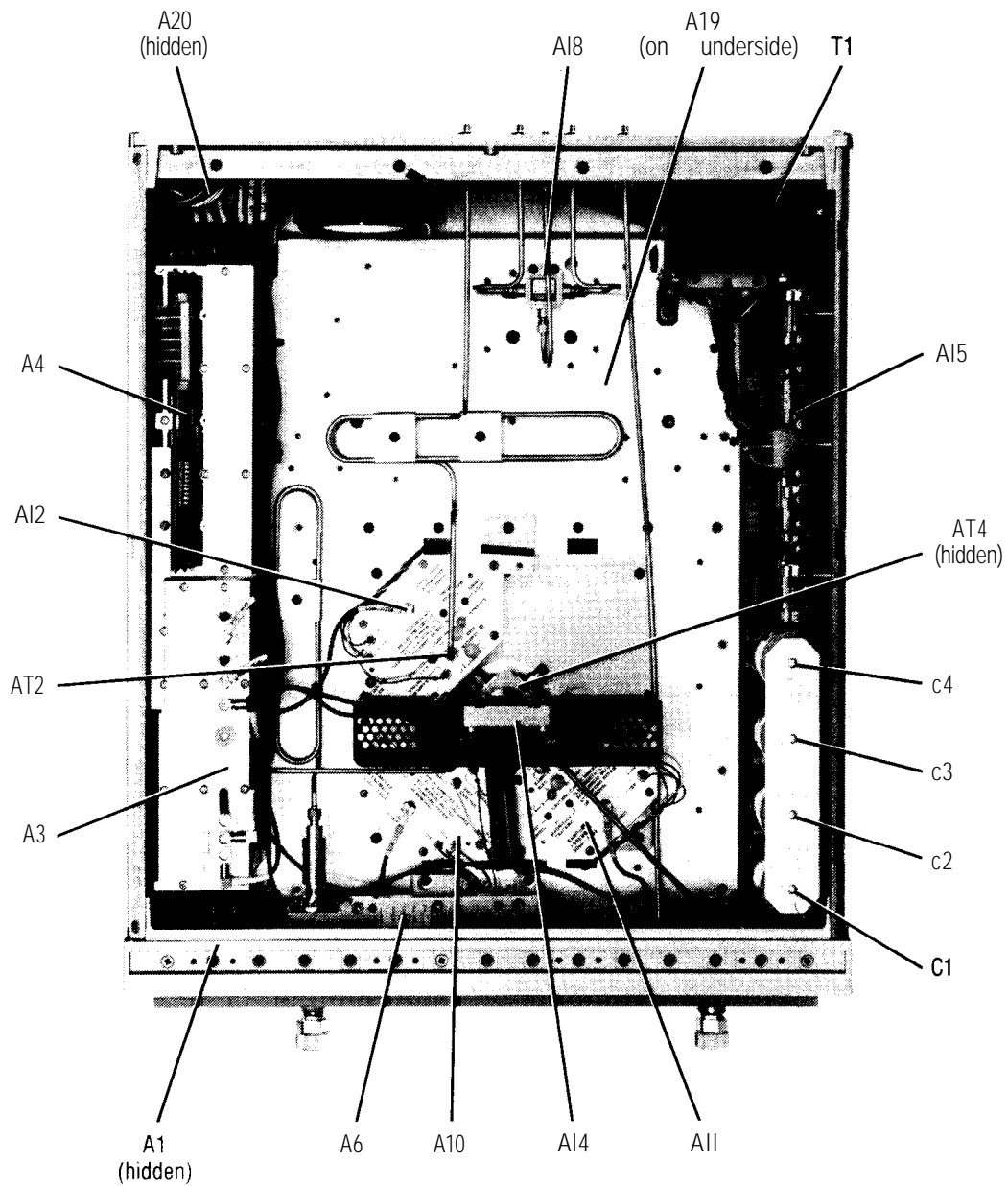
Table 6-3. HP 8512A Replaceable Parts (3 of 4)

Reference Designator	HP Part Number	U	Qty	Description	Mfr Code	Mfr Part Number
W31	08512-20011	€	1	CA AY A6J3-A10J2	28480	08512-20011
W32	08512-20012	/	1	CA AY A8J1-A11J2	28480	08512-20012
W33	08512-20006	€	1	CA AY A12J2-J4	28480	08512-20006
W34	08513-20020	€	1	CA RF A18J3/PRT 1	28480	08513-20020
W35	08513-20021	€	1	CA RF A18J2/PRT 2	28480	08513-20021
W36	08513-20022	€	1	CA AY A18J1/RF	28480	08513-20022
W37	08512-20017	Z	1	CA AY A6J2-J2	28480	08512-20017
W38				NOT ASSIGNED		
W39	08512-20019	4	2	CA AY J2J3 & J4J5	28480	08512-20019
W40				NOT ASSIGNED		
W48				NOT ASSIGNED		
W49	08512-20019	4		CA AY J2J3 & J4J5	28480	08512-20019
W50				NOT ASSIGNED		
W51				NOT ASSIGNED		
W52				NOT ASSIGNED		
W53				NOT ASSIGNED		
W54				NOT ASSIGNED		
W55				NOT ASSIGNED		
W56				NOT ASSIGNED		
W57	08513-60014	4	1	CBL AY RP-MB	28480	08513-60014
W58	08513-60036	0	1	CBL AY RP-HPIB	28480	08513-60036
W59	85102-60193	5	1	CA ASSY LINE SW	28480	85102-60193
W60	08513-60013	3	1	CA AY FRPNL-MBD	28480	08513-60013
W61	08510-60102	8	1	CBL AY TEST SET	28480	08510-60102
W62	8120-1348	5	1	CABLE ASSY 18AWG 3-CNDCT BLK-JKT	28480	8120-1348
W63	8120-3445	7	1	HP-IB CABLE 1 METER	28480	8120-3445
W64	8120-4396	9	1	CBL C AY-SMA	28480	8120-4396
	08513-60005	3	1	BD AY FRONT PNL	28480	08513-60005
<b>MISCELLANEOUS MECHANICAL &amp; CHASSIS PARTS</b>						
	3380-0643	3	2	STANDOFF-HEX 255-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
	3400-0002	2	4	GROMMET-RND .188-IN-ID 312-IN-GRV-OD	28480	3400-0002
	3590-0926	0	4	THREADED INSERT-STDF 6-32 .188-IN-LG SST	28480	3590-0926
	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
	2360-0113	2	3	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2360-0123	4	6	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2420-0001	5	5	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
	2420-0022	0	1	NUT-SPCLY 6-32-THD .23-IN-THK .354-OD	28480	2420-0022
	2510-0138	0	3	SCREW-MACH 8-32 3-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2510-0270	1	1	SCREW-MACH 8-32 3.25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2580-0003	5	4	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
	3050-0139	5	9	WASHER-FL MTLCL NO. 8 .172-IN-ID	28480	3050-0139
	3050-0152	3	4	WASHER-SHLDR NO. 8 .172-IN-ID .438-IN-OD	28480	3050-0152
	3050-0227	3	4	WASHER-FL MTLCL NO. 6 .149-IN-ID	28480	3050-0227
	3050-0692	5	3	WASHER-FL MTLCL NO. 10 .202-IN-ID	28480	3050-0692
	3160-0309	5	1	FINGER GUARD	4N833	2601-43 UL VERSION
	38514-00004	7	1	REAR PANEL	28480	38514-00004
	3624-0099	1	37	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	3624-0099
	3624-0100	5	8	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	3624-0100
	3400-0757	5	2	CLAMP-CABLE .25-DIA 1-WD PVC	28480	400-0757
	3190-0011	3	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	3190-0011
	3200-0105	1	9	SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	3200-0165	3	22	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
	3360-0115	4	55	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	3360-0119	3	6	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	3360-0333	3	12	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	3360-0333
	3510-0192	3	16	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
	3680-0129	3	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	3020-8803	3	1	FRAME FRONT	28480	3020-8803
	3020-8804	3	1	FRAME REAR	28480	3020-8804
	3020-8837	3	4	STRUT CORNER 18"	28480	3020-8837
	38505-20132	3	2	END PLATE ENCL	28480	38505-20132
	38505-20163	3	2	ENCLOSURE CKT	28480	38505-20163
	38512-20005	8	1	RFI GASKET	28480	38512-20005
	38513-00001	3	1	DECK	28480	38513-00001
	38513-00002	4	1	TRANSFORMER BRKT	28480	38513-00002
	38513-00005	7	1	MTG BRACKET-LH	28480	38513-00005
	38513-00006	8	1	MTG BRACKET-RH	28480	38513-00006
	38513-00015	9	1	CAP SPRT PLATE	28480	38513-00015
	38513-00016	0	1	BRACKET-CKT ENCL	28480	38513-00016
	38513-20013	9	1	BRACE-DECK	28480	38513-20013
	38513-20015	1	1	MOUNTING BAR	28480	38513-20015
	35102-20054	3	1	FRONT BEZEL MACH	28480	35102-20054
	3460-0100	7	1	TP ACRLC-XFR-A 1	28480	3460-0100
	2200-0165	5		SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
	1400-1209	4	1	CLP CA .69D 1.0W	28480	1400-1209



