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Errata

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HP References in this Manual

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

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

Agilent Technologies

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Service Guide

HP 70001A

Mainframe

HP Part No. 70001-90060
Printed in USA May 1994

Edition A.0.0

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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 product or the user's work. 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 to the user. Do not proceed beyond a *WARNING* sign until the indicated conditions are fully understood and met.**
DANGER	**The *DANGER* sign denotes an imminent hazard to people. It warns the reader of a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a *DANGER* sign until the indicated conditions are fully understood and met.**

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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.

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

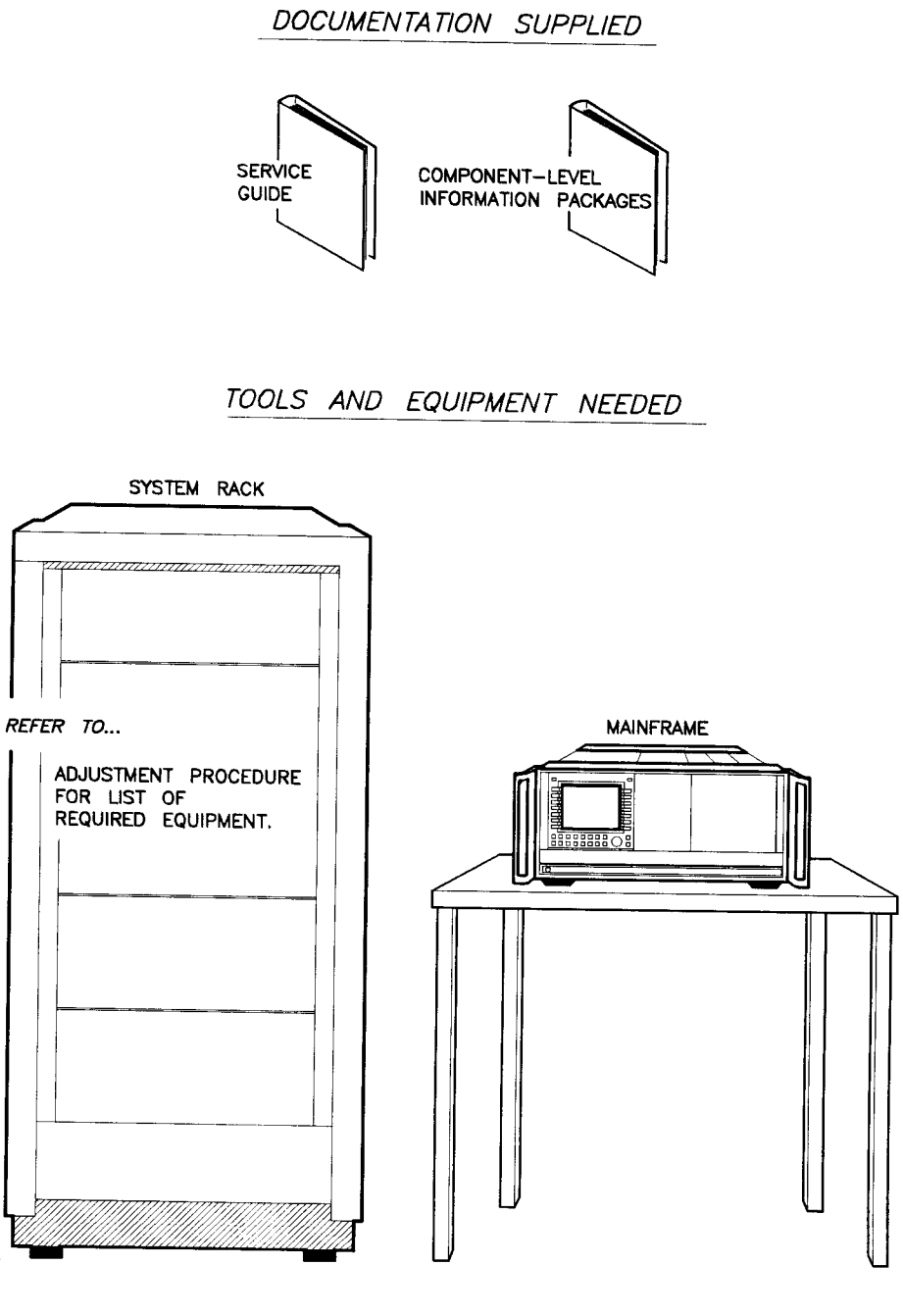
  Any adjustments or service procedures that require operation of the instrument with protective covers removed should be performed only by trained service personnel.

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.

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Servicing at a Glance



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The mainframe is used in HP 70000 Series modular measurement systems to house and supply power to MMS modules.

Software and documentation supplied

This service guide is part of an Option OB3 package which includes:

- *HP 70001A Service Guide*
- *HP 70001A Component Level Information Packages*

Tools needed

Before servicing, refer to Chapter 5 for a list of the tools and accessories that may be needed during servicing.

Antistatic precautions

Electrical components are easily damaged by small amounts of static electricity. If possible, work at a static-safe work station. For further information, refer to "Preparing a Static-Safe Work Station" in Chapter 4.

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In This Book

This book describes all of the service procedures necessary to test, adjust, calibrate, troubleshoot, and repair a mainframe in an HP 70000 Series modular measurement system.

For further information related to the servicing of additional and alternate modules that can be used in this system, refer to that module's service guide.

This service guide is part of an Option OB3 package which consists of two manuals.

Manual 1

Chapter 1 provides information to help get you started so that your mainframe is serviced properly.

Chapter 2 would have contained information needed to use module verification software, but your mainframe does not require this software because there are no module verification tests.

Chapter 3 contains information to help identify and resolve some common problems that may occur with your mainframe before extensive servicing.

Chapter 4 contains information about troubleshooting your mainframe. It presents information on preparing a static-safe work station and then it presents a set of troubleshooting procedures that can be used to optimize repair time.

Chapter 5 contains tables with a complete listing all equipment that may be required for servicing.

Chapter 6 contains the setups for all adjustment procedures that are used to optimize module performance when assemblies are changed, repaired, or adjusted.

Chapter 7 would have contained information needed to perform all module verification tests, but your mainframe does not have any module verification tests.

Chapter 8 would have contained information needed for all equipment calibration procedures, but your mainframe does not have any equipment calibration procedures.

Chapter 9 contains procedures for removal and replacement of major assemblies in your mainframe. It also contains information needed to order mechanical parts for your mainframe.

Chapter 10 contains information on all overall parts identification drawings that should be used when performing the troubleshooting procedures descibed in this service guide.

An index is also added at the end of this service guide to aid the user in finding key items of interest.

Manual 2

Manual 2 contains packets of component-level repair information for each mainframe board assembly that has field-replaceable parts. Each packet includes the parts list, component-location drawing, and schematics for a specific board-assembly part number. This manual also contains a table that can be used to cross reference different board assemblies that have different serial prefix breaks.

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1

Getting Started

This chapter provides information to help get you started so that your mainframe is serviced properly.

This chapter answers the questions "What Is Servicing?" and "When Is Servicing Needed?". It then describes the procedures used to return your mainframe to Hewlett-Packard for servicing.

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What Is Servicing?

Servicing includes testing, adjusting, calibrating, troubleshooting, and repairing.

There are different categories of testing available. These categories are module verification tests, system verification of operation tests, and system performance tests.

Module Verification Tests	Module verification tests are used to test modules so that when assembled into a system, the system meets the system's specifications. These sets of tests are used during servicing.
System Verification of Operation Tests	System verification of operation tests are used to verify the proper operation of an instrument and to verify that the instrument meets approximately 80% of its measurement related specifications. These sets of tests are subsets of system performance tests.
System Performance Tests	System performance tests are used to verify the proper operation of a complete modular measurement system (MMS) to full system specifications.

This service guide provides information related to testing, adjusting, calibrating, troubleshooting, and repairing your mainframe; it also provides information on module verification tests. These sets of tests are used during servicing.

For information related to system verification of operation tests, refer to the *HP 70000 Modular Spectrum Analyzer Installation and Verification Manual*, and for information related to system performance tests, refer to the documentation for HP 11990A system performance test software.

When Is Servicing Needed?

Servicing is needed:

- if error messages are displayed on your HP 70000 Series display
- if an ERROR LED or FAULT LED is on
- to perform repairs or adjustments or both
- to verify the correct operation of your mainframe
- or, if applicable, when upgrading firmware

If you determine that your mainframe needs servicing, you can perform the servicing yourself or, you can return your mainframe to a Hewlett-Packard service center.

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If You Want Hewlett-Packard to Service Your Mainframe

Before calling Hewlett-Packard or returning your mainframe for service, please read your warranty information. Warranty information is printed at the front of this service guide.

In any correspondence or telephone conversations, refer to the mainframe by its full model number and full serial number. With this information, the Hewlett-Packard representative can determine whether your unit is still within its warranty period.

Determining Your Mainframe's Serial Number

When a module is manufactured by Hewlett-Packard, it is given a unique serial number. This serial number is attached to a label on the front frame or front panel of the module. A serial number label is in two parts. (Refer to Figure 1-1.) The first part makes up the serial number prefix and consists of four digits and a letter. The second part makes up the serial number suffix and consists of the last five digits on the serial number label. The serial number prefix is the same for all identical modules; it only changes when a change in the electrical or physical functionallity is made. The serial number suffix, however, changes sequentially and is different for each module.

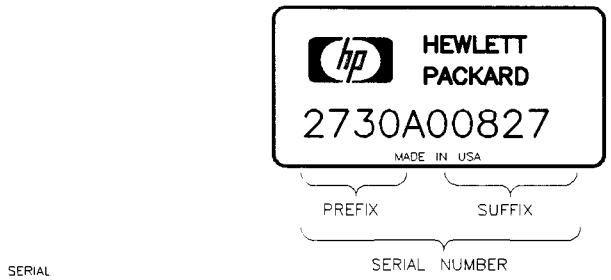


Figure 1-1. Typical Serial Number Label

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

US FIELD OPERATIONS HEADQUARTERS
Hewlett-Packard Company
19320 Pruneridge Avenue
Cupertino, CA 95014, USA
(800) 752-0900

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

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

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) 342-2000

New Jersey
Hewlett-Packard Co.
150 Green Pond Road
Rockaway, NJ 07866
(201) 586-5400

Texas
Hewlett-Packard Co.
930 E. Campbell Rd.
Richardson, TX 75081
(214) 231-6101

EUROPEAN OPERATIONS HEADQUARTERS
Hewlett-Packard S.A.
150, Route du Nant-d'Avril
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
France
(33 1) 69 82 60 60

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Hewlett-Packard-Strasse
61352 Bad Homburg
Germany
(+49 6172) 16-0

Great Britain
Hewlett-Packard Ltd.
Eskdale Road, Winnersh Triangle
Wokingham, Berkshire RG11 5DZ
England
(44 734) 696622

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Hewlett-Packard Company
3495 Deer Creek Rd.
Palo Alto, California 94304-1316
(415) 857-5027

Australia
Hewlett-Packard Australia Ltd.
31-41 Joseph Street (P.O. Box 221)
Blackburn, Victoria 3130
(61 3) 895-2895

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

Japan
Yokogawa-Hewlett-Packard Ltd.
1-27-15 Yabe, Sagamihara
Kanagawa 229, Japan
(81 427) 59-1311

China
China Hewlett-Packard, Co.
38 Bei San Huan X1 Road
Shuang Yu Shu
Hai Dian District
Beijing, China
(86 1) 256-6888

Singapore
Hewlett-Packard Singapore
Pte. Ltd.
Alexandra P.O. Box 87
Singapore 9115
(65) 271-9444

Taiwan
Hewlett-Packard Taiwan
8th Floor, H-P Building
337 Fu Hsing North Road
Taipei, Taiwan
(886 2) 712-0404

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Returning Your Mainframe for Service

Hewlett-Packard has sales and service offices around the world to provide complete support for your mainframe. To obtain servicing information or to order replacement parts, contact the nearest Hewlett-Packard sales and service office listed in Table 1-1.

Use the following procedure to return your mainframe to Hewlett-Packard for service:

1. Fill out a service tag (available at the end of this service guide) and attach it to the instrument. Please be as specific as possible about the nature of the problem. Send a copy of any or all of the following information:
   - any error messages that appeared on the HP 70000 Series display
   - a completed Performance Test record
   - any other specific data on the performance of the mainframe

---

CAUTION Damage can result if the original packaging materials are not used. Packaging materials should be anti-static and should cushion the mainframe on all sides.

Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the instrument or prevent it from moving in the shipping container. Styrene pellets can also cause equipment damage by generating static electricity or by lodging in fan motors.

---

2. Place the mainframe in its original packaging materials. (Refer to "Returning Your Mainframe for Service".)

   If the original packaging materials are not available, you can contact a Hewlett-Packard sales and service office to obtain information on packaging materials or you may use an alternative packing material referred to as "bubble-pack". One of the companies that makes bubble-pack is Sealed Air Corportation of Commerce, California, 90001.

3. Surround the mainframe with at least 3 to 4 inches of its original packing material or bubble-pack to prevent the mainframe from moving in its shipping container.

4. Place the mainframe, after wrapping it with packing material, in its original shipping container or a strong shipping container that is made of double-walled corrugated cardboard with 159 kg (350 lb) bursting strength.

   The shipping container must be both large enough and strong enough to accommodate your mainframe and allow at least 3 to 4 inches on all sides for packing material.

5. Seal the shipping container securely with strong nylon adhesive tape.

6. Mark the shipping container "FRAGILE, HANDLE WITH CARE" to help ensure careful handling.

7. Retain copies of all shipping papers.

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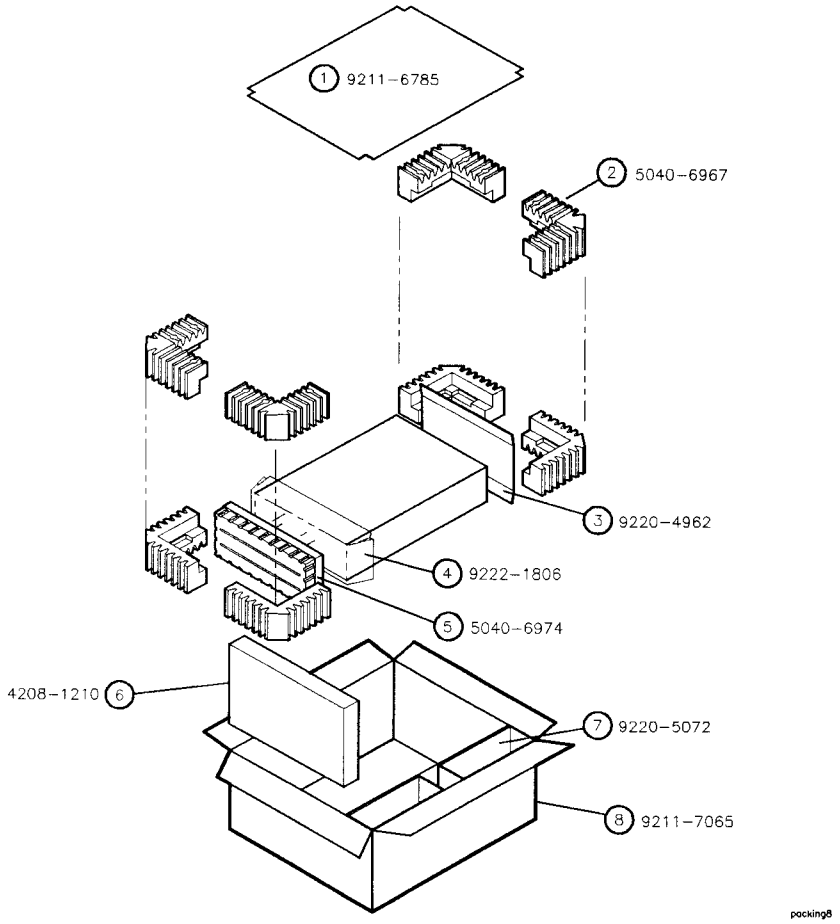


Table 1-2. Packaging for an 8/8 Module

Item	Description	HP Part Number	Qty
1	Corrugated Carton (Top)	9211-6785	1
2	Foam Corner-Pads	5040-6967	8
3	Flat End-Cap	9220-4962	1
4	Static Sheet	9222-1806	1
5	Front Cover	5040-6974	1
6	Foam Plastic	4208-1210	1
7	Corrugated Pad	9220-5072	1
8	Corrugated Carton (Outer)	9211-7065	1

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2

Module Verification Software

Module Verification Software is a program that is designed to automate module verification tests and adjustment procedures.

Note The HP 70001A mainframe does not have any automated module verification tests and therefore does not use module verification software.

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3

Before Extensive Servicing

This chapter contains information to help identify and resolve some common problems that may occur with your mainframe before extensive servicing.

Symptoms to various problems are listed at the top of each page. Most symptoms have a brief description or explanation to help provide more insight into their cause. A possible cause for the symptom and a checklist of possible solutions are then presented. Use this checklist as an aid to correct the problem.

If you determine that your mainframe needs further servicing and your mainframe is not experiencing any of the symptoms presented in this chapter, refer to Chapter 4.

Note If you decide to perform the servicing yourself, prepare a static-safe work station before you begin any servicing procedures. (Refer to "Preparing a Static-Safe Work Station" in Chapter 4.)

If you do not wish to perform the servicing yourself, return your mainframe to a Hewlett-Packard service center. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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If Your Mainframe Is Powered On But Not Responding Correctly

Note

If the input voltage is 230 Vac, but the voltage selector switch is set for 115 Vac, the input fuse is intentionally blown at turn-on to protect the mainframe. (Refer to Figure 4-3.)

Use a known good line-cord and verify that the input line voltage is within limits and that the mainframe voltage selector switch setting agrees with the input line voltage.

After troubleshooting the mainframe, always set the voltage selector switch to match the users input line voltage. An incorrect voltage selector switch setting will result either in too high an input voltage (blowing the ac line fuse) or too low an input voltage (turns the Volt/Temp light on).

To solve this problem:

- ☐ Check the ac line fuse. (Refer to Figure 4-2.) If the fuse is blown (open), replace it. Then, correctly set the voltage selector switch and turn the mainframe on.

  If the mainframe starts working (fans turning, the green front-panel line fault indicator light is lit, and all other fault indicator lights are off), the problem has been fixed. If not, refer to "State 1. No Observed Power. All Front-Panel Fault Indicator Lights are Off." in Chapter 4.

- ☐ If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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If More Than One Module's Error Indicator Is Flashing

If two or more modules are set at the same address, proper communication is not possible.

At power-on, each master module reads its slave address area. If two or more modules are at the same HP-MSIB address, the master module is unable to complete its power-on sequence correctly; this causes error indicators to flash.

To solve this problem:

- ☐ Check the HP-MSIB address map.
  1. Press (DISPLAY).
  2. Press (ADDRESS MAP).
  3. Use the RPG knob to change columns.

     If the address map is locked up (for example, the high-lighted rectangle stays at column 0), two modules may be set to the the same address.

     a. Turn the mainframe power off.

     b. Remove a slave module from the mainframe (one at a time).

     c. Turn the mainframe power on.

     d. Check the address map.

     - If the address map is unlocked, check the address of the module you removed against what its recommended address should be. Also, compare the module you removed with the module in the address map for duplicate addresses. For information about recommended addresses, refer to the *HP 70000 Modular Spectrum Analyzer Installation and Verification Manual.*
     - If the address map is still locked up, continue removing modules and repeating this process until you have found the problem.
- ☐ If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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4

Troubleshooting Your Mainframe

This chapter contains information about troubleshooting your mainframe. It presents information on preparing a static-safe work station and then it presents a set of troubleshooting procedures that can be used to optimize repair time.

A listing of adjustments and verification tests that must be performed, as well as the recommended test equipment that should be used when assemblies are changed, repaired, or adjusted are presented at the end of this chapter.

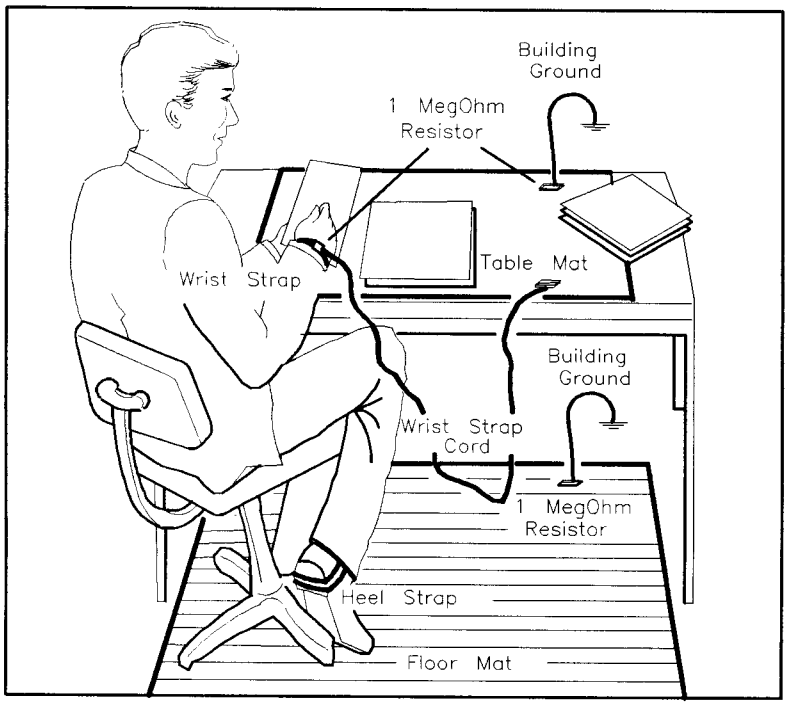
Preparing a Static-Safe Work Station

Electrostatic discharge (ESD) can damage or destroy electronic components. Therefore, all work performed on assemblies consisting of electronic components should be done at a static-safe work station.

Figure 4-1 shows an example of a static-safe work station. Two types of ESD protection are shown:

- a conductive table mat and wrist strap combination
- a conductive floor mat and heel strap combination

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ESDPARTS

Figure 4-1. Static-Safe Work Station

These two types of ESD protection must be used together. Refer to Table 4-1 for a list of static-safe accessories and their HP part numbers.

CAUTION

- Do not touch the edge-connector contacts or trace surfaces with bare hands. Always handle board assemblies by the edges.
- Do not use erasers to clean the edge-connector contacts. Erasers generate static electricity and degrade the electrical quality of the contacts by removing the thin gold plating.
- Do not use paper of any kind to clean the edge-connector contacts. Paper or lint particles left on the contact surface can cause intermittent electrical connections.

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Reducing ESD Damage

To help reduce the amount of ESD damage that occurs during testing and servicing use the following guidelines:

- Be sure that all instruments are properly earth-grounded to prevent buildup of static charge.
- Personnel should be grounded with a resistor-isolated wrist strap before touching the center pin of any connector and before removing any assembly from a piece of equipment.

