HEWLETT PACKARD

Test Sets and Accessories Manual

HP 8510C Network Analyzer

HP 8517B S-Parameter Test Set

Operating and Service Manual

SERIAL NUMBERS

This manual documents the operation of HP 8517B Test Sets with the serial prefix of 3347A or greater.

HEWLETT PACKARD

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The specifications and characteristics chapter contains regulatory information.

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Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

Safety Symbols

The following safety symbols are used throughout this manual. Familiarize yourself with each of the symbols and its meaning before operating this instrument.

Caution

The *caution* sign denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in damage to or destruction of the instrument. Do not proceed beyond a *caution* sign until the indicated conditions are fully understood and met.

Warning

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

General Safety Considerations

Warning

Before this instrument is switched on, **make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact.**

Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal can result in personal injury.

Warning

There are many points in the instrument which can, if contacted, cause personal injury. Be extremely careful.

Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.

Caution

Before this instrument is switched on, make sure its primary power circuitry has been adapted to the voltage of the ac power source.

Failure to set the ac power input to the correct voltage could cause damage to the instrument when the ac power cable is plugged in.

Contents

Figures

Tables

1

Getting Started

This HP 8517B Operating and Service Manual supports the HP 8517B S-parameter test set. Use this manual in conjunction with the HP 8510C network analyzer manual. These documents provide the information needed to properly configure your system, then to make measurements.

First Step — Insert this manual into the HP 8510C Test Sets and Accessories Manual, behind the tab titled "Test Sets." Review Chapter 1, "Getting Started" and Chapter 2, "Installation" of this manual to learn about the following:

- Preparing the site for operation
- Unpacking and inspecting your instrument for shipment damage
- Understanding safety considerations
- Configuring your HP 8517B with an HP 8510C

Second Step — Review the Connector Care Quick Reference Card, supplied with the HP 8510C manual set. Refer to your calibration kit documentation for complete information about care, cleaning, gaging, and connection of precision devices. Knowledge and application of proper connector care is critical to achieving good connections and maintaining maximum performance quality with your precision calibration devices.

Third Step — Read Chapter 3, "Operation." This chapter provides test set front- and rear-panel features information. In addition, there is information about controlling multiple test sets, measuring high power devices, using the anti-rotation clamps, and connecting devices to the test set.

The remaining chapters are for reference purposes. They provide specifications, troubleshooting, replacement procedures, and replaceable parts information.

Test Set Description

The test set combined with an HP 8510B/C network analyzer and an HP 836X Series source provides a system with which to make S-parameter measurements from 45 MHz to 50 GHz. This system configuration is particularly suited for making measurements on two-port devices when it is inconvenient or time-consuming to physically reverse the device-under-test to measure all four S-parameters; or for non-reciprocal devices or components like transistors, amplifiers or isolators where S12 measurements are required.

The test set uses two directional couplers for signal separation, as illustrated in Figure 1-1, for the standard system, and Figure 1-2 for Option 004, and Figure 1-3 for Option 007. For active-device measurements, two bias tees apply external DC bias to both of the test port center conductors.

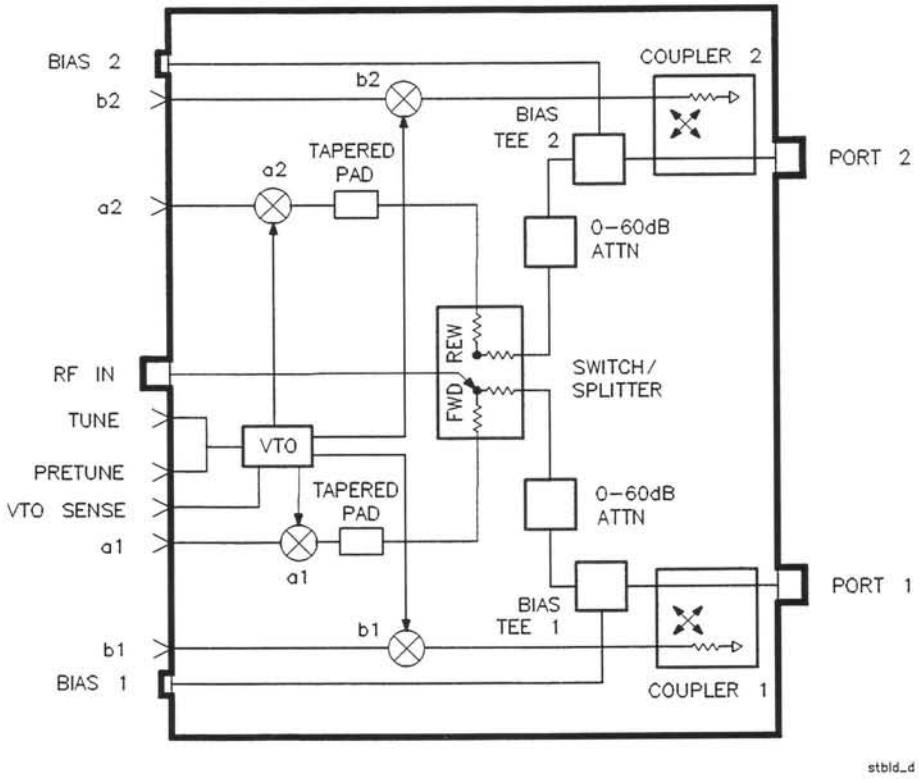


Figure 1-1. Standard HP 8517B Test Set Block Diagram

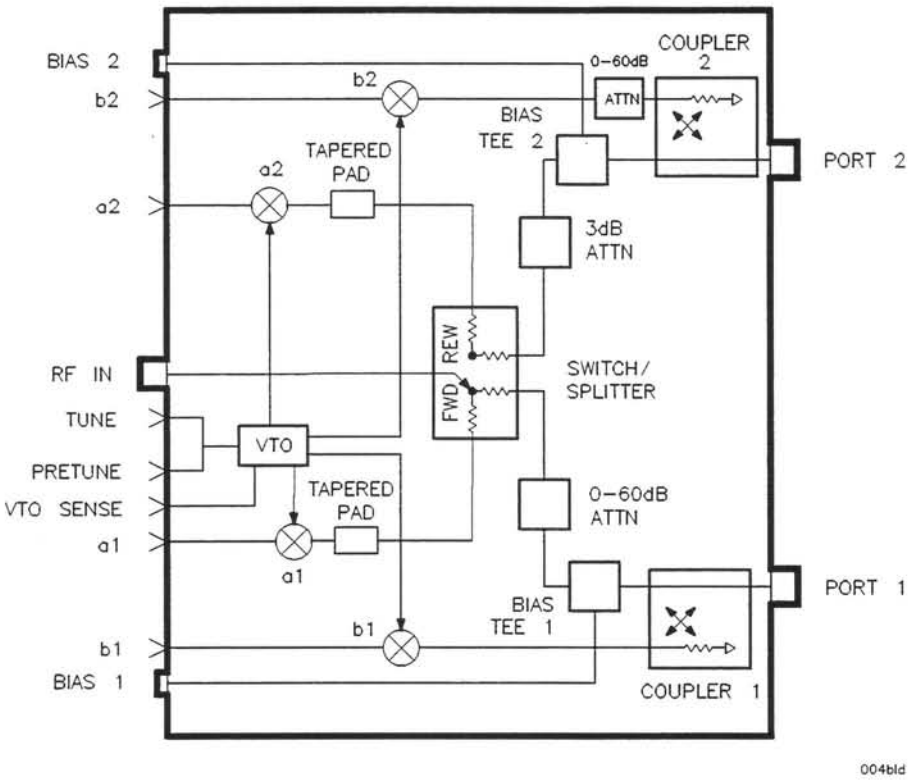


Figure 1-2. Option 004, HP 8517B Test Set Block Diagram

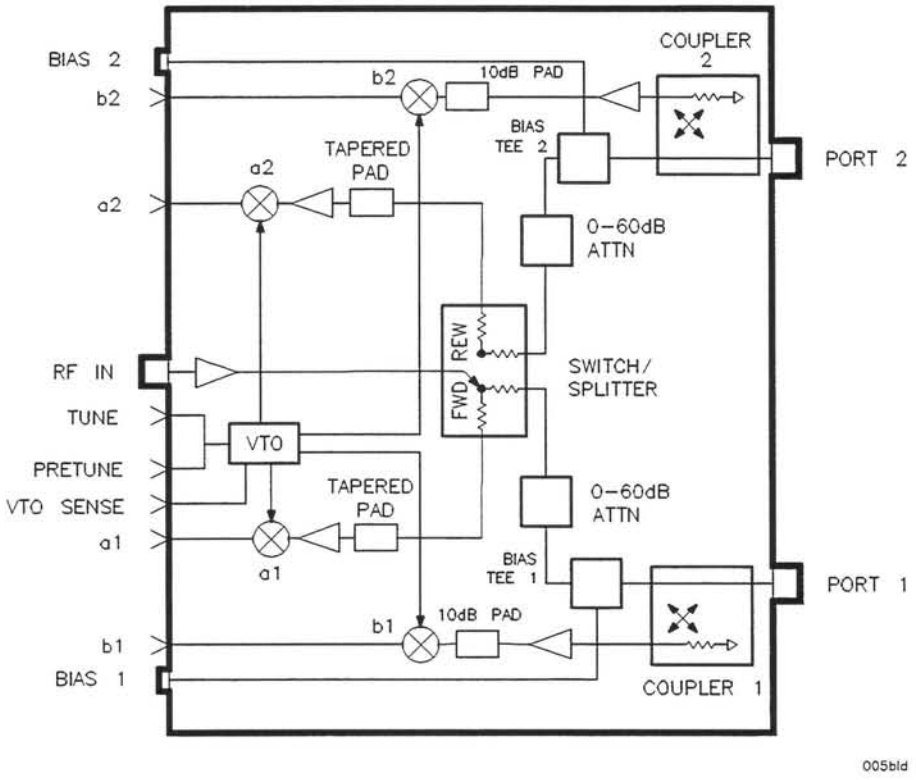


Figure 1-3. Option 007, HP 8517B Test Set Block Diagram

HP 8517B Test Set Options

Option 001	This option adds IF switching capability to allow up to four test sets to be connected to the HP 8510 at the same time. The test set in use is selected from the network analyzer. 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), no reconnecting needed. For more information see "Controlling Multiple Test Sets" in Chapter 3, "Operation" of this manual.
Option 002	This option deletes the programmable attenuators and bias tees. Notice, if bias is required but attenuation is not, the bias can be applied externally by using the HP 11612B bias tee.
Option 004	This option moves the port 2 attenuator in front of the b2 sampler. By protecting the b2 sampler, devices with output power up to 30 dBm (1W) can be measured. A 3 dB attenuator is also added to protect the switch splitter from high power into port 2.
Option 007	This option adds five amplifiers, two 10 dB attenuators, and two tapered attenuators. These components increase the available power and dynamic range of the test set.
Option 908	This option supplies the parts required to rack mount the test set with handles removed. Refer to the "Installation" chapter of this manual for additional information.
Option 910	This option provides a duplicate manual.
Option 913	This option supplies the parts required to rack mount the test set with handles attached. Refer to the "Installation" chapter of this manual for additional information.
Option 002 and 007	This option removes the bias tee, but retains the high dynamic range capability in the test set.
Option 004 and 007	This option adds high-dynamic range and high power measurement capability to port 2.

Verifying Test Set Operation

The test set is designed to operate specifically with the HP 8510C network analyzer.

Checking System Operation	To check for proper operation, perform a system calibration as described in the HP 8510C Operating and Programming manual. A successful calibration is an indication that the system, and therefore the test set, are operating properly.
Checking Specifications	The specifications for the test set, and the system, may be determined by running the specification and performance verification software as described in Chapter 8, "Specification and Performance Verification" of the HP 8510C On-Site Service Manual. Additional mechanical specifications and supplemental characteristics are listed in Chapter 4, "Specifications" of this manual.
Troubleshooting the Test Set	To troubleshoot the test set, refer to the troubleshooting information in the HP 8510C On-Site Service Manual. Use the information in that manual to determine whether the test set is at fault. If so, then refer to Chapter 5, "Test Set Troubleshooting" in this manual to determine the faulty assembly.

Maintaining Measurement Accuracy

Hewlett-Packard recommends that you recalibrate your system every few hours, or at a minimum re-verify your system calibration, to maintain precision measurements.

Precision measurements are dependent upon the precision calibration of the network analyzer. As a general rule, the shorter the time between a calibration and the measurement of a device, the more precise the measurement results are (within the limitations of your system).

The frequency of your system recalibrations is partly determined by the location of the system and the ambient temperature stability of that area.

Instruments Supported by This Manual

A two-part serial number is placed on the rear panel of the test set. To determine the serial number of your instrument, understand the following:

- The first four digits and the letter are the serial number prefix. The contents of this manual apply directly to test sets with the same serial number prefix as the one(s) on the title page.
- The last five digits make up the suffix, which is sequential and unique to each test set. This part of the number is helpful if you need to report test-set problems to a sales and service engineer.

  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 Chapter 10, "Instrument History" of this manual.

Instrument Firmware Compatibility

The test set is compatible with HP 8510B network analyzers having firmware revision B.06.00 and higher, and HP 8510C network analyzers with firmware revision C.06.00 and higher. However, the HP 8517B, Option 007 instrument is compatible with HP 8510C firmware revision 7.0 or higher, only.

You may use the test set with an HP 834X Series or an HP 8350 source up to their higher frequency limits. The HP 8517B, Option 007 is not compatible with the HP 8350B source, however.

To use the test set to 50 GHz, HP 836X Series sources must have a frequency range that extends to 50 GHz. If your network analyzer or source do not meet the required conditions, you need to upgrade your system. Please contact an HP Sales and Service representative for information.

Service and Support Options Available

A variety of service and support products are available. These products cover repair, calibration, and verification. Contact your Hewlett-Packard customer engineer for details. The HP Sales and Service Office listing is located at the end of this document. The purchase of an HP 8517B includes a one year on-site service warranty. In the event of failure Hewlett-Packard provides service for the system. *Note:* system installation is not included.

Option W30	Adds a three year customer return-repair coverage warranty to the instrument. Customers may return the instrument to HP within that three year period for repair.
Option W31	Adds a three year on-site repair coverage warranty for next-day on-site repair of the instrument. Customers may return the instrument to HP within that three year period for repair and get next-day service on their instrument.
Option 1BN	Adds a MIL-STD 45662A Certificate of Calibration to the instrument. This option must be ordered when the instrument order is placed.

Option 1BP	Adds a MIL-STD 45662A Certificate of Calibration and the corresponding calibration data to the instrument. This option must be ordered when the instrument order is placed.

Accessories Supplied and Available

The accessories supplied with the test set, including part numbers, are listed in the "Installation" and "Replaceable Parts" chapters of this manual.

Accessories Available

Note

Additional HP 8510C system accessory information is provided in the HP 8510C manual set.

Cables, Calibration, Verification, and Adapter Kits	Hewlett-Packard offers several suitable calibration kits to calibrate this test set, or system, to make error-corrected measurements. Each calibration kit listed below includes a set of precision standards to calibrate a network analyzer system in the indicated interface. ■ HP 85056A 2.4 mm Calibration Kit Contains open and short circuits, fixed and sliding loads (2), 2.4 mm to 2.4 mm adapters, 2.4 mm connector tools and gauges. ■ HP 85057S 2.4 mm Verification Kit Contains precision airline, mismatched airline, 20 dB and 40 dB attenuators with NIST (National Institute of Standards and Technology) traceable data and uncertainties.

Cables Available

HP 85133C 2.4 mm Test Port Return Cable	For use when you are measuring a 2.4 mm-ported device connected directly to port 1 of the test set. The test port return cable is connected between the device under test and port 2.
HP 85133D 2.4 mm Test Port Return Cable Set	For use when you are measuring a 2.4 mm-ported device connected between the cable ends.
HP 85133E 2.4 mm Flexible Test Port Return Cable	For use when you are measuring a 2.4 mm-ported device connected directly to port 1 of the test set. The test port return cable is connected between the device under test and port 2.
HP 85133F 2.4 mm Flexible Test Port Return Cable Set	For use when you are measuring the 2.4 mm-ported device is connected between the cable ends.

HP 85134D 3.5 mm Test Port Return Cable Set	For use when you are measuring a 3.5 mm device under test connected between the cable ends.
HP 85134E 3.5 mm Flexible Test Port Return Cable	For use when you are measuring one end of a 3.5 mm device connected directly to an HP 85130F adapter at port 1. The test-port return cable is connected between the device and port 2.
HP 85134F 3.5 mm Flexible Test Port Return Cable Set	For use when you are measuring a 3.5 mm device connected between the cable ends.
HP 85135C 7 mm Test Port Return Cable	For use when you are measuring one end of a 7 mm device connected directly to an HP 85130E adapter at port 1. The test port return cable is connected between the device and port 2.
HP 85135D 7 mm Test Port Return Cable Set	For use when you are measuring a 7 mm device connected between the cable ends.
HP 85135E 7 mm Flexible Test Port Return Cable	For use when you are measuring one end of a 7 mm device connected directly to an HP 85130E adapter at port 1. The test port return cable is connected between the device and port 2.
HP 85135F 7 mm Flexible Test Port Return Cable Set	For use when you are measuring a 7 mm device connected between the cable ends.

Adapter Information

HP 85130E Special 2.4 mm to 7 mm Adapter Set	Used to convert special 2.4 mm ports of the test set into a 7 mm connector interface (m or f).
HP 85130F Special 2.4 mm to 3.5 mm Adapter Set	Used to convert special 2.4 mm ports of the test set into 3.5 mm connector interface (m or f).
HP 85130G Special 2.4 mm to 2.4 mm Adapter Set	Used to convert special 2.4 mm ports of the test set into standard 2.4 mm connector interface (m or f). These adapters function as "test port savers."
HP 11904S 2.4 mm to K-2.92 * mm Adapter Kit	This kit allows you to calibrate the test set using 2.4 mm devices, then to change the test ports to 2.92 mm and perform fully error corrected measurements. The kit contains (2) 2.4 mm to 2.92 (m) adapters and (2) 2.4 mm to 2.92 (f) adapters. * The K connector is developed and manufactured by the Wiltron Company (Morgan Hill, California).

Note

For more information about other 2.4 mm adapters, refer to the Operating Note "2.4 mm Adapters and Calibration Accessories" (HP part number 11900-90003).

The HP 85041A Transistor Test Fixture Kit (TTF)

A comprehensive measurement system for testing and characterizing stripline packaged microwave transistors. Although the fixture contains 7 mm connectors and its frequency range limit is 18 GHz, the kit may be adapted easily for use with the test set by using HP 85135C or HP 85135E cables with the HP 85130E adapter set. Please consult your HP Sales and Service Office representative for recommendations.

Recommended Test Equipment

Additional equipment and accessories required for use with the test set are listed in Table 1-1. The table notes which items are required to verify the performance of the test set and which are required to operate it. Other equipment may be substituted if its specifications meet or exceed the specifications listed in the critical specifications column.

Table 1-1. Recommended Test Equipment

Item	Critical Specifications	Recommended Model	Use[1]
Network Analyzer	no substitute	HP 8510B or HP 8510C	O,P,T
Source		HP 83651A	O,P,T
Controller	no substitute	HP 9000 Series 200 or 300 with 3 Mbyte RAM and HP BASIC 3.0 or higher or PCC-305 or PC-308 HP BASIC Controller with 3 Mbyte of Basic Language Processor RAM.	N/A
Disk Drive	compatible with controller		P
Multimeter	range: 0 to 50 V	HP 3456A	T
Oscilloscope	50 MHz bandwidth	HP 1740A	T

1 O = Operation; P 9 <esc>=Performance Test; T <esc>= Troubleshooting

Operating and Safety Precautions

ESD Sensitive

The assemblies in this test set are very sensitive to damage by electrostatic discharge. They may or may not continue to function if subjected to an electrostatic discharge. Their reliability, however, will be impaired.

Handle the instrument devices at static-safe work stations, only.

Operating Precautions

Observe the following normal precautions when handling and operating the test set:

- Do *not* exceed the input power levels, as listed below:

Maximum Power Input Level	Test Port
+17 dBm	Port 1
+17 dBm	Port 2
+30 dBm[1]	Port 2 (Option 004 or Option 004 "plus" Option 007)

1 The maximum input power allowed with HP 8517B, Option 004, or Option 004 plus Option 007, only, if the attenuator set to $\leq$20 dB. With no attenuation, the maximum input power allowed is +17 dBm.

- Do not exceed +15 dBm into the test set with the source RF input. Never apply a DC voltage to the source RF input of the test set.
- Do not torque any connection at the test port connectors to more than 90 N-cm (8 in-lb). The wrench supplied with your accessory kit is calibrated for 90 N-cm (8 in-lb), torque.
- Do not torque any connection at the source RF input, on the back of your test set, to more than 90 N-cm (8 in-lb).

Safety Precautions

The voltages inside this test set warrant normal caution for operator safety. Nevertheless, service should be performed by qualified personnel, only. Service strategy, troubleshooting procedures, replaceable parts, and other information about the test set is provided in this manual, or in the HP 8510C on-site service manual.

2

Installation

This chapter contains information about installing a test set. The topics include initial inspection, environmental considerations, positioning and connecting the test set for use. Refer to this chapter for information about packaging and shipping the test set. Refer to the "Installation" chapter of the HP 8510C On-Site Service manual for the complete system connection and turn-on instructions.

Initial Inspection

Inspect the shipping container (including cushioning material) for damage. If there is damage, keep the container until you have checked the contents for completeness. Figure 2-1 illustrates the accessories supplied with the test set.

If the shipping container is damaged, complete the performance tests outlined in the HP 8510C On-Site Service manual. 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 sales and service office (refer to the HP Sales and Service Office listing at the end of this manual). The office can arrange for repair or replacement of the test set without waiting the claim settlement. If any of the following accessories are not received with the test set, notify your nearest HP sales and service office so that the missing parts can be sent to you.

Operating Environment

For the HP 8517B to perform within specifications, operate the test set in temperatures between 0°C and +55°C, with relative humidity less than 95% (at 40°C dry bulb temperature, maximum). The instrument can be operated at altitudes up to 4,500 meters (15,000 feet).

Storing the Test Set

The test set can be stored in temperatures ranging 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 meters (50,000 feet).

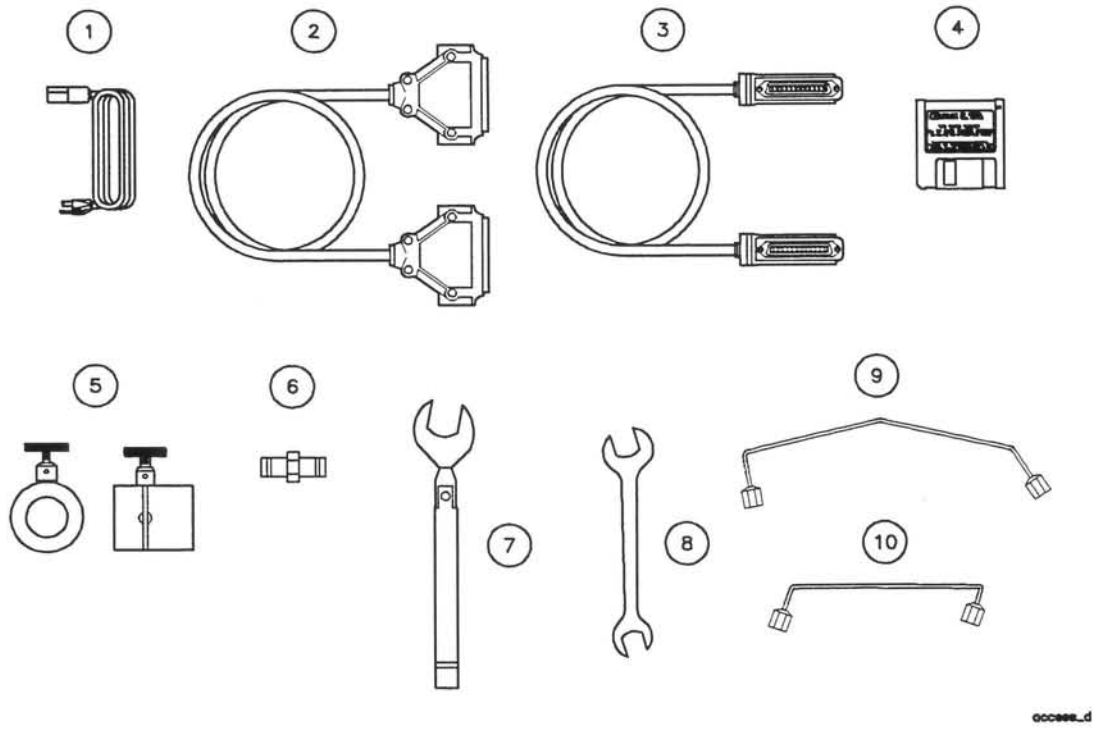


Figure 2-1. Accessories Supplied with the HP 8517B Test Set

① Power Cord U.S.A. only	⑥ Female 2.4 mm to Female 2.4 mm Adapter
② Test Set Interconnect Cable	⑦ 20 mm, 98N-cm (8 in-lb), 16 Torque Wrench
③ HP-IB Cable	⑧ 1/2" x 9/16" Open End wrench
④ Specification and Performance Verification Software	⑨ RF Source Cable, Bench-top Configuration
⑤ Non-rotating Clamps	①⓪ RF Source Cable, Rack Configuration

Warning

Assemblies in the test set are extremely sensitive to damage by static electricity. They may or may not continue to function if subjected to an electrostatic discharge. Their reliability, however, becomes impaired.

Always use an anti-static wrist strap when calibrating or verifying the test set or using the test set to measure devices. Never touch the test port center conductors. Use a wrist strap when connecting the extended center conductor of a sliding load termination.

Installing the Test Set into a System Rack

The system rack recommended is the HP 85043C. Instructions for rack-mounting the test set in a system configuration with the HP 8510 are located in the "Installation" chapter of the HP 8510 On-Site Service manual and in the HP 85043C system rack manual.

Installing the Test Set on a Bench

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

A grounding receptacle is provided on the test set as an alternate grounding point for your anti-static wrist-strap.