Table 6-3. HP 8512A Replaceable Parts (4 of 4)

Reference Designation	HP Part Number	U	Qty	Description	Mfr Code	Mfr Part Number
47	2190-0104	C	5	WASHER-LKINTL T 7/16 IN .439-IN-ID	28480	2190-0104
48	2200-0109	E	1	SCREW-MACH 4-40 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
49	2360-0121	Z	2	SCREW-MACH 6-32 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
50	2510-0141	E	4	SCREW-MACH 8-32 .562-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
51	2950-0132	E	5	NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
52	6960-0001	3	2	PLUG-HOLE DOME-HD FOR .375-D-HOLE STL	28480	6960-0001
53	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
54	5021-0906	6	6	SLEEVE RF PIN POS	28480	5021-0906
55	5021-3427	2	2	WSHR-TS PORT CON	28480	5021-3427
56	5021-3428	3	2	NUT-FLG TS PORT	28480	5021-3428
57	08512-00001	2	1	FRONT PANEL	28480	08512-00001
58	08512-00008	9	2	CLAMP A	28480	08512-00008
59	08512-00009	0	1	CLAMP B	28480	08512-00009
60	08512-00010	3	2	CLAMP C	28480	08512-00010
61	08512-00011	4	1	CLAMP D	28480	08512-00011
62	08513-00017	1	2	BRACKET-CONV AY	28480	08513-00017
63	08513-00019	3	1	COVER-I.F. MUX	28480	08513-00019
64	08513-00027	3	1	CVR BLANK-IF MUX	28480	08513-00027
65	08514-00002	5	1	SUB PANEL	28480	08514-00002
66	08514-20005	0	1	BLOCK-MTG CPLR	28480	08514-20005
67				NOT ASSIGNED		
68	85102-00041	6	1	COVER-BLANK A16	28480	85102-00041
69	2510-0195	9	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	2510-0195
70	7120-4835	0	1	LABEL-INFORMATION .75-IN-WD 2-IN-LG PPR	28480	7120-4835
71	7120-5911	5	1	LABEL-WARNING 1-IN-WD 7-IN-LG PPR	28480	7120-5911
72				NOT ASSIGNED		
73				NOT ASSIGNED		
74				NOT ASSIGNED		
75	5020-8896	7	2	TRIM FRNT HN DL	28480	5020-8896
76	5040-7201	8	4	FOOT-BOTTOM	28480	5040-7201
77	5040-7202	9	1	STRIP TRIM TOP	28480	5040-7202
78	5040-7221	2	4	FOOT-REAR	28480	5040-7221
79	5060-9847	4	1	COVER BTM 18" FM	28480	5060-9847
80	5060-9857	6	1	COVER AY SIDE	28480	5060-9857
81	5060-9899	6	2	HANDLE AY FRONT	28480	5060-9899
82	08513-00021	7	1	TEST SET CVR TOP	28480	08513-00021
83	08513-00025	1	1	COVER-SIDE PERF	28480	08513-00025
84	0380-0010	8	4	SPACER-RND .625-IN-LG .18-IN-ID	28480	0380-0010
85	0050-0105	5	3	WASHER-FL MTLC NO 4 .125-IN-ID	28480	0050-0105
86	0360-0127	3	1	SCREW-MACH 6-32 .875-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
87	08513-00017	1		CONV-ASSEY	28480	08513-00017



See Figure 3 for parts unique to Option 001.

Figure 6-9. HP 8512A Top View Showing Locations of Major Assemblies

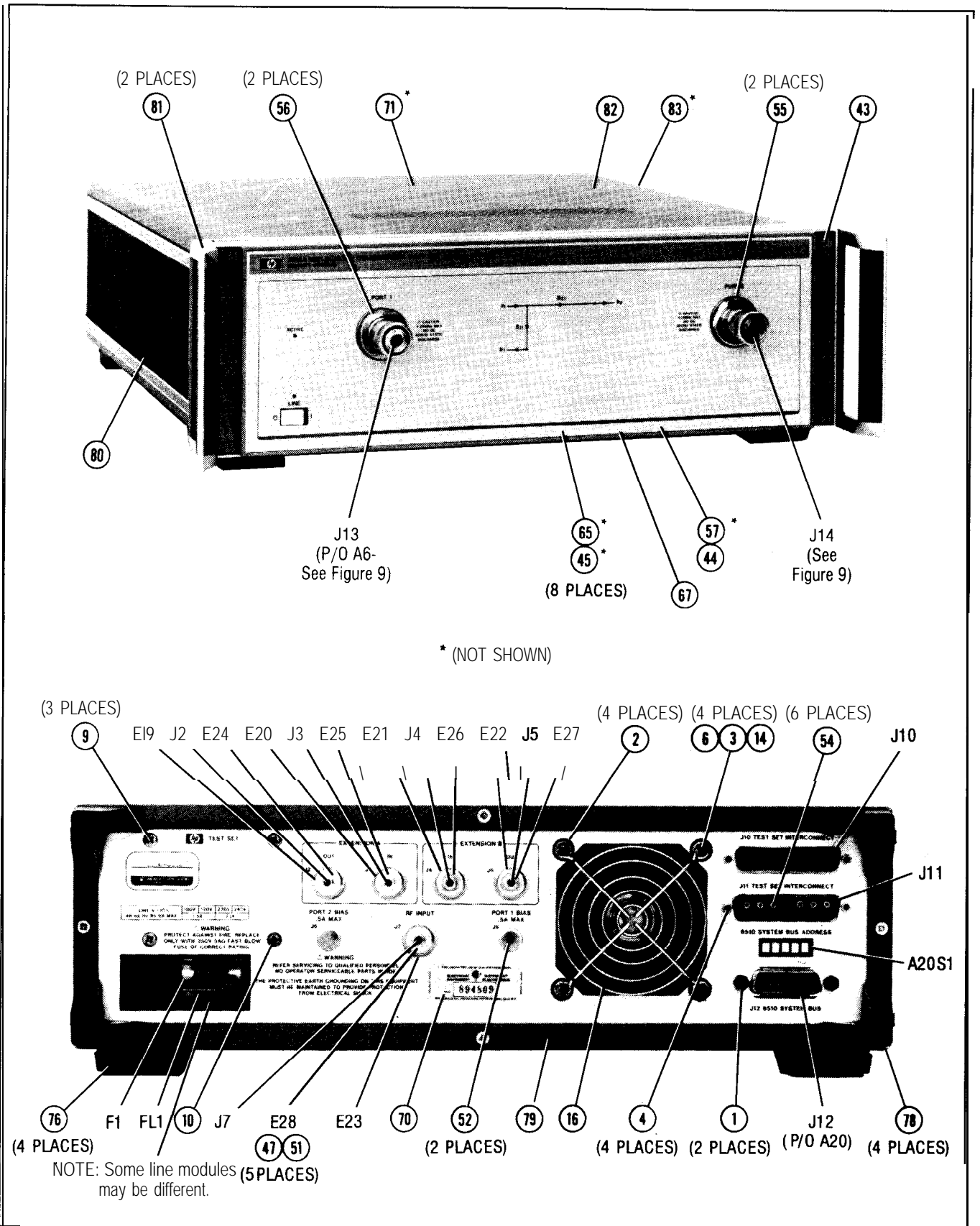
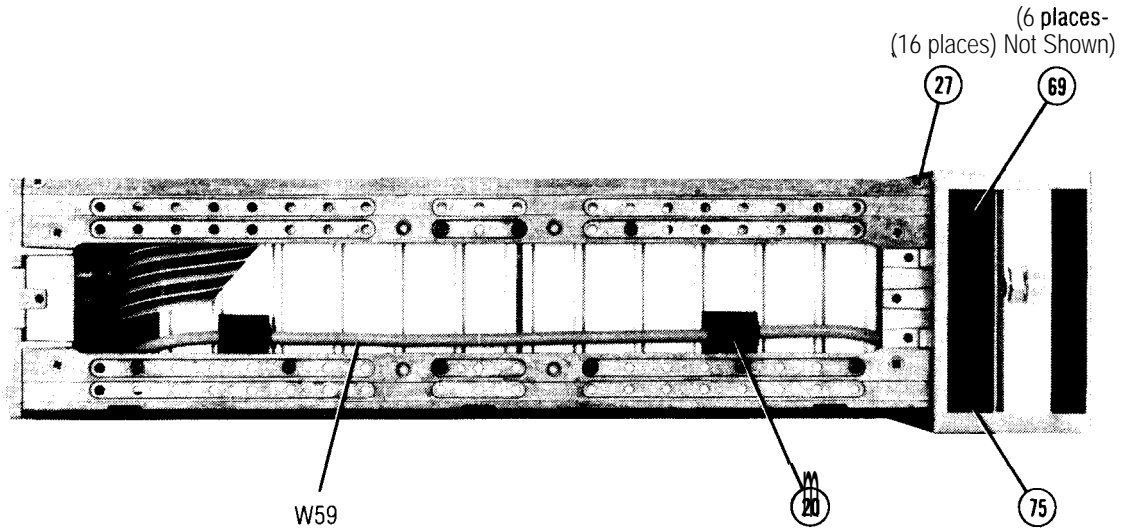


