

# **Service Guide**

**HP 70911A**

**WB IF Section**



**HP Part No. 70911-90002**  
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*For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.*

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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.

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**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.

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**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.

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**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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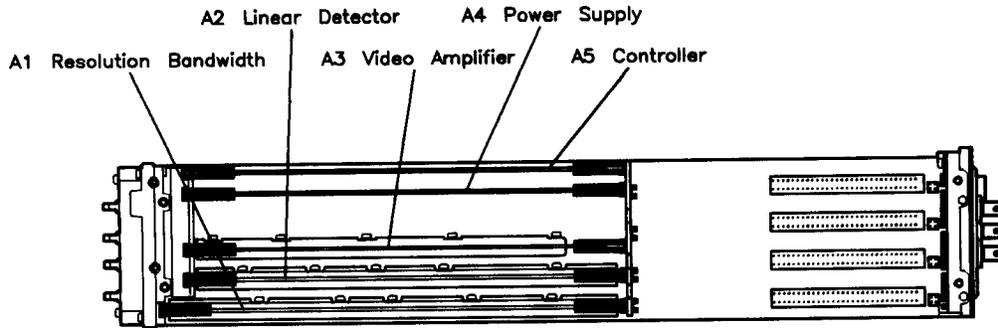
## General Safety Considerations

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- 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.
-

## Servicing at a Glance



st009

A general service kit is available which includes tools required to repair all HP 70000 series modules. The kit also includes a procedure for modifying HP 70000 mainframes. The modification allows access to modules during bench testing and repair. You can order the kit using HP part number 71000-60002. The following list shows some of the items contained in the service kit:

- A supply of 1.0A, 1.5A, 1.6A, 2.0A, and 6.3A fuses
- 8mm hex-ball driver
- Cable pullers
- Extender module
- Modified mainframe covers
- Pin straightener
- RFI gasket material
- 123 cm (48.4 in) 50Ω BNC(m) to SMB(f) cable
- 390 mm (12.2 in) SMB(f) to SMB(f) cable

In addition, when replacing instrument assemblies, you'll need the following tools:

- T-6 screwdriver ..... p/n 8710-1618
- T-8 screwdriver ..... p/n 8710-1614
- T-10 screwdriver ..... p/n 8710-1623
- T-25 screwdriver ..... p/n 8710-1617
- 5/64 allen driver

The HP 70911A WB IF Section is a module that is used in HP 70000 Series modular measurement systems. A standard modular receiver system includes a mainframe with an RF section, IF section, local oscillator, an optional display, and an optional precision frequency reference.

### **Software and documentation supplied**

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

- HP 70911A WB IF Section service guide.
- HP 70911A WB IF Section clip set.
- Module verification software disks.

### **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 your HP 70911A WB IF Section in an HP 70000 Series modular measurement system.

Each module in the HP 70000 Series modular measurement system has its own service guide. This service guide applies directly to HP 70911A WB IF Sections. 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 HP 70911A WB IF Section is serviced properly.

Chapter 2 contains information needed to use module verification software while servicing your HP 70911A WB IF Section.

Chapter 3 contains information to help identify and resolve some common problems that may occur with your HP 70911A WB IF Section before extensive servicing.

Chapter 4 contains information about troubleshooting your HP 70911A WB IF Section. 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 contains the setups for all module verification tests that are used to optimize module performance when assemblies are changed, repaired, or adjusted.

Chapter 8 contains system calibration information used to optimize module performance when assemblies are changed or repaired.

Chapter 9 contains procedures for removal and replacement of major assemblies in your HP 70911A WB IF Section. It also contains information needed to order mechanical parts for your HP 70911A WB IF Section.

Chapter 10 contains information on all overall parts identification drawings that should be used when performing the troubleshooting procedures described 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 HP 70911A WB IF Section 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.

**Before you begin servicing**, you must become familiar with module verification software. For information on how to use this module verification software, refer to Chapter 2.

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## **Getting Started**

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This chapter provides information to help get you started so that your HP 70911A WB IF Section 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 HP 70911A WB IF Section 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 HP 70911A WB IF Section; 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 HP 70911A WB IF Section
- or, if applicable, when upgrading firmware

If you determine that your HP 70911A WB IF Section needs servicing, you can perform the servicing yourself or, you can return your HP 70911A WB IF Section to a Hewlett-Packard service center.

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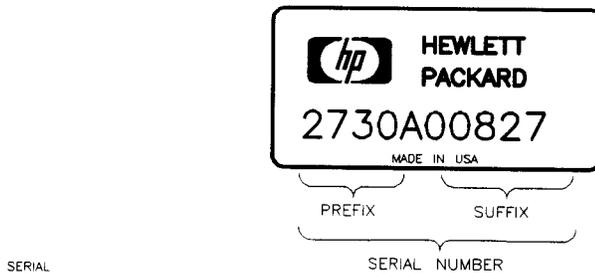
## If You Want Hewlett-Packard to Service Your HP 70911A WB IF Section

Before calling Hewlett-Packard or returning your HP 70911A WB IF Section 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 HP 70911A WB IF Section 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 HP 70911A WB IF Section'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 functionality is made. The serial number suffix, however, changes sequentially and is different for each module.



**Figure 1-1. Typical Serial Number Label**

**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

**Germany**

Hewlett-Packard GmbH  
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

**INTERCON OPERATIONS  
HEADQUARTERS**

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

## Returning Your HP 70911A WB IF Section for Service

Hewlett-Packard has sales and service offices around the world to provide complete support for your HP 70911A WB IF Section. 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 HP 70911A WB IF Section 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 HP 70911A WB IF Section

---

**CAUTION** Damage can result if the original packaging materials are not used. Packaging materials should be anti-static and should cushion the HP 70911A WB IF Section on all sides.

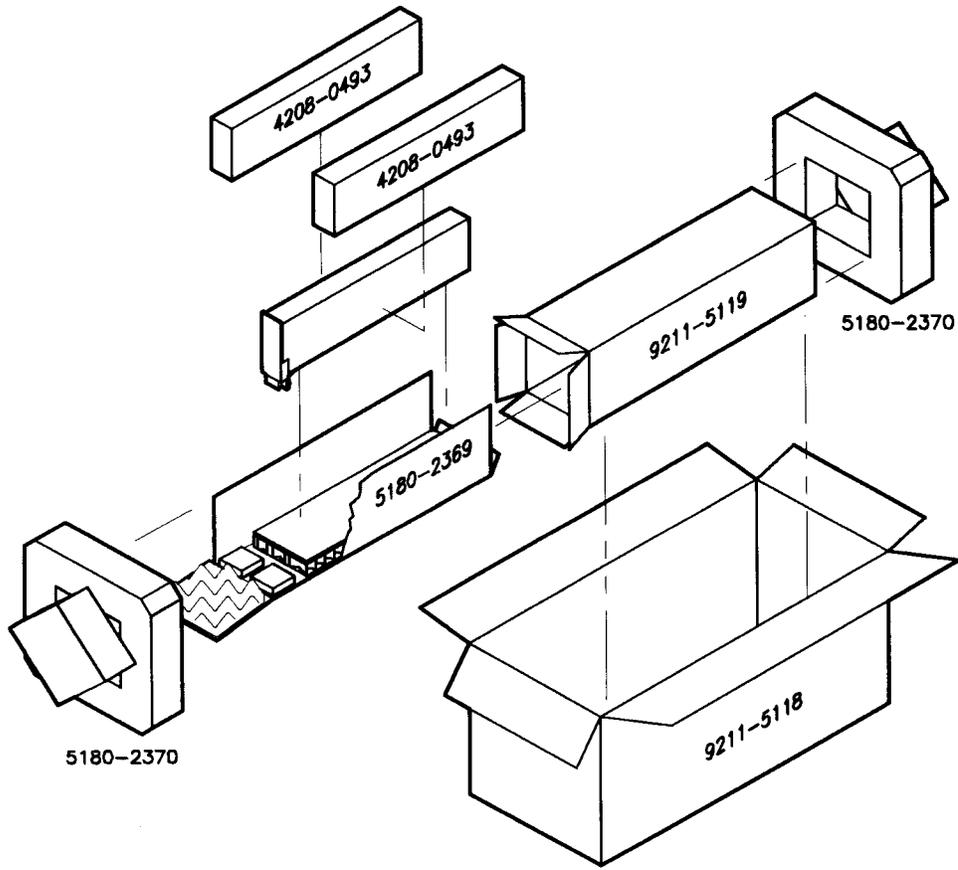
Never use styrene pellets in any shape as packaging materials. They do not adequately cushion the instrument or prevent it from moving in the shipping container. Styrene pellets can also cause equipment damage by generating static electricity or by lodging in fan motors.

---

2. Place the HP 70911A WB IF Section in its original packaging materials.

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 Corporation of Commerce, California, 90001.
3. Surround the HP 70911A WB IF Section with at least 3 to 4 inches of its original packing material or bubble-pack to prevent the HP 70911A WB IF Section from moving in its shipping container.
4. Place the HP 70911A WB IF Section, 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 HP 70911A WB IF Section 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.



packing1

**Table 1-2. Packaging for a 1/8 Module**

Item	Description	HP Part Number	Qty
1	Carton-outer	9211-5118	1
2	Carton-inner	9211-5119	1
3	Carton-sliders	5180-2369	1
4	Foam inserts	4208-0493	2
5	Foam pads	5180-2370	2

## Module Verification Software

---

Module Verification Software is a program that is designed to automate module verification tests and adjustment procedures. Included in this chapter is a step-by-step procedure to load the software and get the verification tests or adjustment procedures underway. For more detailed information, refer to the sections regarding individual menus.

This documentation supports Module Verification Software, Revision A.02.00 or greater. Use this software with slave modules that have an HP 70900A/B local oscillator source as a master. This software is controlled by a softkey-driven menu and user-interface screens. The disks included with this module provide programs that test whether the module meets its characteristics for system operation.

The *HP 70000 Modular Spectrum Analyzer Installation and Verification Manual* contains configuration information for predefined models of HP 70000 Series modular spectrum analyzer systems. The software automatically reads your system configuration data from the Hewlett-Packard Modular System Interface Bus (HP-MSIB) to determine which system or modules you are using.

---

## Computer Compatibility

Module Verification Software is written in HP BASIC 4.0 and can run on the following HP 9000 Series 200/300 controllers. Minimum RAM requirement is 2.5 megabytes.

HP 9816	HP 9920 (with HP 35721A monitor)
HP 9836	HP 9000 Series 300 controller

When using an HP 9000 Series 200 controller, a medium-resolution monitor and either an HP 98203C or an HP 46020A keyboard are required. A high-resolution monitor will preclude printing graphical test results. Due to the various keyboards supported, some minor text differences appear in the menus and softkeys displayed on-screen. (Refer to "Alternate Key Labels" for an explanation of keyboard differences.)

### Alternate Key Labels

For simplicity in this document, we assume that you are using an HP 9000 Series 200 controller keyboard. Refer to the list below if your keyboard key labels do not match the ones used in text.

**Keyboard Key Labels** ..... **Alternate Key Labels**

<b>EXECUTE</b>	.....	<b>RETURN</b>
<b>ENTER</b>	.....	<b>RETURN</b>
<b>RUN</b>	.....	press <b>SYSTEM</b> , then <b>RUN</b>
<b>CONTINUE</b>	.....	press <b>SYSTEM</b> , then <b>CONTINUE</b>

### Computer Language Compatibility

Module Verification Software runs on HP BASIC 5.0, or later, with the BIN files in RAM that are listed below. A procedure for loading HP BASIC is provided in "Installing Module Verification Software".

CLOCK	ERR	HPIB	MAT
CS80*	GRAPH	IO	MS
DISK†	GRAPHX	KBD	PDEV‡

\*Optional - supports Winchester disk drives.

†Optional - supports microfloppies and older Winchester disk drives.

‡Optional - provides debugging features for program development.

In a shared resource management (SRM) environment, the following BIN files are also required:

DCOMM  
SRM

---

**Note**      If you have set up some RAM memory for specific usage, be aware that this program uses RAM memory Volume “:MEMORY, 0, 15”. Move any information stored at this Volume to another location before running Module Verification Software.

---

### **Printer Compatibility**

Module Verification Software supports any HP-IB printer; however, many of the printed test results require a graphics printer. Graphical test results are not output to a non-graphics printer.

---

## Configuring the Hardware

1. Connect the HP 70000 Series modular spectrum analyzer system to the computer port determined by the following criteria:
  - For computers with an HP 98624A HP-IB interface, connect your spectrum analyzer to the port labeled HP-IB SELECT CODE 8. Check that the address switch on the HP 98624A HP-IB interface board assembly matches the HP-IB controller device address. If needed, refer to the *HP 9000 Series 200/300 controller Peripheral Installation Guide, Volume 1*.
  - For computers without an HP 98624A HP-IB interface, connect the HP 70000 Series modular spectrum analyzer system to the port labeled HP-IB SELECT CODE 7.
2. Connect the HP-IB cables from the test equipment to the computer's HP-IB SELECT CODE 7 port.
3. Use a 0.5 meter HP-IB cable (HP 10833D BNC 0.5 meter HP-IB cable, or similar cable) to connect the external disk drive's HP-IB to the HP-IB SELECT CODE 7 port.

---

**Note** Occasionally disk drives exhibit unpredictable behavior when sharing the HP-IB with instruments. If you find this occurring, connect the disk drive to a separate HP-IB interface.

---

4. Set the external test equipment and the HP 70000 Series modular spectrum analyzer system line switches to ON. Allow the equipment to warm up as specified for the verification tests or adjustment procedures.
5. Turn the disk drive (if used) and computer ON.

---

## Installing Module Verification Software

Use the following steps to get the program loaded and running. Later sections of this chapter contain more specific program-operation information.

Two assumptions are made with the Module Verification Software. One is that you are using standard HP-IB addresses for the active devices of the microwave test station. The second is that all passive devices for the microwave test station are available. If either of these assumptions is inaccurate, you are prompted for data during program execution.

1. View the version number of the software program after loading the first program disk.

Look in the right-hand side of the initial display. Specific numbers vary, but the version number looks like this: Rev. A.02.00

2. Locate the program part number printed on the disk labels.
3. Load HP BASIC 4.0 or later, with the appropriate binaries, into an HP 9000 Series 200/300 controller. If necessary, refer to an HP BASIC reference manual.

---

**CAUTION** Make backup copies of all write-protected disks. If the program data on an individual disk should become altered, it cannot be ordered separately. The entire set of disks must be ordered to replace any single disk.

---

4. Assign the MSI (mass storage is) to the drive you will use as the default drive. As an example, assigning the MSI to a disk drive looks like this: MSI ":,700,0"
5. Insert Executive Disk 1 into the assigned default drive. Type the following command line:  
LOAD "MOD\_VERF",1
6. Press **EXECUTE**. The software version number appears in the screen that is next displayed.
7. Follow the on-screen prompts and load Executive Disk 2. Press **CONTINUE**. Loading Executive Disk 2 may require up to two minutes.

---

**Note** Be sure the Executive Disk 3 you load is the disk that belongs with the module you wish to test.

---

8. Replace Executive Disk 2 with Executive Disk 3, then press **PROCEED**. If the date and time prompt appears, enter the date and time in the specified format. (This message appears only if date and time are not current.)
9. If you are using your module's software for the first time, a message appears stating that mass storage data is needed. Press **PROCEED** and follow the on-screen prompts to create a mass storage data file. Once mass storage data is stored, this message will not reappear.
10. An error message may be displayed at this point. If the DUT (device under test) does not match the module listed in the HP-MSIB Address Map, or if the software you are using belongs to another module of your system, refer to "Error Messages" at the end of this chapter to determine a course of action.
11. Load the Operating Disk as directed. The Operating Disk probably needs to remain in the drive specified as the MSI default drive. Load the Driver Disks into the drive specified on-screen.
12. Load all Driver Disks. Insert each Driver Disk and press **PROCEED**. This process may require up to six minutes.
13. If you have not entered serial numbers for passive devices that require calibration data for test purposes, on-screen prompts request the data now. Enter the data via the Calibration

Data screen. Press **CREATE** to access this screen. For a detailed explanation of entering calibration data, refer to "Edit Calibration Data" under "Menus" in this chapter. Enter the serial number for each device specified, or bypass the device to continue if it is not used now. After entering and storing data for passive devices, this prompt screen will not reappear.

---

**Note** In the future, you can access calibration data stored on Operating Disks, rather than enter the data for passive devices of a given serial number each time you begin testing. The program displays any additional passive devices requiring serial numbers and calibration data. Serial numbers are only required for passive devices that need their calibration data stored on the Operating Disk. You are prompted to enter serial numbers for these devices only.

---

14. You may perform any of the items listed below after satisfying the above conditions:

- Select **FINAL TEST** to perform procedures for which the required test equipment is present, automatically.
- Press **equipment menu** and return to the Equipment Menu. From here you can modify the status of the equipment in the menu (make it unavailable, readdress it, change the private bus, and so on). Refer to "Equipment Menu" under "Menus" in this chapter.
- Press **test menu** to choose between verification tests or adjustment procedures. If you have already entered either the verification test or adjustment menus, the screen allowing you to choose one or the other does not reappear. To retrieve the Test or Adjust selection screen, select **main menu** from the Test Menu softkeys. In the Main Menu, press **RESTART**. Be aware that pressing **RESTART** purges status information for any tests you have already run. You determine individual tests or individual adjustments to perform via the menu you select.
- Press **MAIN MENU** to customize your test process via any other menu.

---

## Module Verification Software Overview

### Testing Multiple Modules

Module Verification Software tests only one module at a time. If you have more than one module to test in your system, test them separately. If you have tested a module and want to change the module being tested without turning off the controller, follow the steps below.

1. Get to the Main Menu, then press **equipment menu**.
2. In the Equipment Menu edit screen, move the item indicator to the Device Model number column next to the Module Under Test.
3. Press **SELECT**, modify the model number, and press **ENTER**.
4. Press **DONE**, then **main menu**.
5. From the Main Menu, press **test menu**. If **ERROR MESSAGE: Selected instrument under test is ----**; but the software supports the ---- module appears, press either **RELOAD** and follow the on-screen prompts to load test software, or **CHANGE DUT** to gain access to the Equipment Menu or HP-MSIB Address Menu. From the Equipment Menu, you can select the module under test's model number and modify it to the module number of the software now loaded. From the HP-MSIB Address Menu, select the module to test that matches the software you already have loaded. Otherwise, press **ABORT**.

### Error Messages or Warnings Defined

There are three kinds of error messages or warnings generated by the program.

- One appears briefly at the bottom of the CRT display. The program then goes automatically to a menu that asks you for corrections or modifications.
- Another type of error message begins with **ERROR MESSAGE** and provides special softkeys. These errors are user-correctable and anticipated by the program. There is usually a **Possible Fix** message displayed to help you clear the problem.
- The final type begins with **ERROR** and provides no special softkeys. The message informs you of an unanticipated error. There is no suggested fix displayed. If you cannot recover from one of these errors, please contact your Hewlett-Packard Sales and Service Office.

### Final Tests Defined

Tests defined as Final Tests are a subset of all available verification tests for a given module. After *any* module-level adjustment or repair, run Final Tests. Once a module has passed the Final Tests, install it into any mainframe and expect performance within its specified characteristics. Perform tests classified as Additional Tests after troubleshooting or adjustments to be sure of the proper operation of specific assemblies. The **FINAL TEST** softkey has no defined purpose while performing adjustments.

## Single Tests Defined

You may select individual tests with this program. Refer to "Test Menu" under "Menus" in this chapter for a description of selecting individual tests. As explained in "Final Tests," specific assembly performance is checked by running assembly-associated performance tests.

## Printing Test Results

The program shows whether each procedure passed or failed. You may configure the computer operations to format and print test results via the Parameter Menu. If an HP-IB printer is on the bus and an address is provided in the Equipment Menu, and you configured the Parameter Menu to print test results, the program automatically prints the test results. The printout includes a title and summary page.

The title page lists the following data:

- Module software used and the test date.
- Serial number of the module tested.
- Firmware version of the module tested.
- Power line frequency.
- Test person's identification.
- Test equipment model numbers and names, addresses, and ID or serial number.

The Summary Page lists total test time beside the titles of tests performed. The Summary Page also includes test results beneath one of the following categories:

- Not all Final Tests have been completed . . . and so forth
- The following Final Tests need to be completed:
- The following tests showed insufficient performance:
- The following tests met the appropriate requirements:
- The following additional tests were not completed:

---

## Menus

### Menu Structure

The first menu presented allows you to go to the Main Menu, to begin Final Tests, or to return to the Equipment Menu. From the Main Menu, access any of the following menus:

- Main Menu
- Mass Storage Menu
- Parameter Menu
- Equipment Menu
- Edit Calibration Data
- HP-MSIB Address Menu
- Test Menu

Except for the Test Menu, these menus are configuration menus through which you initialize the software for program operation. Via these menus, you enter information about disk drives, environment conditions, test equipment, the module under test, and so on. Refer to the information following the menu name in this chapter for details.

In the Test Menu, you select and execute module-related procedures. The Test Menu provides some testing options. Refer to "Test Menu" in this chapter for details.

The Mass Storage Menu, the Parameter Menu, and the Equipment Menu have two menu screens. One is the edit screen, the other is the command screen. (The previously mentioned menus use only the command screen.)

- In edit screens, you can edit displayed data or input data to the screen.
- In command screens, you may perform various menu-specific functions, which include storing edited data, selecting test mode, accessing the help screen, accessing the Main Menu, and so on.

### Edit and Command Screen Menus

The following softkeys are present for menus that appear in Figure 2-1 through Figure 2-4. Not all of the menus have edit screens, but all have command screens. When softkey labels are written in lowercase letters, a sub-level softkey menu exists for that particular softkey. Softkey labels written in uppercase letters indicate there no further sub-level softkey menus exist for that softkey.

#### Edit Screen Menus

The following softkeys are present for edit menus that appear in Figure 2-1 through Figure 2-4.

**SELECT OR SELECT/TOGGLE** either one of these keys appears in the Edit Menu. **SELECT** activates the column item where the cursor is located, while **SELECT/TOGGLE** activates predefined choices in the menu.

**DONE** exits the edit screen, then displays the menu's command screen.

#### Command Screen Menus

The following softkeys are present for the command menus pictured in Figure 2-1 through Figure 2-4. An additional softkey, **edit cal data**, appears only in the Equipment Menu command screen. Refer to "Equipment Menu Command Screen" for information about this softkey.

- main menu** returns you to the "Main Menu." Refer to "Main Menu" in this chapter for details.
- EDIT** appears if there is an edit screen in the menu you are working in. Pressing this key returns you to the menu's edit screen.
- STORE** appears if you have data that needs to be stored on the OPERATING VOLUME. The HP-MSIB Address Menu does not require this softkey, therefore it does not appear in that command menu.
- CREATE** appears if you tried to store data without an existing file available. **CREATE** activates the store function and creates a file on the OPERATING VOLUME.
- REPEAT** appears if the correct Operating Disk containing calibration data is not in the disk drive. This key allows you to insert the Operating Disk into the disk drive and try again.
- ABORT** displays the Main Menu screen. **ABORT** is available in various special task screens but never in a menu screen. In general, pressing this key a time or two will display the Main Menu, which has a **quit** softkey.
- If the Main Menu has not appeared for the first time, pressing **ABORT** produces a message asking you to press **(RUN)**, which returns you to where you were when you pressed **ABORT**.
- HELP** accesses menu and softkey descriptions. Listed below are softkey selections and functions available via this softkey.
- NEXT PAGE** takes you to the top of the next available menu page.
- PREVIOUS PAGE** returns you to the top of the preceding menu page.
- PRINT HELP** generates a printout of help-screen information.
- DONE** returns you to the command or edit screen of the menu you were previously in.
- quit** displays the quit screen. This softkey is available only from menu command screens. After you press **quit**, you are asked if you really want to return to BASIC operating system. The following two softkey selections are available via the **quit** softkey.
- YES** stops the program, retains any data files you stored before pressing **quit**, and returns you to BASIC operating system. (You can press **(RUN)** to restart the program and return to the Main Menu. The program retains all previously entered and stored data.)
- NO** displays the edit screen of the previous menu, or the command screen if there is no edit screen.

### Cursor Keys and Menu Selections

When a cursor is present, use either the cursor arrow-keys or the RPG (rotary pulse generator) knob to position the cursor at the column item you wish to edit.

---

**Note**

In most cases, there are more selections available than are displayed on-screen. Be sure to move the cursor to the right and down as far as you can. **NEXT PAGE** and **PREVIOUS PAGE** keys are provided to speed your vertical searches.

---

## Main Menu

From the Main Menu screen you can access all other menus. There is no edit screen for this menu. Figure 2-1 illustrates the Main Menu softkey organization.

Aside from the common softkeys, there are two special softkeys presented in the Main Menu. One is **FINAL TESTS**, which begins the final test sequence for a module. The second is the **RESTART** softkey. Press **RESTART** to reconfigure the program and retest a module, or to test a different module. Pressing this key affects the test status column of both the Test Menu edit screen and HP-MSIB address screen. The remaining Main Menu softkeys include **mass storage**, **parameter menu**, and **equipment menu**. Each of these menus is explained in detail in their sections of this chapter.

If you have stored calibration data on another HP 70000 Software Product Operating Disk, replace your current Operating Disk with that one and access the data. Be sure to return the Operating Disk belonging with your module under test to the default drive.

## Mass Storage Menu

The BASIC operating system can use a number of mass storage devices. These include internal disk drives, external disk drives, and SRM systems. You are prompted to assign the areas where the program stores system and operation data. You do this by assigning Volume Labels to an **msus** (mass storage unit specifier). An **msus** is a string expression that points to a mass storage location. A mass storage Volume is composed of one or more files. Files are data items or subprograms. A Volume might consist entirely of files on a floppy disk, or some number of files on a small portion of a hard disk. The Mass Storage Menu lists Volume Labels that show the location of certain types of program information. These Volume Labels are explained below.