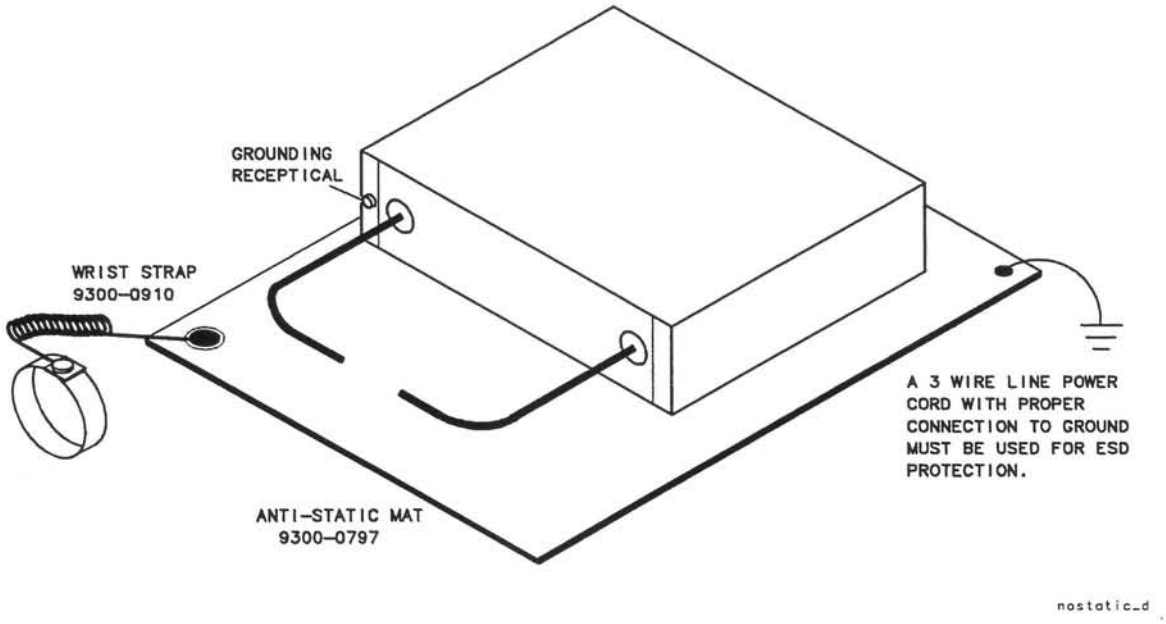


Figure 2-2. Recommended Static-Free Workstation Configuration

Configuring the Test Set in a System

Figure 2-3 illustrates the cable connections for installing an HP 8517B in a system. Refer to the information that follows to install the test set.

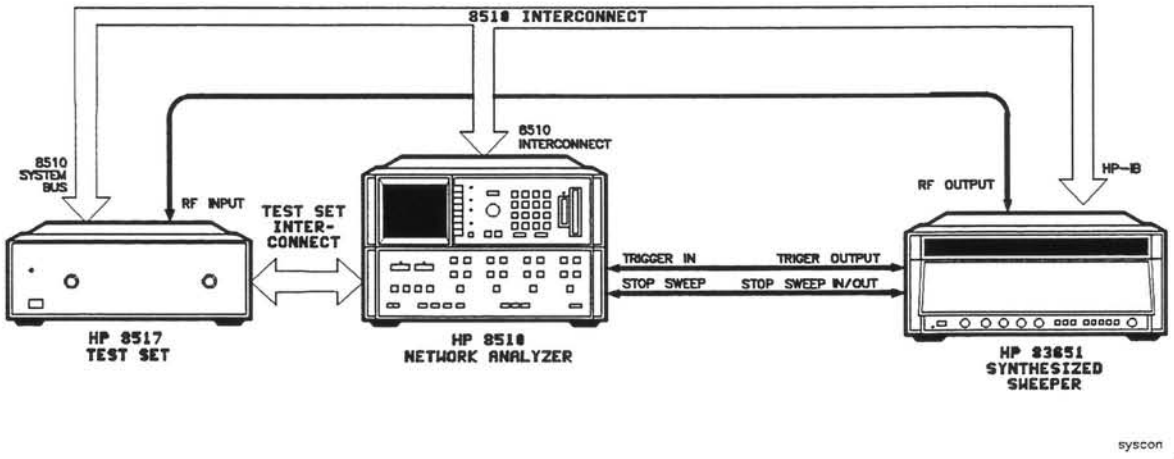


Figure 2-3. Configuring an HP 8517B Test Set in a System

System Power and Control Connections

Make sure the test-set line module is set to a voltage that is correct for your operating environment. Instructions about changing the voltage selection or replacing the line fuse is provided in Chapter 5, "Troubleshooting" of this manual. After confirming the line module setting connect the test set power cord to an electrical outlet.

- Attach the HP 8517B IF-interconnect cable from the J11 TEST SET INTERCONNECT (on the test set's rear panel) to the J1 TEST SET INTERCONNECT on the rear panel of the HP 85102 IF detector.
- Attach the system bus cable from the HP 8517B J12 HP 8510 SYSTEM BUS connector to the HP 8510C INTERCONNECT on 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

IF signals from the test set are transmitted to the HP 85102 IF detector. This path is through the IF interconnect cable.

- Connect the RF output from the rear panel of the source to the RF input on the test set.
- Use the 2.4 mm RF cable supplied with the test set.

Test Port Connectors

Port 1 and port 2 are male, NMD-2.4 mm connectors, and mate with Female 2.4 mm connectors .

Anti-Rotation Clamps

Use the clamps to stabilize the test port or RF cable or adapter at the connection.

- Connect the test port cables or adapters to the test ports.
- Torque the connections to 90 N-cm (8 in lb).

- Loosen the anti-rotation clamp thumb screw enough to slip the clamp over the cable and up to the front panel. The clamp end with the flats should come to rest on the flats of the test port shoulder.
- Finger-tighten the thumb screws to prevent further loosening or tightening of the test port/RF cable connection. Refer to Chapter 3, "Operation" for additional information.

Note

The internal O-ring (HP part number 0900-0007) is a field-replaceable part. There is no need to disassemble the anti-rotation clamp. When the O-ring no longer holds the RF cable securely, pry it out with fine tweezers or any similar tool.

- 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 all the way into the slot.

Packaging the Test Set

When necessary, repackage the test set in its original factory package. Containers and materials identical to those used by the factory are available through Hewlett-Packard Sales and Service offices.

Refer to the test set using its complete model and serial numbers in any correspondence to an HP Sales and Service office.

Alternatively, commercially available, comparable packaging materials may be used. Wrap the test set in heavy paper or anti-static plastic. If you are shipping the test set to an HP Sales or Service office, complete and attach a service tag (located in the HP 8510C 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`.

3

Operating an HP 8517B Test Set

This chapter contains illustrations of the HP 8517B front- and rear-panel features. The functions are described, and information about operating multiple test sets (Option 001) is provided.

Front-Panel Features

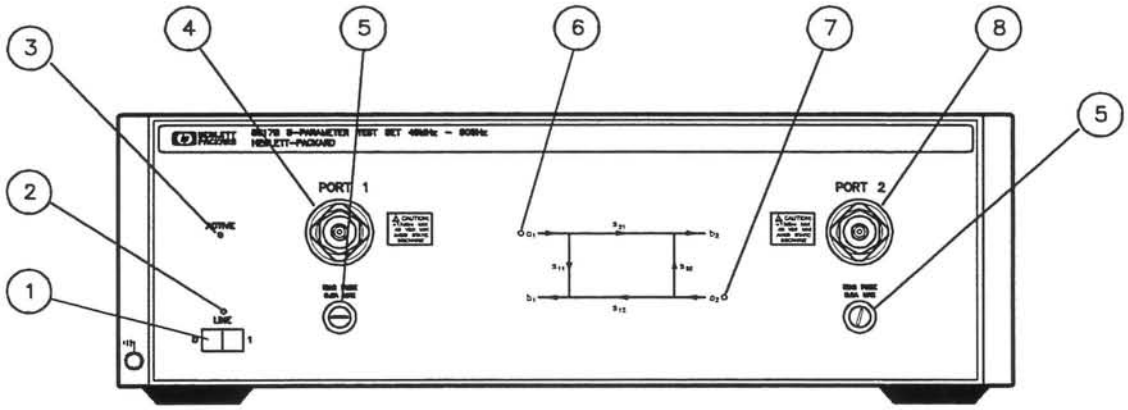


Figure 3-1. Front-Panel Features of the HP 8517B Test Set

① Line Switch. Use this switch turn the test set on or off. When the side of the switch labeled 0 is depressed, the test set is OFF; when the 1 side is depressed, the test set is ON.

② Line LED. This LED is lit when the test set line switch is ON and not when the test set line switch is OFF.

③ Active LED. This LED lights about two seconds after power is turned on, following the successful conclusion of the self-test. If the test set is used with other test sets (option 001) and is not addressed by the HP 8510C, then this light remains off.

④ Port 1. This test port transmits RF energy from the source to the DUT and receives reflected or transmitted RF energy from the DUT. The reflected RF energy is coupled to a sampler within the instrument. Connections made to this input must be torqued no more than 90 N-cm (8 in-lb).

⑤ Bias Fuse. The fuses that limit bias applied to port 1 and port 2 are located in these holders (see the instrument front panel or the replaceable parts list for the fuse values).

⑥ a1 LED. This LED indicates that the test set is internally switched to the S11 or S21 mode and source power is switched to port 1.

⑦ a2 LED. This LED indicates that the test set is internally switched to the S22 or S12 mode and source power is switched to port 2.

⑧ Port 2. This test port transmits RF energy from the source to the DUT and receives reflected or transmitted RF energy from the DUT.

Rear-Panel Features

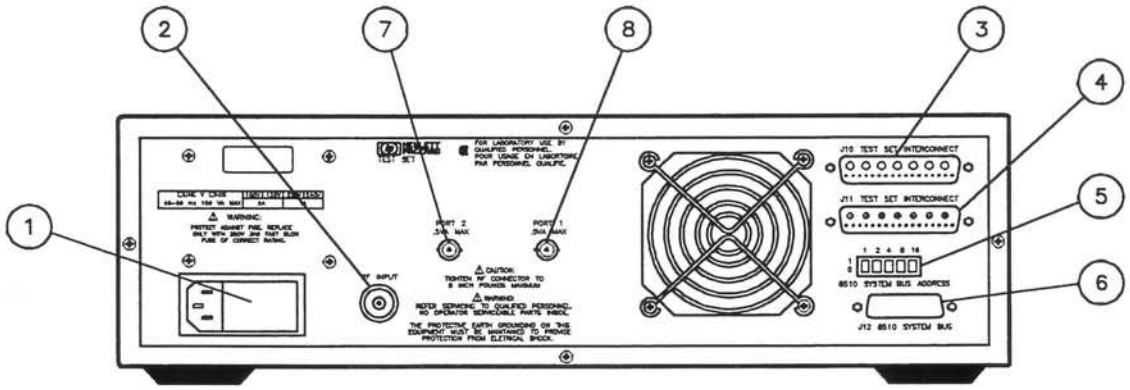


Figure 3-2. Rear-Panel Features of the HP 8517B Test Set

① 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. The voltage selector drum must be removed to rotate it to a different voltage setting. Recommended fuse values are printed on the rear panel.

② RF Input. This 2.4 mm connector receives RF energy from the source. Connections made to this input must be torqued no more than 90 N-cm (8 in-lb).

③ 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 analyzer. The HP 8510 system automatically selects the IF output from the chosen test set for processing and display. Refer to "Controlling Multiple Test Sets" in this chapter for more information.

④ 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.

⑤ HP 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.

⑥ J12 8510 System Bus Connector. This connector is used for HP-IB communications with the HP 85101 display/processor.

⑦ Port 2 Bias. This female BNC connector is used to supply bias through the center conductor of port 2 to active devices under test.

⑧ Port 1 Bias. This female BNC connector is used to supply bias through the center conductor of port 1 to active devices under test.

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, a test device can be connected to test set number 2, which does not need to be equipped with option 001. When the measurement on test set number 1 is complete, then the HP 8510 can control test set number 2.

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.

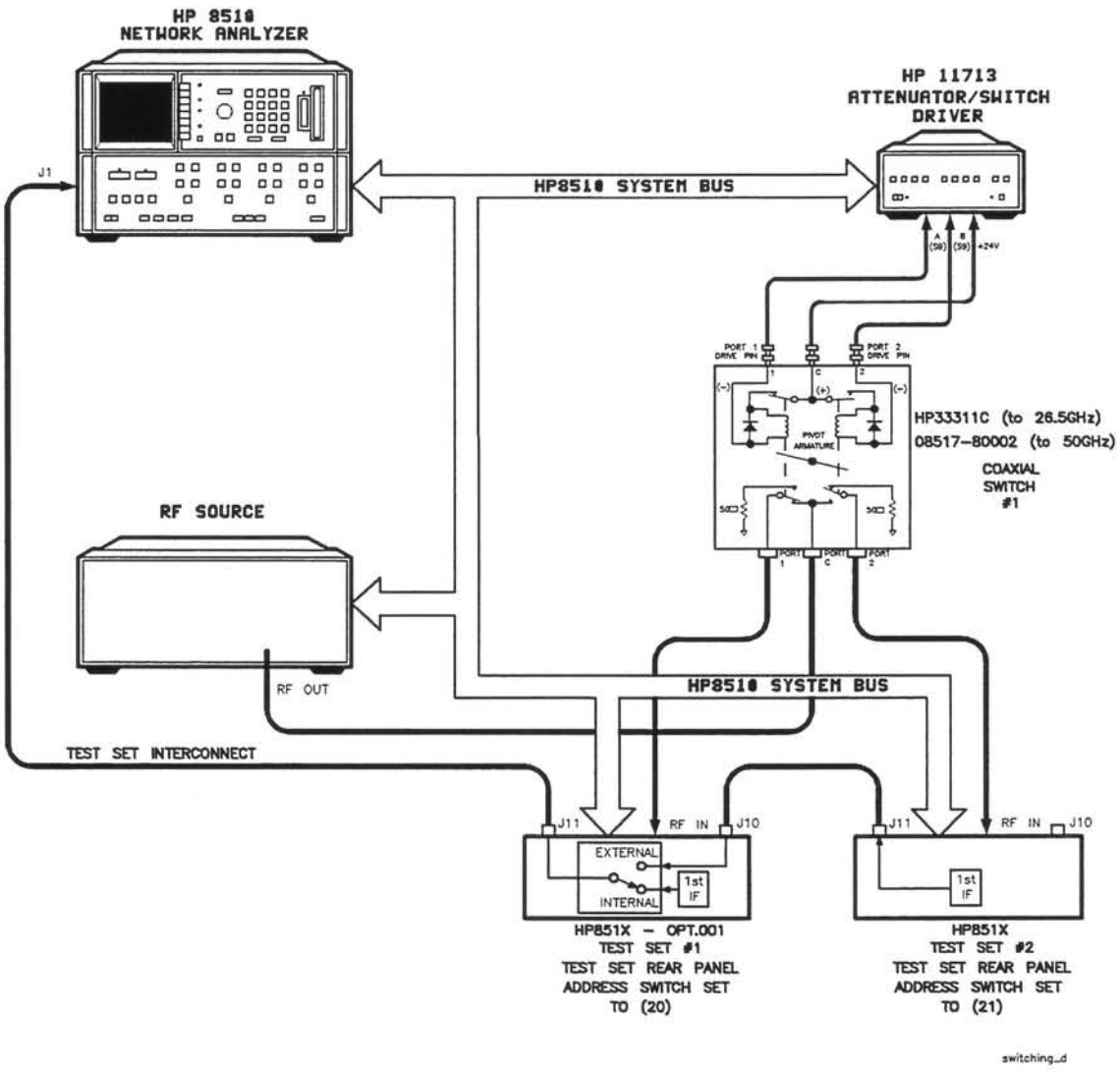


Figure 3-3. RF and IF Switching with Two Test Sets

New ADDRESS of Test Set[1][2]	Test Set Selected	Coaxial Switch Port Selected
20	1	Port 1
21	2	Port 2

1 Not all system connections are illustrated.

2 In dual source configurations, the second source may be multiplexed in a similar manner. If only one dual source test set is used, the second source may be directly connected to the appropriate test set.

Multiple Test-Set Connections

Set each rear panel address switch on the test sets to the address listed in Figure 3-3 for a dual test set configuration, or

Figure 3-4 if configuring more than two test sets.

- Use the supplied test set interconnect cable to connect test set number 1 J11 to the analyzer.
- Use the supplied test set interconnect cable to connect test set number 2 J11 to test set number 1 J10.

You may connect up to four test sets in series, 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 is not incorporated into the system, the RF input to the test set must be manually switched to the active test set.

Initialization at Power-Up

At 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 analyzer's expected test set address by pressing LOCAL TEST SET. The display should match the address of the desired test set. If not, change the address on the analyzer.
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

Selecting a test set involves the following:

Test Set IF Switching

Test Set Addressing

RF Switch Driver Commands

Test Set IF Switching

For test-set IF switching, the active test set is selected by the built-in capability of the analyzer to generate an addressed command to the test set. Each time the `HP 8510 ADDRESS of TEST SET` function is changed (see LOCAL Menu), the analyzer switches the previously addressed test set IF to external, and the newly addressed test set IF to internal.

The front panel ACTIVE LED indicates 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 analyzer.

Test Set Addressing

The address of the active test set can be changed manually from the analyzer front panel by selecting the `ADDRESS of TEST SET` function, then entering the address of the test set and pressing (x1), or change it via program control using the analyzer's 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 analyzer is that when the HP 8510 ADDRESS of TEST SET function is changed, a code sequence is automaticallyissued 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 coaxial switches. These switches, as shown in Figure 3-3 and

Figure 3-4, are used to select which test sets receives the RF output from the network analyzer source. The exact command issued depends upon the new value of the ADDRESS of TEST SET function, also shown in Figure 3-3 and Figure 3-4.

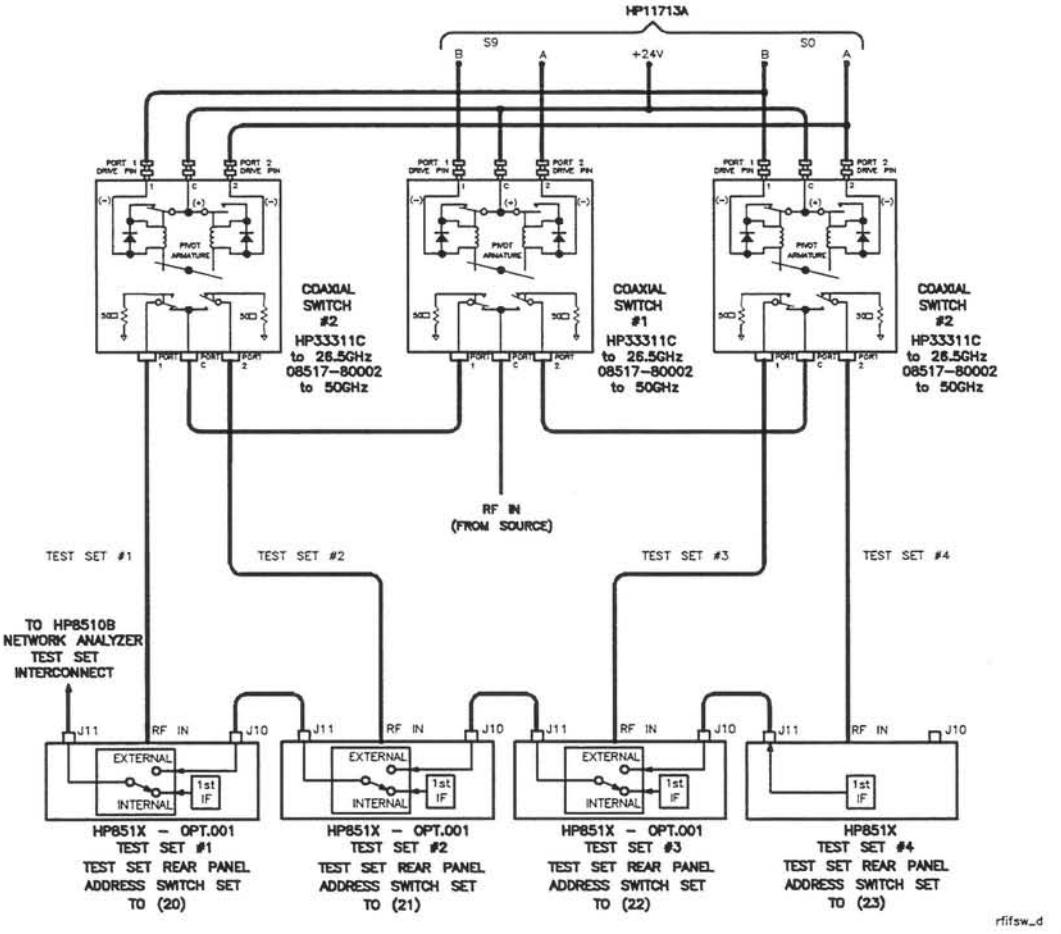


Figure 3-4. RF and IF Switching with Four Test Sets

Coaxial Switch Positions with Four Test Sets

New ADDRESS of Test Set[123]	Test Set Selected[456]	Coaxial Switch Port Selected	
		Switch #1	Switch #2
20	1	Port 1	Port 1
21	2	Port 1	Port 2
22	3	Port 2	Port 1
23	4	Port 2	Port 2

1 Not all system connections are shown.

2 In dual source configurations, the second source can be multiplexed in a similar manner.

3 If only one dual source test set is used, the second source can be directly connected to the appropriate test set.

4 Not all system connections are shown.

5 In dual source configurations, the second source can be multiplexed in a similar manner.

6 If only one dual source test set is used, the second source can be directly connected to the appropriate test set.

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.

Note

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 displaying the HP 8510 caution messages. However, this causes errors in the data displayed 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 disk for future use.

To change the configuration, recall the appropriate hardware state file.

This sets the address of test set and issues the RF switch command, then recalls the appropriate instrument state file which recalls the cal set.

Measuring High-Power Devices with Option 004

The HP 8517B, Option 004 test set enables devices with output power up to 30 dBm (1 watt) to be mesured on Port 2, without adding external attenuators. Reverse dynamic range (S_{12}) is degraded by approximately 3 dB.

When measuring devices with output power greater than +17 dBm, the Port 2 step attenuator must be used to decrease the power to $\leq$+17 dBm.

The step attenuator must be set during calibration to the same value that is to be used during the device measurement. However, it may cause the power level to be too low during calibration. Refer to "changing Signal Path After Calibration," for an explanation of alternative calibration and measurement techniques.

Changing Signal Path After Calibration

If any attenuator or other external equipment is changed after calibration, the measurement results cannot be specified, except by your own estimation of the potential error contribution due to the change. As an example, when the port attenuation is changed with correction ON, the message `CAUTION: CORRECTION MAY BE INVALID` is displayed. You must judge whether the error is tolerable in the particular application and how to compensate for the change.

The only reason for changing an internal attenuator or external equipment between calibrations and measurements is to maximize the levels under both conditions, thus minimizing uncertainty due to noise. Many factors enter into the decision about whether it is more accurate to calibrate at a low signal level without changing the setup, or to change the setup to optimize levels for both calibration and measurement.

Changing the Port 1 or Port 2 attenuator does not seriously change the test set mismatch, directivity, or isolation characteristics, but does change the frequency response magnitude and phase. This difference in the frequency response calibration and measurement can be normalized using the HP 8510 trace memories.

The application question is: Does increasing the signal levels during calibration improve the calibration enough to risk greater error contributions possible by changing the setup?

Changing the Attenuators

If only the Port 1 or Port 2 attenuators are changed, use the following procedure to minimize errors:

- Connect a short, or a thru, and set the Port 1 and Port 2 attenuators for the best IF signal levels during calibraion.
- Perform the appropriate measurement calibration.
- With a correct standard connected, set the Port 1 and Port 2 attenuators to the setting required for operating the test device.

If you view the response of a short circuit, notice that changing the Port 1 attenuator has negligible effect on the S_{11} marker reading. Changing Port 2 attenuator has negligible effect on the S_{22} marker reading. The reason, it is due to the way the attenuators are paired. Both the reference and the test signal are changed by an approximately equal amount.

When viewing S_{21} or S_{12}, however, changing Port 1 or Port 2 attenuators offsets the marker reading by the difference between Port 1 attenuator and Port 2 attenuator values.

Store Trace Memories

The main frequency response effects of changing the attenuators can be compensated for by using the HP 8510 trace memories and trace mathematics as given below:

- Connect the thru used for calibration and set the port attenuators to the value used for device measurement. Recheck the user parameter levels, then press (S21).
- Press (DISPLAY), then `DATA-->MEMORY` to store the S_{21} trace in default trace memory 1. This trace is the frequency response difference of the S_{21} signal path between calibration and measurement.
- Press (S12), then press the following keys:

  (DISPLAY) `SELECT DEFAULTS`

  `DEFAULT to MEMORY:2`

  `DATA-->MEMORY`

  The S_{12} trace is now stored in trace memory 2. this trace is the frequency response difference of the S_{12} signal path between calibration and measurement.

Viewing the Normalized Parameters

Use the traces stored in memory 1 and memory 2 to normalize the corrected data to the new levels after the attenuation is changed. The following example uses normalization only for S_{21} and S_{12}. To view the corrected parameters, follow this example:

- Press (DISPLAY), `DISPLAY:DATA`
- Press (S11) and view the S_{11} measurement.
- Press (S22) and view the S_{22} measurement.
- Press (S21), then press the following keys:

  (DISPLAY) `SELECT DEFAULTS`

  `DEFAULT to MEMORY:1`

  `DISPLAY:MATH(/)`

View the S_{21} measurement. If the thru is connected, the transmission coefficient should be $\angle 0°$.

- Press (S12), then press the following keys:

  `SELECT DEFAULTS`

  `DEFAULT to MEMORY:2`

View the S_{12} measurement. If the thru is connected, the transmission

Normalization is turned OFF for the S_{11} and S_{22} measurements, then the appropriate memory is selected and normalization is turned on to view S_{21} and S_{12}.

Since these are accurate, repeatable attenuators, this sequence may be effective in your application. If it is necessary to change other parts of the test setup, especially components connected to the test ports, this procedure may require additional steps to adequately compensate for the changes.

Operational Checks

To check the operation of a multiple test set configuration, use the following procedure:

1. First, connect a device with a known response to test set number 1.
2. Press `HP 8510 LOCAL` `TEST SET`, `ADDRESS of TEST SET`.
3. Enter the address of test set number 1 (this would be 20), then press [x1]. The test-set number 1 measurement should appear.
4. Press `DISPLAY` `DATA --> MEMORY` `DISPLAY: DATA and MEMORY` to store the trace for later comparison.
5. Now use `ADDRESS of TEST SET` to select test set number 2.
6. Switch back to test set number 1.
7. Observe any difference in the response between the stored trace and the results, after switching back and forth between the test sets.
8. Repeat for each of the test sets.

