

Errata

Title & Document Type: 8515A S-Parameter and 8513A Reflection/Transmission Test Sets Operating and Service Manual

Manual Part Number: 08515-90015

Revision Date: September 1, 1990

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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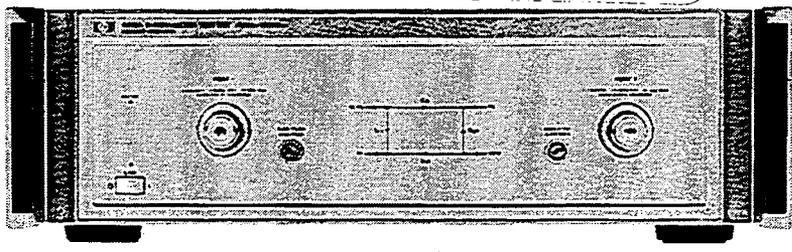
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OPERATING AND SERVICE MANUAL

**HP 8515A
S-PARAMETER
AND HP 8513A
REFLECTION/TRANSMISSION
TEST SETS**

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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

This Hewlett-Packard system product is warranted against defects in materials and workmanship for a period corresponding to the individual warranty periods of its component products. Computer and computer peripherals are warranted for a period of 90 days. Instruments are warranted for a period of one year. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

Warranty service for products installed by HP and certain other products designated by HP will be performed at Buyer's facility at no charge within HP service travel areas. Outside HP service travel areas, warranty service will be performed at Buyer's facility only upon HP's prior agreement and Buyer shall pay HP's round trip travel expenses. In all other areas, products must be returned to a service facility designated by HP.

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

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ASSISTANCE

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For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

HP 8515A S-PARAMETER AND HP 8513A REFLECTION/TRANSMISSION TEST SETS

SERIAL NUMBERS

This manual applies directly to HP 8515A test sets with serial number prefix 2707A and HP 8513A test sets with serial number prefix 2632A.

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 95401 U.S.A.

MANUAL PART NO. 08515-90015
Microfiche Part Number 08515-90016

Printed: SEPTEMBER 1990



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 8515A

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 8515A was qualified as part of a product family which includes the HP 8510C, HP 8530A, HP 8511A, HP 8511B, HP 8514B, 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: +49-7031-143143)

Notice for Germany: Noise Declaration LpA < 70 dB
am Arbeitsplatz (operator position)
normaler Betrieb (normal position)
nach DIN 45635 T. 19 (per ISO 7779)

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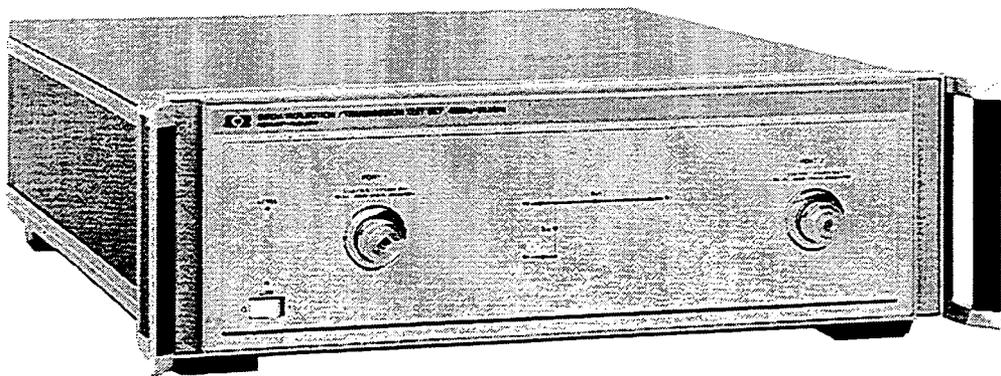
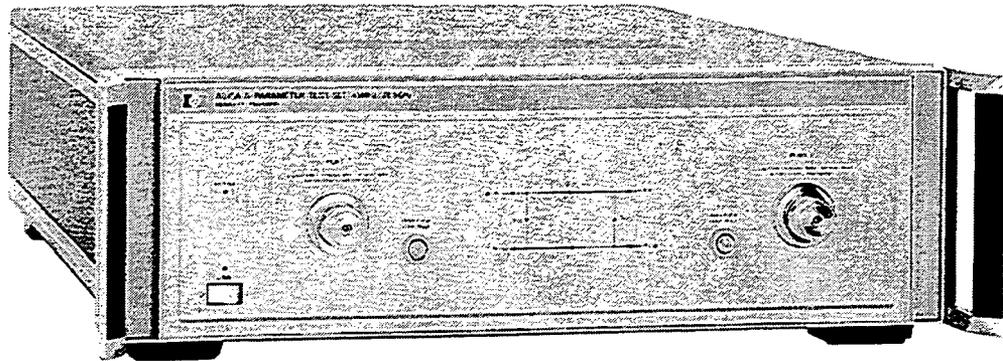


Figure 1. HP 8515A (upper) and HP 8513A Test Sets

General Information

INTRODUCTION

The purpose of this manual is to enable you to use your HP 8515A S-parameter or HP 8513A reflection/transmission test set effectively and confidently. These test sets are integral components of the HP 8510 measurement system. For that reason, this manual has been divided into two major portions (Operating and Service) to be an integral part of the HP 8510 documentation.

To begin using your test set, first place the Operating portion of this manual (with its HP 8515A/8513A Test Sets tab) in the TEST SETS section of the HP 8510B Test Set and Accessories Manual. Or put it in the front of volume 3 of the HP 8510A manual set. The Operating part consists of:

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

Place the Service portion of this manual (with the HP 8515A or 8513A TROUBLESHOOTING tab) behind the TEST SET TROUBLESHOOTING information in the HP 8510B Service Manual. If you do not have the HP 8510B Service manual, put the Service portion behind the Operating portion. 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 8515A and HP 8513A have been designed to operate specifically with the HP 8510 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 HP 8510B System Manual or Volume 2 of the HP 8510A Operating and Service Manual.
- 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 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 print date and part number on the title page of the manual.

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 8515A test set with the HP 8510 network analyzer and source provides a system for making S-parameter measurements over the frequency range of 45 MHz to 26.5 GHz. This system is suited for making all four S-parameter measurements on two port devices without physically reversing the DUT (device under test).

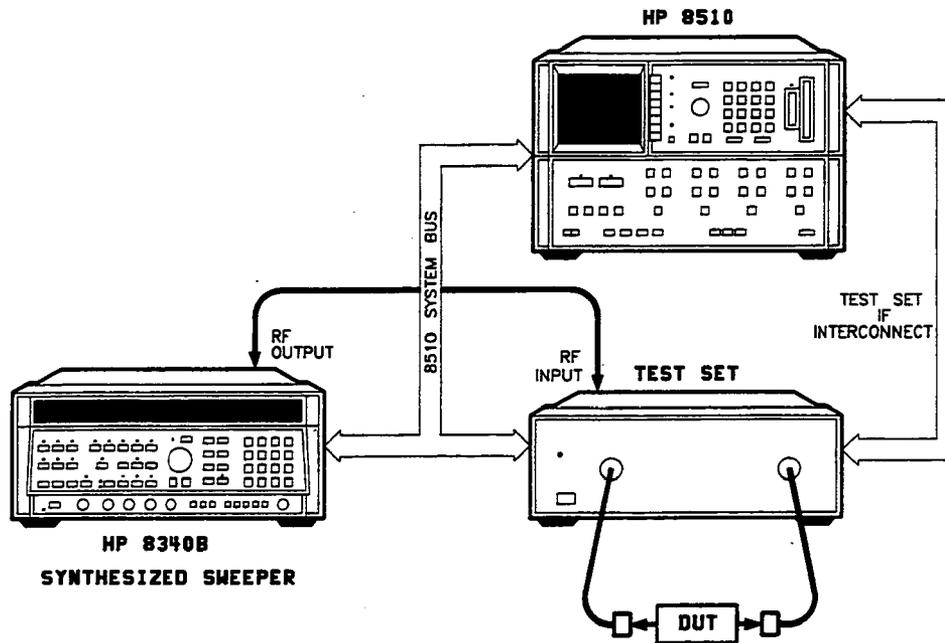
The HP 8515A uses two bridges for signal separation. For measurements of active devices, the standard HP 8515A includes:

- 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 input port center conductors.

The HP 8513A reflection/transmission test set differs from the HP 8515A in four major respects. The HP 8513A has:

- one bridge for making reflection (S11) and transmission (S21) measurements.
- three RF to IF converters.
- 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 HP 8515A and 8513A, respectively. Figure 2 shows the HP 8515A in a typical measurement set-up.



NOTE: SOURCE - HP8510 CABLES NOT SHOWN.

Figure 2. Typical HP 8515A Measurement Set-up

OPTIONS

Option 001

This option adds IF switching capability to allow up to four test sets to be connected to the HP 8510B at the same time. The test set in use is selected from the HP 8510B 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. For more information see "Controlling Multiple Test Sets" in the OPERATION Section of this manual.

Option 002 (HP 8515A only)

This option deletes the 90 dB programmable step attenuators and the dc bias tees. Note that bias can be applied externally, using the HP 11612A bias tee, if bias is required but attenuation not.

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 sale. 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 HP 8510 manual set.

ACCESSORIES

Accessories Supplied

Figure 3 shows the accessories supplied with the HP 8515A and 8513A test sets (except as noted in Table 3). The accessories, with part numbers, are listed in the INSTALLATION section for both test sets.

Accessories Available

Calibration, Verification and Adapter Kits. Hewlett-Packard offers two calibration kits suitable for calibrating an HP 8510/8515A or 8513A when making error corrected measurements with a 3.5 mm connector interface. The HP 85052B Calibration Kit contains the following components:

- open circuits (m) and (f)
- short circuits (m) and (f)
- fixed loads (m) and (f)
- sliding loads (m) and (f)
- 3.5 mm adapters (to convert a 3.5 mm test port interface to either sex)
- 3.5 mm maintenance tools
- 3.5 mm gages.

The HP 85052E Calibration Kit contains the same standards as the HP 85052B, above, except it contains only one sliding load (that can be made either male or female), and it contains no connector gages.

The HP 85053B 3.5 m Verification Kit includes a set of 3.5 mm measured standards to verify the performance of an HP 8510/8515A or 8513A system operating with error correction. The kit standards are supplied with printed and taped data (either electrical or mechanical). The standards included are:

- 10 cm airline
- stepped impedance airline
- 20 dB attenuator
- 40 dB attenuator

Each calibration kit noted below includes a set of precision standards to calibrate an HP 8510 system in the indicated interface.

Connector Type	Calibration Kit	Verification Kit	Adapter Kit
7 mm Type-N 50Ω 3.5 to 7 mm	HP 85050B/C/D HP 85054B	HP 85051B HP 85055A	HP 85130B

RF Cables. The following cables are specified from DC to 26.5 GHz. The HP 85131D 3.5 mm Test Port Return Cable Set is a pair of 21 inch long cables. Typically it is used with the HP 8515A. 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 85131C 3.5 mm Test Port Return Cable is a single, 32 inch cable for measurements where the device is connected directly to the test port. It is typically used with the HP 8513A. The cable has two 3.5 mm (f) connectors.

Transistor Test Fixture Kit. The HP 85041A Transistor Test Fixture Kit (TTF) with the HP 85014A software 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 adapted for use with the HP 8515A. Please consult with your local HP Systems Engineer for specific recommendations.

OPERATING AND SAFETY PRECAUTIONS



ATTENTION Static Sensitive

Handle only at Static Safe
Work Stations

Operating

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
+20 dBm +20 dBm -7 dBm	HP 8515A Port 1 and 2 HP 8513A Port 1 HP 8513A Port 2

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 and replaceable parts information for the HP 8515A and 8513A test sets are in the HP 8510B Service Manual.

ADDITIONAL EQUIPMENT REQUIRED

Table 2 lists additional equipment and accessories required for use with the HP 8515A and 8513A 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.

Specifications

Specifications describe the warranted performance of the instrument.

The electrical specifications of the HP 8515A and HP 8513A test sets with an HP 8510B network analyzer are defined in the SPECIFICATIONS section of the HP 8510B System Manual. Specifications for HP 8510A systems are defined in GENERAL INFORMATION, volume 1 of the HP 8510A manual set.

MECHANICAL SPECIFICATIONS

Table 1A. HP 8510B/8515A Mechanical Specifications

Test Ports (Front Panel)

NMD-3.5 mm connector center pin recession: 0.005 mm to 0.056 mm (0.002 in. to 0.0022 in.)

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

SUPPLEMENTAL CHARACTERISTICS

The supplemental characteristics listed in table 1 are intended to provide information useful in applying the instrument by giving typical, but non-warranted, performance parameters.

Table 1B. HP 8510B/8515A Characteristics

Test Ports (Front Panel)

Connector type: precision 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: $> +20$ dBm CW RF¹

Nominal operating power level:

Frequency	Operating Level
0.045 to 8 GHz	-5 dBm
8 to 20 GHz	-10 dBm
20 to 26.5 GHz	-25 dBm

Nominal connector nut size: 20 mm

Recommended torque: 90 N-cm (8 in.-lb.)

RF Input Connector (Rear Panel)

Connector type: precision 3.5 mm female

Damage input level: $> +23$ dBm

Source power levels for reference channel phase lock:

Minimum: 0 dBm

Maximum: +14 dBm

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.)

1. Do not exceed +2 dBm to test port for proper operation.

Table 1C. HP 8510B/8513A Characteristics

<p>Test Ports (Front Panel)</p> <p>Connector type: precision 3.5 mm male Impedance: 50 ohms nominal Damage input level:¹ Port 1: > +20 dBm Port 2: > +13 dBm Nominal operating power level:</p> <table border="0"> <tr> <td>Frequency</td> <td>Nominal Operating</td> </tr> <tr> <td>0.045 to 8 GHz</td> <td>-5 dBm</td> </tr> <tr> <td>8 to 20 GHz</td> <td>-10 dBm</td> </tr> <tr> <td>20 to 26.5 GHz</td> <td>-25 dBm</td> </tr> </table> <p>Nominal connector nut size: 20 mm Recommended torque: 90 n-cm (8 in.-lb.)</p> <p>RF Input Connector (Rear Panel)</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 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	0.045 to 8 GHz	-5 dBm	8 to 20 GHz	-10 dBm	20 to 26.5 GHz	-25 dBm
Frequency	Nominal Operating								
0.045 to 8 GHz	-5 dBm								
8 to 20 GHz	-10 dBm								
20 to 26.5 GHz	-25 dBm								
<p>1. Do not exceed +2 dBm input to Port 1 or -7 dBm input to Port 2 for proper operation.</p>									

Table 1D. HP 8515A and 8513A Power Requirements and Physical Characteristics

<p>Operating Temperature: 0°C to 55°C</p> <p>Power: 110, 120, 220 or 240 ±10% Vac; 47 to 66 Hz line frequency</p> <p>Dimensions: 460 mm × 133 mm × 610 mm (18.1 × 5.25 × 24 inches)</p> <p>Weight: HP 8515A: 19 kg (41 lb) net HP 8513A: 16 kg (35 lb) net</p>

Table 2. Recommended Equipment

Item	Critical Specifications	Recommended Model	Use ¹
Network analyzer Source ²	no substitute	HP 8510A/B	O, P, T
Controller ³	no substitute	HP 9000 series 200 or 300 with 2 Mbyte RAM and Basic 3.0 or higher or PC-305 or PC-308 HP BASIC Controller with 2 Mbytes of Basic Language processor RAM.	O, P, T P
Disc drive ³	compatible with controller		P
Multimeter	range: 0 to 50V	HP 3456A	T
Oscilloscope	50 MHz bandwidth	HP 1740A	T
<p>1. O = operation P = performance test T = troubleshooting 2. Refer to HP 8510 INSTALLATION manual for recommended sources 3. Not required for manual performance tests with HP 8510A.</p>			

INTRODUCTION

This section explains how to install the HP 8515A and HP 8513A 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 HP 8510 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 in Table 3 and illustrated in Figure 3.

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.

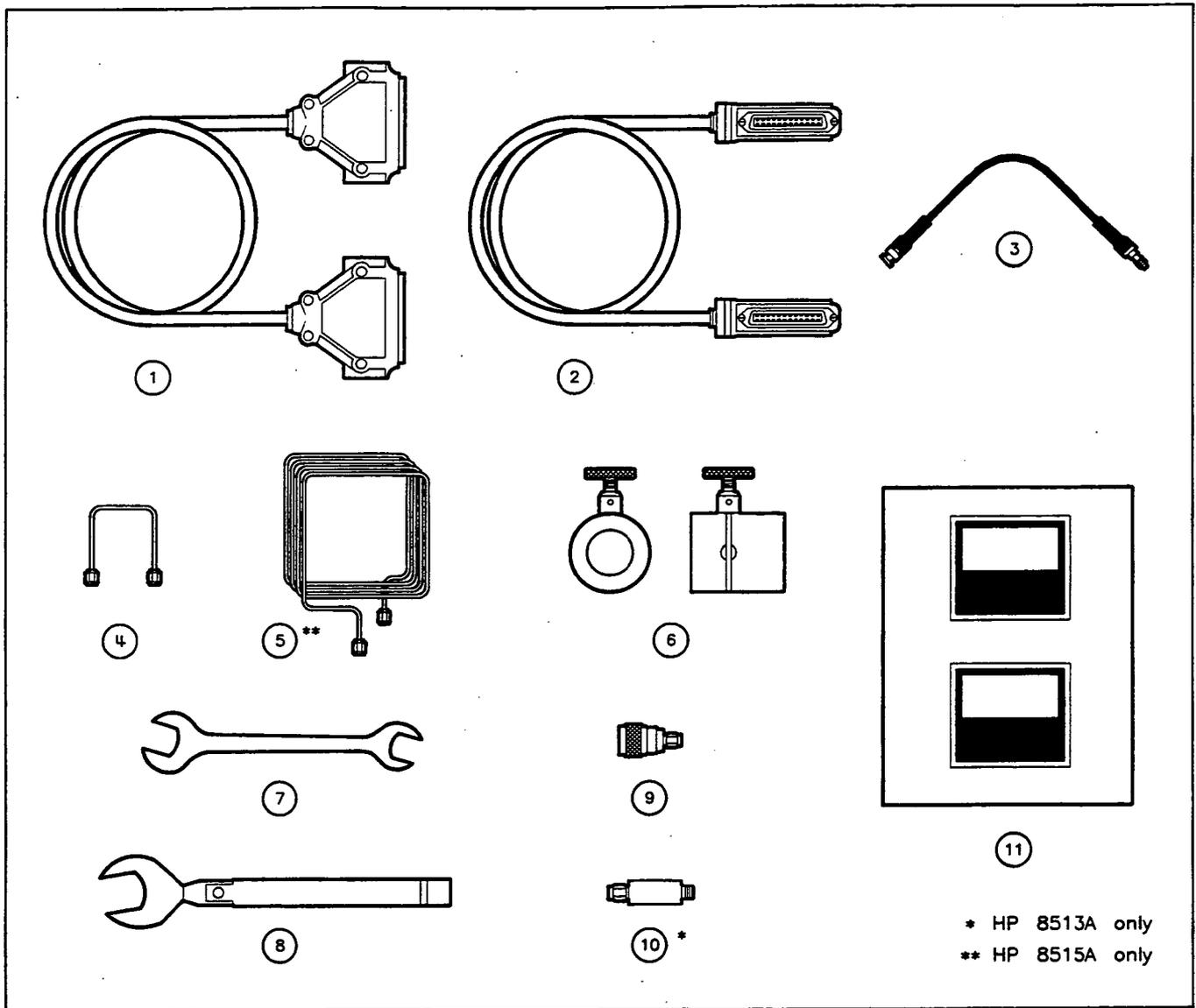
If the shipping container is damaged, complete the performance tests outlined in the HP 8510 manual set. If the test set fails the performance tests, or is damaged or defective, keep the shipping materials and notify both the carrier and the nearest Hewlett-Packard office. The HP office will arrange for repair or replacement of the test set without waiting for settlement of the claim. If the components received with the test set are incomplete, notify your nearest HP office and the deficient 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).



* HP 8513A only
 ** HP 8515A only

Item	HP Model or Part Number	
	HP 8515A	HP 8513A
POWER CORD ¹	8120-1348	8120-1348
1 TEST SET IF INTERCONNECT CABLE	08510-60102	08510-60102
2 HP-B CABLE, 1 METER	8120-3445	8120-3445
3 RF CABLE (FLEXIBLE)	08513-60009	08513-60009
4 REFERENCE PORT EXTENSION CABLES (SHORT, 2)	08512-20019	08512-20019
5 REFERENCE PORT EXTENSION CABLES (LONG, 2)	08514-20013	
6 ANTI-ROTATION CLAMPS (2)	08515-60003	08515-60003
7 OPEN END WRENCH 1/2 IN. X 3/4 IN.	8710-1770	8710-1770
8 TORQUE WRENCH 20 MM 90 N-cm (8 IN.-LB.)	8710-1764	8710-1764
9 TYPE-N (m) TO SMA (m) ADAPTER	1250-1894	1250-1894
10 ATTENUATOR (10 dB, 3.5 MM)		8493C OPTION 010
OPERATING AND SERVICE MANUAL ¹	08515-90015	08515-90015
PRINCIPLES OF MICROWAVE CONNECTOR CARE ¹	5954-1566	5954-1566
SPECIFICATION AND PERFORMANCE VERIFICATION SOFTWARE		
11 PROGRAM AND DATA DISK	08510-10033	08510-10033

¹ NOT SHOWN IN FIGURE 3

Figure 3. Accessories supplied with HP 8515A and HP 8513A

PREPARATION FOR USE

Positioning the Test Set

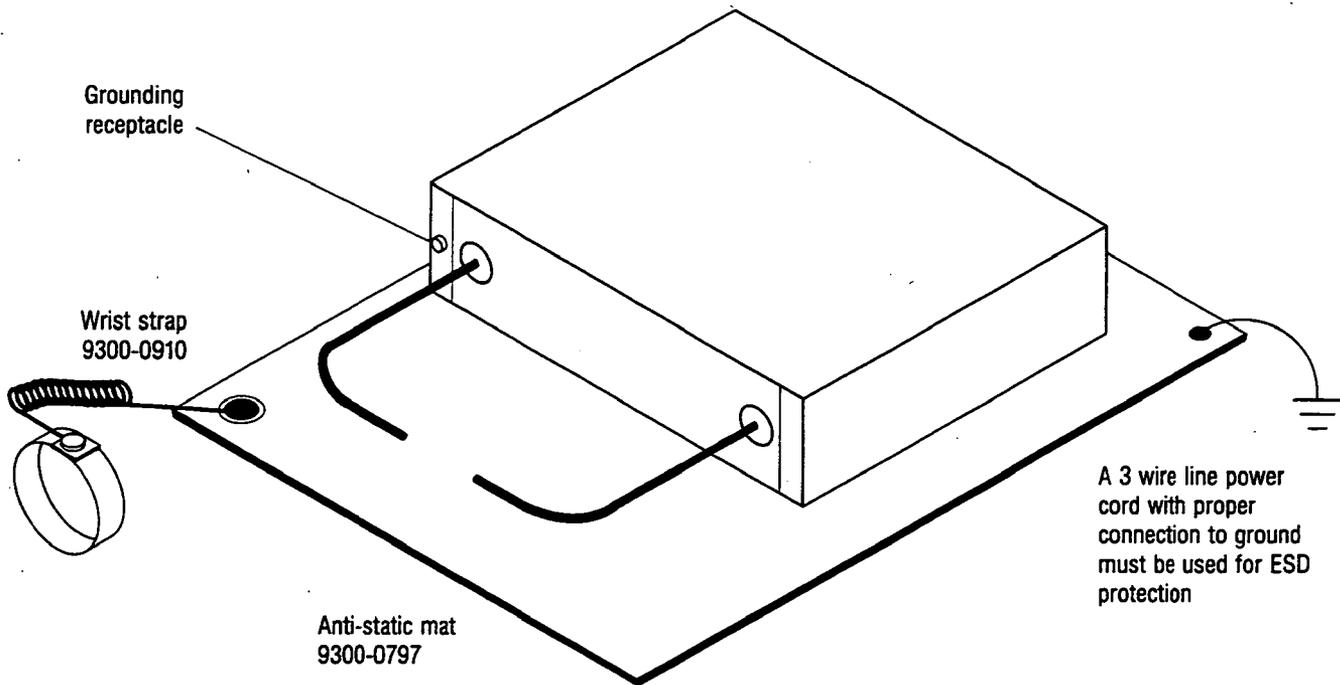
Typically the test set is placed on the work surface (anti-static recommended) whether it is rack-mounted or used on a bench. To install the flanges to rack mount it (with or without handles) in a standard 19 inch rack, refer to Figure 4.