- **DATA** is where the test results are temporarily stored.
- **ERROR LOG** is where unanticipated errors are recorded for possible future use.
- **OPERATING** is where all the program data is stored.

The program retrieves specific information from the following Volume Labels:

- **SYSTEM** contains the Executive Disk 3 program code. There must be an **msus** assigned to this Volume Label.
- **OPERATING** contains the menu configuration files and calibration data.
- **DRIVER DISK** contains the driver instrument control program code. There must be an **msus** assigned to this Volume Label.
- **TEST DISK** contains the module performance tests programs.
- **ADJUST DISK** contains the module adjustment procedures.

Volume Labels each have a default **msus**. From the Mass Storage Menu, you can reassign the current **msus** or directory path designation to another designation. You cannot edit Volume Labels, but you may edit their **msus** designations and directory path data fields.

## Mass Storage Menu Edit Screen

The Mass Storage Menu softkeys and their functions are described below.

**SELECT** activates the column item where the cursor is located.

**DONE** exits the edit screen, then displays the Mass Storage Menu command screen.

1. Use either the keyboard arrow keys or the RPG knob to position the cursor next to the column item you wish to edit. The annotations `<=more` and `more=>` indicate that you must scroll the screen left or right to view off-screen column items.
2. Press **SELECT**. Key in the new location (msus or Directory Path). Press **ENTER** when data entry for the selected item is complete.

---

**Note** Leave the Directory Path field blank unless you are using an SRM system, or HP BASIC 5.0 (or later version) that uses directory path hierarchy.

---

3. Repeat steps 1 and 2 until you have finished editing. Press **DONE** to display the Mass Storage Menu command screen.

The Data Volume is predefined to use RAM DISK ":MEMORY,0,0". If this RAM disk is not initialized to at least 1040 records, or contains additional files not required by module verification, BASIC error 64 may occur. Either reinitialize the RAM disk or use the Mass Storage Menu edit screen to select another medium.

## Mass Storage Menu Command Screen

From the command screen, you can press **STORE** to save the edited data. Saving Mass Storage Menu data for the first time causes an error message prompting you to create a file. Do this simply by pressing **CREATE**.

Next, press **main menu** to return to the Main Menu screen, or press **EDIT** and return to the Mass Storage Menu edit screen.

## Parameter Menu

You may determine some operating conditions of the software program in the Parameter Menu. You can select the printer and its output parameters, decide whether you want the program beep feature on or off, include a message on the test-results output, and so on. Use the **SELECT/TOGGLE** softkey to select the parameter item and enter data, or toggle to a predefined state. The parameter items and their appropriate selections are defined below.

### Parameter Menu Edit Screen

Results sent to: Your choices are Screen or Printer. Press **SELECT/TOGGLE**.  
When Screen is displayed, the test results appear on the CRT.  
When Printer is displayed, test results are displayed on-screen and printed out.

Output Format: Your choices are Graph or Table. Press **SELECT/TOGGLE**. When Graph is displayed, test results are generated in a graph format if appropriate for the particular test results (a graphics printer is required if Printer and Graph are both selected). When Table is displayed, the test results are output in a table format.

- Printer Lines:** Lines allowed are from 50 to 70. Press **SELECT/TOGGLE**. Enter a number from 50 to 70 to set the number of lines per printed page.
- Line Frequency:** Valid frequency selections are 50 Hz, 60 Hz, and 400 Hz. Press **SELECT/TOGGLE** until the power line frequency for your system is displayed. The line frequency value affects some test results.
- Beeper to be activated:** Your choices are Yes or No. Press **SELECT/TOGGLE**. When **Yes** is displayed, the warning and time-lapse reminder beeps are activated. When **No** is displayed, the program's beep feature is disabled.
- Verify equipment on HP-IB:** Your choices are Yes or No. Press **SELECT/TOGGLE** to indicate your choice. **Yes** causes the program to verify the presence of each instrument on HP-IB at the address shown in the Equipment Menu. Select **No** to bypass this feature.
- Test person's ID:** Press **SELECT/TOGGLE**, then enter your name or ID number to include it on the output report.
- Number lines added:** Lets you include a printed message with the test results. Depending on the program, you can enter up to 30 lines, with no more than 30 characters per line. Enter the message you wish to have printed in this screen by selecting User Line.
- User Line:**
1. Position the cursor to the left-hand side of a User Line in the menu. Press **SELECT/TOGGLE**.
  2. The prompt, **Enter additional information**, appears. Type in your message (up to 30 characters per line), then press **(ENTER)**.
  3. After you have entered your message, reposition the cursor at **Number lines added:**. Enter the number of user lines your message occupies, then press **(ENTER)**.

### Parameter Menu Command Screen

Press **DONE** when you are finished with the Parameter Menu edit screen. The next screen displayed is the command screen. Press **STORE** to save any edited Parameter Menu data, **EDIT** to return to the edit screen, or **main menu** to return to the Main Menu screen.

Saving Parameter Menu data for the first time causes an error message. The message prompts you to create a file. Do this simply by pressing **CREATE**.

### Equipment Menu

The Equipment Menu edit screen displays a list of all the equipment required to test your DUT completely. Next to each DEVICE TYPE in the equipment list is a column labeled DEVICE MODEL for the model number, ADDRESS for the HP-IB address, SERIAL or ID NO. (for example, calibration lab number), and PRIVATE BUS for private bus designation (as for HP 8757C scalar network analyzers, and so on).

Chapter 4 contains a table of required test equipment. Using preferred models of test equipment assures the most complete verification and adjustment testing. Refer to Chapter 7 and Chapter 6 for individual test scripsions and test setups.

## Equipment Menu Edit Screen

From the Equipment Menu edit screen you can enter data about your test equipment. You cannot edit the DEVICE TYPE column.

You may use either the cursor arrow keys or the RPG knob to position the cursor at the column item you wish to edit.

1. Edit a DEVICE MODEL item by locating the cursor beside the model number you wish to edit. Press **SELECT**, type the model number, then press **ENTER**.
2. Edit an ADDRESS by locating the cursor beside the address you want to edit. Press **SELECT**, edit the address, then press **ENTER**. If the DEVICE MODEL has no address in the ADDRESS column, **Missing ETE** is included in the Status column next to the tests that required the device. Tests tagged with **Missing ETE** are not performed. Valid active device addresses are restricted to the following ranges:
  - 700 to 730 and 800 to 830 for an HP 70000 Modular Spectrum Analyzer master module.
  - 700 to 730 for any other device type.

These three-digit HP-IB address include the HP-IB select code and the actual HP-IB address. For example, an HP 70000 Series modular spectrum analyzer system HP-IB select code of 8 and an HP-IB address of 21 yields an address of 821. The addresses of DUTs that function as slaves should match their master device's address.

Address passive devices (non-programmable devices such as sensors, directional bridges, and detectors) as either **Available** or **Not Available**. For some of the passive devices, entering **Available** in the address column requires entering calibration data and a serial number for the device. The calibration data for a passive device is stored on Operating Disks.

Passive devices tagged **Not Available** in the address column cause **Missing ETE** to be printed next to the test names on the test results that are output for any procedure that required the missing device. Tests tagged with **Missing ETE** are not performed.

3. Edit a SERIAL NUMBER by locating the cursor beside the serial number. Press **SELECT**, enter the new serial number (10 digits or less), then press **ENTER**. Some passive devices that have **Available** displayed in the address column must also have a serial-number entry.
4. Enter 19 in the PRIVATE BUS column if you are to use a Microwave or Full Microwave source with a network analyzer. Configure these instruments by connecting the source's HP-IB cable to the network analyzer's SYSTEM INTERFACE connection.
  - a. Move the cursor through the DEVICE TYPE column until you reach the Full Microwave or Microwave source, then move horizontally to the PRIVATE BUS column.
  - b. Enter 19 and press **ENTER**. The program enters the ADDRESS column data for the selected source when 19 appears in the PRIVATE BUS column. Nineteen is the only allowable address for sources on a private bus. Refer to the network analyzer's manual for addressing information.

## Equipment Menu Command Screen

After you have finished editing the Equipment Menu, press **DONE** to enter the Equipment Menu command screen. Press **STORE** to save the edited data.

Saving Equipment Menu data for the first time generates an error message prompting you to create a file. Do this simply by pressing **CREATE**.

This command screen displays the following additional softkeys:

**edit cal data**

displays the Select Passive Device screen. From this screen, move the cursor to the passive device that needs its calibration data edited. Press **SELECT**, then enter the required data. Refer to "Edit Calibration Data" in this chapter for more information.

**NO ADDRESS**

appears only if the program cannot find an instrument at a specified HP-IB address. To check which instruments are not responding, follow the steps below.

1. Access the Equipment Menu edit screen.
2. Scroll the ADDRESS column for flashing addresses, then be sure that the instrument is on.
3. **SELECT** the flashing address and either correct the address or press **NO ADDRESS** to delete all fault-addresses from the edit menu.

---

**Note**

Either exiting the Equipment Menu or entering the Test Menu causes the program to search the addresses in the Equipment Menu for instruments assigned to HP-IB, if this feature is selected in the Parameter Menu.

---

4. Press **main menu** to return to the Main Menu, or **edit cal data** to enter calibration data for passive devices. Pressing **edit cal data** displays the Select Passive Device screen. Refer to the following section for more information.

**Edit Calibration Data**

The Select Passive Device screen displays all passive devices needing calibration data entered. Press **edit cal data** to enter the Select Passive Device screen. The program requires calibration data for some of the passive devices listed in the Equipment Menu edit screen.

---

**Note**

Selecting a passive device needing a serial number generates a prompt requesting that you enter the number via the Equipment Menu. If you have formerly entered calibration data for a passive device of a given serial number and you would rather not reenter the data, replace your current Operating Disk with one containing data for passive devices from previous testing. Press **REPEAT** to access the calibration data from that disk. If you only need to enter the passive device's calibration data, press **CREATE** to enter the Edit Calibration Data screen, then begin at step 4.

---

1. Locate the cursor beside the device and press **SELECT**. The next screen displayed allows you to delete or edit data related to the passive device.

---

**Note**

Not all frequencies are listed on the screen at once. Be sure to enter calibration data for frequencies listed on the next pages of the display.

---

2. If you edit the factory default FREQUENCY or CAL FACTORS values, enter valid calibration factors for each frequency edited.

---

**Note** For power sensors, you must enter a frequency and calibration factor for 10 MHz and 300 MHz, even if the device has no factor listed at 10 MHz or 300 MHz. Enter the values from the list of valid factors, below. Other frequencies outside the normal range of the device may also be required. Prior to using your device, you may need to calibrate it at these frequencies to ensure accurate measurement results.

---

<b>Passive Device</b> .....	<b>Calibration Factors</b>
Mixers .....	16 to 24 dB
Directional Couplers .....	8 to 11 dB
Noise Sources .....	12 to 16 dB
Sensors .....	0.3 to 1.6 (stored as a percentage by the program)

**Edit Calibration Data Edit Screen**

1. Move the cursor to a column item and press **SELECT**. Enter the new frequency or calibration factor, then press **ENTER**. (It is not necessary to enter new frequency values in numeric order. The program sorts them before storing them on the Operating Disk.)
2. To delete an item, move the cursor to the column item. Press **SELECT**, clear the line, then move to another item. Repeat the above process as needed to edit frequency values or calibration data for any passive devices.

**Edit Calibration Data Command Screen**

1. After you have entered the necessary data, press **DONE**. The Equipment Menu command screen is displayed.
2. From the command screen, you can press **main menu** when you are ready to continue with the program.

**HP-MSIB Address Menu**

The HP-MSIB Address Menu lists the names and HP-MSIB addresses of the modules in the HP 70000 Series modular spectrum analyzer system that you may select to test. The HP-MSIB address of the master and the system are the same. In other words, the address of the master module determines the address of the system. For information on configuring the software to test a specific module, refer to "Equipment Menu" in this chapter.

There is no edit screen for this menu. The command screen has a **SELECT MODULE** softkey but requires no **STORE** softkey. Locate the cursor next to the module you wish to test. Press **SELECT MODULE**. Be sure the module selected here matches the **Module Under Test** listed in the Equipment Menu.

**Test Menu**

Pressing **test menu** from the Main Menu screen accesses the Test or Adjust selection screen. If **ERROR MESSAGE: The \_\_\_\_ is listed as the DUT in the Equipment Menu, but the \_\_\_\_ is selected in the HP-MSIB Address Menu** appears, the possible fix information suggests you select either **MODIFY MODULE** to enter new ROM data or **CHANGE DUT** to select the module you wish to test.

If you press **MODIFY MODULE**, on-screen commands help you change the model and serial number to the module you want to test. If you press **CHANGE DUT**, go either to the Equipment

Menu to change the model number or to the HP-MSIB Address Map to select the module number you want to test.

To begin the testing process, select **TEST** to run verification tests or **ADJUST** to perform adjustments procedures. Press **main menu** to return to the Main Menu.

If you have pressed **FINAL TEST**, and wish to get to the adjustment procedures, press **main menu**, **RESTART**, **TEST MENU**, then **ADJUST**. If you are in the adjustment procedures and want to get to the verification tests, press **main menu**, **RESTART**, **TEST MENU**, then **TEST**.

---

**CAUTION** Pressing either **RESTART** or **equipment menu** any time after testing begins purges Test Menu Status column information. Selecting a new module to test in the HP-MSIB Map Screen Menu also deletes the Status column data. The assumption is that verification-test status will most likely be modified if you are moving between modules, ETE model numbers, or to the adjustment procedures.

---

After selecting **Tests**, the names of the verification tests are displayed. Review the Status column for tests performed.

Additional test equipment is required to perform tests beside which **Missing ETE** is listed. To review which additional test equipment is required, locate the cursor beside the test name, then press **SINGLE TEST**. The Missing ETE screen displays the missing test equipment for that test.

A message stating that calibration data for passive devices is missing may also appear. If the correct Operating Disk is in the default drive, store the calibration data there. Press **CREATE** to build the data file. After the problem is cleared, the Test Menu is displayed.

### Test Menu Command Screen

The Test Menu only has a command screen. It deviates from the command screen formats previously described. The following list defines the softkeys available in this menu.

**FINAL TEST** begins a sequence of final tests, which are a subset of verification tests. A full calibration requires all verification tests. Review the Test Menu Test Name list for all available tests. During the final test sequence, the keys listed below are also available.

**END SEQUENCE** interrupts the test sequence at the end of the test in progress. The Test Menu is displayed with an additional softkey labeled **RESUME TESTING**. Press this key to resume the test sequence where the program left off.

**ABORT** ends the testing process and displays the Test Menu. From there you may choose some other action.

**RESUME TESTING** allows you to continue the final test sequence after you have pressed **FINAL TEST** followed by **END SEQUENCE**.

**SINGLE TEST** lets you select an individual test to run. If **Missing ETE** is listed in the Status column, you can review which test equipment is missing. Locate the cursor beside that test name, then press **SINGLE TEST**. The Missing ETE screen is displayed. If you choose to return to the Test Equipment Menu via the Test Menu to install the missing test equipment, you lose

the status of any tests that have run. To run a single test that has the necessary ETE, locate the cursor beside the test name and press **SINGLE TEST**.

#### multiple test

softkey lets you organize a group of tests sequentially. Locate the cursor beside the test you want to run. Press **SELECT** to assign the first number of the series to that test. Continue to locate the cursor and press **SELECT** until you have organized the tests you want to run. Press **END LIST** when you are ready to begin testing. During testing, the following softkeys are also available.

**END SEQUENCE** interrupts the test sequence at the end of the test in progress, then displays the Test Menu.

**ABORT** ends the testing process and displays the Test Menu. From there you may choose some other action.

#### repeat mult.

softkey allows you to select a test sequence (you determine the quantity and order). The tests loop through this sequence until you decide to stop them. Locate the cursor beside the test you want to run, press **SELECT**, move the cursor to the next test, press **SELECT**, and so on. Continue selecting tests until you are ready to begin testing. It is acceptable to select the same test for repeated testing. Press **END LIST** to start the test sequence. During testing, the following softkeys are also available.

**END SEQUENCE** interrupts the test sequence at the end of the test in progress, then displays the Test Menu. **ABORT** ends the testing process and displays the Test Menu. From there you may choose some other action.

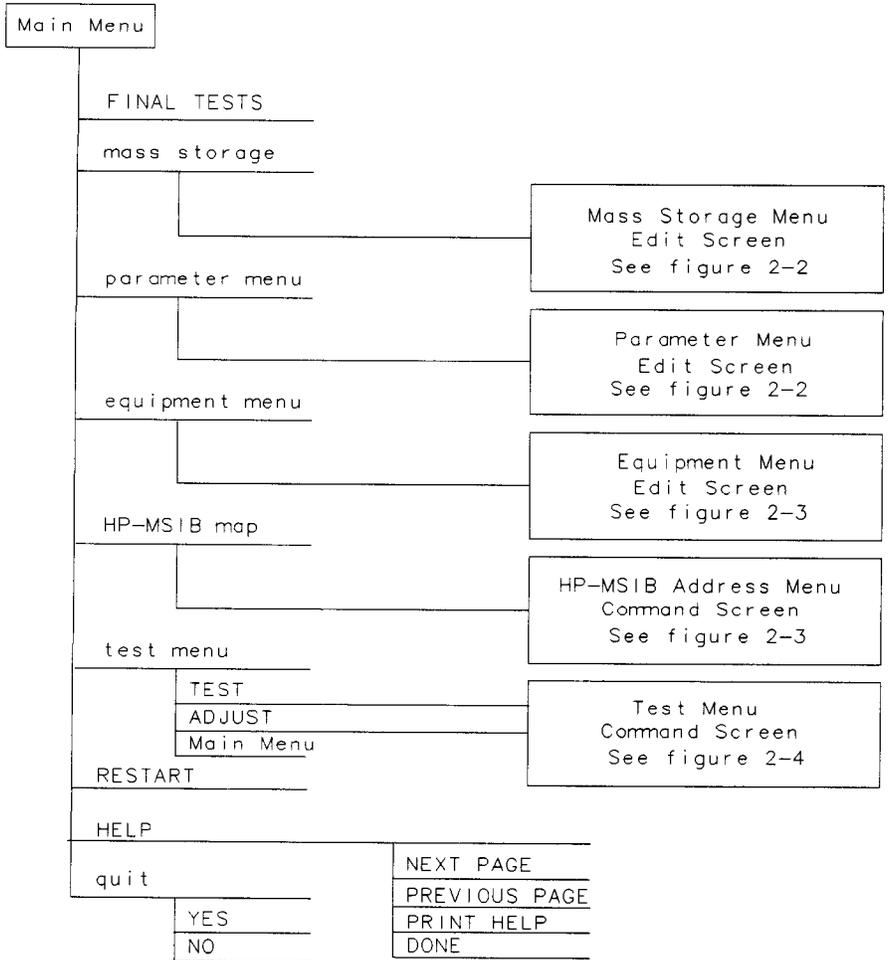
#### more keys

toggles between **SUMMARY**, **select output**, and **PURGE CAL DATA** and the previously explained Test Menu command screen softkeys.

**SUMMARY** gives you a printout of the current tests run.

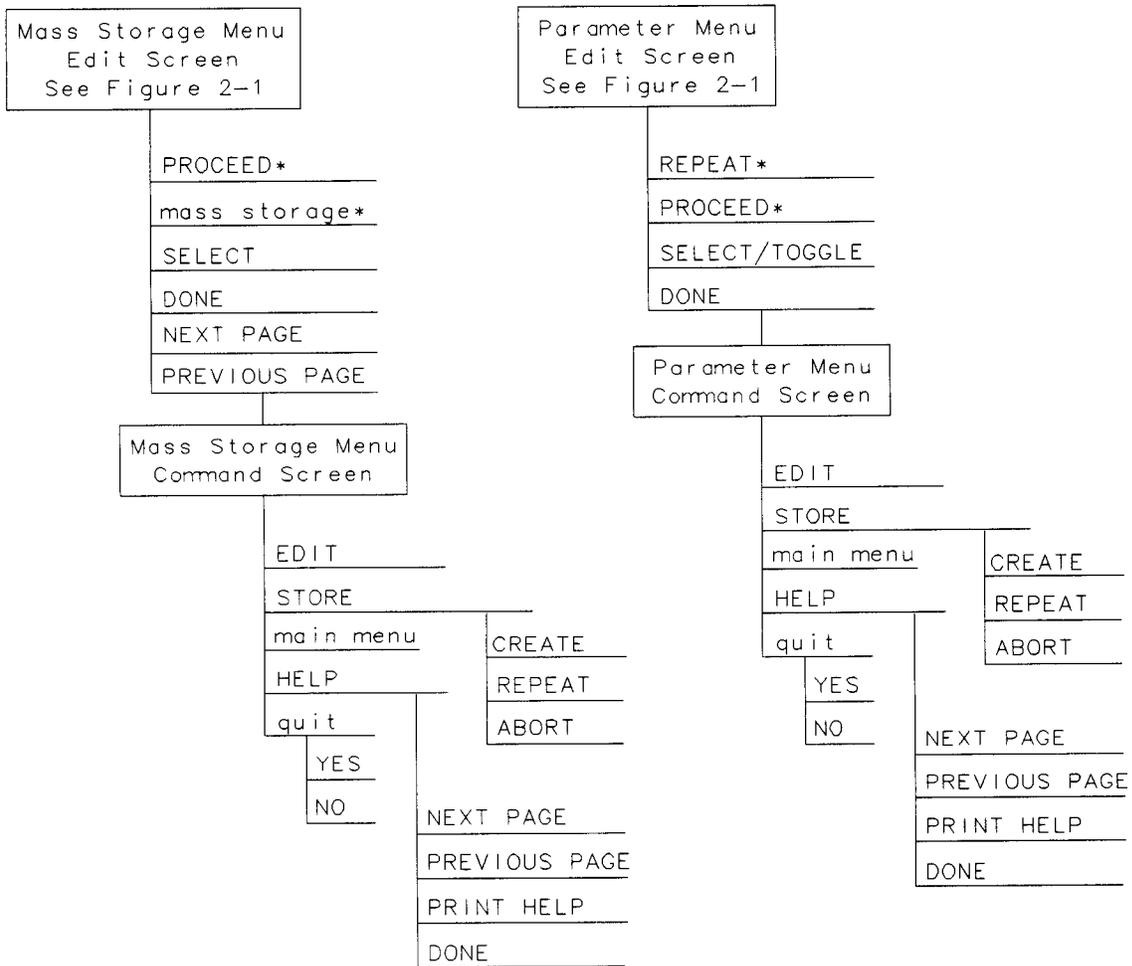
**select output** chooses an output device. You can print test results by pressing **PRINTER**, or you can print the current display by pressing **SCREEN**. Press **RETURN** to return to the previous set of softkeys in the Test Menu command screen.

**PURGE CAL DATA** Pressing this softkey deletes stored calibration data for the spectrum analyzer and any other calibration routines used for testing. Before module verification tests can be run again, equipment calibration routines have to be redone.