Any differences in the data is believed to be due to the IF switch (Option 001) or RF switching must be checked out, refer to the "Troubleshooting" chapter.

Performance Verification

Standard system performance verification procedures are used to verify the operation of an Option 001 test set used 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. Refer to the *HP 8510C On-Site Service Manual* for the performance verification procedure.

Installing Cables and the Anti-Rotation Clamps

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 when the device under test is moved. This could invalidate calibrations and measurements.

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

1. Two anti-rotation clamps are included in the test set accessories box.
2. Remove one clamp from the box and loosen the thumb-screw until it is about out of the counter-sunk hole in the clamp body.
   a. Gently push the clamp (round-hole end first) over and past the RF cable connector you plan to connect to the test set RF port. The rubber O-ring in the round end of the clamp should fit tightly over the connector. (Refer to the "Replacement Procedures" chapter for instructions about replacing the internal O-ring in the anti-rotation clamp, if needed.)
   b. Wiggle the clamp if necessary to ease it over the connector.
   c. Connect the cable to the test port and tighten it as specified in the cable manual.

Note Make sure that you do not twist the cable as you attach it to the test port.

   d. Use the torque wrench supplied with your calibration kit and tighten the cable to 90 N-cm (8 in-lb), and no greater.

Caution Important! The test set RF connector is loosened easily. Hold the RF cable securely throughout the remainder of this procedure. Do not allow the cable to rotate.

3. See Figure 3-5. Turn the clamp so that the thumb-screw points upwards.

a. Turn the clamp to visually align the clamp flats with the flats on the test port connector nut. This step minimizes rotating the connector in the next step.

Note The flats may be in any orientation with respect to the front panel.

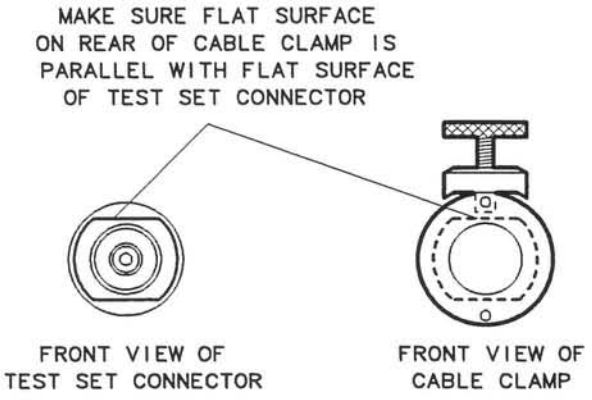


Figure 3-5. Visually Aligning Clamp and Nut Flats

4. See Figure 3-6. While holding the cable with one hand, use the other to press the clamp gently and steadily while wiggling the clamp straight over the RF connector and onto the test port connector nut.

Note Be sure to loosen the clamp when you are slipping it over the connector.

5. Fit the internal flats in the clamp over the flats on the test port connector nut. Avoid rotating the clamp as you do this or the RF connection may be loosened.

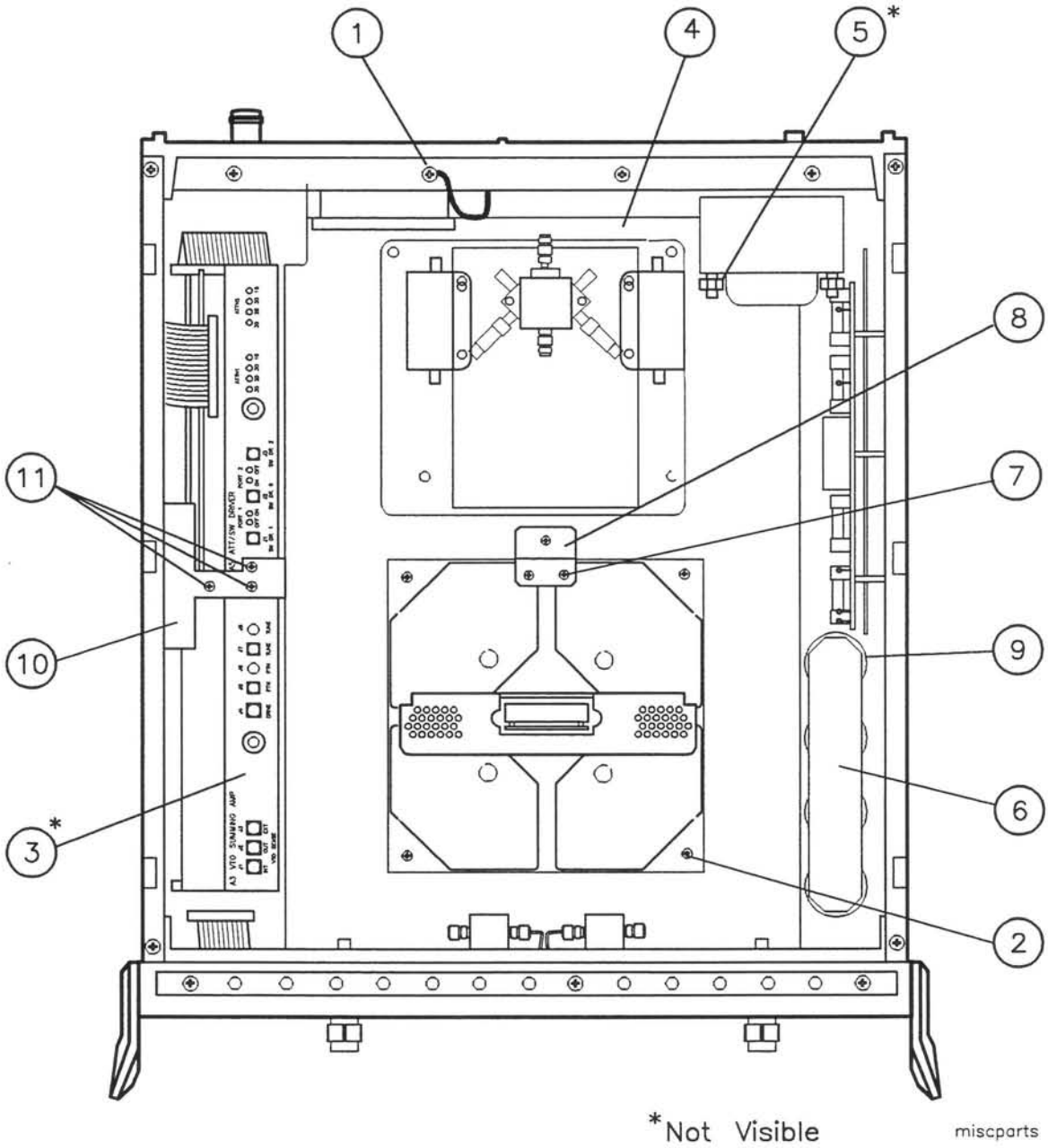


Figure 3-6. Mating the Clamp and Nut Flats

6. See Figure 3-7. Ensure that the thumb-screw is aligned with the counter-sunk hole on the clamp body.

   a. Push the clamp toward the test set front panel.

   b. Then tighten the thumb-screw to finger tightness. The cable cannot be damaged if the thumb-screw is tightened too tightly.

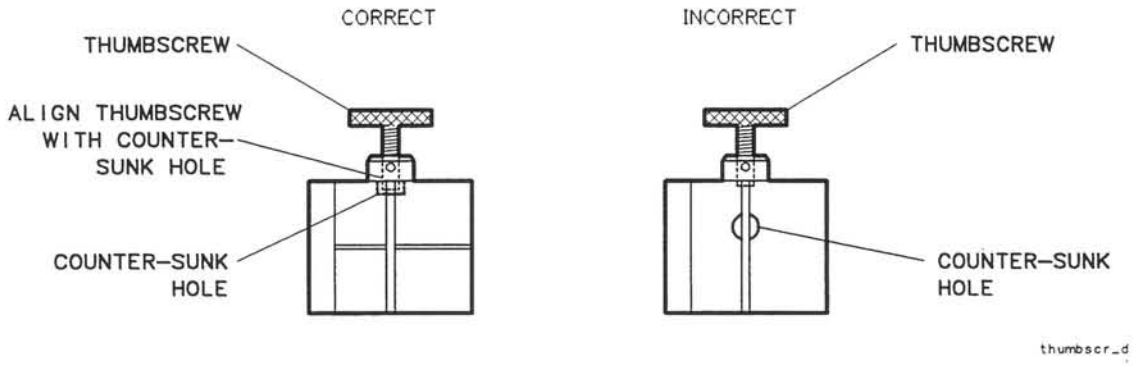


Figure 3-7. Aligning the Thumbscrew With the Counter-Sunk Hole

7. To complete the anti-rotation clamp installation procedure, repeat the steps above, beginning at Step 1, and attach the second clamp.

4

Specifications

Introduction

Specifications describe the warranted performance of the instrument. The electrical specifications of the test set, used with an HP 8510 network analyzer, are defined in the *HP 8510C On-Site Service Manual*.

Mechanical Specifications

Table 4-1. HP 8510/HP 8517B Mechanical Specifications

Test Port Description	Specification
Connector Type	2.4 mm[1]
Center Pin Recession[2]	+0.00254 mm to +0.0178 mm
	+0.0001 inches to +0.007 inches

1 Precision rugged male test-port connector.

2 Refer to the calibration kit manual for instructions about measuring pin depth with the gage.

Supplemental Characteristics

Supplemental characteristics listed in Table 4-2, provides useful information, by giving typical, but non-warranted, performance parameters.

Table 4-2. HP 8510/HP 8517B Supplemental Characteristics

Front Panel Test Ports	
Connector type	precision 2.4 mm, male
Connector torque	90 N-cm (8 in-lb), maximum
Impedance	50Ω, nominal
DC bias	500 mA, 40 Vdc, maximum
Damage Input Level	
Port 1 and Port 2	17 dBm CW, RF
Port 2 with Option 004	30 dBm (1 watt) CW, RF
Nominal source operating power level	+2 dBm to −20 dBm, with flatness correction off, depending on frequency
Nominal connector nut size	20 mm
Recommended torque	90 N-cm (8 in-lb), maximum
Rear Panel RF Connectors	
Connector type	precision 2.4 mm female
Connection torque	90 N-cm (8 in-lb), maximum for precision 2.4 mm hrdware
Damage input level	15 dBm[1]
Nominal connector nut size	8 mm^M
User 1 Power Levels for Reference Channel Phase Lock	
Minimum	−45 dBm
Maximum	−10 dBm to −20 dBm, depending on frequency
HP 8517B Power Requirements and Physical Characteristics	
Operating temperature	0°C to 55°C
Power	110, 120, 220, or 240 Vac ±10%; Line frequency from 47 to 66 Hz
Dimensions	460 mm (high) × 133 mm (wide) × 609 mm (deep)
	(18.1 inches H × 5.25 inches W × 24 inches D)
Weight	15 kg (35 lb), net

1 This must be AC coupled.

5

Troubleshooting the Test Set

The troubleshooting strategy for the HP 8517B S-Parameter test set is a systematic sequence of procedures. The information may be used^M is a systematic sequence of procedures. The information may be used after system-level troubleshooting has pin-pointed the test set as the problem instrument.

Use the troubleshooting flowchart in Figure 5-2 to identify the faulty assembly. The troubleshooting flowchart is keyed to numbered, individual troubleshooting procedures. As you progress through the flowchart, perform the numbered procedure associated with each block. Block diagrams are provided at the end of this section to assist in understanding the operation of the test set.

Theory of Operation

The RF paths for port 1 and port 2 are similar. Source power, as applied to test port 1, is discussed in detail, as if S11 and S21 were being measured.

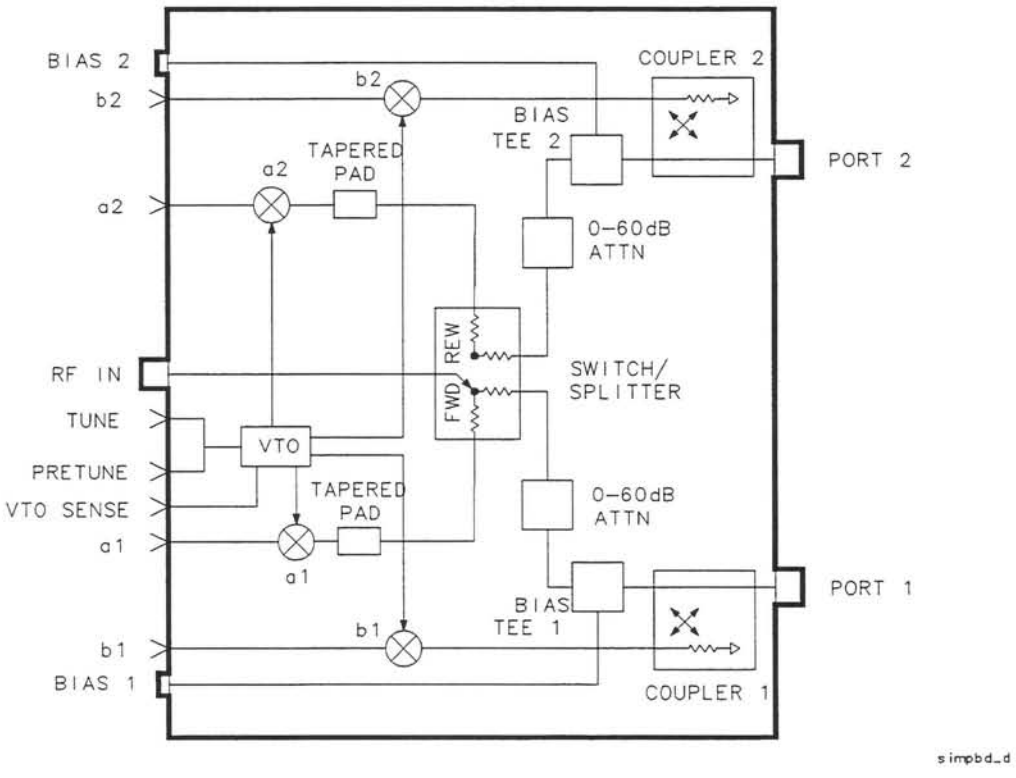


Figure 5-1. Simplified HP 8517B RF Block Diagram

The RF power from the source enters the test set through the rear panel, then is applied to the switch/splitter. At the switch/splitter, it is attenuated by approximately 7 dB to 14 dB, depending upon frequency.

The switch/splitter is a combination of two power splitters and a solid-state switch. The switch/splitter receives its control signals from the attenuator/switch driver board. The switch selects the power splitter to be used and, therefore, the test port that receives the RF power from the source. LEDs on the front panel and on the switch driver board indicate which test port is currently active.

The reference signal is routed from the switch/splitter through a 20-7 dB tapered pad that compensates for losses. The signal is then applied to the A1 sampler assembly where it is down-converted to a 20 MHz intermediate frequency.

Because the RF power is being applied to port 1, the A1 IF signal is used to phase lock the network analyzer. Had the RF power been applied to port 2, the A2 IF signal would have been used to phase lock the network analyzer.

The test signal is routed from the switch/splitter to a 60 dB programmable attenuator. The signal may then be attenuated in 10 dB steps or passed through without attenuation to the port 1 bias tee. A bias supply can be connected to the port 1 bias input on the rear panel of the test set to supply a DC voltage to the bias tee.

The RF signal rides this DC level which is used to turn active devices on (bias ON) so that their S-parameters may be measured. After the bias tee, the test signal travels to the directional coupler. At the coupler, the incident RF power is applied to the device under test. The signal reflected from the DUT is separated from the signal incident to the DUT by a port 1 coupler. The reflected signal leaves the coupler and is applied to the B1 sampler, and is down-converted to a 20 MHz IF signal.

The measured S11 is the ratio of the two IF signals out of samplers a1 and b1. The incident signal is transmitted through the DUT, through port 2 coupler, then into b2 sampler. It is down-converted to a 20 MHz IF signal so S21 can be measured as the ratio of IF signals from samplers a1 and b2.

The samplers may be turned on and off, depending upon the parameter being measured. The switching is controlled by a microprocessor on the HP-IB board. The default condition (test set power ON and no HP-IB commands sent by the network analyzer) is for the test set to be active with the RF applied to port 1. If the test set is equipped with Option 001 (multiple test sets) its begin state is inactive. That is, rather than using the internal IF of the test set, a switch is set in the test set to accecpt an IF from another test set.

The LO generated by the VTO/driver is phase locked to the source so that the desired VTO harmonic is 20 MHz greater than the source frequency. The phase-locked loop includes portions of the test set (such as the VTO summing amp board, VTO/driver, and a1 sampler assembly) and the HP 8510.

The VTO summing amp board provides the control voltages that tune the VTO to the correct LO frequency. The VTO also has an output LENDRA (Low END of RAnge) which is sent to the HP 85102, via the test set interconnect cable. The LENDRA provides an indication to the network analyzer about whether or not the VTO is operating in its normal frequency range.

If the VTO exceed its normal frequency range, the network analyzer responds by displaying the running error message `VTO OVER RANGE`.

Warning **Electrostatic Discharge Sensitive (ESD) Assemblies**

Assemblies you may need to handle in these troubleshooting procedures are extremely sensitive to damage from static electricity. They may or may not continue to function if they are subjected to electrostatic discharge. Their reliability, however, is impaired.

Troubleshooting Sequence

Use the troubleshooting flowchart below along with the procedures in the following section to identify faulty assemblies.

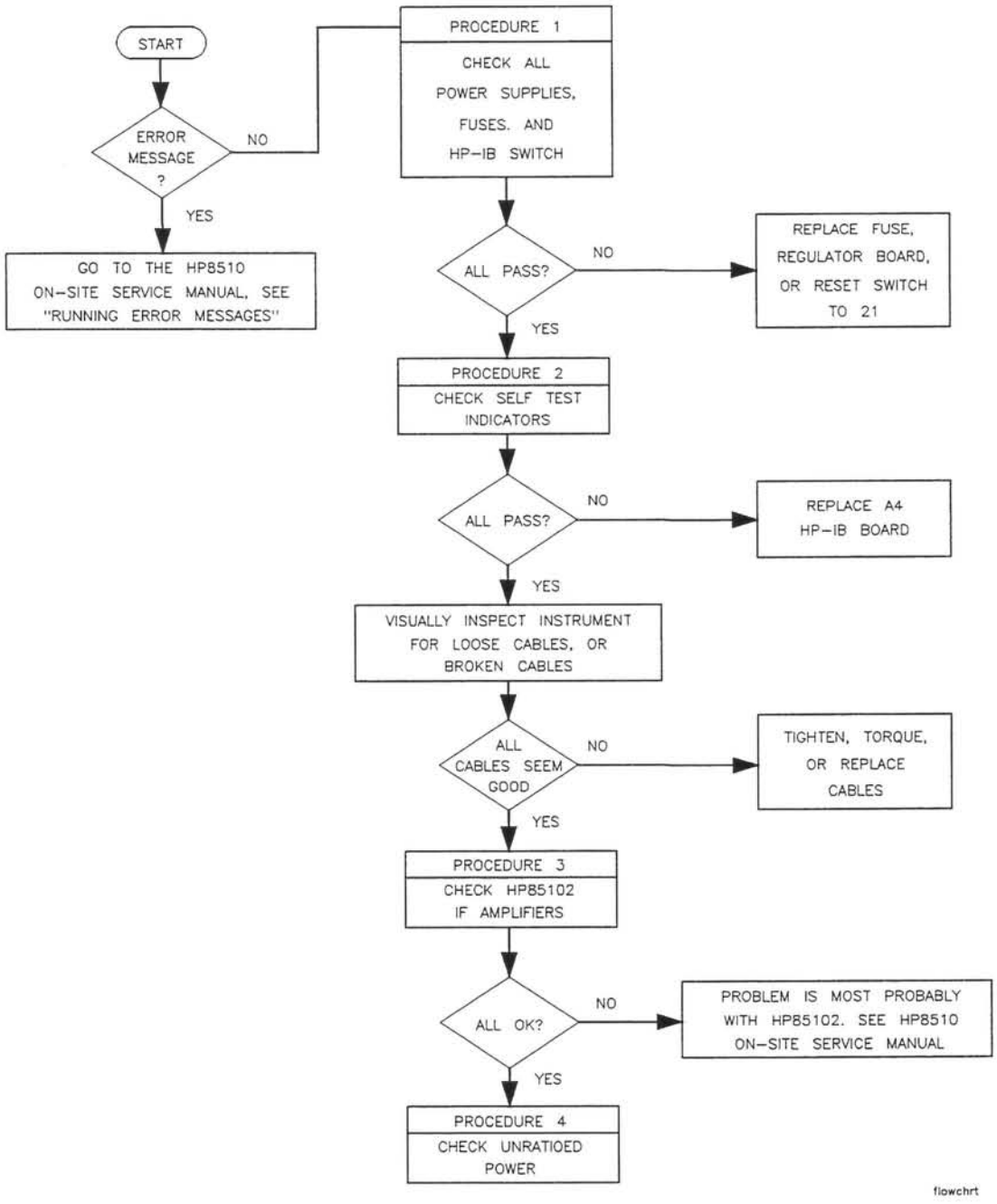


Figure 5-2. Troubleshooting Flowchart

Equipment Needed, But Not Supplied

Gather the equipment in the following list to troubleshoot your instrument (these pieces are not supplied with the instrument at shipment).

Table 5-1. Equipment Required, But Not Supplied

Equipment	HP Part Number
1-point, pozidriv screwdriver	8710-0899
2-point pozidriv screwdriver	8710-0900
Service adapter	85105-60210
5/16-inch torque wrench	8710-1655
Oscilloscope	HP 1740A

Troubleshooting Procedure 1. A15 Regulator, HP-IB Address Switches, and Fuse Locations

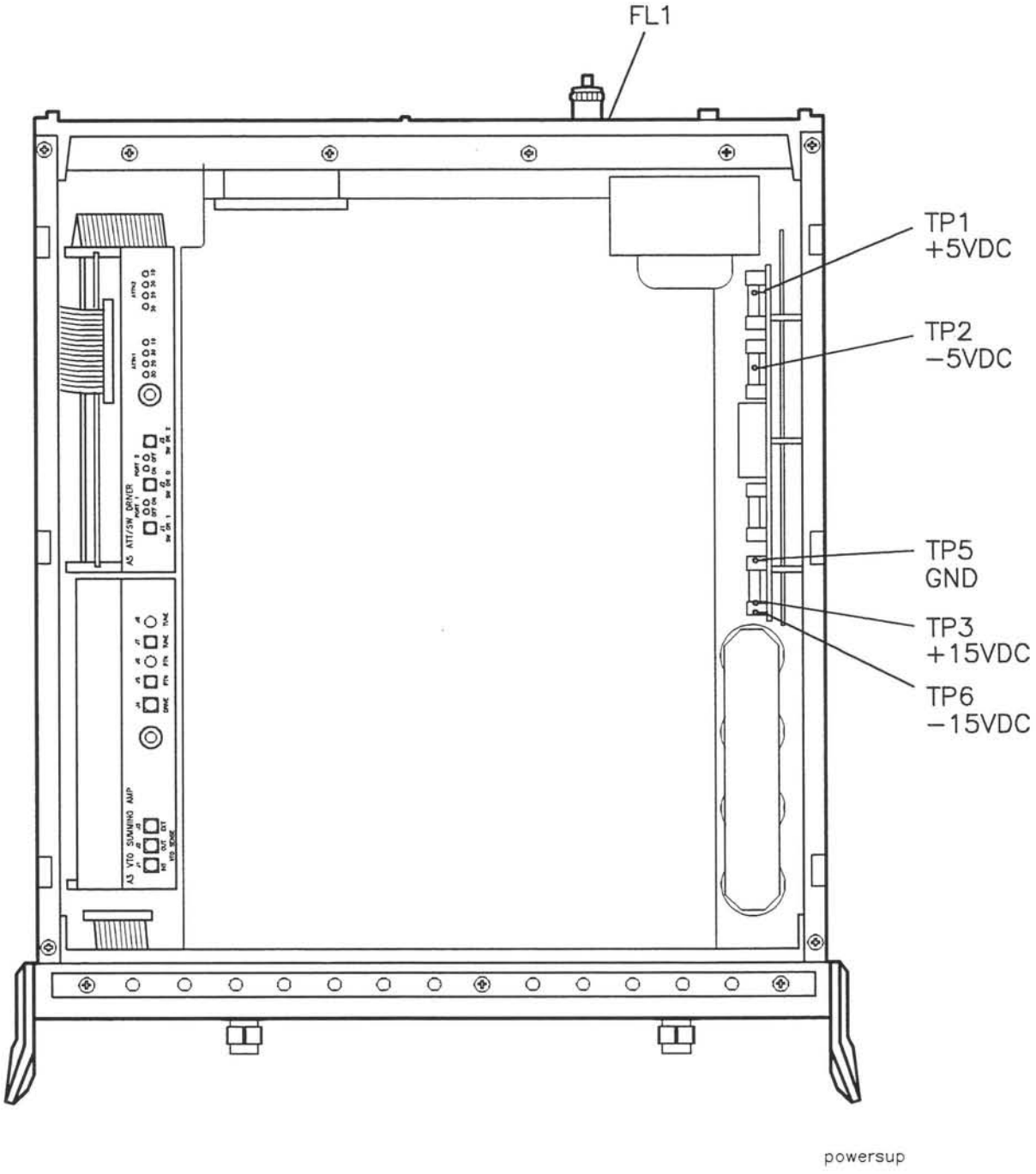


Figure 5-3. Power Supply Fuses and Test Points

A15 Primary Regulator Board Assembly

Use a digital voltmeter to check the voltages and an oscilloscope to check the ripple listed in Table 5-2.

Table 5-2. Power Supply Voltages

Nominal Voltage	Test Point	Voltage Range	Maximum Ripple/Peak-to-Peak
+5.05 Vdc	A15TP1	+4.75 to +5.25	2 mv
−5.20 Vdc	A15TP2	−4.90 to −5.50	2 mv
+14.85 Vdc	A15TP3	+14.10 to +15.60	2 mv
−14.85 Vdc	A15TP6	−14.10 to −15.60	2 mv

A27 Post-Regulator Board Assembly (Option 007, Only)

Use a digital voltmeter to check the voltages and an oscilloscope to check the ripple listed in Table 5-3.