The recommended rack is the HP 85043A. Instructions for rack mounting the test sets in a system configuration with the HP 8510 are provided in the HP 8510 INSTALLATION section and in the HP 85043A system rack manual.

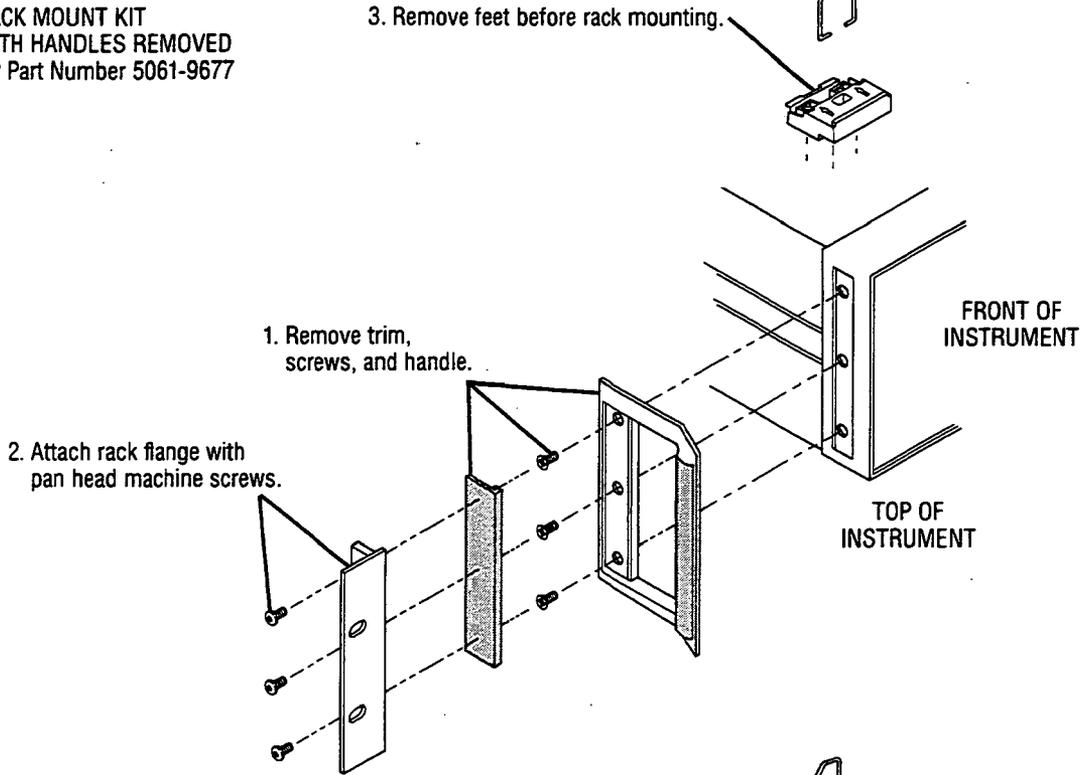
Static Free Workstation

When installing the test set for use on a bench, place it on an anti-static work surface 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 for the test ports and cable ends.

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



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

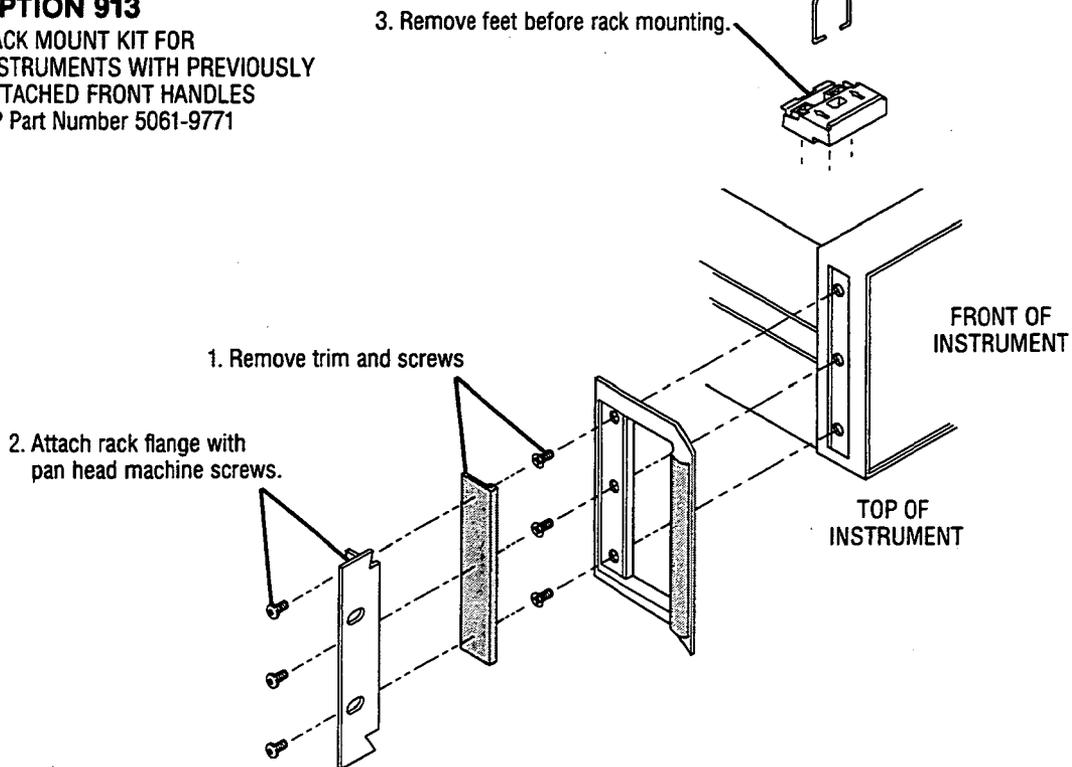


Figure 4. Attaching Rack Mounting Hardware

Connecting the Test Set

Mating Connectors: PORTS 1 and 2 are precision 3.5 mm male connectors that mate with precision 3.5 mm female connectors.

The TEST SET INTERCONNECT connector is a series D subminiature female connector with 7 RF connections. It mates with the corresponding male connector.

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

Power and Control Connections: The following connections, with the exception of line power, are illustrated in Figure 5. That figure also shows connections required for the RF source.

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 HP 85102 IF Detector.

Connect the system bus cable from the HP 8515A (or 8513A) J12 8510 SYSTEM BUS connector to the 8510 INTERCONNECT connector of the HP 85101 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.

Anti-Rotation Clamps: Use these clamps to stabilize the test port/RF cable connection or the test port/adaptor connection. Connect the test port cables (or adaptors) to the test ports and tighten them as specified in the accessory manual. Loosen the anti-rotation clamp thumb screw sufficiently to slip the clamp over the cable (or adaptor) 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 screw to prevent further loosening or tightening of the test port 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.

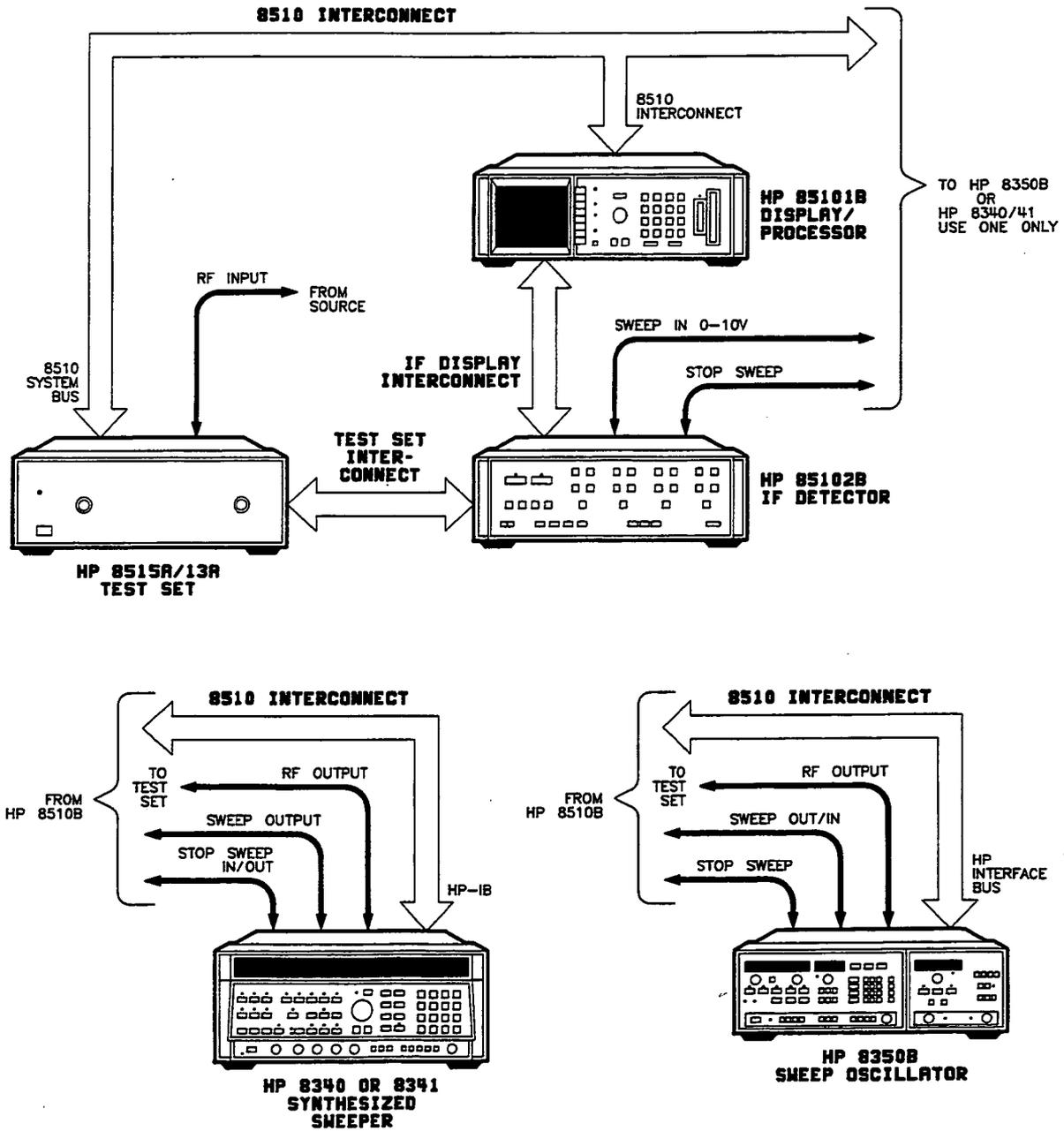


Figure 5. HP 8515A and 8513A System Connections

INTRODUCTION

This section illustrates the features and functions of the front and rear panels of the HP 8515A and 8513A test sets (Figures 6 and 7).

FRONT PANEL FEATURES

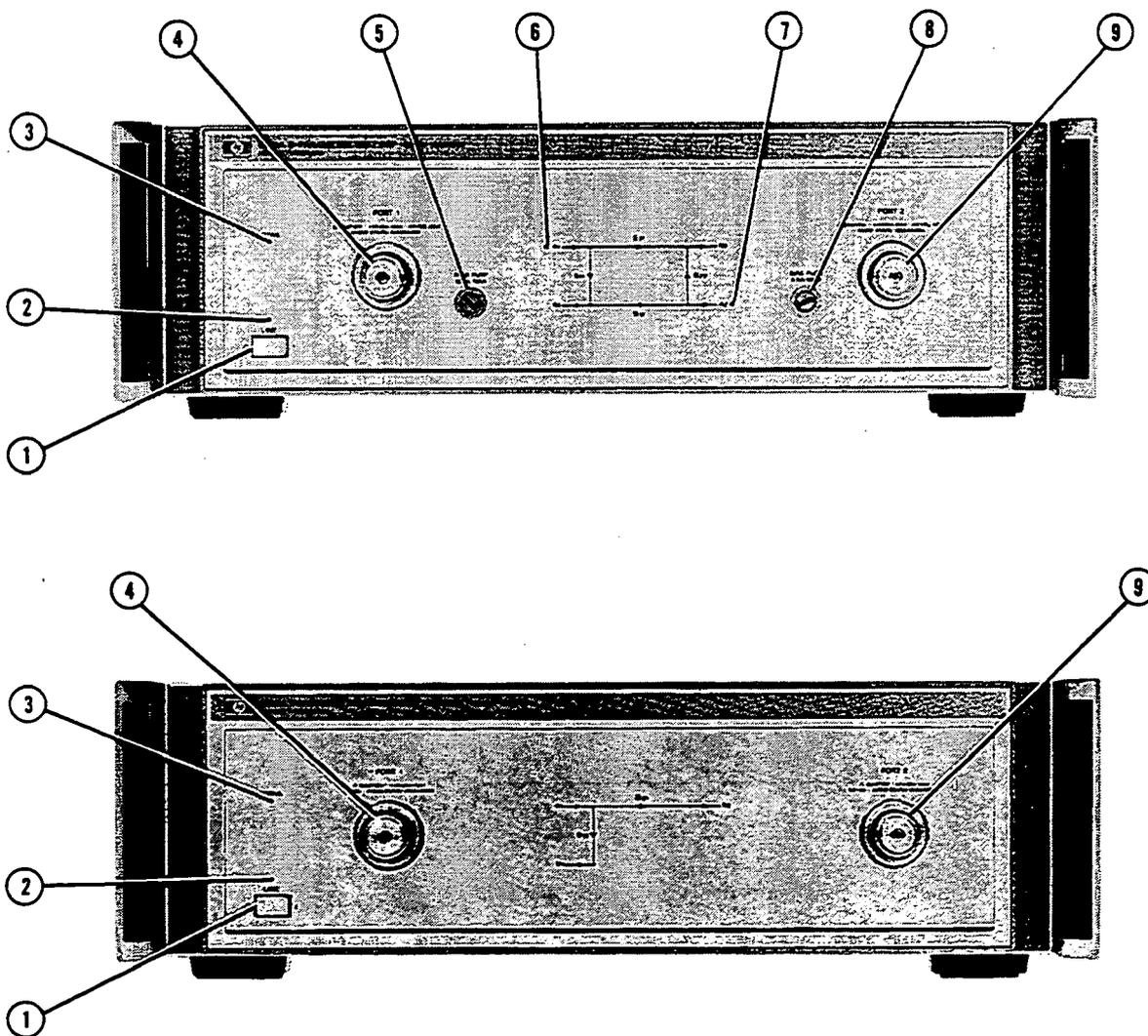


Figure 6. Front Panel Features of HP 8515A (upper) and HP 8513A.

1. **Line Switch.** This switch turns the test set on and off. When the side of the switch labeled O is depressed, the test set is off; I is on.
2. **Line LED.** This LED goes on and off with the test set.
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 by a bridge to a sampler within the instrument.
5. **Bias Fuse.** (HP 8515A only) The fuse which limits bias applied to Port 1 is within this holder (see replaceable parts list for value of fuse).
6. **a1 LED.** (HP 8515A only) This LED indicates that the HP 8515A is internally switched to the S11 or S21 mode.
7. **b2 LED.** (HP 8515A only) This LED indicates that the HP 8515A is internally switched to the S22 or S12 mode.
8. **Bias Fuse.** (HP 8515A only) The fuse which limits bias applied to Port 2 is within this holder (see replaceable parts list for value of fuse).
9. **Port 2.** In the HP 8515A, this test port transmits RF energy from the source to the DUT and receives reflected RF energy from the DUT.

In the HP 8513A, this port only receives transmitted (from Port 1) RF energy. The received RF energy is input directly to a sampler within the instrument.



ATTENTION
Static Sensitive

**Handle only at Static Safe
Work Stations**

**Do not input more than +13 dBm (20 mW) or apply more than 1.0 Vdc to
the input ports.**

REAR PANEL FEATURES

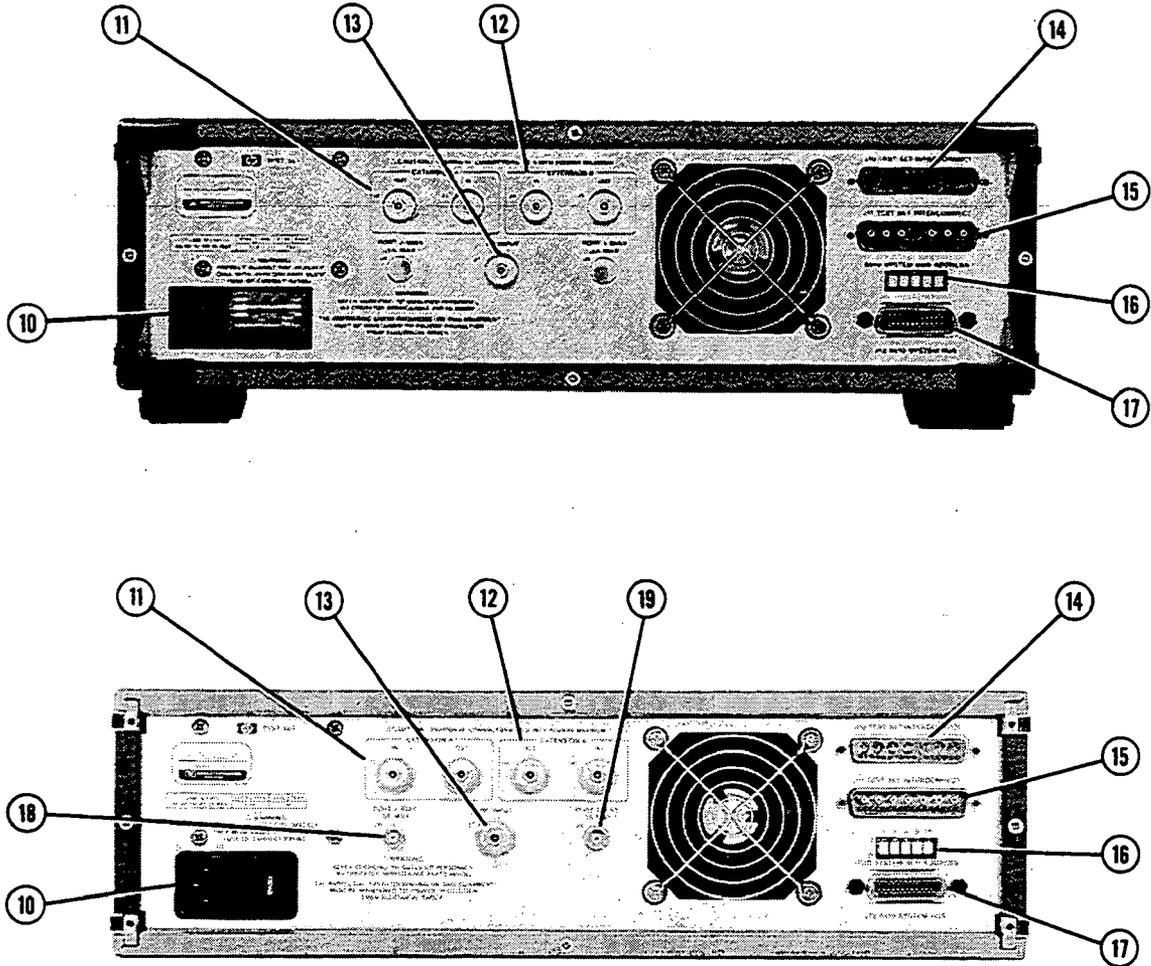


Figure 7. Rear Panel Features of HP 8515A (upper) and HP 8513A.

10. **Line module.** This assembly houses the line cord connector, line fuse and line voltage selector. Pull out the right side of the line module cover to replace or change the fuse or to change the voltage selection. Note that the voltage selector drum must be removed to rotate it to a different setting. Recommended fuse values are printed on the rear panel. (HP 8513A line modules may appear similar to HP 8515A modules.)

11. **Extension A.** This pair of 3.5 mm connectors holds the reference port extension cable (RPEC, supplied) used to balance the distance of the DUT to Port 2. When the DUT is connected to Port 2 with any of the recommended RF cables, connect the long RPEC to Extension A.
12. **Extension B.** This pair of 3.5 mm connectors holds the reference port extension cable (supplied) used to balance the distance of the DUT to Port 1. When the DUT is connected to Port 1 with any of the recommended RF cables, connect the long RPEC to Extension B. When the DUT is connected directly to Port 1, connect the short RPEC to Extension B.
13. **RF Input.** This 3.5 mm connector receives RF energy from the source.
14. **J10 Test Set Interconnect.** This connector is used only in test sets with Option 001. It allows connecting another test set to the option 001 test set. Up to four test sets can be serially connected to the HP 8510. The HP 8510 system automatically selects the IF output from the chosen test set for processing and display.
15. **J11 Test Set Interconnect.** This connector transmits the IF signal from the test set to the HP 85102 IF Detector. It also transmits control signals bidirectionally.
16. **8510 System Bus Address Switch.** This five-pole binary-weighted switch sets the system bus address of the test set. The binary weight of each pole is indicated on the rear panel as are the on and off positions. Decimal twenty (off-off-on-off-on, from left to right) is the default setting.
17. **J12 8510 System Bus Connector.** This connector is used for HPIB communications with the HP 85101 display/processor.
18. **Port 2 Bias.** (HP 8515A only) This female BNC connector is used to supply bias through the center conductor of Port 2 to active devices under test.
19. **Port 1 Bias.** (HP 8515A only) This female BNC connector is used to supply bias through the center conductor of Port 1 to active devices under test.