Figure 6-10. HP 8512A Miscellaneous Mechanical, Chassis, and Electrical Parts (1 of 5)

LEFT SIDE



RIGHT SIDE

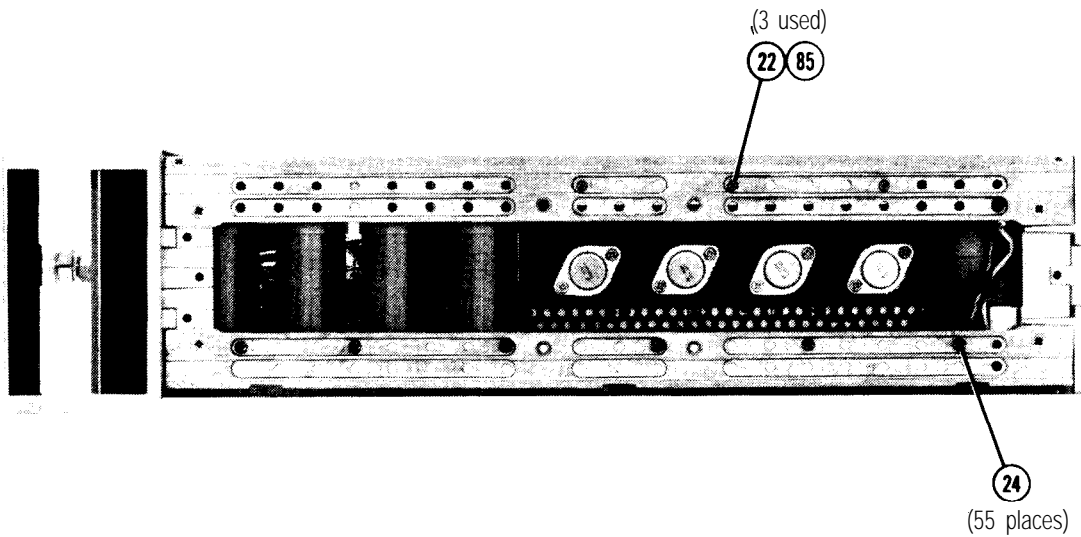


Figure 6-10. HP 8512A Miscellaneous Mechanical, Chassis, and Electrical Parts (2 of 5)