  Use a resistor-isolated wrist strap that is connected to the HP 70000 Series modular spectrum analyzer system mainframe's chassis. If you do not have a resistor-isolated wrist strap, touch the chassis frequently to equalize any static charge.
- Before connecting any coaxial cable to an instrument connector for the first time each day, *momentarily* short the center and outer conductors of the cable together.
- Handle all PC board assemblies and electronic components only at static-safe work stations
- Store or transport PC board assemblies and electronic components in static-shielding containers
- PC board assembly edge-connector contacts may be cleaned by using a lintfree cloth with a solution of 80% electronics-grade isopropyl alcohol and 20% deionized water. This procedure should be performed at a static-safe work station.

Static-Safe ESD Accessories

Table 4-1. Static-Safe ESD Accessories

HP Part Number	Description
9300-0797	Set includes: 3M static control mat 0.6 m × 1.2 m (2 ft × 4 ft) and 4.6 cm (15 ft) ground wire. (The wrist-strap and wrist-strap cord are not included. They must be ordered separately.)
9300-0980	Wrist-strap cord 1.5 m (5 ft)
9300-1383	Wrist-strap, color black, stainless steel, without cord, has four adjustable links and a 7 mm post-type connection.
9300-1169	ESD heel-strap (reusable 6 to 12 months).
Order the following by calling HP DIRECT at (800) 538-8787 or through any Hewlett-Packard Sales and Service Office.	

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If the Diagnostic Table Fault Indicators are Used

Start by observing the diagnostic table fault indicators.

- If the mainframe front-panel indicators are normal, but a module is not receiving power, continue to "State 5. All Fault Indicators are OK but Some or All Modules Have No Power".
- If you have HP-MSIB problems continue to "State 6. HP-MSIB Troubleshooting".
- If you have HP-IB problems, continue to "State 7. HP-IB Troubleshooting".
- For other front-panel indications, go to the appropriate section shown in the diagnostic table.
- If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

Table 4-2. Diagnostic Table

	Green Line "ON"	Red Volt/Temp	Red Current	Red I/O
Normal Operation	ON	OFF	OFF	OFF
State 1	OFF	OFF	OFF	OFF
State 2	ON	ON	OFF	OFF
State 3	ON	OFF	ON	OFF
State 4	ON	OFF	OFF	ON

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State 1. No Observed Power. All Front-Panel Fault Indicator Lights are Off.

Note

If the input voltage is 230 Vac, but the voltage selector switch is set for 115 Vac, the input fuse is intentionally blown at turn-on to protect the mainframe. (Refer to Figure 4-3.)

Use a known good line-cord, verify that the input line voltage is within limits, and verif that the mainframe voltage selector switch setting agrees with the input line voltage.

After troubleshooting the mainframe, always set the voltage selector switch to match the users input line voltage. An incorrect voltage selector switch setting will result either in too high an input voltage (blowing the ac line fuse) or too low an input voltage. This causes the red volt/temp fault indicator light (A1DS6) to turn on.

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To solve this problem:

1. Check the ac line fuse. If the fuse is blown (open), replace it. Then, correctly set the voltage selector switch and turn the mainframe on. (Refer to Figure 4-2.)
   a. *If the mainframe starts working* (fans turning, the green front-panel line fault indicator light is lit, and all other fault indicator lights are off), the problem has been fixed. If not, continue at Step b.
   b. *If all the mainframe fault indicator lights are still off* (after checking or replacing the ac line fuse), then turn off the mainframe. Set the voltage selector switch to 115 Vac. Remove the bottom cover, which includes the A1 power supply. (Refer to "Bottom Cover" in Chapter 9.)

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State 1. No Observed Power. All Front-Panel Fault Indicator Lights are Off.

c. Connect the Line-Isolated Variable Mains Transformer (VARIAC) output into the mainframe's input. Turn the VARIAC on and adjust the VARIAC's output to ≈115 Vac.

2. Observe the A1DS1 neon indicator light. (Refer to Figure 4-4 and Figure 4-5.)
   - If A1DS1 is off, then unplug the ac line cord and check the ac line fuse. (Refer to Figure 4-2.) If the fuse is blown (open), continue at Step a. If the fuse is OK, continue at Step b.
   - If A1DS1 is on, with all other fault indicator lights off, observe the green A1DS2 bias supply LED. If A1DS2 is off, then continue at Step c. If A1DS2 is on, then continue at Step d.

   a. If the ac line fuse is blown (open), then something is shorting the ac input voltage. First, check the ac input cable plugged into A1J1. If it is offset by one pin (on either side), the input will be shorted to ground and the ac line fuse will blow; replace the fuse. Continue at Step e. If the connector is correctly plugged into A1J1, then check the spiral gasketing under the A1 power supply. It must be seated *in the channel* on the bottom cover.
      i. If the spiral gasketing under the A1 power supply is in place, replace the A1 power supply. Continue at Step e.
      ii. If the spiral gasketing under the A1 power supply is out of the channel (shorting the A1 power supply), then reseat the gasket. Replace the ac line fuse and plug in the line cord. If the power supply indicator lights are now normal (with the fans running), continue at Step e. But, if the power supply indicator lights are not normal, replace the A1 power supply. Continue at Step e.

   b. If the ac line fuse is OK (not blown), but A1DS1 is off, replace the A1 power supply and continue at Step e.

   c. If the green A1DS2 bias supply LED is off, then turn Line-Isolated Variable Mains Transformer (VARIAC) off. *Wait one minute after A1DS1 goes out.* Remove and check the A1F2 bias fuse. (Refer to Figure 4-4 and Figure 4-5.)
      - If the A1F2 fuse is blown (open), then replace the fuse. Turn the VARIAC on. If the power supply indicator lights are now normal (with the fans running), continue at Step e. But, if the power supply is not operating normally, turn the VARIAC off. *Wait one minute after A1DS1 goes out*, replace the A1 power supply, then continue at Step e.
      - If the A1F2 fuse is OK, replace the A1 power supply and continue at Step e.

   d. *If the green A1DS2 bias supply LED is on*, but all the other fault indicator lights are off, turn the VARIAC off and *wait one minute after A1DS1 goes out.* Replace the A1 power supply.

   e. *If the mainframe starts working* (fans turning, the green front-panel line fault indicator light is lit, and all other fault indicator lights are off), the problem has been fixed. Reassemble the mainframe.

3. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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State 1. No Observed Power. All Front-Panel Fault Indicator Lights are Off.

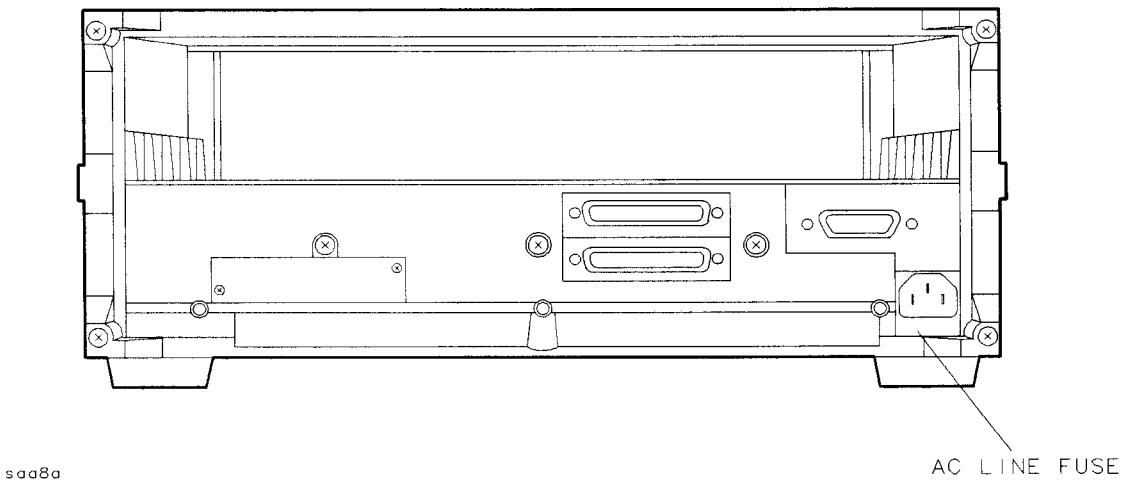


Figure 4-2. AC Line Fuse

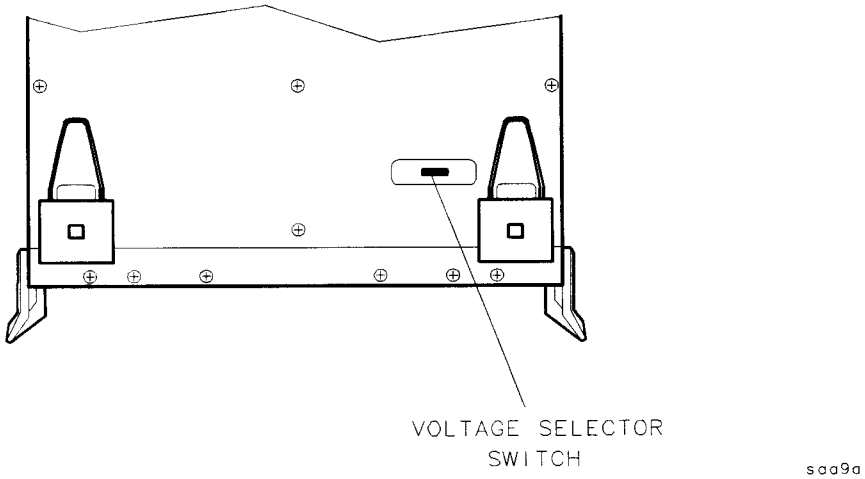


Figure 4-3. Voltage Selector Switch

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State 1. No Observed Power. All Front-Panel Fault Indicator Lights are Off.

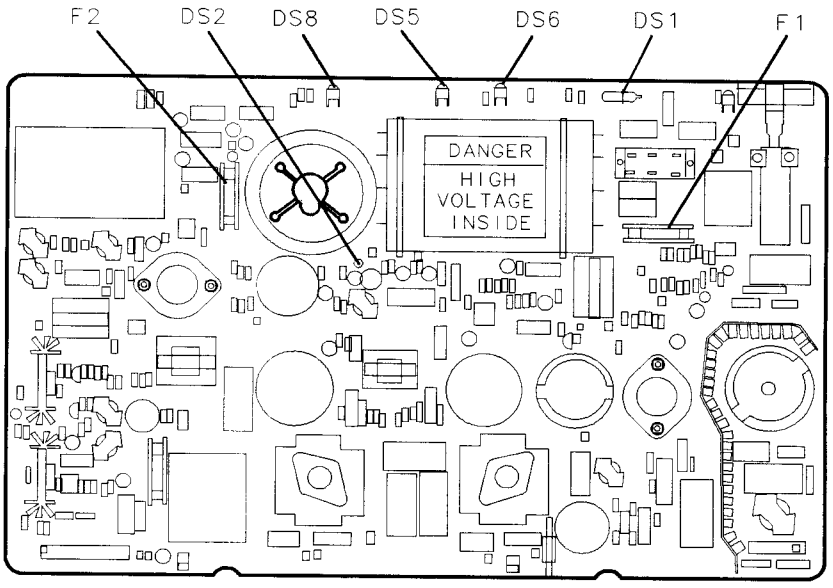


Figure 4-4. A1 Power Supply for Serial #3327A and Below

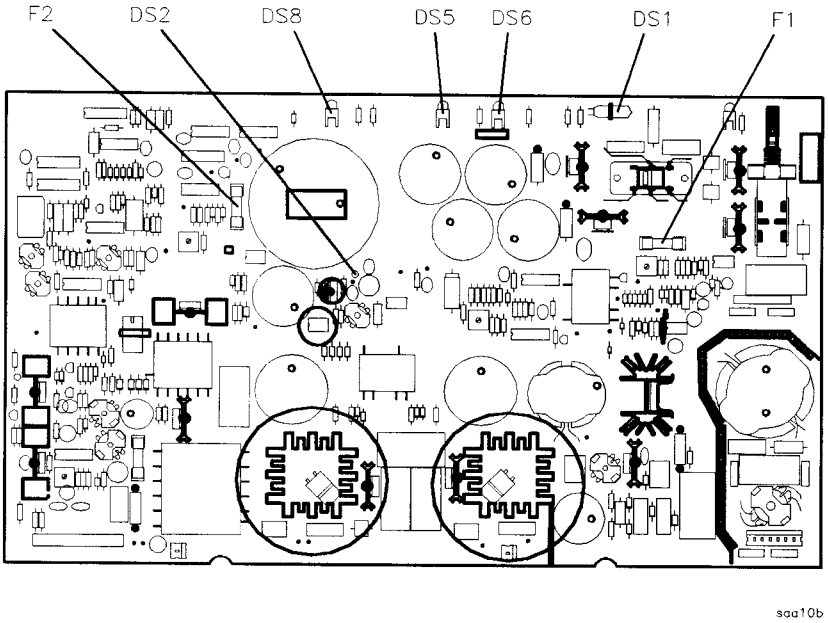


Figure 4-5. A1 Power Supply for Serial #3330A and Above

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State 2. The Red Volt/Temp Fault Indicator Light (A1DS6) is On

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To solve this problem:

1. The red volt/temp fault indicator light (A1DS6) indicates that a fault has occurred and the A1 power supply has turned off its output to protect both itself and any modules resident in the HP 70001A mainframe. Four conditions can cause the red volt/temp fault indicator light (A1DS6) to turn on.
   - If the ambient temperature surrounding the mainframe exceeds 55°C, the mainframe will protect itself and the modules from overheating by shutting down. *This is not a failure.* Move the mainframe into a cooler environment and wait at least 10 minutes (so the mainframe's internal temperature can cool down) before turning the mainframe back on. The mainframe should now operate correctly. If the red volt/temp fault indicator light (A1DS6) is still on, continue at Step 2.
   - Low ac input voltage to the mainframe. Check the voltage selector switch setting on the bottom cover. (Refer to Figure 4-3.) The switch setting must be either 115 Vac for a 90 to 132 Vac input or 230 Vac for a 198 to 264 Vac input. If the line voltage does not meet specification, then the mainframe is probably OK. Connect the mainframe to a good line voltage source and verify its operation. If the voltage selector switch setting is incorrect, then change the setting. The mainframe should now operate correctly. If the red volt/temp fault indicator light (A1DS6) is still on, continue at Step 2.
   - The A1 power supply output voltage to the fans is protected by the A1F3 Fan I/O fuse. (Refer to Figure 4-6.) If A1F3 is blown (open), the red volt/temp fault indicator light (A1DS6) will light to warn the user that the modules are no longer being cooled by the fans. Continue at Step 2.
   - If the mainframe's 40 kHz output exceeds its maximum voltage specification by 30%, the mainframe will shut down. Continue at Step 2.

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State 2. The Red Volt/Temp Fault Indicator Light (A1DS6) is On

2. Remove the bottom cover, which includes the A1 power supply. With the VARIAC turned off, connect the VARIAC's isolated into the mainframes's input. Verify the mainframe's voltage selector switch setting (115 Vac). Remove and check the A1F3 fan fuse. If the A1F3 fuse is OK, continue at Step b. If it is open, replace it. Turn the VARIAC on and adjust its output to ≈115 Vac. If replacing the A1F3 fuse fixes the mainframe (indicators in the normal state) then reassemble the mainframe.
   a. If the A1F3 fan fuse is blown (open) again, then one of the two fans may be shorting this output. Turn the VARIAC off. *Wait one minute after A1DS1 goes out*, then disconnect the fan connectors from A1J3 and A1J4 on the A1 power supply. Replace A1F3 and turn the VARIAC on. If the red volt/temp fault indicator light (A1DS6) turns on, turn the VARIAC off, *wait one minute after A1DS1 goes out*, then replace the A1 power supply and reassemble the mainframe. If the red volt/temp fault indicator light (A1DS6) stays off, turn the VARIAC off. Reconnect the first fan to the A1J3 connector and turn the VARIAC on. Turn the VARIAC off, *wait one minute after A1DS1 goes out*, unplug the fan from A1J3 and plug the other fan into A1J4. Turn the VARIAC on. Replace the fan that causes the red volt/temp fault indicator light (A1DS6) to turn on. Also, replace the A1F3 fuse again. All the front-panel indicators should be in their normal state (with the fans running). If no other errors are present, reassemble the mainframe.
   b. If the A1F3 fan fuse is not damaged, reinsert A1F3, then turn the VARIAC on. If the red volt/temp fault indicator light (A1DS6) is still on, turn the VARIAC off. *Wait one minute after A1DS1 goes out*, then remove the A1F1 service fuse. Connect the oscilloscope probe from the PW test point to the COM test point. (Refer to Figure 4-8.) Set the scope to 2 μs/Div and 1 Volt/Div. Turn the VARIAC on (≈115 Vac). Observe the waveform at the PW test point. The signal should be narrow pulses about 12.5 μs apart (approximately six divisions), and about 5 volts in amplitude.
   c. *If the PW pulses look bad*, turn the VARIAC off, *wait one minute after A1DS1 goes out*, then replace the A1 power supply.
   d. Reinstall the A1F1 service fuse and turn the VARIAC on. If A1DS6 still lights, turn the VARIAC off, then replace the A1 power supply The mainframe should now be fixed, with the mainframe's indicator lights in the normal state. Reassemble the mainframe.
   e. *If the PW pulses look good*, replace the A1 power supply. The mainframe should now be fixed, with the mainframe's indicator lights in the normal state. Reassemble the mainframe.
3. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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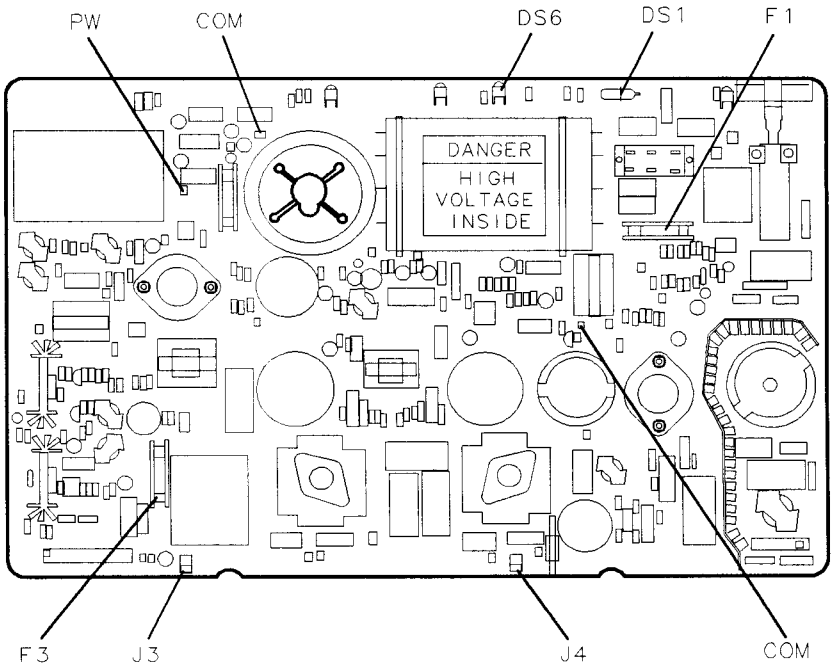


Figure 4-6. Red Volt/Temp Fault Indicator Light (A1DS6) for Serial #3327A and Below

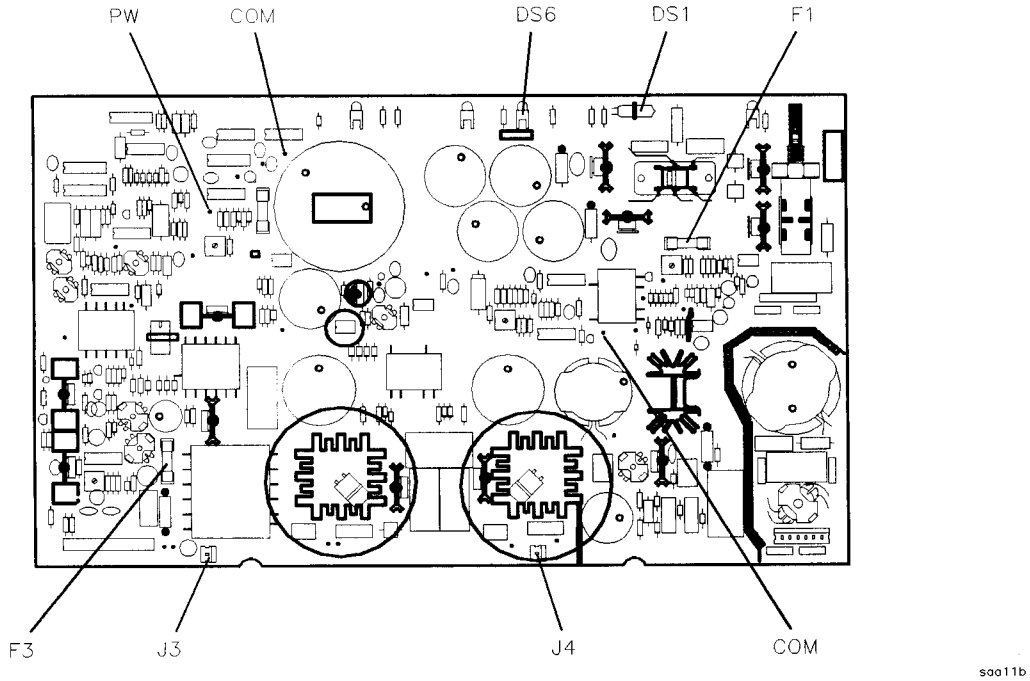


Figure 4-7. Red Volt/Temp Fault Indicator Light (A1DS6) for Serial #3330A and Above

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State 2. The Red Volt/Temp Fault Indicator Light (A1DS6) is On

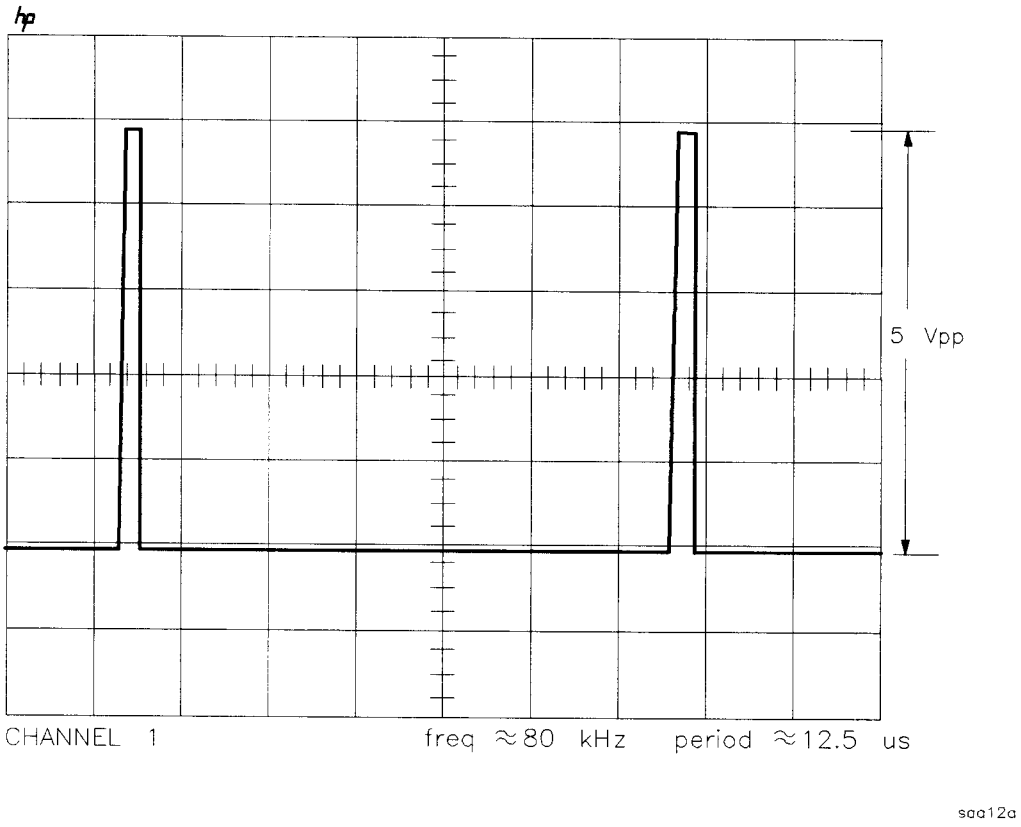


Figure 4-8. PW Test Point Waveform

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State 3. The Red Current Fault Indicator Light (A1DS5) is On

The HP 70001A mainframe's 40 kHz output is current limiting (overloaded), causing the A1 power supply to shut down to prevent damage to itself.