Table 5-3. Power Supply Voltages

Nominal Voltage	Test Point	Voltage Range	Maximum Ripple/Peak-to-Peak
+5.0 Vdc	A27TP1	+4.75 to +5.25	2 mv
−3.50 Vdc	A27TP2	−3.26 to −3.75	2 mv

HP-IB Address Switch

Set the address switch as illustrated in Figure 5-4 (the dark side of the switch is the side that is depressed). Decimal twenty, binary 00101 (off, off, on, off, on) is the default setting.

The HP-IB address switch is located on the rear-panel of the instrument. It is easy to access, but unnecessary to change unless the error message `SYSTEM BUS ADDRESS ERROR` appears on the system display.

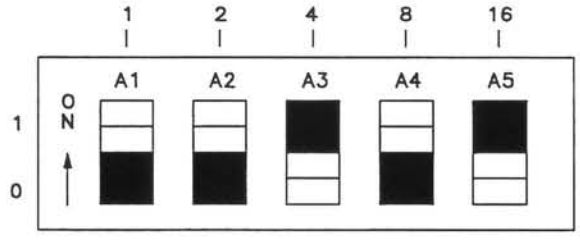


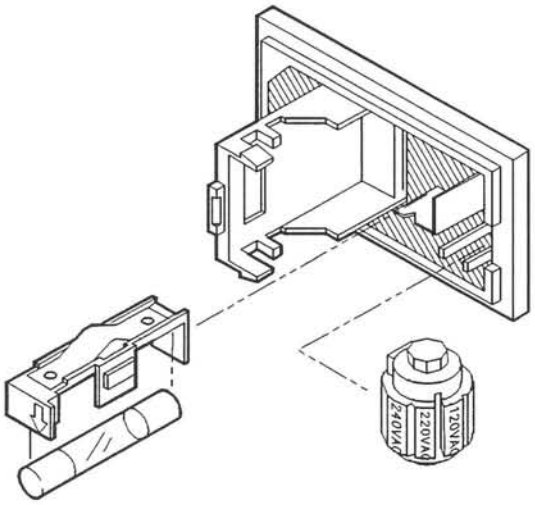
Figure 5-4. Instrument HP-IB Switch Setting

Fuses

Fuses are located in the test set as illustrated in Figure 5-3. The value ratings and part numbers of these fuses are listed in the "Replaceable Parts" chapter.

Refer to Figure 5-5 for information about how to set the voltage selector cam or to replace the line fuse.

Troubleshooting Procedure 2. Self-Test Indicators



CAUTION:

Do not attempt to rotate the voltage selector cam while it is installed in the line module or non-repairable damage will result. The cam must be completely removed from the line module, rotated to the proper position, and reinstalled. Refer to the instruction below.

REPLACEMENT OF FUSE

1. Pry open line module cover door.
2. Pull out fuse carrier.
3. Insert fuse of proper rating.
4. Place carrier back into line module.

SELECTION OF OPERATING VOLTAGE

1. Pry open line module cover door.
2. REMOVE CAM FROM THE LINE MODULE.
3. Rotate the cam to the desired voltage. (When the line module cover is closed, the selected voltage will be visible through a small window).
4. Insert the cam back into the line module.
5. Close the line module cover door.

Figure 5-5. Location of Self-Test Indicators

If the front-panel ACTIVE LED fails to light within five seconds after turning the power on, or if it lights immediately, the instrument has failed self-test.

To determine the portion of the self-test that failed, note which A4 board assembly LEDs are turned on (see Figure 5-6).

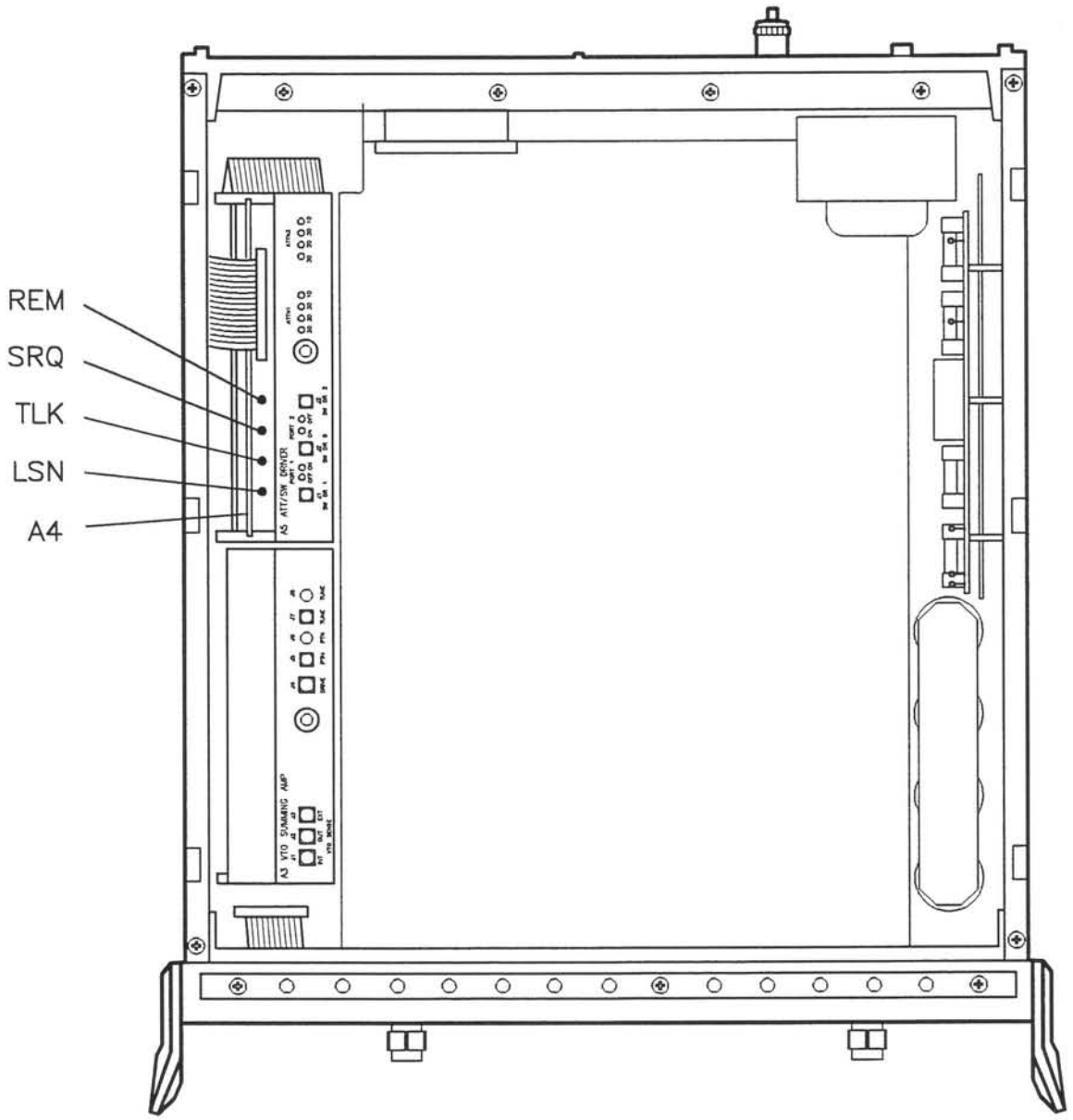


Figure 5-6. HP 8517B Test Set, A4 Board Assembly LEDs

Self-Test Indication	LSN	TLK	SRQ	REM	Time (following power-on)
PWON	ON	ON	ON	ON	0 to 0.5 seconds
Start ROM Test	OFF	ON	ON	ON	on briefly (a flash)
Pass ROM Test	OFF	OFF	ON	ON	0.5 to 2.0 seconds
Start RAM Test	OFF	OFF	OFF	ON	
Pass RAM Test	OFF	OFF	OFF	OFF	after 2 seconds

If the Self-Test Does Not Run Properly

If the portion of memory holding the self-test program is faulty, the self-test does not run properly. The following conditions indicate that the A4 HP-IB board is likely to be faulty.

- All LEDs flash briefly, then turn off
- All LEDs flash briefly and stay on
- The ACTIVE LED turns on too quickly after power on
- The ACTIVE LED does not turn on at all

Troubleshooting Procedure 3. HP 85102 IF Amplifier Test

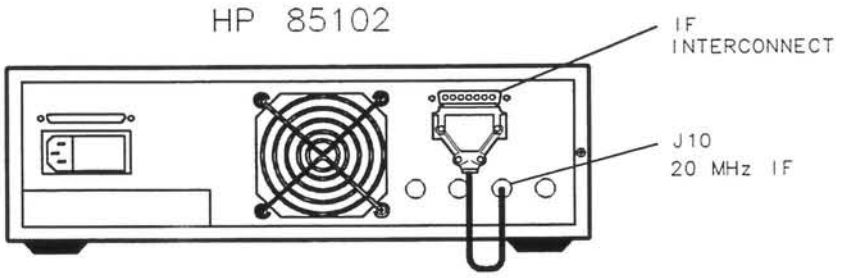


Figure 5-7. Service Adapter Connections

Using the Service Adapter

The service adapter can substitute as a test set by returning the 20 MHz IF signal from the HP 85102 to the amplifier on the HP 85102. Doing this determines whether a fault is in the test set or in the HP 85102.

1. Connect the service adapter as shown in Figure 5-7.
2. Press (PRESET), (MARKER), STIMULUS (MENU), STEP PARAMETER (MENU).
3. Examine each user parameter by pressing the corresponding softkey to observe the unratioed power level of `User1` through `User4` channels.

The traces should be flat lines, quite close to one another, as indicated by the marker value (typically about -28 ± 5 dB).

Service Adapter Conclusions

If all channels look good	The HP 85102 is working properly. The problem is most likely in the source or the test set. Refer to Procedure 4, the "Unratioed Power Tests" in this chapter.
If one or more channels look bad	The problem is most likely in the HP 85102. Refer to the *HP 8510 On-Site Service Manual* for information about troubleshooting the HP 85102.

Troubleshooting Procedure 4. Unratioed Power Test

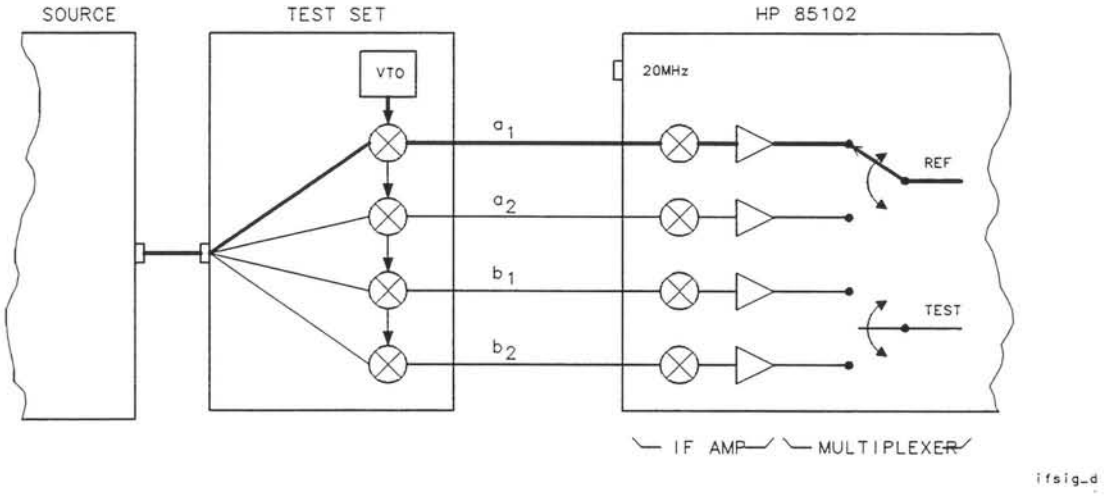


Figure 5-8. IF Signal Path

Six RF signal paths in the test set are examined by observing their associated IFs. Figure 5-9 through Figure 5-10 show the assemblies that are common and those that are unique in paths 1 through 6.

Determining which RF component in the test set is most likely the cause of a failure can be accomplished within four steps:

1. Run the tests labeled path 1 through path 6 on the following pages.
2. Record your results in Table 5-4 for each path.
3. Compare the results you recorded in Table 5-4 with those in Table 5-5.
4. Investigate the most probable cause, based on the information inTable 5-5.

Testing Signal Paths 1-4

1. Preset the analyzer. Set source for step mode.
2. Press (PRESET), STIMULUS (MENU), and `STEP` on the network analyzer.
3. Examine the four IFs produced by the samplers. Do this by redefining which port and sampler are used by the analyzer for phase lock.
4. Redefine a2:
   a. Press PARAMETER (MENU), `User3 a2`, `REDEFINE PARAMETER`.
   b. Press `DRIVE`, `Port 2`, `PHASE LOCK` and `a2`.
   c. Press `REDEFINE DONE` to redefine a2.

5. Redefine b2:
   a. Press `User2 b2` and `REDEFINE PARAMETER`.
   b. Press `DRIVE`, `Port 2`, `PHASE LOCK`, and `a2`.
   c. Press `REDEFINE DONE` to redefine b2.
6. Connect an open (or short) to port 1 and port 2. Power is reflected back to the b1 and b2 samplers through the coulper.
7. Press `User1 a1`, `User2 b2`, `User3 a2`, and `User4 b1` to check the samplers indicated.

   The RF signal paths are shown in Figure 5-9.

Record your results for paths 1 thru 4 (User1 through User4) in Table 5-4.

Testing Paths 5 and 6

1. Connect a cable between port 1 and port 2.
2. Press PARAMETER (MENU).
   a. Press `USER4 b1`, and `REDEFINE PARAMETER`.
   b. Press `DRIVE`, `PORT 2`, `PHASELOCK`, and `a2`.
   c. Press `REDEFINE DONE`, to observe the b1 power-level trace through path 5. The path is illustrated in Figure 5-10.
   d. Each trace should typically look like the examples in Figure 5-9, ±5 dB.
   e. Record your results in Table 5-4.
3. Press PARAMETER (MENU).
   a. Press `USER2 b2`, `REDEFINE PARAMETER`.
   b. Press `DRIVE`, `PORT 1`, `PHASELOCK`, and `a1`.
   c. Press `REDEFINE DONE` to observe the b2 power level trace through path 6. The path is illustrated in Figure 5-10.
   d. Record your results in Table 5-4.

Note

Be sure that you return the parameters to their original conditions for a1, b1, a2, b2. Use the redefine function to achieve this.

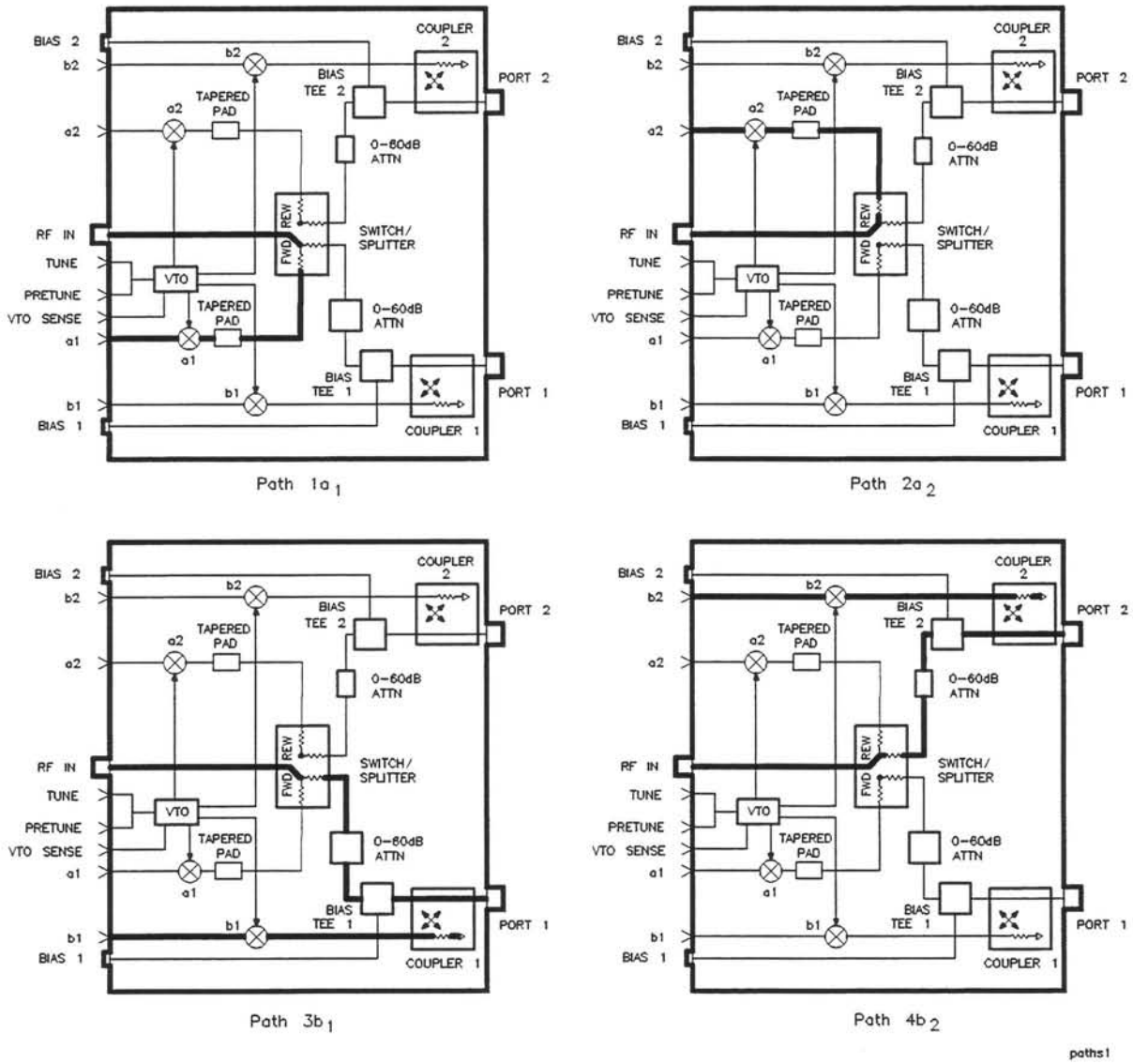


Figure 5-9. RF Path 1 through Path 4, HP 8517B Standard

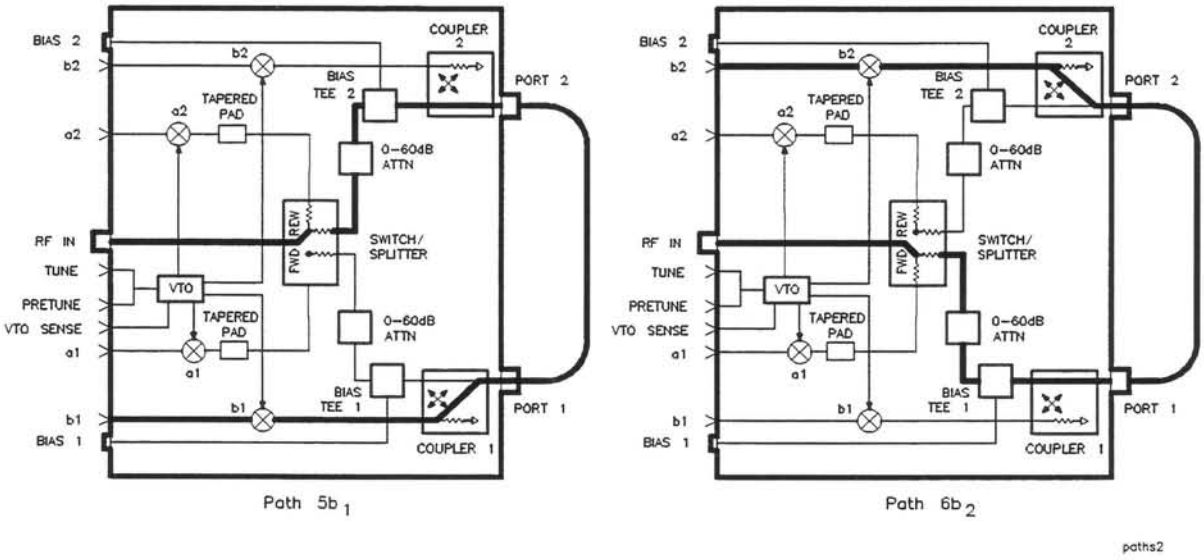


Figure 5-10. RF Path 5 and Path 6, HP 8517B Standard

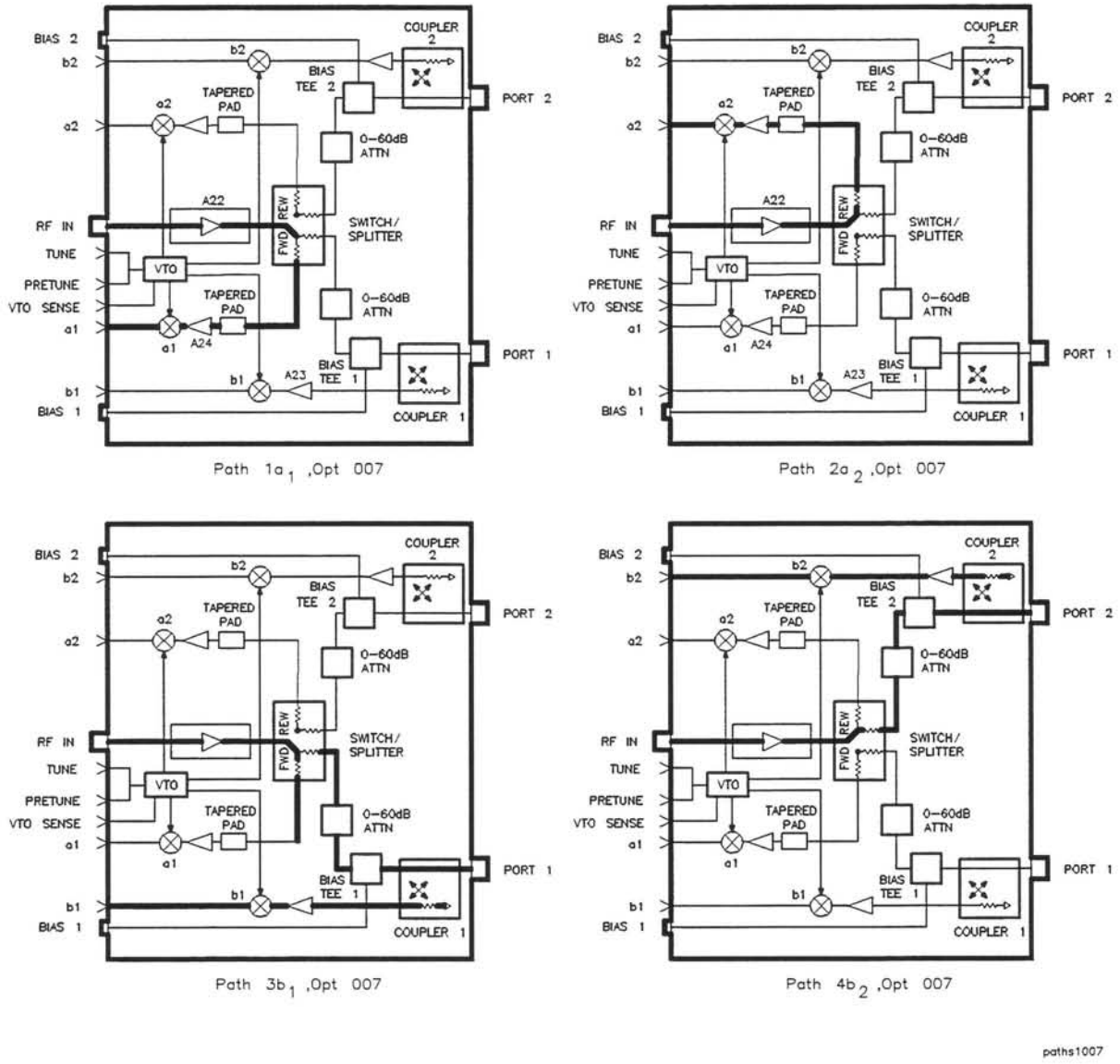


Figure 5-11. RF Path 1 through Path 4, HP 8517B Option 007

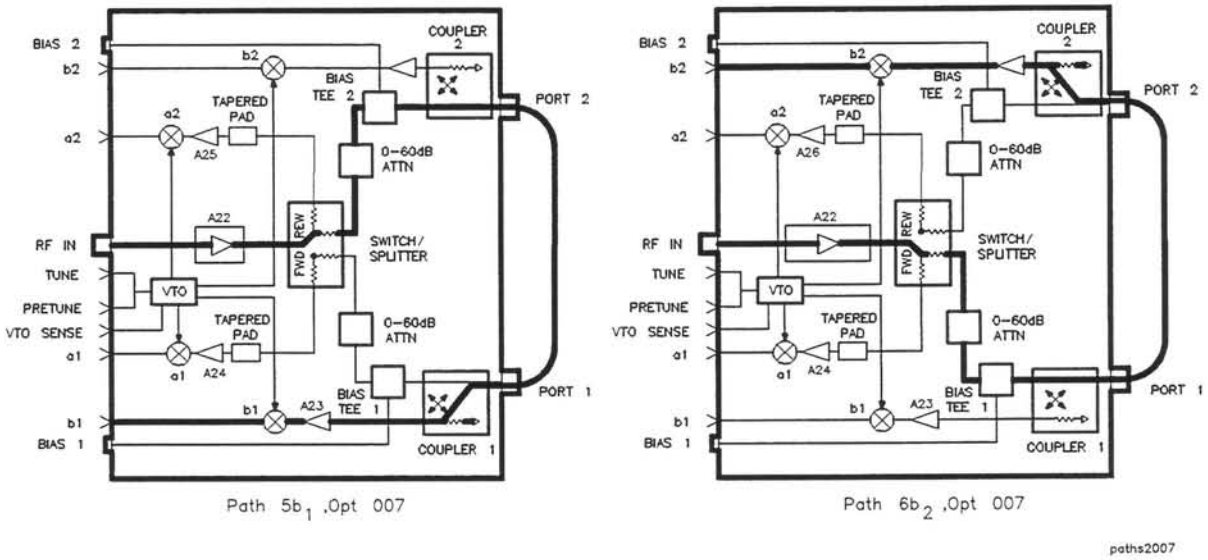


Figure 5-12. RF Path 5 and Path 6, HP 8517B Option 007

Finding the Faulty Assembly

Compare the results recorded in Table 5-4 with the matrix in

Table 5-5. There are 32 possible variations. Twelve result in probable failures. These are listed in Table 5-5.