OPERATOR'S CHECK

The purpose of this check is to confirm that the HP 8515A and HP 8513A 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.

EQUIPMENT

Item	HP Model or Part Number
Network analyzer system	HP 8510A/B
Test port return cable set	HP 85131D ¹
Test port return cable	HP 85131C ²
10 dB pad (attenuator)	HP 8493C option 010 ¹

1. use with HP 8515A
2. use with HP 8513A

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 HP 8510 system as shown in Figure 5. 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 HP 85102 to preset the HP 8510 and access the STIMULUS menu.

- a. HP 8340/41 systems: press **[STEP]** on the HP 85101 to put the source in step mode.
- b. HP 8350B systems: press **[SWEEP TIME] [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 8 for a given frequency.

NOTE: All of the observed traces should decrease from -20 ± 5 dB at 45 MHz to -40 ± 5 dB at 26.5 MHz, similar to Figure 8.

Now perform either the HP 8515A or 8513A Operator's Check.

In case of difficulty, refer to TEST SET TROUBLESHOOTING in the HP 8510B Service Manual or contact your local HP Service Office.

HP 8515A OPERATOR'S CHECK

Sampler Test

1. To check all of the samplers in the HP 8515A 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. All of the CRT traces should resemble Figure 8.

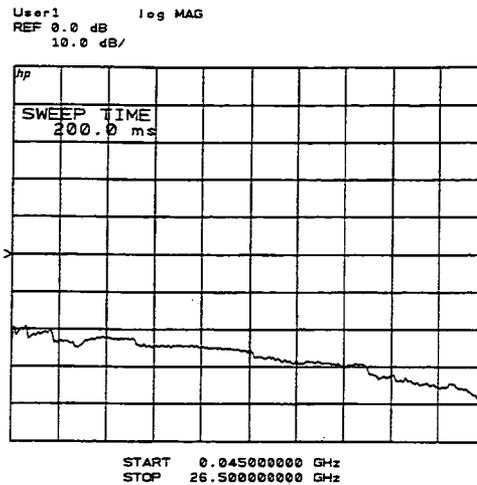


Figure 8. Typical Operator's Check CRT Trace

b1 Thru Test

4. Connect a thru (two RF 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.

b2 Thru Test

6. Press [USER 2 b2] to observe the b2 thru power level trace.
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 8513A OPERATOR'S CHECK

a1 Test

1. Press PARAMETER [MENU] [USER 1 a1] to see the channel a1 power level trace. The trace level should decrease from -20 ± 5 dB at 45 MHz to -40 ± 5 dB at 26.5 GHz.

b1 Reflection Test

2. Connect an open (or a short) to port 1.
3. Press [USER 4 b1] and check that the trace for each is within the limits described above.

b2 Thru Test

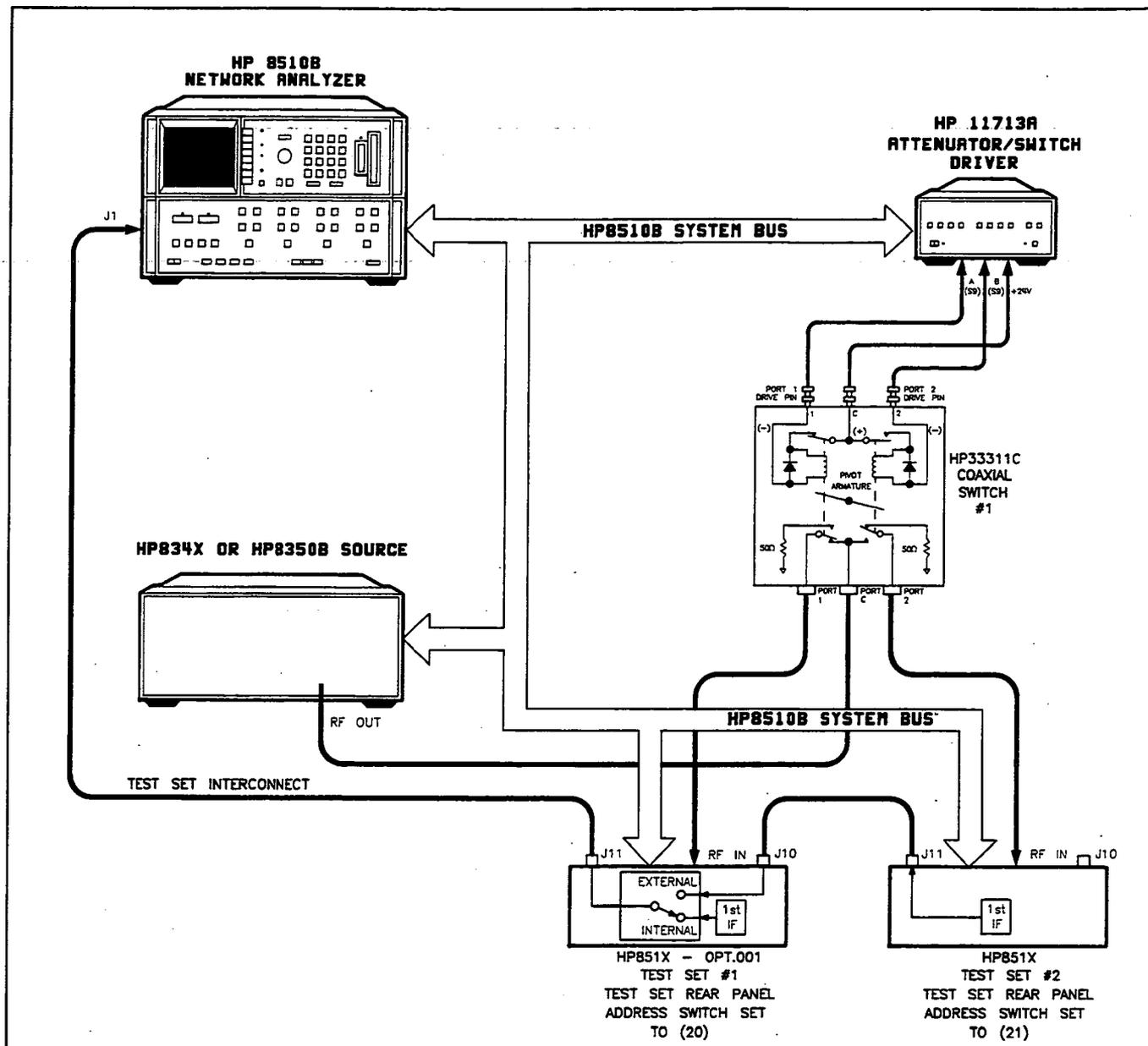
4. Connect a thru (an RF cable) and a 10 dB pad between port 1 and port 2.

5. Press **[USER 2 b2]** and check that the trace is within the same limits.
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 3-3, 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.



- NOTE:**
1. Not all system connections are shown.
 2. In dual source configurations, the second can be multiplexed in a similar manner. If only one dual source test set is used, the second source can be directly connected to the appropriate test set.

HP 33311C Coaxial Switch Positions with Two Test Sets

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

Figure 9. RF and IF Switching with Two Test Sets

INSTALLATION

Set each test set rear panel address switch to the address listed in Figure 9 if using a two test set configuration, and Figure 10 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.

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 **[x1]**, or it can be changed under program control using the HP 8510 **HP-IB ADDRESS;** 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 9 and 10, 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 9 and 10.

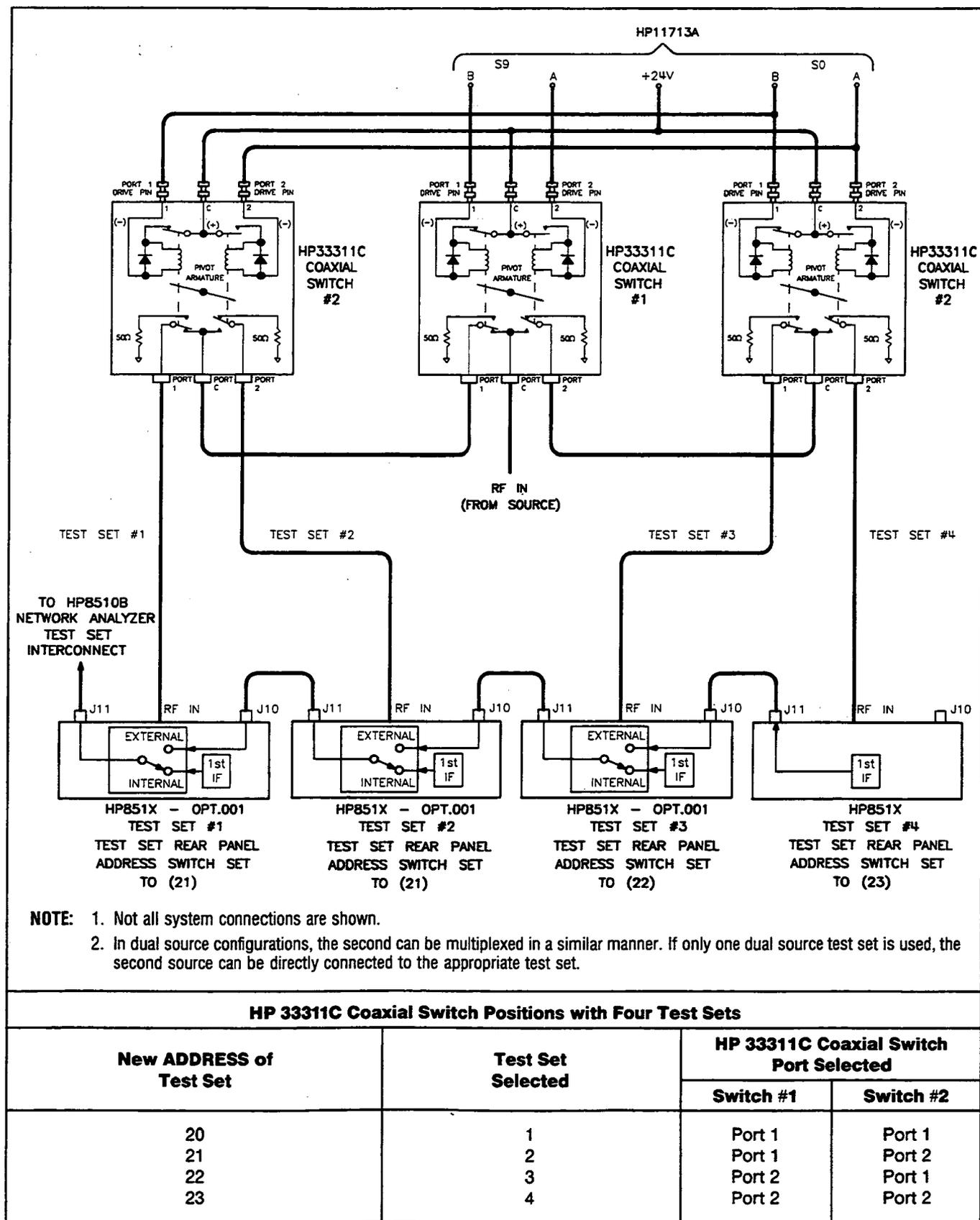


Figure 10. RF and IF Switching with Four Test Sets

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 [x1]. 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.

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.

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 11. 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.

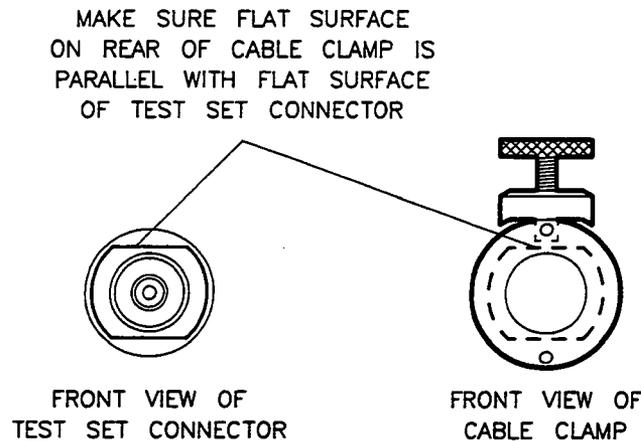


Figure 11. Visually Aligning Clamp and Nut Flats

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).

4. See Figure 12. 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.

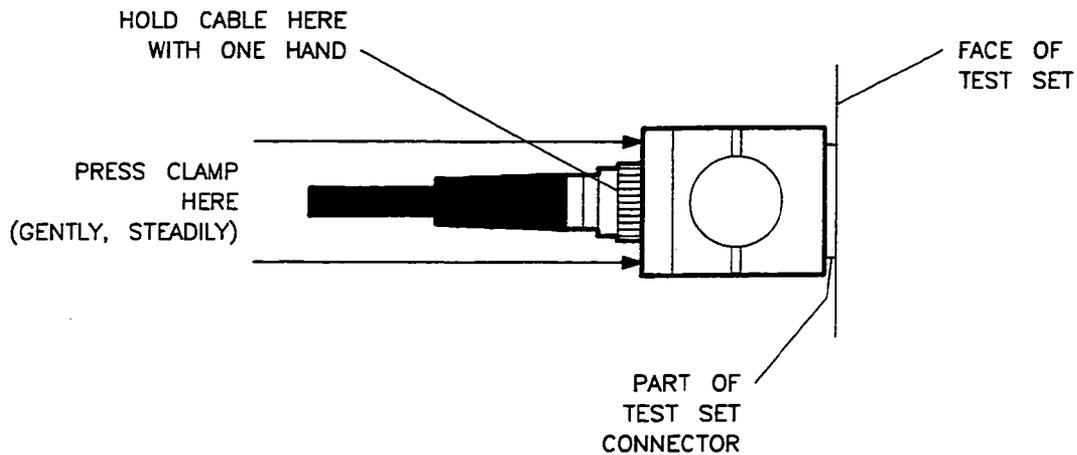


Figure 12. Mating the Clamp and Nut Flats

5. See Figure 13. 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.

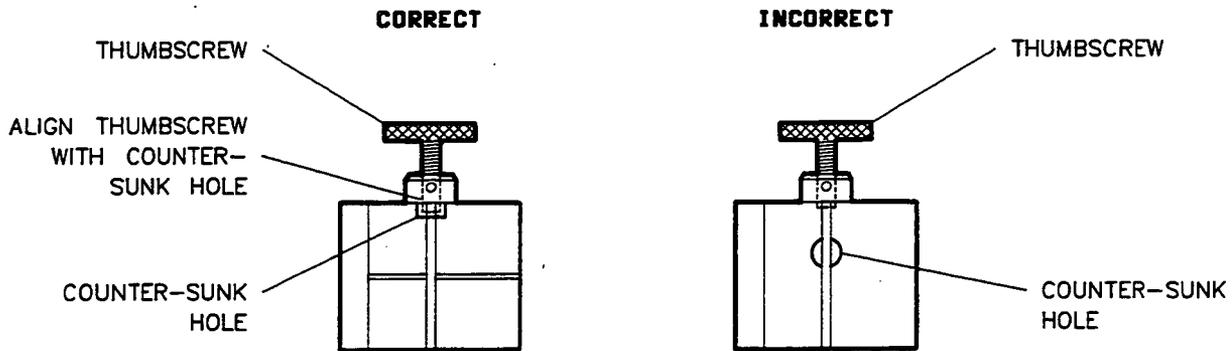


Figure 13. Aligning the Thumbscrew with the Counter-bored Hole

6. 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.

PERFORMANCE TESTS

Performance test information and procedures are located in the PERFORMANCE TESTS section of the HP 8510B System Manual and volume 2 of the HP 8510A manual set.

ADJUSTMENTS

The HP 8515A and HP 8513A 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.

MANUAL BACKDATING

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.

REPLACEABLE PARTS

The REPLACEABLE PARTS section of the HP 8515A/8513A manual should have been placed with the *HP 8515A or 8513A Troubleshooting* tab in the TROUBLESHOOTING section of the HP 8510B Service Manual. Otherwise it should have been kept behind this section as previously directed.

SERVICE

The **SERVICE** section of the HP 8515A/8513A manual should have been placed with the *HP 8515A or 8513A Troubleshooting* tab and the **REPLACEABLE PARTS** section in the **TROUBLESHOOTING** section of the HP 8510B Service Manual. Otherwise it should have been kept with the **Replaceable Parts** section as previously directed.

Replaceable Parts

Place with HP 8515A or 8513A TROUBLESHOOTING tab in TEST SET TROUBLESHOOTING section of HP 8510B Service Manual.

INTRODUCTION

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

HP 8515A replaceable parts are identified by Table 2 and Figures 1 through 6.

HP 8513A replaceable parts are identified by Table 3 and Figures 3 and 5 through 9.

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 (option 001 only)
- A3 VTO summing amplifier board assembly
- A4 HPIB board assembly
- A5 attenuator/switch driver assembly¹
- A6 triax bridge
- A7 bias tee¹

- A8 triax bridge¹
- A9 bias tee¹
- A10 sampler assembly (input b1)
- A11 sampler assembly (input b2)
- A12 sampler assembly (input a1)
- A13 sampler assembly (input a2)¹

- A14 VTO/driver assembly
- A15 regulator board assembly
- A16 step attenuator¹
- A17 step attenuator¹
- A18 switch/splitter¹

¹. HP 8515A 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 alphabetical 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. Manufacturer's code is a five digit number assigned to each manufacturer (identified in Table 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 8515A and port 1 of the HP 8513A are identified in Figure 6.

The replaceable parts of port 2 of the HP 8513A are identified in Figure 9.

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. The gold nose connector (f) should be torqued to 25 in-lb.

Table 1. *Manufacturer Codes and Reference Designations*

MANUFACTURER'S CODES			
Manufacturer 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 HP 8510B Service Manual.			

Table 2. HP 8515A 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	28480	08513-60005
A2	08513-60004	2			IF MULTIPLEXER ASSY (OPT 001, NEW)	28480	08513-60004
A2	08513-69004	0			IF MULTIPLEXER (OPT 001, REBUILT)	28480	08513-69004
A3	08513-60008	5		1	BOARD ASSEMBLY, VTO SUMMING AMP (NEW)	28480	08513-60008
A3	08513-69008	2		1	BOARD ASSEMBLY, VTO SUMMING AMP (REBUILT)	28480	08513-69008
A4	08513-60002	0		1	BOARD ASSEMBLY, HP IB (NEW)	28480	08513-60002
A4	08513-69002	8		1	BOARD ASSEMBLY, HP IB (REBUILT)	28480	08513-69002
A5	08513-60011	1		1	BOARD ASSY, ATTEN/SWITCH DRIVER (NEW)	28480	08513-60011
A5	08513-69011	9		1	BOARD ASSY, ATTEN/SWITCH DRIVER (REBUILT)	28480	08513-69011
A6	5086-7328	6		2	TRIAx BRIDGE, PORT 1 (NEW)	28480	5086-7328
A6	5086-6328	4		2	TRIAx BRIDGE, PORT 1 (REBUILT)	28480	5086-6328
A7	5086-7322	0		2	BIAS TEE, PORT 2 (NEW)	28480	5086-7322
A7	5086-6322	8		1	BIAS TEE, PORT 2 (REBUILT)	28480	5086-6322
A8	5086-6328	4			TRIAx BRIDGE, PORT 2 (REBUILT)	28480	5086-6328
A8	5086-7328	6			TRIAx BRIDGE, PORT 2 (NEW)	28480	5086-7328
A9	5086-7322	0			BIAS TEE, PORT 1 (NEW)	28480	5086-7322
A9	5086-6322	3			BIAS TEE, PORT 1 (REBUILT)	28480	5086-6322
A10	5086-7402	7		4	SAMPLER ASSY REPLACEMENT KIT, B1 (NEW)	28480	5086-7402
A10	5086-6402	5			SAMPLER ASSY REPLACEMENT KIT, B1 (REBUILT)	28480	5086-6402
A11	5086-7402	7		4	SAMPLER ASSY REPLACEMENT KIT, B2 (NEW)	28480	5086-7402
A11	5086-6402	5			SAMPLER ASSY REPLACEMENT KIT, B2 (REBUILT)	28480	5086-6402
A12	5086-7402	7		4	SAMPLER ASSY REPLACEMENT KIT, A1 (NEW)	28480	5086-7402
A12	5086-6402	5			SAMPLER ASSY REPLACEMENT KIT, A1 (REBUILT)	28480	5086-6402
A13	5086-7402	7		4	SAMPLER ASSY REPLACEMENT KIT, A2 (NEW)	28480	5086-7402
A13	5086-6402	5			SAMPLER ASSY REPLACEMENT KIT, A2 (REBUILT)	28480	5086-6402
A14	5086-7231	0		1	VTO/DRIVER (NEW)	28480	5086-7231
A14	5086-6231	8		1	VTO/DRIVER (REBUILT)	28480	5086-6231
A15	08513-60007	5		1	BOARD ASSEMBLY, REGULATOR (NEW)	28480	08513-60007
A15	08513-69007	3			BOARD ASSEMBLY, REGULATOR (REBUILT)	28480	08513-69007
A16	08340-60175	9		1	STEP ATTENUATOR, PORT 1 (NEW)	28480	08340-60175
A16	08340-60223	8			STEP ATTENUATOR, PORT 1 (REBUILT)	28480	08340-60223
A17	08340-60175	9		1	STEP ATTENUATOR, PORT 2 (NEW)	28480	08340-60175
A17	08340-60223	8			STEP ATTENUATOR, PORT 2 (REBUILT)	28480	08340-60223
A18	5086-7324	2		1	SWITCH/SPLITTER (NEW)	28480	5086-7324
A18	5086-6324	0		1	SWITCH/SPLITTER (REBUILT)	28480	5086-6324
A19	08513-60001	9		1	BOARD ASSEMBLY, MOTHER	28480	08513-60001
THE FOLLOWING PARTS ARE NOT SUPPLIED WHEN A19 IS ORDERED: A19C1 A19C2 A19C3 A19C4							
A19C1	0180-2671	7		4	CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C2	0180-2671	7			CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C3	0180-2671	7			CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C4	0180-2671	7			CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C5	0160-4834	6			CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	0160-4834
A19C6	0160-4834	6			CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	0160-4834
A19J1	1251-5745	4			CONNECTOR 20-PIN M POST TYPE	28480	1251-5745
(A19J1 DOES NOT INCLUDE A19MP1 & A19MP2)							
A19J2	1251-6868	4		4	CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J3	1251-7939	2		1	CONN-POST TYPE .100-PIN-SPCG 14-CONT	28480	1251-7939
(A19J3 DOES NOT INCLUDE A19MP3).							
A19J4	1251-6868	4			CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J5	1251-6868	4			CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J6	1251-6868	4			CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J7	1251-3825	7		1	CONNECTOR 5-PIN M POST TYPE	28480	1251-3825
A19J8	1200-0508	0		2	SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A19J9	1200-0508	0			SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A19MP1	1251-5595	2			POLARIZING KEY-POST CONN	28480	1251-5595
A19MP2	1251-5595	2			POLARIZING KEY-POST CONN	28480	1251-5595
A19MP3	1251-5595	2			POLARIZING KEY-POST CONN	28480	1251-5595
A19R1	0764-0015	7		2	RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
A19R2	0764-0015	7			RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
A19R3	0764-0016	8		2	RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
A19R4	0764-0016	8			RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
A19R5	0757-0394	0			RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A19R6	0757-0394	0			RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F