Note HP 70001A mainframes with a serial number 2704A01341 and before may have rear grounding spring fingers shorting to the 50-pin HP-MSIB connectors. The HP-MSIB connectors are located at the inside-rear of the module slots in the mainframe. Inspect each 50-pin connector for shorts to each grounding spring. If a short exists, replace the ground springs with the new version of the spring, which does not exhibit the problem.

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To solve this problem:

1. First, turn the mainframe off and remove all the modules. Turn the mainframe on and verify operation. If the red current fault indicator light (A1DS5) is still on, continue at Step 2. If the red current fault indicator light (A1DS5) is no longer on, turn off the mainframe and reinstall each module one at a time (cycling power after installing each module) to locate the faulty module. Remove the first module and install the second, and so on. If, after replacing each module, the red current fault indicator light (A1DS5) is off, check either "Current Limit Adjustment for Serial "#3327A and Below" in Chapter 6 or "Current Limit Adjustment for Serial "#3330A and Above" in Chapter 6.
2. Remove the bottom cover, which includes the A1 power supply.
3. Disconnect the A1W2 flex-cable from the A1J2 connector. (Refer to Figure 4-9.) Disconnect the two fan cables from A1J3 and A1J4. Verify that the mainframe's voltage selector switch is set to 115 Vac. (Refer to Figure 4-3.) Connect the Line-Isolated Variable Mains Transformer (VARIAC) output into the mainframe's input. Turn the VARIAC on and adjust the VARIAC's output to ≈115 Vac.

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State 3. The Red Current Fault Indicator Light (A1DS5) is On

a. If the red current fault indicator light (A1DS5) is still on, turn the VARIAC off, and *wait one minute after A1DS1 goes out.* Check the spiral gasketing under the A1 power supply, making sure it is not shorting out the A1 power supply. If the spiral gasketing is not properly seated, then reseat gasket into its channel on the bottom cover (beneath the A1 power supply). Turn the VARIAC on. If A1DS5 current light is still on, replace the A1 power supply. The power supply should be operating normally (fans turning). Reassemble the mainframe.

b. If the red current fault indicator light (A1DS5) is off and the power supply begins operating (both green A1DS3 and DS7 lights on), then a short probably exists on one or more of the following: the A1W2 flex-cable, the A2 interconnect, the A4 HP-MSIB, or one of the two fan assemblies (B1 or B2). Turn the VARIAC off.

Note When the faulty assembly has been identified (A1DS5 current light is on) and replaced, check the operation of the A1 power supply. If the A1 power supply operates normally (fans turning), reassemble the mainframe.

---

c. Connect the A1W2 flex-cable into the A1J2 connector. If the red current fault indicator light (A1DS5) comes on when the power is cycled, replace the A1W2 flex-cable assembly. Turn the VARIAC off and reconnect the fan assemblies, one at a time, cycling the power after connecting each fan. If A1DS5 lights after connecting either fan, replace the defective fan assembly. If A1DS5 stays off, turn the VARIAC off, then remove the A2 interconnect. Connect the A2 interconnect to the A1W2 flex-cable connector on the bottom cover assembly. Turn the VARIAC on. If A1DS5 lights, replace the A2 interconnect. If A1DS5 stays off, then turn the VARIAC off. Remove the A4 HP-MSIB and connect the board assembly into the A2 interconnect. Connect both the A4 HP-MSIB and A2 interconnect into the A1W2 flex-cable connector. Turn the VARIAC on. If A1DS5 lights, replace the A4 HP-MSIB. If A1DS5 stays off, then proceed to the next step.

d. If the red current fault indicator light (A1DS5) is still off after performing the procedure outlined in Step c, then the problem is likely a mechanical interference between a conductive point on one of the assemblies with the mainframe chassis. Also, check the RFI spiral-gasketing around the A4 HP-MSIB for shorting to the A2 interconnect or the A4 HP-MSIB assemblies. Check the A1W2 flex-cable for any visible damage (pinching) caused by the casting. The HP 70001A mainframe should now operate normally (fans turning) without the red current fault indicator light (A1DS5) lighting. Reassemble the HP 70001A mainframe.

4. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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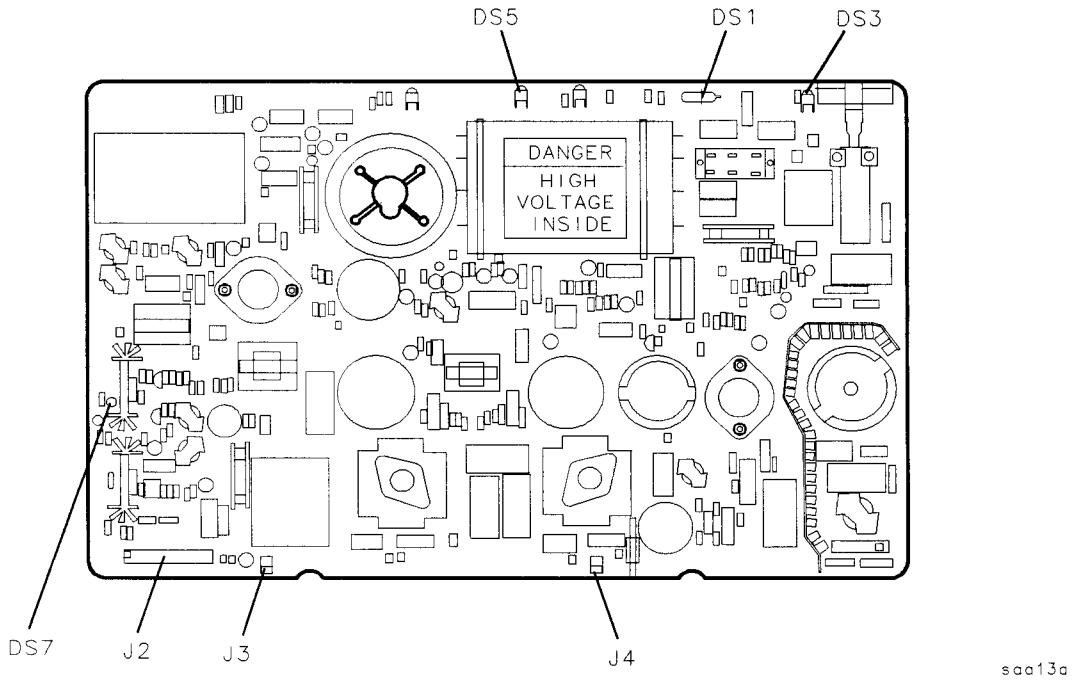


Figure 4-9. A1DS5 Current Fault Indicator Light for Serial #3327A and Below

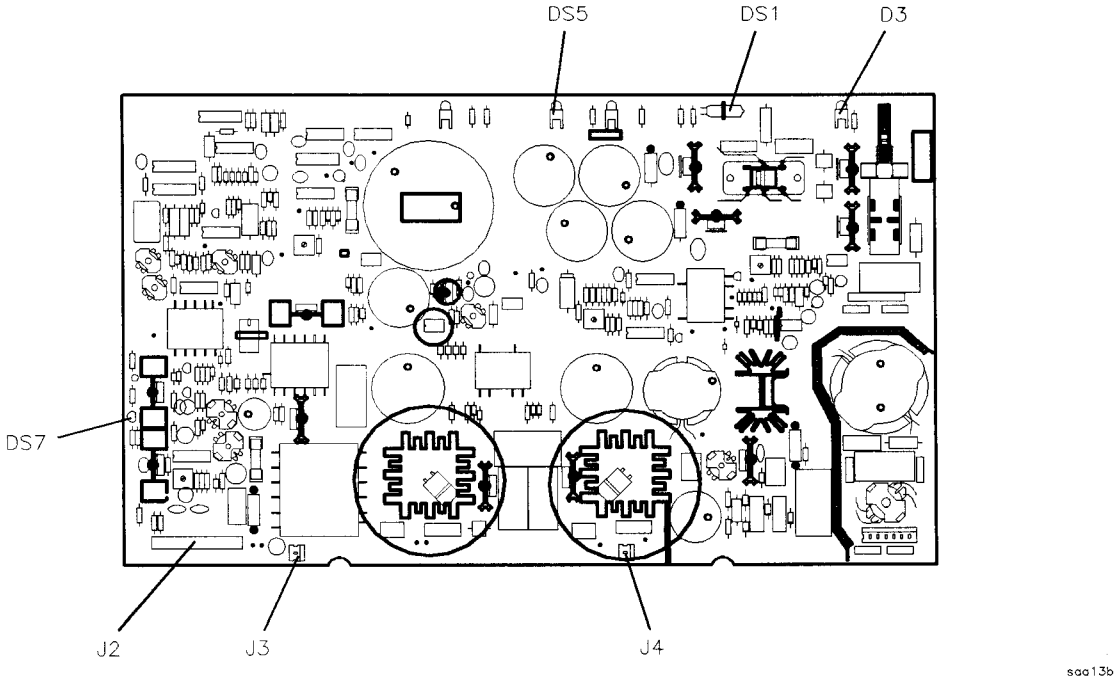


Figure 4-10. A1DS5 Current Fault Indicator Light for Serial #3330A and Above

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State 4. I/O Fault Indicator Light (A1DS8) is On

The I/O fault indicator light (A1DS8) indicates a problem on the HP-MSIB external loop or insufficiently low bias (+5 V) to the A4 HP-MSIB. The A4 HP-MSIB has a circuit that checks to see if the external cables are connected properly. This circuit also monitors the external HP-MSIB instruments to see if they are in RESET. Whenever an instrument connected to the HP-MSIB is turned off, all other instruments' I/O lights will turn on and all displays will be blanked. (Refer to Figure 4-11.)

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To solve this problem:

1. Check all the HP-MSIB cables in the system. If a cable is loose or disconnected, the I/O fault indicator light (A1DS8) will be on. Securely connect all cables and cycle power. The problem should now be fixed (the I/O fault indicator light is off). If one of the HP-MSIB instruments in the loop is off, the I/O fault indicator light will stay on. Turn on all the HP-MSIB instruments connected to that loop. The problem should now be fixed (the I/O fault indicator light should be off). If I/O fault indicator light comes on again , continue to the next step.
2. Remove the HP-MSIB cables from the mainframe. If the the I/O fault indicator light stays on, continue at Step 3. If the the I/O fault indicator light is now off, then take a known good HP-MSIB cable and connect it from the mainframe's HP-MSIB IN to HP-MSIB OUT connectors. If the I/O fault indicator light comes on again, replace the A4 HP-MSIB. The problem should now be fixed.
3. If the I/O fault indicator light is on, even when both HP-MSIB cables are removed, then the +5 V HP-MSIB supply on the A1 power supply may be too low. Remove the HP 70001A mainframe's rear-panel service cover. (Refer to Figure 4-12).
   a. Measure the voltage between A4J11 pin 49 to the mainframe's chassis. (Refer to Figure 4-12.) The voltage should measure between 4.99 and 5.22 Vdc.

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- If the voltage is within limits, but the I/O fault indicator light is still on, replace the A4 HP-MSIB. If this fixes the problem, then reassemble the HP 70001A mainframe. If the I/O fault indicator light is still on after replacing the A4 HP-MSIB, then continue at Step b.
- If the voltage is out of limits, continue at Step b.

b. Turn off the mainframe, remove the power cord and wait one minute or more after A1DS1 goes out and remove the bottom cover (which includes the A1 power supply).

c. Connect the mainframe to the Line-Isolated Variable Mains Transformer (VARIAC) isolated output. Set the mainframe's voltage selector switch to 115 Vac. Turn the VARIAC on and adjust the VARIAC's output to ≈115 Vac.
   - If the I/O fault indicator light stays off, continue at Step d.
   - If the I/O fault indicator light is still on (even though the A2 interconnect and A4 HP-MSIB are no longer connected), then turn off the VARIAC. Wait one minute or more after A1DS1 goes out. Replace the A1 power supply. Turn the VARIAC on. If the I/O fault indicator light still turns on, then turn the VARIAC off. Replace the A1W2 flex-cable assembly. The I/O fault indicator light cannot now be on. Reassemble the mainframe.

d. Measure the voltage on the A1W2 flex-cable's output between sockets 9 and 10. (Refer to Figure 4-15.) The voltage should measure between 4.99 and 5.22 Vdc. Also measure between sockets 3 and 2. The voltage between sockets 3 and 2 should measure ≈0.300 Vdc higher than the voltage between sockets 9 and 10.
   - If the service connector's voltage is low, but the flex-cable's voltage is within limits, then replace the A2 interconnect.
   - If the voltage is high or low, then refer to the Adjustment Procedures chapter of this manual and adjust the +5 V output. The A1W2 flex-cable output voltages should then be within limits. Once the adjustment is completed and verified, reassemble the mainframe.

4. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

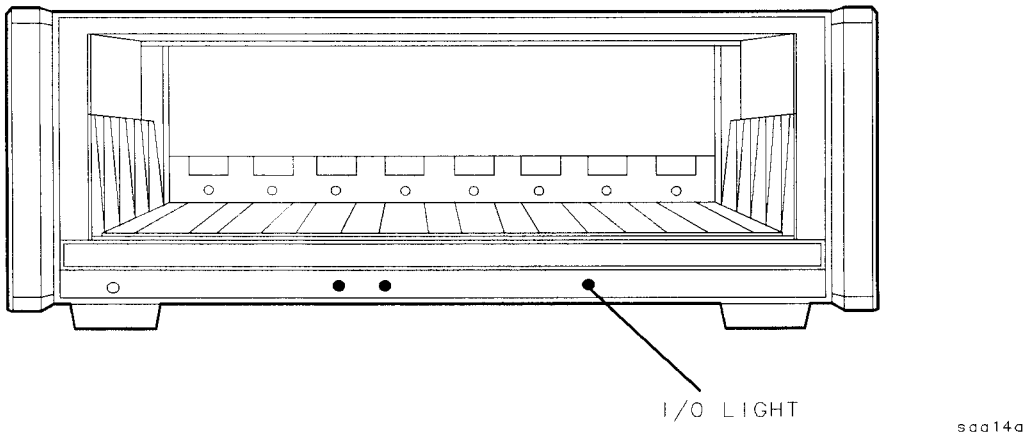
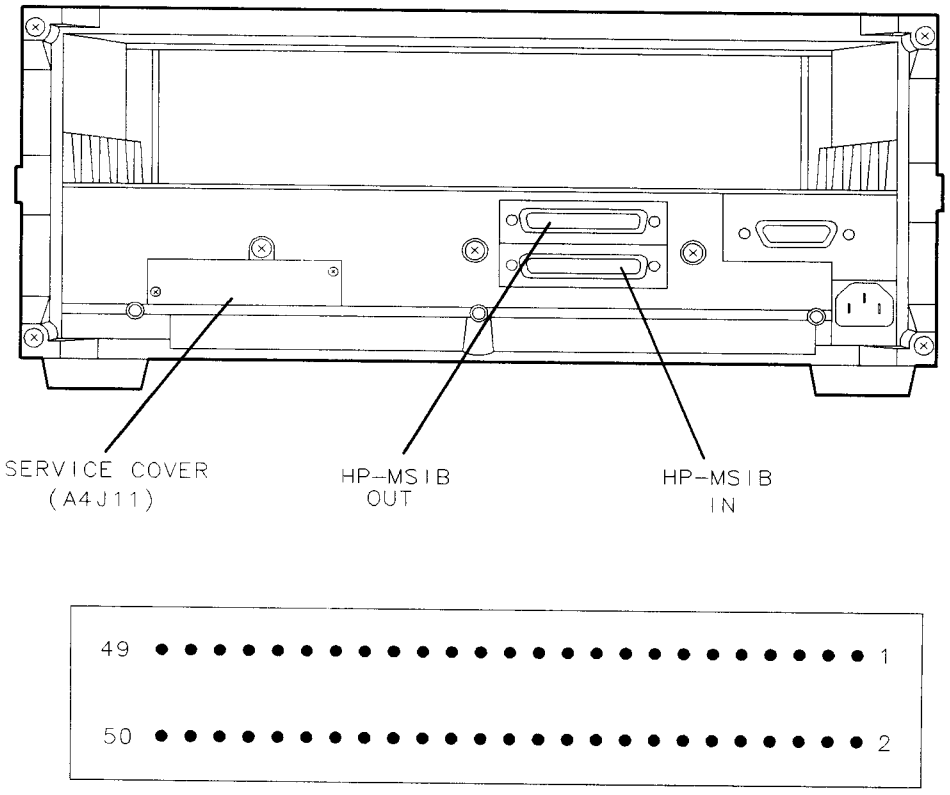


Figure 4-11. Front-Panel I/O Fault Indicator Light

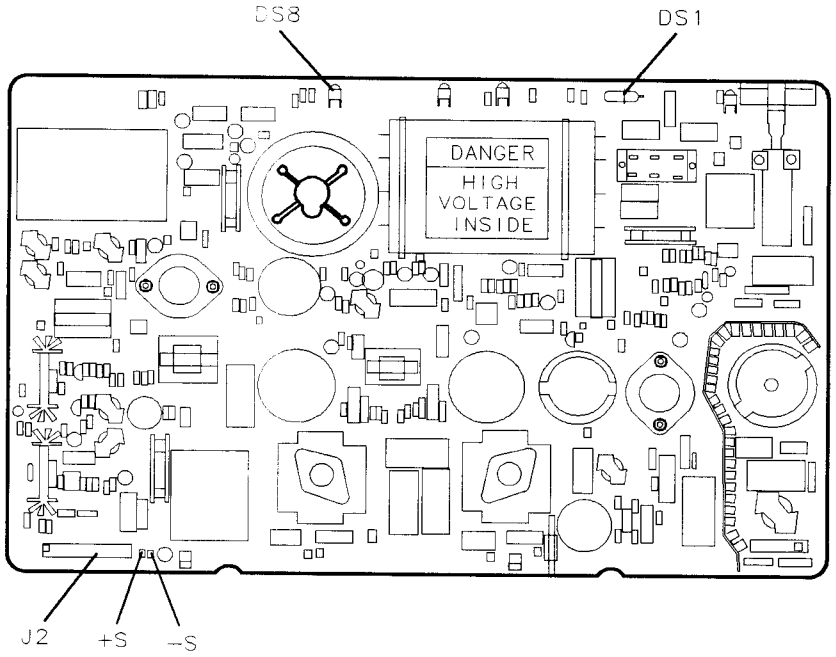
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State 4. I/O Fault Indicator Light (A1DS8) is On



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Figure 4-12. Rear-Panel Service Cover and Connector (A4J11)



saa16a

Figure 4-13. A1DS8 I/O Fault Indicator Light for Serial #3327A and Below

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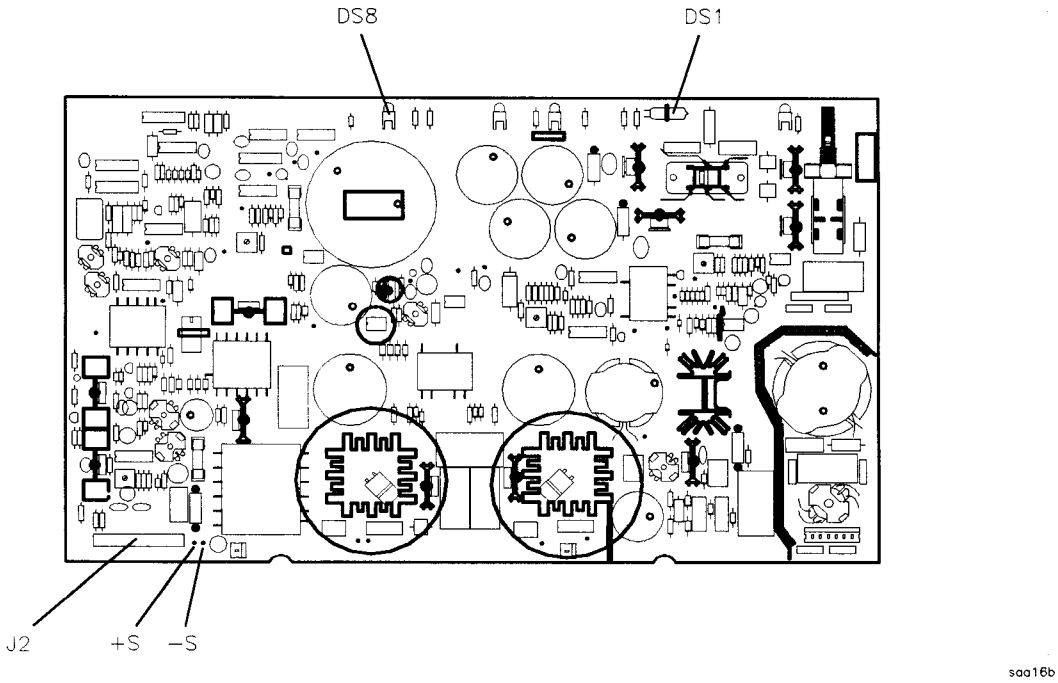


Figure 4-14. A1DS8 I/O Fault Indicator Light for Serial #3330A and Above

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State 5. All Fault Indicators are OK but Some or All Modules Have No Power

The HP 70001A mainframe supplies the power requirements of the modules. The most obvious sign that the A1 power supply's 40 kHz output is working is the noise generated by the mainframe's two fans. If fan noise cannot be heard, then the modules in all likelihood are not receiving power. Continue at Step 1.

Also at power-up, all module front-panel LEDs turn-on, then off, indicating that the module has input power. If a module's LEDs do not flash on and then off, then the slot that contains the module may be bad (no 40 kHz power).

- If the HP 70001A mainframe fans are turning, but one of the modules is not receiving power, move that module to a different slot. If moving the module to a different slot solves the problem, replace the A2 interconnect. The HP 70001A mainframe should now work properly.
- If moving the module to another slot does not solve the problem, install a known good module in the slot. If the known good module receives power, then the first module requires repair. This is not a mainframe failure.
- If the mainframe fans are turning, but none of the module front-panel LEDs turn on, then either the A2 interconnect or the A1W2 flex-cable has failed. Continue at Step 1.