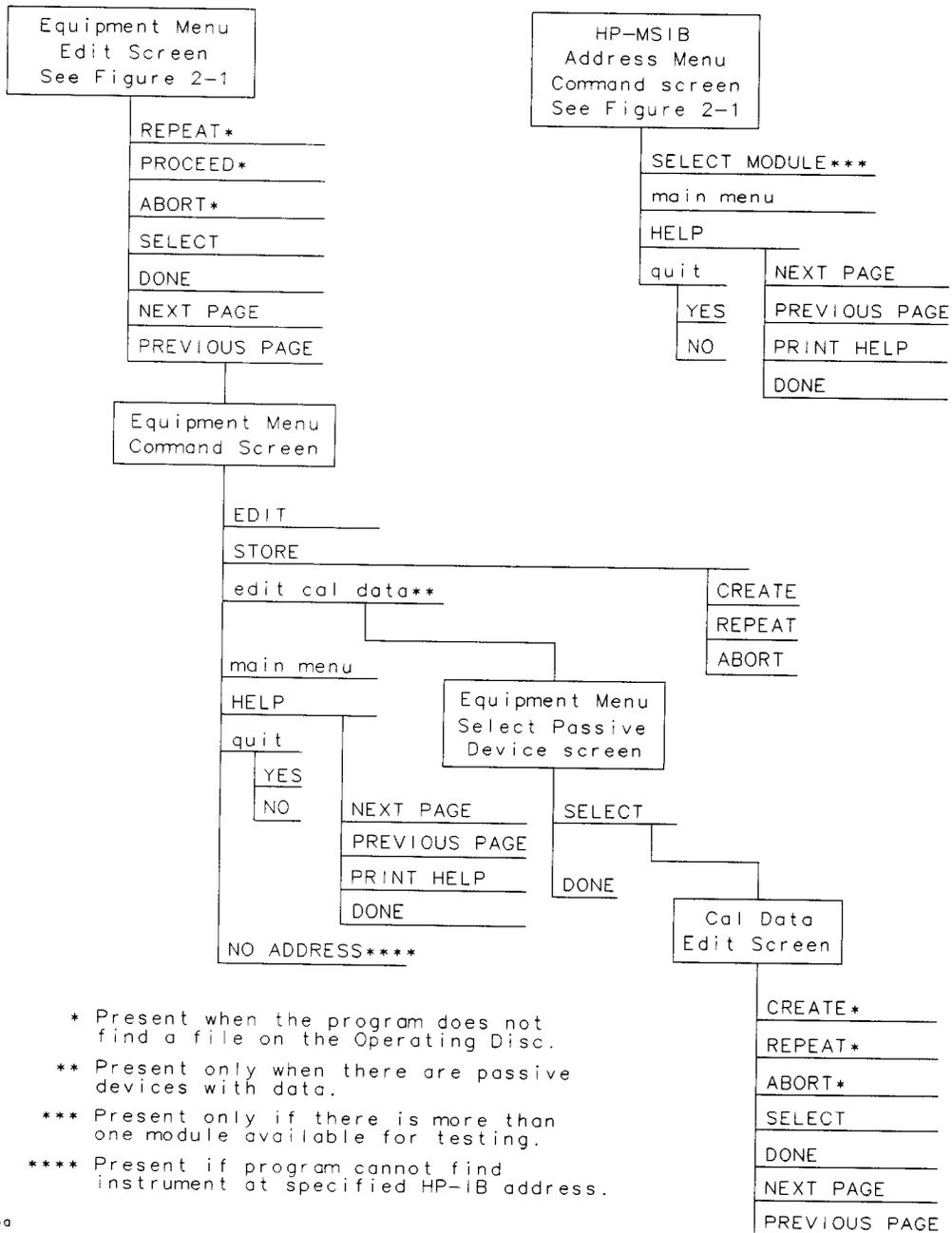
sja4a

**Figure 2-1. Main Menu Softkeys**

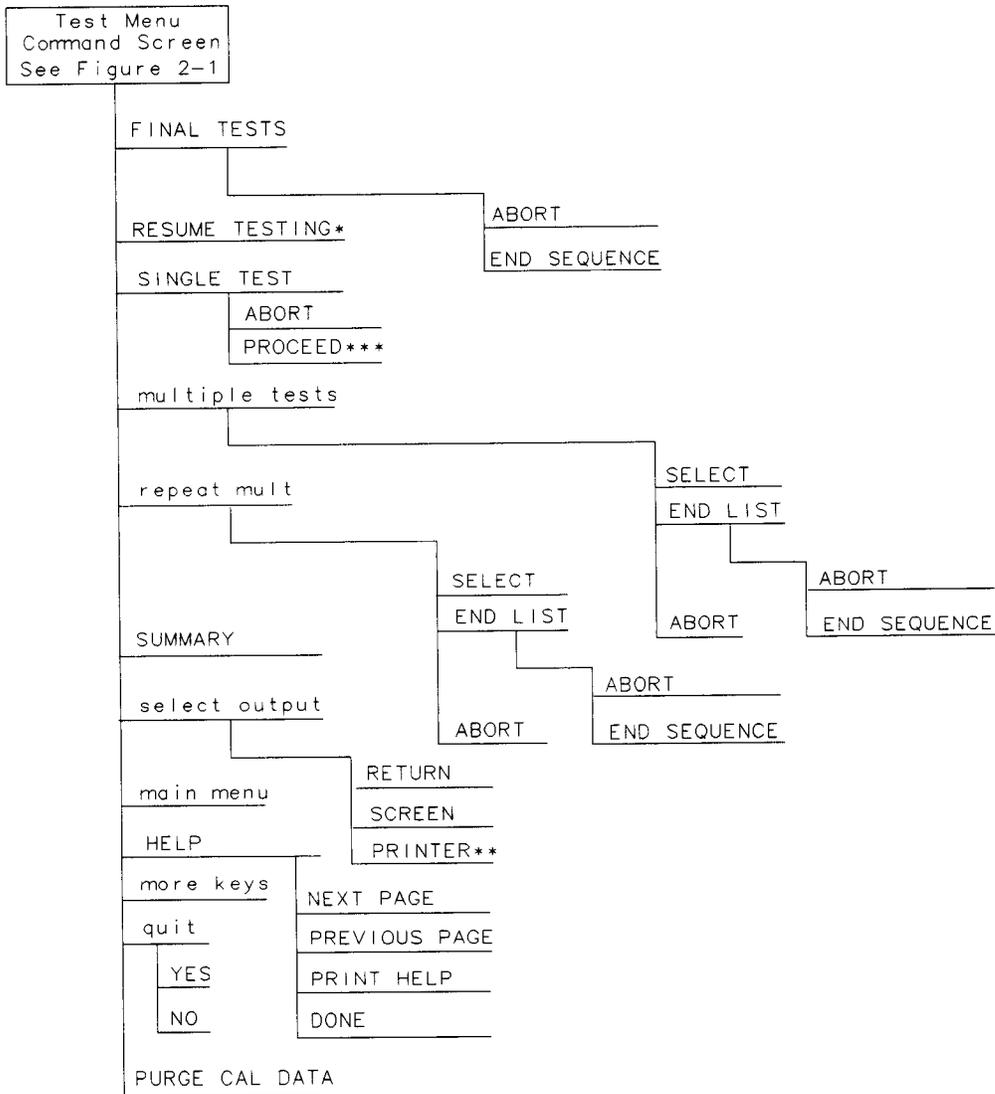


\* Present when the program does not find a file on the Operating Disc.

**Figure 2-2. Mass Storage Menu and Parameter Menu Softkeys**



**Figure 2-3. Equipment Menu and HP-MSIB Map Screen Menu Softkeys**



\*Present only if END SEQUENCE was previously selected for FINAL TESTS.  
 \*\*Present only if a printer address is available in Equipment Menu.  
 \*\*\*Present when you've selected SINGLE TEST for a test having Missing ETE in the status column.

sj07a

**Figure 2-4. Test Menu Softkeys**

---

## Error and Status Messages

User interface messages used with HP 70000 Series software products are alphabetized in this section. The messages are designed to provide information about test results, operator errors, and system conditions. Refer to your *HP BASIC Language Reference* for system error information.

### Aborted

You aborted the test indicated.

EEPROM for \_\_\_\_ is defective.

The EEPROM needs to be replaced.

### Failed

The module under test needs adjustment or repair to pass the test number indicated.

CAUTION: Passthru address is incorrect. (See Edit Screen).

The address of the microwave source is not set to 19, or the address specified in the Equipment Menu does not match the address of the synthesized source. Return to the edit screen of the Equipment Menu to modify addresses in either the address column or the private bus column.

CAUTION: Some Model #'s are not supported. (See Edit Screen).

You have model numbers in the Equipment Menu that are not supported by the software. Ignore this caution if you are sure program memory contains a driver for these models. A driver that is required but missing causes the error message Undefined function or subprogram to appear on-screen. You are returned to the Test Menu.

Equipment list is not acceptable.

You attempted to enter the Test Menu, but the program could not locate all the instruments for which you have specified HP-IB addresses. Verify that the indicated equipment is turned on, then return to the Equipment Menu edit screen to verify accuracy of addresses that are flashing in either the address column or the private bus column.

Equipment list shows no analyzer to test.

The DUT has no assigned HP-IB address. Return to the Equipment Menu and edit the Address column.

ERROR: Address matches system disk drive.

You entered an HP-IB address matching that of the computer's external disk drive. HP-IB protocol allows only one instrument per address.

Address not in acceptable range.

You entered an HP-IB address outside the range 700 to 730, inclusive.

ERROR: Duplicate HP-IB address.

You attempted to exit the Equipment Menu after assigning the same HP-IB address to different model numbers. HP-IB protocol allows only one instrument per address. (It is acceptable to assign the same address to identical model numbers, implying multiple use of the same instrument.)

ERROR: Non-responding HP-IB address.

You attempted to exit the Equipment Menu after assigning an HP-IB address to an instrument not responding on HP-IB.

ERROR: Search for \_\_\_\_ unsuccessful.

The program tried to find the disk identified but could not. Either assign a drive to the disk and press **REPEAT** or insert the required disk into its appropriate drive. Press **REPEAT**.

ERROR: Some devices listed as Available require serial numbers.

You pressed **View Cal Data**, then selected a device to which you have not assigned a required serial number. Display the Equipment Menu edit screen and assign the serial number.

ERROR MESSAGE: Address is HP-IB controller address.

You entered an HP-IB address matching the computer's address. HP-IB protocol allows only one instrument per address.

ERROR MESSAGE: Attempt to close file \_\_\_\_ failed.

There is a problem with the data file on the Operating Disk. Correct the problem, then do one of the following:

- Press **REPEAT** to try again.
- Press **CREATE** to create a new file.
- Press **ABORT** to return to the Main Menu.

ERROR MESSAGE: Attempt to create file \_\_\_\_ failed.

There is a problem with the data file on the Operating Disk. Correct the problem, then do one of the following:

- Press **REPEAT** to try again.
- Press **CREATE** to create a new file.
- Press **ABORT** to return to the Main Menu.

ERROR MESSAGE: Attempt to Edit Mass Storage failed.

Your edits to the Mass Storage Menu were not valid. Return to this menu and correct the errors.

ERROR MESSAGE: Attempt to store Mass Storage failed.

You pressed **ABORT** after pressing **STORE** mass storage. The Mass Storage Menu failed. Press **ABORT** to return to the Main Menu.

ERROR MESSAGE: Bad instrument address in equipment list. Address matches controller.

You entered an HP-IB address matching that of the controller. HP-IB protocol allows only one instrument per address and only one controller per HP-IB system. (The factory preset controller address is 21.)

ERROR MESSAGE: Calibration data frequency exceed acceptable limits.

Return to the Calibration Data edit screen and correct the data entries that are flashing.

ERROR MESSAGE: Calibration data frequency is less than minimum range of \_\_\_\_.

The frequency entered next to the device in the Cal Data edit screen is out of the device's operating range. The return to this screen is automatic. Enter valid frequencies for the values that are flashing.

ERROR MESSAGE: Calibration data frequency is greater than maximum range of \_\_\_\_.

The frequency entered next to the device in the Cal Data edit screen is out of the device's operating range. The return to this screen is automatic. Enter valid frequencies for the values that are flashing.

ERROR MESSAGE: Calibration data for \_\_\_\_ is blank for some frequencies listed.

Return to the Calibration Data edit screen to enter the calibration data for frequencies indicated with flashing markers.

ERROR MESSAGE: Calibration data for \_\_\_\_ is less than minimum range of \_\_\_\_.

The factor entered next to the device in the Cal Data edit screen is out of the device's operating range. The return to this screen is automatic. Enter valid values for the ones that are flashing.

ERROR MESSAGE: Calibration data for \_\_\_\_ is greater than maximum range of \_\_\_\_.

The factor entered next to the device in the Cal Data edit screen is out of the device's operating range. The return to this screen is automatic. Enter valid values for the ones that are flashing.

ERROR MESSAGE: Calibration data file not found for \_\_\_\_ with serial number \_\_\_\_.

The data file cannot be found or there is a problem with the data file on the Operating Disk. Correct the problem, then either press **REPEAT** to try again or press **CONTINUE**.

ERROR MESSAGE: DUT does not have an address.

You attempted to leave the Test Equipment Menu, but the program cannot verify the DUT at the specified HP-IB address. First check the address. If the address is correct, cycle the main power of the system under test.

ERROR MESSAGE: DUT was not at address in the equipment list. DUT was expected at address \_\_\_\_.

The DUT is not at the specified address, or HP-IB is at fault, or main power is off on the DUT. Press **ABORT**, then return to the Equipment Menu to verify the address.

ERROR MESSAGE: DUT was not found at address in equipment list.

The address specified for the DUT is not valid. Press **ABORT**, then return to the Equipment Menu to verify the address.

ERROR MESSAGE: Equipment address matches external disk drive.

You entered an equipment address matching that of the external disk drive. HP-IB protocol allows only one instrument per address.

ERROR MESSAGE: Equipment Menu data not found on \_\_\_\_.

The program could not find the Equipment Menu data file on the Operating Disk. Possible Fix instructions appear with the on-screen error message. If the data file is available in a location other than the one currently specified in the Mass Storage Menu, return to that menu and change the msus and/or the directory path of the Operating Disk. It may also be that the Operating Disk accessed by the program is not the one containing the Equipment Menu file. Insert the correct Operating Disk, then press **REPEAT** or **CONTINUE**.

ERROR MESSAGE: Equipment does not have an address.

There is no address assigned to the DUT. Return to the Equipment Menu edit screen and verify or enter an address in the Address column.

ERROR MESSAGE: ERROR XXX in XXXXX \_\_\_\_ .

An unanticipated occurrence in the program caused a program failure. For clarification, call your Hewlett-Packard Sales and Service Office.

ERROR MESSAGE: File \_\_\_\_ not found while assigning I/O path.

You attempted to **STORE** a list (equipment, mass storage, or parameter) for the first time on the current Operating Disk. Possible Fix instructions appear with the on-screen error message. Follow the on-screen instructions or return to the Mass Storage Menu to change the location of the Operating Disk.

ERROR MESSAGE: Incorrect Volume found. \_\_\_\_ required.

The wrong disk is in the required storage medium. Either correct the fault and press **REPEAT** to retry, or select **mass storage** to return to the Mass Storage Menu. From here you can indicate a different mass storage drive.

ERROR MESSAGE: Parameter Menu data not found on \_\_\_\_.

The program could not find Parameter Menu data file on the Operating Disk. Possible Fix instructions appear with the on-screen error message. If the data file is available in a location other than the one currently specified in the Mass Storage Menu, return to that menu and change the msus and/or the directory path of the Operating Disk. It may also be that the Operating Disk accessed by the program is not the one containing the Parameter Menu data file. Insert the correct Operating Disk, then press **REPEAT** or **CONTINUE**.

ERROR MESSAGE: Read \_\_\_\_ data from file \_\_\_\_ failed.

There is a problem with the data file on the Operating Disk. Correct the problem, then either press **REPEAT** to try again or **CONTINUE** to use default values.

ERROR MESSAGE: Selected instrument under test is \_\_\_\_; but the software supports the \_\_\_\_.

The module entered in the HP-MSIB map is not currently supported by software. Either load the correct software or select a different module in the Equipment Menu or HP-MSIB Map Menu.

ERROR MESSAGE: Sensor model # \_\_\_\_ not supported.

Software does not support the sensor model number entered for the Signal Sensor in the Equipment Menu. Return to the Equipment Menu and select a sensor with a model number that is supported. (Refer to Chapter 5 for a list of supported equipment.)

ERROR MESSAGE: Test Parameter data file not found on \_\_\_\_.

The program could not find parameter-list data file on the Operating Disk. Possible Fix instructions appear with the on-screen error message. If the data file is available in a location other than the one currently specified in the Mass Storage Menu, return to that menu and change the msus and/or the directory path of the Operating Disk. It may also be that the Operating Disk being accessed by the program is not the one containing the parameter-list data file. Insert the correct Operating Disk, then press **REPEAT** or **CONTINUE**.

ERROR MESSAGE: The \_\_\_\_ is listed as the DUT in the Equipment Menu, but the \_\_\_\_ is selected in the HP-MSIB Address Menu.

The DUT and the model selected in the HP-MSIB Address Map do not agree. You are given suggested fix instructions either to modify the module or change the DUT.

ERROR MESSAGE: The Operating Disk is write protected.

Make a working copy of the Operating Disk and store the original in a safe place, or remove the write-protect.

**ERROR MESSAGE:** Too many Cal Data frequencies were eliminated. There must be at least two frequencies.

Only one Cal Frequency remains in the Cal Data edit screen. Return to that screen and enter more frequencies in the Frequency column.

**ERROR MESSAGE:** Write \_\_\_\_ data to file \_\_\_\_ failed.

There is a problem with the data file on the Operating Disk. Correct the problem, then do one of the following:

- Press **REPEAT** to try again.
- Press **CREATE** to create a new file.
- Press **ABORT** to return to the Main Menu.

**ERROR MESSAGE:** Wrong device at specified address. DUT was expected at address \_\_\_\_.

The address specified for the DUT is actually that of a test instrument. Possible Fix instructions appear with the on-screen error message. If necessary, return to the Equipment Menu.

**ERROR MESSAGE:** \_\_\_\_ Volume was not located.

The program cannot access the listed Volume. If the Volume is correct, press **REPEAT** to retry. If the Volume is incorrect, press **mass storage** to return to the Mass Storage Menu. From here you can indicate a different mass storage medium for the Volume in question.

**FORMAT ERROR:** Observe date format and character position.

You entered the date/time in an unacceptable format. Enter date/time in the format dd mmm yyyy and hh:mm, then press **(ENTER)**.

**Hdw Broken**

Actual test results far exceed the expected results. This is often an indication of a hardware failure (hardware broken) or incorrect connections.

**Logging errors to ERRORLOG failed. Operating Disk is write protected.**

The program tried to store error data onto the Operating Disk and could not because of the write-protect. Make a working copy of the Operating Disk and store the original in a safe place, or remove the write-protect.

**KEYBOARD SYSTEM CRASH WITH KEYBOARD: \_\_\_\_.**

The software program does not support the current keyboard. Install a keyboard having one of the part numbers listed at the beginning of this chapter, then restart the program.

**Passed**

The module meets the tested characteristics. **PAUSED. PRESS CONTINUE.**

You pressed **(PAUSE)** on the computer keyboard. Press **(CONTINUE)** to resume program execution.

**PRGM ERROR**

The program detected an error within itself. For clarification contact Hewlett-Packard Signal Analysis Division.

**Reading errors from ERRORLOG failed. Check disk at \_\_\_\_.**

The program tried to read error data from the Operating Disk. Check that the Operating Disk is installed in the drive specified in the error message.

Return to Equipment Menu to enter serial number for \_\_\_\_.

You must return to the Equipment Menu edit screen and enter a SERIAL or ID NO. for the passive device selected before you can edit the device's calibration data.

#### Setup Error

The program aborted the test after attempting to verify the test setup. Ensure that all required ETE is present, has been turned on, and is properly connected.

SORRY, but your SERIAL NUMBER must end in a NUMERIC -- This is \_\_\_\_.

Contact Hewlett-Packard Signal Analysis Division for assistance.

Test can not be done.

Required ETE is missing. Return to the Equipment Menu and enter all ETE listed as required for the current test.

TEST\_LIST is not compatible.

A bad test list exists. Contact Hewlett-Packard Signal Analysis Division for assistance.

The controller does not have sufficient memory. This software cannot load. See the computer hardware system documentation for information on adding additional memory.

Either refer to the appropriate manual to extend the memory capability of your system, or off-load some data to make room for the program.

The \_\_\_\_ at address \_\_\_\_ was not found on HP-IB.

When Verify HP-IB is set to ON in the Parameter Menu, this error message displays the ETE with the address that is either missing or not set to ON.

The 436A is in lowest range, waiting 10 seconds.

The current power measurement requires the lowest power-meter range. Program execution will resume in 10 seconds.

The 8902A needs repair (Error 6).

There is a problem related to the HP 8902A measuring receiver. Correct the fault or return to the Equipment Menu where you can enter a different model number.

The DUT must have an HP-IB address.

You attempted to leave the Equipment Menu, but the program cannot find the HP 70000 system at the assigned HP-IB address.

THIS COLUMN CAN NOT BE EDITED.

You pressed **SELECT** with the cursor positioned in the first column of the Mass Storage edit screen or the Equipment Menu edit screen. This column cannot be edited.

THIS IS \_\_\_\_ AND FOUND DUPLICATE FILES: \_\_\_\_.

Contact Hewlett-Packard Signal Analysis Division for assistance.

This test can not be selected because of missing ETE.

You were in either Multiple Tests or Repeat Multiple, then tried to select a test that has missing ETE. This is not allowed. Check the Status column of the Test Menu to verify a Missing ETE tag next to the test name you attempted to select.

#### Timed Out

The program aborted the test.

WARNING: Duplicate Address

You entered a duplicate HP-IB address to an item in the Equipment Menu. (You may have to scroll through the menu to find the duplication.)

**WARNING: Duplication may exclude specific tests.**

You assigned two generic device functions to one ETE. (For example, the TOI test will not be run if you assign a single HP 3335A synthesizer/level generator as both the required level generator and the required general source.)

**WARNING: String is too long. It has been truncated.**

You entered too many characters in a user's line of the Parameter Menu edit screen. Select the line and enter 30 or fewer characters.

**Write protected.**

You attempted to store data on a write-protected disk. After correcting the fault, press **CONTINUE**.



## Before Extensive Servicing

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This chapter contains information to help identify and resolve some common problems that may occur with your HP 70911A WB IF Section 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 HP 70911A WB IF Section needs further servicing and your HP 70911A WB IF Section is not experiencing any of the symptoms presented in this chapter, refer to "Performing Related Adjustments and Verification Tests" in Chapter 4 to determine which adjustments and verification tests must be performed and also Table 5-1 for a list of recommended test equipment to use when assemblies are changed, repaired, or adjusted.

---

**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 HP 70911A WB IF Section to a Hewlett-Packard service center. (Refer to "If You Want Hewlett-Packard to Service Your HP 70911A WB IF Section" in Chapter 1.)

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## If the System's Power-On Self Test Fails

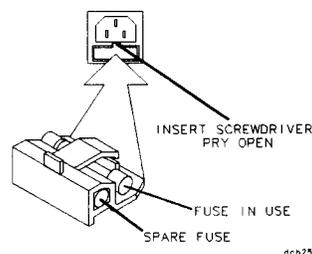
Each time the system is turned on, the following actions take place:

1. The system runs through an initializing routine (power-on self test) during which the front-panel STATUS LEDs on each module flash on momentarily and then turn off again.
2. If the power-on self test passes, the MEASURE LED on the LO module starts blinking on and off, being triggered by the system sweep, and the ACT LED on each active module's front-panel is turned on.

If one or more of these actions do not occur, then your module is not functioning properly.

To solve this problem:

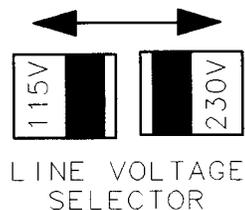
- Check that the HP 70911A WB IF Section is powered on.
- Check that the system display and mainframe are plugged into the proper ac line voltage.
- Check that the line socket has ac line voltage.
- Check that the line voltage selector switch is set to the correct voltage for the ac line voltage being used. The line voltage selector switch is located on the left side of the HP 70004A color display, on the bottom of the HP 70001A mainframe, or on the rear panel of the HP 70206A system graphics display.



**Figure 3-1. Line Voltage Selector**

- Check the line fuse on the display or the mainframe to ensure that it is not damaged.

The line fuse is located inside the power-cord receptacle housing on the rear of the display and mainframe. Also included in this housing is a spare fuse. The fuse is a 5 by 20 mm fuse rated at 6.3 A, 250 V (HP part number 2110-0703). This line fuse can be used with both 120 V and 230 V line voltage.



**Figure 3-2. Line Fuse Removal and Replacement**

- If necessary, obtain service from Hewlett-Packard. (Refer to "If You Want Hewlett-Packard to Service Your HP 70911A WB IF Section" in Chapter 1.)

---

## **If Your HP 70911A WB IF Section Is Powered On But Not Responding Correctly**

If your HP 70911A WB IF Section is powered on but not responding correctly, then something may be wrong with the system setup.

To solve this problem:

- Check that other equipment, cables, and connectors are connected and operating correctly.
- Check that the HP-MSIB address is set correctly.
- If necessary, obtain HP service.

---

## **If the STATUS ERR Indicator LED on Your New HP 70911A WB IF Section Is Flashing**

The HP 70911A WB IF Section communicates with the system over the HP-MSIB.

If the STATUS ERR indicator LED, located on the HP 70911A WB IF Section's front panel, is flashing at a 1 Hz rate, the module cannot communicate over the HP-MSIB.

To solve this problem:

- Remove the HP 70911A WB IF Section and reinstall it using the following steps:
  1. Switch off the system's ac line power.
  2. Disconnect the HP 70911A WB IF Section's rear panel cables.
  3. Remove the HP 70911A WB IF Section from the system.
  4. Switch on the system's ac line power and check that no error LEDs are flashing on the other system modules.
  5. If all other modules are working correctly, reinstall the HP 70911A WB IF Section.
- Check that the HP-MSIB address is set correctly.
- If necessary, obtain HP service.

---

## **If More Than One Module's Error Indicator Is Flashing**

The HP 70911A WB IF Section communicates with the system over the HP-MSIB.

When the error indicator LED on a module is flashing at a 1 Hz rate, then that module is not communicating over the HP-MSIB.

To solve this problem:

- Check that the HP-MSIB address is set correctly.

If two separate modules, are set to the same HP-MSIB address, this problem will occur.

- Remove all modules and reinstall them one at a time until a module that causes the ERR LED to flash is found.

Turn the power on each time after a module is removed to determine if the problem has been solved.

- If necessary, obtain HP service.



## Troubleshooting Your HP 70911A WB IF Section

---

This chapter contains information about troubleshooting your HP 70911A WB IF Section. It presents information on preparing a static-safe work station and then it presents troubleshooting information 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.

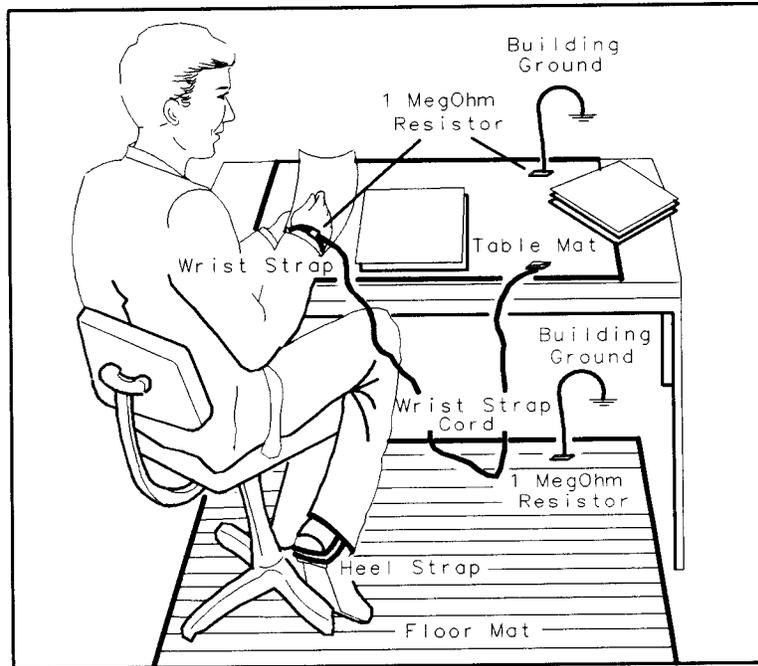
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### Preparing a Static-Safe Work Station

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



sj03a

**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.

## 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**

<b>HP Part Number</b>	<b>Description</b>
9300-0797	Set includes: 3M static control mat 0.6 m × 1.2 m (2 ft × 4 ft) and 4.6 m (15 ft) ground wire. (The wrist-strap and wrist-strap cord are not included. They must be ordered separately.)
9300-0865	Ground wire, 4.6 m (15 ft)
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.	