Table 2. HP 8515A Replaceable Parts (2 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A19XA2	1251-7882	4	5	CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA3	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA4	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA5	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA6-A19XA14				NOT ASSIGNED		
A19XA15	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A20	08513-60006	4	1	BOARD ASSEMBLY, HP IB INTERCONNECT	28480	08513-60006
				MISCELLANEOUS ELECTRICAL PARTS		
AT1	8493C #006	7	4	3.5MM 6dB ATTENUATOR	28480	8493C #006
AT2	8493C #006	7		3.5MM 6dB ATTENUATOR	28480	8493C #006
AT3	8493C #006	7		3.5MM 6dB ATTENUATOR	28480	8493C #006
AT4	8493C #006	7		3.5MM 6dB ATTENUATOR	28480	8493C #006
AT5	08513-60015	5	2	3.5MM 13dB ATTENUATOR	28480	08513-60015
AT6	08513-60015	5		3.5MM 13dB ATTENUATOR	28480	08513-60015
B1	3160-0273	2	1	FAN-TBAX 34-CFM 115V 50/60-HZ 1.5KV-DIEL	4N833	126LF-182
C1	0160-4311	4	1	CAPACITOR-FXD .022UF +80-20% 100VDC CER	56289	C023B101H223Z-CDH
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		TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E4	0360-0042	4	1	TERMINAL-SLDR LUG PL-MTG FOR-#6-SCR	28480	0360-0042
E5	0362-0265	7	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E6	0362-0265	7		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E7	08513-00018	2	1	INSULATOR-BRACE	28480	08513-00018
E8	1990-0858	6		LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858
E9	1990-0858	6		LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858
E10	5061-5394	0	5	PIN AND BEAD ASSEMBLY	28480	5061-5394
E11-13				SEE FIGURE 6		
E14-E23				NOT ASSIGNED		
E24	08513-20016	2		CONNECTOR NOSE-F	28480	08513-20016
E25	08513-20017	3	5	CONN-BULKHEAD	28480	08513-20017
E26-E36				NOT ASSIGNED		
E37	08513-80028	2	2	FUSE HOLDER	28480	08513-80028
E38	08513-80028	2		FUSE HOLDER	28480	08513-80028
E39-E50				NOT ASSIGNED		
E51	0360-1673	9	1	TERMINAL STRIP 6-TERM PHEN 1.5-IN-L	28480	0360-1673
E52	9170-0029	3	1	CORE SHIELD, 4A	28480	9170-0029
F1	2110-0043	8		FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
F2	2110-0012	1	2	FUSE .5A 250V NTD 1.25X.25 UL	28480	2110-0012
FL1	0960-0443	1	1	LINE MODULE-FILTERED	28480	0960-0443
R1	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
T1	9100-4389	9	1	XFMR PWR	28480	9100-4389
W1-W12				NOT ASSIGNED		
W13	08513-60133	8	1	CA AY A3J1-A14J1	28480	08513-60133
W14	08513-60134	9	1	CA AY A3J2-J11A7	28480	08513-60134
W15				NOT ASSIGNED		
W16	08513-60136	1	1	CA AY A3J5-J11A5	28480	08513-60136
W17				NOT ASSIGNED		
W18	08513-60138	3	1	CA AY A3J7-J11A6	28480	08513-60138
W19				NOT ASSIGNED		
W20	08513-60140	7	1	CA AY A3J4-A18J2	28480	08513-60140
W21	08513-60141	8	1	CA AY A5J2-A18J4	28480	08513-60141
W22	08513-60142	9	1	CA AY A5J1-A18J3	28480	08513-60142
W23	08513-60143	0	1	CA AY A5J3-A18J6	28480	08513-60143
W24	08513-60144	1	1	CA AY A12J3-J11A1	28480	08513-60144
W25	08513-60145	2	1	CA AY A13J3-J11A4	28480	08513-60145
W26	08513-60146	3	1	CA AY A10J3-J11A2	28480	08513-60146
W27	08513-60147	4	1	CA AY A11J3-J11A3	28480	08513-60147
W28-W32				NOT ASSIGNED		
W33	08514-20013	0	2	CA RF J2J3/J4J5	28480	08514-20013
W34	08514-20014	1	2	A18J8-J3 & A18J2-J4	28480	08514-20014
W35	08514-20015	2	1	CA RF A18J7-A17J2	28480	08514-20015
W36				NOT ASSIGNED		
W37	08514-20017	4	1	CA RF A18J1-A16J2	28480	08514-20017
W38				NOT ASSIGNED		
W39	08512-20019	4	2	CA RF J2-J3 & J4-J5	28480	08512-20019

Table 2. HP 8515A Replaceable Parts (3 of 4)

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
W40-W42					NOT ASSIGNED		
W43	08514-20013	0			CA RF J2-J3 & J4-J5	28480	08514-20013
W44	08514-20014	1			A18J8-J3 & A18J2-J4	28480	08514-20014
W45	08514-20019	6	1		CA RF A18J5-J7	28480	08514-20019
W46-W48					NOT ASSIGNED		
W49	08512-20019	4			CA RF J2-J3 & J4-J5	28480	08512-20019
W50					NOT ASSIGNED		
W51					NOT ASSIGNED		
W52	08515-20002	8	2		CA RF A6J3-A11J2 & A8J3-A10J2 A8J3/A10J2	28480	08515-20002
W53	08515-20003	9	1		CA RF A7J1-A16J1	28480	08515-20003
W54	08515-20004	0	1		CA RF A9J1-A17J1	28480	08515-20004
W55	08515-20007	3	1		CA RF A12J2-J5	28480	08515-20007
W56	08515-20008	4	1		CA RF A13J2-J2	28480	08515-20008
W57	08513-60014	4	1		CA AY REAR PANEL-MOTHERBOARD	28480	08513-60014
W58	08513-60036	0	1		CA ASSY RP-HPIB	28480	08513-60036
W59	85102-60193	5	1		CA ASSY LINE SW	28480	85102-60193
W60	08513-60013	3	1		CA AY FRONT PANEL-MOTHERBOARD	28480	08513-60013
W61	08510-60102	8	1		CBL AY TEST SET	28480	08510-60102
W62	8120-1348	5	1		PWR CRD 3C 903 0	28480	8120-1348
W63	8120-3445	7	1		CBL AY 24C HPIB	28480	8120-3445
W64	8120-4396	9	1		CBL C AY-SMA	28480	8120-4396
	08510-10005	5	1		PRFM TS 8510/15A	28480	08510-10005
MISCELLANEOUS MECHANICAL & CHASSIS PARTS							
1	0380-0643	3	2		STANDOFF-HEX .255-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
2	0400-0002	2	4		GROMMET-RND .188-IN-ID .312-IN-GRV-OD	28480	0400-0002
3	0590-0926	0	4		THREADED INSERT-STDF 6-32 .188-IN-LG SST	28480	0590-0926
4	1251-2942	7	4		LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0017	4	4		WASHER-LK HLCL NO. 8 .168-IN-ID	28480	2190-0017
6	2360-0113	2	1		SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
7	2360-0123	4	4		SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
8	2420-0001	5	4		NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
9	2420-0022	0	1		NUT-SPLY 6-32-THD .23-IN-THK .354-OD	28480	2420-0022
10					NOT ASSIGNED		
11	2580-0004	6	4		NUT-HEX-DBL-CHAM 8-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
12	3050-0139	6	12		WASHER-FL MTLCL NO. 8 .172-IN-ID	28480	3050-0139
13	3050-0152	3	4		WASHER-SHLDR NO. 8 .172-IN-ID .438-IN-OD	28480	3050-0152
14	3050-0227	3	4		WASHER-FL MTLCL NO. 6 .149-IN-ID	28480	3050-0227
15					NOT ASSIGNED		
16	3160-0309	5	1		FINGER GUARD	4N833	12601-43 UL VERSION
17	08514-00011	4	1		REAR PANEL	28480	08514-00011
18	0624-0099	1	38		SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
19	0624-0100	5	8		SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
20	1400-0757	5	2		CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
21	2190-0006	1	2		WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
22	2190-0007	2	2		WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
23	2190-0011	8	8		WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
24	2200-0105	4			SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	2200-0165	6	14		SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
26	2360-0115	4	65		SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
27	2360-0117	6			SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
28	2360-0119	8	6		SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	2360-0333	8	12		SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
30	2420-0002	6	2		NUT-HEX-DBL-CHAM 6-32-THD .109-IN-THK	28480	2420-0002
31	0515-1331	5	16		SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
32	2680-0129	8	8		SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
33	3050-0105	6	3		WASHER-FL MTLCL NO. 4 .125-IN-ID	28480	3050-0105
34	5021-8403	3	1		FRAME FRONT	28480	5021-8403
35	5021-5804	3	1		FRAME REAR	28480	5021-5804
36	5021-5837	6	4		STRUT CORNER 18"	28480	5021-5837
37	08505-20132	3	2		END PLATE ENCL	28480	08505-20132
38	08505-20163	0	2		ENCLOSURE CKT	28480	08505-20163
39	08512-20005	8	2		RFI GASKET	28480	08512-20005
40	08513-00001	3	1		DECK	28480	08513-00001

Table 2. HP 8515A Replaceable Parts (4 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
41	08513-00002	4	1	TRANSFORMER BRKT	28480	08513-00002
42	08513-00005	7	1	MOUNTING BKT-LH	28480	08513-00005
43	08513-00006	8	1	MOUNTING BKT-RH	28480	08513-00006
44	08513-00015	9	1	CAP SPRT PLATE	28480	08513-00015
45	08513-00037	5	1	BRACKET-CKT ENCL	28480	08513-00037
46	08513-20013	9	1	BRACE-DECK	28480	08513-20013
47	08513-20015	1	1	MOUNTING BAR	28480	08513-20015
48	5021-8747	3	1	FRONT BEZEL	28480	5021-8747
49	1400-1209	4	1	CLP CA .69D 1.0W	28480	1400-1209
50	1450-0615	9	2	RETAINER-LED 0.75 IN LG; 0.38 IN WD	28480	1450-0615
51	2190-0104	0	5	WASHER-LK INTL T 7/16 IN .439-IN-ID	28480	2190-0104
52	7121-2380	8	1	LABEL-SERIAL NUMBER	28480	7121-2380
53	5021-0906	6	7	SLEEVE RF PIN POS	28480	5021-0906
54	5021-3427	2	2	WSHR-TS PORT CON	28480	5021-3427
55	5021-3428	3	2	NUT-FLG TS PORT	28480	5021-3428
56	08340-40002	9	2	MOUNT-LED	28480	08340-40002
57	08512-00008	9	1	CLAMP A	28480	08512-00008
58	08512-00010	3	1	CLAMP C	28480	08512-00010
59	08512-20005	8		RFI GASKET	28480	08512-20005
60	08515-00014	3	1	FRONT PANEL	28480	08515-00014
61	08513-00036	4	1	SUB PANEL	28480	08513-00036
62	0510-1148	2	2	RETAINER-PO 0.140ID	28480	0510-1148
63	08513-00017	1	1	BRACKET-CONV AY	28480	08513-00017
64	08513-00027	3	1	CVR BLANK-IF MUX	28480	08513-00027
65	08513-00030	8	2	SPRT CLAMP-BRDG	28480	08513-00030
66	08515-00005		1	HEAT SHIELD	28480	08515-00005
67	08515-00006		1	COVER CABLE A	28480	08515-00006
68	08514-00005	8	2	BRACKET-ATTEN	28480	08514-00005
69	08514-00007	0	1	MNTG PLATE-SWTC	28480	08514-00007
70	0624-0099	1		SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
71	1400-0054	5	1	CLAMP-CABLE .078-DIA .375-WD STL	28480	1400-0054
72	0515-0896	5	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	0515-0896
73	7120-4835	0	1	LBL IN CSA ELEC	28480	7120-4835
74	7120-5911	5	1	LBL WRN CAU METR	28480	7120-5911
75	5021-8496	5	2	TRIM FRNT HNDL	28480	5021-8496
76	5041-8801	8	4	FOOT-BOTTOM	28480	5041-8801
77	5041-8802	9	1	STRIP TRIM TOP	28480	5041-8802
78	5041-8821	3	4	FOOT-REAR	28480	5041-8821
79	5062-3747	1	1	COVER BTM 18" FM	28480	5062-3747
80	5062-3757	1	1	COVER AY SIDE	28480	5062-3757
81	5062-3799	3	2	HANDLE AY FRONT	28480	5062-3799
82	08513-00040	1	1	TOP CVR-TEST SET	28480	08513-00040
83	08513-00041	2	1	SIDE COVER-PERF	28480	08513-00041
84	08515-80001	3	1	LBL IN 08515-	28480	08515-80001
85	08513-20014	0	2	WR SPANNER 8513	28480	08513-20014
86	2360-0127		1	SCREW-MCAH 632 .875 PNPD		ORDER BY DESCRIPTION
87	2950-0132	4	5	NUT-HEX-DBL-CHAM 7/16-22-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
88-95				NOT ASSIGNED		
96	5001-3907	1	1	LINE MODULE RETAINER	28480	5001-3907

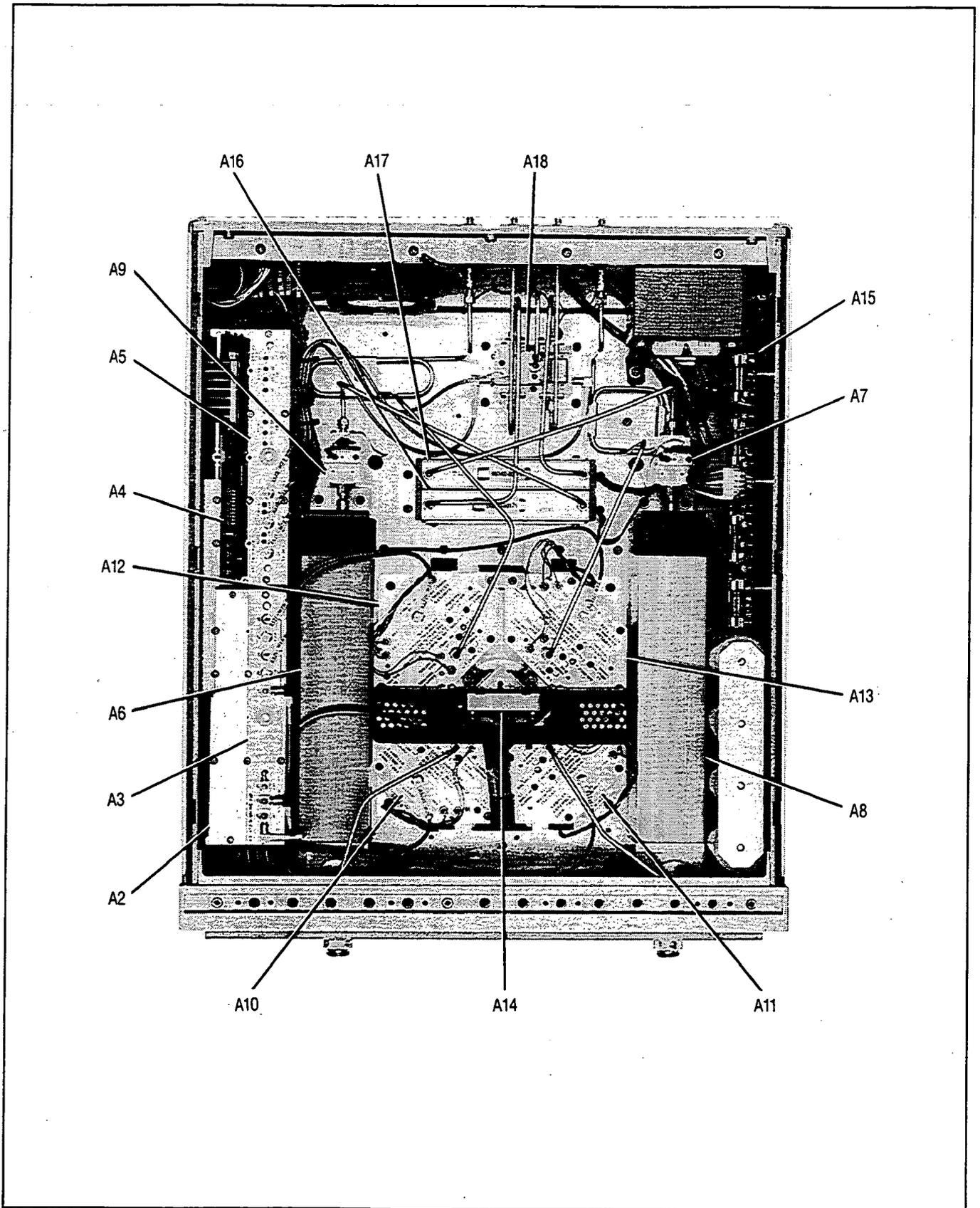


Figure 1. HP 8515A Major Assemblies

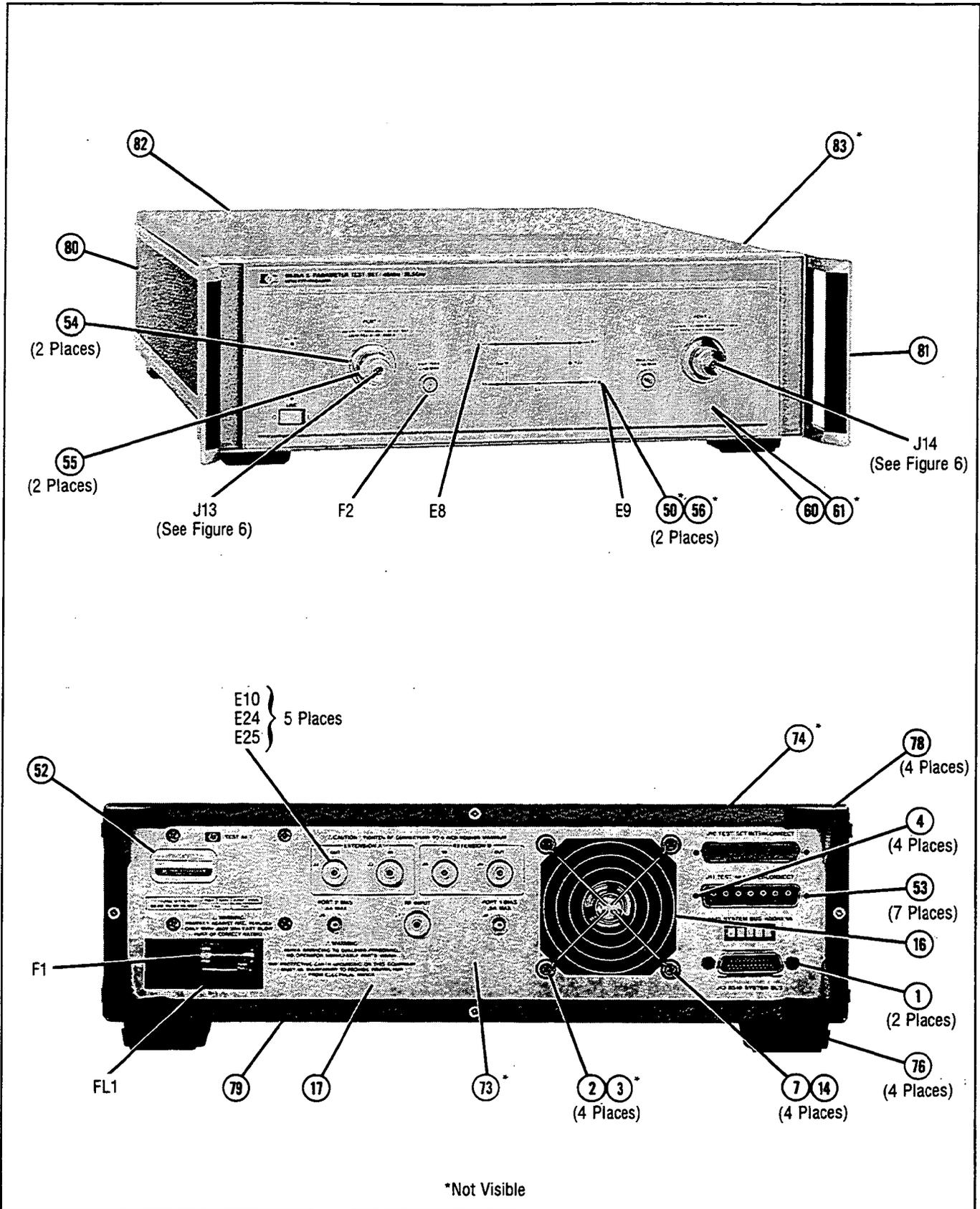
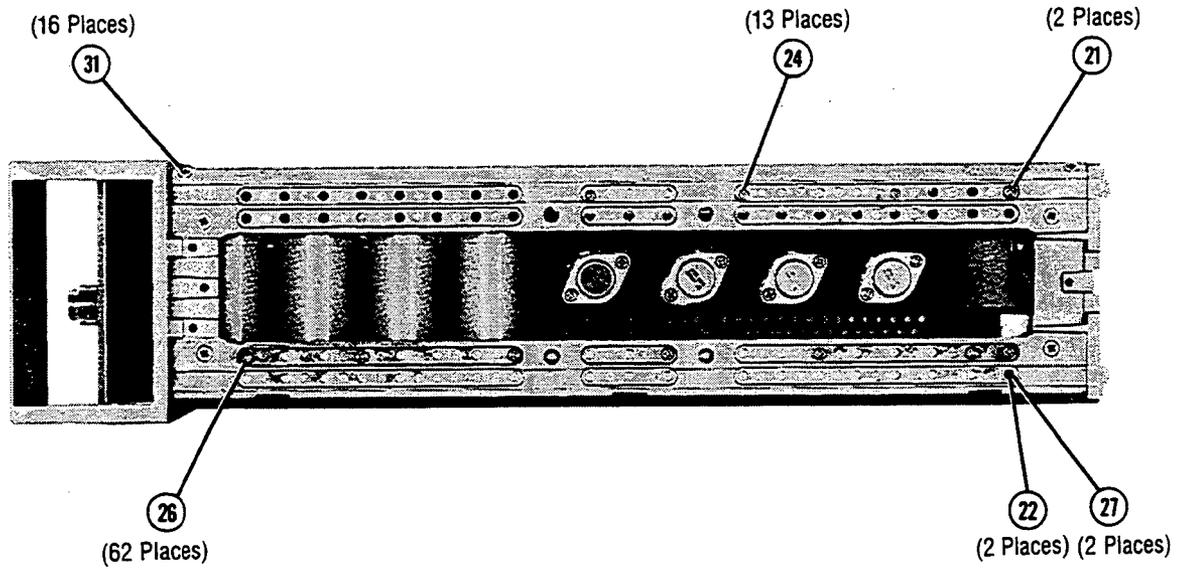
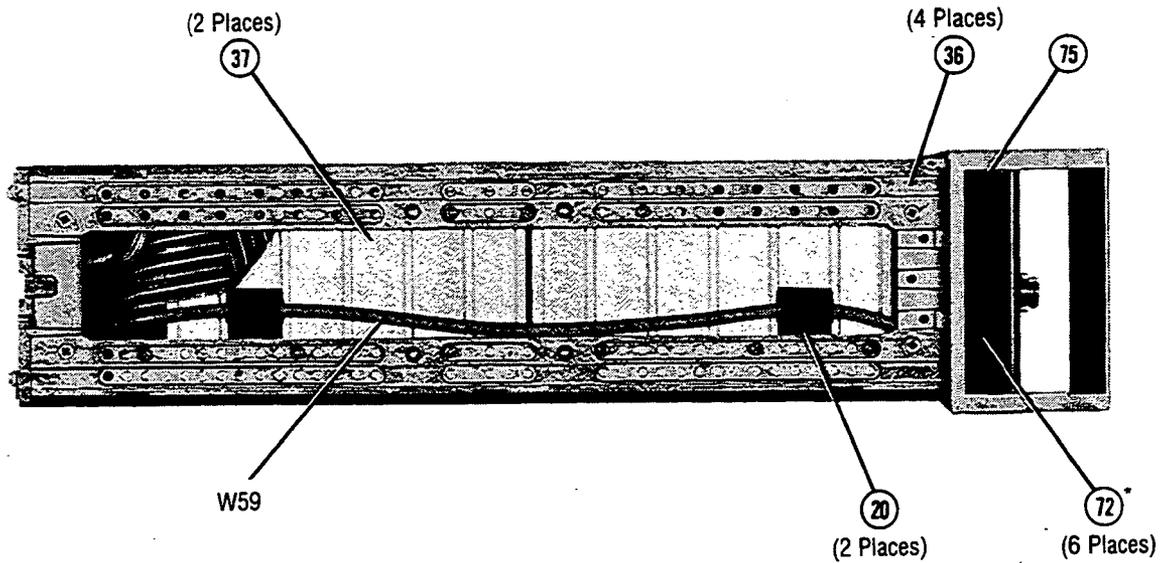