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To solve this problem:

1. Remove the bottom cover, which includes A1 power supply. Set the voltage selector switch on the bottom cover to 115 Vac. (Refer to Figure 4-3.) With the VARIAC turned off, connect the line cord from the A1 power supply to the VARIAC's isolated output.
   - If the mainframe's two fans were operating before removing the bottom cover, continue at Step 2.

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- Remove the A1F1 Service Fuse and check it. If the A1F1 Service Fuse is OK, reinsert the fuse and then continue at Step 2. (Refer to Figure 4-15.)
- If the A1F1 Service Fuse is open, replace the fuse. Turn the VARIAC on. If the A1 power supply does not function correctly and the fuse blows again, turn the VARIAC off and wait one minute after A1DS1 goes out. Check the spiral gasket under the A1 power supply for shorts. The gasket must be seated in the channel on the bottom cover. If the spiral gasket is out of its channel, then reseat the gasket. Replace the A1F1 Service Fuse (if open). If the power supply now operates normally (fans turning), reassemble the mainframe. If the gasketing is properly in place (but the A1F1 Service Fuse was blown), replace the A1 power supply. If the power supply is now operating normally (fans turning) with A1DS7 on, reassemble the mainframe.

2. Turn the VARIAC on and adjust the VARIAC's output to ≈115 Vac. Using a DVM, check the A1W2 flex-cable's 15-pin connector, between pins 8 and 14 for a reading of ≈27 Vac. (Refer to Figure 4-15.) If the mainframe current limit (A1DS5) is tripped, cycle power and remeasure the voltage.
   a. If the flex-cable voltage is present, then replace the A2 interconnect. Reassemble the mainframe.
   b. If the voltage at the A1W2 flex-cable's 15-pin socket is not present, next verify the A1 power supply's output voltage. First, check the voltage between A1F3 (either side) and the GND test point next to A1T12. It should measure ≈13.5 Vac.
      1. If the voltage is missing and A1F1 Service Fuse is OK, replace the A1 power supply.
      2. If the A1F3 to GND measurement is ≈13.5 Vac, then replace the A1W2 flex-cable. If the A1W2 flex-cable 15-pin socket still does not have a 27 Vac output, replace the A1 power supply (unless it has been replaced). Once the A1W2 flex-cable output voltage is within limits, reassemble the mainframe and verify that the modules have power (check for module front-panel LEDs at power-up).
3. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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State 5. All Fault Indicators are OK but Some or All Modules Have No Power

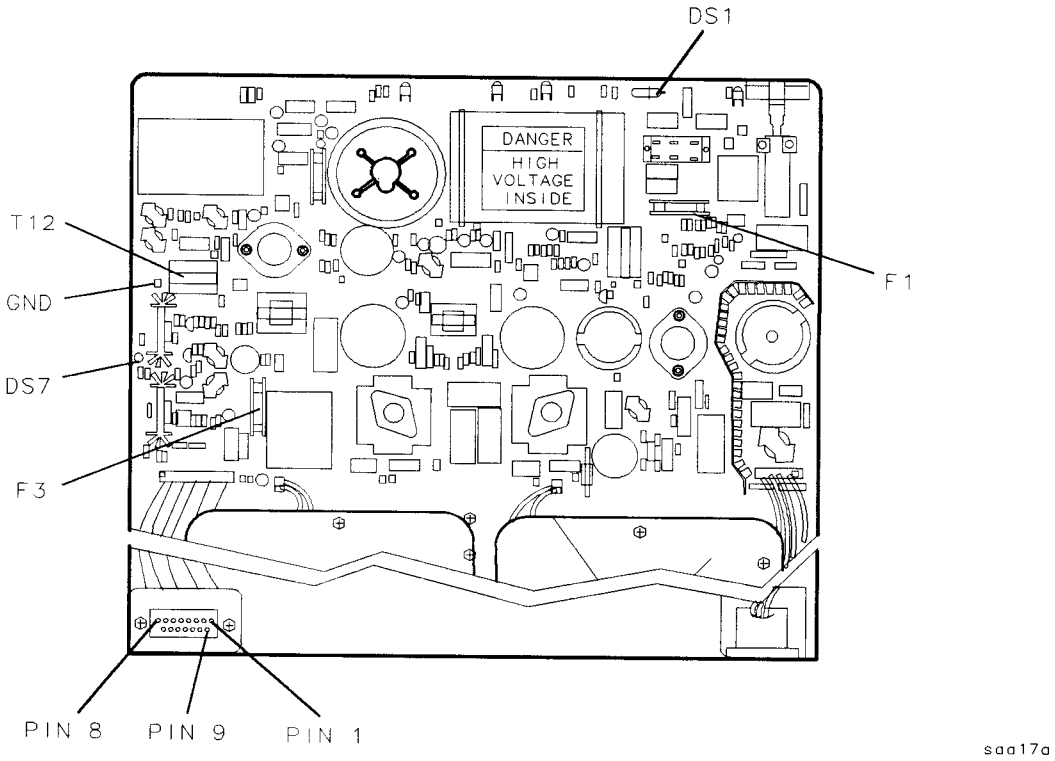


Figure 4-15. A1 Power Supply (A1J2)

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State 6. HP-MSIB Troubleshooting

The flashing E fault indicator light in the display status box performs a similar function as the flashing ERR fault indicator on HP 70000 Series modular measurement system modules. A flashing E or ERR indicates one of the following three problems:

Note The use of a good display or master module, and good HP-MSIB cables are required for HP-MSIB troubleshooting.

- An HP-MSIB backplane error has been detected at power-up which may prevent normal HP-MSIB communications (and normal error reporting). This problem must be repaired before any predictable system operation can occur.
- The A4 HP-MSIB is not receiving +5 bias voltage.
- The A4 HP-MSIB is defective.
- The fault indicator can also indicate a hardware failure in a module. You can use the display's REPORT ERRORS softkey to read the error message.

  The most probable cause for a flashing E or ERR in a new system occurs when two modules in the same system have the same HP-MSIB address (row and column). The display's address map will always lock-up under that condition. Turn off the mainframe, remove the modules and verify that all the modules in the system have different address switch settings.

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

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State 6. HP-MSIB Troubleshooting

To solve this problem:

1. If the flashing E or ERR fault indicator appears at power-up, turn off the mainframe. Remove all the modules and both HP-MSIB cables. Install the good display or master module and turn on the mainframe.
   a. If the flashing E or ERR is no longer present, the problem could still be on the mainframe's external HP-MSIB loop. The external HP-MSIB loop was disconnected when the HP-MSIB cables were removed. To verify whether the external HP-MSIB loop is the problem, connect a good HP-MSIB cable between the IN and OUT HP-MSIB connectors on the mainframe's rear panel. (Refer to Figure 4-16.) Cycle power. If the flashing E or ERR problem still exists, replace the A4 HP-MSIB. If after turning on the mainframe the flashing E or ERR does not reappear, then the problem is fixed.
   b. If the E or ERR fault indicator is still flashing, then turn the mainframe off and try the display or master module in another slot. Turn the mainframe on and check for the flashing E or ERR. If the fault indicator stops flashing, replace the A2 interconnect.
   c. If the E or ERR light is still flashing, then the +5 V HP-MSIB supply on the A1 power supply may be much too low. Remove the mainframe's rear-panel service cover and measure the voltage between A4J11 pin 49 and the mainframe chassis. (Refer to Figure 4-16.) The voltage should measure between 4.99 and 5.22 Vdc.
   d. If the voltage is within limits, but the E or ERR light is still flashing, replace the A4 HP-MSIB. If this fixes the problem, then reassemble the mainframe. If the problem persists, replace the A2 interconnect (unless it was replaced already). The mainframe should now be fixed.
   e. If the voltage is zero (0), turn off the mainframe, remove the power cord and wait one minute or more and remove the bottom cover, which includes the A1 power supply.
   f. Connect the mainframe to the Line-Isolated Variable Mains Transformer (VARIAC) isolated output. Set the mainframe's voltage selector switch to 115 Vac. Turn the VARIAC on and adjust the VARIAC's output to ≈115 Vac.
   g. Measure the voltage on the A1W2 flex-cable's output between sockets 9 and 10. (Refer to Figure 4-15.) The voltage should measure between 4.99 and 5.22 Vdc.
      - If the flex-cables voltages are within limits, then replace the A2 interconnect.
      - If the flex-cable voltage is ZERO (0), then check the voltage leaving the A1 power supply. Measure the +5 V output between test points (+S) and (−S). If the voltage between (+S) and (−S) is ZERO (0), then replace the A1 power supply. If the voltage between (+S) and (−S) is within limits, replace the A1W2 flex-cable. If the A1W2 flex-cable output is still out of limits, replace the A1 power supply (if the power supply has not already been replaced). The flex-cable voltage (between pins 9 and 10) should now be within limits. Reassemble the mainframe.
2. Some HP-MSIB problems do not show up as a flashing E or ERR. This step involves using the display's address map as a troubleshooting tool.
   a. First install a good display or master module in the mainframe. If an external display (an HP 70004A color display or HP 70206A system graphics display) is used, connect the display and mainframe together with good HP-MSIB cables.
   b. Next access the display's address map:
      1. Press (DSP) or (DISPLAY), `address map`.
   c. Rotate the RPG knob from column 0 to column 31 and back. Both the display's and master module's ID and HP-IB address should appear on the address map.
      1. If the address map freezes in one spot, then replace the mainframe's A4 HP-MSIB. If after replacing the A4 HP-MSIB the address map still locks up, replace the A2 interconnect.
      2. If an internal display was used and the address map has not locked up, turn off the mainframe and connect a good HP-MSIB cable between the mainframe's rear-panel HP-MSIB IN and OUT connectors. Check the display's address map and follow the directions in preceding step.

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3. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

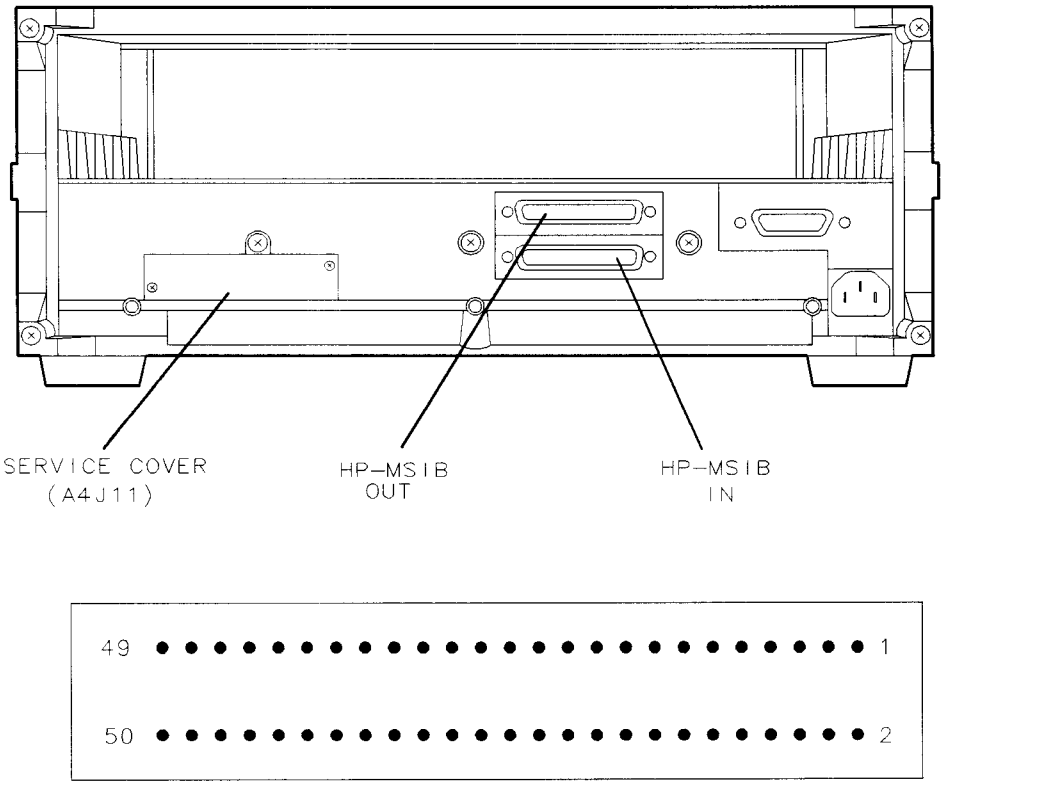


Figure 4-16. Rear-Panel Service Cover and Connector (A4J11)

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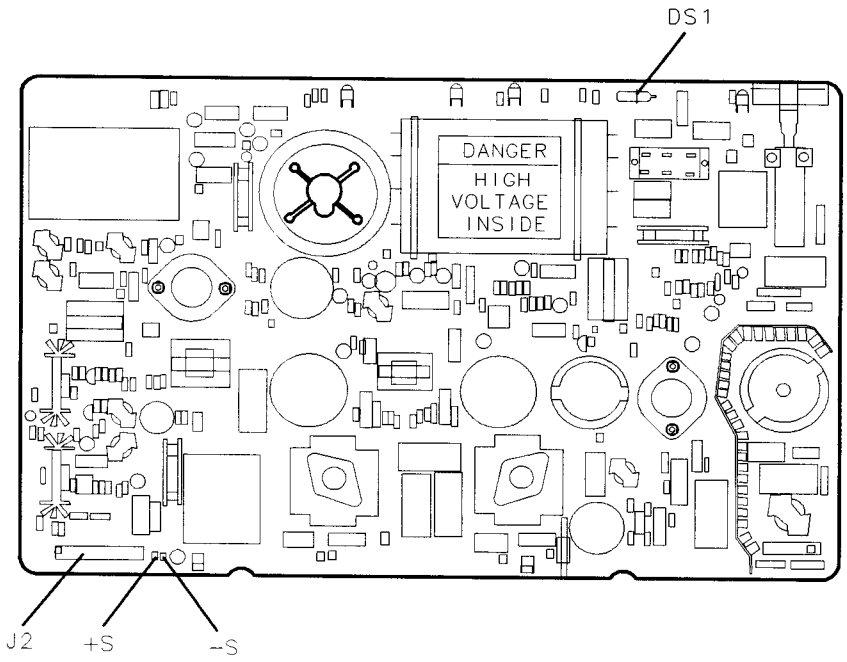


Figure 4-17. HP-MSIB Troubleshooting

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State 7. HP-IB Troubleshooting

The path for HP-IB signals from the HP-IB connector on the mainframe rear-panel to the modules consists of traces only (no cabling). The signals go from the HP-IB cable connector to the A3 HP-IB, then to the A2 interconnect, and finally to the module slots. All the module slots are connected in parallel on the A2 interconnect.

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

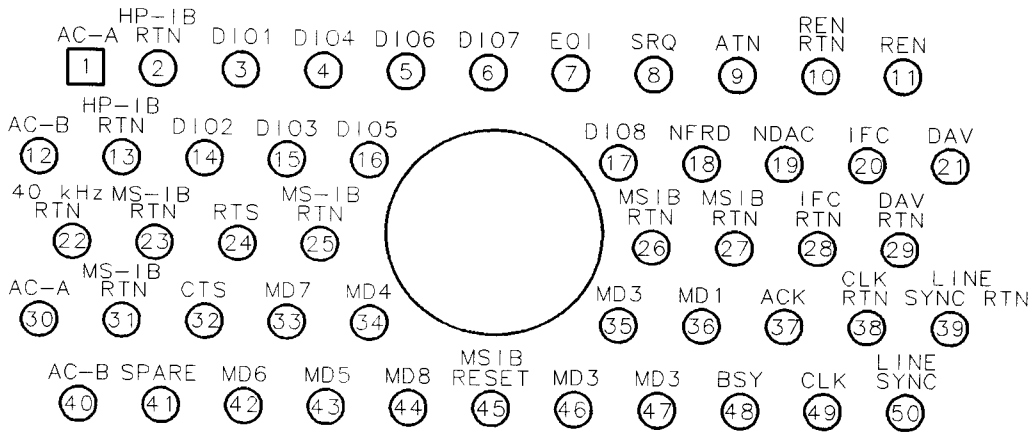
To solve this problem:

1. If a known good master module will not talk over HP-IB, first check that the HP-IB switch on the module is set correctly (it must be on). Next use a known good HP-IB cable. If the problem persists, place the module in another module slot in the same mainframe. If that solves the problem, replace the A2 interconnect.

Note For more information about module addressing, refer to the *HP 70000 Modular Spectrum Analyzer Installation and Verification Manual.*

2. If the problem persists, then remove the A3 HP-IB and check it for opens. If the board is bad, replace it. If that does not solve the problem, replace the A2 interconnect.
3. If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your Mainframe" in Chapter 1.)

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PIN	ASSIGNMENT
1	AC-A
2	HP-IB RTN (1)
3	DIO1
4	DIO4
5	DIO6
6	DIO7
7	EOI
8	SRQ
9	ATN
10	REN-RTN (1)
11	REN

PIN	ASSIGNMENT
12	AC-B
13	HP-IB RTN (1)
14	DIO2
15	DIO3
16	DIO5
17	DIO8
18	NRFD
19	NDAC
20	IFC
21	DAV

PIN	ASSIGNMENT
22	40 kHz RTN (3)
23	MSIB RTN (1)
24	RTS
25	HP-MSIB RTN
26	HP-MSIB RTN
27	HP-MSIB RTN (1)
28	IFC-RTN
29	DAV-RTN

PIN	ASSIGNMENT
30	AC-A
31	HP-MSIB RTN (1)
32	CTS
33	MD7
34	MD4
35	MD3
36	MD1
37	ACK
38	CLK RTN (1)
39	LINE SYNC RTN (2)

PIN	ASSIGNMENT
40	AC-B
41	SPARE
42	MD6
43	MD5
44	MD8
45	HP-MSIB RESET
46	MD2
47	MD0
48	BSY
49	CLK
50	LINE SYNC (4)

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Figure 4-18. Mainframe Module Connector

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5

Recommended Test Equipment Tables

Table 5-1. Recommended Test Equipment

Equipment	Recommended Model
Meters Digital multimeter	HP 3466A digital multimeter
HP 70000 Components Display	HP 70205A graphics display
Standard Equipment	HP 54501A general-purpose oscilloscope HP 10432A oscilloscope probe
Adjustment Tools	HP 8170-0033 fiber tuning tool
Specialized Test Equipment Line-Isolated Variable Mains Transformer (VARIAC)	Staco EJ401V
Cables HP 70800B 1.0 m HP-MSIB cable	

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6

Adjustment Procedures

This chapter contains the setups for all adjustment procedures that are used to optimize module performance when assemblies are changed, repaired, or adjusted. All of the setups described in this chapter are manual.

A procedure is considered an adjustment when the cover plate of a module must be removed to perform a repair or an adjustment. A procedure is also considered an adjustment when a module is replaced.

Conversely, a procedure is considered a test when checks are performed on a module and cover plates and modules are not removed from a system.

Note

Perform the "Power Supply Adjustments" for corrective servicing, not as routine maintenance.

Replacement A1 power supply assemblies are preadjusted at the factory and *do not* require any adjustment. Adjustments are necessary *only* if the power supply has been repaired or if the adjustments have been altered.

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Power Supply Adjustments

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

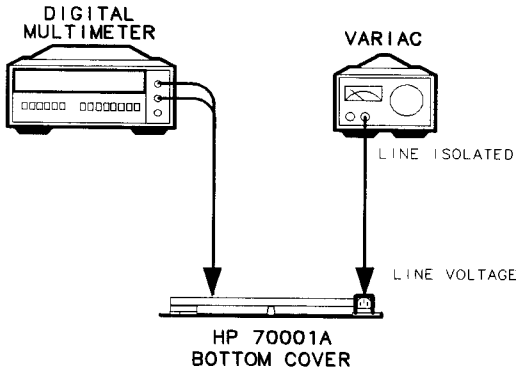


Figure 6-1. Power Supply Adjustments Setup

Test Equipment	**Preferred Model Numbers**
Fiber tuning tool	HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC)	Staco EJ401V
Digital voltmeter	HP 3466A digital multimeter

The purpose of the "Power Supply Adjustments" is to adjust the A1 power supply. Table 6-1 lists the adjustable components by reference designator, name, and adjustment description.

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Table 6-1. A1 Power Supply Adjustable Components

Reference Designator	Adjustment Name	Adjustment Description
A1R58	"Low-Line Fault Adjustment"	Adjusts the Low-Line sense circuit.
A1R210	"Current Limit Adjustment for Serial "#3327A and Below"	Adjusts the maximum current trip point.
	or "Current Limit Adjustment for Serial "#3330A and Above"	
A1R107	"Output Voltage Adjustment"	Adjusts the output feedback circuit.
A1R314	"+5 Volt Adjustment"	Adjusts the +5 Vdc output voltage.

The "Power Supply Adjustments" should be performed in the following order:

1. (A1R58) "Low-Line Fault Adjustment"
2. (A1R210) "Current Limit Adjustment for Serial "#3327A and Below" or "Current Limit Adjustment for Serial "#3330A and Above"
3. (A1R107) "Output Voltage Adjustment"
4. (A1R314) "+5 Volt Adjustment"

The first two adjustments are performed with the power supply service fuse (A1F1) removed. The existing setting for all the adjustments are checked before any adjustments are made.

1. Remove the bottom cover. *Do not detach the power supply from the mainframe bottom cover*. Refer to "Bottom Cover" in Chapter 9.

   The Staco EJ401V Line-Isolated VARIAC is intended to operate on a standard 115 Vac (50/60 Hz) line source. Do not plug the Line-Isolated VARIAC into a 230 Vac line voltage source.

2. Turn the LINE-ISOLATED VARIAC OFF. Adjust the VARIAC to 0 Vac (turn the voltage control knob completely counterclockwise (CCW)).

   Note that from this point on, the A1 power supply switch is in the ON state at all times. The only control of line power is via the line-isolated VARIAC.