---

## Troubleshooting Using Self Tests

Troubleshooting should begin with the first three adjustments in the following order:

Enable/Initialize/Stabalize

ADC Test

Self Tests

The ADC test must pass before going further as the self tests rely on proper function of the ADC. The ADC test is not a 100% guarantee of proper operation. If the results of the self tests seem worse than the original failure (for example, all tests fail or more than one board is reported as a failure), suspect the ADC section on the A5 controller or possibly a bad line on the mother board.

The first diagnostic test is a check of the A1 assembly identification. If this test fails, and all other board tests fail on a single board, suspect the GAL, IOB, or ADDR lines on the failed board as the source of the problem. If all boards fail, the mother board, processor, or a board connected to the IOB/ADDR lines is shorted.

IF the A1 assembly identification passes and all other tests fail, suspect the controller, ADC, or a bad line on the mother board.

There are detectors on at least one output of each of the A1 through A3 assemblies. The ADC on the controller board can measure the output of the detectors. The self tests use this feature to verify that the output of each assembly can be varied over a range. The detector output is compared against a table stored in the module. Any failures are reported to the test. The **TROUBLE SHOOT** softkey in the test accesses a menu for running an individual test. This can be used to verify failures, or set to loop for component-level troubleshooting.

---

**Note** Due to the density of surface mount devices, component-level troubleshooting is not recommended.

---

If the self tests pass, and there is still a problem, refer to Table 4-2 for a list of tests to board dependancies:

**Table 4-2. Tests to Board Dependancies**

<b>Procedure Name</b>	<b>Board(s) Affected</b>
<b>Adjustments</b>	
Enable/Initialize/Stabalize	
ADC Test	A5, A2, A3
Self Tests	A1 through A6
Resolution Bandwidth Filter	A1, A2
Resolution Bandwidth Compensation	A1
Calibration Attenuation	A2
Step Gain	A1, A2
Linear Detector	A2
Video Board	A3
Option 004 I/Q Offset/Gain	A9, A10
Option 004 I/Q Tracking	A9, A10
Option 005 FM Demodulation Offset	A8
Option 007 70 MHz filter	A13
140 MHz Filter	Special Handling Option
<b>Module Verification Tests</b>	
Front Panel LED	A7, A5
Level Detector	A1 through A3
Step Gain	A1, A2
Resolution Bandwidth Filter	A1 through A3
Daisy Chain Video Gain	A3
Option 001 70 MHz Gain	A1, A2, A11 (not done if A13 present)
Option 002 140 MHz Gain	A1, A2, A12 (not done if A13 present)
Option 004 I/Q Magnitude/Phase Tracking	A1, A2, A9, A10
Option 005 FM Output Level	A1, A2, A8

## Performing Related Adjustments and Verification Tests

After an assembly has been repaired, changed, or adjusted, there are a set of related adjustments and verification tests that must be performed to ensure proper operation.

If an assembly has been repaired, changed, or adjusted, refer to the following table to determine related adjustments and verification tests for each assembly.

**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”.)

**Table 4-3. Procedures Performed After Servicing**

Procedure Name	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13
<b>Adjustments</b>													
Enable/Initialize/Stabalize					X								
ADC Test				X	X	X							
Self Tests	X	X	X	X	X	X	X	X	X	X	X	X	X
Resolution Bandwidth Filter	X	X		X	X	X							
Resolution Bandwidth Compensation	X	X		X	X	X							
Calibration Attenuation		X		X	X	X							
Step Gain	X	X		X	X	X							
Linear Detector		X		X	X	X							
Video Board	X	X	X	X	X	X							
Option 004 I/Q Offset/Gain				X	X	X			X	X			
Option 004 I/Q Tracking				X	X	X			X	X			
Option 005 FM Demodulation Offset					X	X		X					
Option 007 70 MHz Filter					X	X					X	X	
Option 002 140 MHz Filter					X	X					X		X
<b>Module Verification Tests</b>													
Front Panel LED				X	X	X							
Level Detector	X	X	X		X	X							
Step Gain	X	X			X	X							
Resolution Bandwidth Filter	X			X									
Daisy Chain Video Gain		X			X								
Option 001 70 MHz Gain												X	
Option 002 140 MHz Gain													X
Option 004 I/Q Magnitude/Phase Tracking									X	X			
Option 005 FM Output Level								X					

Refer to Chapter 6 and Chapter 7 for recommended test equipment when performing adjustments and module verification tests.

## Recommended Test Equipment Tables

**Table 5-1. Recommended Test Equipment**

<b>Equipment</b>	<b>Recommended Model</b>
<b>Controllers</b> Controller	HP 9000 Series 200/300 controller
<b>Signal Sources</b> Synthesized source	HP 8662A synthesized signal generator, or HP 8663A synthesized signal generator
<b>Analyzers</b> Network analyzer	HP 8753C scalar network analyzer HP 85046A Option 913 S-parameter test set
<b>Meters</b> Power meter  Power sensor Digital multimeter	HP 436A power meter, or HP 438A dual-channel power meter (2 required) or HP 70100A power meter (2 required) HP 8482A N(m) power sensor (2 required) HP 3458A digital multimeter, or HP 70110A digital multimeter
<b>HP 70000 Components</b> Mainframe Local oscillator source	HP 70001A mainframe HP 70900B local oscillator source
<b>Power splitters</b>	HP 11667A power splitter HP 11667C power splitter HP 5068-7408 power splitter
<b>Attenuators</b>	HP 0955-0122 6 dB attenuator (2 required) HP 8494G programmable step attenuator or HP 8494H programmable step attenuator HP 8496G programmable step attenuator or HP 8496H programmable step attenuator
<b>Terminations</b>	HP 11593A 50 $\Omega$ BNC(m) termination (2 required) HP 1250-0676 precision 50 $\Omega$ SMB(f) termination (1 required)
<b>Accessory Equipment</b>	HP 0955-0117 300 MHz RLC Filter SMA HP 11713A attenuator/switch driver or HP 70611A attenuator/switch driver ZFM-4 mixer mini circuits CIR-Q-TEL LR13-1 low pass filter or equivalent 120 MHz to 150 MHz LPF

**Table 5-1. Recommended Test Equipment (continued)**

<b>Equipment</b>	<b>Recommended Model</b>
<b>Specialized Test Equipment</b>	
250 MHz lowpass filter	Built by User
<b>HP 70000 system service kit</b>	HP 71000-60002
consisting of:	
A module extender	HP 70001-60013 extender module
A cable puller	HP 5021-6773
A long 8 mm hex-ball driver	HP 8710-1307
or a short 8 mm hex-ball driver	HP 8710-1651
A modified box wrench, 10 inch-pound	HP 8710-1794
A bandpass filter tuning tool	HP 8710-1728
Three BNC (m) to SMB (f) cable assemblies	HP 85680-60093
Seven 309 mm SMB (f) to SMB (f) cables	HP 5061-9021
Two feet of chromeric gasket	HP 8160-0495
A connector pin straightener	HP 5021-7445
<b>Cables</b>	
HP 8120-5106 47 cm (18.5 in) SMA(m) to SMB(f) (3 required)	
HP 8120-5068 62 cm (24.4 in) SMA(m) to SMA(m) (2 required)	
HP 8120-0514 5 cm (2 in) SMB(f) to SMB(f) (2 required)	
HP 8120-5048 123 cm (48.4 in) BNC(m) to SMB(f) (1 required)	
HP 8120-2582 1 meter BNC(m) to BNC(m) (1 required)	
<b>Adapters</b>	
HP 1251-2277 50Ω BNC(f) to dual banana plug (1 required)	
HP 1250-0781 50Ω BNC tee(m) (f) (f) (1 required)	
HP 1250-0780 50Ω N(m) to BNC(f) (1 required)	
HP 1250-1250 50Ω N(m) to SMA(f) (5 required)	
HP 1250-0672 50Ω SMB(f) to SMB(f) (1 required)	
HP 1250-0671 50Ω SMB(m) to N(m) (1 required)	
HP 1250-1159 50Ω SMA(m) to SMA(m) (3 required)	
HP 1250-1391 50Ω SMB tee(f) (m) (m) (2 required)	

## Adjustment Procedures

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This chapter contains the setups for all adjustment procedures that are used to optimize module performance when assemblies are changed or repaired. All of the setups described in this chapter are automated. These automated setups require a controller and are run with software that is described in Chapter 2.

A procedure is considered an adjustment when data is programmed into the module.

A procedure is considered a test when verifying the presence of a signal from an output port. Adjustment procedures must be performed before module verification tests and must be performed in the following order:

1. Enable/Initialize/Stabalize
2. ADC Test
3. Self Tests
4. Resolution Bandwidth Filter
5. Resolution Bandwidth Compensation
6. Calibration Attenuator
7. Step Gain
8. Linear Detector
9. Video Board
10. Option 004 I/Q Offset/Gain
11. Option 004 I/Q Tracking
12. Option 005 FM Demodulation Offset
13. Option 007 70 MHz Filter
14. Special Handling 140 MHz Filter

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**Note** To ensure that proper operating temperature is maintained, the module must be installed in a system mainframe or display when performing adjustments and tests and be on for a minimum of one hour.

---

---

## Before You Begin Testing

The following information must be considered before testing can begin:

### References (10 MHz and 100 MHz)

- All test equipment must be phase locked together (standards connected).
- The HP 8662A is the main reference.
- The LO module that is used as the 300 MHz reference for the module must have an external reference. This generally means a precision reference is required. An alternate method that can be used is to achieve lock with a synthesizer tuned to 100 MHz whose reference is locked to all other test equipment, and the 100 MHz output is connected to the LO module's 100 MHz REF IN.

### Coaxial Cabling

- Keep cables as short as possible.
- The 321.4MHz input on the rear panel should ideally be connected to the power splitter with an SMB (f) to SMB (f) adapter (1250-0672), or use a Type N (m) to SMB (f) connected to the power splitter. If this is not possible, use a 50 mm SMB (f) to SMB (f) cable (8120-0514).
- If you use long cables at the 321.4 MHz input, try using a three resistor power splitter.
- Use as few adapters as possible.

### HP-IB Cabling

- Follow the HP-IB standards for cable routing.
- Some problems will occur when using excessively long cables with a HP 700 computer.
- Keep HP-IB cables routed neatly.

### Network Analyzer Inputs

- You must use the APC-7 to APC-3.5 connectors found in the APC-3.5 calibration kit.

### Attenuator ET

- The attenuator ET is comprised of an HP 11713A, an HP 8494G/H Step Attenuator, and an HP 8496G/H Step Attenuator as shown in Figure 6-1.

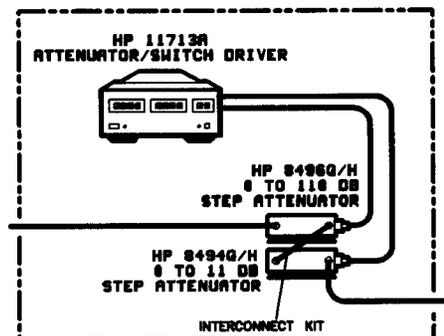


Figure 6-1. Attenuator ET

## Before You Begin Testing

- The attenuators must be characterized before making measurements. The values are placed into a disk file (or can be manually entered using the `edit cal data` key) and are used by the tests.

After characterization, remember that any connectors or cables used become part of the characterization and must not be substituted with other similar connectors or cables.

- The recommended interconnection kits are:

HP 11716A

HP 11716B

### Alignment and Testing of Video Ports

- Alignment and testing of the video ports is done with a  $50\Omega$  load connected to the video ports not being tested.

---

## **Enable/Initialize/Stabilize Adjustment Procedure**

The purpose of this adjustment procedure is to verify that the module has the correct firmware, serial number, and option information. It then waits for the temperature to stabilize. When the temperature is stable, it then exits to the first menu. This procedure can also be used to update module firmware to the latest revision. If this is done, the module must be realigned.

---

**Note**            No external test equipment is required for this adjustment. This test is completely automated. No manual steps are required.

---

## ADC Test Adjustment Procedure

The purpose of this adjustment procedure is to confirm the operational status of the ADC and the x10 amplifier on the A5 Controller.

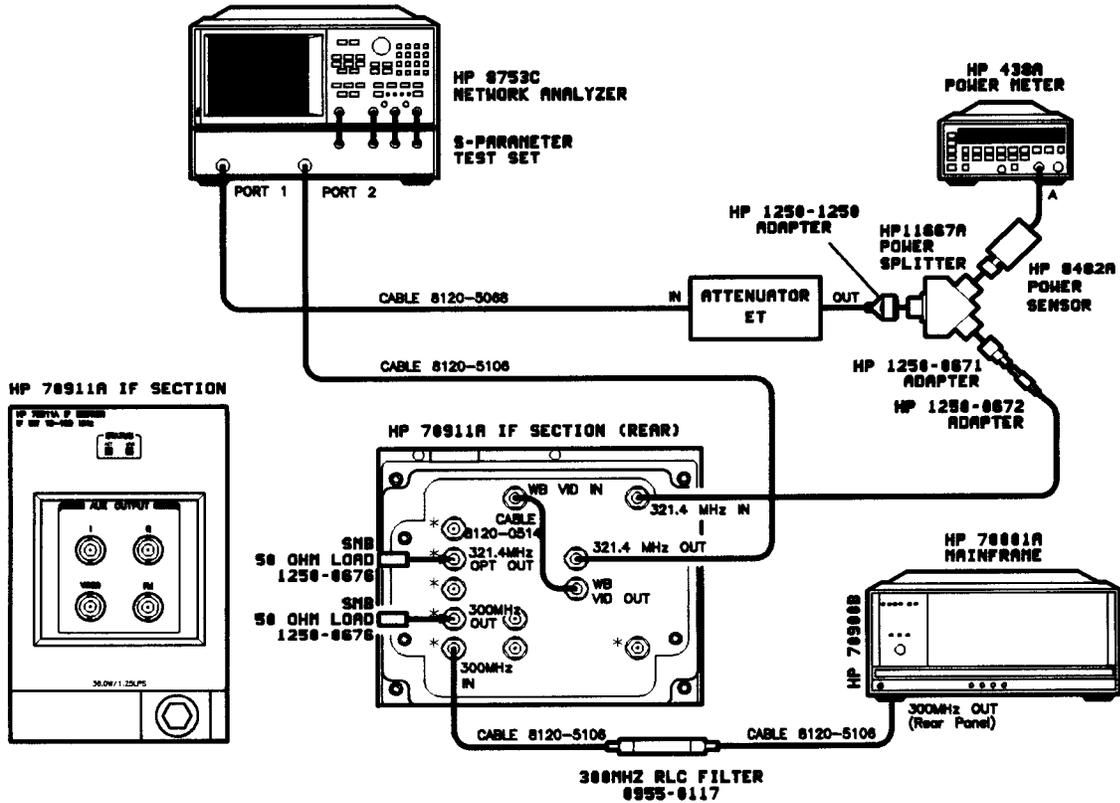
The ADC on the A5 Controller is used by the module's firmware to measure the temperature of the module and by an internal self-test to measure voltages at various nodes throughout the module. The temperature readings are used to correct for amplitude versus temperature drift. The voltage readings made by the internal self-test are used to verify the operational status of the module.

---

**Note**            No external test equipment is required for this adjustment. This test is completely automated. No manual steps are required.

---

# Self Tests Adjustment Procedure



\* Equipment connected to these connectors only apply if options are installed.

tsms04d

Figure 6-2. Self Tests Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Network Analyzer .....	HP 8753C
S-Parameter Test Set .....	HP 85046A Option 913
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Adapters

SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 Ω Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672

## Self Tests Adjustment Procedure

### Cables

3 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to verify that the module's hardware is connected and operational. This test runs the module's internal self test and reports any errors found. Included in the test is extensive troubleshooting capability. Refer to Chapter 4.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Resolution Bandwidth Filter Adjustment Procedure

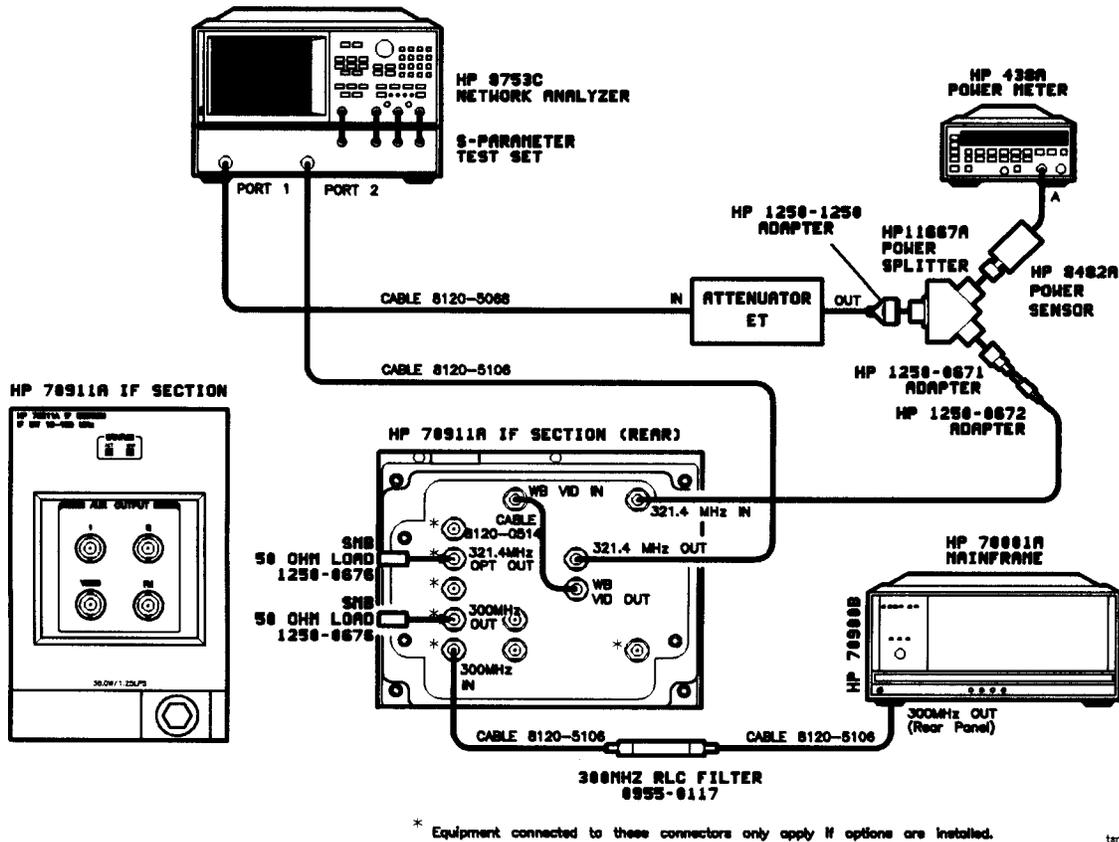


Figure 6-3. Resolution Bandwidth Filter Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Network Analyzer .....	HP 8753C
S-Parameter Test Set .....	HP 85046A Option 913
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Adapters

SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672

## Resolution Bandwidth Filter Adjustment Procedure

### Cables

3 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to align the resolution bandwidth filters.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Resolution Bandwidth Compensation Adjustment Procedure

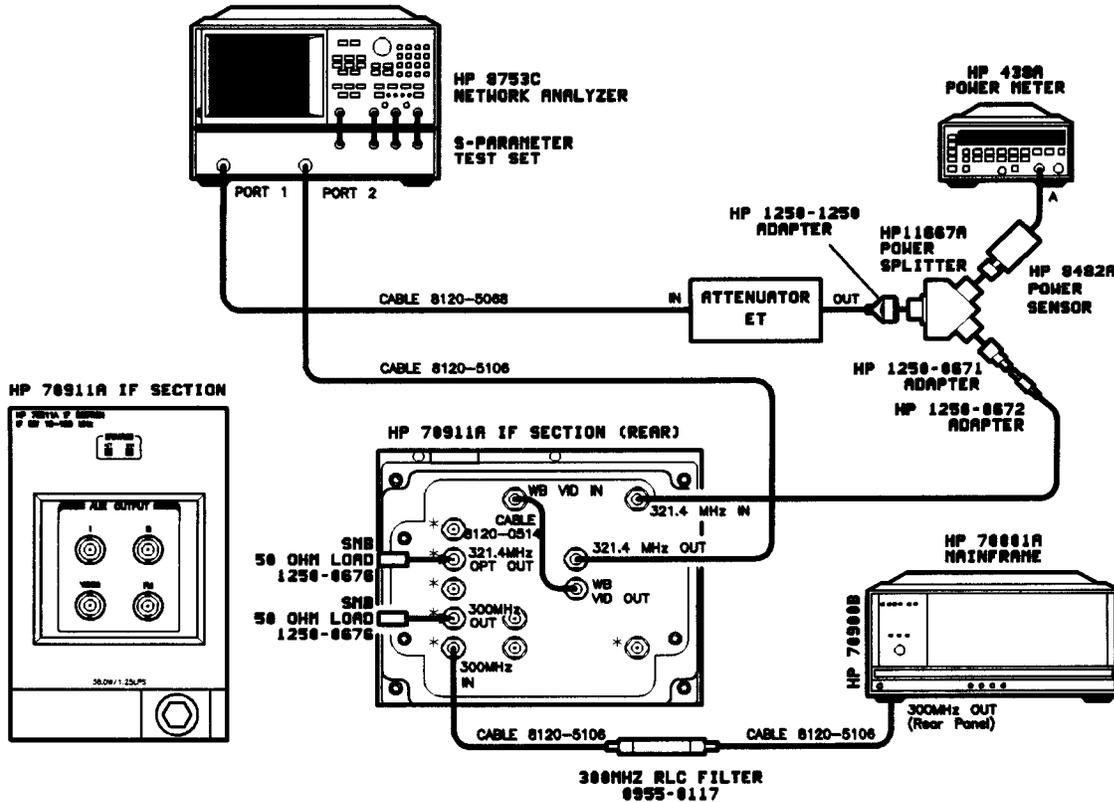


Figure 6-4. Resolution Bandwidth Compensation Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Network Analyzer .....	HP 8753C
S-Parameter Test Set .....	HP 85046A Option 913
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Adapters

SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672

## Resolution Bandwidth Compensation Adjustment Procedure

### Cables

3 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

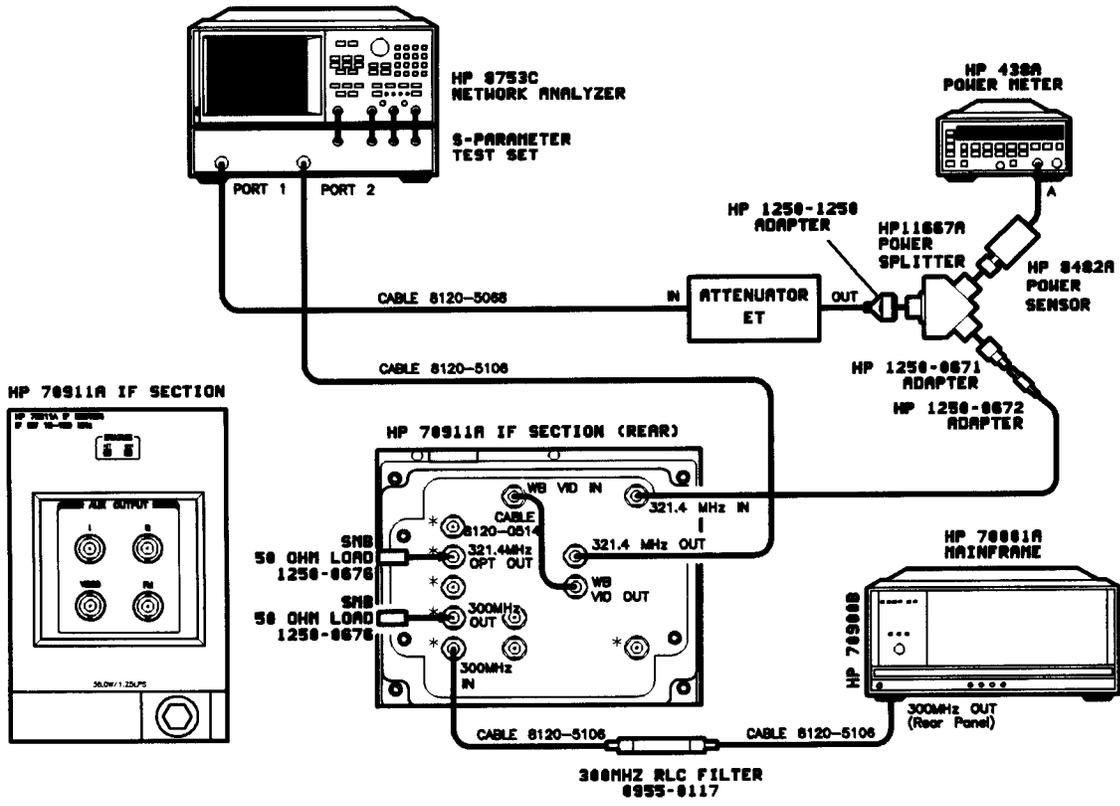
The purpose of this adjustment procedure is to create a bandwidth amplitude correction table.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Calibration Attenuator Adjustment Procedure