Sample Diagnostics

Suppose you have determined that paths 3 and 5 are bad. Paths 1, 2, 4, and 6 are good. Refer to Table 5-5 and recognise that the most likely cause for the failure is the b1 sampler.

Table 5-4. Test Results for Path 1 through Path 6

a_1 Path1	a_2 Path 2	b_1 Path 3	b_2 Path 4	b_1 thru Path 5	b_2 thru Path 6

Table 5-5.
Most Probable Failures
(B = 'Bad' and – = 'Good')

Path						Most Probable Failure
1	2	3	4	5	6	Description, or Assembly
–	–	–	–	–	–	The test set is not the problem
B	B	B	B	B	B	Source, source cable, VTO, cables from rear panel to switch splitter
–	B	–	B	B	–	Switch splitter
B	–	B	–	–	B	Switch splitter
–	–	B	–	B	–	b1 sampler
B	–	–	–	–	–	a1 sampler
–	B	–	–	–	–	a2 sampler
–	–	–	B	–	B	b2 sampler
–	–	B	–	B	B	Port 1 connector or directional coupler
–	–	B	–	B	B	A1, T1
–	–	–	B	B	–	A2, T2
–	–	–	B	B	B	Port 2 connector or directional coupler

6

HP 8517B Replacement Procedures

The following replacement procedures are provided in this chapter:

(1) Switch/splitter
(2) Frequency converter
(3) Regulator board assembly
(4) Filter capacitors
(5) 2.4 mm test port connector
(6) Fan
(7) Power Transformer
(8) Anti-rotation clamp O-ring
(9) Front panel
(10) Bias tee
(11) Coupler
(12) Attenuator
(13) Input Amplifier
(14) Buffer Amplifier
(15) Post Regulator Board

Equipment Needed But Not Supplied

Table 6-1 lists the equipment needed to replace the assemblies documented in the following procedures. Use Figure 6-1 to locate the test set assemblies.

Table 6-1. Equipment Needed For Test Set Major Assemblies Replacement

Tools	Procedure Used For	HP Part Number
2 point Pozidriv screwdriver	all components	8710-0900
1 point Pozidriv screwdriver	all components	8710-0899
5/16 inch torque wrench, 90 N-cm (8 in-lb)	all components and 3.5 mm semi-rigid cables, 2.4/1.85 mm cables	8710-1765
5/16 inch torque wrench, 112 N-cm (10 in-lb)	HP 8516A 2.4 mm semi-rigid cables	8710-1655
1/2 inch torque wrench, 280 N-cm (25 in-lb	7 mm, 2.4 mm, 1.85 mm test port connectors	8710-1581)
9/16 inch torque wrench, 470 N-cm (42 in-lb)	HP 8517 rear panel 2.4mm connectors	8710-1580
20 mm torque wrench, 90 N-cm (8 in-lb)	2.4 mm and 1.85 mm test port connectors	8710-1764
2.9 mm gage kit	port connectors	Part of HP 85056A Cal Kit
anti-static mat	all components	9300-0797
wrist strap	all components	9300-1257
clip lead	C1-C4 capacitors	any supplier
needle nose pliers	couplers	any supplier
wire cutters	couplers, B1 fan	any supplier
T-10 Torx screwdriver	all components	8710-1623
T-15 Torx screwdriver	8710-1622	
9/16 inch 50 in-lb torque wrench	test parts	8710-1948
9/16 inch nut driver	connector repair	8720-0008
1/2 inch torque wrench, 280 N-cm (25 in-lb)	connector repair	8710-1581
100Ω, 20 watt resistor	C1-C4 capacitor removal	0819-0019
1 inch torque wrench, 800 N-cm (72 in-lb)	coupler removal and test port connector flange removal	MTB 100 72 lb-inE[1]
5/16 inch open end wrench	fan replacement and test port connector removal	any supplier
1/2 inch open-end wrench	RF input connector	any supplier
1/214:299/16 inch thin wrench, fixed	test port connector removal	8710-1770
5/16 inch thin rench, fixed	3.5 mm, 2.4 mm, 1.85 mm semi-rigid connector removal	8710-2079

1 Order from Mountz Company, 1080 North 11th Street, San Jose, CA 95112

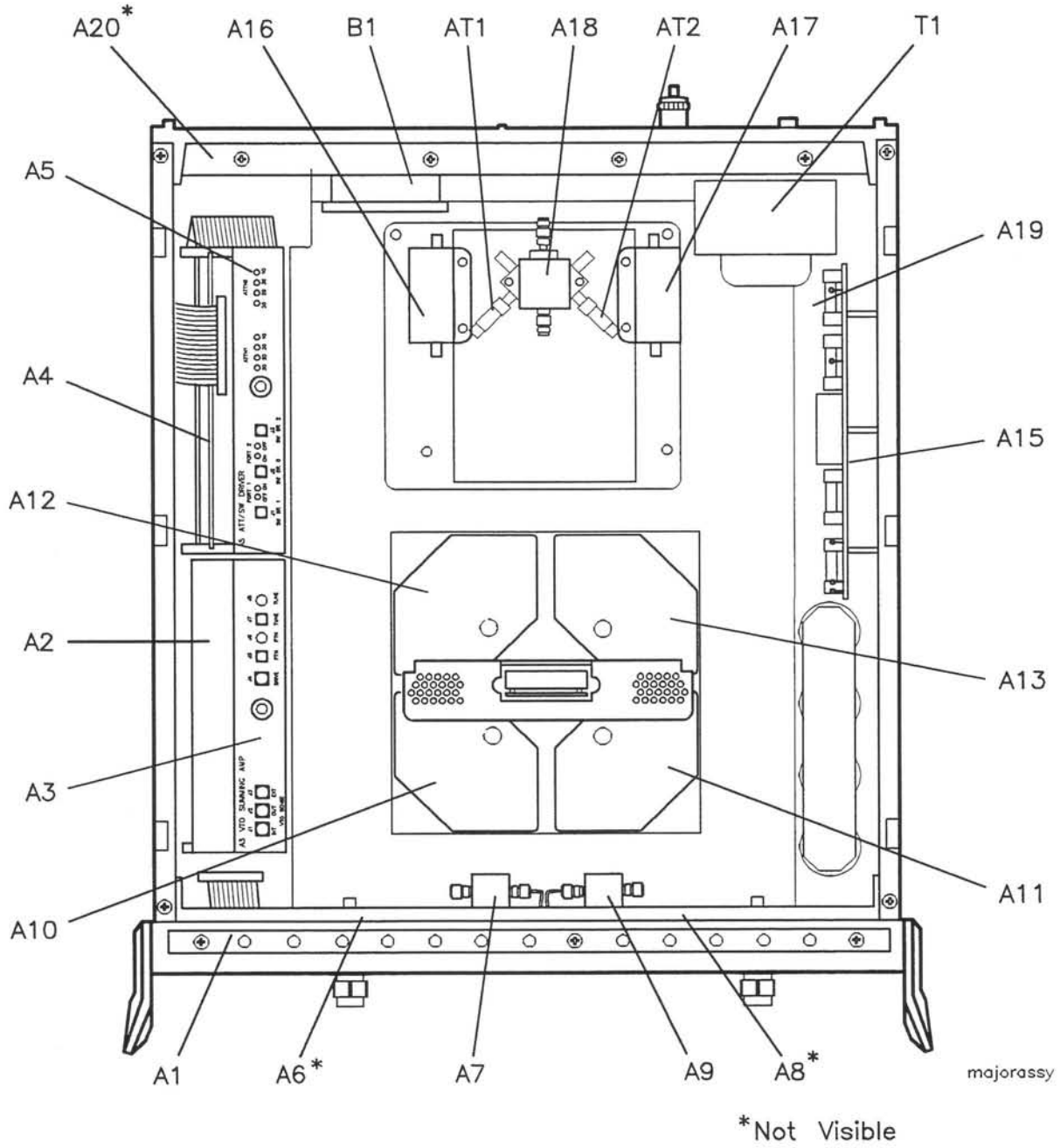


Figure 6-1. HP 8517B Major Assembly Location Diagram

Assembly Replacement Procedures

Caution

To prevent electrostatic discharge (ESD) damage, earth ground the work area and yourself. The assemblies you may handle in the following procedures are very sensitive to damage caused by static. Assemblies exposed to ESD may, or may not, continue to operate properly. However, their reliability is impaired.

Preliminary Precautions

1. Turn the HP 8517 test set OFF.
2. Disconnect the power cord.
3. Remove the top and side covers, trim strips, and handles.
4. Torque 2.4 mm connections to 90 N-cm (8 in-lb).
5. Exercise caution when handling semi-rigid coax cables. They bend very easily.
6. When installing an assembly, reverse its disassembly procedure, unless otherwise noted.

(1) SWITCH/SPLITTER

1. Remove the five semi-rigid cables and the three flexible cables from the switch/splitter. (Reposition any other cables as required to ease removal.)
2. Remove the two fixed attenuators from the switch/splitter (three fixed attenuators for Option 007 and Option 004 "plus" 007.
3. Remove the two screws that attach the switch/splitter to the bracket.
4. Remove the switch/splitter from the test set.

(2) FREQUENCY CONVERTER

The frequency converter consists of a VTO (voltage-tuned oscillator) assembly and four samplers.

1. Remove the semi-rigid cable attached to each of the four samplers.
2. Remove the four in-line attenuators from the samplers (Options 007, 002 "plus" 007, and Option 004 "plus" 007).
3. Remove the six flexible cables from the frequency converter by gently pulling on the gold connector.
4. Remove the four frequency converter mounting plate screws and the bracket screw that fastens the frequency converter to the chassis.
5. Unplug the ribbon cable near the front panel.
6. Unplug the four harnessed (multi-colored) wire and socket assemblies.
7. Lift the frequency converter out of the test set.
8. Remove the frequency converter bracket by removing the two pozidrive screws.

(3) REGULATOR BOARD ASSEMBLY

1. Unplug the transformer socket from the regulator board.
2. Unplug the apmlifier socket from the regulator board (Options 007, 002 "plus" 007, and Option 004 "plus" 007).^M
3. Remove the three mounting screws from the top edge of the regulator board.
4. Remove the regulator board. (You may have to partially back out one of the transformer mounting screws for clearance.)

(4) FILTER CAPACITORS

1. Set the test set upright and pull the metal and plastic cover off the capacitors.
2. Turn the test set over and remove the bottom cover.
3. To discharge the capacitors, do the following:
   a. Attach one end of an insulated clip lead to the chassis of the instrument and the other end of the clip lead to a 100Ω 20 watt resistor.
   b. Use the resistor to discharge each capacitor terminal (large Pozidriv screw on the bottom side of the test set). Each capacitor has two terminals.
   c. Discharge all capacitor terminals. It takes approximately six seconds to discharge each capacitor.
4. To remove a capacitor, remove the corresponding pair of screws and pull the capacitor out of the test set.

(5) 2.4 mm TEST PORT CONNECTOR

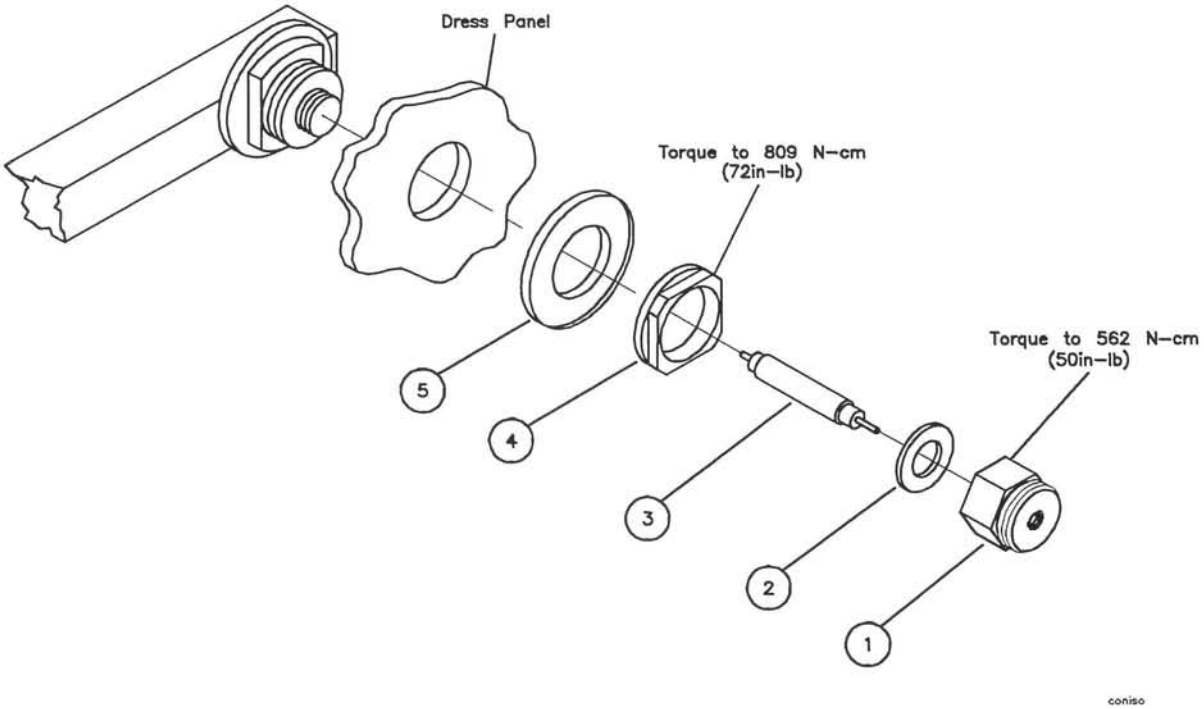


Figure 6-2. Exploded Diagram of a 2.4 mm Test Port Connector

1. Incline the rear of the test set approximately four inches and support it on a substantial object (book etc.).
2. Unscrew the test port connector nut using a 9/16 inch open end wrench.
3. Pull out the center conductor assembly and replace it with a new assembly. Do not touch either end of the new assembly.
4. Replace the test port connector nut and torque it to 562 N-cm (50 in-lb).
5. Measure the pin depth of each port using a 2.4 mm female pin-depth gage. Refer to the connector care information in the calibration kit manual for more information about using the gage.
6. If the center pin protrudes, or if the depth is less than 0.0001 inch, remove the connector assembly and add the appropriate shim to adjust the pin depth to between 0.0001 and 0.0007 inch. When measuring the pin depth be sure to take into consideration the uncertainty of your gage.
7. If shimmed, regage the test port connector assembly.

(6) B1 FAN

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

To replace the fan B1, you must remove the transformer (T1) so that the ends of the fan wires can be unsoldered from the line module FL1. Refer to the "Replaceable Parts" chapter of this manual for a detailed view of the fan and transformer hardware.

1. Turn the test set onto its right-hand side.
2. Using a 5/16-inch open end wrench, remove the hardline cables connected between the couplers A7 and A9 and the bulkhead connectors J2 and J5.
3. Unplug the transformer connector at J2 on the A15 regulator board.
4. Using a large Pozidriv screwdriver, remove the four screws and washers that hold the transformer onto the rear panel.
5. Using a large Pozidriv screwdriver, remove the screw that holds the transformer angle bracket to the main deck. The transformer wires soldered to the line module are short, so do not pull the transformer out too far.
6. Carefully remove the transformer from the test set and put it on the bench close to the test set.
7. Strip the heat shrink tubing off the two fan wires and unsolder the wires from the line module. Cut any cable ties holding the fan wires to nearby cables.
8. Using a small Pozidriv screwdriver, remove the screw and lockwasher that secure the green/yellow fan ground wire to the top of the rear panel frame.
9. Using a small Pozidriv screwdriver, remove the four screws that hold the fan to the rear panel. Remove the fan.

(7) T1 POWER TRANSFORMER

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

1. Turn the test set onto its right-hand side.
2. Using a 5/16-inch open end wrench, remove the hardline cables connected between coupler A7 and bulkhead connector J2.
3. Unplug the transformer connector at J2 on the A15 regulator board.
4. Using a large Pozidriv screwdriver, remove the four screws and washers that hold the transformer onto the rear panel.
5. Using a large Pozidriv screwdriver, remove the screw that holds the transformer angle bracket to the main deck. The transformer wires soldered to the line module are short, so do not pull the transformer out too far.
6. Carefully remove the transformer from the test set and put it on the bench close to the test set.
7. Strip the heat shrink tubing off the transformer wires soldered to the line module, and unsolder the wires.
8. Unsolder the transformer ground wire connected to the chassis side rail.
9. Remove the transformer.
10. When you replace the transformer, refer to Figure 6-3 for the location of the wires connected to the line module.

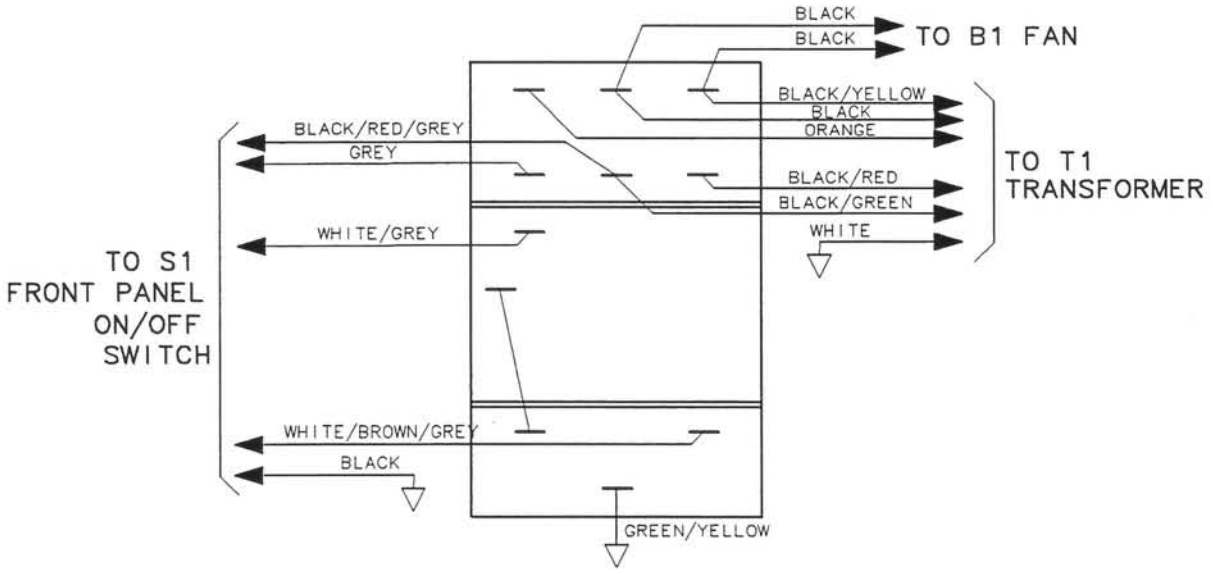


Figure 6-3. Wire Connections to Line Module FL1

(8) ANTI-ROTATION CLAMP O-RING

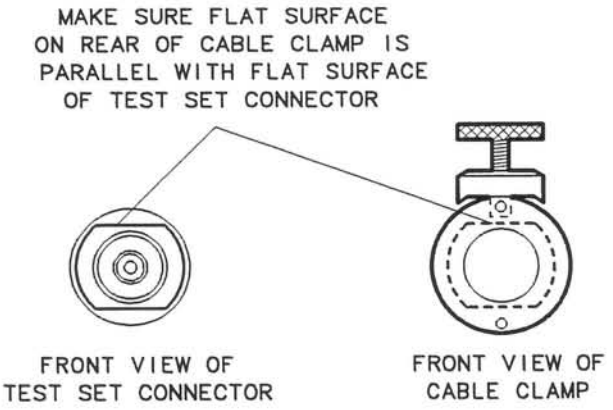


Figure 6-4. Postition of the O-Ring in the Clamp

1. Pry the O-ring out of the clamp with fine tweezers or a similar tool.
2. To insert the new O-ring (HP part number 0900-0007) engage one side of it in the slot of the phenolic clamp donut.
3. Use your fingers to seat the O-ring into the rest of the slot.

(9) FRONT PANEL ASSEMBLY

1. Remove the four semi-rigid cables that connect to the coupler on the front panel.
2. Remove the ten screws that secure the front panel assembly to the front frame.
3. Grasp the test ports and pull the front panel assembly out, tilting the top of the assembly toward yourself.
4. Unplug the ribbon cable attached to the board assembly on the front panel.
5. Grasp the cable attached to the line switch and pull it toward the front of the instrument. This provides enough cable length for you to tilt the front panel assembly the rest of the way out of the test set frame.
6. Carefully remove the front panel assembly.
7. Lay the front panel assembly face down on the work surface.

(10) BIAS TEE

1. Remove the two semi-rigid cables attached to the bias tee.
2. Desolder the wires attached to the bias tee.
3. Remove the two screws that secure the bias tee to the bias tee bracket. Remove the bias tee.

Note

This procedure does not apply to HP 8517B, Option 002 or Option 002 "plus" 007.

(11) TEST PORT COUPLERS

1. Remove the front panel assembly as described in Procedure 10.
2. Remove the test port nut, using a 1-inch wrench.
3. Remove the test port washer.
4. Remove the coupler from the front panel.

(12) ATTENUATOR

1. Remove the two semi-rigid cables attached to the attenuator.
2. Unplug the ribbon cable from the attenuator.
3. Remove the two screws that secure the attenuator bracket to the amplifier bracket.
4. Remove the attenuator/attenuator bracket from the instrument.
5. Remove the two screws that secure the attenuator to the attenuator bracket.

Note

This procedure does not apply to HP 8517B, Option 002 or Option 002 "plus" 007.

(13) INPUT AMPLIFIER

(Used for Option 007, 002 "plus" 007, and 004 "plus" 007, only)

1. Remove the five semi-rigid cables attached to the switch splitter. Leave the fixed pads attached to the switch splitter.
2. Remove the semi-rigid cable running between the input amplifier and the rear-panel RF input.
3. Remove the two screws holding the switch splitter to the smplifier mount bracket.
4. Remove the switch splitter from the amplifier mount bracket.
5. Remove the four screws that secure the input amplifier to the amplifier mount bracket.

(14) BUFFER AMPLIFIERS

(Used for Option 007, 002 "plus" 007, and 004 "plus" 007, only.)

1. Remove the two semi-rigid cables attached to the buffer amplifier that needs to be changed.
2. Remove the four screws securing the buffer amplifier to the amplifier mount bracket.
3. Remove the buffer amplifier.

(15) REGULATOR BOARD FOR AMPLIFIERS

(Used for Option 007, 002 "plus" 007, and 004 "plus" 007, only)

1. Remove the four semi-rigid cables attached to the attenuators at Port 1 and Port 2. Leave the step attenuator attached to the bracket. (This step is not applicable to Option 002 "plus" 007.)
2. Remove the four buffer amplifiers from the bracket (refer to Procedure 15).
3. Remove the switch splitter (refer to Procedure 1).
4. Remove the input amplifier (refer to Procedure 14).
5. Remove the four screws attaching the amplifier bracket to the test set.
6. Flip the amplifier bracket over. Note the board assembly mounted on the underside of the bracket.
7. De-solder the two pins from the regulator to remove the amplifier regulator board assembly.
8. Remove the five screws holding the board assembly to the bracket.
9. Remove the two screws holding the voltage regulator to the bracket.
10. Remove the regulator board assembly from the amplifier mount bracket.

Note Do not loose the grommets (HP part number 3050-0003) located on the board assembly when it is removed.

11. For reassembly, place two grommets on the underside of the mount bracket. There are two cut-outs on the heet metal for these insulators.

7

Replaceable Parts

Introduction

Use this section when you need to order replaceable parts for the instrument. The replaceable parts include major assemblies, and chassis hardware, but not parts of major assemblies. Table 7-1 lists the major reference designations and abbreviations used in the parts lists.

R-E (Rebuilt-Exchange) Assemblies Cost Less

Lower cost assemblies are available through the rebuilt-exchange program. These factory rebuilt (repaired and tested) assemblies meet all factory specifications required of a new assembly. They are offered on an exchange (trade-in) basis only. The defective assembly must be returned for credit. Figure 7-2 illustrates the rebuilt-exchange procedure. The rest of the figures provide parts information. If you have any questions, contact your HP customer engineer.

Replaceable Parts List

Use the figures in this chapter to help you locate and identify all of the HP 8517B replaceable parts. There is a replaceable parts list included for each illustration that provides the following information:

1. Hewlett-Packard part number.
2. Part quantity as shown in the corresponding figure. There may or may not be more of the same part located elsewhere in the instrument.
3. Part description, using abbreviations in Table 7-1.

   The following information is given only if a part is available from an alternate supplier (other than Hewlett-Packard).
4. A typical manufacturer of the part in a five-digit code (refer to the Manufacturers Code list in Table 7-1 for addresses).

Ordering Information

To order a part listed in the replaceable parts lists, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office.

To order a part that is not listed in the replaceable parts lists, include the instrument model number, complete instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

To Order Parts.... Fast!

1-(800) 227-8164

Monday through Friday, 6 am to 5 pm (Pacific Standard Time)

The parts specialists have direct online access to replacement parts inventory corresponding to the replaceable parts list in this manual. There is a charge for hotline one day delivery, but four day delivery time is standard. After hours and holidays, call (415) 968-2347. This fast service applies to the United States only. Outside the United States, contact your nearest HP office.