3. Switch A1S2 line voltage selector (located under the bottom cover) to the 115 V position.

4. Connect the power cord from the power supply line module to the LINE-ISOLATED VARIAC *isolated* output.

5. The setup for the adjustments is now complete and should agree with Table 6-1.

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Low-Line Fault Adjustment

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

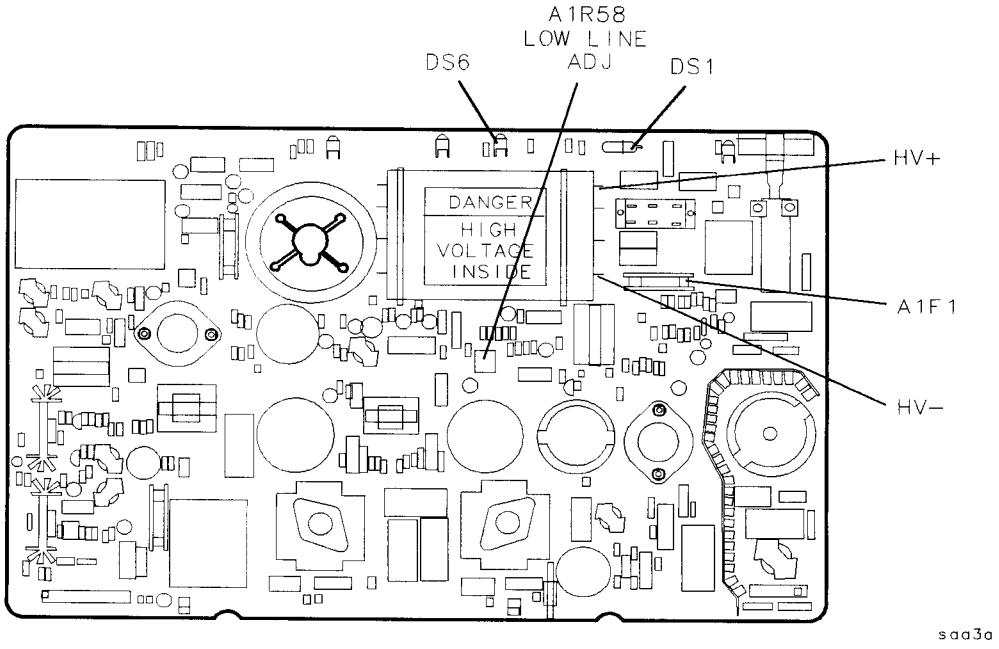


Figure 6-2. Low Line Adjustment

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Test Equipment	Preferred Model Numbers
Fiber tuning tool	HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC)	Staco EJ401V
Digital voltmeter	HP 3466A digital multimeter

The purpose of the "Low-Line Fault Adjustment" is to adjust the trip-point of the line voltage sense circuit for power supply start-up. When the range switch is set to 115 V, the trip point is equivalent to 86 Vac. When the range switch is set to 230 V, the trip point is equivalent to 172 Vac. These are the lower limits for operation of the supply.

1. First, verify that the LINE-ISOLATED VARIAC is *OFF*. Next, verify that the A1DS1 indicator light on the A1 power supply is *OFF* (wait one minute or more after A1DS1 stops glowing).

DANGER **A1DS1 *on* indicates that A1C209 and C210 are charged to unsafe levels.**

---

2. Remove the A1F1 service fuse from the A1 power supply.
3. Connect a set of insulated test leads and clips (600 V insulation) to the DVM. Connect the DVM positive lead to A1HV+ and the DVM negative lead to A1HV−. Set the DVM to measure >>325 Vdc.
4. Turn ON the LINE-ISOLATED VARIAC and slowly increase its output (turn the Voltage Control knob clockwise (CW)) until the DVM reads 234 Vdc (A1DS6 should still be ON). Increase the VARIAC's output voltage to read 244 Vdc on the DVM. A1DS6 should go out between 234 and 244 Vdc.
   - If the Volt/Temp fault indicator LED (A1DS6) goes out, A1R58 ("Low-Line Fault Adjustment") is set correctly. Go to the "Current Limit Adjustment for Serial "#3327A and Below".
   - If A1DS6 (Volt/Temp LED) is still on, go to Step 5.
5. Set the LINE-ISOLATED VARIAC to 0 Vdc (Voltage Control knob completely CCW). Turn the VARIAC OFF.
6. Turn the A1R58 ("Low-Line Fault Adjustment") completely CCW. Wait one minute, turn on the LINE-ISOLATED VARIAC, then slowly increase its output until the DVM indicates 238 Vdc ±2 Vdc. A1DS6 (Volt/Temp LED) will now be ON.
7. Slowly turn A1R58 ("Low-Line Fault Adjustment") CW until A1DS6 (Volt\Temp LED) goes out. The low line voltage turn-on point is now set. Turn-off the LINE-ISOLATED VARIAC and wait one minute. Go to Step 4 and verify that the setting is correct. If necessary repeat the adjustment until it passes.

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Current Limit Adjustment for Serial #3327A and Below

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

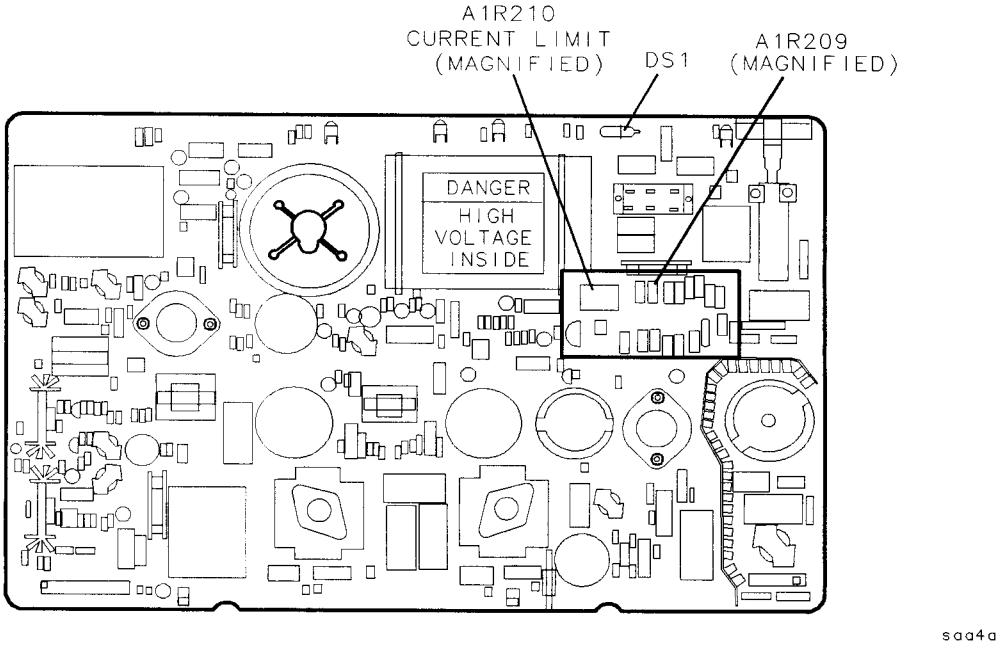


Figure 6-3. Current Limit Adjustment for Serial #3327A and Below

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Test Equipment	Preferred Model Numbers
Fiber tuning tool	HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC)	Staco EJ401V
Digital voltmeter	HP 3466A digital multimeter

The purpose of the "Current Limit Adjustment for Serial "#3327A and Below" is to set the current trip point for the mainframe's 40 kHz output. Module load currents exceeding the current trip point cause the 40 kHz output to shut down, preventing damage to the A1 power supply.

1. Increase the LINE-ISOLATED VARIAC output until the DVM reads 325 Vdc ±10 Vdc. Turn off the VARIAC and wait one minute or more after A1DS1 goes out.
2. Connect the DVM's leads across R209 (to measure the absolute voltage across R209).
3. Turn ON the LINE-ISOLATED VARIAC. The absolute voltage (either polarity is OK) across R209 must fall between 0.88 and 0.96 Vdc. If the voltage is within specified limits, the current limit trip point is adjusted correctly. Go to the "Output Voltage Adjustment". If the voltage is not within the specified limits, go to Step 4.
4. Turn A1R210 ("Current Limit Adjustment for Serial "#3327A and Below") CW or CCW until the absolute voltage across A1R209 is measures 0.92 Vdc ±0.02 Vdc. The current limit trip point is now set. Go to Step 3 to verify that the setting is correct. If necessary repeat the adjustment until it passes.

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Current Limit Adjustment for Serial #3330A and Above

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

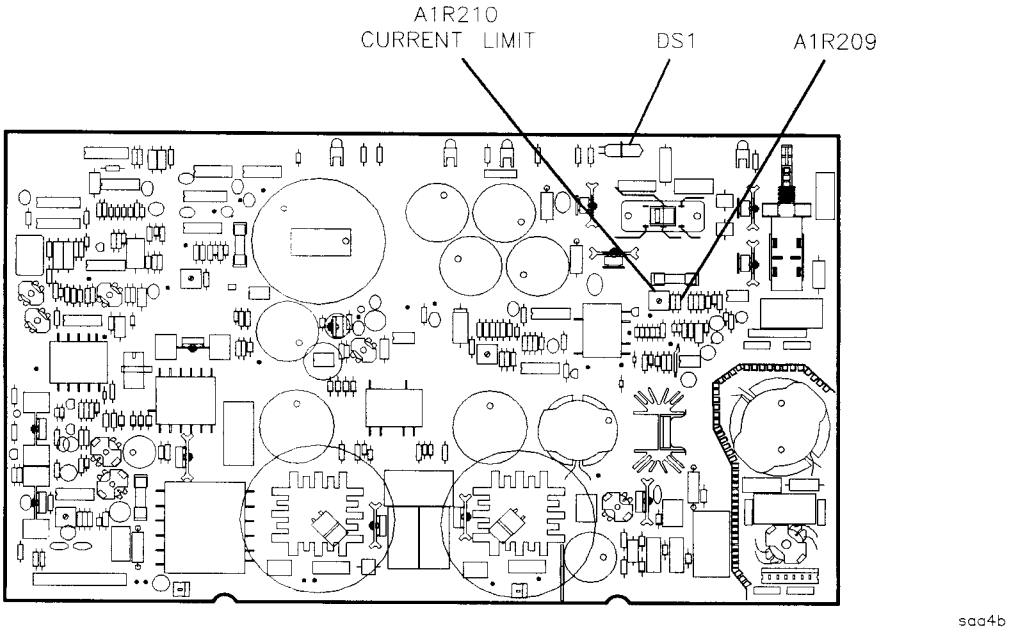


Figure 6-4. Current Limit Adjustment for Serial #3330A and Above

Test Equipment	Preferred Model Numbers

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Fiber tuning tool ..... HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC) ..... Staco EJ401V
Digital voltmeter ..... HP 3466A digital multimeter

The purpose of the "Current Limit Adjustment for Serial "#3330A and Above" is to set the current trip point for the mainframe's 40 kHz output. Module load currents exceeding the current trip point cause the 40 kHz output to shut down, preventing damage to the A1 power supply.

1. Increase the LINE-ISOLATED VARIAC output until the DVM reads 325 Vdc ±10 Vdc. Turn off the VARIAC and wait one minute or more after A1DS1 goes out.
2. Connect the DVM's leads across R209 (to measure the absolute voltage across R209).
3. Turn ON the LINE-ISOLATED VARIAC. The absolute voltage (either polarity is OK) across R209 must fall between 1.04 and 1.12 Vdc. If the voltage is within specified limits, the current limit trip point is adjusted correctly. Go to the "Output Voltage Adjustment". If the voltage is not within the specified limits, go to Step 4.
4. Turn A1R210 ("Current Limit Adjustment for Serial "#3330A and Above") CW or CCW until the absolute voltage across A1R209 is measures 1.08 Vdc ±0.02 Vdc. The current limit trip point is now set. Go to Step 3 to verify that the setting is correct. If necessary repeat the adjustment until it passes.

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Output Voltage Adjustment

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

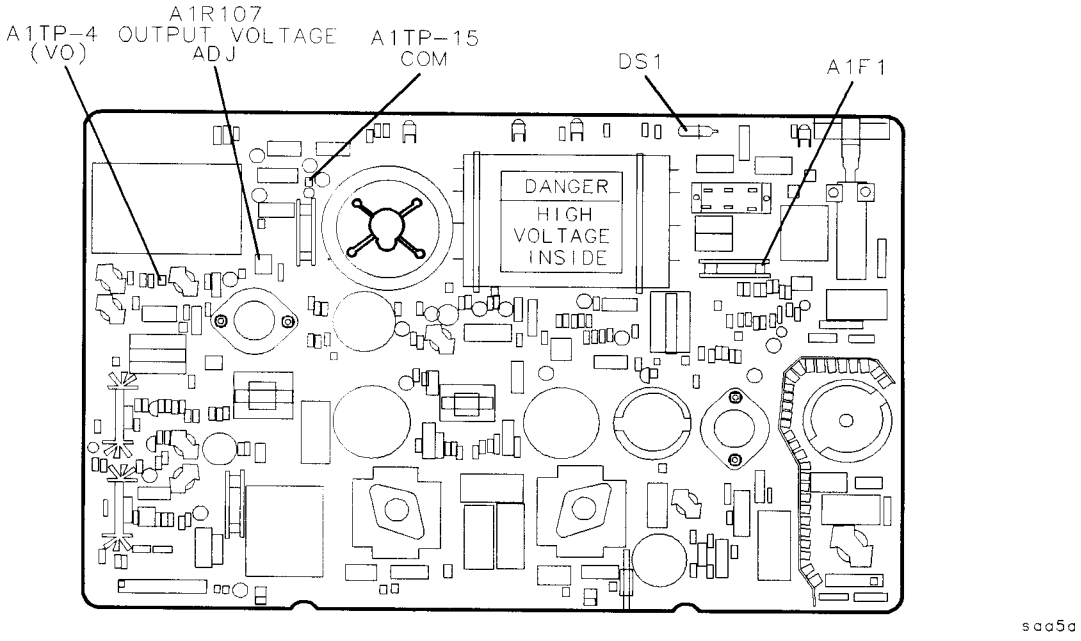


Figure 6-5. Output Voltage Adjustment

Test Equipment **Preferred Model Numbers**

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Fiber tuning tool ..... HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC) ..... Staco EJ401V
Digital voltmeter ..... HP 3466A digital multimeter

The purpose of the "Output Voltage Adjustment" is to adjust the output voltage of the regulated 40 kHz sinewave provided to the modules.

1. Turn the LINE-ISOLATED VARIAC OFF. Wait one minute or more after A1DS1 goes out, then connect the DVM positive lead to TP-4 (VO) and the negative lead to TP-15 (COM).
2. Reinsert the A1F1 service fuse. Turn the LINE-ISOLATED VARIAC ON. Adjust the VARIAC to 115 Vac. Check the fan operation to verify that the power supply is running.
3. Verify a DVM voltage reading between 8.055 and 8.085 Vdc. If the voltage is within specified limits, the output voltage is adjusted correctly. Go to the "+5 Volt Adjustment". If the voltage is not within the specified limits, go to Step 4.
4. Adjust A1R107 (VO Adj) until the DVM reads 8.070 Vdc ±0.010 Vdc.

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+5 Volt Adjustment

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

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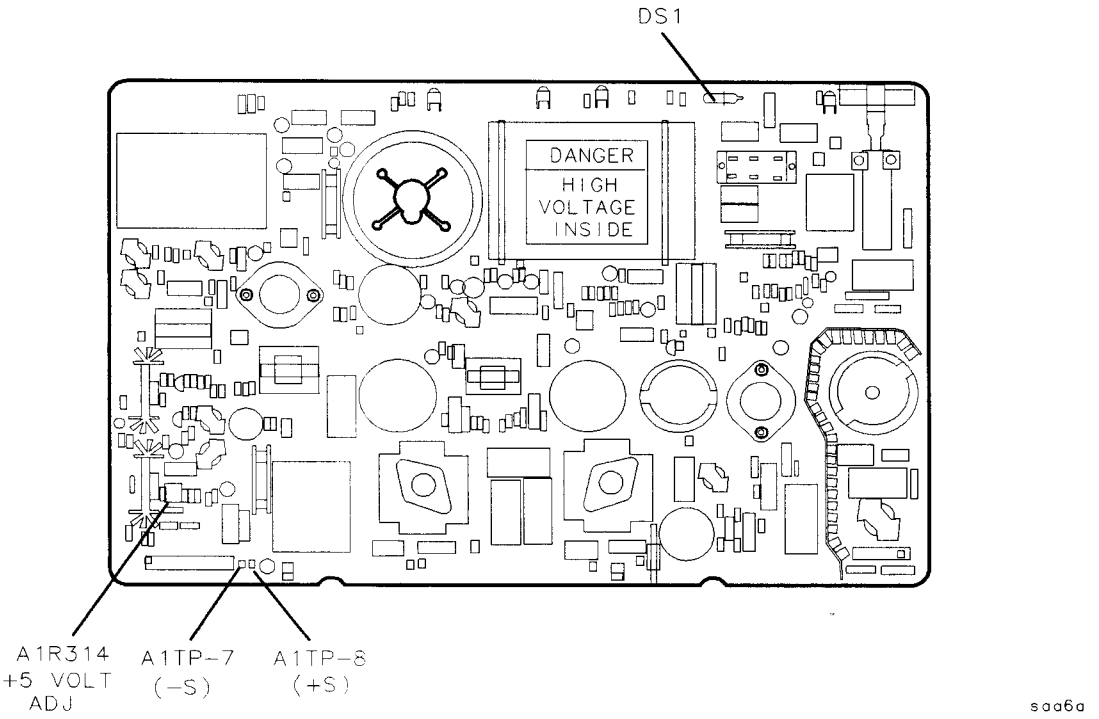


Figure 6-6. +5 Voltage Adjustment

Test Equipment	**Preferred Model Numbers**
Fiber tuning tool	HP Part Number 8170-0033.
Line Isolated Variable Mains Transformer (VARIAC)	Staco EJ401V
Digital voltmeter	HP 3466A digital multimeter

The purpose of the "+5 Volt Adjustment" is to adjust the +5 Vdc output voltage that provides power to the A4 HP-MSIB.

1. Turn the LINE-ISOLATED VARIAC OFF. Wait one minute or more after A1DS1 goes out, then connect the DVM positive lead to TP-8 (+S) and the negative lead to TP-7 (−S).
2. Turn the LINE-ISOLATED VARIAC ON. Adjust the VARIAC for 115 Vac. Verify a DVM reading between 5.05 and 5.15 Vdc. If the voltage in not within the specified limits, go to Step 3. If the voltage is within specified limits, the "+5 Volt Adjustment" is adjusted correctly and the "Power Supply Adjustments" have been completed. Turn the VARIAC OFF and wait one minute after A1DS1 goes out, then reassembly the HP 70001A mainframe. Refer to "Bottom Cover" in Chapter 9.
3. Turn A1R314 ("+5 Volt Adjustment") until the DVM reads 5.080 Vdc ±0.020 Vdc.

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7

Module Verification Tests

This chapter would have contained the setups for all module verification tests that must be performed in order to optimize module performance when assemblies are changed, repaired, or adjusted.

Note The HP 70001A mainframe does not have any module verification tests.

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8

Equipment Calibration

This chapter would have contained the setups for all equipment calibration procedures that must be performed in order to optimize module performance when assemblies are changed, repaired, or adjusted.

Note The HP 70001A mainframe does not have any equipment calibration procedures.

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9

Replacing Major Assemblies

This chapter contains procedures for removal and replacement of major assemblies in your mainframe. Instructions are given for the following assemblies:

- "Front Panel/Main Line Switch Actuator"
- "Bottom Cover"
- "A1 Power Supply"
- "A2 Interconnect"
- "A3 HP-IB"
- "A4 HP-MSIB"
- "B1 and B2 Fans"
- "Rear Cover"

This service guide is part of an Option OB3 package which consists of two manuals. To obtain a list of all versions of all assemblies available for your mainframe, refer to Manual 2.

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Front Panel/Main Line Switch Actuator

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the Front Panel/Main Line Switch Actuator

1. Set the line switch to the OFF position.
2. Disconnect the line power cord.
3. Disconnect any module rear-panel cables. Remove all modules from the HP 70001A mainframe.
4. Turn the HP 70001A mainframe over so the bottom faces up.
5. Remove the two front feet (1). See Figure 9-1.
6. Remove the six front-panel screws (2).
7. Remove the front panel (3) and main-line switch (4).

To Replace the Front Panel/Main Line Switch Actuator

1. Replace the main line switch (4), door lock shaft (5), and light pipes (6) (if necessary). The fourth light pipe hole from the left (line switch side) is empty. See Figure 9-1.

Note The door lock shaft (5) may or may not be part of your mainframe depending on how old it is. The push/push switch used on the currently produced mainframe does not use this item.

2. Replace the front panel (3), taking care that the door lock shaft (5) and light pipes (6) are aligned properly.
3. Replace the six front-panel screws (2).
4. Replace the two front feet (1).

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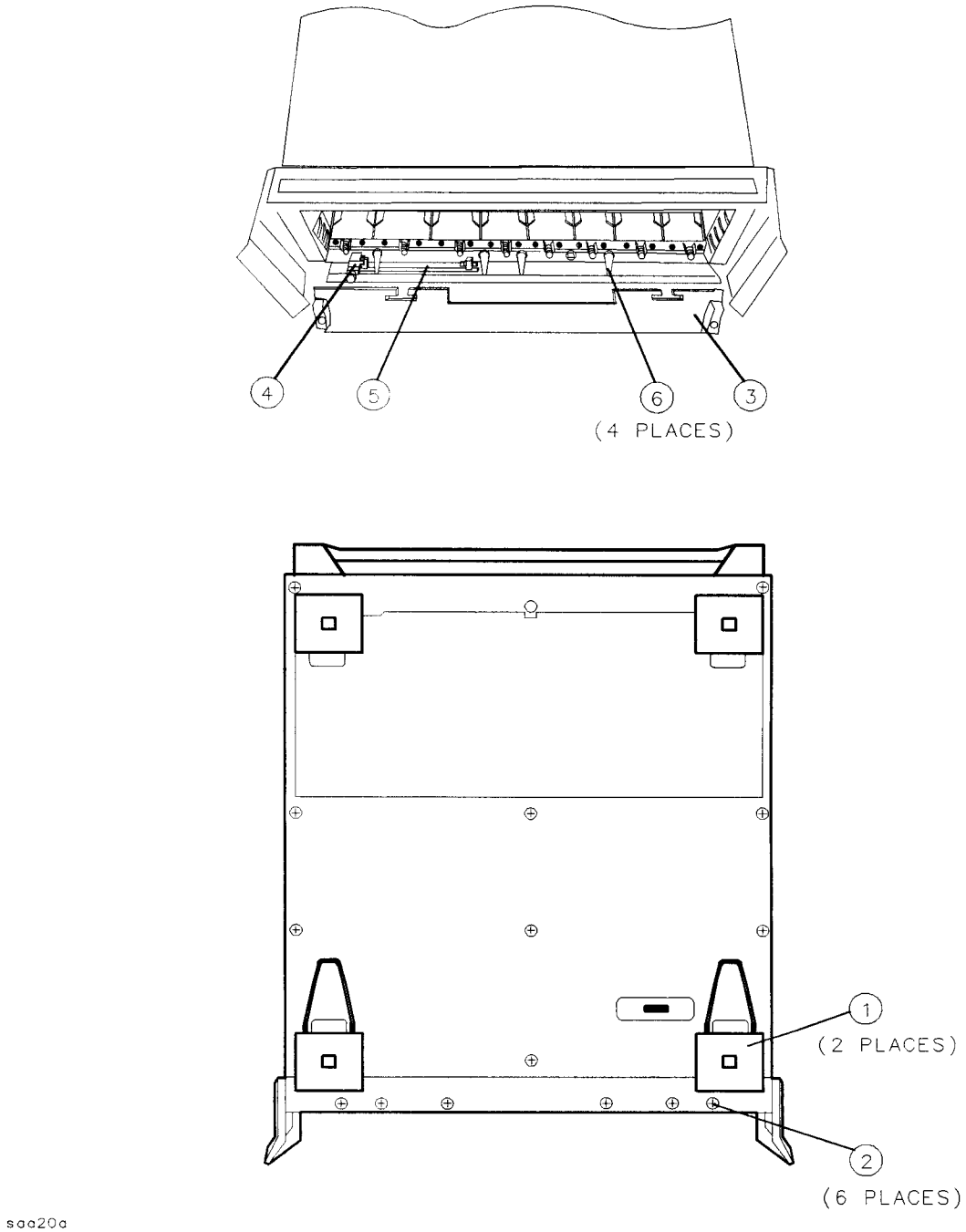


Figure 9-1. Front Panel/Main Line Switch Actuator Removal/Replacement

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Bottom Cover

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the Bottom Cover

1. Disconnect the line power cord.
2. Disconnect any module rear-panel cables. Remove all modules from the HP 70001A mainframe.
3. Set the line switch to the ON position. To avoid damage, the line switch must remain in the ON position during removal or replacement of any board assembly.
4. Turn the mainframe over so the bottom faces up.
5. Remove all four bottom feet (1). See Figure 9-2.
6. Remove the 12 bottom-cover screws (2).
7. Remove the bottom cover with the attached A1 power supply.