Figure 2. HP 8515A Miscellaneous Mechanical, Chassis, and Electrical Parts (1 of 5)

RIGHT SIDE



LEFT SIDE



*Not Visible

Figure 2. HP 8515A Miscellaneous Mechanical, Chassis, and Electrical Parts (2 of 5)

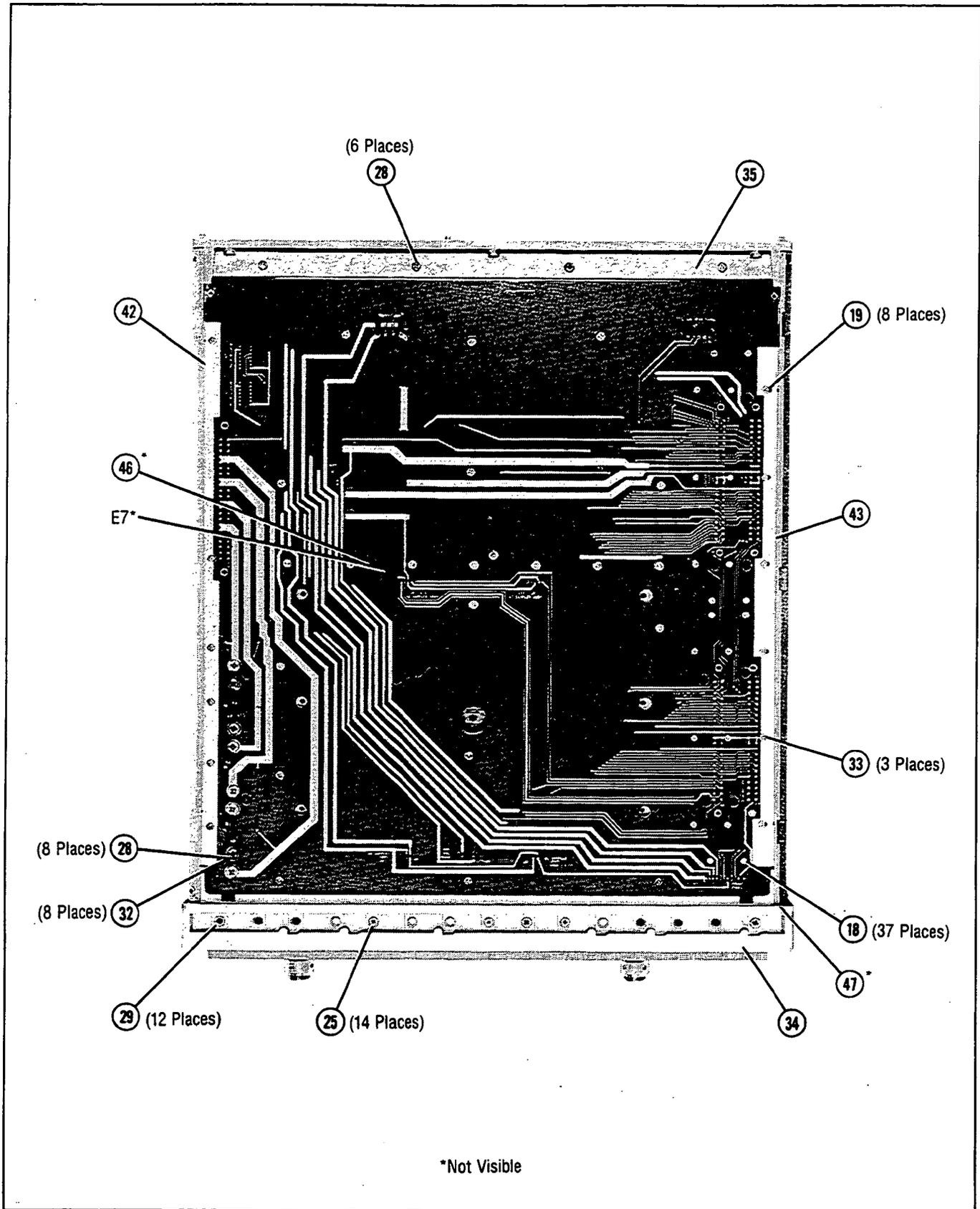


Figure 2. HP 8515A Miscellaneous Mechanical, Chassis, and Electrical Parts (3 of 5)

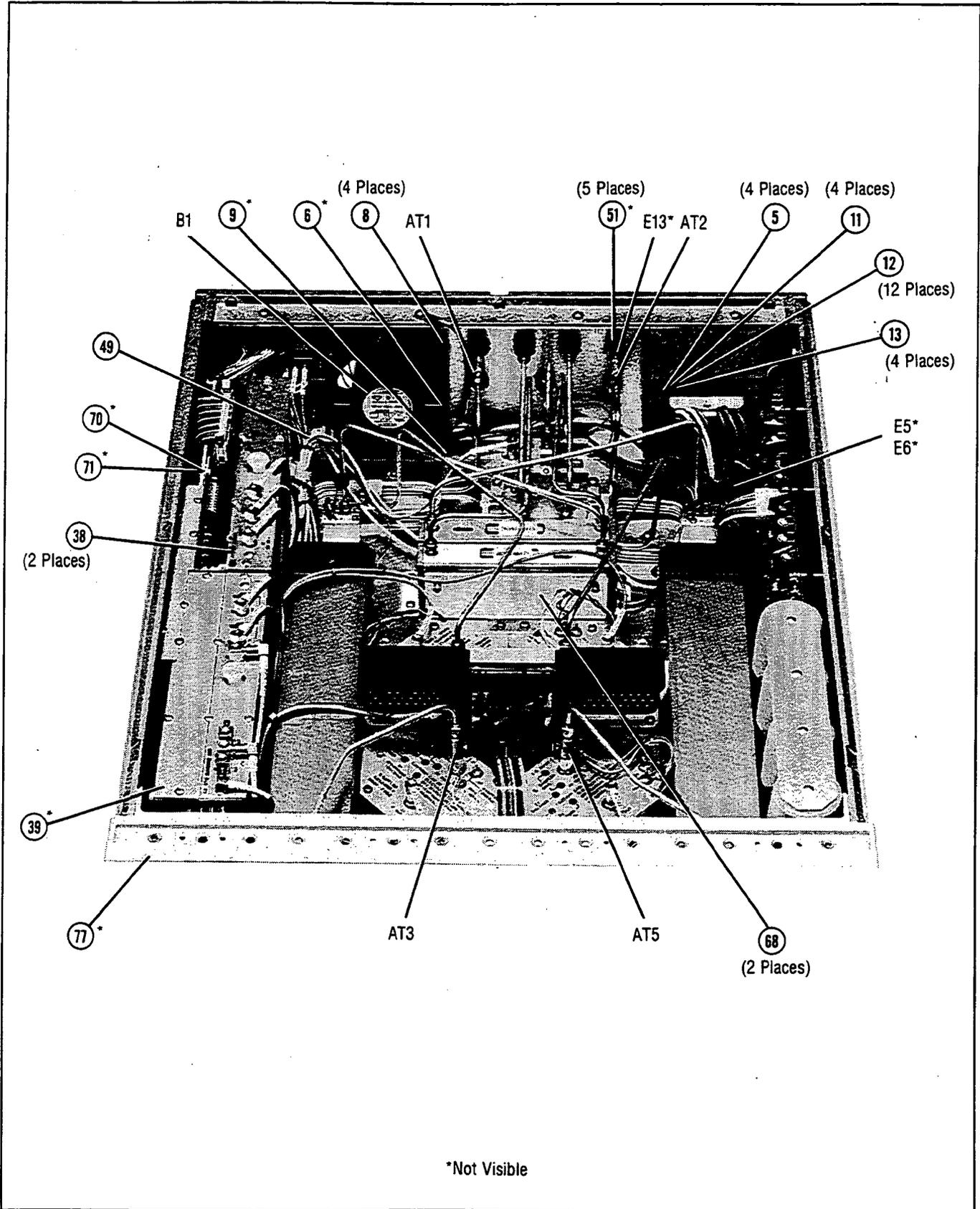
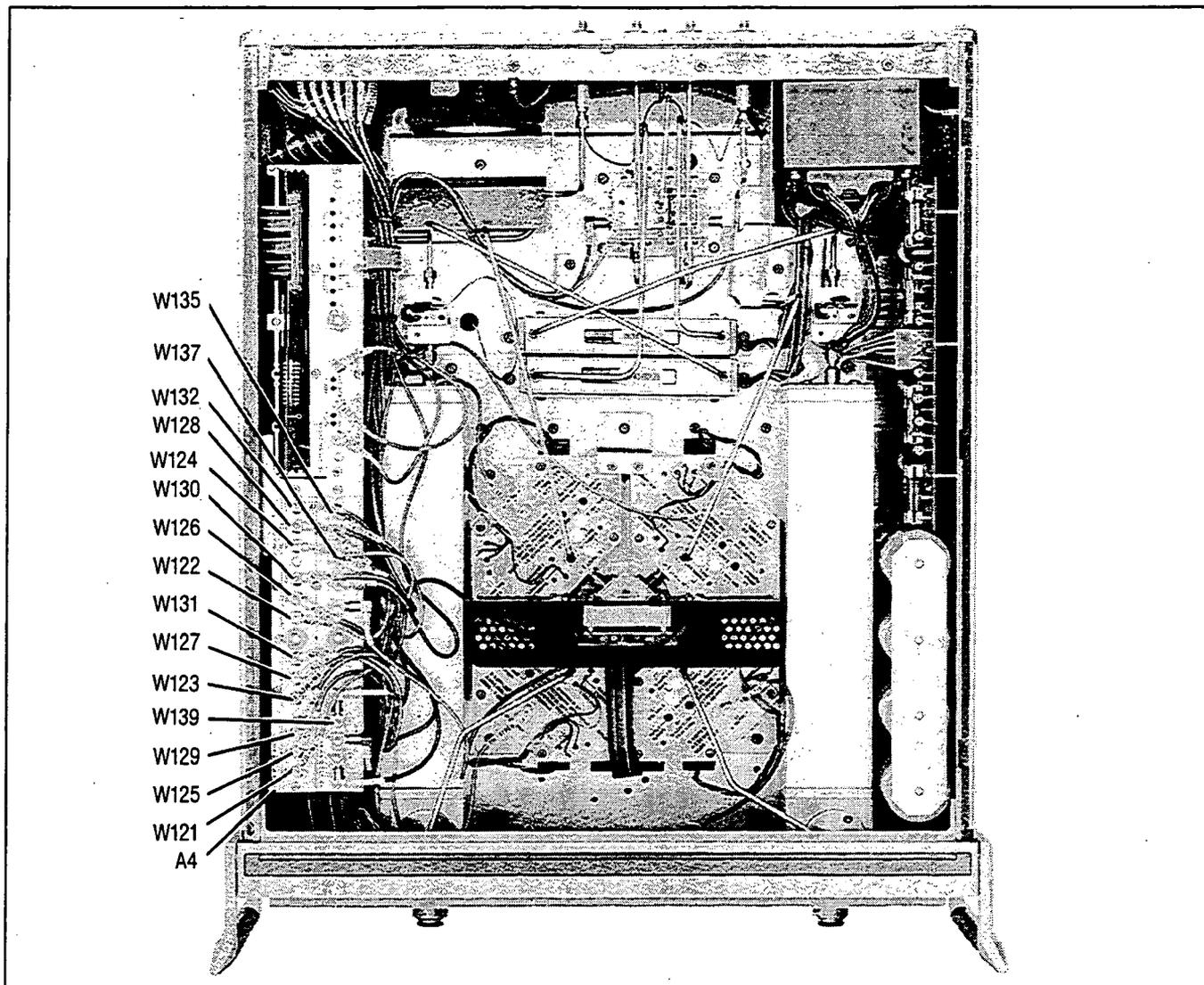


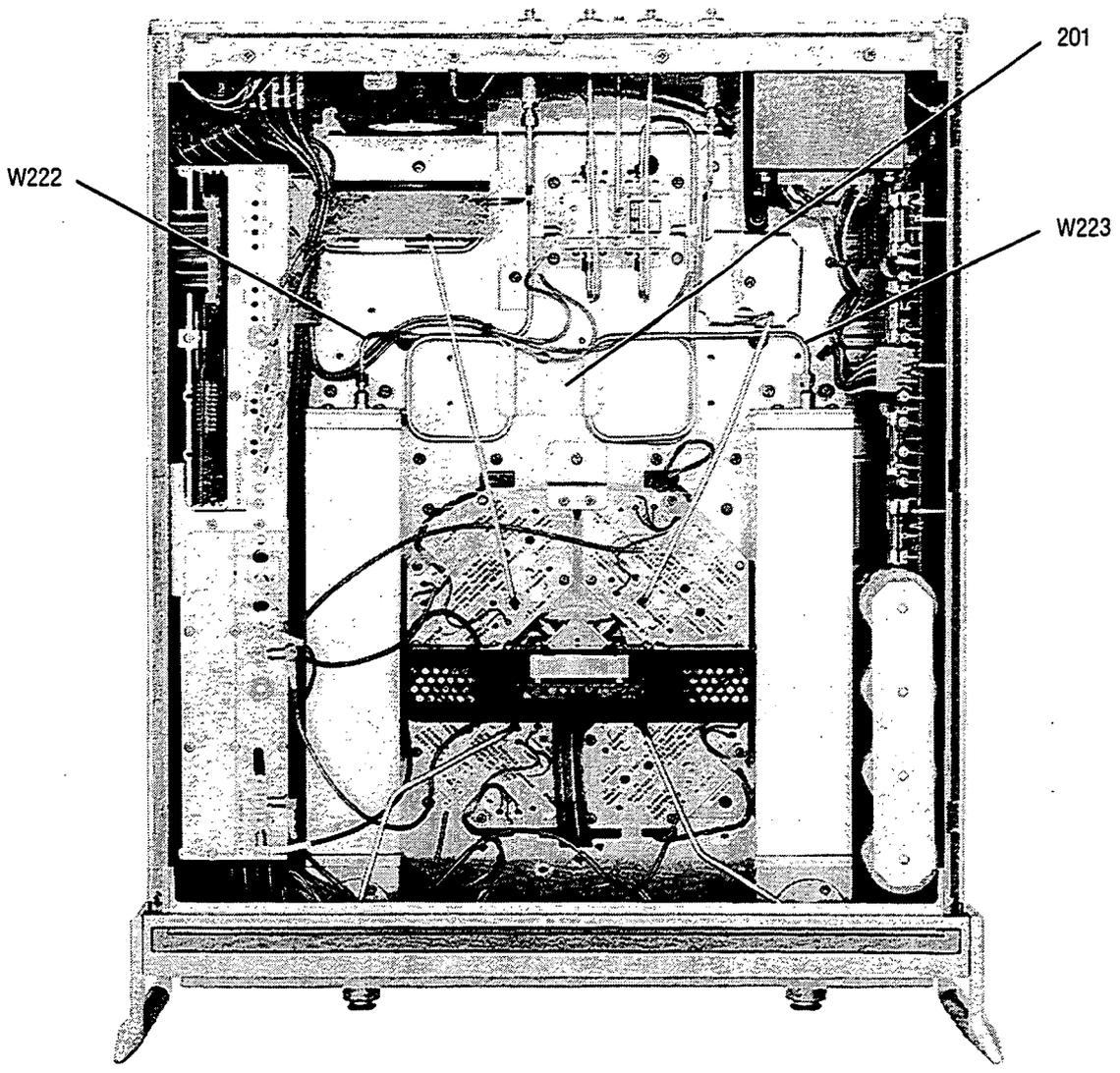
Figure 2. HP 8515A Miscellaneous Mechanical, Chassis, and Electrical Parts (5 of 5)



HP 8515A TOP INTERNAL, OPTION 001

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
A4	08513-60004	2	1		IF MULTIPLEXER BD AY	28480	08513-60004
W121	08513-60121	4	1		A12J3-A2J1 CABLE AY	28480	08513-60121
W122	08513-60122	5	1		A13J3-A2J7 CABLE AY	28480	08513-60122
W123	08513-60123	6	1		A10J3-A2J4 CABLE AY	28480	08513-60123
W124	08513-60124	7	1		A11J3-A2J10 CABLE AY	28480	08513-60124
W125	08513-60125	8	1		A2J2-J11A1 CABLE AY	28480	08513-60125
W126	08513-60126	9	1		A2J8-J11A4 CABLE AY	28480	08513-60126
W127	08513-60127	0	1		A2J5-J11A2 CABLE AY	28480	08513-60127
W128	08513-60128	1	1		A2J11-J11A3 CABLE AY	28480	08513-60128
W129	08513-60129	2	1		A2J3-J10A1 CABLE AY	28480	08513-60129
W130	08513-60130	5	1		A2J9-J10A4 CABLE AY	28480	08513-60130
W131	08513-60131	6	1		A2J6-J10A2 CABLE AY	28480	08513-60131
W132	08513-60132	7	1		A2J12-J10A3 CABLE AY	28480	08513-60132
W133	08513-60135	0	1		A3J3-J10A7 CABLE AY	28480	08513-60135
W134-136					NOT ASSIGNED		
W137	08513-60137	2	1		A3J6-J10A5 CABLE AY	28480	08513-60137
W138					NOT ASSIGNED		
W139	08513-60139	4	1		A3J8-J10A6 CABLE AY	28480	08513-60139

Figure 3. Parts Unique to HP 8515A and 8513A Option 001



HP 8515A TOP INTERNAL, OPTION 002

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
W222	08514-20022	1		1	CABLE ASSEMBLY, A18J1-A6J2	28480	08514-20022
W223	08514-20023	2		1	CABLE ASSEMBLY, A18J7-ABJ2	28480	08514-20022
201	08515-00009	3		1	OPT 002 CABLE CLAMP	28480	08515-00009