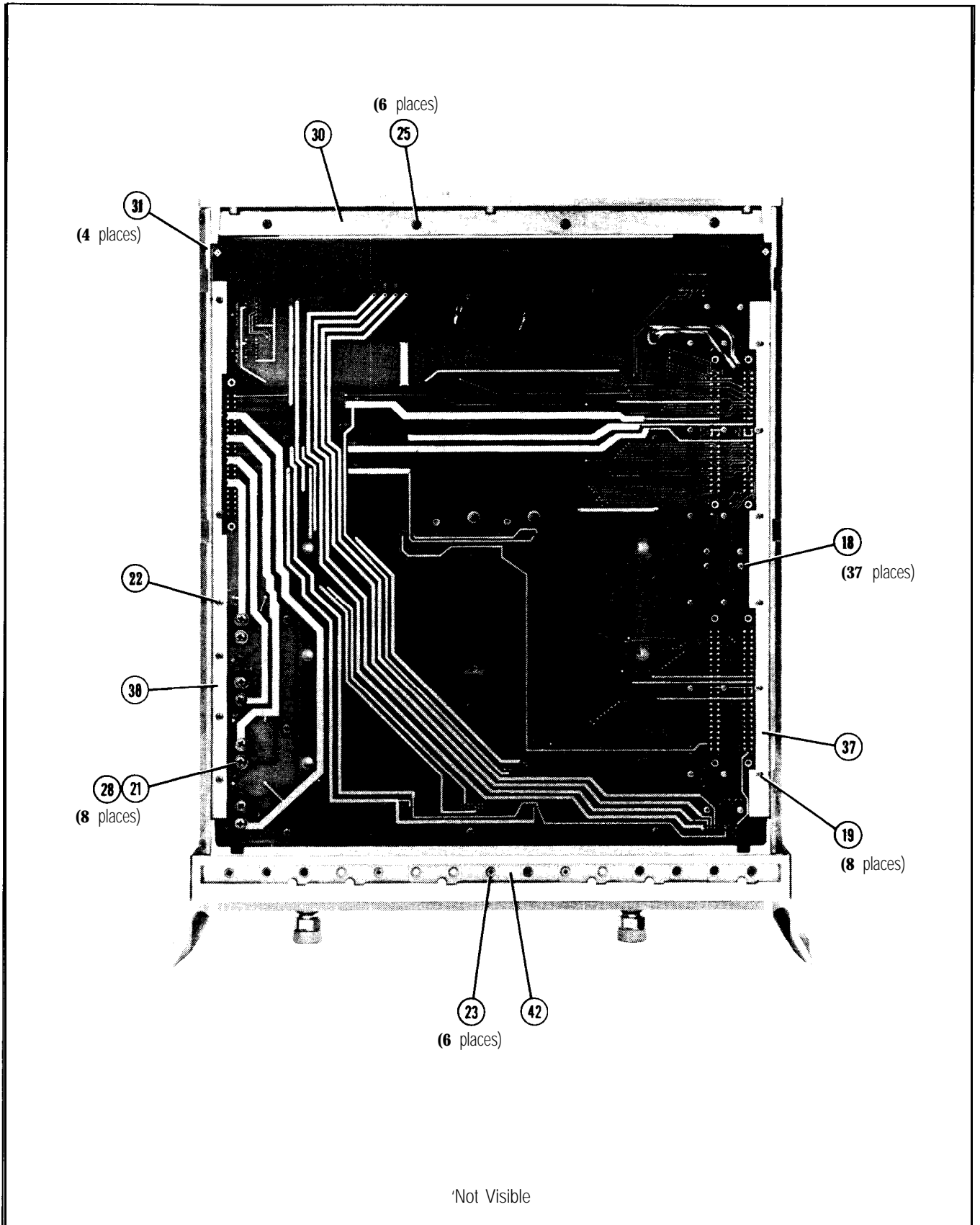
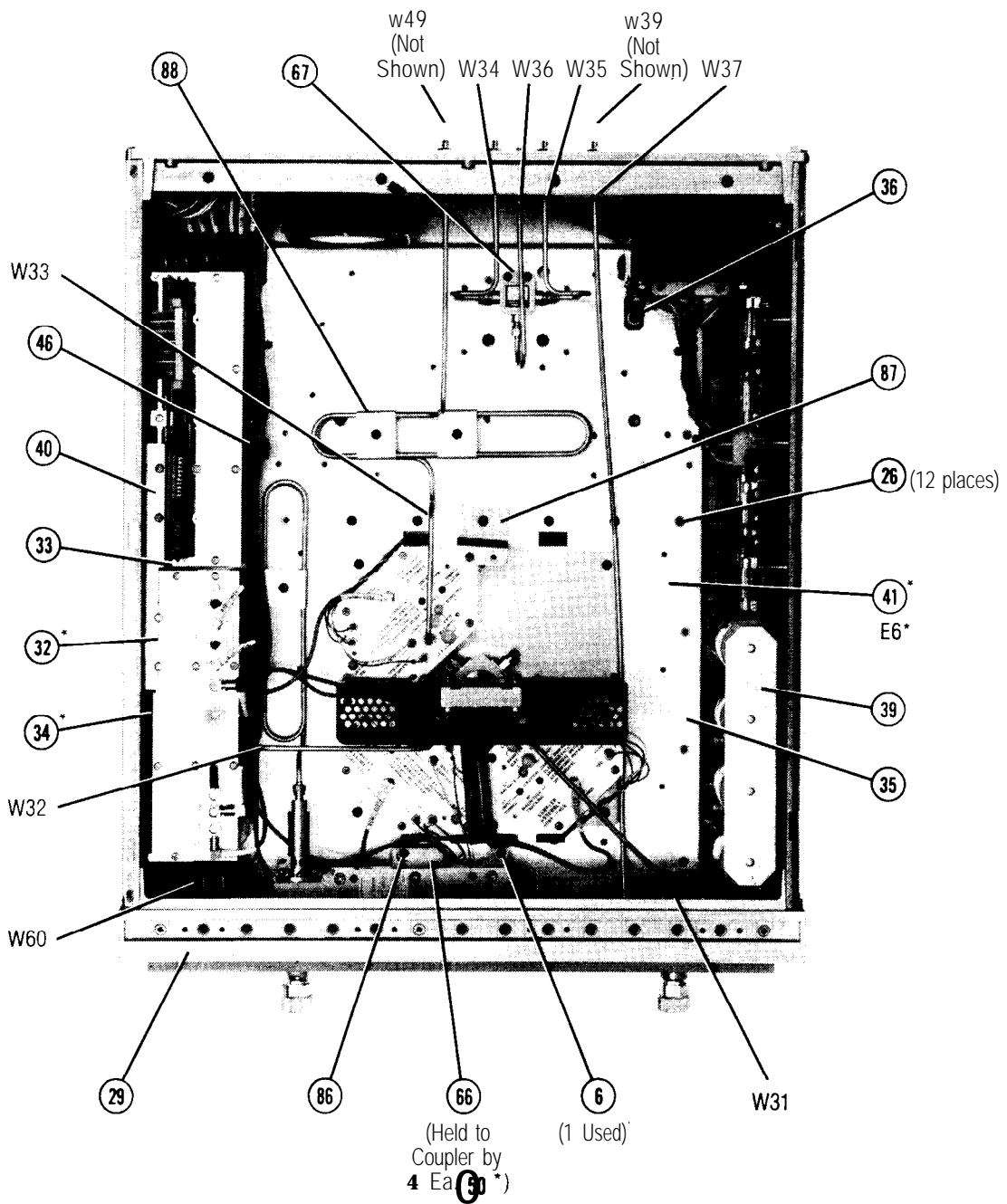
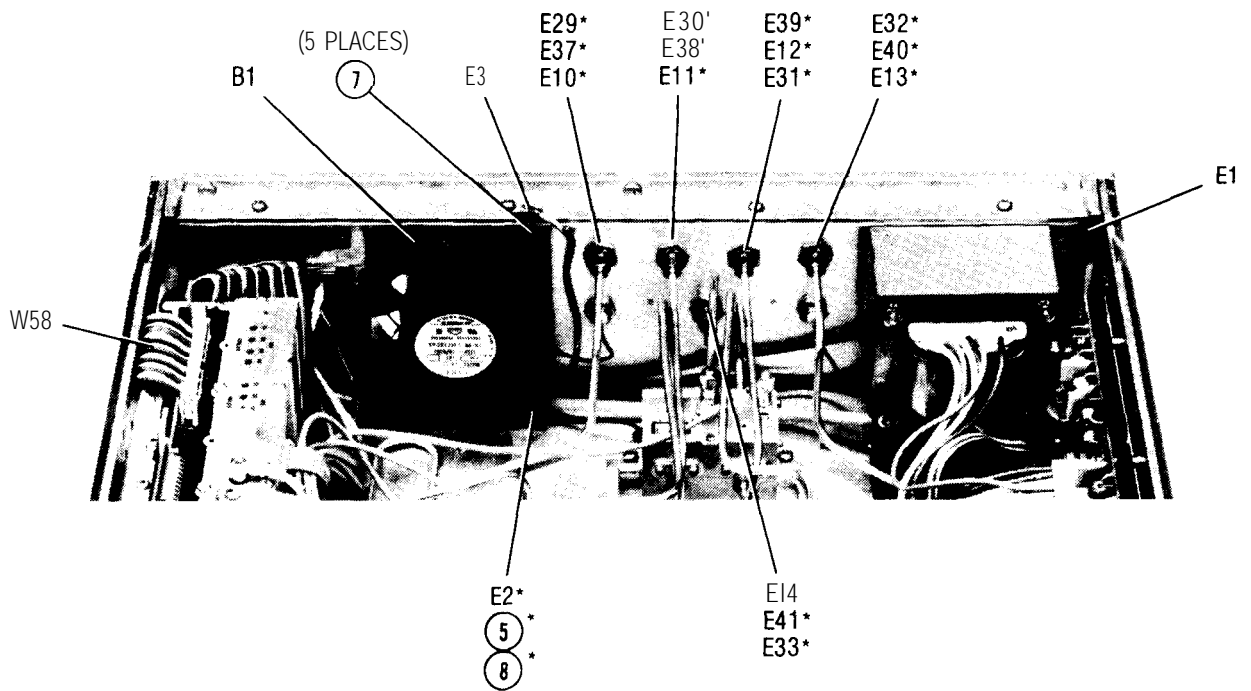


Figure 6-10. HP 8512A Miscellaneous Mechanical, Chassis, and Electrical Parts (3 of 5)