\* Equipment connected to these connectors only apply if options are installed.

tsnozd

Figure 6-5. Calibration Attenuator Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Network Analyzer .....	HP 8753C
S-Parameter Test Set .....	HP 85046A Option 913
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Adapters

SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672

## Calibration Attenuator Adjustment Procedure

### Cables

3 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to adjust the calibration attenuators.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Step Gain Adjustment Procedure

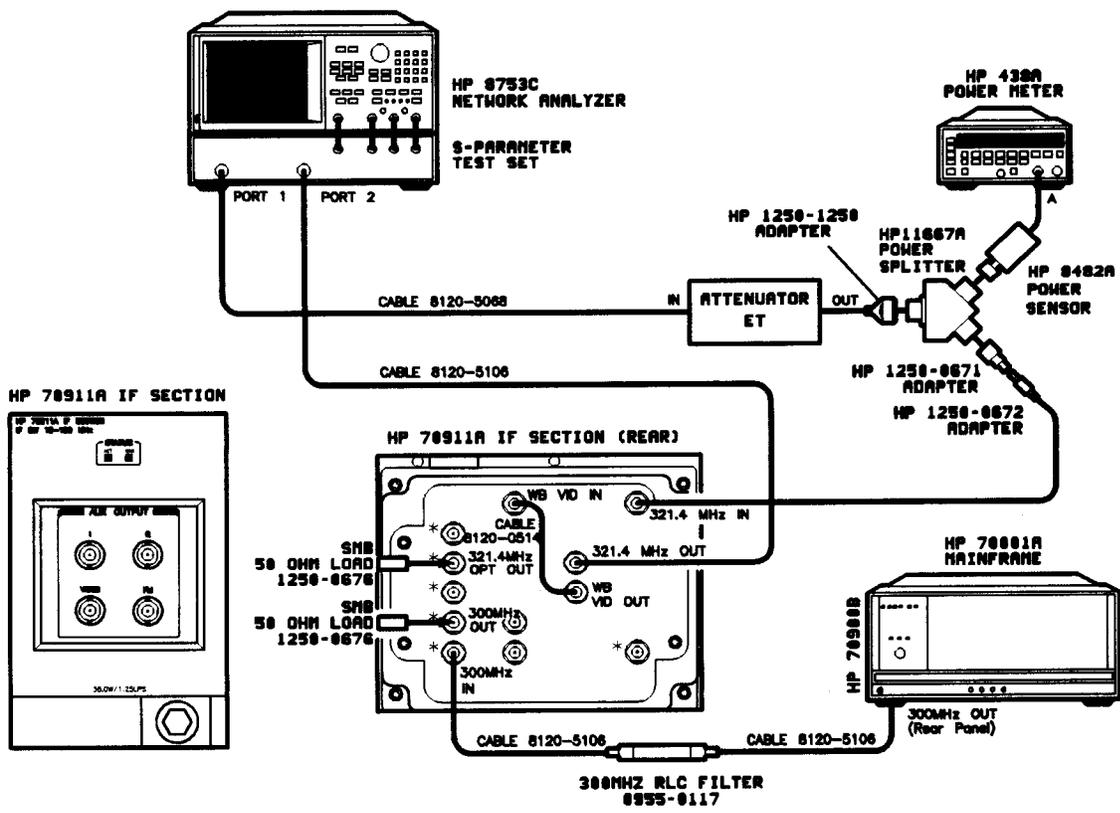


Figure 6-6. Step Gain Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Network Analyzer .....	HP 8753C
S-Parameter Test Set .....	HP 85046A Option 913
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Adapters

SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 Ω Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672

## Step Gain Adjustment Procedure

### Cables

3 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

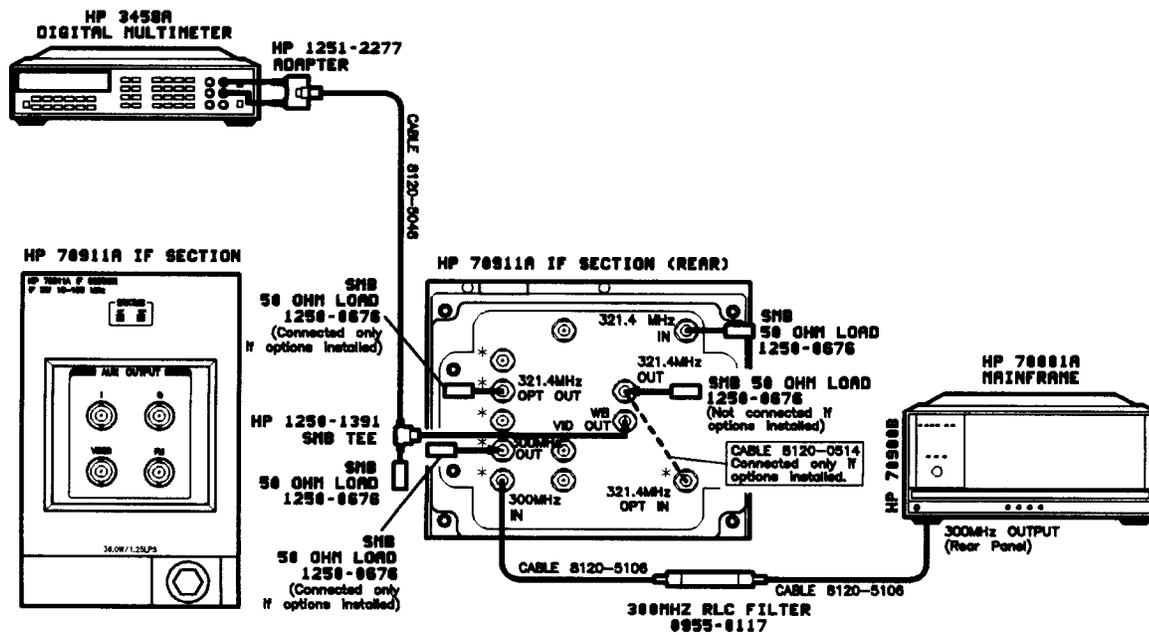
The purpose of this adjustment procedure is to adjust the step gains. Step gains are aligned in each of the 26 bandwidths due to interactions between step gain error and resolution bandwidth.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Linear Detector Adjustment Procedure



\* Equipment connected to these connectors only apply if options are installed.

tadmrow

Figure 6-7. Linear Detector Adjustment Setup

## Linear Detector Adjustment Procedure

### Test Equipment

### Preferred Model Numbers

Synthesized Signal Generator .....	HP 8662A
Digital Multimeter .....	HP 3458A or 70110A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
3 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391
BNC (f) to Dual Banana .....	HP P/N 1251-2277

### Cables

BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068

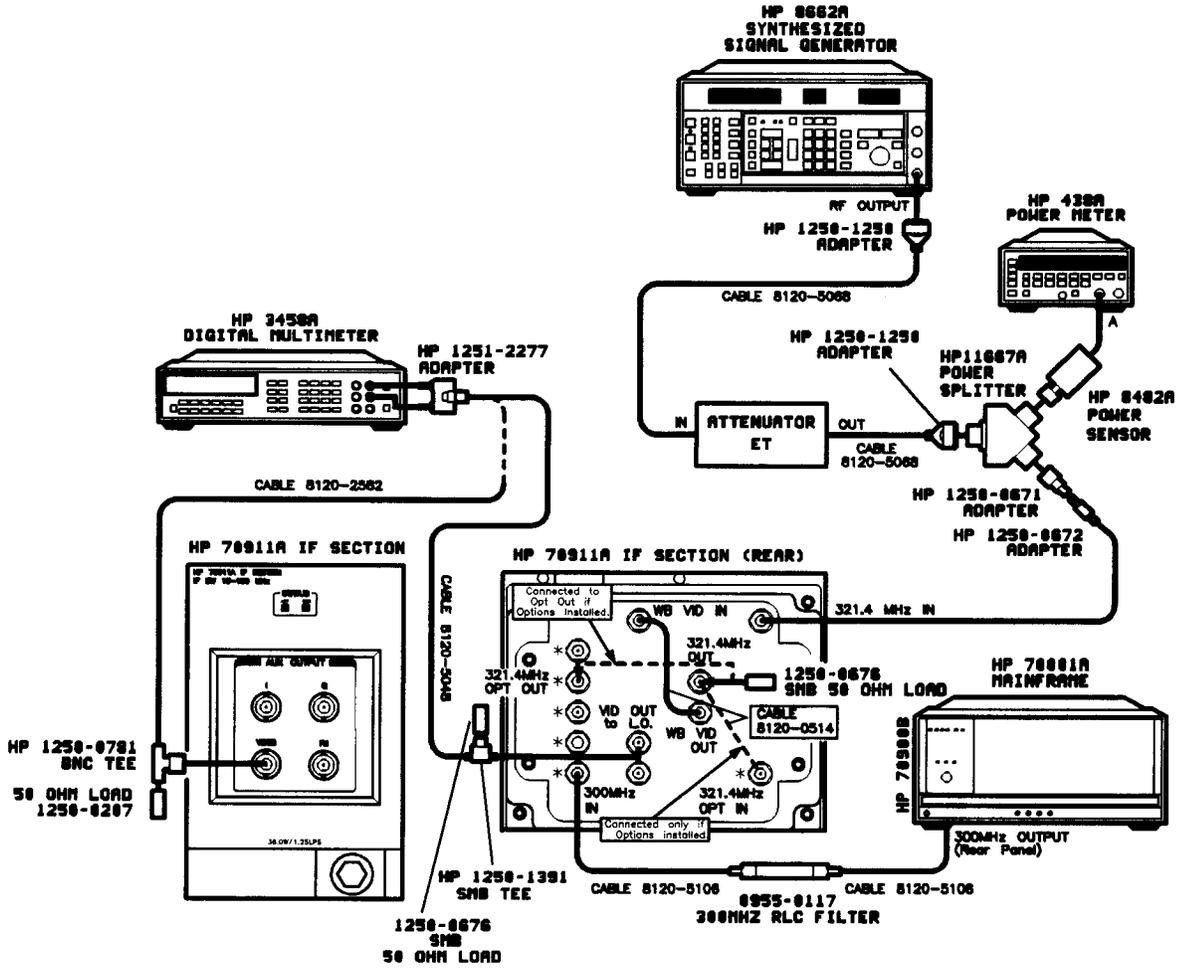
The purpose of this adjustment procedure is to set the optimum bias point of the linear detector.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Video Board Adjustment Procedure



\* Equipment connections to these connectors only apply if options are installed.

Figure 6-8. Video Board Adjustment Setup

## Test Equipment

## Preferred Model Numbers

Synthesized Signal Generator .....	HP 8662A
Digital Multimeter .....	HP 3458A or 70110A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

## Video Board Adjustment Procedure

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391
BNC (f) to Dual Banana .....	HP P/N 1251-2277
BNC (m) 50 $\Omega$ Load .....	HP P/N 1250-0207
BNC (m)(f)(f) TEE .....	HP P/N 1250-0781

### Cables

BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to BNC (m) 1 meter .....	HP P/N 8120-2582

The purpose of this adjustment procedure is to adjust the offset and gain of the VID OUT TO L.O. (rear panel) and VIDEO (front panel) ports.

---

**Note**            This test is completely automated. No manual steps are required.

---



## Option 004 I/Q Offset/Gain Adjustment Procedure

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
BNC (m)(f)(f) TEE .....	HP P/N 1250-0781
BNC (f) to Dual Banana .....	HP P/N 1251-2277
BNC (m) 50 $\Omega$ Load .....	HP P/N 1250-0207

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to BNC (m) 1 meter .....	HP P/N 8120-2582

The purpose of this alignment procedure is to align I/Q offset and gain.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Option 004 I/Q Tracking Adjustment Procedure

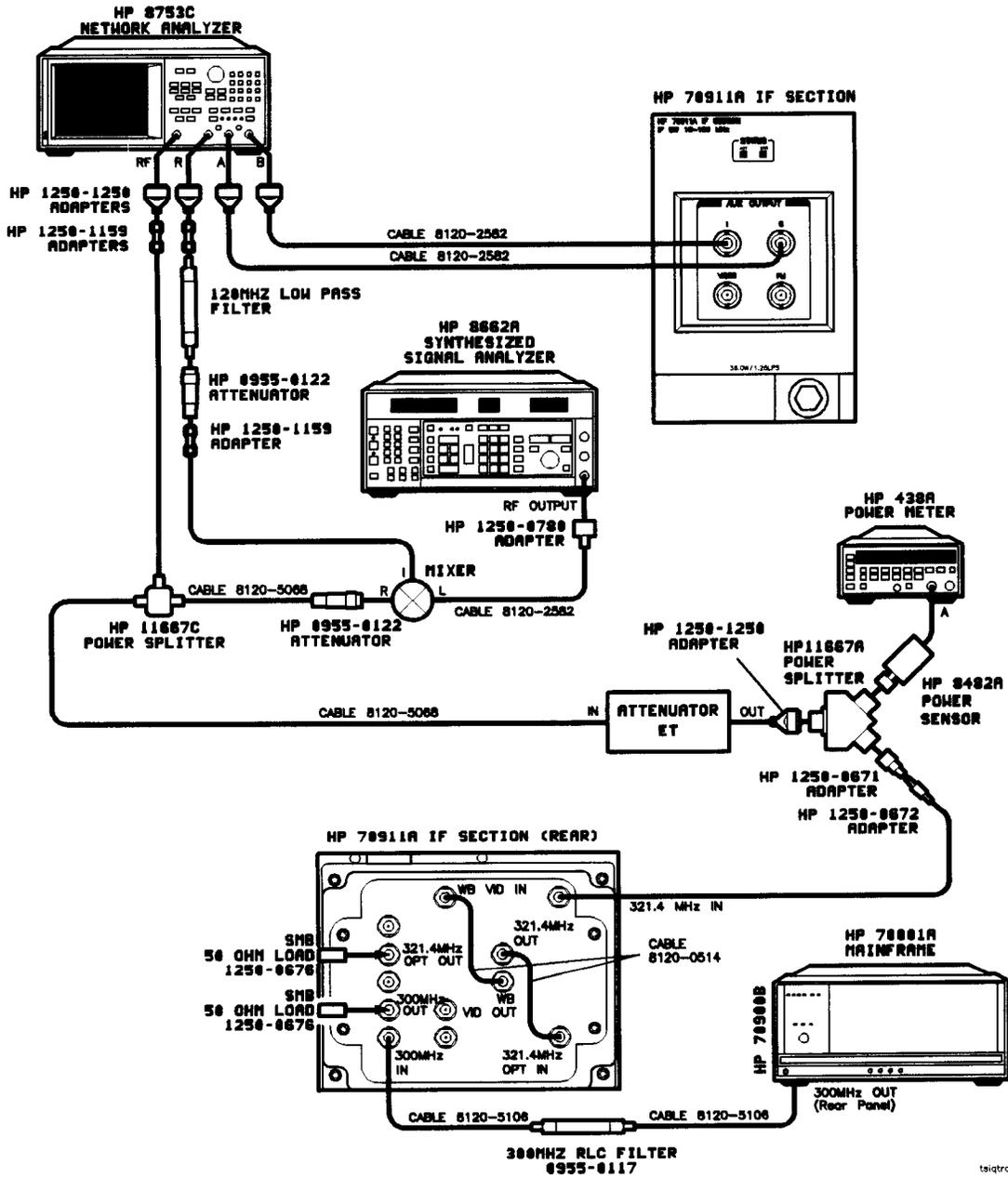


Figure 6-10. I/Q Tracking Adjustment Setup

## Option 004 I/Q Tracking Adjustment Procedure

Test Equipment	Preferred Model Numbers
Network Analyzer .....	HP 8753C
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Splitter .....	HP 11667C
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B
Mixer .....	ZFM-4
2 6 dB Attenuators .....	HP P/N 0955-0122
Low Pass Filter .....	CIRQTEL LR13-1

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

5 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
3 SMB (m) to SMB (m) .....	HP P/N 1250-1159
Type N (m) to BNC (f) .....	HP P/N 1250-0780

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
3 BNC (m) to BNC (m) 1 meter .....	HP P/N 8120-2582

The purpose of this adjustment procedure is to align I/Q gain and phase tracking. This alignment is not fully automated and requires manual interaction.

Tracking alignment begins by verifying the setup to the test instrumentation. The network analyzer and cables connecting the HP 70911A to the network analyzer are then calibrated. Connection to the I/Q ports are exchanged twice during calibration. Two phase tracking graphs are then displayed on the computer display. The upper plot contains error from ideal when the RF at the input to the HP 70911A is <321.4 MHz. The lower plot contains error from ideal when the RF at the input is >321.4 MHz. Test limits are also present. The task is to adjust phase tracking and amplitude error to a minimum.

Softkeys corresponding to the names of the three dacs affecting tracking alignment appear along with softkeys for redrawing the error plots and automatic alignment. It is recommended that an automatic alignment be attempted first:

1. Press **AUTO ALIGN**. This accesses another set of softkeys.

Pressing **PHASE SLOPE**, **QUADRATURE**, **GAIN**, or **ALIGN ALL** will initiate the corresponding alignment to a precision of 20 dac counts. If **ALIGN ALL** is pressed, quadrature, phase slope, and gain are aligned to a precision of 20 counts.

2. Press **ALIGN ALL** to align gain and phase tracking.

## Option 004 I/Q Tracking Adjustment Procedure

---

**Note** Fine tuning may be necessary after using these automatic alignment features.

---

3. When finished, press **MAIN MENU** to return to the previous menu.

4. Press **PHASE** and verify phase tracking error is within alignment limits.

If phase tracking is not within alignment limits, manual phase tracking alignment is necessary:

5. Press **QUADRATURE** to redraw the graphs and activate the alignment for quadrature. The current value of the quadrature dac is displayed.

6. Note the current value of the quadrature dac.

7. Change the dac number by a small amount and observe the new error plots.

8. Press **REDRAW GRAPH** to redraw the graphs and clean up the display.

9. Repeat steps 6 through 8 until quadrature is adjusted for minimum.

10. Press **PHASE SLOPE**. The current value of the phase slope dac is displayed.

11. Try few different different values until phase tracking is optimum.

Next, adjust the magnitude tracking:

12. Press **MAG**. The error graphs for magnitude are displayed.

13. Press **GAIN** and adjust this dac for minimum tracking error.

14. When finished, press **DONE**.

15. Enter a DAC value using the computer keypad, then press **Enter**. The DAC value limits are 0 to 4095. A new plot is generated.

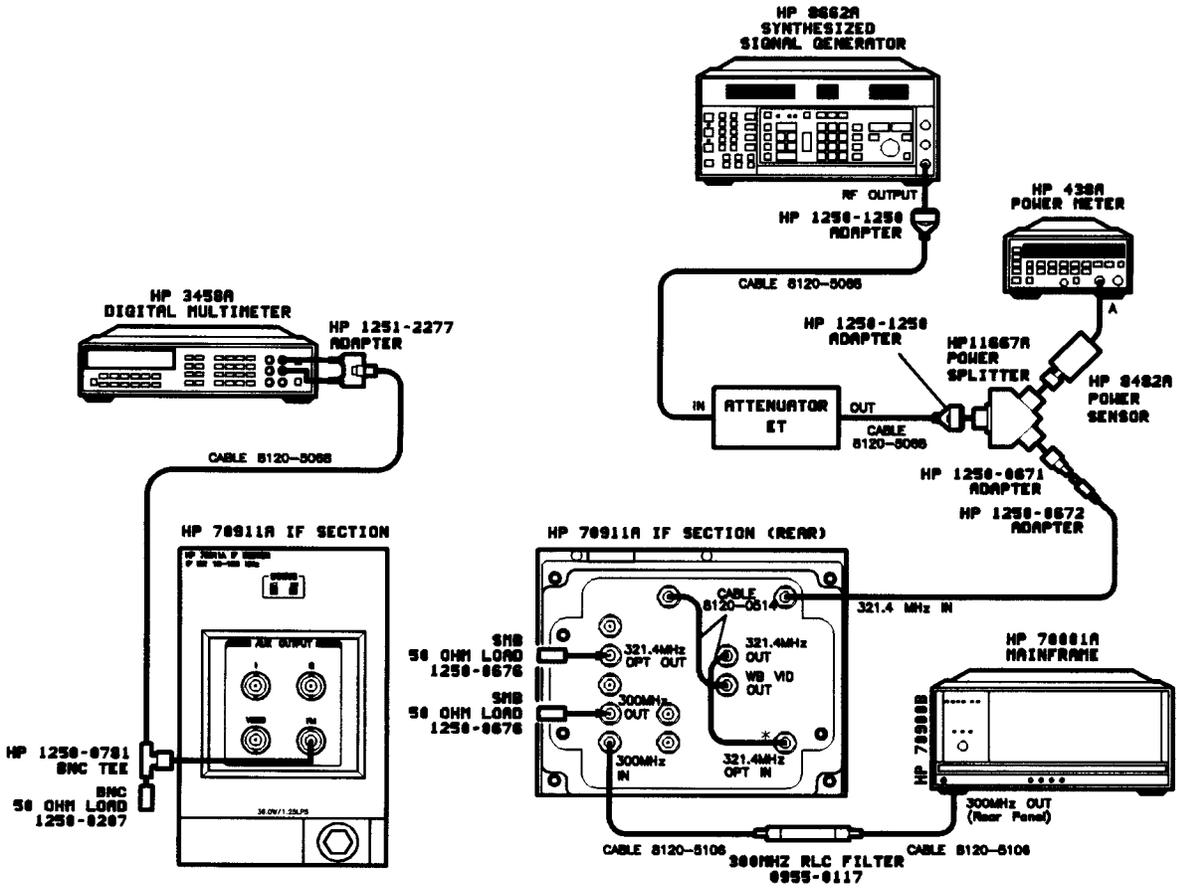
16. Observe the new plot. If it is still not within the limit lines, repeat step 15. Otherwise, continue with the next step.

17. If you adjusted gain, then press **PHASE** and observe the phase graph. The **SLOPE** and **QUAD** softkeys are used to adjust the phase.

18. If you adjusted phase, then press **GAIN** and observe the gain graph.

19. If necessary, iterate between entering DAC values for gain and phase until both plots are within the limit lines.

# Option 005 FM Demodulation Offset Adjustment Procedure



tsdvrfm

Figure 6-11. FM Demodulation Offset Adjustment Setup

## Option 005 FM Demodulation Offset Adjustment Procedure

### Test Equipment

### Preferred Model Numbers

Synthesized Signal Generator .....	HP 8662A
Digital Multimeter .....	HP 3458A or 70110A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391
BNC (f) to Dual Banana .....	HP P/N 1250-2277

### Cables

BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to align the DC operating point of the FM discriminator and measure the residual DC offset resulting from the alignment.

---

**Note** This test is completely automated. No manual steps are required.

---

Option 007 70 MHz Filter Adjustment Procedure

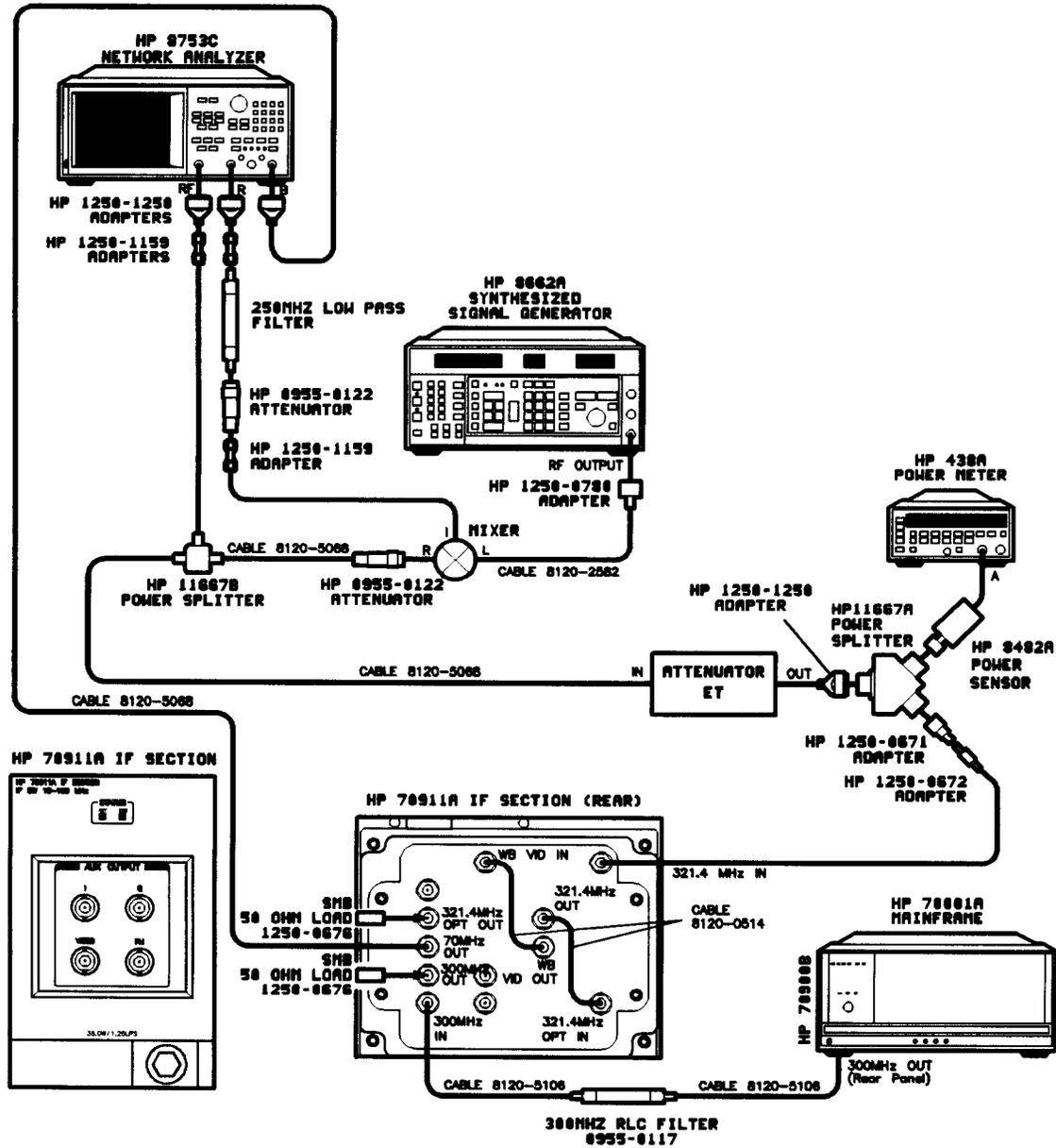


Figure 6-12. 70 MHz Filter Adjustment Setup

1670

## Option 007 70 MHz Filter Adjustment Procedure

### Test Equipment

### Preferred Model Numbers

Network Analyzer .....	HP 8753C
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B
50 $\Omega$ Power Splitter .....	HP P/N 5086-7408
2 6 dB Attenuators .....	HP P/N 0955-0122
250 MHz Low Pass Filter .....	(user supplied)
Mixer .....	ZFM-4
300 MHz RLC Filter .....	HP P/N 0955-0117

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

4 SMA (f) to Type N (m) .....	HP P/N 1250-1250
3 SMB (m) to SMB (m) .....	HP P/N 1250-1159
Type N (m) to BNC (f) .....	HP P/N 1250-0780
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676

### Cables

BNC (m) to BNC (m) 1meter .....	HP P/N 8120-2582
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
3 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to adjust the unique gain DAC settings for each filter installed on the board.