Figure 4. Parts Unique to HP 8515A Option 002

A19

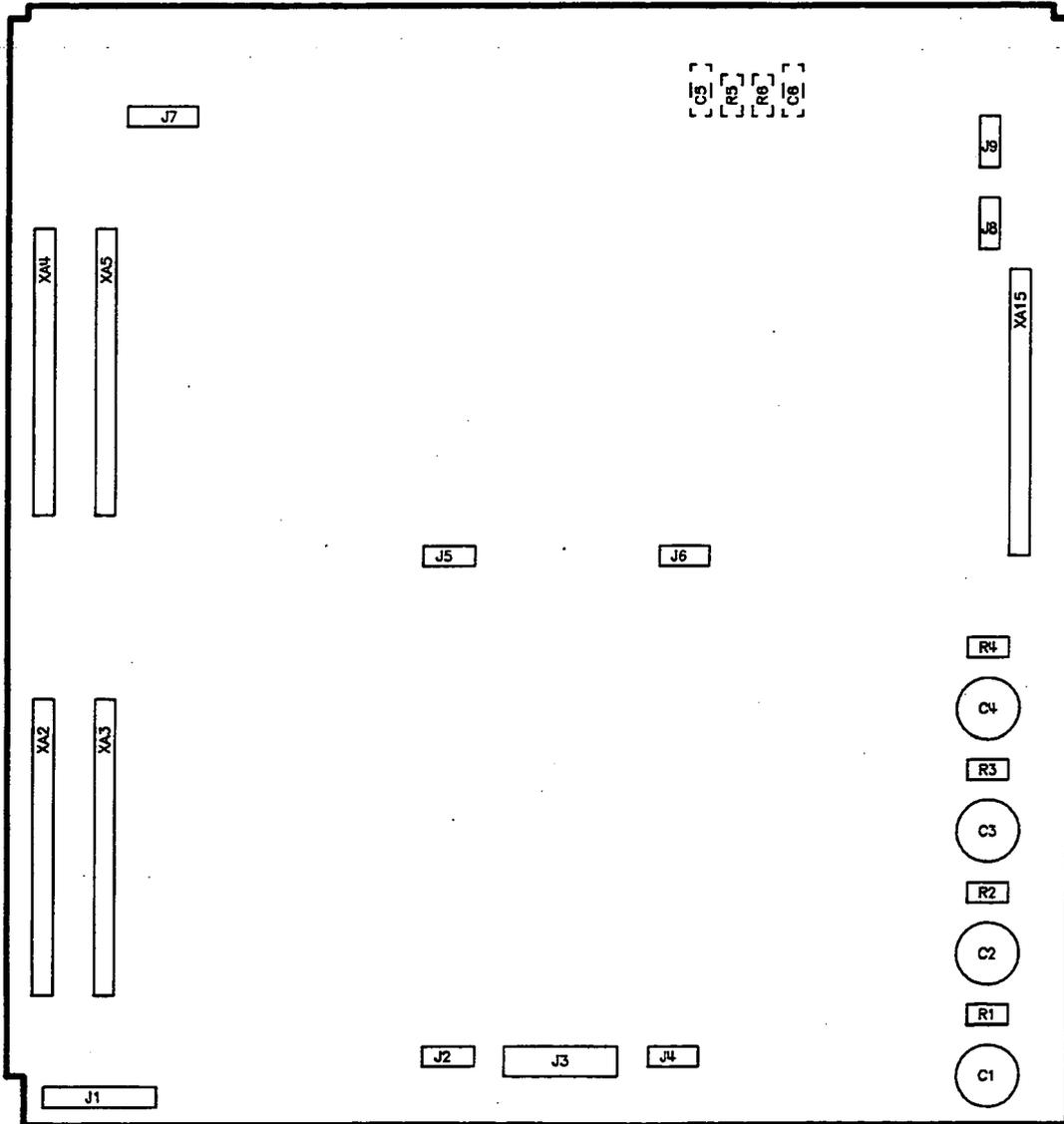
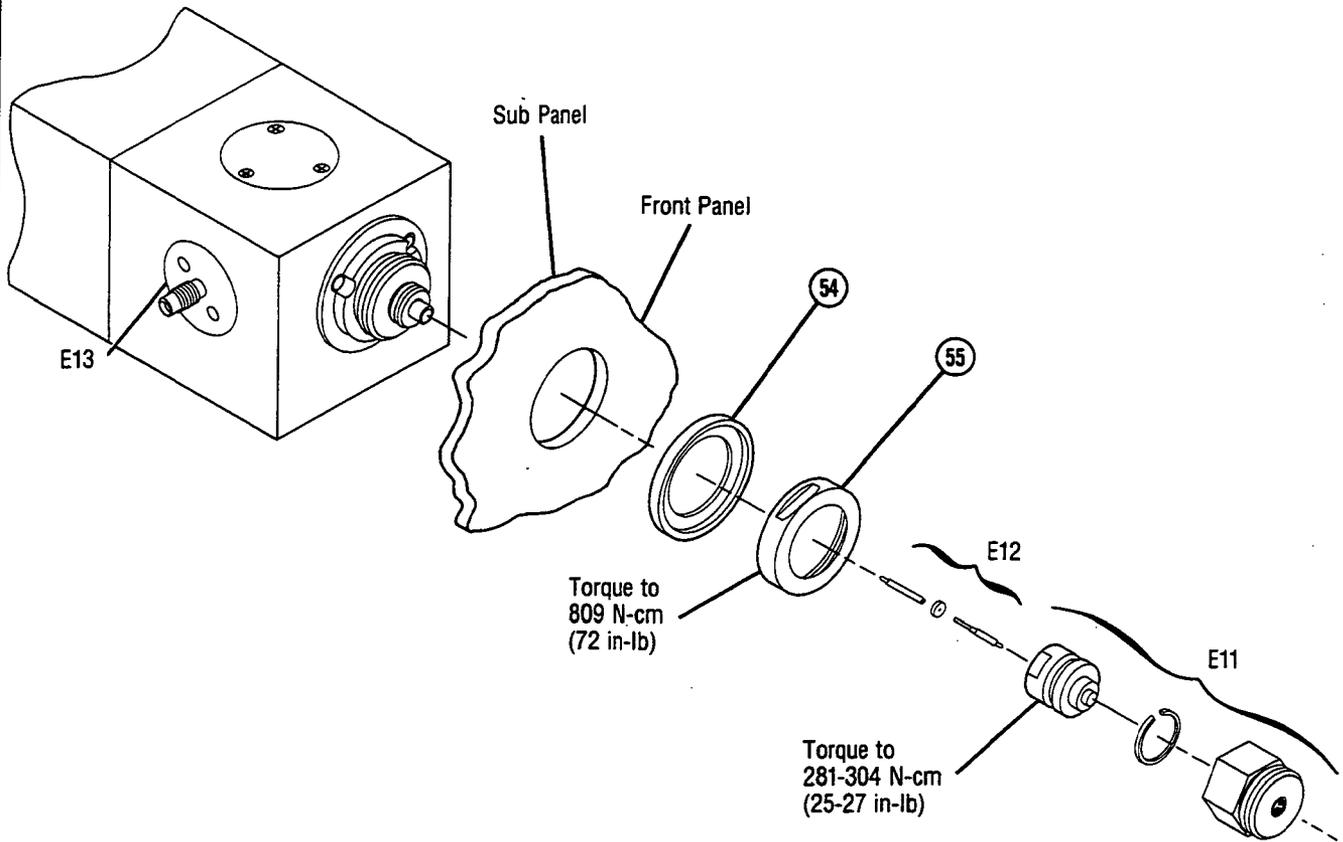


Figure 5. HP 8515A and A513A Motherboard Component Location Diagram

**PORTS 1 AND 2: HP 8515A
PORT 1: HP 8513A**



See Figure 9 for HP 8513A Port 2 Replacement Parts List.

Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
E11	5062-1245	4		2	3.5 MM NUT ASSEMBLY	28480	5062-1245
E12	5061-5355	3		2	TEST BEAD ASSEMBLY	28480	5061-5355
E13					THIS CONNECTOR IS NOT FIELD REPLACEABLE		
54	5021-3427	2		2	WASHER, TEST SET PORT CONN	28480	5021-3427
55	5021-3428	3		2	NUT FLANGE, TEST SET PORT	28480	5021-3428

Figure 6. HP 8515A Ports 1 and 2 and HP 8513A Port 1 Replaceable Part (1 of 2)

TEST PORT CONNECTOR REPLACEMENT PROCEDURE

This procedure applies to test ports 1 and 2 of both the HP 8515A and 8513A even though the HP 8513A does not have a triax bridge behind port 2.

NOTE: To change only the 3.5 mm nut assembly, follow the procedure but do not remove the test bead assembly except to clean and inspect it.

1. Carefully fit a 1/10 inch wide (ground down if necessary) 9/16 inch wrench onto the 3.5 mm nut assembly wrench flats.
2. Loosen and remove the 3.5 mm nut assembly. Some or all of the test bead assembly may come off with the 3.5 mm nut assembly.
3. Remove the test bead assembly; it should pull out easily.
4. To replace the test bead assembly, order the part number listed in Figure 6.
5. When replacing the test bead assembly, use only your clean fingers or tissue paper. Insert the longer end of the test bead assembly directly in the center of the receiving end of the bridge (look inside the opening to see how it fits). Be careful to not bend the receiving fingers within the bridge.
6. When the test bead assembly is properly inserted, you should see only the outer pin and bead and ring (which encircles the bead). The inner pin will be invisible because it fits all the way into the female bridge connector.
7. With the outer pin sticking straight out from the test set, carefully replace the 3.5 mm nut assembly over the test bead assembly. It may be difficult to thread the 3.5 mm nut assembly on because the 3.5 mm body (with wrench flats) and nut spin freely. Try applying a little back pressure on the nut while lightly turning the body with the wrench. Avoid touching the pin and bead assembly.
8. Visually check the outer pin to confirm that it is centered. If so, torque the 3.5 mm body to 281 N-cm (25 in-lb).
9. Use a calibrated gage to check the pin depth of the new assembly. The pin depth should be 0.000 to 0.002 inches.

NOTE: Additional connector care information (including gage use) is located in the *Microwave Connector Care* manual (available separately and as part of the HP 8510B documentation).

Figure 6. HP 8515A Port 1 and 2 and HP 8513A Port 1 Replaceable Parts (2 of 2)

Table 3. HP 8513A 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	28480	08513-60005
A1DS1	1990-0858	6	2	LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858
A1DS2	1990-0858	6		LED-LAMP LUM-INT=15UCD IF=25MA-MAX	28480	1990-0858
A2				NOT ASSIGNED		
A3	08513-60008	6	1	BOARD ASSEMBLY, VTO SUMMING AMP (NEW)	28480	08513-60008
A3	08515-69008	2	1	BOARD ASSEMBLY, VTO SUMMING AMP (REBUILT)	28480	08513-69008
A4	08513-60002	0	1	BOARD ASSEMBLY, HP IB (NEW)	28480	08513-60002
A4	08513-69002	8	1	BOARD ASSEMBLY, HP IB (REBUILT)	28480	08513-69002
A5				NOT ASSIGNED		
A6	5086-7328	6	1	TRIAx BRIDGE (NEW)	28480	5086-7328
A6	5086-6328	5		TRIAx BRIDGE (REBUILT)	28480	5086-6328
A7-A9				NOT ASSIGNED		
A10	5061-5338	2	3	SAMPLER ASSEMBLY REPLACEMENT KIT, B1 (NEW)	28480	5061-5338
A10	5086-6402	5		SAMPLER ASSY REPLACEMENT KIT, B1 (REBUILT)	28480	5086-6402
A11	5061-5338	2		SAMPLER ASSEMBLY REPLACEMENT KIT, B2 (NEW)	28480	5061-5338
A11	5086-6402	5		SAMPLER ASSY REPLACEMENT KIT, B2 (REBUILT)	28480	5086-6402
A12	5061-5338	2		SAMPLER ASSEMBLY REPLACEMENT KIT, A1 (NEW)	28480	5061-5338
A12	5086-6402	5		SAMPLER ASSY REPLACEMENT KIT, A1 (REBUILT)	28480	5086-6402
A13				NOT ASSIGNED		
A14	5086-6231	8	1	VTO/DRIVER (REBUILT)	28480	5086-6231
A14	5086-7231	0	1	VTO/DRIVER (NEW)	28480	5086-7231
A15	08513-60007	5	1	BOARD ASSEMBLY, REGULATOR (NEW)	28480	08513-60007
A15	08513-69007	3		BOARD ASSEMBLY, REGULATOR (REBUILT)	28480	08513-69007
A16				NOT ASSIGNED		
A17				NOT ASSIGNED		
A18	5086-7408	3	1	POWER SPLITTER	28480	5086-7408
A19	08513-60001	9	1	BOARD ASSEMBLY, MOTHER	28480	08513-60001
A19C1-A19C4				NOT SUPPLIED WHEN A19 IS ORDERED		
A19C1	0180-2671	7	4	CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C2	0180-2671	7		CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C3	0180-2671	7		CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C4	0180-2671	7		CAPACITOR-FXD .012F+75-10% 30VDC AL	00853	500123U030AC2A
A19C5	0160-4834	6	2	CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	0160-4834
A19C6	0160-4834	6		CAPACITOR-FXD .047UF ± 10% 100VDC CER	28480	0160-4834
A19J1	1251-5745	4		CONNECTOR 20-PIN M POST TYPE	28480	1251-5745
A19J2	1251-6868	4	4	(A19J1 DOES NOT INCLUDE A19MP1 & A19MP2)	28480	1251-6868
A19J3	1251-7939	2	1	CONNECTOR 5-PIN M POST TYPE	28480	1251-7939
A19J4	1251-6868	4		CONN-POST TYPE .100-PIN-SPCG 14-CONT (A19J3 DOES NOT INCLUDE A19MP3). CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J5	1251-6868	4		CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J6	1251-6868	4		CONNECTOR 5-PIN M POST TYPE	28480	1251-6868
A19J7	1251-3825	7	1	CONNECTOR 5-PIN M POST TYPE	28480	1251-3825
A19J8	1200-0508	0	2	SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A19J9	1200-0508	0		SOCKET-IC 14-CONT DIP-SLDR	28480	1200-0508
A19MP1	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
A19MP2	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
A19MP3	1251-5595	2		POLARIZING KEY-POST CONN	28480	1251-5595
A19R1	0764-0015	7	2	RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
A19R2	0764-0015	7		RESISTOR 560 5% 2W MO TC=0±200	28480	0764-0015
A19R3	0764-0016	8	2	RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
A19R4	0764-0016	8		RESISTOR 1K 5% 2W MO TC=0±200	28480	0764-0016
A19R5	0757-0394	0		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
A19R6	0757-0394	0		RESISTOR 51.1 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
A19XA3	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA4	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA5	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A19XA6-A19XA14				NOT ASSIGNED		
A19XA15	1251-7882	4		CONNECTOR-PC EDGE 2-ROWS	28480	1251-7882
A20	08513-60006	4	1	BOARD ASSEMBLY, HP IB INTERCONNECT	28480	08513-60006
MISCELLANEOUS ELECTRICAL PARTS						
AT1	08513-60015	5	1	3.5MM 13DB PAD	28480	08513-60015
AT2	8493C #003	1	1	3.5MM 3DB PAD	28480	8493C #003
AT3	8493C #006	7	2	3.5MM 6DB PAD	28480	8493C #006
AT4	8493C #006	7		3.5MM 6DB PAD	28480	8493C #006
AT5	0960-0050	6	1	FEMALE SMA LOAD	28480	8493C #006

Table 3. HP 8513A Replaceable Parts (2 of 4)

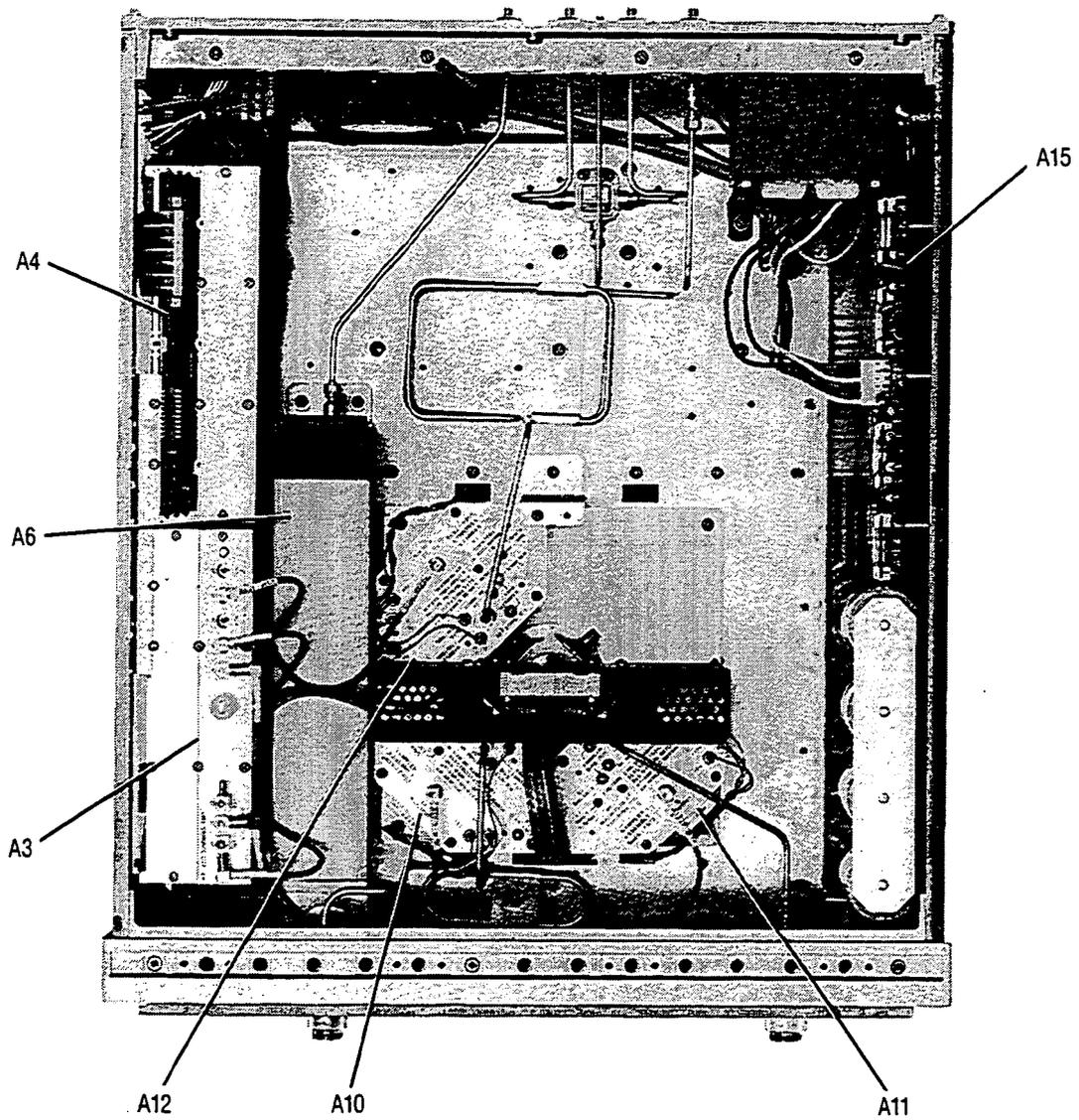
Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
AT6	8493C #010	6	1	3.5MM 10DB PAD	28480	8493c #010
B1	3160-0273	2	1	FAN-TBAX 34-CFM 115V 50/60-HZ 1.5KV-DIEL	4N833	126LF-182
E1	0360-0009	3	1	TERMINAL-SLDR LUG PL-MTG FOR-#6-SCR	28480	0360-0009
E2	0360-0031	1	2	TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E3	0360-0031	1		TERMINAL-CRIMP R-TNG #6 22-16-AWG RED	28480	0360-0031
E4	0360-0042	4	1	TERMINAL-SLDR LUG PL-MTG FOR-#6-SCR	28480	0360-0042
E5	0362-0265	7	2	CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E6	0362-0265	7		CONNECTOR-SGL CONT SKT 1.14-MM-BSC-SZ	28480	0362-0265
E7	08513-00018	2	1	INSULATOR-BRACE	28480	08513-00018
E8-E10				NOT ASSIGNED		
E11				SEE FIGURE 9		
E12				SEE FIGURE 9		
E13-E14				NOT ASSIGNED		
E15				SEE FIGURE 9		
E16-E18				NOT ASSIGNED		
E19	5061-5394		5	PIN AND BEAD ASSEMBLY	28480	5061-5394
E20	08513-20016		5	CONNECTOR NOSE-F	28480	08513-20016
E21-E28				NOT ASSIGNED		
E29	08513-20017	3		CONN BULKHEAD	28480	08513-20017
E30-E34				NOT ASSIGNED		
E35	08513-20027	5	1	CONN FLANGE TP2	28480	08513-20027
E36	08513-20028	6	1	OTR BODY 3.5 FLG	28480	08513-20028
E37-E43				NOT ASSIGNED		
E44	5021-3510	4	5	CONTACT-FEMALE	28480	5021-3510
E45	5021-3510	4		CONTACT-FEMALE	28480	5021-3510
E46	5021-3510	4		CONTACT-FEMALE	28480	5021-3510
E47	5021-3510	4		CONTACT-FEMALE	28480	5021-3510
E48	5021-3510	4		CONTACT-FEMALE	28480	5021-3510
F1	2110-0043	8		FUSE 1.5A 250V NTD 1.25X.25 UL	28480	2110-0043
FL1	0960-0443	1	1	LINE MODULE-FILTERED	28480	0960-0443
T1	9100-4389	9	1	XFMR PWR	28480	9100-4389
W1-W12				NOT ASSIGNED		
W13	08513-60133	8	1	CA AY A3J1-A14J1	28480	08513-60133
W14	08513-60134	9	1	CA AY A3J2-J11A7	28480	08513-60134
W15-W23				NOT ASSIGNED		
W24	08513-60144	1	1	CA AY A12J3J11A1	28480	08513-60144
W25				NOT ASSIGNED		
W26	08513-60146	3	1	CA AY A10J3J11A2	28480	08513-60146
W27	08513-60147	4	1	CA AY A11J3J11A3	28480	08513-60147
W28	08513-20003	7	1	CA RF A6J3/A10J1	28480	08513-20003
W29	08513-20009	3	1	CA RF A11J1/PRT2	28480	08513-20009
W30	08513-20010	6	1	CA RF A1-J1/PRT2	28480	08513-20010
W31	08513-20012	8	1	CA RF A6-J1/PRT1	28480	08513-20012
W32	08513-20020	8	1	CA RF A18J2/J3		
W33	08513-20021	9	1	CA RF A18J3/J4	28480	0513-20021
W34	08513-20022	0	1	CA RF A18-J1/RF	28480	08513-20022
W35-W38				NOT ASSIGNED		
W39	08512-20019	4	2	CA RF J2J3+J4J5	28480	08512-20019
W40-W48				NOT ASSIGNED		
W49	08512-20019	4		CA RF J2J3+J4J5	28480	08512-20019
W50-W56				NOT ASSIGNED		
W57	08513-60014	4	1	CA ASSY RRPNL/MB	28480	08513-60014
W58	08513-60036	0	1	CA ASSY 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	PWR CRD 3C 903 0	28480	8120-1348
W63	8120-3445	7	1	CBL AY 24C HPIB	28480	8120-3445
W64	8120-4396	9	1	CBL C AY-SMA	28480	8120-4396
				MISCELLANEOUS MECHANICAL & CHASSIS PARTS		
1	0380-0643	3	2	STANDOFF-HEX .255-IN-LG 6-32THD	00000	ORDER BY DESCRIPTION
2	0400-0002	2	4	GROMMET-RND .188-IN-ID .312-IN-GRV-OD	28480	0400-0002
3	0590-0926	0	4	THREADED INSERT-STDF 6-32 .188-IN-LG SST	28480	0590-0926
4	1251-2942	7	4	LOCK-SUBMIN D CONN	28480	1251-2942
5	2190-0017	4	4	WASHER-LK HLCL NO. 8 .168-IN-ID	28480	2190-0017