Table 7-1. Reference Designations, Abbreviations, and Multipliers (1 of 4)

REFERENCE DESIGNATIONS					
A	Assembly	F	Fuse	RT	Thermistor
AT	Attenuator, Isolator, Limiter, Termination	FL	Filter	S	Switch
		HY	Circulator	T	Transformer
B	Fan, Motor	J	Electrical Connector (Stationary Portion), Jack	TB	Terminal Board
BT	Battery			TC	Thermocouple
C	Capacitor			TP	Test Point
CP	Coupler	K	Relay	U	Integrated Circuit, Microcircuit
CR	Diode, Diode Thyristor, Step Recovery Diode, Varactor	L	Coil, Inductor		
		M	Meter	V	Electron Tube
		MP	Miscellaneous Mechanical Part	VR	Breakdown Diode (Zener), Voltage Regulator
DC	Directional Coupler	P	Electrical Connector (Movable Portion), Plug		
DL	Delay Line			W	Cable, Wire, Jumper
DS	Annunciator, Lamp, Light Emitting Diode (LED), Signaling Device (Visible)			X	Socket
		Q	Silicon Controlled Rectifier (SCR), Transistor, Triode Thyristor	Y	Crystal Unit (Piezoelectric, Quartz)
				Z	Tuned Cavity, Tuned Circuit
E	Miscellaneous Electrical Part	R	Resistor		

ABBREVIATIONS					
	A	BSC	Basic	CNDCT	Conducting, Conductive, Conductivity, Conductor
		BTN	Button		
A	Across Flats, Acrylic, Air (Dry Method), Ampere				
			C		
				CONT	Contact, Continuous, Control, Controller
ADJ	Adjust, Adjustment	C	Capacitance, Capacitor, Center Tapped, Cermet, Cold, Compression		
ANSI	American National Standards Institute (formerly USASI-ASA)			CONV	Converter
				CPRSN	Co mpression
ASSY	Assembly	CCP	Carbon Composition Plastic	CUP-PT	Cup Point
AWG	American Wire Gage			CW	Clockwise, Continuous Wave
		CD	Cadmium, Card, Cord		
	B				
		CER	Ceramic		
BCD	Binary Coded Decimal	CHAM	Chamfer		
		CHAR	Character, Characteristic, Charcoal		**D**
BD	Board, Bundle				
BE-CU	Beryllium Copper			D	Deep, Depletion, Depth, Diameter, Direct Current
BNC	Type of Connector	CMOS	Complementary Metal Oxide Semiconductor		
BRG	Bearing, Boring				
BRS	Brass			DA	Darlington

Table 7-1. Reference Designations, Abbreviations, and Multipliers (2 of 4)

ABBREVIATIONS					
DAP-GL	Diallyl Phthalate Glass	FT	Current Gain Bandwidth Product (Transition Frequency), Feet, Foot	JFET	Junction Field Effect Transistor
DBL	Double				
DCDR	Decoder				**K**
DEG	Degree				
D-HOLE	D-Shaped Hole	FXD	Fixed	K	Kelvin, Key, Kilo, Potassium
DIA	Diameter				
DIP	Dual In-Line Package		**G**	KNRLD	Knurled
DIP-SLDR	Dip Solder			KVDC	Kilovolts
D-MODE	Depletion Mode	GEN	General, Generator		Direct Current
DO	Package Type Designation	GND	Ground		
		GP	General Purpose, Group		**L**
DP	Deep, Depth, Diametric Pitch, Dip			LED	Light Emitting Diode
			H		
DP3T	Double Pole Three Throw			LG	Length, Long
		H	Henry, High	LIN	Linear, Linearity
DPDT	Double Pole Double Throw	HDW	Hardware	LK	Link, Lock
		HEX	Hexadecimal, Hexagon, Hexagonal	LKG	Leakage, Locking
DWL	Dowell			LUM	Luminous
	E				
		HLCL	Helical		
E-R	E-Ring	HP	Hewlett-Packard Company, High Pass		**M**
EXT	Extended, Extension, External, Extinguish			M	Male, Maximum, Mega, Mil, Milli, Mode
			I		
	F				
		IC	Collector Current, Integrated Circuit	MA	Milliampere
F	Fahrenheit, Farad, Female, Film (Resistor), Fixed, Flange, Frequency			MACH	Machined
		ID	Identification, Inside Diameter	MAX	Maximum
				MC	Molded Carbon Composition
		IF	Forward Current, Intermediate Frequency		
FC	Carbon Film/ Composition, Edge of Cutoff Frequency, Face			MET	Metal, Metallized
				MHZ	Megahertz
		IN	Inch	MINTR	Miniature
		INCL	Including	MIT	Miter
FDTHRU	Feedthrough	INT	Integral, Intensity, Internal	MLD	Mold, Molded
FEM	Female			MM	Magnetized Material, Millimeter
FIL-HD	Fillister Head				
FL	Flash, Flat, Fluid		**J**	MOM	Momentary
FLAT-PT	Flat Point			MTG	Mounting
FR	Front	J-FET	Junction Field Effect Transistor	MTLC	Metallic
FREQ	Frequency			MW	Milliwatt

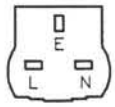
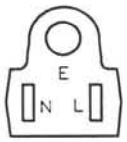
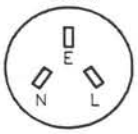
Table 7-1. Reference Designations, Abbreviations, and Multipliers (3 of 4)

ABBREVIATIONS					
	N	PLSTC	Plastic	SMA	Subminiature,
		PNL	Panel		A Type (Threaded
N	Nano, None	PNP	Positive Negative		Connector)
N-CHAN	N-Channel		Positive (Transistor)	SMB	Subminiature,
NH	Nanohenry	POLYC	Polycarbonate		B Type (Slip-on
NM	Nanometer,	POLYE	Polyester		Connector)
	Nonmetallic	POT	Potentiometer	SMC	Submi niature,
NO	Normally Open,	POZI	Pozidriv Recess		C-Type (Threaded
	Number	PREC	Precision		Connector)
NOM	Nominal	PRP	Purple, Purpose	SPCG	Spacing
NPN	Negative Positive	PSTN	Piston	SPDT	Single Pole
	Negative (Transistor)	PT	Part, Point,		Double Throw
NS	Nanosecond,		Pulse Time	SPST	Single Pole
	Non-Shorting, Nose	PW	Pulse Width		Single Throw
NUM	Numeric			SQ	Square
NYL	Nylon (Polyamide)			SST	Stainless Steel
			Q	STL	Steel
	O			SUBMIN	Subminiature
		Q	Figure of Merit	SZ	Size
OA	Over-All				
OD	Outside Diameter		**R**		
OP AMP	Operational				
	Amplifier	R	Range, Red,		**T**
OPT	Optical, Option,		Resistance, Resistor,		
	Optional		Right, Ring	T	Teeth,
		REF	Reference		Temperatu re,
	P	RES	Resistance, Resistor		Thickness, Time,
		RF	Radio Frequency		Timed, Tooth,
PA	Picoampere, Power	RGD	Rigid		Typical
	Amplifier	RND	Round	TA	Ambient
PAN-HD	Pan Head	RR	Rear		Temperature,
PAR	Parallel, Parity	RVT	Rivet, Riveted		Tantalum
PB	Lead (Metal),			TC	Temperature
	Pushbutton		**S**		Coeffi cient
PC	Printed Circuit			THD	Thread, Threaded
PCB	Printed Circuit	SAWR	Surface Acoustic	THK	Thick
	Board		Wave Resonator	TO	Package Type
P-CHAN	P-Channel	SEG	Segment		Designation
PD	Pad, Power	SGL	Single	TPG	Tapping
	Dissipation	SI	Silicon,	TR-HD	Truss Head
PF	Picofarad, Power		Square Inch	TRMR	Trimmer
	Factor	SL	Slide, Slow	TRN	Turn, Turns
PKG	Package	SLT	Slot, Slotted	TRSN	Torsion

Table 7-1. Reference Designations, Abbreviations, and Multipliers (4 of 4)

ABBREVIATIONS					
	U	VAR	Variable		**Y**
		VDC	Volts—Direct Current		
UCD	Microcandela			YIG	Yttrium-Iron-Garnet
UF	Microfarad				
UH	Microhenry		**W**		
UL	Microliter, Underwriters' Laboratories, Inc.	W	Watt, Wattage, White, Wide, Width		**Z**
UNHDND	Unhardened	W/SW	With Switch	ZNR	Zener
		WW	Wire Wound		
	V				
			X		
V	Variable, Violet, Volt, Voltage	X	By (Used with Dimensions), Reactance		
VAC	Vacuum, Volts—Alternating Current				

MULTIPLIERS					
Abbreviation	**Prefix**	**Multiple**	**Abbreviation**	**Prefix**	**Multiple**
T	tera	10^{12}	m	milli	10^{-3}
G	giga	10^{9}	μ	micro	10^{-6}
M	mega	10^{6}	n	nano	10^{-9}
k	kilo	10^{3}	p	pico	10^{-12}
da	deka	10^{2}	f	femto	10^{-15}
d	deci	10^{-1}	a	atto	10^{-18}
c	centi	10^{-2}			

PLUG TYPE **	CABLE HP PART NUMBER	PLUG DESCRIPTION	CABLE LENGTH CM (INCHES)	CABLE COLOR	FOR USE IN COUNTRY
250V 	8120-1351 8120-1703	Straight* BS1363A 90°	229 (90) 229 (90)	Mint Gray Mint Gray	Great Britain, Cyprus, Nigeria, Singapore, Zimbabwe
250V 	8120-1369 8120-0696	Straight* NZSS198/ASC112 90°	201 (79) 221 (87)	Gray Gray	Argentina, Australia, New Zealand, Mainland China
250V 	8120-1689 8120-1692	Straight* CEE7-Y11 90°	201 (79) 201 (79)	Mint Gray Mint Gray	East and West Europe, Central African Republic, United Arab Republic (unpolarized in many nations)
125V 	8120-1348 8120-1538	Straight* NEMA5-15P 90°	203 (80) 203 (80)	Black Black	United States Canada, Japan (100 V or 200 V), Brazil, Colombia, Mexico, Philippines, Saudia Arabia, Taiwan
	8120-1378 8120-4753 8120-1521 8120-4754	Straight* NEMA5-15P Straight 90° 90°	203 (80) 230 (90) 203 (80) 230 (90)	Jade Gray Jade Gray Jade Gray Jade Gray	
250V 	8120-5182 8120-5181	Straight* NEMA5-15P 90°	200 (78) 200 (78)	Jade Gray Jade Gray	Israel

* Part number for plug is industry identifier for plug only. Number shown for cable is HP Part Number for complete cable, including plug.

** E = Earth Ground; L = Line; N = Neutral.

FORMAT80

Figure 7-1. Power Cable and Plug Part Numbers

Table 7-2. Touch-up Paint

Color	Part Number	Applicable Use
Dove Grey	6010-1146	On the frame, around the front panel and painted portions of front handles.
French Grey	6010-1147	On the side, top and bottom covers.
Parchment Grey	6010-1148	On the rack-mount flanges, rack support shelves and front panels.

Table 7-3. Instrument Fuses

Fuse	Name	Location	Amps for 100 to 120 Vac, (part number)		Amps for 220 to 250 Vac (part number) 220 to 250 Vac, Part Number	
AC Line	F1	Rear Panel	2.0	2110-0002	1.0	2110-0001
+5 VDC	F1	Regulator Board	1.5	2110-0043	1.5	2110-0043
−5 VDC	F2	Regulator Board	1.0	2110-0001	1.0	2110-0001
+15 VDC	F3	Regulator Board	1.5	2110-0043	1.5	2110-0043
−15 VDC	F4	Regulator Board	1.0	2110-0001	1.0	2110-0001
Bias	Bias Fuses	Front Panel	0.5	2110-0012	0.5	2110-0012

Use this fast, efficient, economical method to keep your Hewlett-Packard instrument in service.

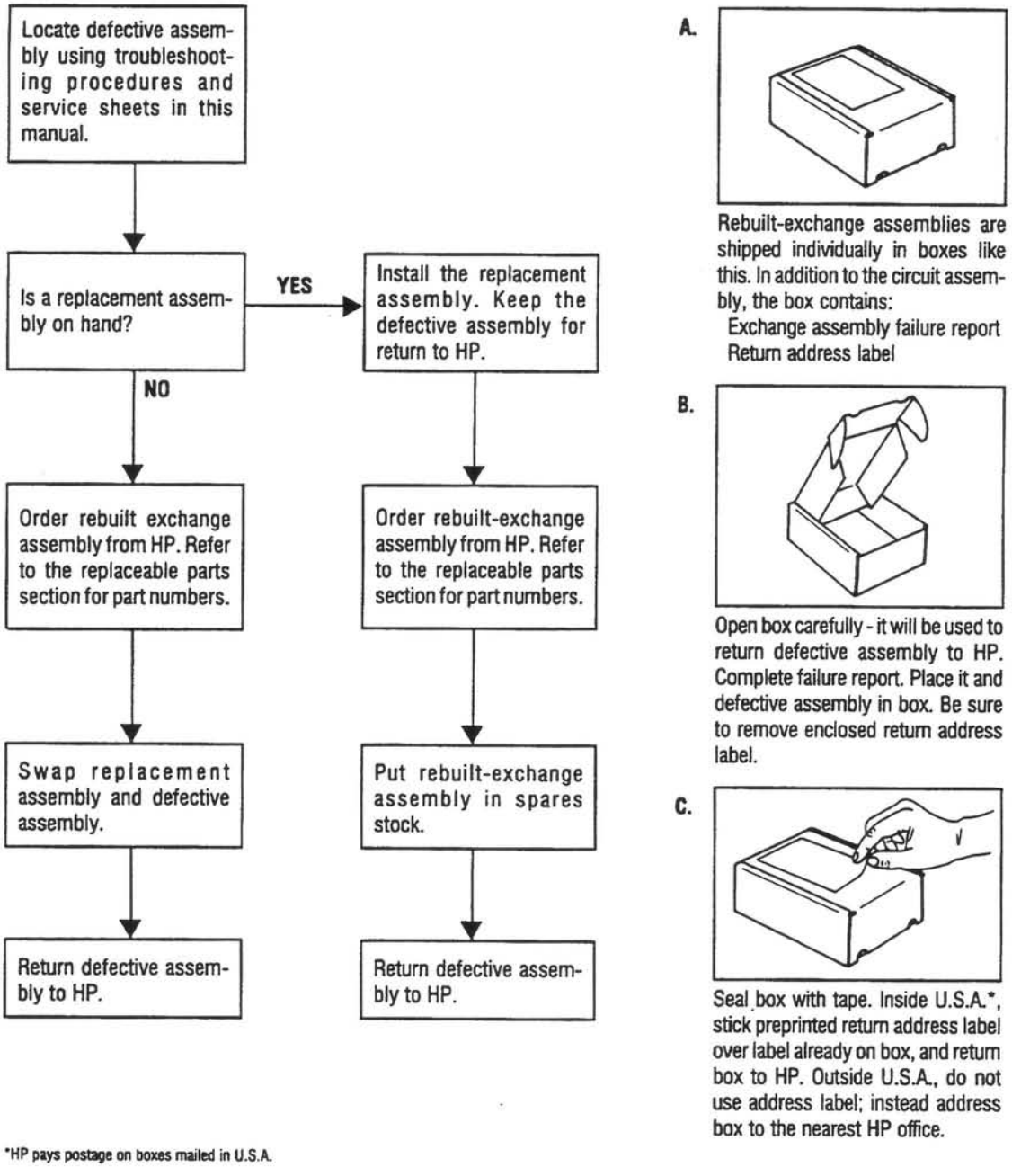
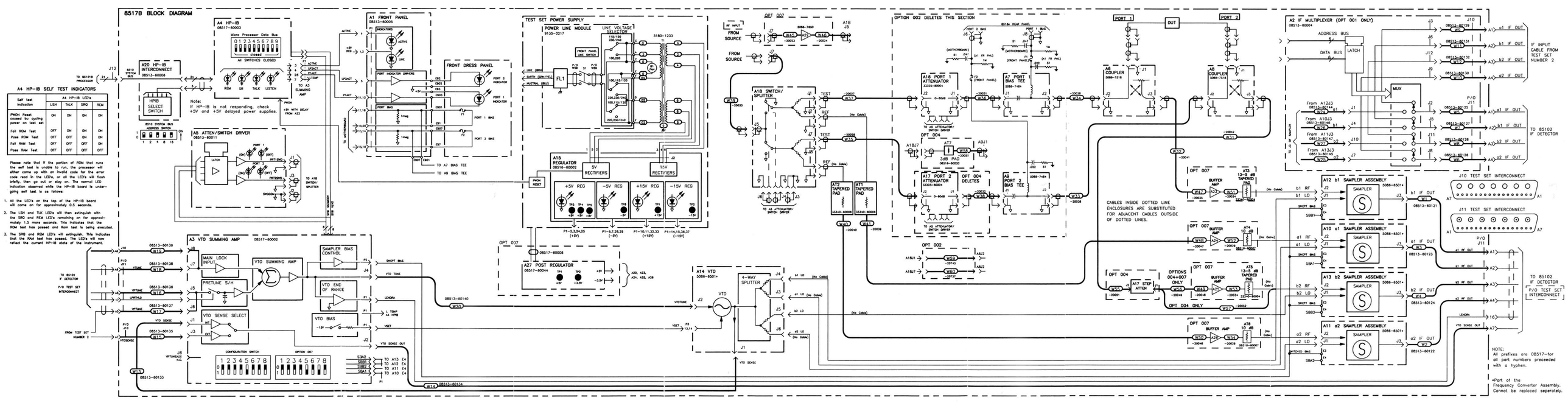


Figure 7-2. The Low Cost Rebuilt-Exchange Procedure

Major Assemblies of the HP 8517B Standard Instrument

Reference Designator	HP Part Number	QTY	Description
A1	08513-60005	1	FRONT PANEL INTERFACE BOARD ASSEMBLY
A6,A8	5086-7518	2	50 GHZ COUPLER, (NEW)
	5086-6518		50 GHz COUPLER, (R-E)
A7,A9	5086-7484	2	BIAS TEE (NEW)
	5086-6484		BIAS TEE (R-E)
A16,A17	33325-60004	2	60 DB STEP ATTENUATOR (NEW)
	33325-69004		60 DB STEP ATTENUATOR (R-E)
A18	5086-7570	1	SWITCH SPLITTER (NEW)
	5086-6570		SWITCH SPLITTER (R-E)
AT1,AT2	33340-60006	2	20-7 DB TAPERED PAD
A2			USED FOR OPTION 001 (SEE Figure 7-12)
A3	08517-60002	1	VTO SUMMING AMP BOARD ASSEMBLY (NEW)
	08517-69002		VTO SUMMING AMP BOARD ASSEMBLY (R-E)
A4	08517-60003	1	HP-IB BD ASSEMBLY (NEW)
A5	08517-60001	1	ATTEN/SWITCH DRIVER BOARD ASSEMBLY
A10 thru A13	5086-6501	4	FREQUENCY CONVERTER ASSEMBLY
A14	5086-7501	1	FREQ. CONV. 50 GHZ (SAMPLERS & VTO) (NEW)
	5086-6501		FREQ. CONV. 50 GHZ (SAMPLERS & VTO) (R-E)
A15	08516-60002	1	REGULATOR BOARD ASSEMBLY
A19	08513-60001	1	MOTHERBOARD ASSEMBLY
A20	08513-60006	1	HP-IB INTERFACE BOARD ASSEMBLY
A27	08517-60044	1	POST REGULATOR BOARD ASSEMBLY
B1	08513-20031	1	FAN-TBAX 34-CFM 115V 50/60 HZ 1.5KV DIEL
T1	9100-4723	1	POWER TRANSFORMER

8517B BLOCK DIAGRAM



A4 HP-IB SELF TEST INDICATORS

Self test indication	A4 HP-IB LED's			
	LSN	TALK	SRQ	REM
PWON Reset caused by cycling power on test set	ON	ON	ON	ON
Fail ROM Test	OFF	ON	ON	ON
Pass ROM Test	OFF	OFF	ON	ON
Fail RAM Test	OFF	OFF	OFF	ON
Pass RAM Test	OFF	OFF	OFF	OFF

Please note that if the portion of ROM that runs the self test is unable to run, the processor will either come up with an invalid code for the error code read in the LED's, or all the LED's will flash briefly, then go out or stay on. The normal LED indication observed while the HP-IB board is undergoing self test is as follows:

1. All the LED's on the top of the HP-IB board will come on for approximately 0.5 seconds.
2. The LSN and TLK LED's will then extinguish with the SRQ and REM LED's remaining on for approximately 1.5 more seconds. This indicates that the ROM test has passed and Ram test is being executed.
3. The SRQ and REM LED's will extinguish. This indicates that the RAM test has passed. The LED's will now reflect the current HP-IB state of the instrument.

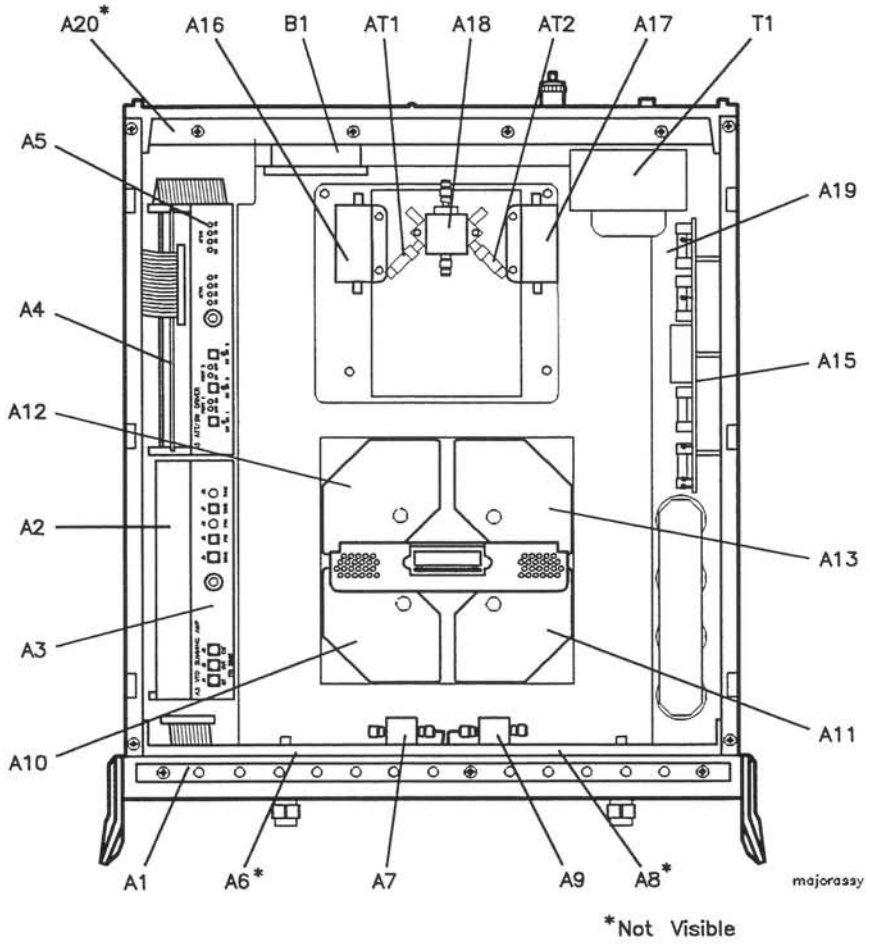


Figure 7-3. Major Assemblies of HP 8517B Standard Instrument

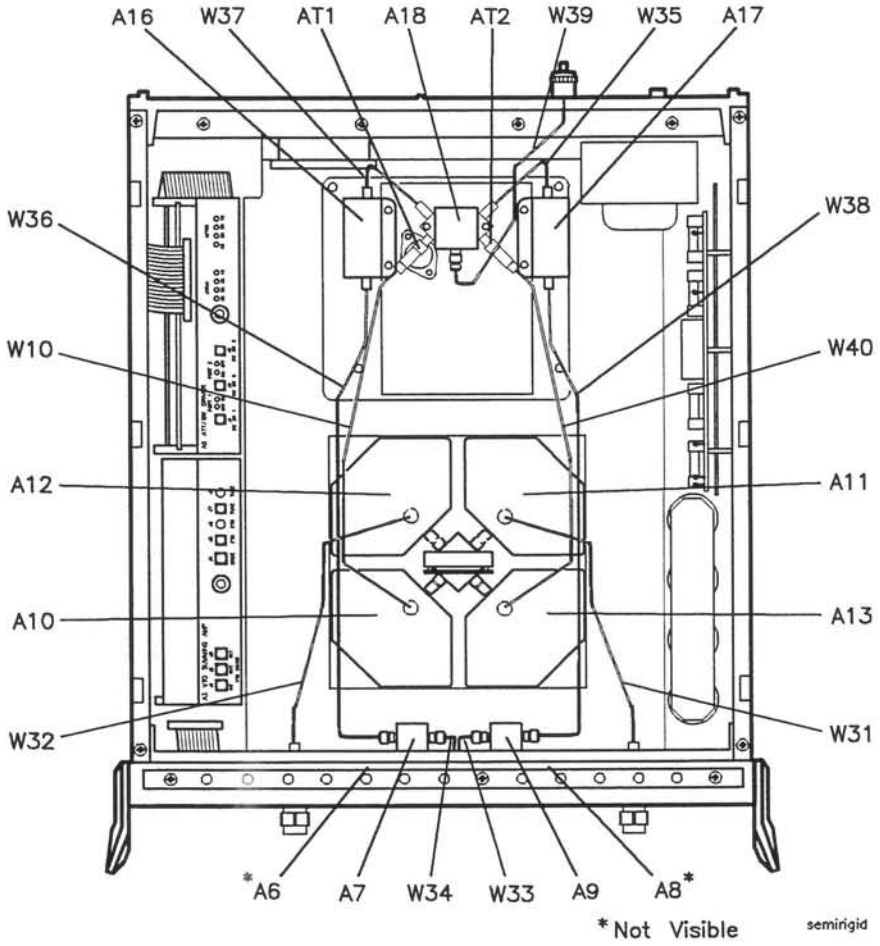


Figure 7-4. HP 8517B Standard Instrument Semi-Rigid Cable Assemblies

Cable Assemblies of the HP 8517B Standard Instrument

Reference Designator	HP Part Number	QTY	Description
Semi-Rigid Cable Assemblies			
W31	08517-20042	1	CABLE ASSEMBLY A8J3 TO A11J2
W32	08517-20041	1	CABLE ASSEMBLY A6J3 TO A12J2
W33	08517-20038	1	CABLE ASSEMBLY A8J2 TO A9J2
W34	08517-20038	1	CABLE ASSEMBLY A6J2 TO A7J2
W35	08517-20028	1	CABLE ASSEMBLY A17J2 TO A18J7
W36	08517-20031	1	CABLE ASSEMBLY A7J1 TO A16J1
W37	08517-20027	1	CABLE ASSEMBLY A16J2 TO A18J1
W38	08517-20032	1	CABLE ASSEMBLY A9J1 TO A17J1
W39	08517-20033	1	CABLE ASSEMBLY A18J5 TO REAR PANEL J7
W40	08517-20040	1	CABLE ASSEMBLY AT2 TO A13J2
W10	08517-20039	1	CABLE ASSEMBLY AT1 TO A10J2