---

**Note** This test is completely automated. No manual steps are required.

---

# Special Handling 140 MHz Filter Adjustment Procedure

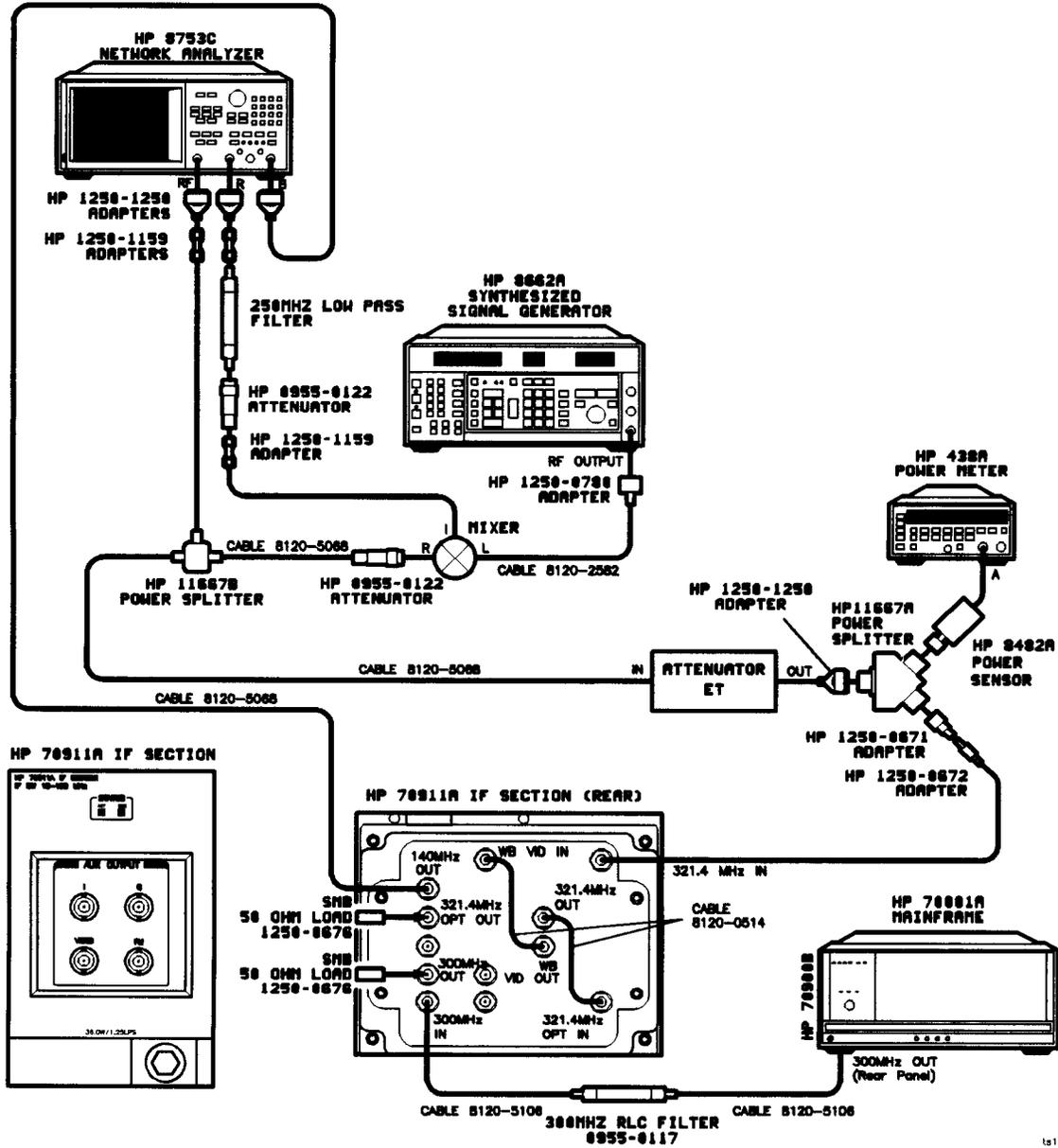


Figure 6-13. 140 MHz Filter Adjustment Setup

## Special Handling 140 MHz Filter Adjustment Procedure

### Test Equipment

### Preferred Model Numbers

Network Analyzer .....	HP 8753C
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B
50 $\Omega$ Power Splitter .....	HP P/N 5086-7408
2 6 dB Attenuators .....	HP P/N 0955-0122
250 MHz Low Pass Filter .....	(user supplied)
Mixer .....	ZFM-4
300 MHz RLC Filter .....	HP P/N 0955-0117

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

4 SMA (f) to Type N (m) .....	HP P/N 1250-1250
3 SMB (m) to SMB (m) .....	HP P/N 1250-1159
Type N (m) to BNC (f) .....	HP P/N 1250-0780
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676

### Cables

BNC (m) to BNC (m) 1meter .....	HP P/N 8120-2582
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
3 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this adjustment procedure is to adjust the unique gain DAC settings for each filter installed on the board.

---

**Note** This test is completely automated. No manual steps are required.

---

## Module Verification Tests

---

This chapter contains the setups for all module verification tests that are used to optimize module performance when assemblies are changed or repaired. All of the setups described in this chapter are automated. These automated setups require a controller and are run with software that is described in Chapter 2.

Module verification tests verify input and output ports not used in adjustment procedures.

- 
- Note**
- The module must be installed in a system mainframe or display when performing adjustments and tests and be on for a minimum of one hour.
  - Adjustment procedures must be performed before module verification tests. Refer to Chapter 6.
  - If Option 001 or Option 002 downconverter is installed, the tests for checking these assemblies will not run with Special Handling 140 MHz Filter installed.
-

---

## Before You Begin Testing

The following information must be considered before testing can begin:

### References (10 MHz and 100 MHz)

- All test equipment must be phase locked together (standards connected).
- The HP 8662A is the main reference.
- The LO module that is used as the 300 MHz reference for the module must have an external reference. This generally means a precision reference is required. An alternate method that can be used is to achieve lock with a synthesizer tuned to 100 MHz whose reference is locked to all other test equipment, and the 100 MHz output is connected to the LO module's 100 MHz REF IN.

### Coaxial Cabling

- Keep cables as short as possible.
- The 321.4MHz input on the rear panel should ideally be connected to the power splitter with an SMB (f) to SMB (f) adapter (1250-0672), or use a Type N (m) to SMB (f) connected to the power splitter. If this is not possible, use a 50 mm SMB (f) to SMB (f) cable (8120-0514).
- If you use long cables at the 321.4 MHz input, try using a three resistor power splitter.
- Use as few adapters as possible.

### HP-IB Cabling

- Follow the HP-IB standards for cable routing.
- Some problems will occur when using excessively long cables with a HP 700 computer.
- Keep HP-IB cables routed neatly.

### Network Analyzer Inputs

- You must use the APC-7 to APC-3.5 connectors found in the APC-3.5 calibration kit.

### Attenuator ET

- The attenuator ET is comprised of an HP 11713A, an HP 8496G/H Step Attenuator, and an HP 8494G/H Step Attenuator as shown in Figure 7-1.

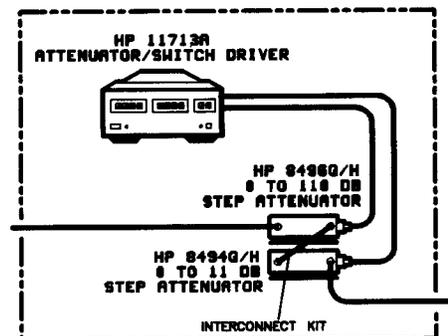


Figure 7-1. Attenuator ET

## Before You Begin Testing

- The attenuators must be characterized before making measurements. The values are placed into a disk file (or can be manually entered using the `edit cal data` key) and are used by the tests.

After characterization, remember that any connectors or cables used become part of the characterization and must not be substituted with other similar connectors or cables.

- The recommended interconnection kits are:

HP 11716A

HP 11716B

### Alignment and Testing of Video Ports

- Alignment and testing of the video ports is done with a 50 $\Omega$  load connected to the video ports not being tested.

# Front-Panel LED Verification Test

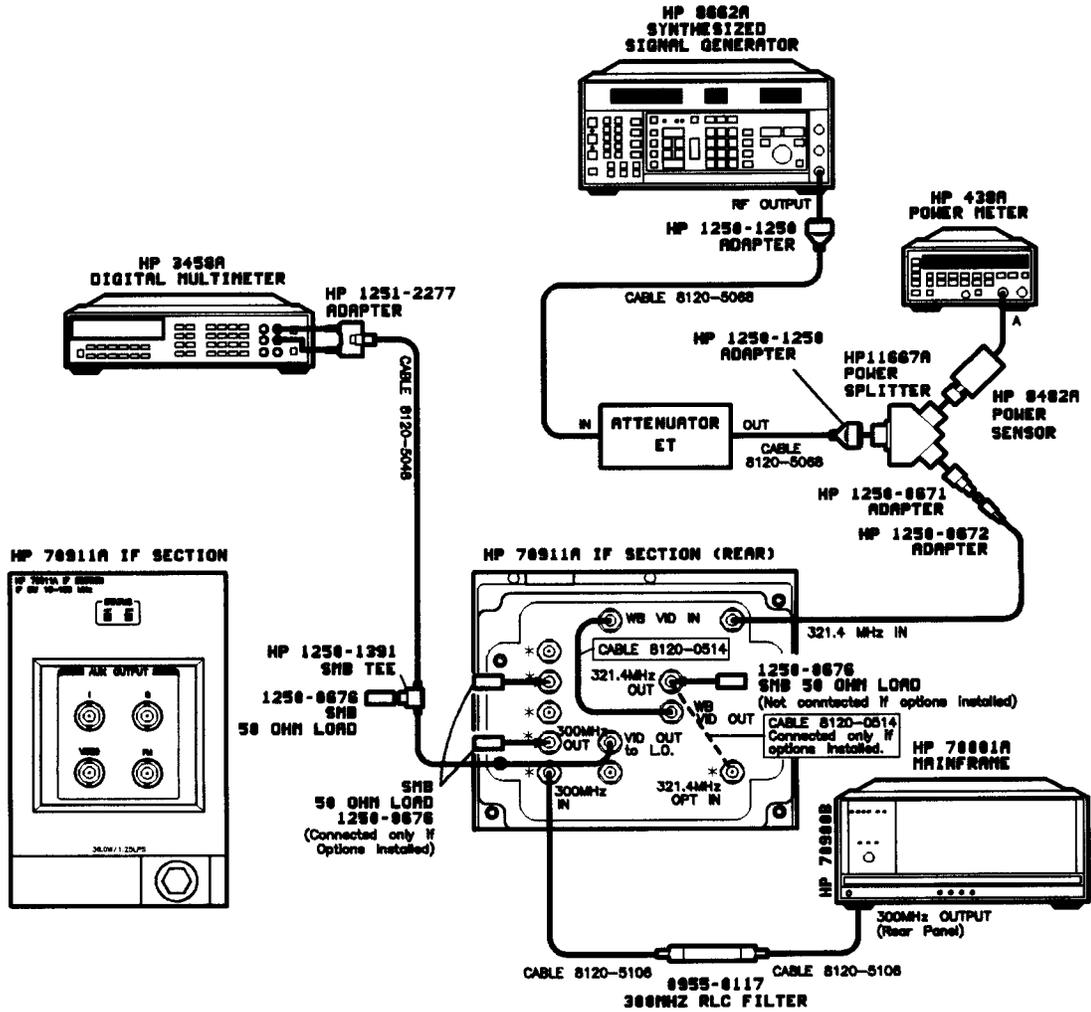


Figure 7-2. Front Panel LED Setup

**Test Equipment**

**Preferred Model Numbers**

Digital Multimeter .....	HP 3458A or 70110A
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

**Adapters**

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
BNC (f) to Dual Banana .....	HP P/N 1251-2277
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391

**Cables**

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048

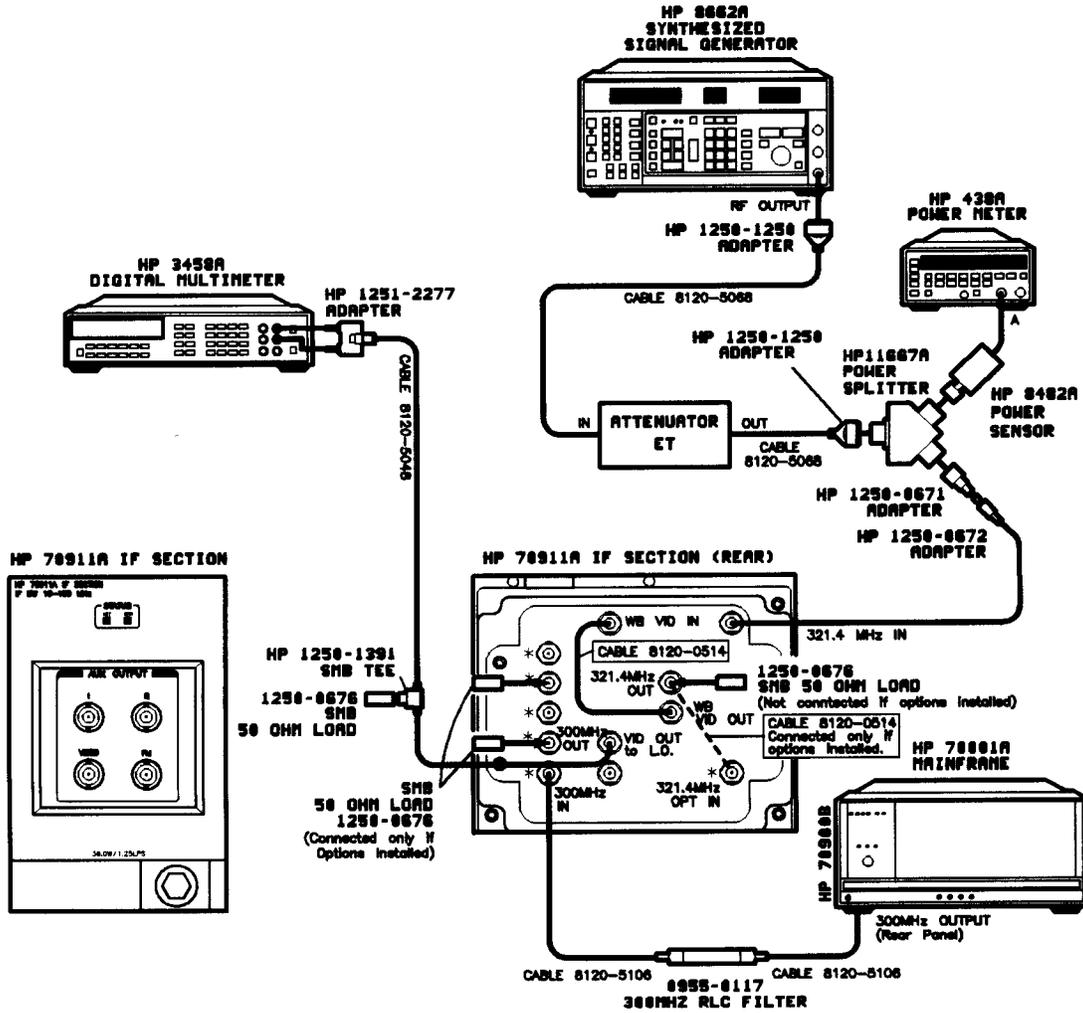
The purpose of this test procedure is to verify operation of the front panel LEDs.

---

**Note** This test is completely automated. No manual steps are required.

---

# Level Detector Verification Test



\* Equipment connections to these connectors only apply if options are installed.

Figure 7-3. Level Detector Setup

## Level Detector Verification Test

### Test Equipment

### Preferred Model Numbers

Digital Multimeter .....	HP 3458A or 70110A
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
BNC (f) to Dual Banana .....	HP P/N 1251-2277
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048

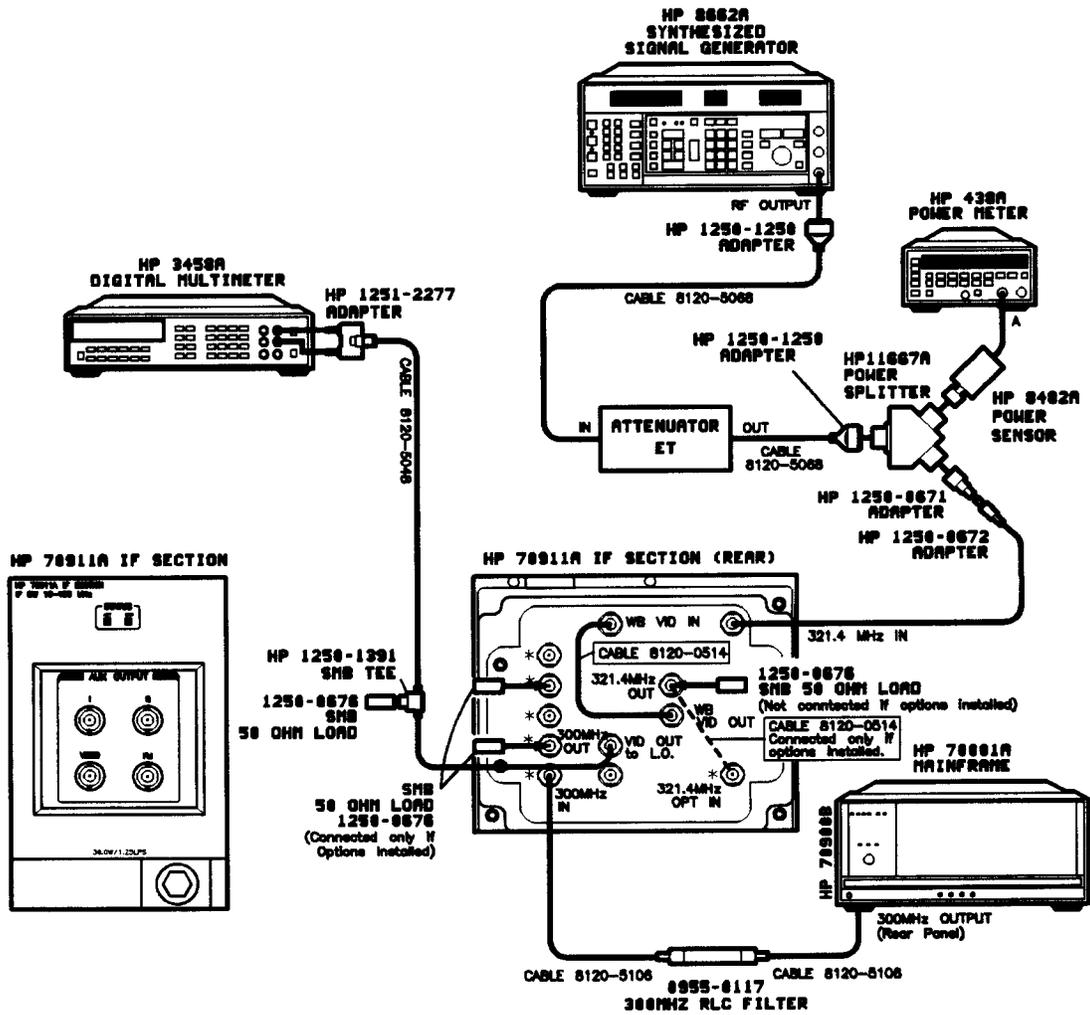
The purpose of this test is to measure and bound the performance of the level detectors.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Step Gain Verification Test



\* Equipment connections to these connectors only apply if options are installed.

Figure 7-4. Step Gain Setup

## Step Gain Verification Test

### Test Equipment

### Preferred Model Numbers

Digital Multimeter .....	HP 3458A or 70110A
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
BNC (f) to Dual Banana .....	HP P/N 1251-2277
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048

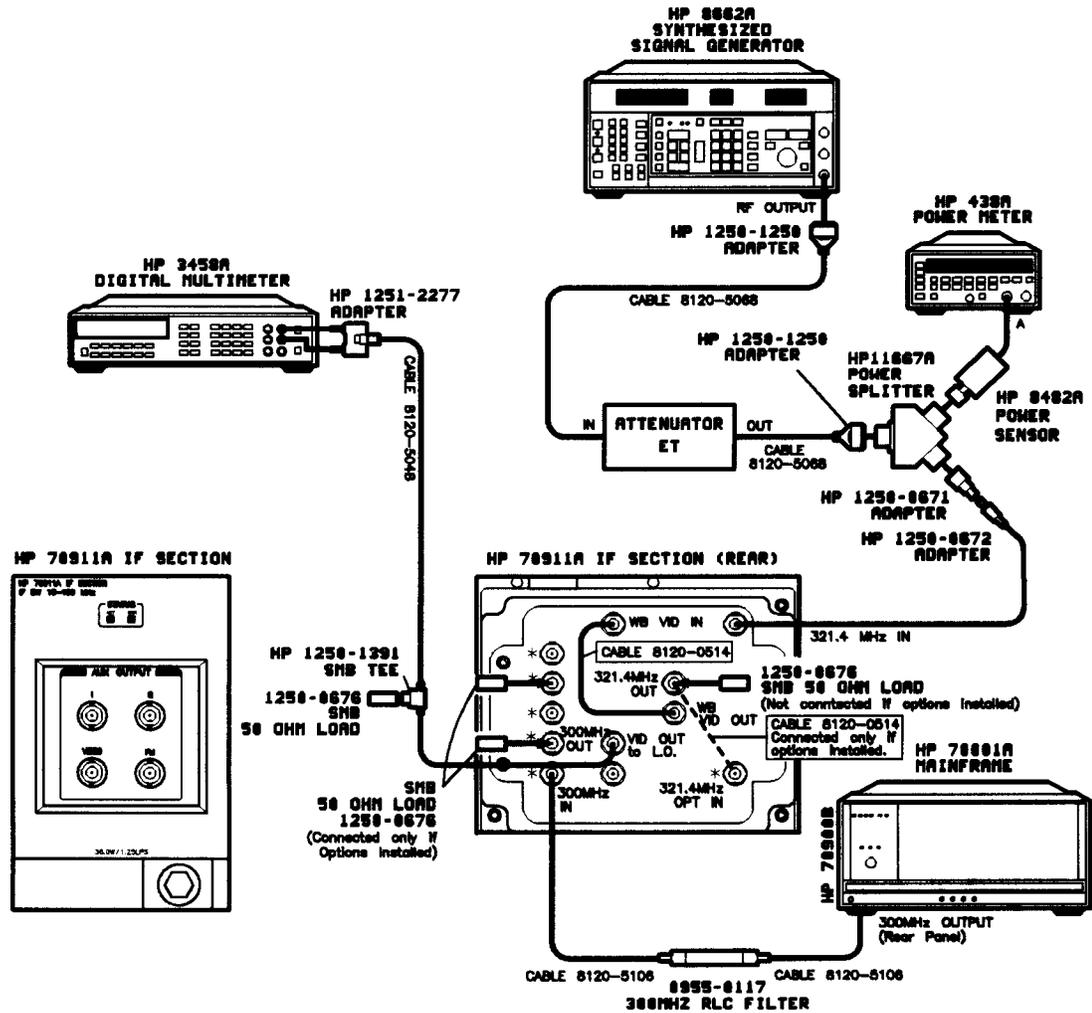
The purpose of this test is to measure the gain accuracy of the IF step gain amplifier.

---

**Note** This test is completely automated. No manual steps are required.

---

# Resolution Bandwidth Filter Verification Test



\* Equipment connections to these connectors only apply if options are installed.

Figure 7-5. Resolution Bandwidth Filter Setup

## Resolution Bandwidth Filter Verification Test

### Test Equipment

### Preferred Model Numbers

Digital Multimeter .....	HP 3458A or 70110A
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
BNC (f) to Dual Banana .....	HP P/N 1251-2277
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048

The purpose of this test is to measure the center frequency (Hz), center frequency (% of bandwidth), bandwidth error (%), amplitude error (dB), and amplitude (dB relative to reference bandwidth) at the video output port.