Table 3. HP 8513A Replaceable Parts (3 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
6	2360-0113	2	1	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
7	2360-0123	4	4	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
8	2420-0001	5	4	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
9	2420-0022	0	1	NUT-SPCLY 6-32-THD .23-IN-THK .354-OD	28480	2420-0022
10	2510-0270	1	4	SCREW-MACH 8-32 3.25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
11	2580-0004	6	4	NUT-HEX-DBL-CHAM 8-32-THD .125-IN-THK	00000	ORDER BY DESCRIPTION
12	3050-0139	6	12	WASHER-FL MTLN NO. 8 .172-IN-ID	28480	3050-0139
13	3050-0152	3	4	WASHER-SHLDR NO. 8 .172-IN-ID .438-IN-OD	28480	3050-0152
14	3050-0227	3	4	WASHER-FL MTLN NO. 6 .149-IN-ID	28480	3050-0227
15				NOT ASSIGNED		
16	3160-0309	5	1	FINGER GUARD	4N833	12601-43 UL VERSION
17	08514-00004	7	1	REAR PANEL	28480	08514-00004
18	0624-0099	1	38	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
19	0624-0100	5	8	SCREW-TPG 4-40 .5-IN-LG PAN-HD-POZI STL	28480	0624-0100
20	1400-0757	5	2	CLAMP-CABLE .25-DIA 1-WD PVC	28480	1400-0757
21	2190-0006	1	2	WASHER-LK HLCL NO. 6 .141-IN-ID	28480	2190-0006
22	2190-0007	2	2	WASHER-LK INTL T NO. 6 .141-IN-ID	28480	2190-0007
23	2190-0011	8	8	WASHER-LK INTL T NO. 10 .195-IN-ID	28480	2190-0011
24	2200-0105	4		SCREW-MACH 4-40 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
25	2200-0165	6	14	SCREW-MACH 4-40 .25-IN-LG 82 DEG	00000	ORDER BY DESCRIPTION
26	2360-0115	4	62	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
27	2360-0117	6	6	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
28	2360-0119	8	6	SCREW-MACH 6-32 .438-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
29	2360-0333	8	12	SCREW-MACH 6-32 .25-IN-LG 100 DEG	28480	2360-0333
30	2420-0002	6	2	NUT-HEX-DBL-CHAM 6-32-THD .109-IN-THK	28480	2420-0002
31	2510-0192	6	16	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION
32	2680-0129	8	8	SCREW-MACH 10-32 .312-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
33	3050-0105	6	3	WASHER-FL MTLN NO. 4 .125-IN-ID	28480	3050-0105
34	5020-8803	6	1	FRAME FRONT	28480	5020-8803
35	5020-8804	7	1	FRAME REAR	28480	5020-8804
36	5020-8837	6	4	STRUT CORNER 18"	28480	5020-8837
37	08505-20132	3	2	END PLATE ENCL	28480	08505-20132
38	08505-20163	0	2	ENCLOSURE CKT	28480	08505-20163
39	08512-20005	8	2	RFI GASKET	28480	08512-20005
40	08513-00001	3	1	DECK	28480	08513-00001
41	08513-00002	4	1	TRANSFORMER BRKT	28480	08513-00002
42	08513-00005	7	1	MOUNTING BKT-LH	28480	08513-00005
43	08513-00006	8	1	MOUNTING BKT-RH	28480	08513-00006
44	08513-00015	9	1	CAP SPRT PLATE	28480	08513-00015
45	08513-00016	0	1	BRACKET-CKT ENCL	28480	08513-00016
46	08513-20013	9	1	BRACE-DECK	28480	08513-20013
47	08513-20015	1	1	MOUNTING BAR	28480	08513-20015
48	85102-20054	3	1	FRONT BEZEL	28480	85102-20054
49	1400-1209	4	1	CLP CA .69D 1.0W	28480	1400-1209
50	2190-0104	0	5	WASHER-LK INTL T 7/16 IN .439-IN-ID	28480	2190-0104
51	6960-0001	3	2	PLUG-HOLE DOME-HD FOR .375-D-HOLE STL	28480	6960-0001
52	7121-2380	8	1	LBL LINE PTR-500W	28480	7121-2380
53	5021-0906	6	6	SLEEV RF PIN POS	28480	5021-0906
54	5021-3427	2	2	WSHR-TS PORT CON	28480	5021-3427
55	5021-3428	3	2	NUT-FLG TS PORT	28480	5021-3428
56	08512-00008	9	1	CLAMP A	28480	08512-00008
57	08512-00010	3	1	CLAMP C	28480	08512-00010
58	08512-20005	8		RFI GASKET	28480	08512-20005
59	08513-00003	5	1	FRONT PANEL	28480	08513-00003
60	08513-00004	6	1	SUB PANEL	28480	08513-00004
61	08513-00017	1	1	BRACKET-CONV AY	28480	08513-00017
62	08513-00032	1	1	CABLE COVER B	28480	08513-00032
63	2360-0127	1	1	SM-6-32 .875 PNP 2360	28480	2360-0127
64	08513-00027	3	1	CVR BLANK	28480	08513-00027
65	08513-00030	1	1	SPRT CLAMP-BRDG	28480	08513-00030
66	85102-00041	6	1	COVER-BLANK	28480	85102-00041
67	0624-0099	1	1	SCREW-TPG 4-40 .375-IN-LG PAN-HD-POZI	28480	0624-0099
68	1400-0054	5	1	CLAMP-CABLE .078-DIA .375-WD STL	28480	1400-0054
69	2510-0195	9	6	SCREW-MACH 8-32 .375-IN-LG 100 DEG	28480	2510-0195
70	7120-4835	0	1	LBL IN CSA ELEC	28480	7120-4835

Table 3. HP 8513A Replaceable Parts (4 of 4)

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
71	7120-5911	5	1	LBL WRN CAU METR	28480	7120-5911
72	5020-8896	7	2	TRIM FRNT HNDL	28480	5020-8896
73	5040-7201	8	4	FOOT-BOTTOM	28480	5040-7201
74	5040-7202	9	1	STRIP TRIM TOP	28480	5040-7202
75	5040-7221	2	4	FOOT-REAR	28480	5040-7221
76	5060-9847	4	1	COVER BTM 18" FM	28480	5060-9847
77	5060-9857	6	1	COVER AY SIDE	28480	5060-9857
78	5060-9899	6	2	HANDLE AY FRONT	28480	5060-9899
79	08513-00021	7	1	TOP CVR-TEST SET	28480	08513-00021
80	08513-00025	1	1	SIDE COVER-PERF	28480	08513-00025
81	08513-80033	9	1	LBL IN 08513-	28480	08513-80033
82	08513-20014	0	2	WR SPANNER 8513	28480	08513-20014



NOTE: See Figure 3 for parts unique to HP 8513A Option 001.

Figure 7. HP 8513A Major Assemblies

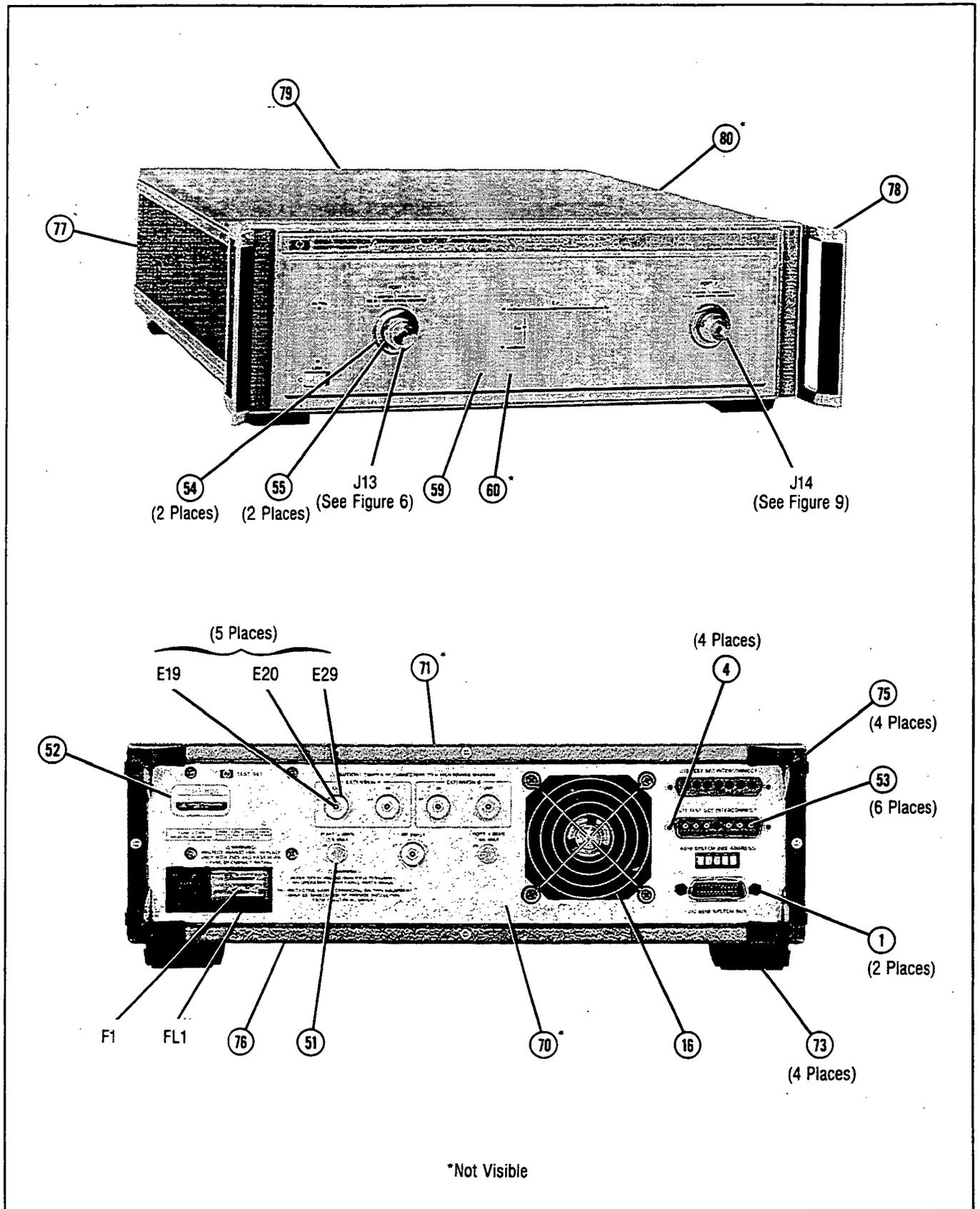
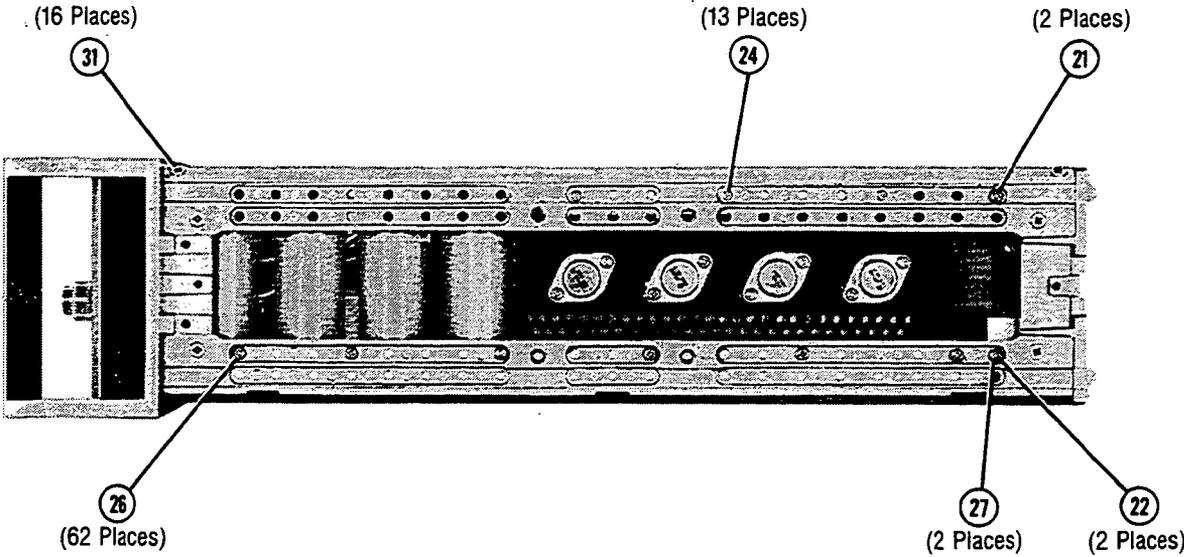
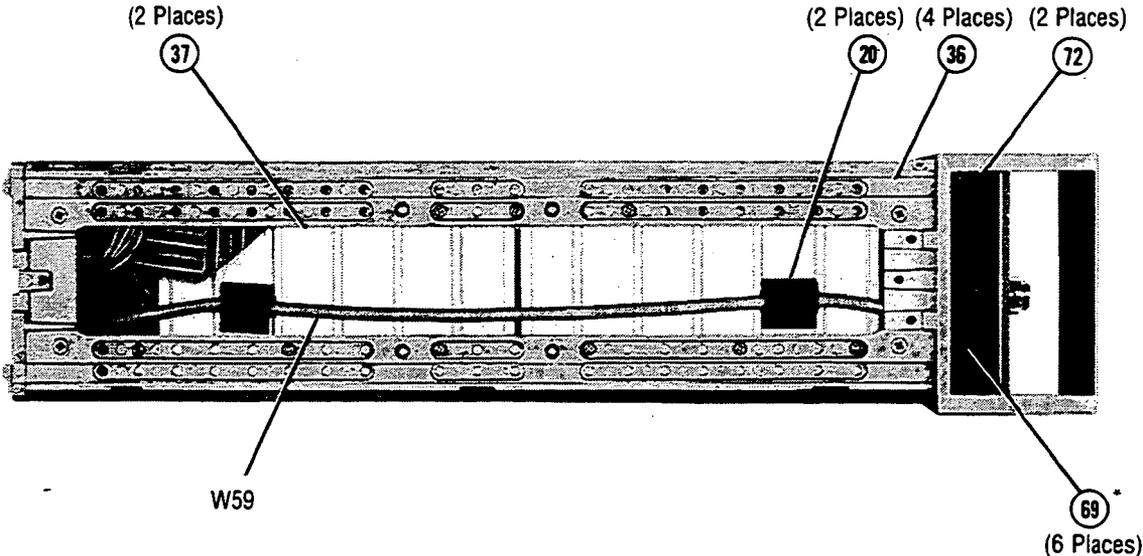


Figure 8. HP 8513A Miscellaneous Mechanical, Chassis, and Electrical Parts (1 of 5)

RIGHT SIDE



LEFT SIDE



*Not Visible

Figure 8. HP 8513A Miscellaneous Mechanical, Chassis, and Electrical Parts (2 of 5)

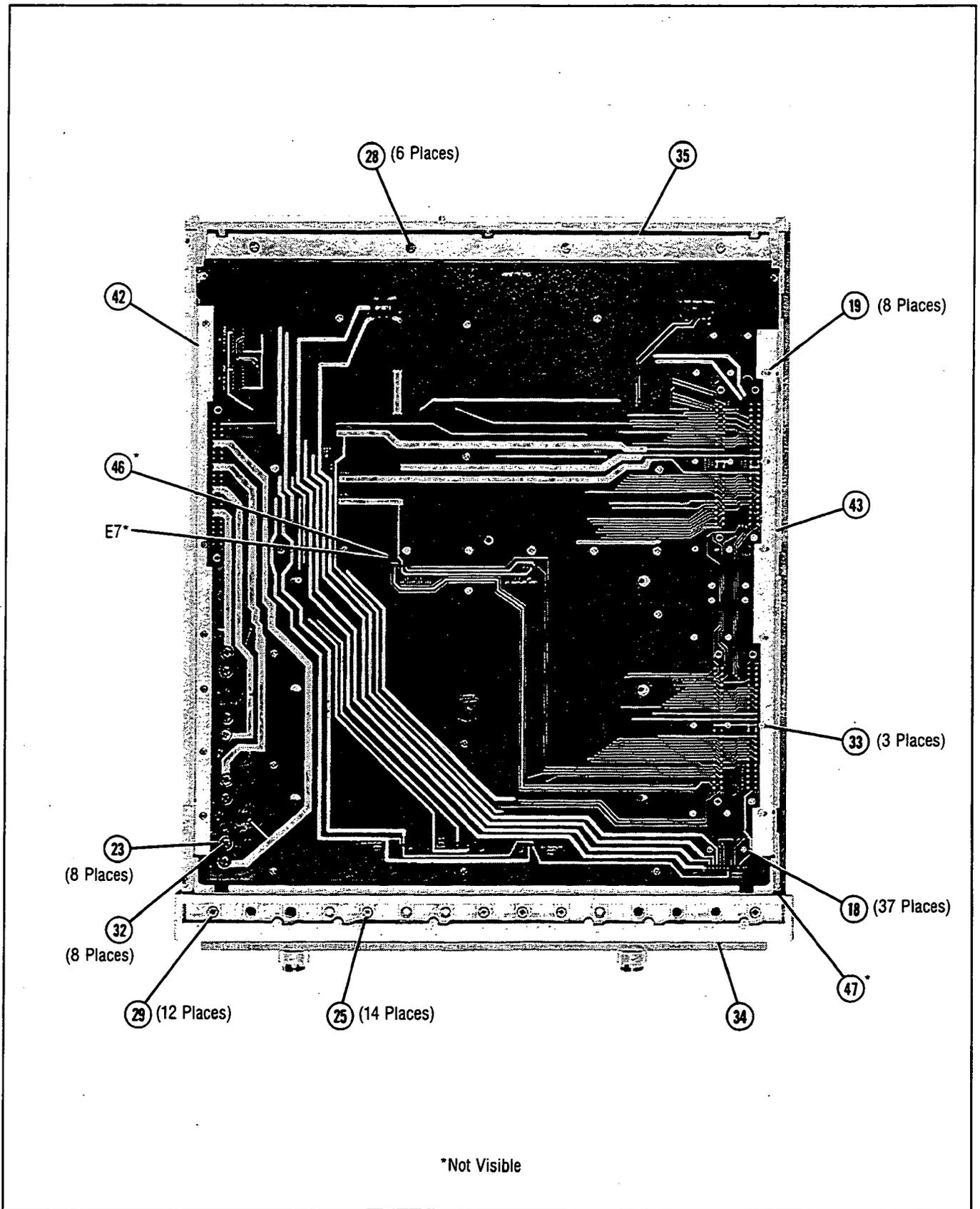


Figure 8. HP 8513A Miscellaneous Mechanical, Chassis, and Electrical Parts (3 of 5)

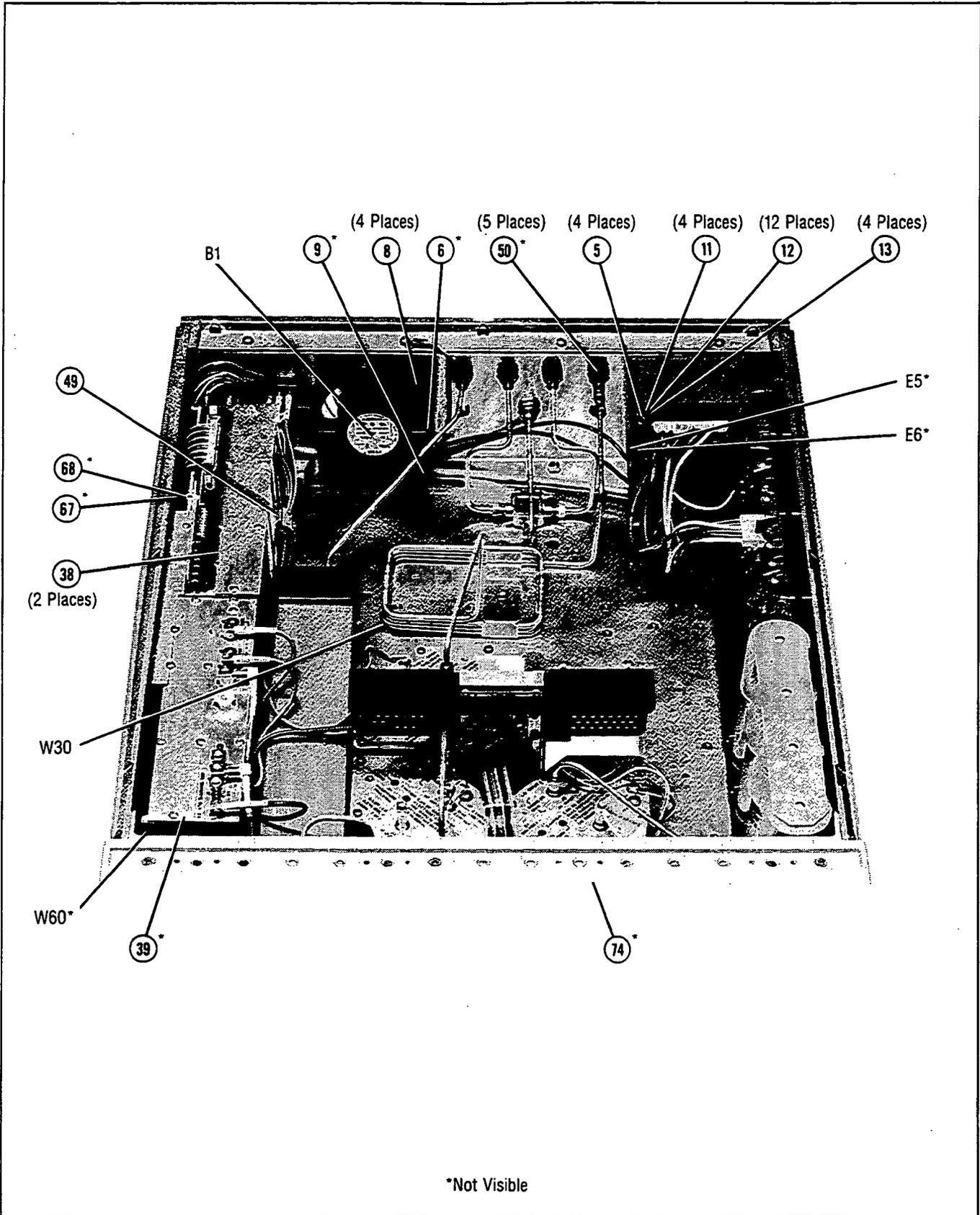


Figure 8. HP 8513A Miscellaneous Mechanical, Chassis, and Electrical Parts (4 of 5)