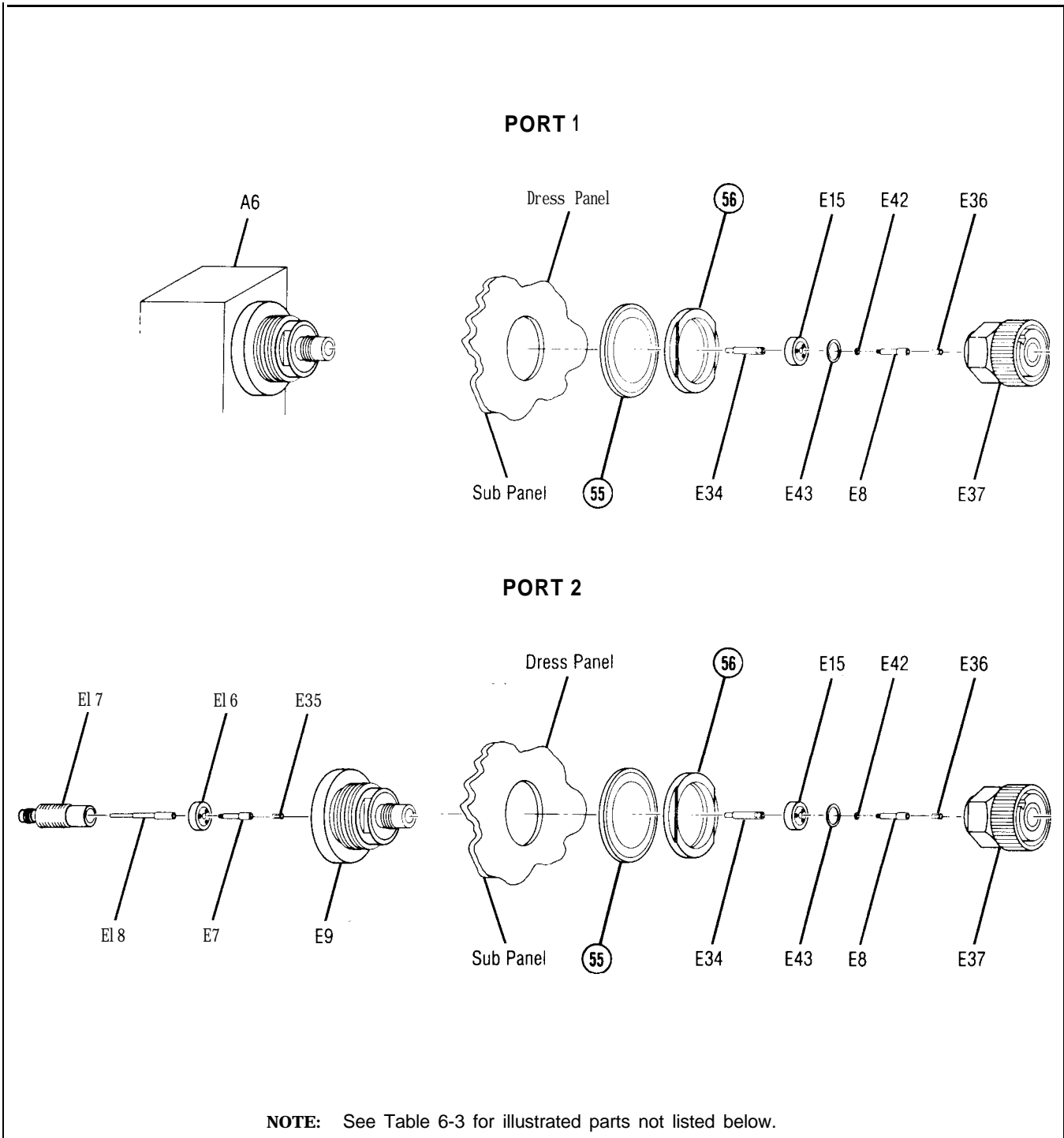
\*Not Visible

Figure 6-10. HP 8512A Miscellaneous Mechanical, Chassis, and Electrical Parts (4 of 5)



'NOTVISIBLE

Figure 6-10. HP 8512A Miscellaneous Mechanical, Chassis, and Electrical Parts (5 of 5)



Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
E42	5020.8541	9		0.0005 IN. INNER SHIM	28480	5020-8541
	5020-8540	8		0.0010 IN. INNER SHIM	28480	5020-8540
	08742-0005	3		0.0020 IN. INNER SHIM	28480	08742-0005
E43	5021-0830	5		0.0010 IN. OUTER SHIM	28480	08742-0006
	08742.0006	4		0.0020 IN. OUTER SHIM	28480	08742-0006

Figure 6-11. HP 8512A Port 1 and Port 2 Replaceable Parts



## Section 7. Service

---

This HP 8514B/8512A SERVICE section consists of a wiring diagram keyed to Figure 3, the component location diagram of the motherboard (A19). Use these two tools as aids to troubleshoot motherboard trace and component problems. Figure 3 is located in the previous section, *Replaceable Parts*. This section also information on servicing the front panel test port connectors.

Other service information is included in the Test Set *Troubleshooting* section of the this manual. Topics covered include checks of the major assemblies and assembly removal procedures, among others.

The repair of 3.5 mm RF connectors (like those on the rear panels of these test sets) is described in the Test Set *Troubleshooting* section of this manual.