---

**Note** This test is completely automated. No manual steps are required.

---



## Daisy Chain Video Gain Verification Test

### Test Equipment

### Preferred Model Numbers

Digital Multimeter .....	HP 3458A or 70110A
Pulse/Function Generator .....	HP 8116A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

### Adapters

2 SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
BNC (f) to Dual Banana .....	HP P/N 1251-2277
2 SMB (f)(m)(m) TEE .....	HP P/N 1250-1391

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048

The purpose of this test is to verify that the narrow band video port is functional.

---

**Note**            This test is completely automated. No manual steps are required.

---

# Option 001 70 MHz Gain Verification Test

**Note** This test will not run with Special Handling 140 MHz Filter installed.

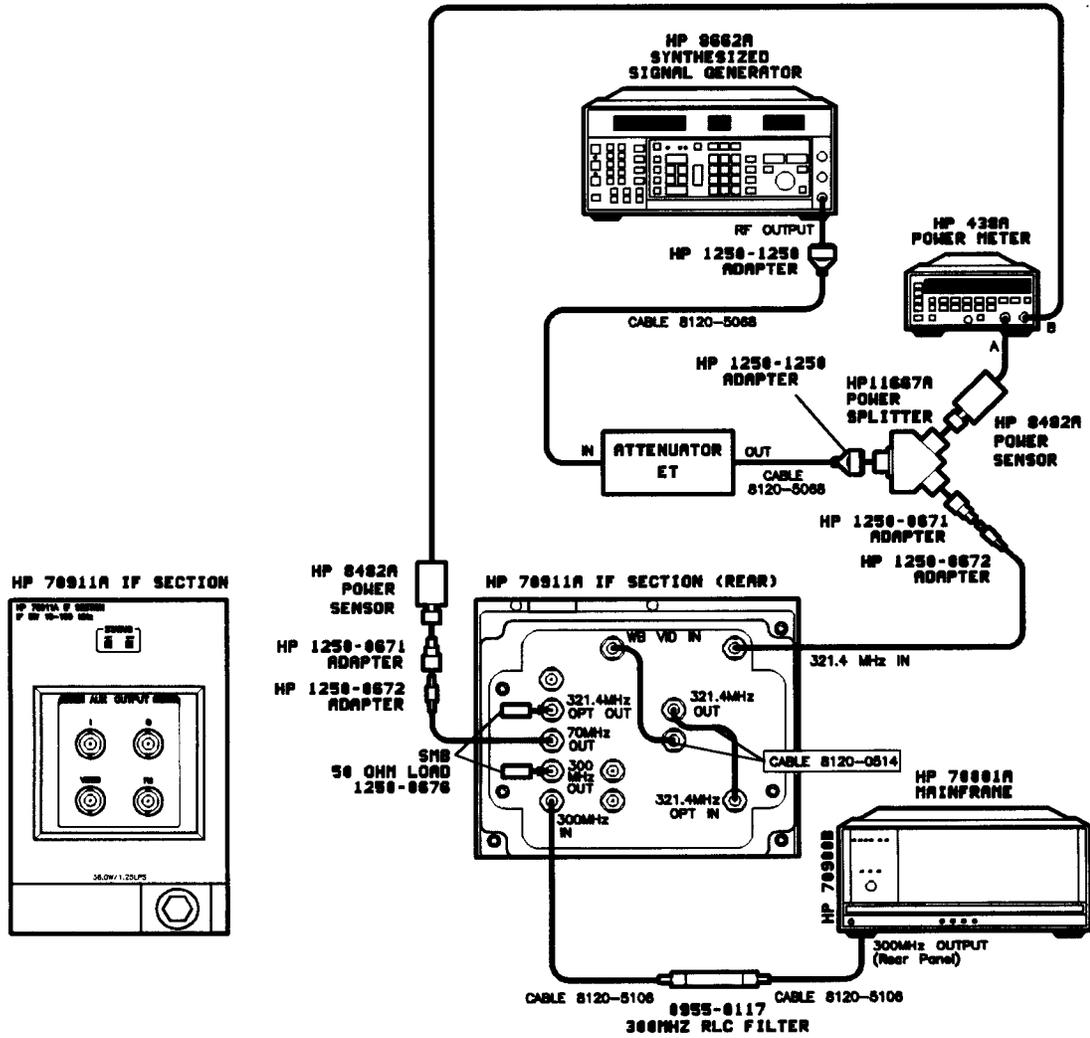


Figure 7-7. 70 MHz Gain Setup

## Option 001 70 MHz Gain Verification Test

### Test Equipment

### Preferred Model Numbers

Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
2 Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
2 Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) to SMB (f) .....	HP P/N 1250-0672

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this test is to verify the functionality of the 70 MHz downconverter.

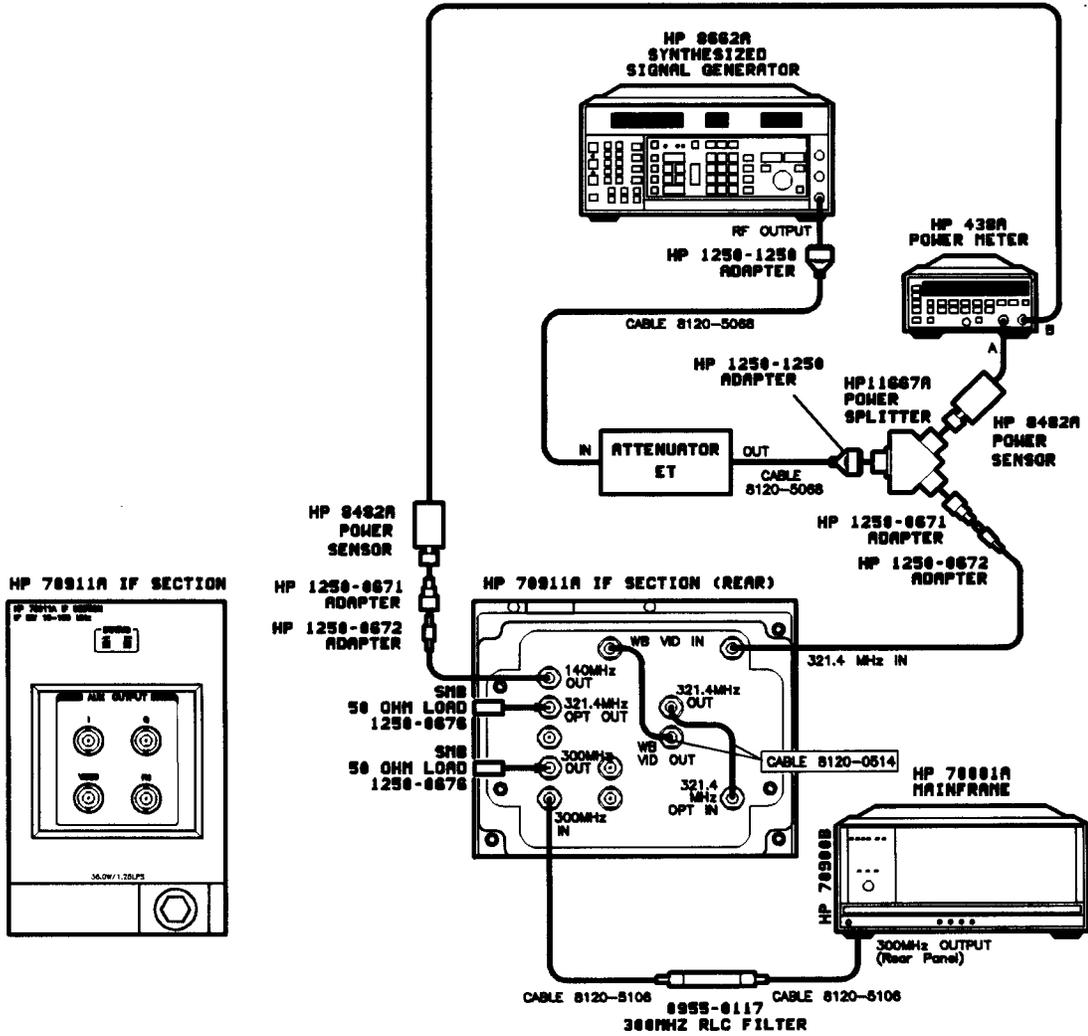
---

**Note** This test is completely automated. No manual steps are required.

---

# Option 002 140 MHz Gain Verification Test

**Note** This test will not run with Special Handling 140 MHz Filter installed.



tsopt002

Figure 7-8. 140 MHz Gain Setup

## Option 002 140 MHz Gain Verification Test

Test Equipment	Preferred Model Numbers
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
2 Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
2 Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) to SMB (f) .....	HP P/N 1250-0672

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this test is to verify the functionality of the 140 MHz downconverter.

---

**Note** This test is completely automated. No manual steps are required.

---

# Option 004 I/Q Magnitude/Phase Tracking Verification Test

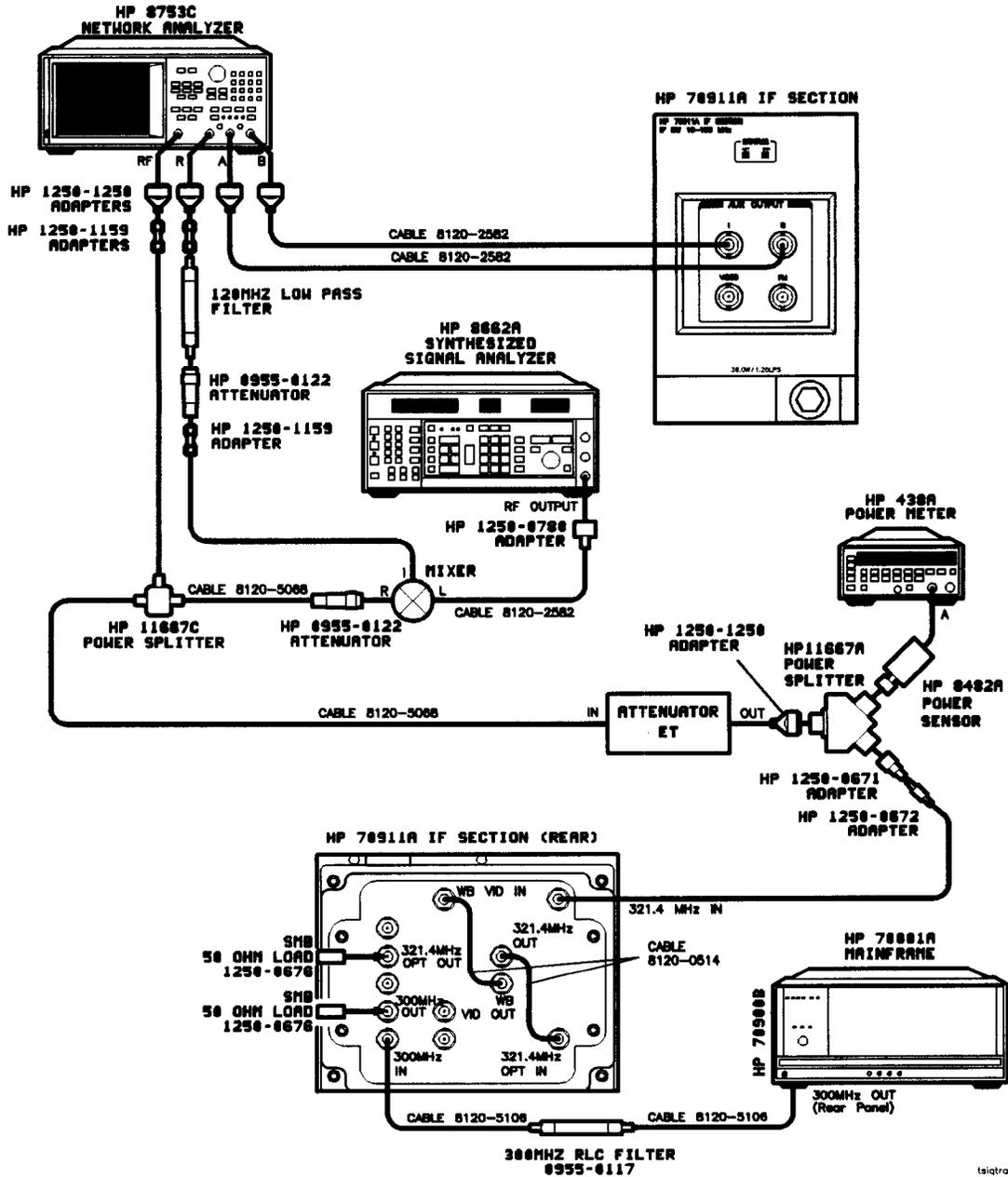


Figure 7-9. I/Q Magnitude/Phase Tracking Setup

## Option 004 I/Q Magnitude/Phase Tracking Verification Test

Test Equipment	Preferred Model Numbers
Network Analyzer .....	HP 8753C
Synthesized Signal Generator .....	HP 8662A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Splitter .....	HP 11667C
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B
Mixer .....	ZFM-4
2 6 dB Attenuators .....	HP P/N 0955-0122
Low Pass Filter .....	CIRQTEL LR13-1

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

### Adapters

5 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
SMB (f) 50 $\Omega$ Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
3 SMB (m) to SMB (m) .....	HP P/N 1250-1159
Type N (m) to BNC (f) .....	HP P/N 1250-0780

### Cables

2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
2 SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514
3 BNC (m) to BNC (m) 1 meter .....	HP P/N 8120-2582

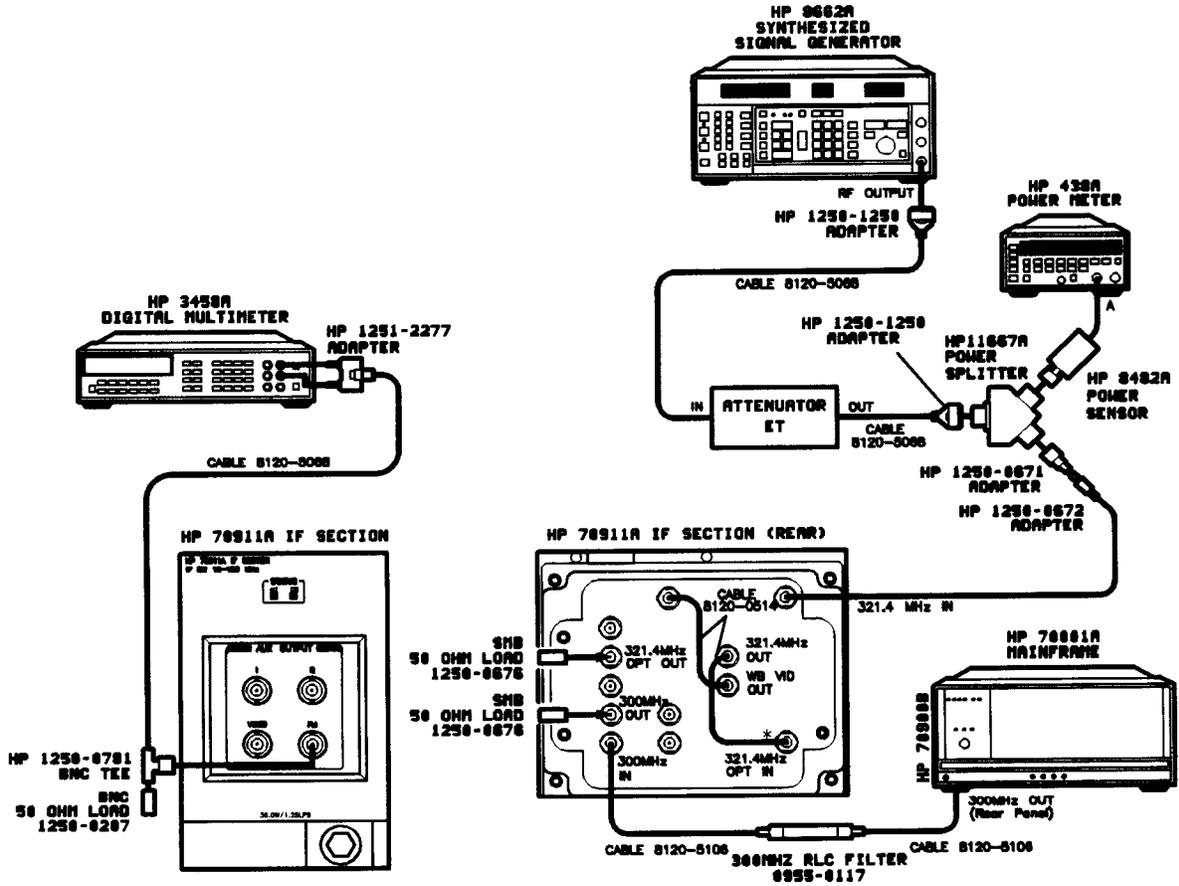
The purpose of this test is to measure the amplitude and phase tracking of the I/Q ports of the module.

---

**Note** This test is completely automated. No manual steps are required.

---

# Option 005 FM Output Level Test



tsdvfm

Figure 7-10. FM Output Level Setup

**Test Equipment**

**Preferred Model Numbers**

Synthesized Signal Generator .....	HP 8662A
Digital Multimeter .....	HP 3458A or 70110A
Power Meter .....	HP 70100A, 436A, or 438A
Attenuator ET* .....	HP 11713A/HP 8494G/HP 8496G
Power Splitter .....	HP 11667A
Power Sensor .....	HP 8482A
300 MHz RLC Filter (SMA) .....	HP P/N 0955-0117
System Mainframe .....	HP 70001A
Local Oscillator .....	HP 70900B

\* Refer to "Before You Begin Testing" in this chapter for information about the Attenuator ET.

**Adapters**

2 SMA (f) to Type N (m) .....	HP P/N 1250-1250
Type N (m) to SMB (m) .....	HP P/N 1250-0671
2 SMB (f) 50 Ω Load .....	HP P/N 1250-0676
SMB (f) to SMB (f) .....	HP P/N 1250-0672
SMB (f)(m)(m) TEE .....	HP P/N 1250-1391
BNC (f) to Dual Banana .....	HP P/N 1250-2277

**Cables**

BNC (m) to SMB (f) 1230 mm .....	HP P/N 8120-5048
2 SMA (m) to SMB (f) 470 mm .....	HP P/N 8120-5106
2 SMA (m) to SMA (m) 620 mm .....	HP P/N 8120-5068
SMB (f) to SMB (f) 50 mm .....	HP P/N 8120-0514

The purpose of this test is to measure the FM output level.

---

**Note**            This test is completely automated. No manual steps are required.

---



## **System Calibration**

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No manual system calibration procedures are required for this module. All system calibration is performed when running the automated adjustment and module verification procedures.



## Replacing Major Assemblies

---

This chapter contains procedures for removal and replacement of major assemblies in your HP 70911A WB IF Section. Instructions are given for the following assemblies:

- Module Cover
- Front Sub-Panel
- Rear Panel
- MSIB Connector
- A1 Res Bandwidth (10–100 MHz)
- A2 Linear Detector
- A3 Video Amplifier
- A4 Power Supply
- A5 Controller

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 HP 70911A WB IF Section, refer to Manual 2.

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**Note**            Some assemblies use castings and gaskets to shield components. Replacement assemblies do not come with these castings and gaskets; therefore, you must reuse the old castings and gaskets on the new assemblies where applicable.

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## Cable Routing Considerations

The cables from the rear panel connectors should be routed according to the information provided in Table 9-1.

**Table 9-1. Cable Routing**

<b>Connector Name:</b>	<b>Route Cable Between:</b>
140 MHZ OUT	A3 Video Amplifier and A4 Power Supply
321.4 MHZ OPT OUT	A3 Video Amplifier and A4 Power Supply
70 MHZ OUT	A3 Video Amplifier and A4 Power Supply
300 MHZ OUT	A3 Video Amplifier and A4 Power Supply
300 MHZ IN	A3 Video Amplifier and A4 Power Supply
WB VID IN	A3 Video Amplifier and A4 Power Supply
VID OUT TO L.O.	A3 Video Amplifier and A4 Power Supply
NB VID IN	A3 Video Amplifier and A4 Power Supply
321.4 MHZ OUT	A2 Linear Detector and A3 Video Amplifier
WB VID OUT	A2 Linear Detector and A3 Video Amplifier
321.4 MHZ IN	A1 Resolution Bandwidth and A2 Linear Detector
321.4 MHZ OPT IN	A1 Resolution Bandwidth and A2 Linear Detector

---

**Note** Cables from the HP-MSIB connector to the A1 res bandwidth (10–100 MHz) and A2 linear detector assemblies must be positioned up against the rear panel to prevent cables from being pinched.

---

## Option Assembly Removal/Replacement Considerations

There are several techniques to consider when removing option assemblies. (Consider these while facing the front panel.)

1. If no option assemblies are installed to the left of the assembly to be removed, simply pull the assembly out and away from the module enough to disconnect the cables, then remove.
2. If no option assemblies are installed to the right of the assembly to be removed, simply pull the assembly out and away from the module enough to disconnect the cables, then remove.
3. If option assemblies are installed to the right and left of the assembly to be removed, first remove all assemblies to the right before removing the assembly of interest.

Refer to Chapter 10, "Overall Parts Identification Drawings," for proper option cable connections and proper option assembly configuration.

---

**Note****OPTION ASSEMBLIES MUST BE INSTALLED IN A SPECIFIC ORDER.**

For example, if you are installing Option 001, 004, and 005, Option 005 must be inserted into the left-most slot, Option 004 A9 into the next slot to the right, Option 004 A10 into the next slot to the right, and Option 001 into the right-most slot.

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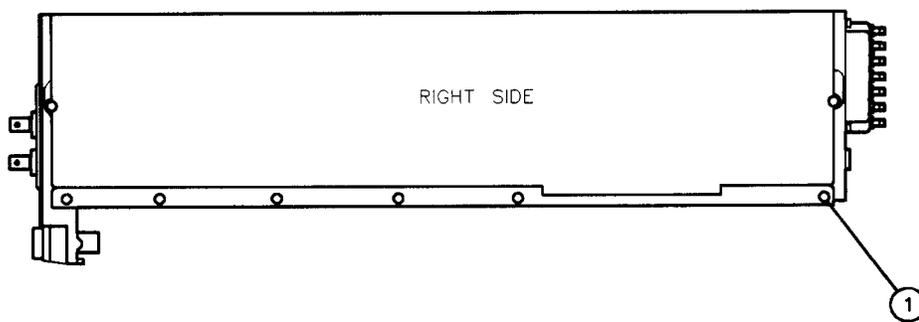
## Module Cover

### To remove the module cover

1. Remove the 19 screws ① located on top and on either side of the module cover.
2. Lift the module cover off the module.

### To replace the module cover

1. Place the module cover on the module.
2. Secure the module cover using 19 screws ①.



ch9right

**Figure 9-1. Module Cover Removal/Replacement**

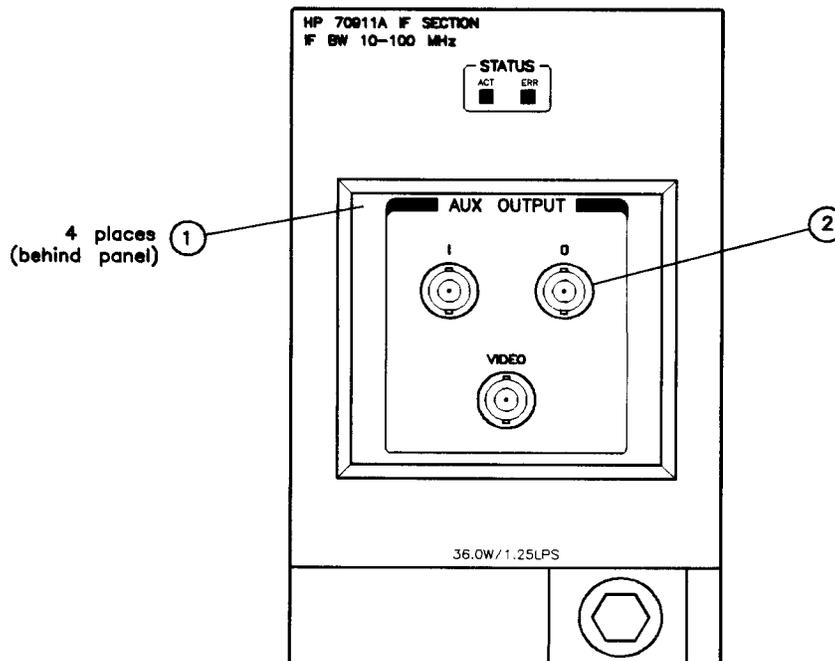
## Front Sub-Panel

### To remove the front sub-panel

1. Remove the module cover as described in "Module Cover."
2. Remove all option assemblies (if applicable).
3. Remove the four screws ① securing the front sub-panel.
4. Remove the nut(s) ② securing the front-panel connector(s).

### To replace the front sub-panel

1. Place the front sub-panel connector(s) into the proper hole(s). If adding a new option requiring a front sub-panel cable, add supplied cable at this time.
2. Replace front sub-panel connector nut(s) ②.
3. Secure the front sub-panel to the front panel with four screws ①.
4. Replace the module cover as described in "Module Cover."



ch9front

Figure 9-2. Front Sub-Panel Removal/Replacement

## Rear Panel

### To remove the rear panel

1. Remove the module cover as described in "Module Cover."
2. Disconnect all cables going to the rear panel from where they connect to the assembly.
3. Remove four screws ① securing rear panel.
4. Carefully pull the rear panel, with attached cables, out of the instrument.

### To replace the rear panel

1. Remove one of the cables from the old rear panel, then install it into the appropriate hole in the new rear panel. Repeat this step until all cables are installed into the new rear panel.

If you are adding options, install the supplied option cables and assemblies at this time. Refer to Chapter 10, "Overall Parts Identification Drawings," for proper option cable connections and proper option assembly configuration.