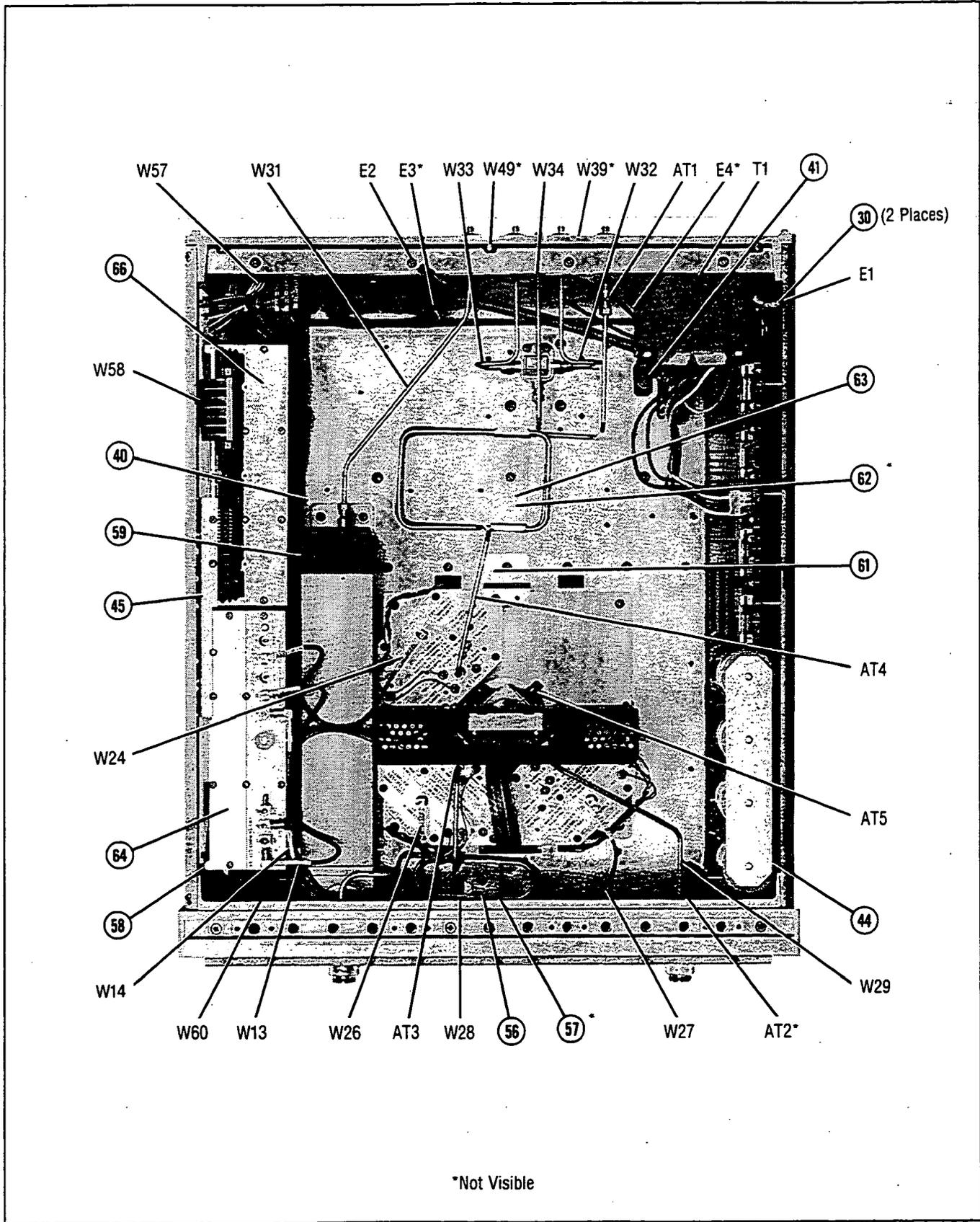
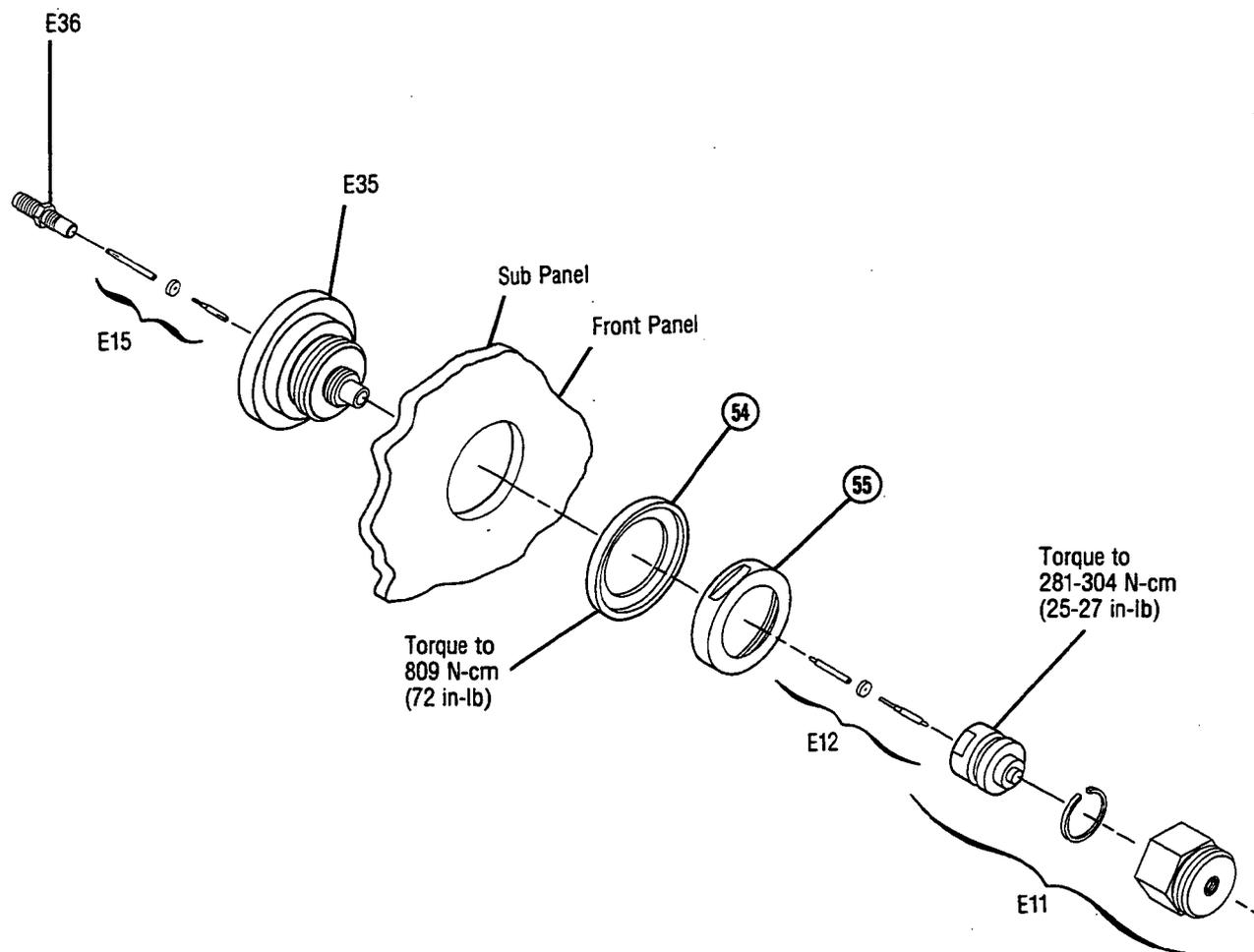


Figure 8. HP 8513A Miscellaneous Mechanical, Chassis, and Electrical Parts (5 of 5)

PORT 2: HP 8513A

(See Figure 6 for HP 8513A Port 1 replaceable parts and procedure)



Reference Designation	HP Part Number	C	D	Qty	Description	Mfr Code	Mfr Part Number
E11	5062-1245	4		1	3.5 MM NUT ASSEMBLY	28480	5062-1245
E12	5061-5355	3		1	TEST BEAD ASSEMBLY	28480	5061-5355
E15	5061-5354	2		1	BULKHEAD BEAD ASSEMBLY	28480	5061-5354
54	5021-3427	2		2	WASHER, TEST SET PORT CONN	28480	5021-3427
55	5021-3428	3		2	NUT FLANGE, TEST SET PORT	28480	5021-3428

Figure 9. HP 8513A Port 2 Replaceable Parts

This HP 8515A/8513A SERVICE section consists of a wiring diagram keyed to Figure 5, the component location diagram of the motherboard (A19). Use these two tools as aids to troubleshoot motherboard trace and component problems. Figure 5 is in the previous section, REPLACEABLE PARTS.

Other service information is included in the TEST SET TROUBLESHOOTING section of the HP 8510B Service Manual and volume 4 of the HP 8510A manual set. 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 the HP 8510B Service Manual and in Service Note 8511A-1.

The repair of 3.5mm connectors (like those on the front panels of these test sets) is described in the REPLACEABLE PARTS section of this manual.

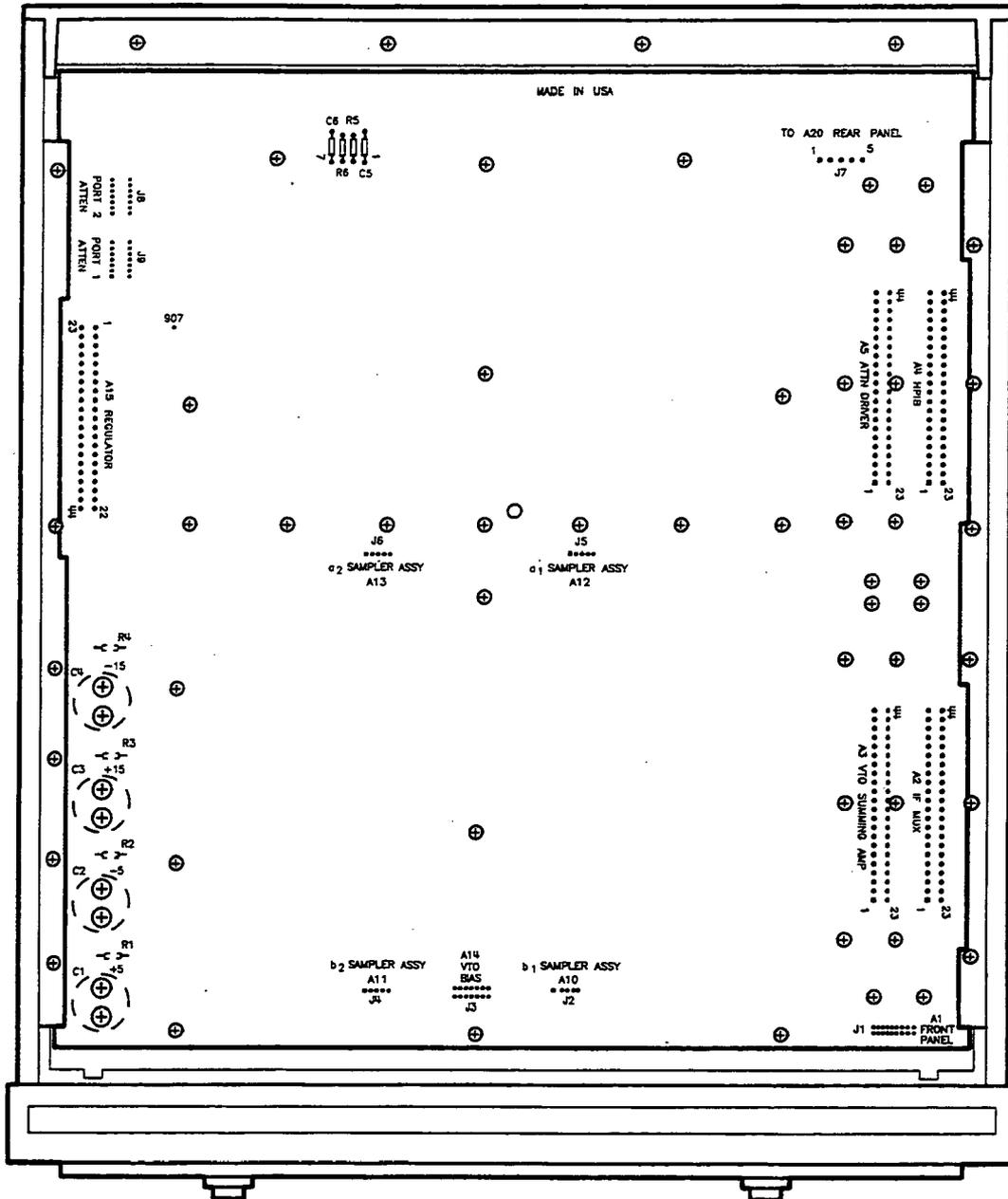
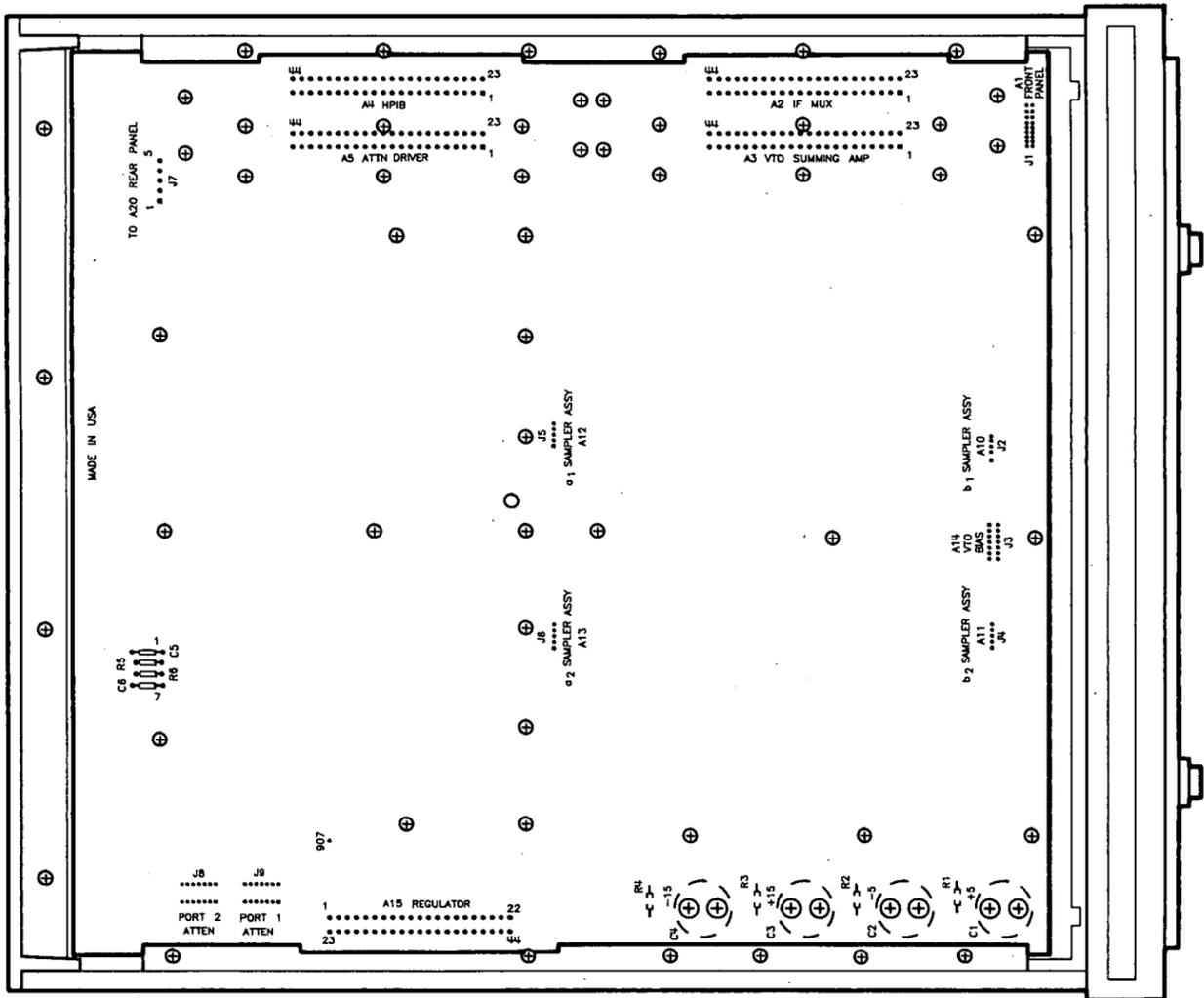


Figure 10. HP 8513A/8515A Motherboard

Test Sets Interconnect Table (1 of 2)

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

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



Test Sets Interconnect Table (2 of 2)

MEMORIC	DESCRIPTION	SIGNAL ENTERS MOTHERBOARD (CONNECTOR/PIN)	SIGNAL ENTERS (ASSEMBLY) →	A1 FRONT PANEL	A2 IF MULTIPLEXER	A3 VTO SUMMING AMP	A4 HP-IB	A5 ATTN/SWITCH	A10 SAMPLER	A11 SAMPLER	A12 SAMPLER	A13 SAMPLER	A14 VTO/DRIVER	A15 REGULATOR	A16 STEP ATTN 1	A17 STEP ATTN 2	A20 REAR PANEL
LBIOS LBUIWR LENDRA LLOPTP	Low = Buffered I/O Strobe Low = Buffered Write Low = End of Range Low = Option Present	XA4-5 XA4-27 XA3-43 XA2-20	J1	XA2	XA3	XA4	XA5	J2	J4	J5	J6	J3	XA15	J8	J9	J7	
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	7		7	43 7										2
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		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	26, 27 8, 9, 30, 31	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	10, 32 13, 35	4 3	4 3	4 3	4 3	11, 12 5, 6				

Motherboard Pin Numbers

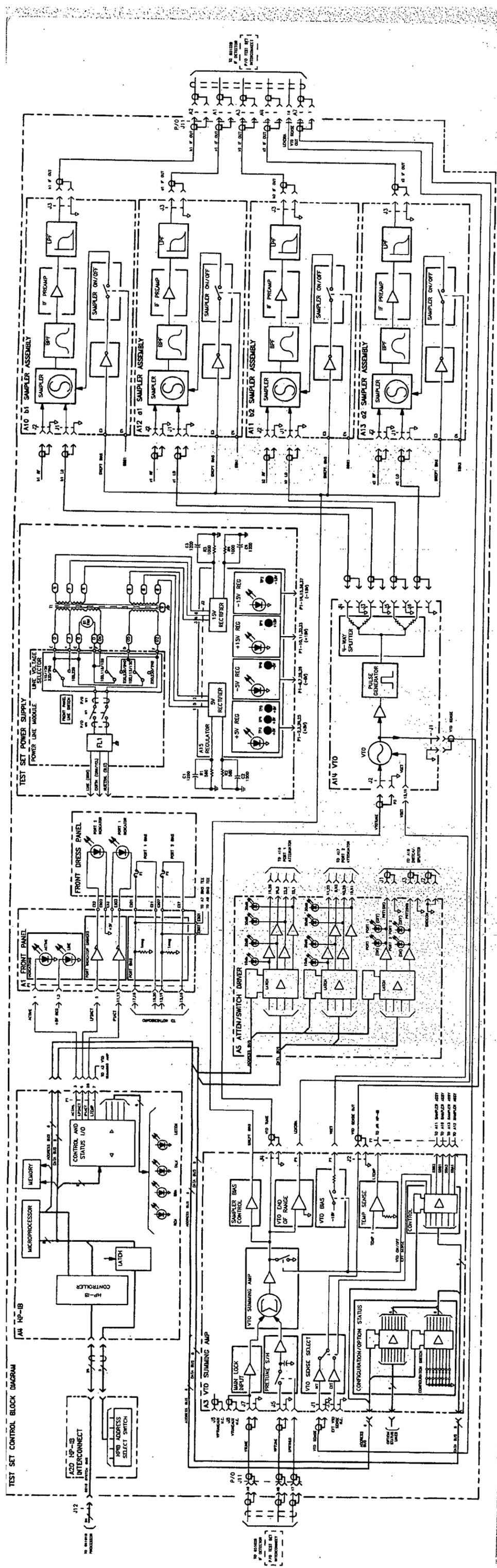


Figure 11. Test Set Control Circuit Block Diagram

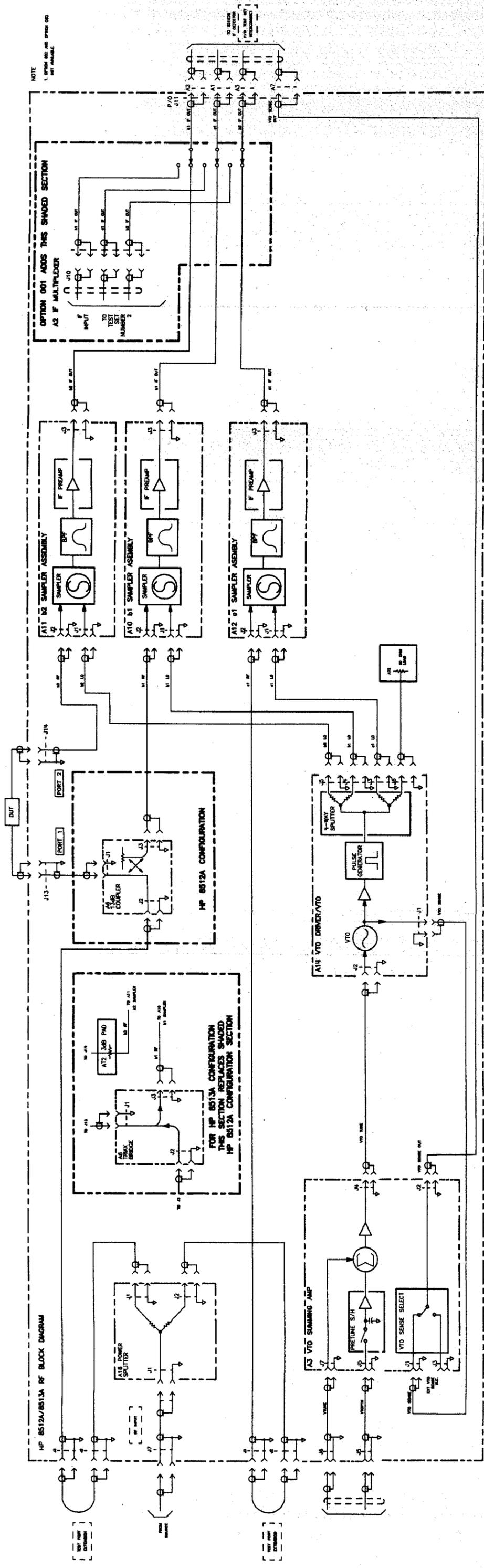


Figure 12. HP 8512A/8513A RF Block Diagram

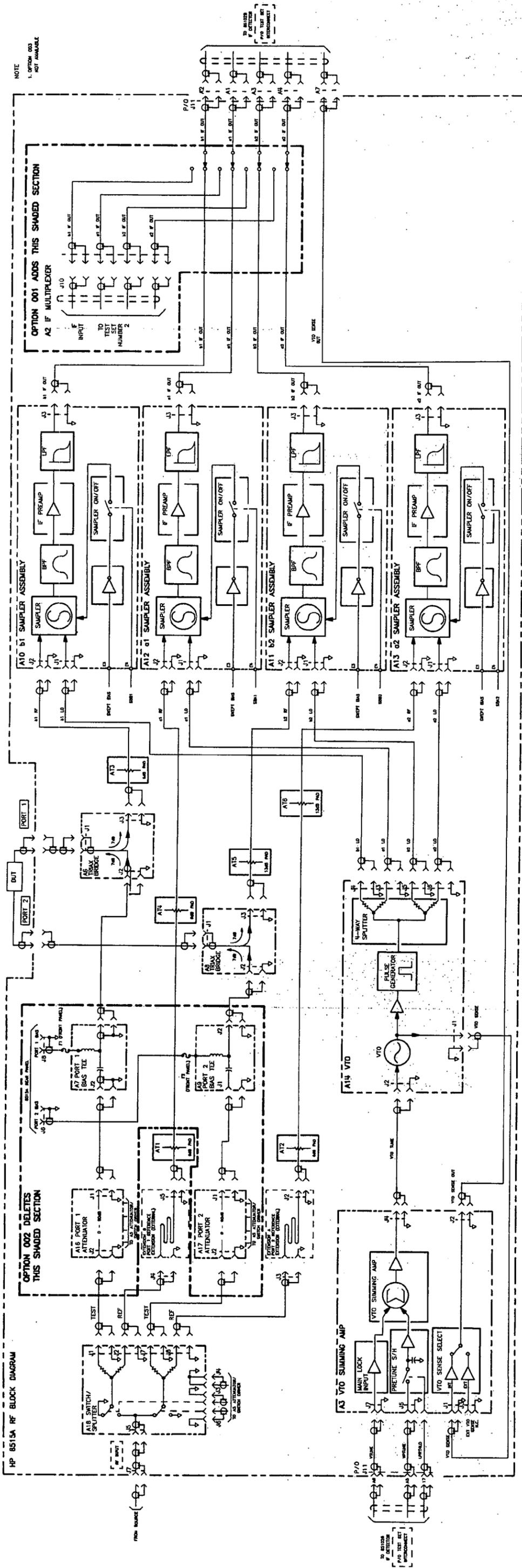


Figure 13. HP 8515A RF Block Diagram

NOTE
1. OPTION 003
NOT AVAILABLE



HP Part Number 08515-90015

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