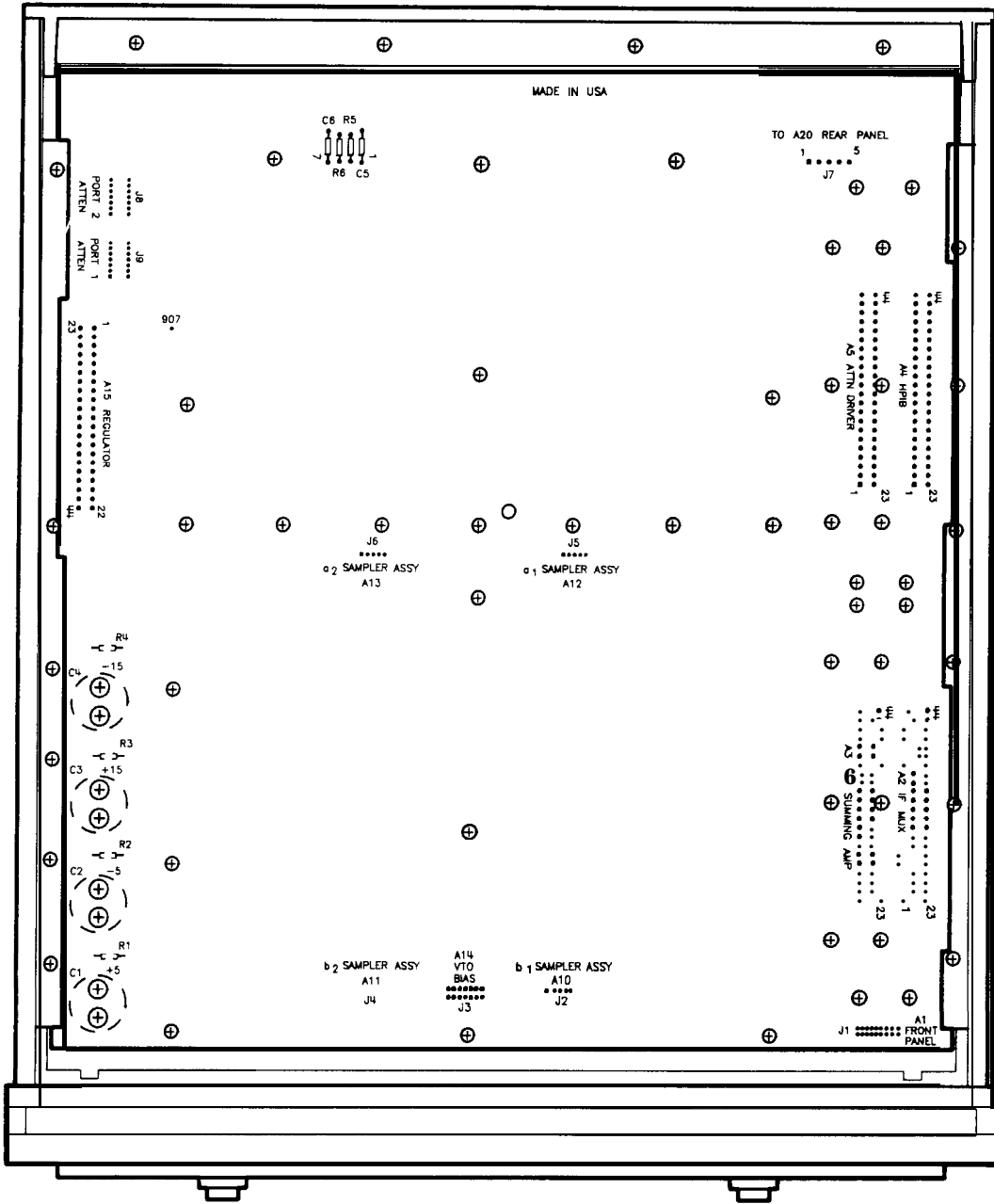
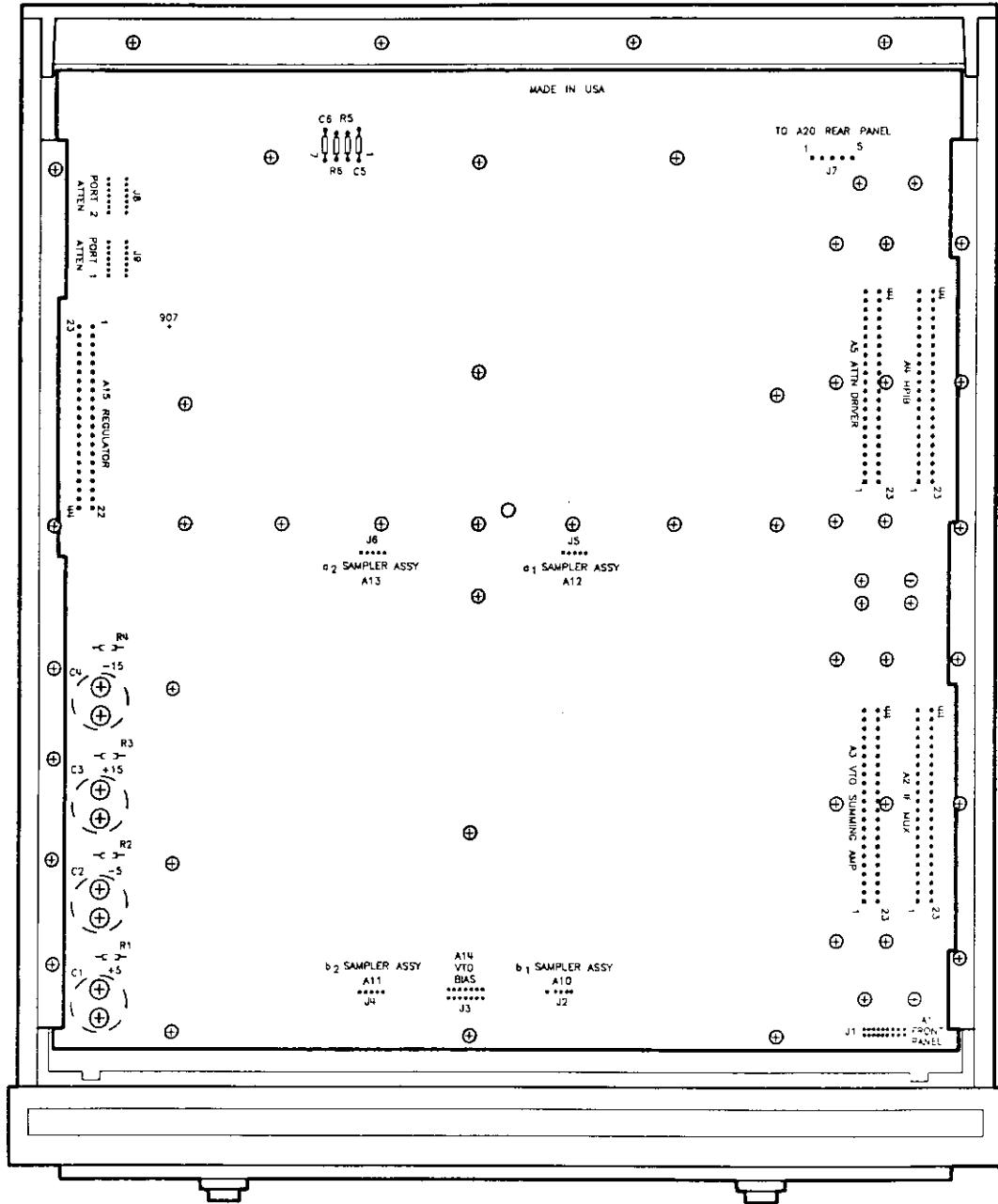


Figure 7-1. HP 8514B/8512A Motherboard

Test Sets Interconnect Table (1 of 2)

MNEMONIC	DESCRIPTION	SIGNAL ENTERS MOTHERBOARD (CONNECTOR/PIN)	SIGNAL ENTERS (ASSEMBLY) ←	A1 FRONT	A2 IF	A3 VTO	A4 HP-IB	A5 ATTN/	A10 SAMPLER	A11 SAMPLER	A12 SAMPLER	A13 SAMPLER	A14 VTO/	A15	A16 STEP	A17 STEP	A20 REAR	
				PANEL	MULTIPLEXER	SUMMING AMP	IB	SWITCH				DRIVER	REGULATOR	ATTN 1	ATTN 2	PANEL		
			SIGNAL EXITS MOTHERBOARD (CONNECTOR) →	J1	XA2	XA3	XA4	XA5	J2	J4	J5	J6	J3	XA15	J8	J9	J7	
ACTIVE	Active LED Indicator	XA4-3	<b>Motherboard Pin Numbers</b>	4														
AB0	Address Bus Bit 0	XA4-29							29									
AB1	Address Bus Bit 1	XA4-8							8									
AB2	Address Bus Bit 2	XA4-30							30									
AB3	Address Bus Bit 3	XA4-9							9									
AB4	Address Bus Bit 4	XA4-31							31									
A1S11	Attenuator 1 Section 1 In	XA5-4														2		
A1S10	Attenuator 1 Section 1 Out	XA5-26														13		
A1S21	Attenuator 1 Section 2 In	XA5-24														9		
A1S20	Attenuator 1 Section 2 Out	XA5-3														3		
A1S31	Attenuator 1 Section 3 In	XA5-23														5		
A1S30	Attenuator 1 Section 3 Out	XA5-2														11		
A1S41	Attenuator 1 Section 4 In	XA5-25														10		
A1S40	Attenuator 1 Section 4 Out	XA5-1														4		
A2S11	Attenuator 2 Section 1 In	XA5-44														2		13
A2S10	Attenuator 2 Section 1 Out	XA5-22																
A2S21	Attenuator 2 Section 2 In	XA5-18														9		
A2S20	Attenuator 2 Section 2 Out	XA5-42														3		
A2S31	Attenuator 2 Section 3 In	XA5-40														5		
A2S30	Attenuator 2 Section 3 Out	XA5-20														11		
A2S41	Attenuator 2 Section 4 In	XA5-19														10		
A2S40	Attenuator 2 Section 4 Out	XA5-41													4			
BNMINT	Buffered Non-Maskable Interrupt	XA4-28																
BSRQ	Buffered Service Request	XA4-2		28	4		2	28										
DB0	Data Bus Bit 0	XA4-15																
DB1	Data Bus Bit 1	XA4-37																
DB2	Data Bus Bit 2	XA4-16																
DB3	Data Bus Bit 3	XA4-38																
DB4	Data Bus Bit 4	XA4-17																
DB5	Data Bus Bit 5	XA4-39																
DB6	Data Bus Bit 6	XA4-18																
DB7	Data Bus Bit 7	XA4-40																
GND	Chassis Ground	XA15-18-23, 40-44		3, 5	11, 12, 33, 34	11, 12, 33, 34	11, 12, 33, 34	11, 12, 33, 34	2	2	2	2	3, 4		14	14		
LAP1	Low = Port 1 Attenuator Present	J8-1																
LAP2	Low = Port 2 Attenuator Present	J9-1																
LATORVP	Low = Attenuator Switch/Driver Present	XA5-43																