To Replace the Bottom Cover

1. Verify that the line switch actuator is in the ON position.
2. Replace the bottom cover with the attached A1 power supply.
3. Replace the 12 bottom-cover screws (2). See Figure 9-2.
4. Replace all four bottom feet (1).
5. Set the line switch to the OFF position.
6. Replace the line power cord.

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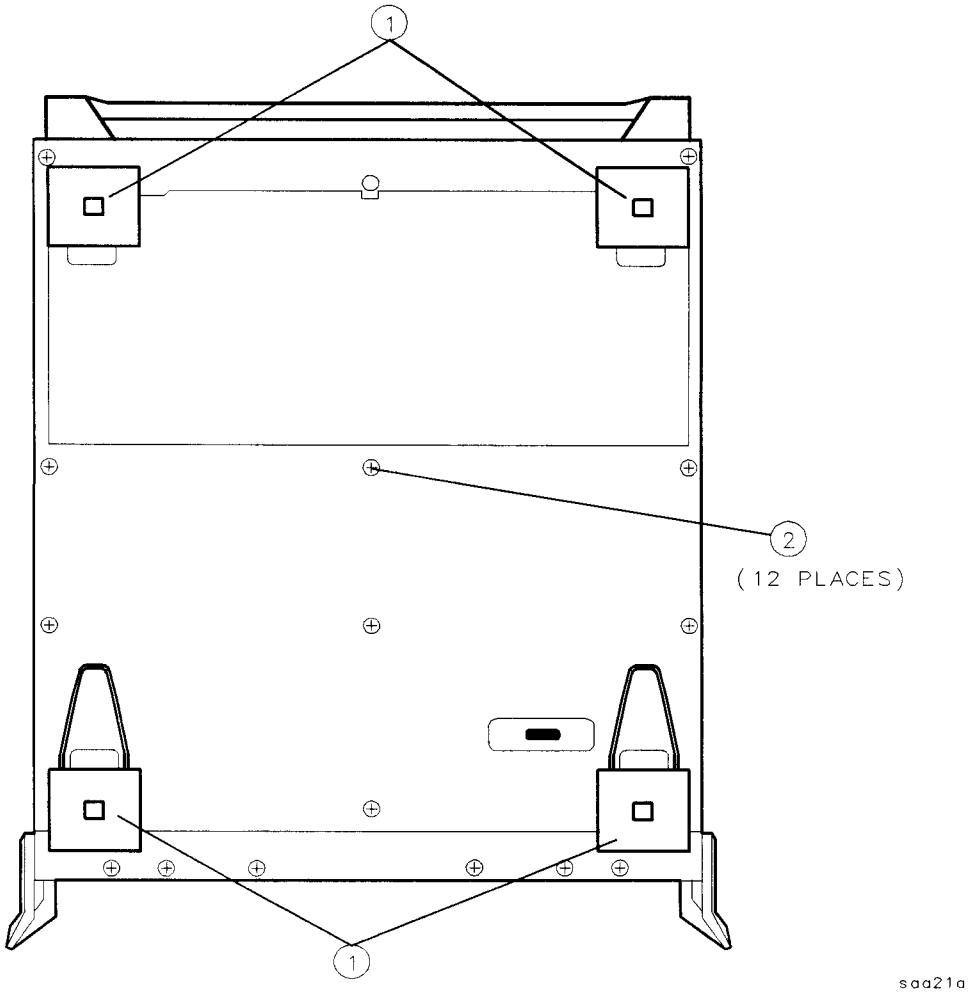


Figure 9-2. Bottom Cover Removal/Replacement

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A1 Power Supply

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the A1 Power Supply

1. Remove the bottom cover. Refer to "Bottom Cover".
2. Disconnect the following cables from the A1 power supply. See Figure 9-3.
   - W1 line input (1)
   - W2 power supply output (2)
   - W3 B1 Fan (3)
   - W4 B2 Fan (4)
3. Remove the six stand-offs (5) used to attach the A1 power supply to the bottom cover.
4. Lift the A1 power supply from the bottom cover.

To Replace the A1 Power Supply

1. Verify that the spiral gasket is properly seated in its bottom cover channel.
2. Place the HP 70001A mainframe.on the bottom cover.
3. Replace the six stand-offs (5) used to attach the A1 power supply to the bottom cover. See Figure 9-3.
4. Connect the following cables on the HP 70001A mainframe.
   - W1 line input (1)
   - W2 power supply output (2)
   - W3 B1 Fan (3)
   - W4 B2 Fan (4)
5. Replace the bottom cover. Refer to "Bottom Cover".

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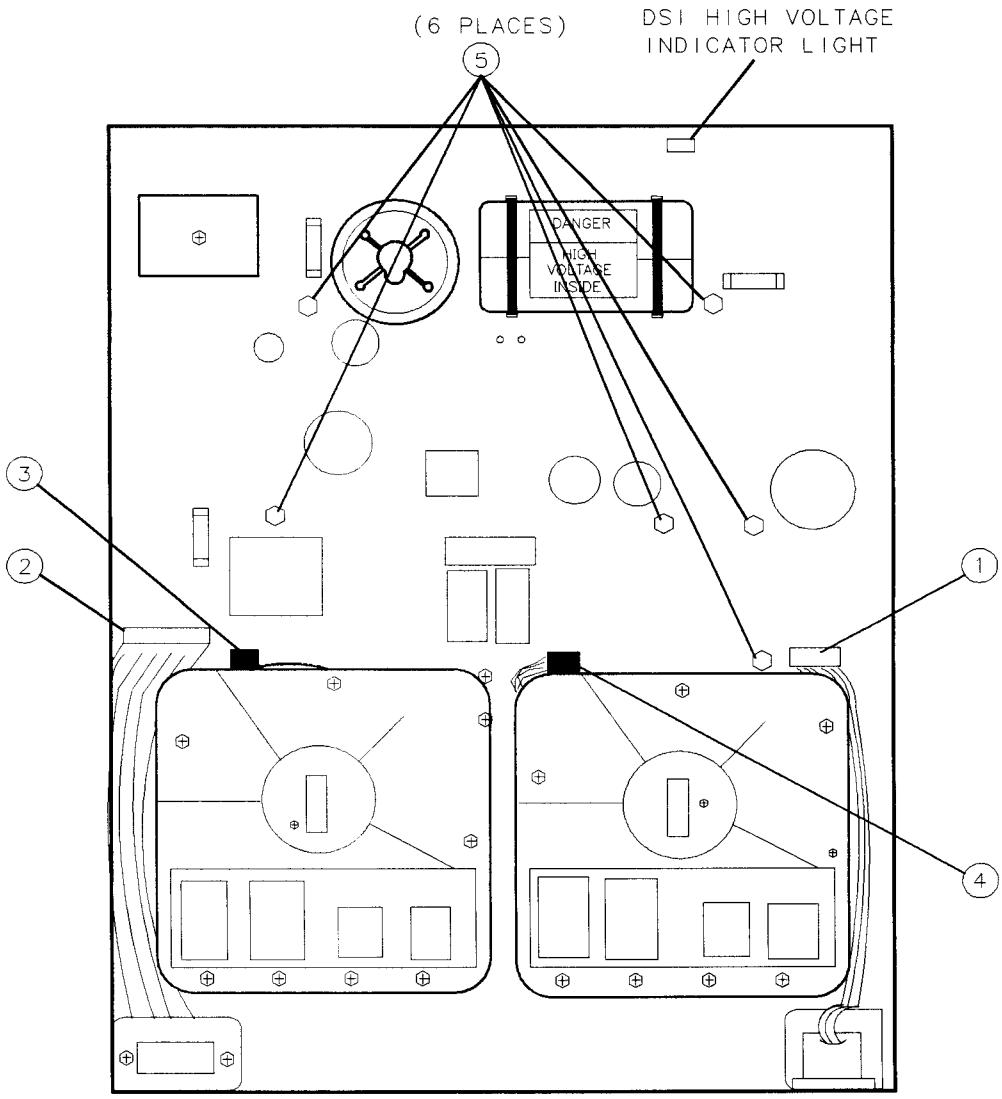


Figure 9-3. A1 Power Supply Removal/Replacement

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A2 Interconnect

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the A2 Interconnect

1. Remove all modules from the HP 70001A mainframe.
2. Remove the rear cover. Refer to "Rear Cover".
3. Remove the bottom cover. Refer to "Bottom Cover".
4. Remove the three large screws (1) on the interconnect cover. See Figure 9-4.
5. Remove the 11 screws (2) on the interconnect cover.
6. Remove the interconnect cover (3), being careful with the RFI gasket (4). The RFI gasket may be reused if NOT damaged.

Note Do not remove the support bracket screws at the bottom left of the interconnect board assembly. These screws secure the support bracket for the board assembly connector. The connector may be damaged if the screws are removed.

7. Remove the A2 interconnect (5).

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To Replace the A2 Interconnect

1. Replace the A2 interconnect (5). See Figure 9-4.
2. Replace the interconnect cover (3), then the RFI gasket (4).

CAUTION Do not torque the small screws (2) on the A2 interconnect to more than 3 in/lbs.

---

3. Replace the 11 screws (2) on the interconnect cover and tighten.
4. Replace the three large screws (1) on the interconnect cover.
5. Replace the rear cover. Refer to "Rear Cover".
6. Replace the bottom cover. Refer to "Bottom Cover".

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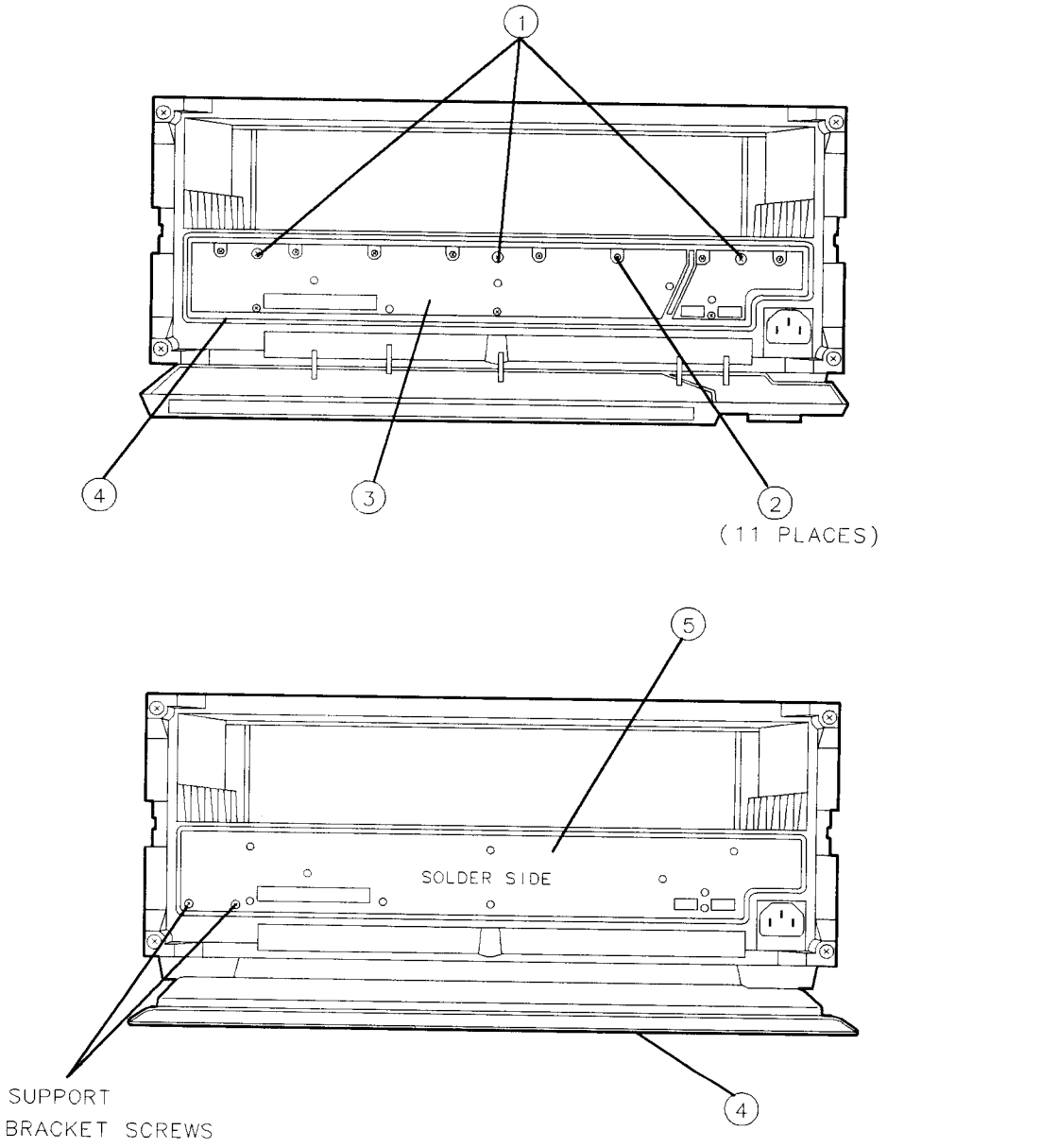


Figure 9-4. A2 Interconnect Removal/Replacement

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A3 HP-IB

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the A3 HP-IB

1. Remove the rear cover. Refer to "Rear Cover".
2. Remove the one screw (1) and two nuts (2) securing the A3 HP-IB to the rear cover. See Figure 9-5.
3. Remove the A3 HP-IB (3) from the rear cover.

To Replace the A3 HP-IB

1. Replace the A3 HP-IB (3) on the back of the rear cover. See Figure 9-5.
2. Replace the one screw (1) and two nuts (2) that secure the A3 HP-IB to the rear cover.
3. Replace the rear cover. Refer to "Rear Cover".

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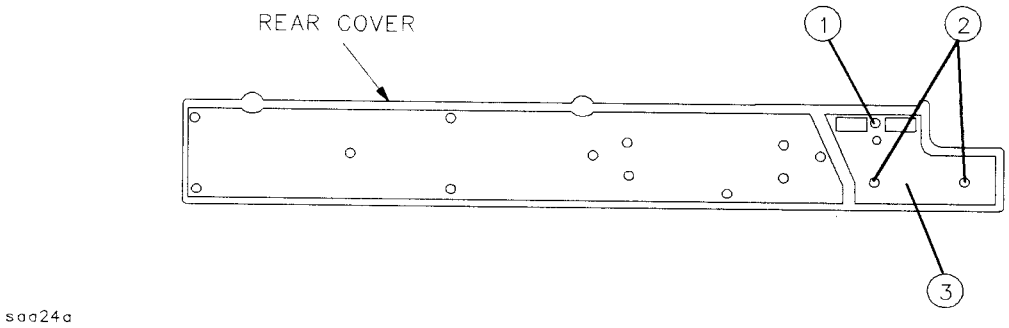


Figure 9-5. A3 HP-IB Removal/Replacement

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A4 HP-MSIB

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the A4 HP-MSIB

1. Remove the rear cover. Refer to "Rear Cover".
2. Remove the four screws (1) and four nuts (2) securing the A4 HP-MSIB to the rear cover. See Figure 9-6.
3. Remove the A4 HP-MSIB (3) from the rear cover.

To Replace the A4 HP-MSIB

CAUTION When tightening the nuts on the A4 HP-MSIB, the nut driver can press the IC leads into the pads under the nuts. Inspect the board for shorts between the pads under the nuts and the IC leads next to the pads.

1. Replace the A4 HP-MSIB (3) on the rear cover. See Figure 9-6.
2. Replace the four screws (1) and four nuts (2) that secure the A4 HP-MSIB to the rear cover.
3. Replace the rear cover. Refer to "Rear Cover".

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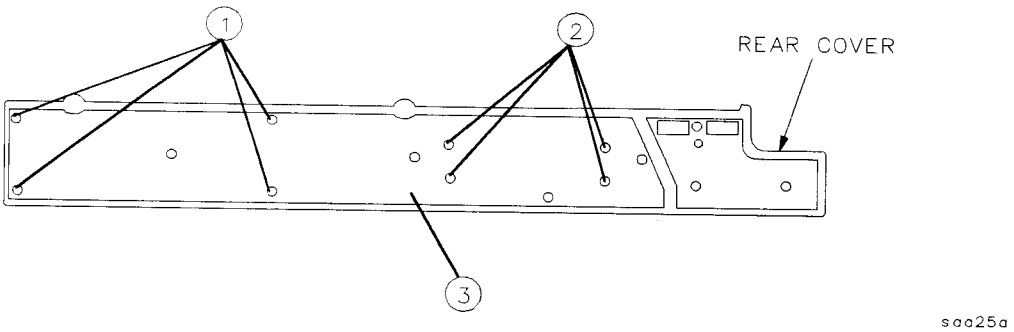


Figure 9-6. A4 HP-MSIB Removal/Replacement

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13. Remove the two screws (6) securing the A6 HP-MSIB to the rear frame.
14. Remove the A6 HP-MSIB.

To Replace the A6 HP-MSIB

1. Secure the A6 HP-MSIB to the rear frame using two screws (6).
2. Press the HP-IB connector side of the rear panel into place first.
3. Secure the HP-MSIB connectors using four hex screws (5).
4. Secure the HP-IB connector using two hex screws (4).
5. Replace the two flathead screws (3).
6. Replace the four screws (2) above the opening in the rear panel.
7. Replace the A4 power supply as described in "A4 power supply Replacement," steps 3 through 5.
8. Secure the fan grill using four screws (1).
9. Position the HP 70004A color display top-side-up on the work bench.
10. Replace the instrument cover.
11. Replace all modules.
12. Reconnect the line cord.

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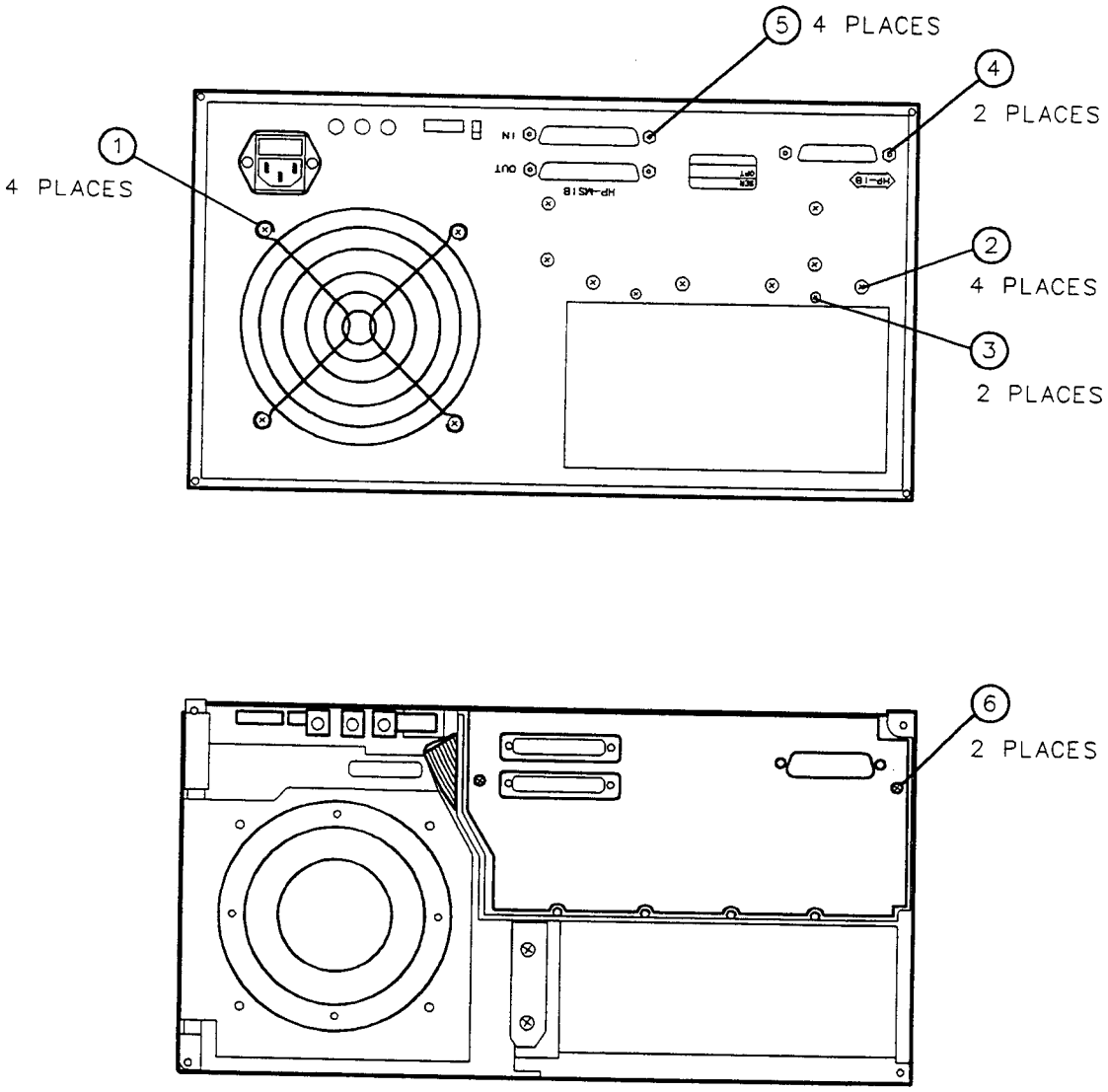


Figure 9-6. A6 HP-MSIB Removal/Replacement

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B1 and B2 Fans

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

To Remove the B1 and B2 Fans

1. Remove the bottom cover. Refer to "Bottom Cover".
2. Disconnect the following cables for the fans being removed from the A1 power supply. See Figure 9-7.
   W3 B1 Fan (1)
   W4 B2 Fan (2)
3. Remove the nine screws (3) securing fans.
4. Remove the fans (4).

To Replace the B1 and B2 Fans

1. Replace the fans (4). See Figure 9-7.
2. Replace the nine screws (3).
3. Connect the following cables for the fans to the A1 power supply.
   W3 B1 Fan (1)
   W4 B2 Fan (2)
4. Replace the bottom cover. Refer to "Bottom Cover".