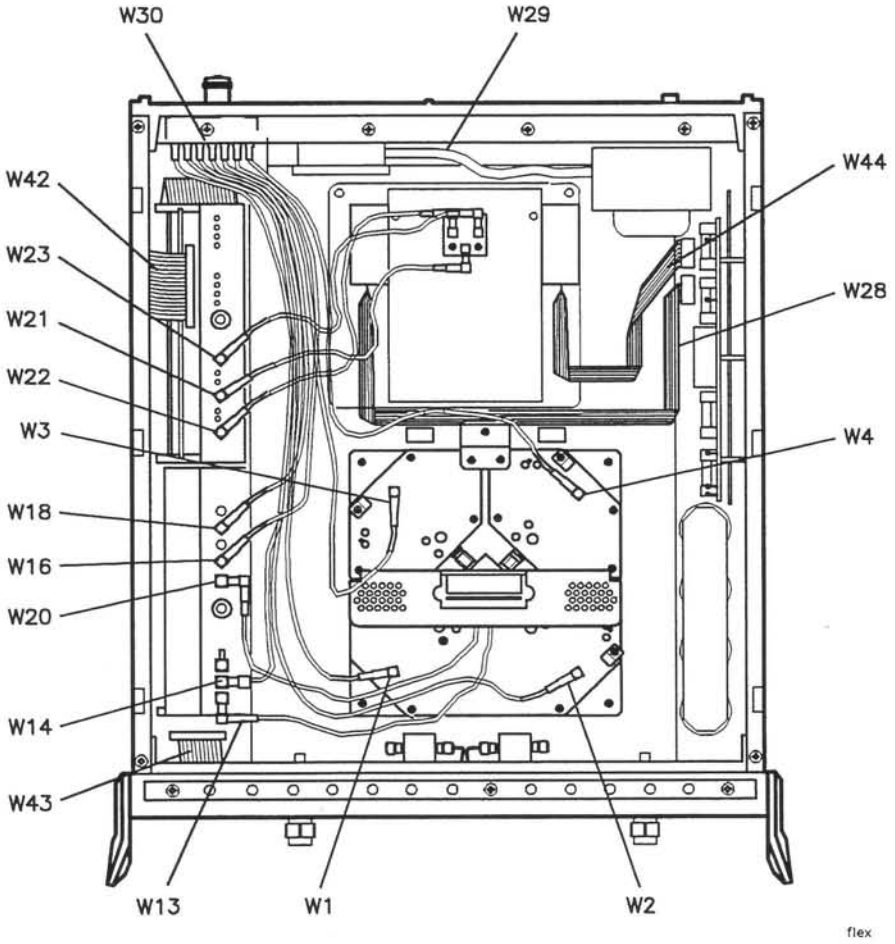


Figure 7-5. HP 8517B Standard Instrument Flexible Cable Assemblies

Cable Assemblies of the HP 8517B Standard Instrument

Reference Designator	HP Part Number	QTY	Description
Flexible Cable Assemblies of the HP 8517B Standard Instrument			
W1	08513-60121	1	CABLE ASSEMBLY A12J3 TO A1J11
W2	08513-60122	1	CABLE ASSEMBLY A13J3 TO A4J11
W3	08513-60123	1	CABLE ASSEMBLY A10J3 TO A2J11
W4	08513-60124	1	CABLE ASSEMBLY A11J3 TO A3J11
W13	08513-60133	1	CABLE ASSEMBLY A3J1 TO A14J1
W14	08513-60134	1	CABLE ASSEMBLY A3J2 TO A7J11
W16	08513-60136	1	CABLE ASSEMBLY A3J5 TO A5J11
W18	08513-60138	1	CABLE ASSEMBLY A3J7 TO A6J11
W20	08513-60140	1	CABLE ASSEMBLY A3J4 TO A14J2
W21	08513-60141	1	CABLE ASSEMBLY A5J2 TO A18J4
W22	08513-60142	1	CABLE ASSEMBLY A5J1 TO A18J3
W23	08513-60143	1	CABLE ASSEMBLY A5J3 TO A18J6

Cable Assemblies of the HP 8517B Standard Instrument (continued)

Reference Designator	HP Part Number	QTY	Description
W28	08517-60014	1	RIBBON CABLE ASSEMBLY A16-A19
W29	85102-60226	1	CABLE ASSEMBLY LINE SWITCH
W30	08513-60014	1	CABLE ASSEMBLY J10 TO J11
W42	08513-60036	1	CABLE ASSEMBLY A4 TO A20
W43	08513-60013	1	CABLE ASSEMBLY A1 TO A19
W44	08517-60015	1	RIBBON CABLE ASSEMBLY A17-A19

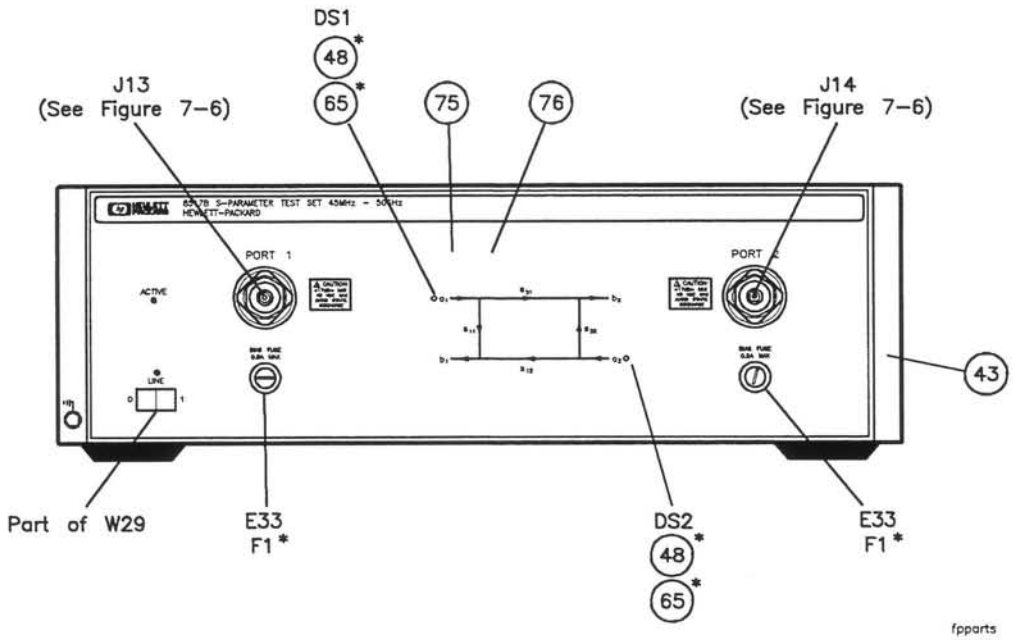


Figure 7-6. Miscellaneous Parts, Front Panel

Flexible Cable Assemblies of the HP 8517B Standard Instrument

Reference Designator	HP Part Number	QTY	Description
DS1,DS2	1990-0858	2	LED LAMP 25MA MAX
E33,E34	2110-0797	2	FUSEHOLDER
F1,F2	2110-0012	2	FUSE .5A 250V
J13,J14			SEE Figure 7-7
43	5021-8747	1	FRONT BEZEL
48	1450-0615	2	RETAINER LED
65	08340-40002	2	MOUNT LED
75	08517-00002	1	FRONT DRESS PANEL
76	08517-00003	1	FRONT SUB PANEL

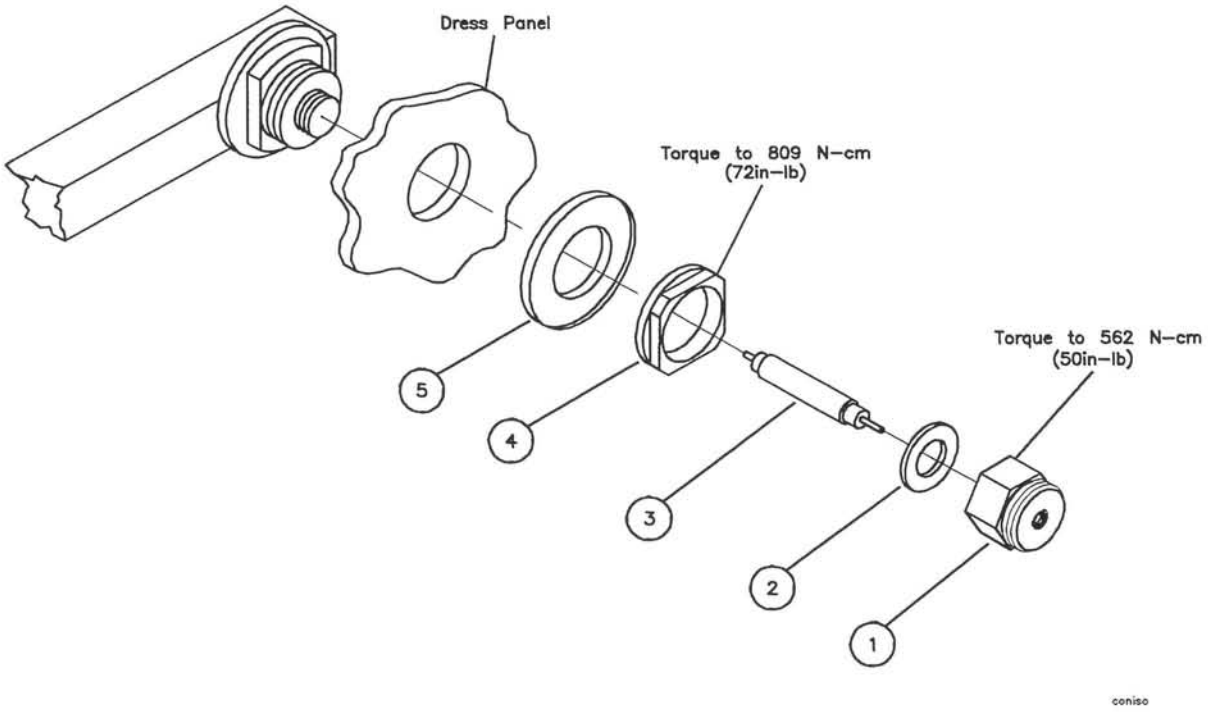


Figure 7-7. Test Port Connectors

Test-Port Connector Assembly Parts

Reference Designator	HP Part Number	QTY	Description
1	5062-7274	1	TEST PORT CONNECTOR
2	5001-3930		.0002 IN. SHIM
	5001-3904		.0005 IN. SHIM
	5001-3905		.001 IN SHIM
	5001-3906		.002 IN SHIM
3	5062-7276	1	TEST PORT CENTER CONDUCTOR
4	5021-3428	2	TEST PORT NUT
5	5021-3427	2	TEST PORT WASHER

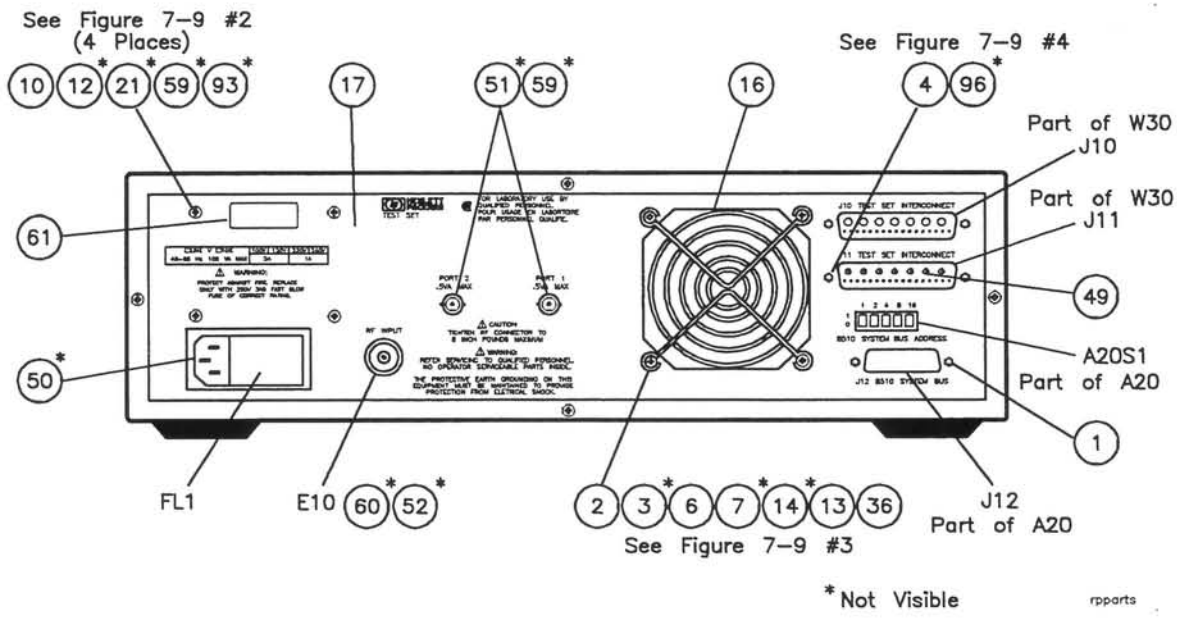


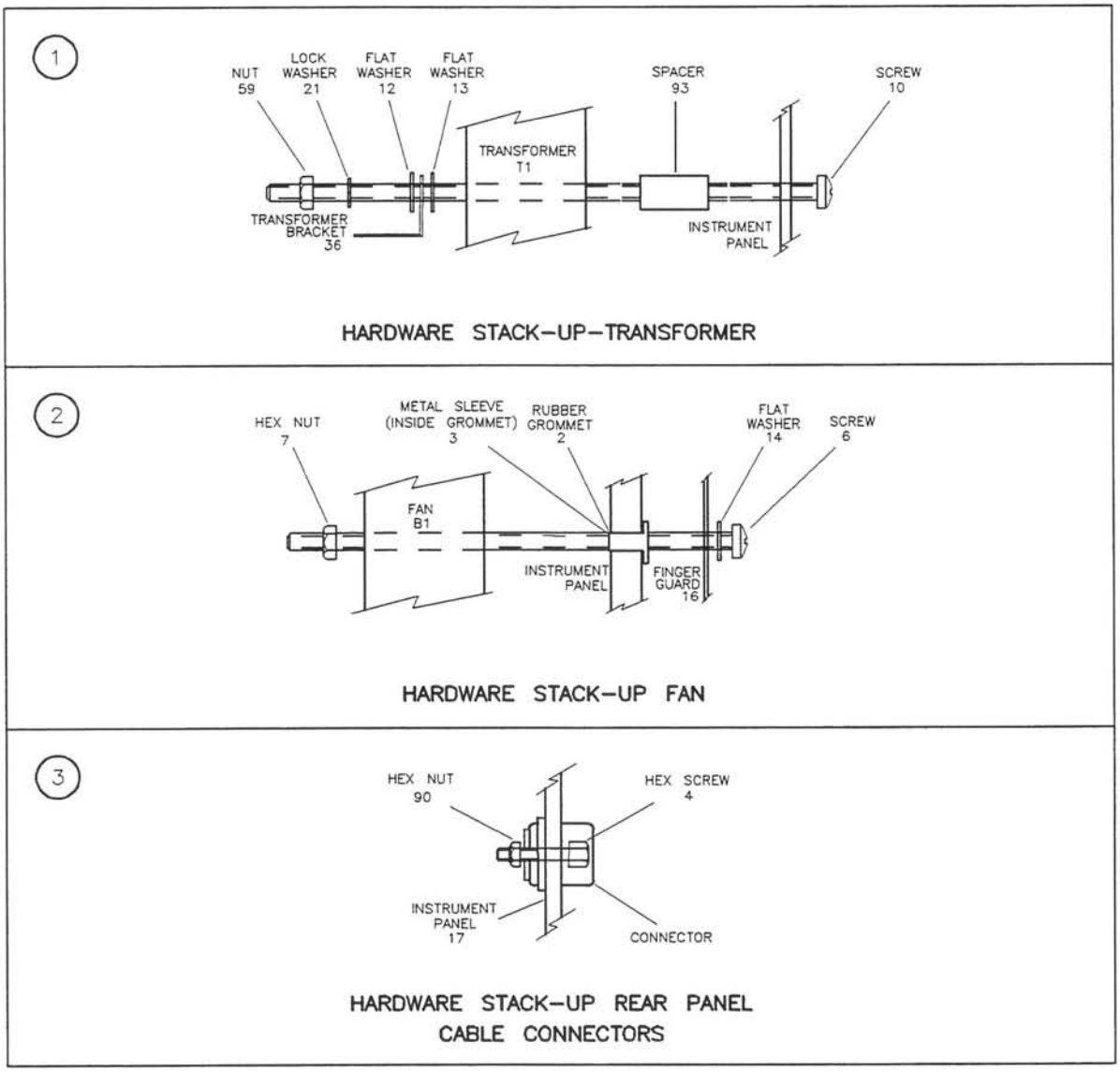
Figure 7-8. Miscellaneous Parts Rear Panel

Table 7-4. Miscelaneous Parts, Rear Panel

Reference Designator	HP Part Number	QTY	Description	Mfr Code	Mfr Part Number
E10	5062-7243	1	2.4 MM RF CONNECTOR ASSEMBLY		
FL1	9135-0217	1	LINE MODULE-FILTERED		
J10	1251-2197	1	CONNECTOR R&P 24F (PART OF W30)		
J11	1251-2204	1	CONNECTOR R&P 24M (PART OF W30)		
1	0380-0643	2	STANDOFF-HEX .255-IN-LG 6-32 THD	00000	ORDER BY DESCRIPTION
2	0400-0010	4	GROMMET-RND .188-IN-ID .312-IN-GRV-OD		
3	0380-0926	4	THREADED INSERT-STDF 6-32 .188-IN-LG SST		
4	1251-7812	6	CONNECTOR JACKSCREW		
6	0380-0002	4	SCREW-MACH 6-32 .625-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
7	2510-0322	4	NUT-HEX-W/LKWR 6-32-THD .109-IN-THK	00000	ORDER BY DESCRIPTION
10	2510-0270	4	SCREW-MACH 8-32 3.25-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
12	3050-0139	12	WASHER-FL MTLC NO.8 .172-IN-ID		
13	3050-0152	4	WASHER-SHLDR NO.8 .172-IN-ID .438-IN-OD		

Table 7-4. Miscelaneous Parts, Rear Panel (continued)

Reference Designator	HP Part Number	QTY	Description	Mfr Code	Mfr Part Number
14	3050-0227	4	WASHER-FL MTLC NO.6 .149-IN-ID		
16	3160-0309	1	FINGER GUARD		
17	08517-00001	1	REAR PANEL		
21	2190-0017	4	WASHER-LK INTL NO. 10 .195-IN-ID		
36	08513-00002	1	TRANSFORMER BRACKET		
49	5021-0906	14	TEFLON CABLE SLEEVE		
50	5001-3907	2	LINE MODULE RETAINER CLIPS		
51	2190-0016	2	WASHER-LK INTL T 3/8 IN .377-IN-ID		
52	2190-0104	1	WASHER-LK INTL T 7/16 IN .439-IN-ID		
59	2950-0001	2	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
60	2950-0132	1	NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
61	7121-2380	1	LABEL-SERIAL NUMBER		
93	08513-20032	2	TRANSFORMER SUPPORT BRACKET		
96	0590-0663	6	NUT-HEX 4/40		



rpmiscpt

Figure 7-9. Detailed Views

Miscellaneous Parts, Mother Board (continued)

Reference Designator	HP Part Number	QTY	Description	Mfr Code	Mfr Part Number
J1	1251-5745		CONNECTOR 20-PIN M POST TYPE (A19J1) DOES NOT INCLUDE A19MP1&A19MP2)		
J2	1251-6868	4	CONNECTOR 5-PIN M POST TYPE		
J3	1251-7939	1	CONN-POST TYPE .100-PIN-SPCG 14-CONT (A19J3 DOES NOT INCLUDE A19MP3)		
J4	1251-6868		CONNECTOR 5-PIN M POST TYPE		
J5	1251-6868		CONNECTOR 5-PIN M POST TYPE		
J6	1251-6868		CONNECTOR 5-PIN M POST TYPE		
J7	1251-3825	1	CONNECTOR 5-PIN M POST TYPE		
J8	1200-0508	2	SOCKET-IC 14-CONT DIP-SLDR		
J9	1200-0508		SOCKET-IC 14-CONT DIP-SLDR		
R1	0764-0015	2	RESISTOR 560 5% 2W MO TC=0±200		
R2	0764-0015		RESISTOR 560 5% 2W MO TC=0±200		
R3	0764-0016	2	RESISTOR 1K 5% 2W MO TC=0±200		
R4	0764-0016		RESISTOR 1K 5% 2W MO TC=0±200		
R5	0757-0394		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
R6	0757-0394		RESISTOR 51.1 1% .125W F TC=0±100	24546	C4-1/8-T0-51R1-F
XA2	1251-7882	5	CONNECTOR-PC EDGE 2-ROWS		
XA3	1251-7882		CONNECTOR-PC EDGE 2-ROWS		
XA4	1251-7882		CONNECTOR-PC EDGE 2-ROWS		
XA5	1251-7882		CONNECTOR-PC EDGE 2-ROWS		
XA6 - X14			NOT ASSIGNED		
XA15	1251-7882		CONNECTOR-PC EDGE 2-ROWS		

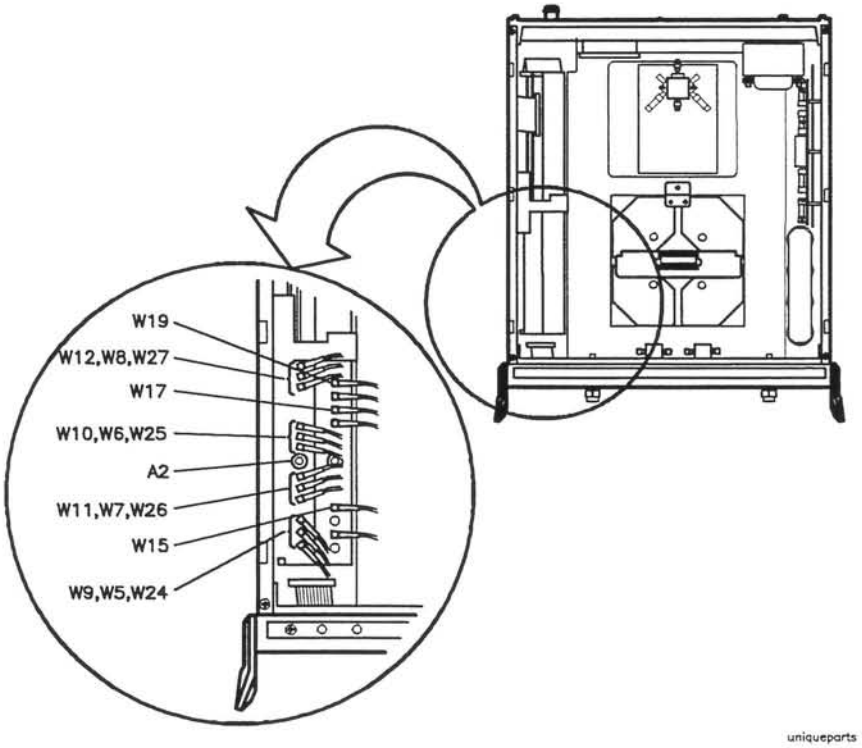


Figure 7-12. Parts Unique to Option 001

Table 7-5. Parts Unique to Option 001

Reference Designator	HP Part Number	QTY	Description
A2	08513-60004	1	BOARD ASSEMBLY, IF MULTIPLEXER (NEW)
A2	08513-69004	1	BOARD ASSEMBLY, IF MULTIPLEXER (REBUILT)
Cable Assemblies Unique to Option 001			
W5	08513-60125	1	CABLE ASSEMBLY A2J2 TO J11A1
W6	08513-60126	1	CABLE ASSEMBLY A2J8 TO J11A4
W7	08513-60127	1	CABLE ASSEMBLY A2J5 TO J11A2
W8	08513-60128	1	CABLE ASSEMBLY A2J11 TO J11A3
W9	08513-60129	1	CABLE ASSEMBLY A2J3 TO J10A1

Table 7-5. Parts Unique to Option 001 (continued)

Reference Designator	HP Part Number	QTY	Description
W10	08513-60130	1	CABLE ASSEMBLY A2J9 TO J10A4
W11	08513-60131	1	CABLE ASSEMBLY A2J6 TO J10A2
W12	08513-60132	1	CABLE ASSEMBLY A2J12 TO J10A3
W13-W14			NOT UNIQUE TO OPTION 001
W15	08513-60135	1	CABLE ASSEMBLY A3J3 TO J10A7
W16			NOT UNIQUE TO OPTION 001
W17	08513-60137	1	CABLE ASSEMBLY A3J6 TO J10A5
W18			NOT UNIQUE TO OPTION 001
W19	08513-60139	1	CABLE ASSEMBLY A3J8 TO J10A6
W24	08513-60144	1	CABLE ASSEMBLY A12J3 TO A2J1
W25	08513-60145	1	CABLE ASSEMBLY A13J3 TO A2J7^M
W26	08513-60146	1	CABLE ASSEMBLY A10J3 TO A2J4^M
W27	08513-60147	1	CABLE ASSEMBLY A11J3 TO A2J10^M
W45	08517-20017	1	CABLE ASSEMBLY A8 TO A18
W46	08517-20018	1	CABLE ASSEMBLY A6 TO A18