HP 8511A  
 HP 8514B/8512A  
 HP 8515A/8513A  
 HP 8516A  
 HP 85110A

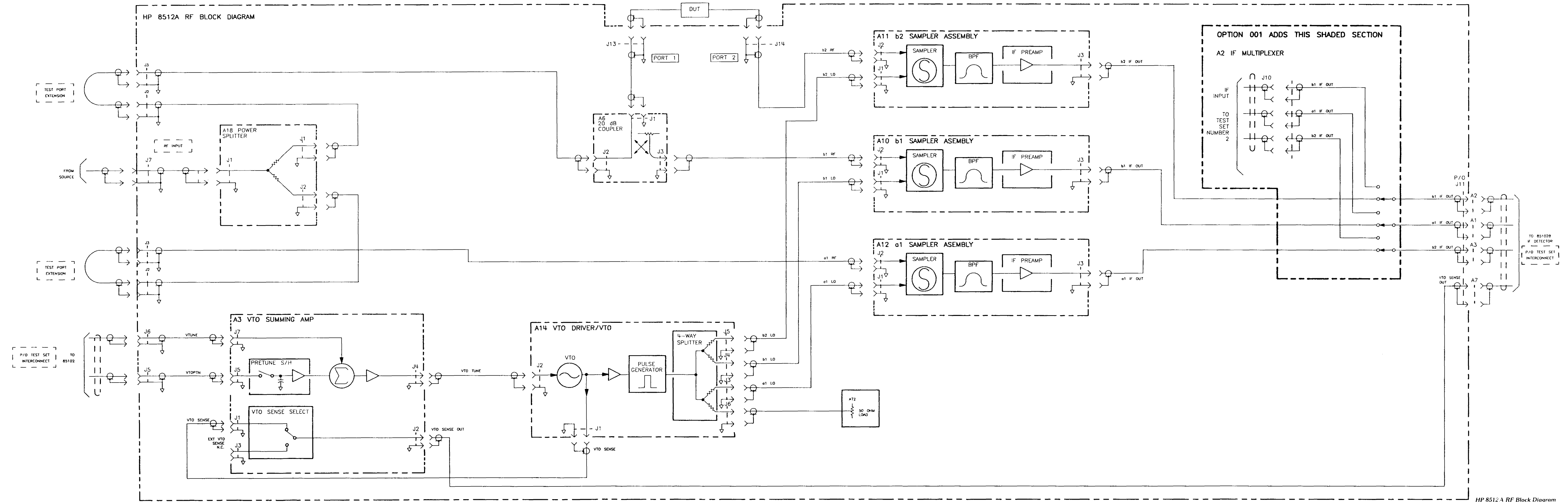


Test Sets Interconnect Table (2 of 2)

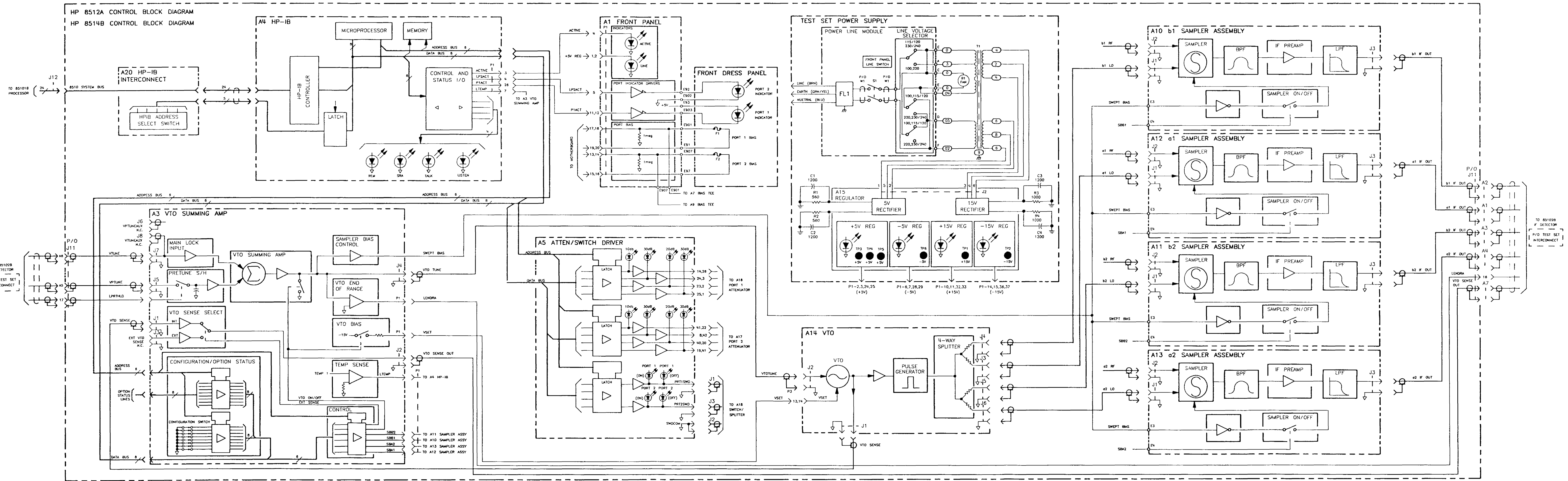
MNEMONIC	DESCRIPTION	SIGNAL ENTERS MOTHERBOARD (CONNECTOR/PIN)	SIGNAL ENTERS (ASSEMBLY) -	A1 FRONT	A2 IF	A3 VTO	A4 HP-IB	A5 ATTN/	A10 SAMPLER	A11 SAMPLER	A12 SAMPLER	A13 SAMPLER	A14 VTO	A15	A16 STEP	A17 STEP	A20 REAR	
				PANEL	MULTIPLEXER	SUMMING AMP	SWITCH	J2	J4	J5	J6	DRIVER	REGULATOR	ATTN 1	ATTN 2	PANEL		
			SIGNAL EXITS MOTHERBOARD (CONNECTOR) -	J1	XA2	XA3	XA4	XA5	J2	J4	J5	J6	J3	XA15	J8	J9	J7	
LBIOS LBUFWR LENDRA LOPTP	Low - Buffered I/O Strobe Low - Buffered Write Low - End of Range Low - Option Present	XA4-5 XA4-27 XA3-43 XA2-20	<b>Motherboard Pin Numbers</b>		5	5	27	5									2	
LPRTHLD LP2ACT LSWDRVP LTEMP	Low - Preturn Hold Low - Port 2 Active Low - Sweep Driver Present Low - Over Temperature	J11-17 XA4-4 XA3-21 XA3-7		6					43 7									3
PWON P1ACT P1BIASIN P1BIASOUT	Power On Port 1 Active Port 1 Bias Voltage In Port 1 Bias Voltage Out	XA4-6 XA4-26 J8 (Rear Panel) Port 1 (Front Panel)		19, 20 17, 18		6			6						1			
P2BIASIN P2BIASOUT SWEPTBIAS SBA1	Port 2 Bias Voltage In Port 2 Bias Voltage Out Swept Bias A1 Sampler On/Off	J6 (Rear Panel) Port 2 (Front Panel) XA3-24 XA3-4		15, 16 13, 14							1	1 5	1					
SBA2 SBB1 SBB2 TEMP2	A2 Sampler On/Off B1 Sampler On/Off B2 Sampler On/Off Analog Temperature Sensor	XA3-26 XA3-3 XA3-25 XA3-1								5	5		5					
VSET -5VA -5VCAP -5VCAP	VTO Set Voltage -5 Volts to Attenuators -5 Volts Unregulated to Input Filter Capacitor -5 Volts Unregulated to Input Filter Capacitor	XA3-2 XA5-17, 39 XA15-45 XA15-8, 9, 30, 31												13, 14		6	6	
+15VCAP 15VCAP +5VREG 5VREG	-15 Volts Unregulated to Input Filter Capacitor -15 Volts Unregulated to Input Filter Capacitor +5 Volts Regulated Supply 5 Volts Regulated Supply	XA15-12, 13, 34, 35 XA15-16, 17, 38, 39 XA15-2, 3, 24, 25 XA15-6, 7, 28, 29		1, 2	14, 36	14, 36	14, 36							9, 10 7, 8	12, 13, 34 16, 17, 38, 39			
+15VREG -15VREG	-15 Volts Regulated Supply -15 Volts Regulated Supply	XA15-10, 11, 32, 33 XA15-14, 15, 36, 37		7, 8	10, 32 13, 35	10, 32 13, 35	10, 32 13, 35	10, 32 13, 35	4 3	4 3	4 3	4 3	4 3	11, 12 5, 6				