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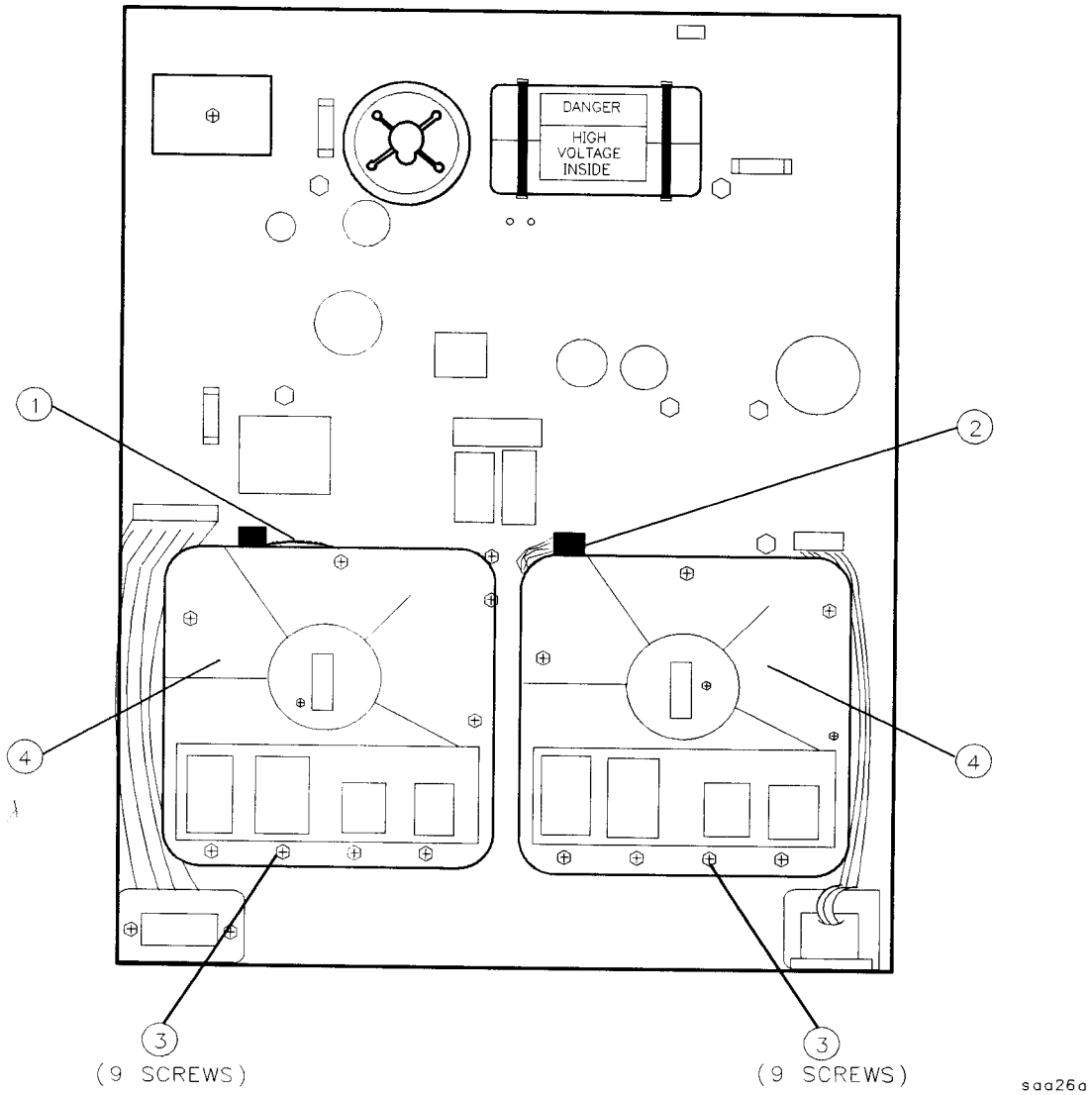


Figure 9-7. B1 and B2 Fans Removal/Replacement

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Rear Cover

DANGER

- **Do not touch the A1 power supply with your hands while power is applied.**
- **The A1 power supply has lethal voltages, with lethal currents, in all areas for at least three minutes after power is turned off.**
- **Use of a Ground Fault Interrupter (GFI), a Line-Isolated Variable Mains Transformer (VARIAC), and extreme care are mandatory when servicing the A1 power supply.**
- **Service personnel must use a >>1 MΩ resistor-isolated wrist strap or heel strap while handling the A1 power supply.**
- **To avoid damaging the HP 70001A mainframe module connectors, the HP 70001A mainframe must be off before installing or removing any modules.**
- **Do not operate an HP 70001A Option 400 mainframe at 400 Hz without the Line-Isolated Variable Mains Transformer (VARIAC). Failure to follow this precaution can create a shock hazard which may result in personal injury.**

  The HP 70001A Option 400 mainframe can be operated on a 50/60 Hz power line if the Line-Isolated Variable Mains Transformer (VARIAC) is detached from the instrument and a standard power cord is used. The VARIAC must be re-attached before the instrument is plugged into a 400 Hz power line source. The VARIAC protects the user from shock hazard in the event the power-line source is incorrectly grounded.

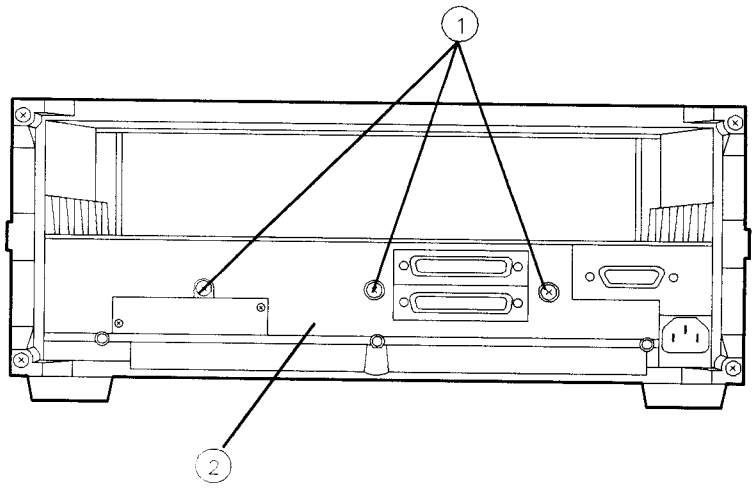
To Remove the Rear Cover

1. Disconnect all cables attached to the rear cover.
2. Loosen the three captive rear-cover screws (1) until they slide back freely. Do not remove them. See Figure 9-8.
3. Remove the rear cover (2).

To Replace the Rear Cover

1. Replace the rear cover (2). See Figure 9-8.
2. Tighten the three rear-cover screws (1).

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Figure 9-8. Rear Cover Removal/Replacement

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10

Overall Parts Identification Drawings

This chapter contains information on all overall parts identification drawings that should be used when performing the troubleshooting procedures descibed in this service guide.

This chapter contains the following sections:

- "Front View Identification"
- "Rear View Identification"
- "Bottom View Identification"
- "Bottom Cover Removed Identification"
- "Side View Identification"
- "Overall Dimensions"

Because this service guide is part of an Option OB3 package which consists of two manuals, refer to Manual 2 of this option set for information on part listings and schematics.

Manual 2 contains packets of component-level repair information for each mainframe board assembly that has field-replaceable parts. Each packet includes the parts list, component-location drawing, and schematics for a specific board-assembly part number. Manual 2 also contains a table that can be used to cross reference different board assemblies that have different serial prefix breaks.

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Front View Identification

Table 10-1. Overall Parts Identification Listing, Front View

Item	HP Part Number	CD	Description
1	70001-00045	7	Top Cover
2	5040-7202	9	Trim Strip, Top
3	70001-40024	6	Mounting Block, Right
	70001-00018	4	Grounding Spring, Right
	3050-0893	9	Washer, Flat 4.4MMID 8.85MMOD 0.8MM
	0535-0023	2	Nut, Hex M4 X 0.70 A/F 3.2MM
	70001-00013	9	Panel, Dress Right
4	~~0515-1231~~	4	Screw, THD RLG M3 X 0.5 10MM LG PNPD
5	70001-40009	7	Pipe, Light
6	70001-60010	2	Latch, Front
7	0515-1127	7	Screw, M3.0 X 0.50 2.5MM LG PNPD
8	0570-1290	1	Plunger, Metric Ball 3.18/3.20MM Ball
	70001-00053	5	Spring, Switch Locking Shaft
	70001-40007	5	Bearing Block, Left
	70001-40008	6	Holder, Light Pipe
	70001-40006	4	Bearing Block, Right
	0535-0042	5	Nut, Hex Plstc-LKG M3 X 0.54MM-LG
	3050-0891	7	Washer, Flat 3.3MMID 6.58MMOD 0.5MM
9	70001-20033	5	Shaft, Door Lock[1]
10	~~0515-1~~231	4	Screw, M3.0 X 0.50 10MM PNPD
	70001-40005	3	Knob, Line Power Switch
	70001-20094	6	Shaft, Push-Push Switch
11	70001-00032	2	Panel, Dress Left
	70001-00017	3	Grounding Spring, Left
	70001-40025	7	Mounting Block, Left
	3050-0893	9	Washer, FL M4.0MMID 8.85MMOD 0.8MM
	0535-0023	2	Nut, Hex M4 X 0.70 A/F 3.2MM
12	70001-20085	7	Front Door Casting
13	70001-00049	1	Annunicator Panel

1 The door lock shaft may or may not be part of your mainframe depending on how old it is. The push/push switch used on the currently produced mainframe does not use this item.

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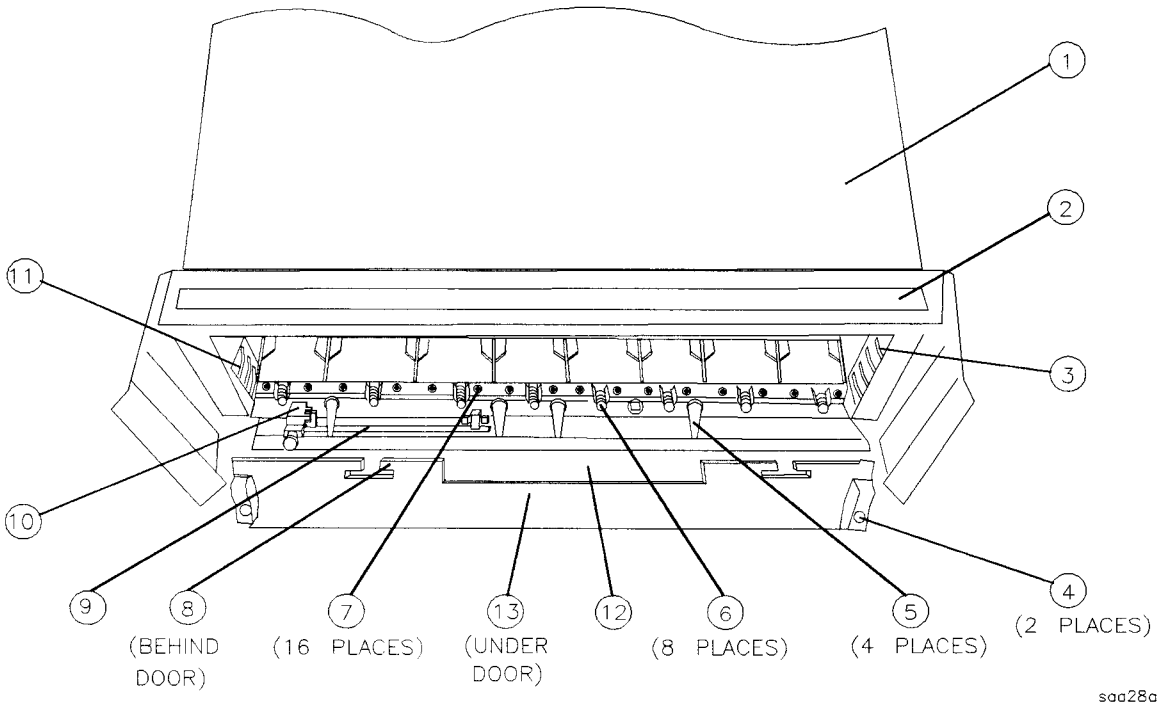


Figure 10-1. Overall Parts Identification Drawing, Front View

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Rear View Identification

Table 10-2. Overall Parts Identification Listing, Rear View

Item	HP Part Number	CD	Description
1	0515-1115	3	Screw, Mach M4 X 0.7 12MMLG-PAN-HD
2	0900-0010	2	O-Ring, .101 IN-DIA
3	5021-6391	5	Screw, HPIB Conn
4	2190-0586	2	Washer, FL MTLC 3.0MM 3.3MM
5	70001-20071	1	Screw, HP-MSIB Cover Mounting
6	5021-6390	4	Screw, HP-MSIB Conn
7	70001-20069	7	Cover, HP-MSIB Casting
8	0515-0886	3	Screw, Mach M3 X 0.5 6MM LG PAN-HD
9	7120-4627	8	Label, Inspection Plate Warning
10	70001-20015	3	Cover, HP-MSIB Inspection
11	8160-0485	3	Gasket, RFI .062 IN-OD
12	70001-40026	8	Foot, RR Left
13	7120-4835	0	Label, CSA-LAB Use
14	70001-40027	9	Foot, RR Right
15	7120-4627	8	Label, Warning Continuity
16	7120-3528	6	Label, Warning Fire Hazard
17	70001-60011	3	AC Receptacle and Cable

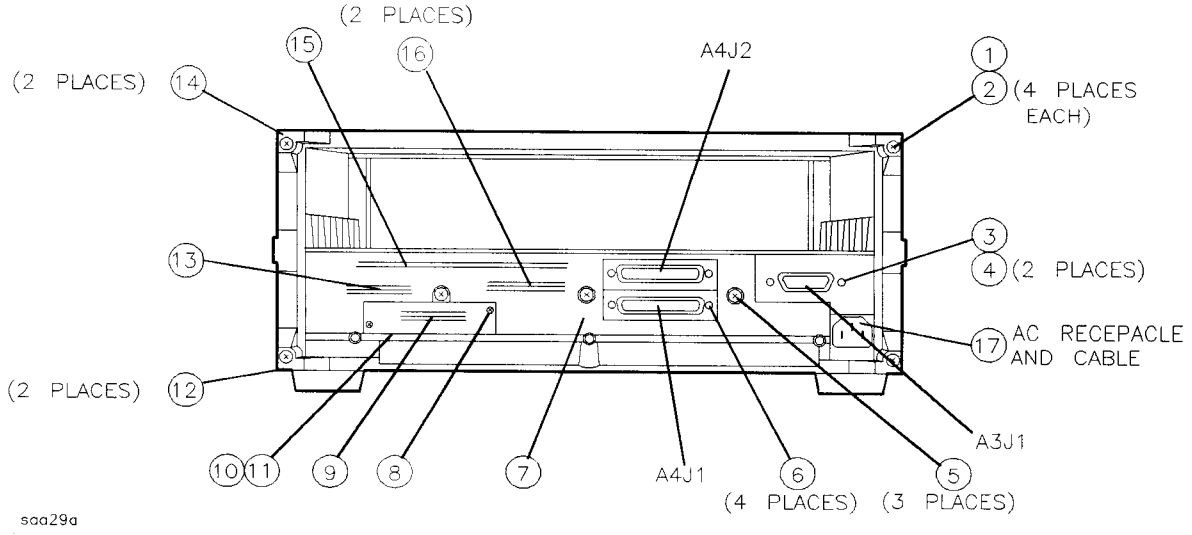


Figure 10-2. Overall Parts Identification Drawing, Rear View

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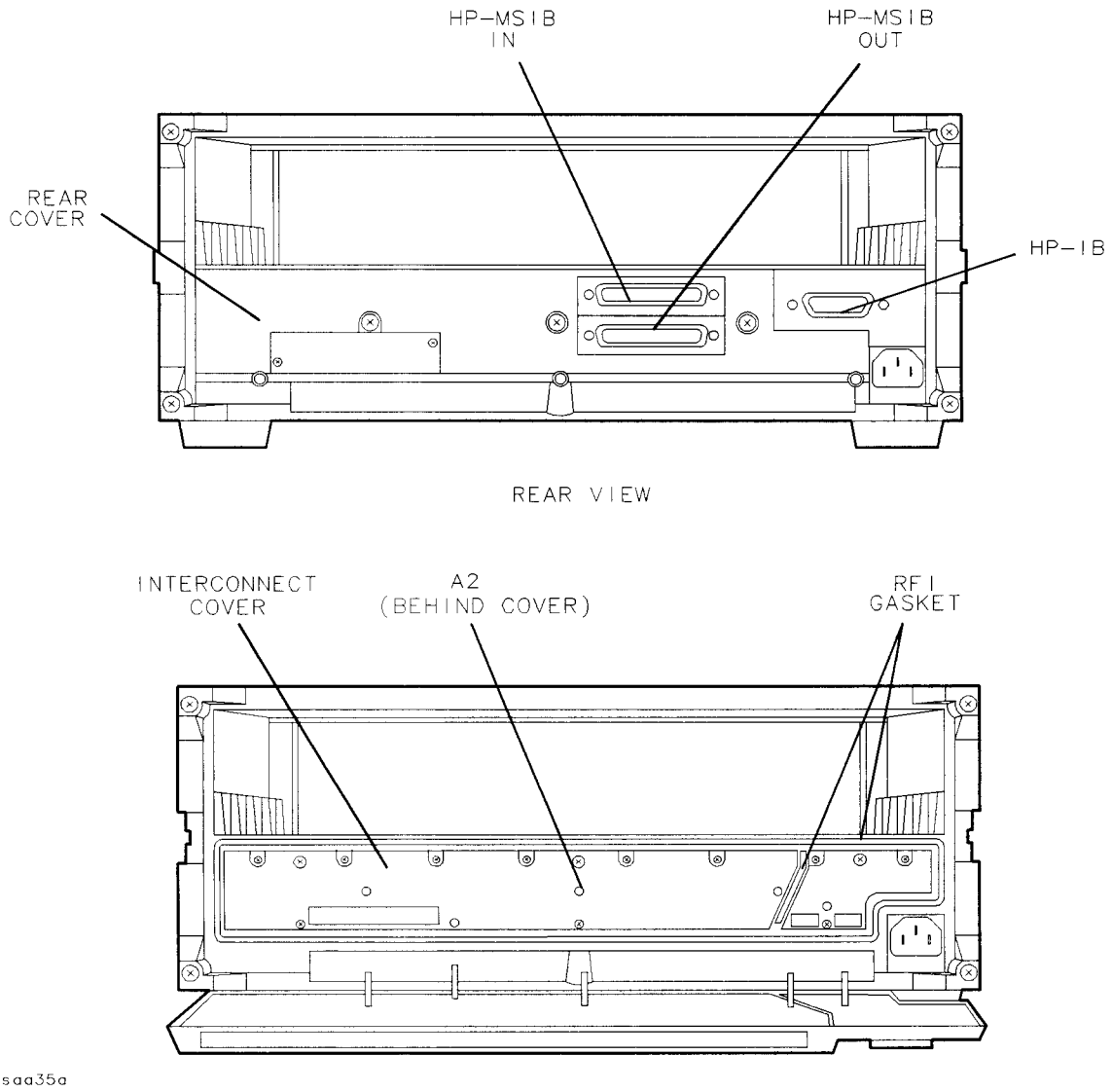


Figure 10-3.
Overall Parts Identification Drawing, Rear View Behind A2 Interconnect Cover

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Bottom View Identification

Table 10-3. Overall Parts Identification Listing, Bottom View

Item	HP Part Number	CD	Description
1	5040-7201	8	Foot, Bottom
2	0515-1105	1	Screw, Mach M3X0.5 10MM LG PNPDS
3	3050-0105	6	Washer, FL MTLC #4 .125 IN-ID
4	5062-3990	0	Handle, Front
5	70001-20083	5	Casting, Front Frame
6	0515-1129	9	Screw, Mach M4 X 0.7 16MM LG PCFLPDS
7	1460-1345	5	Spring, Wire Form
8	70001-20014	2	Casting, Bottom Cover
9	70001-60084	0	Cover, Bottom (with A1 power supply & B1/B2 fans
10	70001-00046	8	Cover, Bottom (sheet metal)
11	70001-60009	9	B1 and B2 Fans

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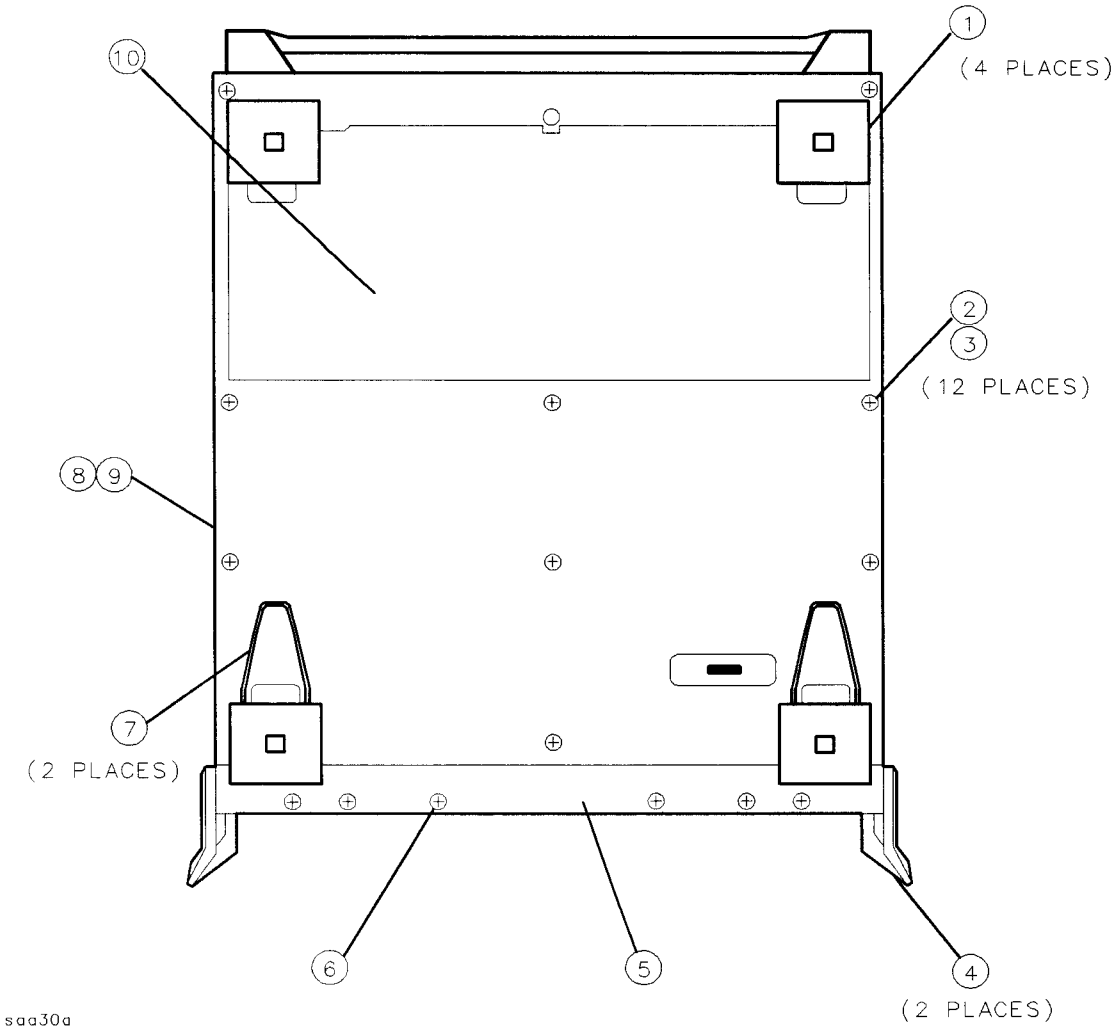