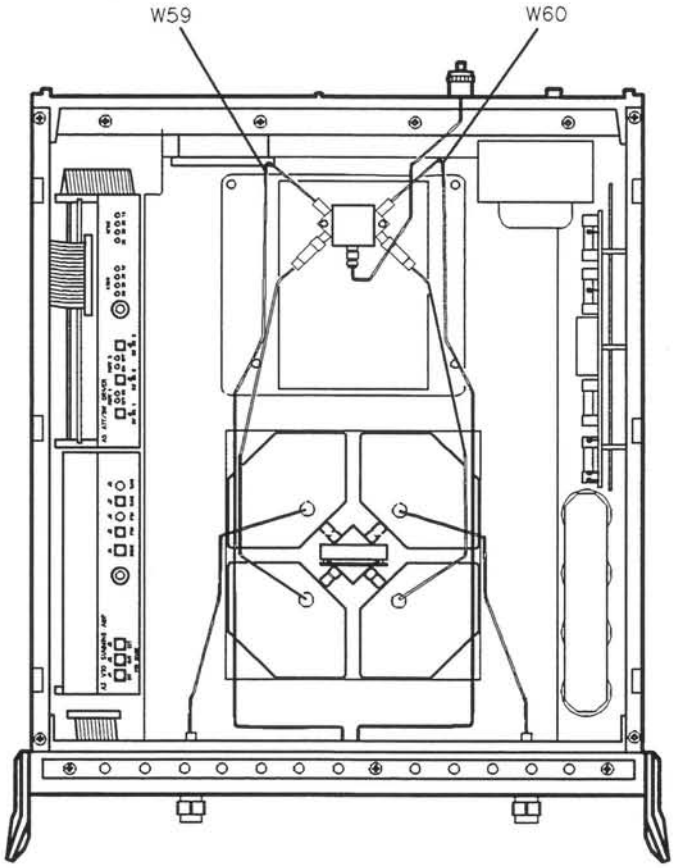


Figure 7-13. Parts Unique to Option 002

Table 7-6. Parts Unique to Option 002

Reference Designator	HP Part Number	QTY	Description
W59	08517-20743	1	CABLE ASSEMBLY A12J3 TO PORT 1 J13
W60	08517-20737	1	CABLE ASSEMBLY A13J3 TO PORT 2J14

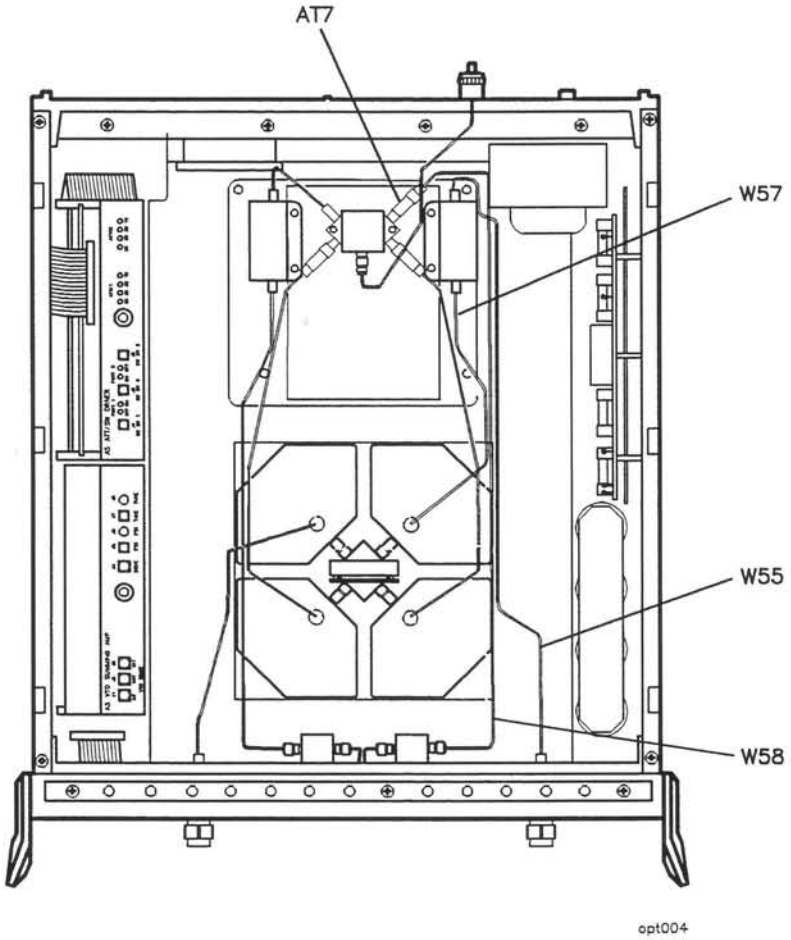


Figure 7-14. Parts Unique to Option 004

Table 7-7. Parts Unique to Option 004

Reference Designator	HP Part Number	QTY	Description
W55	08517-20051	1	CABLE ASSEMBLY AT7 to A9J1
W57	08517-20052	1	CABLE ASSEMBLY A8J3 to A17J2
W58	08517-20050	1	CABLE ASSEMBLY A17J1 to A11J2
AT7	08517-60020	1	3 DB ATTENUATOR

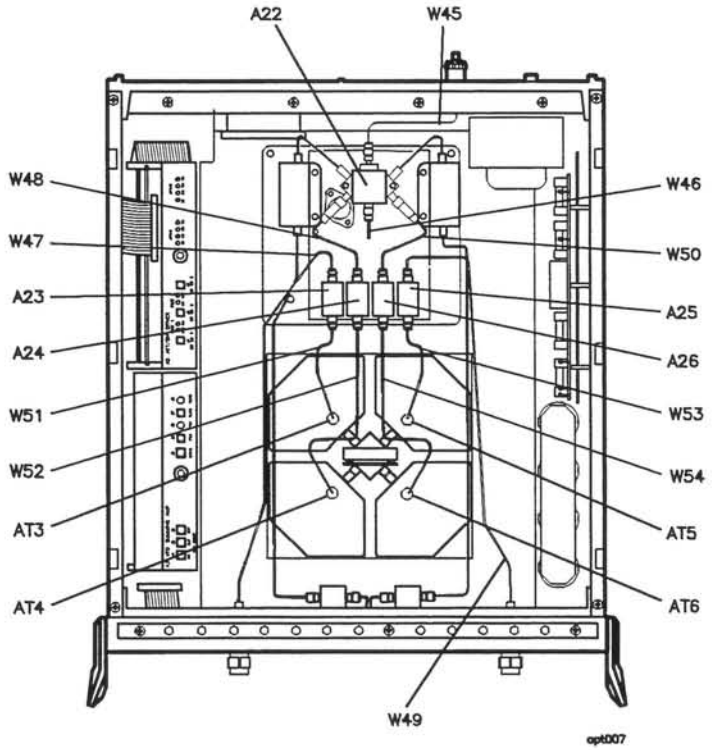


Figure 7-15. Parts Unique to Option 007

Table 7-8. Parts Unique to Option 007

Reference Designator	HP Part Number	QTY	Description
AT23 to AT26	5086-7649	4	BUFFER AMPLIFIER
A27	08517-60044	1	POST REGULATOR BOARD ASSEMBLY
Cable Assemblies Unique to Option 007			
W45	08517-20023	1	FRONT PANEL J7 TO A22
W46	08517-20024	1	A22 TO A18J5
W47	08517-20035	1	A6 COUPLER TO A23
W48	08517-20047	1	AT1 TO A24
W49	08517-20036	1	A8 COUPLER TO A25
W50	08517-20048	1	AT2 TO A26
W51	08517-20034	1	A23 TO AT3
W52	08517-20029	1	A24 TO AT4
W53	08517-20034	1	A25 TO AT5
W54	08517-20030	1	AT6 to A26
AT3	33340-60004	1	13 TO 5 DB ATTENUATOR
AT4	08516-60004	1	10 DB ATTENUATOR
AT5	33340-60004	1	13 TO 5 DB ATTENUATOR
AT6	08516-60007	1	10 DB ATTENUATOR

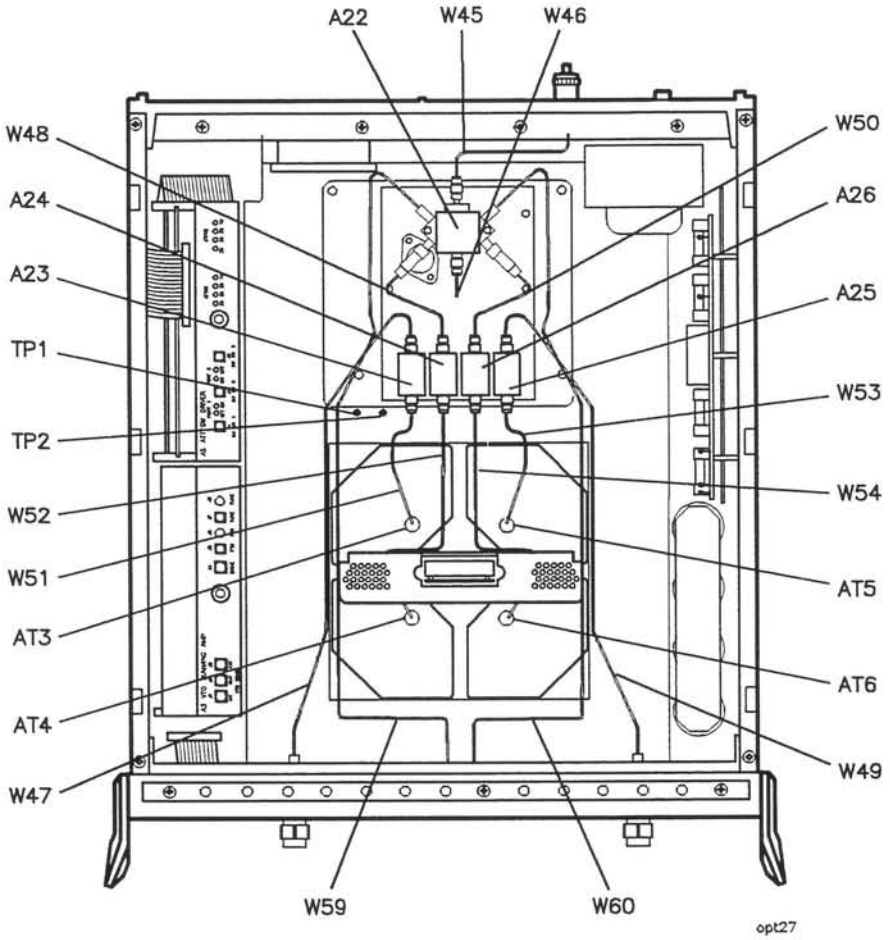


Figure 7-16. Parts Unique to Option 002 "plus" Option 007

Table 7-9. Parts Unique to Option 002 "plus" Option 007

Reference Designator	HP Part Number	QTY	Description
			No unique parts to Option 002 "plus" Option 007. All other parts are included on Option 002 or Option 007

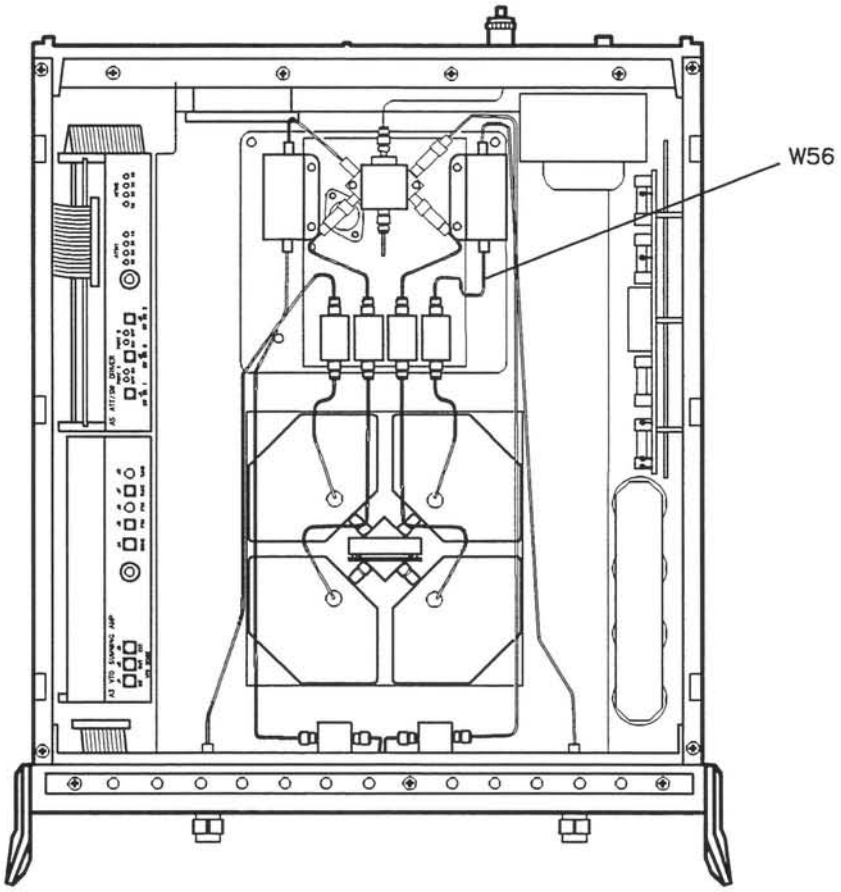


Figure 7-17. Parts Unique to Option 004 "plus" Option 007

Table 7-10. Parts Unique to Option 004 "plus" Option 007

Reference Designator	HP Part Number	QTY	Description
W56	08517-20049	1	A17J1 TO A25 All other parts are included on Option 004 and Option 007

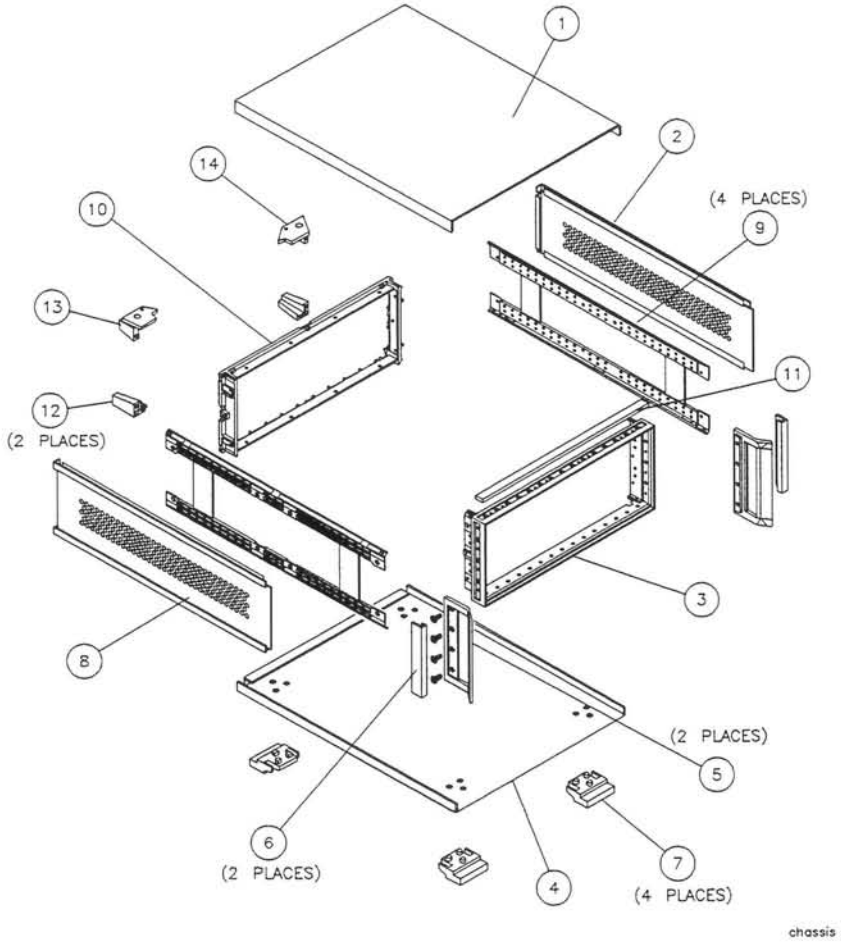


Figure 7-18. Instrument Chassis Replaceable Parts

Instrument Chassis Replaceable Parts

Reference Designator	HP Part Number	QTY	Description
1	08513-00040	1	TOP COVER
2	08513-00041	1	SIDE COVER PERFORATED
3	5021-8403	1	FRONT FRAME
4	5062-3747	1	BOTTOM COVER
5	5062-3799	1	HANDLE ASSEMBLY
6	5021-8496	1	TRIM FRONT HANDLE
7	5041-8821	4	BOTTOM FOOT
8	5062-3757	1	SIDE COVER
9	5021-5837	1	18-INCH CORNER STRUT
10	5021-5804	1	REAR FRAME
11	5041-8802	1	TRIM STRIP
12	5041-8821	2	BACK PANEL FOOT
13	5021-8538	1	LOCK FOOT
14	5021-8540	1	LOCK FOOT

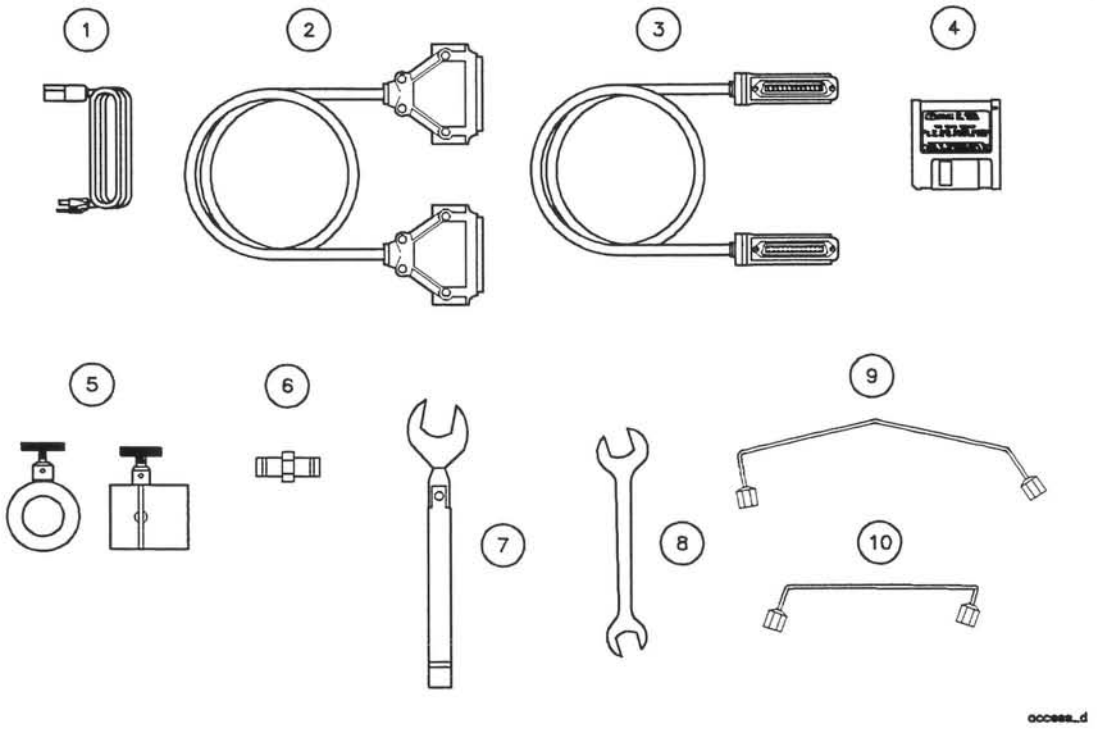


Figure 7-19. Accessories Supplied with the Test Set

Accessories Supplied with the Test Set

Reference Designator	HP Part Number	QTY	Description
1	8120-1348	1	POWER CORD U.S.A.
2	08510-60106	1	INTERFACE CABLE
3	8120-3445	1	HP-IB CABLE
4	08510-10037	1	SPECIFICATION AND PERFORMANCE VERIFICATION SOFTWARE
5	08515-60003	2	TEST PORT CLAMPS
6	1250-2188	1	ADAPTER FEMALE TO FEMALE 2.4MM
7	8710-1764	1	20 MM 8 IN.-LB WRENCH
8	8710-1770	1	1/2"X 9/16" WRENCH
9	08517-20005	1	SOURCE CABLE, RACK MOUNT
10	08517-20019	1	SOURCE CABLE, BENCH CONFIGURATION

8

Performance Tests

Performance test information and procedures are located in Chapter 8 of the *HP 8510C On-Site Service Manual.* Note that the HP 8510C performance test software (spplied with the test set) is required to test the HP 8517B. Performance test results are based on the HP 8510C system, including the test set, cables, calibration kit, etc.

9

Adjustments

The HP 8517B Test Set has no adjustments. Specifically, no attempt should be made to adjust the samplers.

10

Instrument History

This manual applies directly to instruments as designated on the title page.

If your instrument has a lower serial number prifix than the one stated on the title pate, and needs additional documentation, it would be located in this section. For additional information, refer to "Instruments Covered by this Manual" in Chapter 1.

Table 10-1. Hewlett-Packard Sales and Service Offices

US FIELD OPERATIONS

Headquarters
Hewlett-Packard Company
19320 Pruneridge Avenue
Cupertino, CA 95014, USA
(800) 752-0900

California, Northern
Hewlett-Packard Co.
301 E. Evelyn
Mountain View, CA 94041
(415) 694-2000

California, Southern
Hewlett-Packard Co.
1421 South Manhattan Ave.
Fullerton, CA 92631
(714) 999-6700

Colorado
Hewlett-Packard Co.
24 Inverness Place, East
Englewood, CO 80112
(303) 649-5000

Georgia
Hewlett-Packard Co.
2000 South Park Place
Atlanta, GA 30339
(404) 955-1500

Illinois
Hewlett-Packard Co.
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

New Jersey
Hewlett-Packard Co.
150 Green Pond Road
Rockaway, NJ 07866
(201)627-6400

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930 E. Campbell Rd.
Richardson, TX 75081
(214) 231-6101

EUROPEAN FIELD OPERATIONS

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1217 Meyrin 2/Geneva
Switzerland
(41 22) 780.8111

France
Hewlett-Packard France
1 Avenue Du Canada
Zone D'Activite De Courtaboeuf
F-91947 Les Ulis Cedex
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(33 1) 69 82 60 60

Germany
Hewlett-Packard GmbH
Hewlett-Packard Strasse
6380 Bad Homburg v.d.H
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(49 6172) 16-0

Great Britain
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Wokingham, Berkshire RF11 5DZ
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3495 Deer Creek Rd.
Palo Alto, California 94304-1316
(415) 857-5027

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Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
(61 3) 895-2895

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Hewlett- Packard (Canada) Ltd.
17500 South Service Road
Trans- Canada Highway
Kirkland, Quebec H9J 2X8
Canada
(514) 697-4232

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China Hewlett-Packard Co.
38 Bei San Huan X1 Road
Shuang Yu Shu
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Beijing, China
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Yokogawa-Hewlett-Packard Ltd.
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1150 Depot Road
Singapore 0410
(65) 273-7388

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337 Fu Hsing North Road
Taipei, Taiwan
(886 2) 712-0404

HEWLETT PACKARD
Customer Order Number
08517-90041
Printed in USA December 1993
Edition 1

INSTRUCTIONS FOR INSTALLING THE HP 08515-60003 ANTI-ROTATION CLAMPS

INTRODUCTION

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 1. 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.

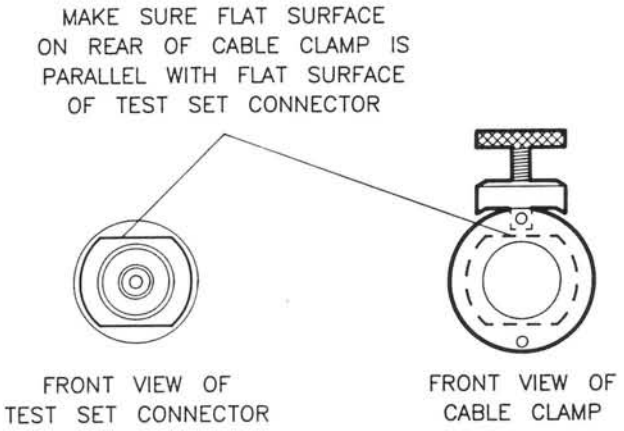

Figure 1. Visually Aligning Clamp and Nut Flats

4. See Figure 2. 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.

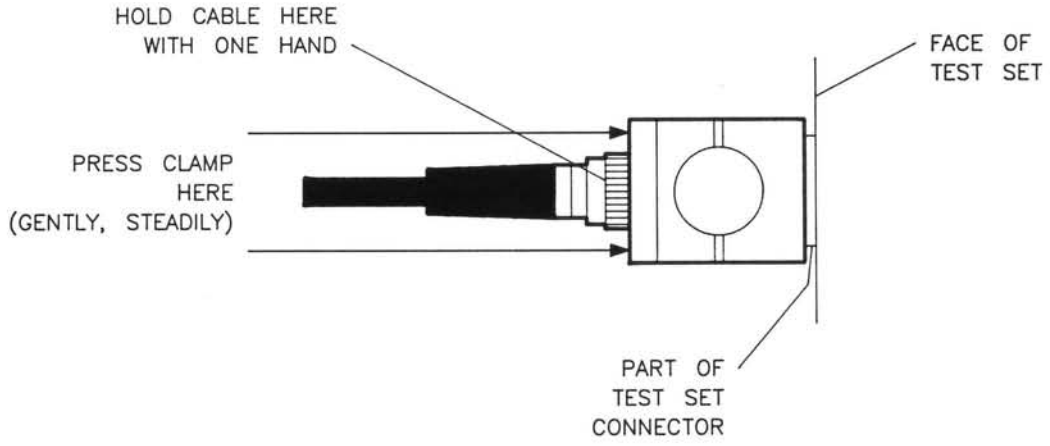

Figure 2. Mating the Clamp and Nut Flats

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

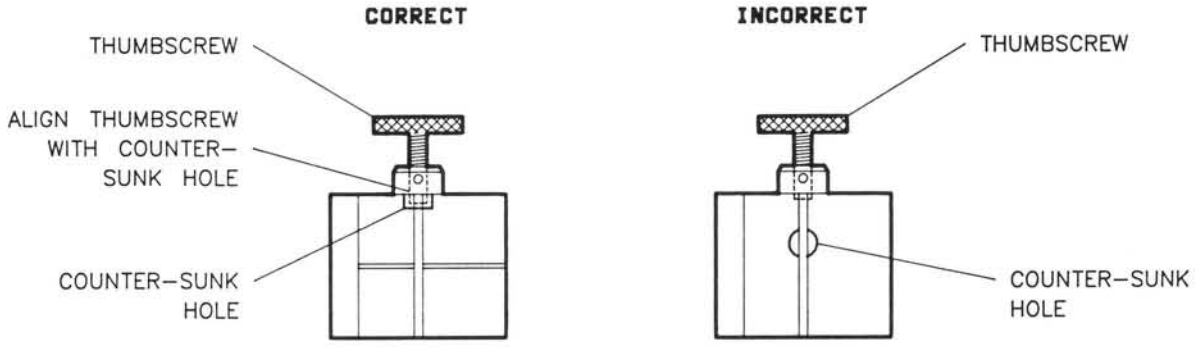

Figure 3. Aligning the Thumbscrew With the Counter-bored Hole

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.