HP 8511A  
HP 8514B/8512A  
HP 8515A/8513A  
HP 8516A  
HP 85110A

HP 8512A RF BLOCK DIAGRAM



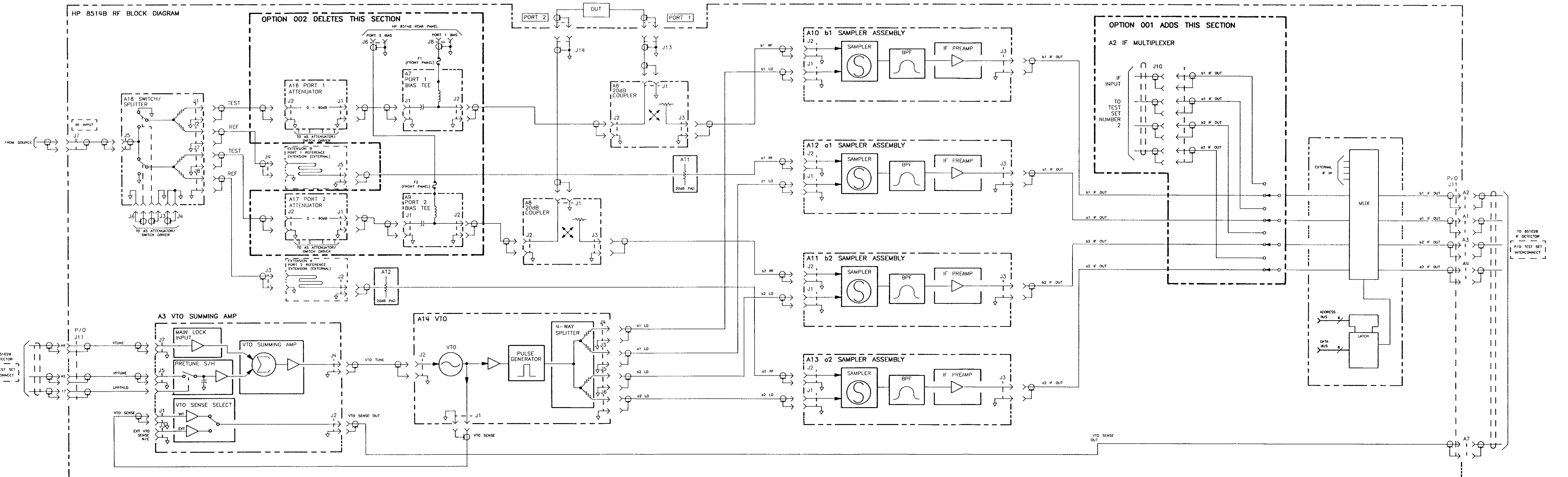
HP 8512A CONTROL BLOCK DIAGRAM  
HP 8514B CONTROL BLOCK DIAGRAM



HP 8514B/8512A Control Block Diagram

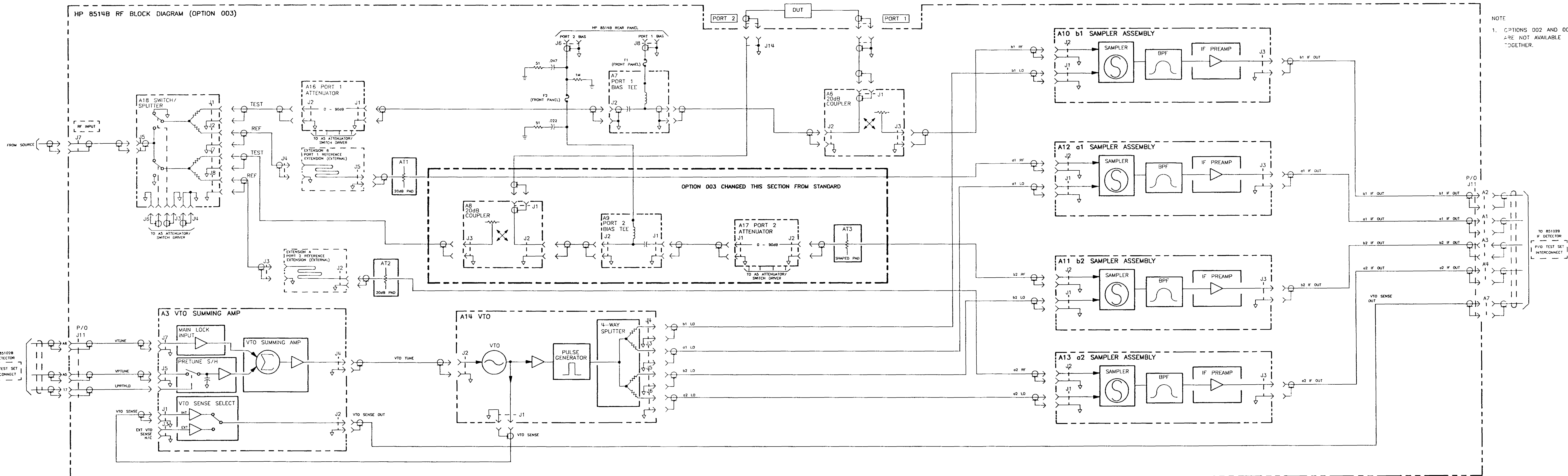
OPTION 002 DELETES THIS SECTION

OPTION 001 ADDS THIS SECTION





HP 8514B RF BLOCK DIAGRAM (OPTION 003)



NOTE  
1. OPTIONS 002 AND 003  
ARE NOT AVAILABLE  
TOGETHER.

## Section 8. Performance Tests

---

Performance test information and procedures are located in the *Performance Tests* section of the *HP8510B System Manual* and volume 2 of the *HP 8510A manual set*. Note that the *HP85108 performance test software* (supplied with the *System Manual*) is required to test the *HP85148* up to 20 GHz.

## Section 9. Adjustments

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The HP8514B and HP 8512A have one adjustment only, the sampler assembly adjustment. The procedure is documented in the *HP 8510B Service Manual* in the section titled *Adjustments*. It is also in the *Test Set Adjustments* section in volume 2 of the HP 8510A manual set. The adjustment is **software-guided**.

This adjustment should be performed only if the need to do so is firmly established. A poor adjustment is worse than none at all. Thus the software driven adjustment procedure begins with a check of the sampler in question to establish the need.

Do not perform the actual adjustment if the sampler passes the check.

## **Section 10. Manual Backdating**

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Manual backdating is not required for this manual set. This manual applies directly to instruments with the same (or lower) serial number prefix indicated on the title page. Instruments with serial number prefixes higher than the title page prefix may be documented in a manual update supplement.

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