Figure 10-4. Overall Parts Identification Drawing, Bottom View

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Bottom View Identification

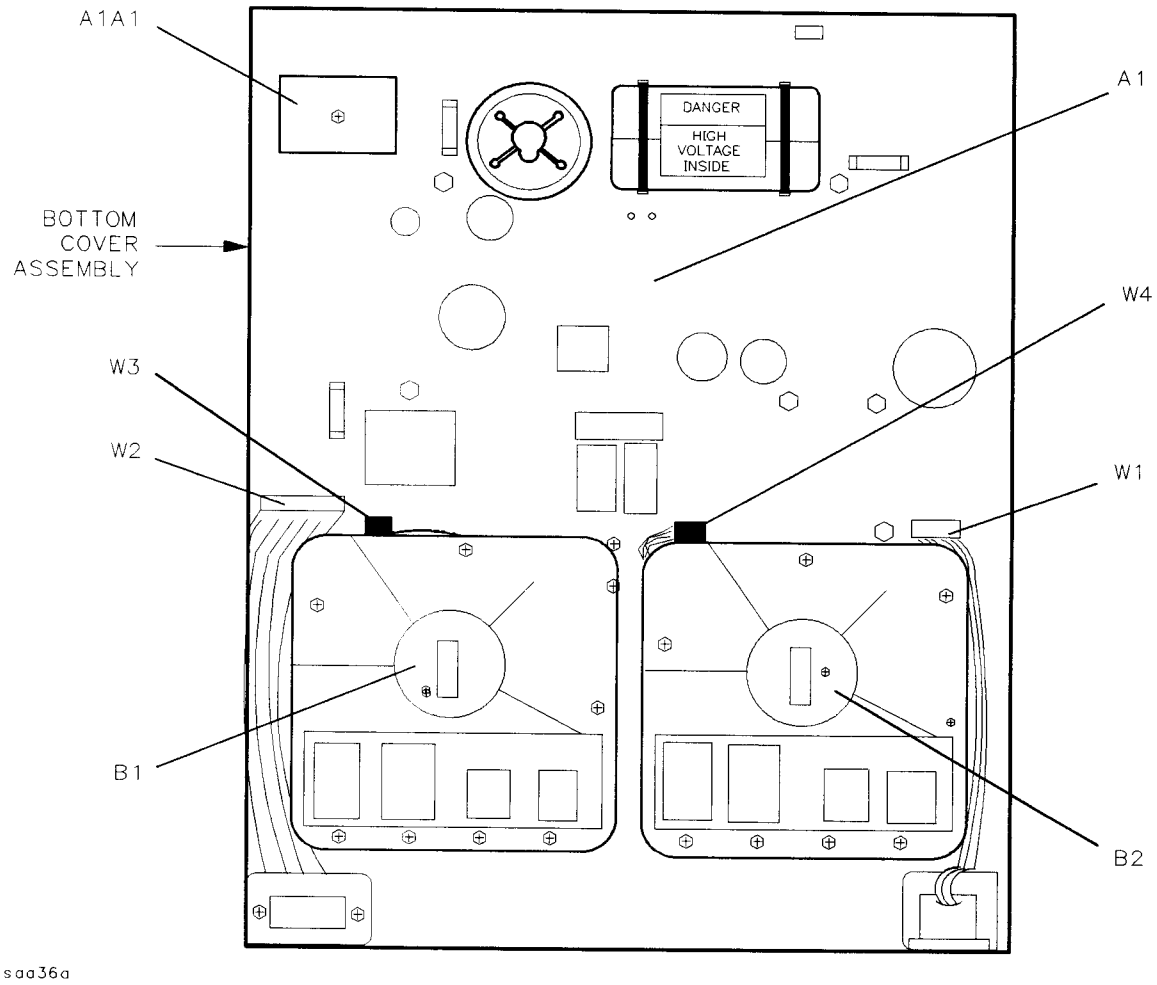


Figure 10-5. Overall Parts Identification Drawing, Bottom View Cover Removed

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Bottom Cover Removed Identification

Table 10-4.
Overall Parts Identification Listing, Bottom View, A1 Power Supply, and Bottom Cover Removed

Item	HP Part Number	CD	Description
1	70001-20066	1	Casting, Rear Frame
2	0515-0886	3	Screw, Mach M3 X 0.5 6MM LG PAN-HD
3	8160-0484	2	Gasket, RFI .062 IN-OD
4	70001-00043	5	Trim Strip, Left
5	70001-20012	0	Casting, Main H-Frame
6	70001-00029	7	Insulator, H-Frame
7	70001-20083	5	Casting, Front Frame
8	0515-1570	4	Screw, Mach M4 X 0.7 16MM LGSEMFHPD
9	70001-00044	6	Trim Strip, Right
10	0515-1461	2	Screw, Mach M3 X 0.5 6MM LGSEMFHPD
11	70001-40004	2	Airseal
12	70001-40026	8	Foot, RR Left
13	70001-40027	9	Foot, RR Right
14	70001-40004	2	Airseal

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Bottom Cover Removed Identification

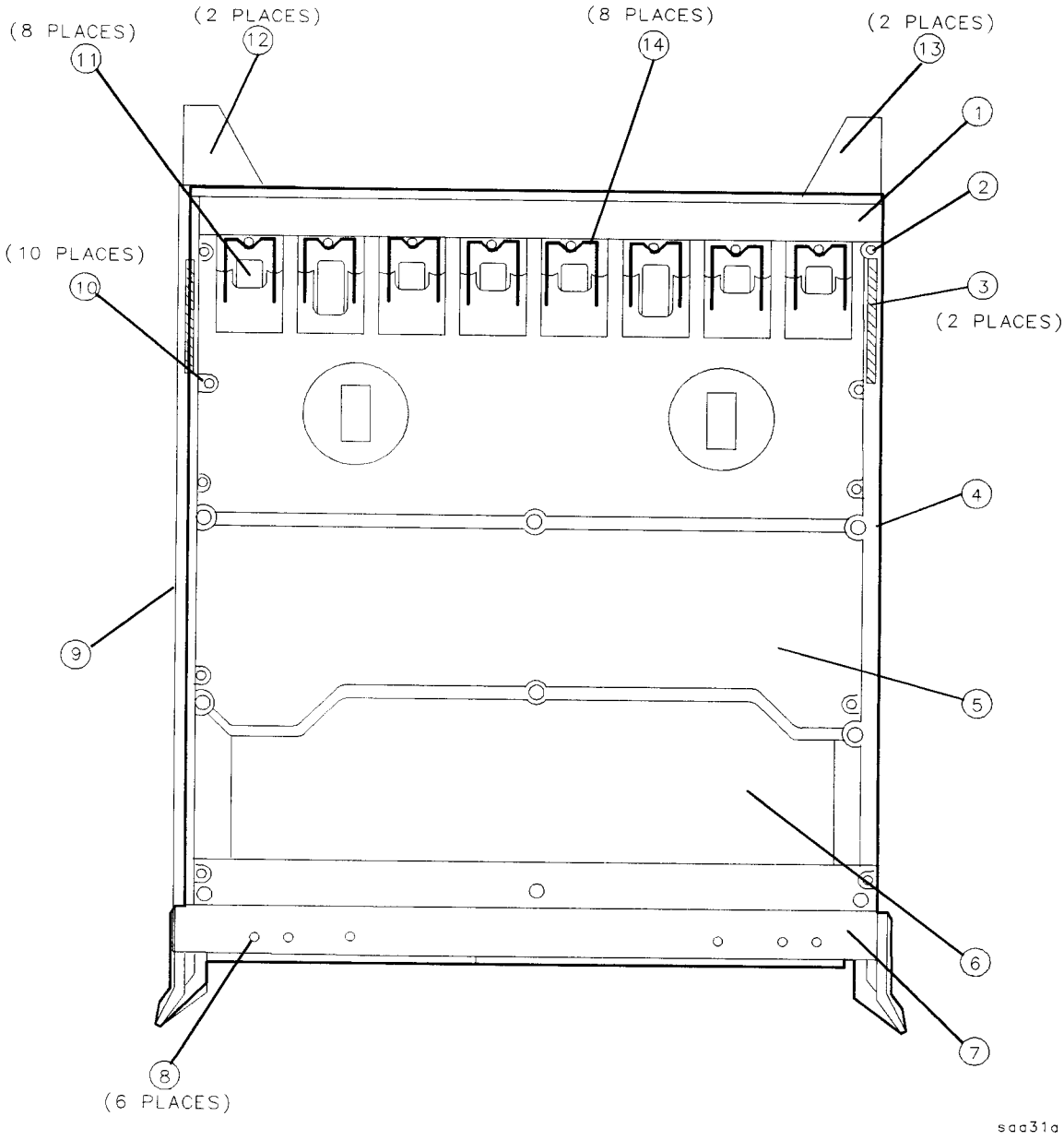


Figure 10-6.
Overall Parts Identification Drawing, Bottom View, A1 Power Supply, and Bottom Cover Removed

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Side View Identification

Table 10-5. Overall Parts Identification Listing, Side View

Item	HP Part Number	CD	Description
1	70001-00045	7	Cover, Top
2	5041-~~6819~~ 8819	7	Strap Handle Cap, Front
3	0515-1072	1	Screw, Mach M5 X 0.8 14MM LGPCFLPDS
4	0535-0025	4	Nut, Hex DBL-CHAM M3 X 0.5 2.4MM
5	~~5060-9804~~ 5062-3704	3	Strap, Side-Handle
6	5041-~~6820~~ 8820	0	Strap Handle Cap, Rear

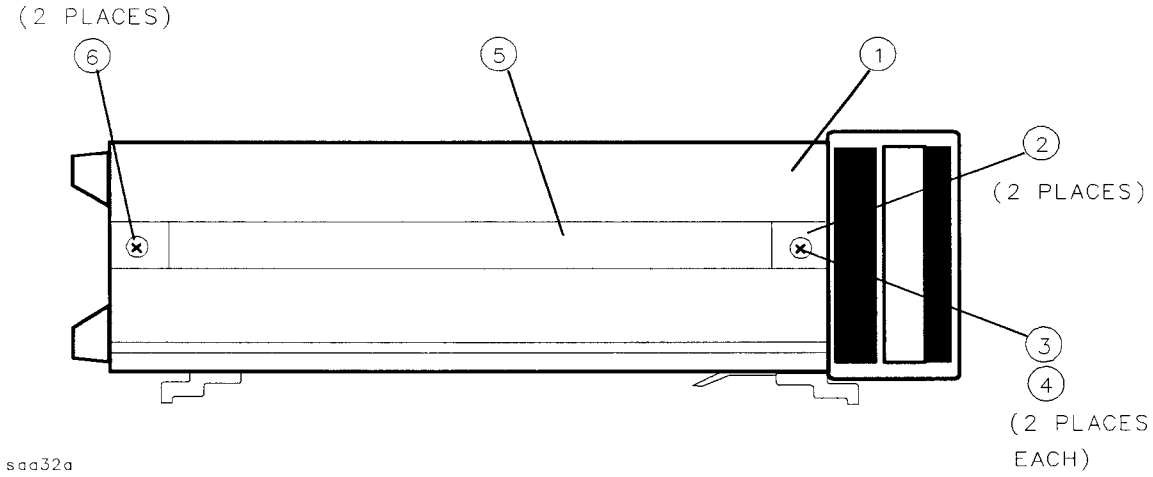


Figure 10-7. Overall Parts Identification Drawing, Side View

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A1 Power Supply Identification

Table 10-6. A1 Power Supply Overall Parts Identification Drawing

Item	HP Part Number	CD	Description
1	8160-0485	3	Gasket, RFI RND BEC .063 OD
2	0515-1770	6	Screw, Mach M2 X 0.46MM LGSEMPNPD
3	0515-0886	3	Screw, Mach M2 X 0.46MM LGPCPNPDS
4	70001-00006	0	Insulator, Bottom Louver
5	0515-1792	3	Screw, Mach M3 X 0.59MM LGSEMFHPD
6	0380-1706	1	Stand-Off, Hex 16MM LG
7	0515-0886	3	Screw, Mach M2 X 0.46MM LGPCPNPDS
8	0535-0025	4	Nut, Hex DBL-CHAM M3 X 0.52.4MM
9	2190-0584	0	WSHR LK M3.0ID
10	0515-0886	3	Screw, Mach M2 X 0.46MM LGPCPNPDS
11	70001-60009	9	Fan Assembly

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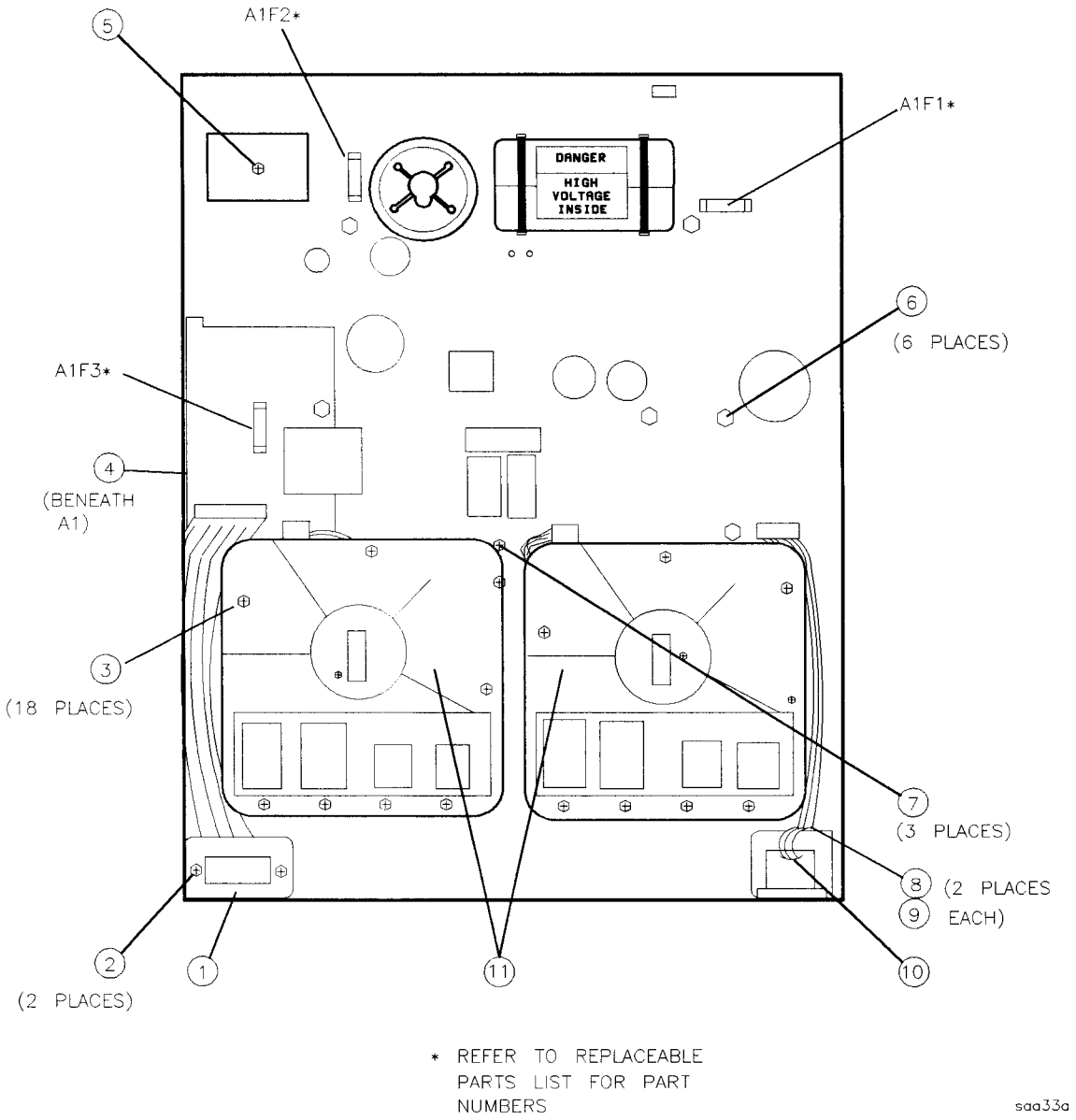


Figure 10-8. A1 Power Supply Overall Parts Identification Drawing

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A3 HP-IB and A4 HP-MSIB Identification

Table 10-7.
A3 HP-IB and A4 HP-MSIB Overall Parts Identification Drawing, Side View

Item	HP Part Number	CD	Description
1	70001-00045	7	Cover, Top
2	70001-40027	9	Foot, RR Right
3	0515-1115	3	Screw, M3 X 0.70 12MM PCNPNDS
4	8160-0484	2	Gasket, RFI .125D
5	5021-6391	5	Screw, CONN (HP-IB)
6	70001-20069	7	Casting, HP-MSIB Cover
7	5021-6390	4	Screw, CONN (HP-MSIB)
8	0535-0042	5	Nut, PLST LKGM 3.05
9	8160-0484	2	Gasket, RFI .125D
10	70001-80001	3	Label, Cable Remove Caution
11	0515-0886	3	Screw, Mach M3 X 0.5 6MM LG PCPNPDS
12	0515-1110	8	Screw, Mach M3 X 0.5 12MM LG PCPNPDS
13	70001-20008	4	Casting, Interconnect Board Assembly
14	0515-1717	1	Screw, Mach M2.5 X 0.45 6MM LG SEMPNPD
15	0515-1040	3	Screw, M4 X 0.70 8MM SEMPNPD
16	70001-60011	3	AC Receptacle and Cable

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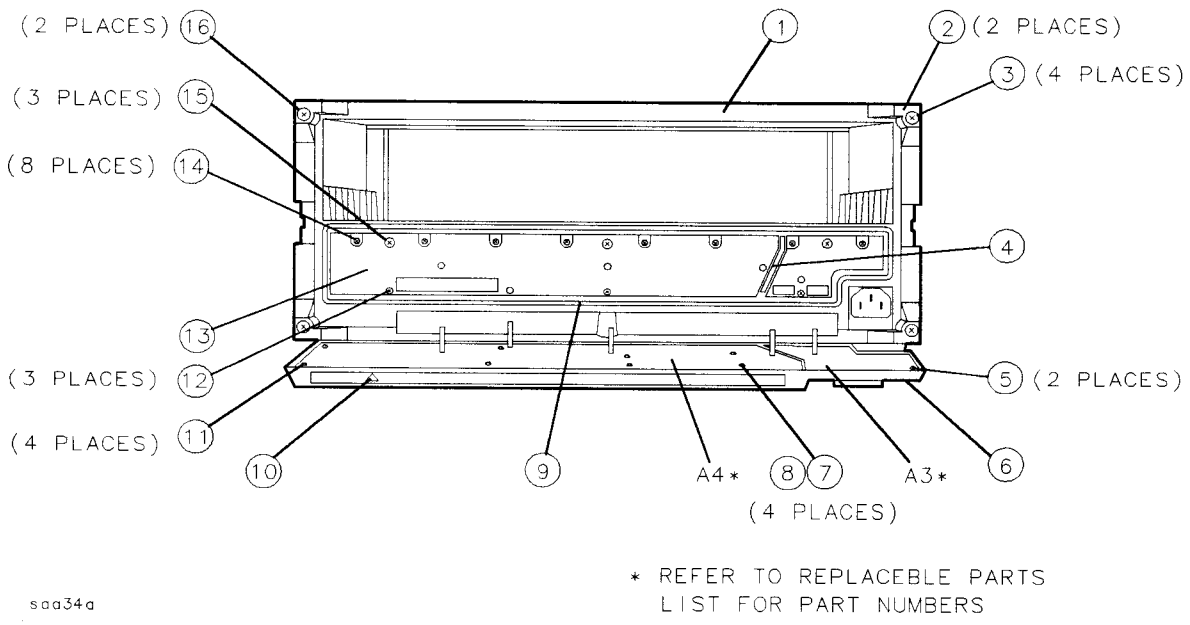


Figure 10-9. A3 HP-IB and A4 HP-MSIB Overall Parts Identification Drawing, Side View

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A3 HP-IB and A4 HP-MSIB Identification

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MAINFRAME DATUM ORIGINS AND EXPLANATIONS			
	DATUM	ORIGIN	FUNCTION
1.	-A-	MAINFRAME FRONT FACE (FIGURE 6-29)	PRIMARY DATUM FOR FRONT DETAILS.
2.	-B-	MAINFRAME FRONT 'V' FEATURE (FIGURE 6-29)	SECONDARY DATUM FOR FRONT DETAILS.
3.	-C-	MAINFRAME FRONT LOCATION TAB (FIGURE 6-30)	TERTIARY DATUM FOR FRONT DETAILS.
4.	-D-	MAINFRAME GUIDE PIN (FIGURE 6-31)	TERTIARY DATUM FOR REAR DETAILS.
5.	-E-	MAINFRAME REAR FACE (FIGURE 6-31)	PRIMARY DATUM FOR REAR DETAILS.
6.	F-G	MAINFRAME GUIDE PIN PLANE (FIGURE 6-32)	SECONDARY DATUM FOR REAR DETAILS.

FIGURE 6-27. EXPLANATIONS OF MAINFRAME DATUMS

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MATERIAL LIST FOR MAINFRAME ASSEMBLY				
	ITEM	QTY	MAT'L DESCRIPTION	FIG #
RULE	20	1 PER SLOT	STUD, LATCH 70001-20039	6-43
RULE	21	1 PER SLOT	HOUSING, LATCH 70001-40013	6-44
RULE	22	1 PER SLOT	SPRING, LATCH 70001-20038	6-45
RULE	23	1 PER SLOT	RETAINER, LATCH 70001-60010	6-46
RULE	24	1 PER SLOT	PIN, MAINFRAME GUIDE	6-48
SUGGESTION	25	1 PER 4 SLOTS	GROUND SPRING, TOP FRONT	6-49
SUGGESTION	26	1 PER 4 SLOTS	GROUND SPRING, BOTTOM REAR	6-51
SUGGESTION	27	1 PER SLOT	GROUND SPRING, TOP REAR	6-50
RECOMMENDATION	28	1 PER SLOT	VIBRATION STOP	6-52
RULE	29	1 PER SLOT	CONNECTOR, MAINFRAME	6-53
RECOMMENDATION	30	2 PER SLOT	SCREW, FLAT HEAD, M3.0X25L	NONE
RULE	1	1 PER SLOT	O-RING	6-17
RECOMMENDATION	12	A/R	GREASE, STEM	NONE

70001-60010

70001-20026

70001-00033

70001-00035

70001-00034

70001-40003

Part of the 70001-60002

6040-0024

FIGURE 6-42. MATERIAL LIST FOR MAINFRAME ASSEMBLY

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