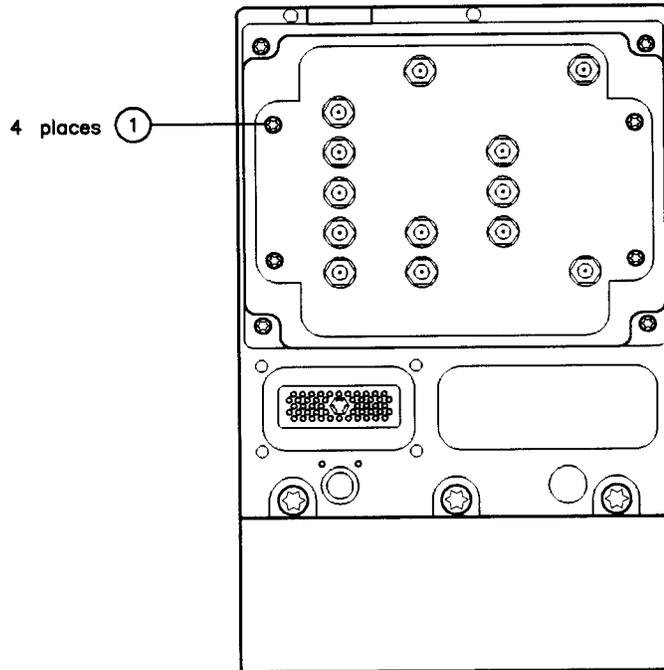
---

#### Note

**OPTION ASSEMBLIES MUST BE INSTALLED IN A SPECIFIC ORDER.** For example, if you are installing Option 001, 004, and 005, while facing the front panel, Option 005 must be inserted into the left-most slot, Option 004 A9 into the next slot to the right, Option 004 A10 into the next slot to the right, and Option 001 into the right-most slot.

---

2. Replace the rear panel. Route the cables according to the information provided in Table 9-1 in this chapter.
3. Secure the rear panel with four screws ①.
4. Connect each cable to the appropriate assembly. Refer to Chapter 10, "Overall Parts Identification Drawings," for proper cable connections.
5. Replace the module cover as described in "Module Cover."



ch9rear

**Figure 9-3. Rear Panel Removal/Replacement**

---

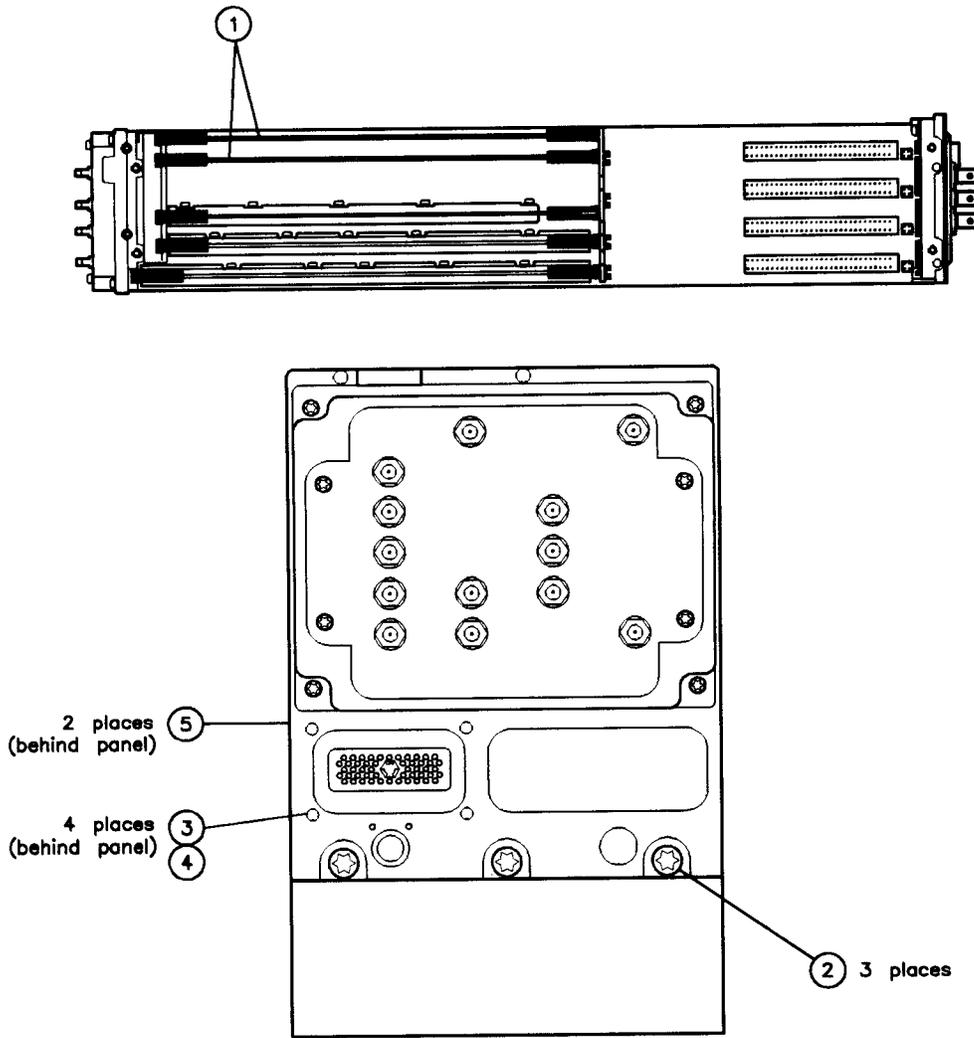
## **MSIB Connector**

### **To remove MSIB connector**

1. Remove the module cover as described in “Module Cover.”
2. Remove the A5 Controller and A4 Power Supply assemblies ① being careful to disconnect the MSIB connectors.
3. Remove the three screws ② securing the rear frame and pull the rear frame away from the module enough to access the MSIB connector.
4. Remove the four nuts ③ securing the MSIB connector, the four springs ④, and the two connector bars ⑤.
5. Remove the MSIB connector.

### **To replace the MSIB connector**

1. Position the MSIB connector into the rear frame.
2. Replace the two connector bars ⑤, the four springs ④, then secure the MSIB connector with the four nuts ③.
3. Secure the rear frame with three screws ②.
4. Connect the MSIB connectors to the A5 Controller and A4 Power Supply assemblies ①.
5. Replace the A5 Controller and A4 Power Supply assemblies ① into the module.
6. Replace the module cover as described in “Module Cover.”



ch9msib

Figure 9-4. HP-MSIB Connector Removal/Replacement

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## A1 Res Bandwidth (10–100 MHz)

### To remove the A1 Resolution Bandwidth assembly

1. Remove the module cover as described in “Module Cover.”
2. Lift up on the A1 board extractors ① and carefully lift the A1 out and slightly away from the module.
3. Disconnect W1 (8120-6386) to A1J1 and W8 (8120-6387) to A1J2.
4. Remove the A1 Res Bandwidth (10–100 MHz) assembly.

### To replace the A1 Resolution Bandwidth assembly

1. Connect W1 (8120-6386) to A1J1 and W8 (8120-6387) to A1J2.
2. Replace the A1 Res Bandwidth (10–100 MHz) assembly into the module.
3. Replace the module cover as described in “Module Cover.”

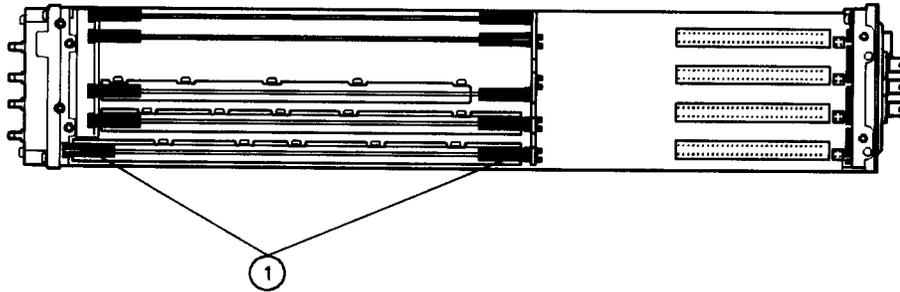


Figure 9-5. A1 Resolution Bandwidth Removal/Replacement

ch9a1

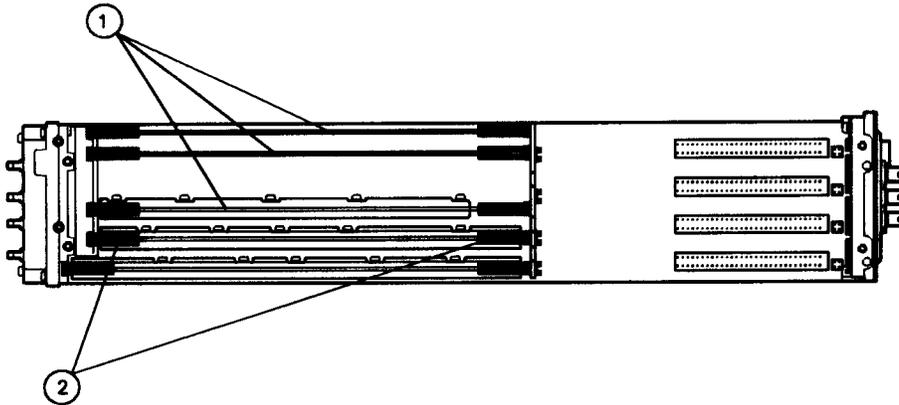
## A2 Linear Detector

### To remove the A2 Linear Detector assembly

1. Remove the module cover as described in "Module Cover."
2. Remove the A5 Controller, A4 Power Supply, and A3 Video Amplifier assemblies ①.
3. Disconnect W2 (8120-6386) on A2J5, W3 (8120-6388) on A2J2, and W8 (8120-6387) on A2J1.
4. Lift up on the A2 board extractors ② and carefully lift the A2 out of the module.

### To replace the A2 Linear Detector assembly

1. Replace the A2 Linear Detector assembly into the module.
2. Connect W2 (8120-6386) on A2J5, W3 (8120-6388) on A2J2, and W8 (8120-6387) on A2J1.
3. Replace the A3 Video Amplifier, A4 Power Supply, and A3 Video Amplifier assemblies ① into the module.
4. Replace the module cover as described in "Module Cover."



ch9o2

Figure 9-6. A2 Linear Detector Removal/Replacement

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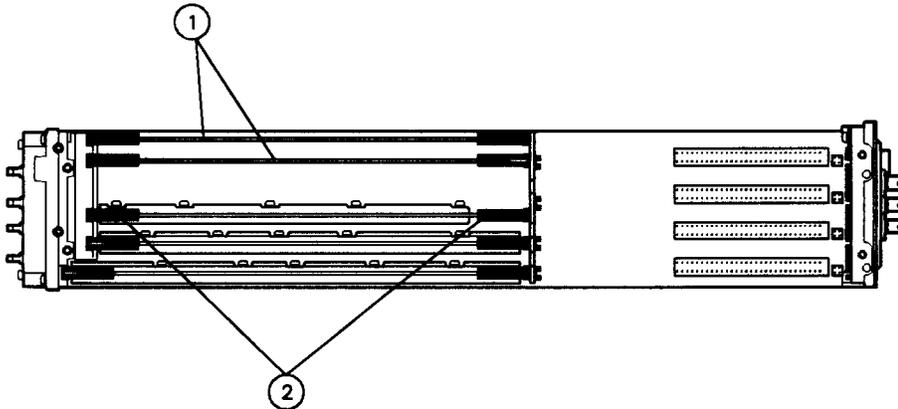
## A3 Video Amplifier

### To remove the A3 Video Amplifier assembly

1. Remove the module cover as described in "Module Cover."
2. Remove the A5 Controller and A4 Power Supply assemblies ①.
3. Disconnect W4 (8120-6386) on A3J4, W5 (8120-6388) on A3J2, W6 (8120-6386) on A3J1, and W7 (8120-6417) on A3J3.
4. Lift up on the A3 board extractors ② and carefully lift the A3 out of the module.

### To replace the A3 Video Amplifier assembly

1. Replace the A3 Video Amplifier assembly into the module.
2. Connect W4 (8120-6386) on A3J4, W5 (8120-6388) on A3J2, W6 (8120-6386) on A3J1, and W7 (8120-6417) on A3J3.
3. Replace the A4 Power Supply and A5 Controller assemblies ① into the module.
4. Replace the module cover as described in "Module Cover."



ch9a3

**Figure 9-7. A3 Video Amplifier Removal/Replacement**

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## A4 Power Supply

### To remove the A4 Power Supply assembly

1. Remove the module cover as described in "Module Cover."
2. Remove the A5 Controller.
3. Lift up on the A4 board extractors ① and carefully lift the A4 out of the module enough to access the attached cable.
4. Disconnect the power cable from A4 Power Supply.
5. Remove the A4 Power Supply assembly from the module.

### To replace the A4 Power Supply assembly

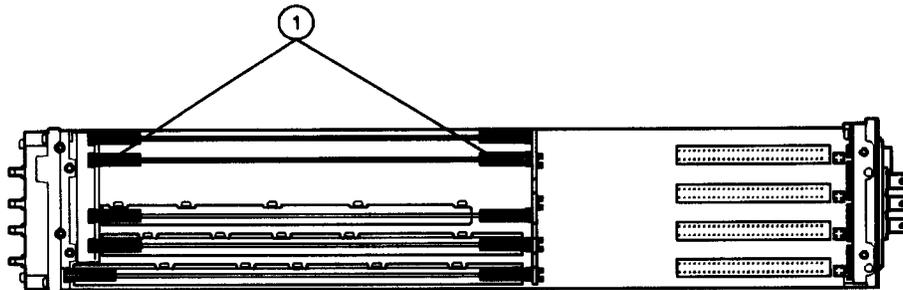
1. Connect the power cable to the A4 Power Supply.
2. Replace the A4 Power Supply assembly into the module.

---

**Note** Be careful not to route coax cables under capacitors or transformers when replacing the A4 Power Supply assembly.

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3. Replace the A5 Controller assembly into the module.
4. Replace the module cover as described in "Module Cover."



ch9a4

**Figure 9-8. A4 Power Supply Removal/Replacement**

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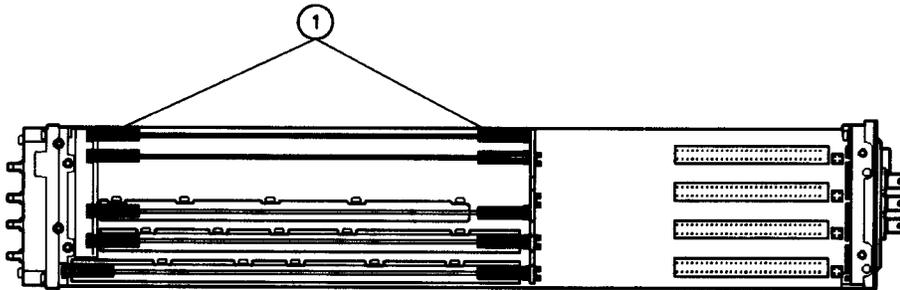
## A5 Controller

### To remove the A5 Controller assembly

1. Remove the module cover as described in "Module Cover."
2. Lift up on the A5 board extractors ① and carefully lift the A5 out of the module enough to access the attached cable.
3. Disconnect the MSIB connector.
4. Remove the A5 Controller assembly from the module.

### To replace the A5 Controller assembly

1. Connect the MSIB connector.
2. Replace the A5 Controller assembly into the module.
3. Replace the module cover as described in "Module Cover."



ch9a5

**Figure 9-9. A5 Controller Removal/Replacement**

## Overall Parts Identification Drawings

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

This chapter contains the following sections:

- Standard Assemblies and Cable Identification
- Front View Identification
- Rear View Identification
- Top View Identification
- Top View, Cover Removed Identification
- Bottom View Identification
- Left View Identification
- Right View Identification
- Option Assemblies and Cable Identification

---

## Options

To locate the assembly and cable identification diagram for options, refer to the following table:

Option Combination					Refer to Page Number
001	002	004	005	007	
•					10-27
•	•				10-30
•	•	•			10-26
•	•		•		10-19
•		•	•		10-15
•			•		10-17
•	•				10-21
•			•	•	10-23
•	•		•	•	10-24
•		•		•	10-25
•				•	10-29
•	•			•	10-31
	•				10-28
	•	•			10-22
	•		•		10-18
	•	•	•		10-16
		•			10-20
		•			10-14
			•		10-13

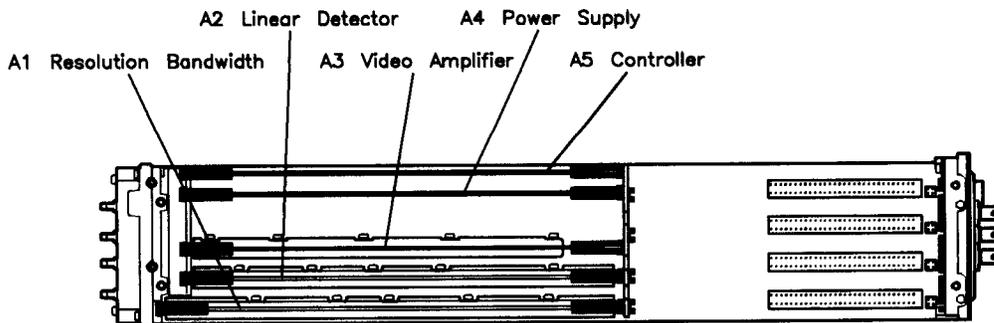
Because this service guide is part of an Option OB3 package which consists of two manuals, refer to Manual 2 of this option set for information on part listings and schematics.

Manual 2 contains packets of component-level repair information for each HP 70911A WB IF Section 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.

# Standard Assembly and Cable Identification

**Table 10-1. Standard Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A1	70911-60003	Resolution Bandwidth
A2	70911-60004	Linear Detector
A3	70911-60006	Video Amplifier
A4	70911-60008	Power Supply
A5	70911-60005	Controller
W1	8120-6386	Cable (from A1J1 to rear-panel 321.4 MHZ IN)
W2	8120-6386	Cable (from A2J5 to rear-panel WB VID OUT)
W3	8120-6388	Cable (from A2J2 to rear-panel 321.4 MHZ OUT)
W4	8120-6386	Cable (from A3J4 to rear-panel VID OUT TO L.O.)
W5	8120-6388	Cable (from A3J2 to rear-panel WB VID IN)
W6	8120-6386	Cable (from A3J1 to rear-panel NB VID IN)
W7	8120-6417	Cable (from A3J3 to front-panel VIDEO)
W8	8120-6387	Cable (from A1J2 to A2J1)
W9	8120-5014	Cable, Rear Panel Jumper (from WB VID OUT to WB VID IN)



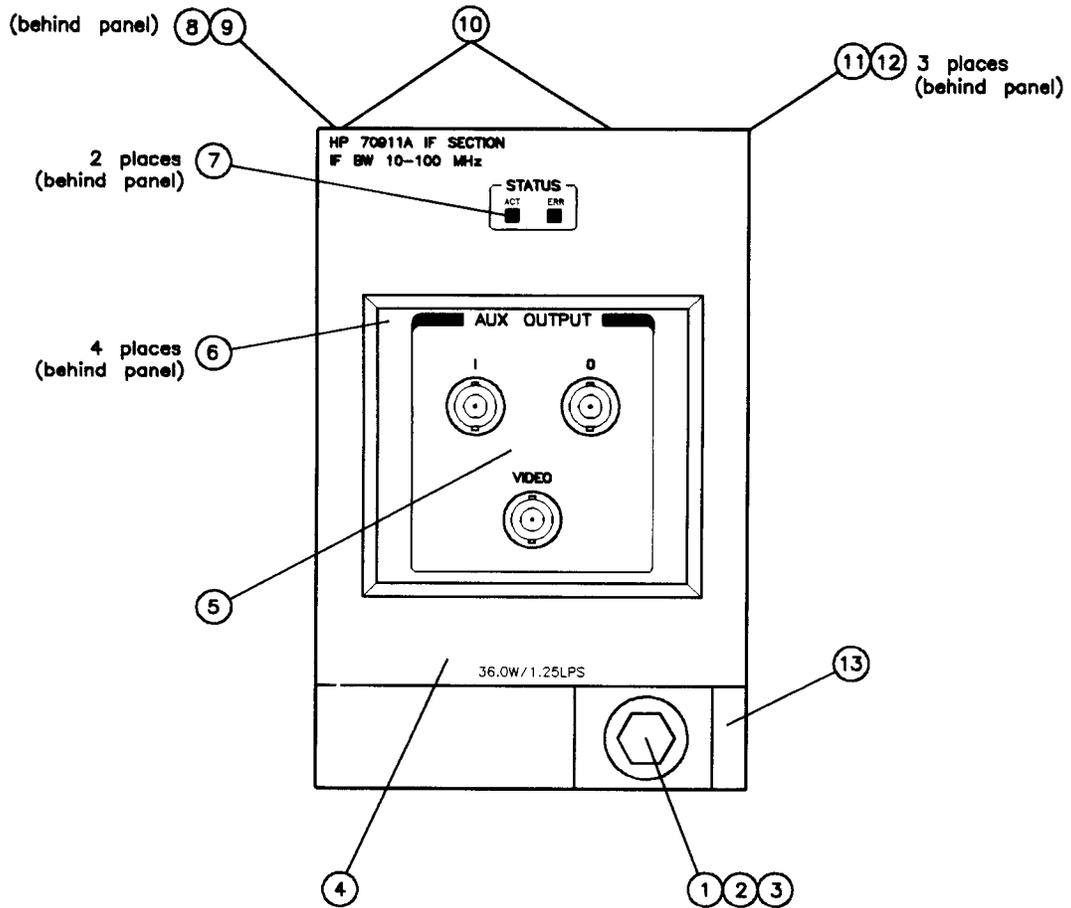
**Figure 10-1. Standard Assemblies and Cable Identification**

## Front View Identification

**Table 10-2. Overall Parts Identification Listing, Front View**

<b>Item</b>	<b>HP Part Number</b>	<b>Qty</b>	<b>Description</b>
1	5022-0051	1	Latch
2	0900-0012	1	O-Ring
3	0510-1244	1	Retainer Clip
4	70911-00002	1	Front Dress Panel
5	70911-20026	1	Mounting Plate (standard)
5	70911-20027	1	Mounting Plate (FM)
5	70911-20028	1	Mounting Plate (IQ)
5	70911-20029	1	Mounting Plate (FM and IQ)
6	0515-2126	4	Screw, Mounting Plate
7	0515-2126	2	Screw, A7 Front Panel Board
8	70911-00006	1	Front Guide
9	0515-2126	1	Screw
10	0515-1521	2	Screw
11	3050-0116	3	Washer
12	0515-1950	3	Screw
13	70911-20021	1	Front Frame

# Front View Identification



hdwfront

**Figure 10-2. Overall Parts Identification Drawing, Front View**

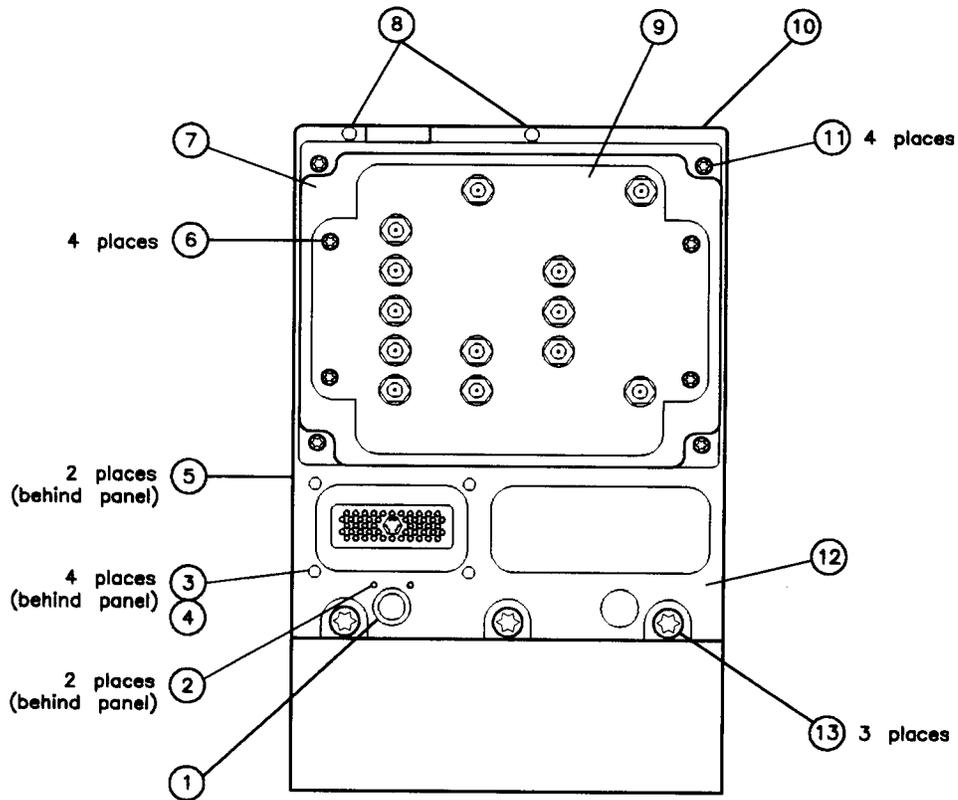
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## Rear View Identification

**Table 10-3. Overall Parts Identification Listing, Rear View**

<b>Item</b>	<b>HP Part Number</b>	<b>Qty</b>	<b>Description</b>
1	5001-5840	1	Ground Spring
2	0515-0366	2	Screw
3	1460-2095	4	Spring
4	0535-0042	4	Nut
5	5001-5835	2	Connector Bars
6	0515-2126	4	Screw
7	70911-20009	1	Rear Panel Extension
8	0515-1521	2	Screw
9	70911-00003	1	Rear Panel (standard)
9	70911-00009	1	Rear Panel (option)
10	70911-00005	1	Rear Guide
11	0515-2126	4	Screw
12	70911-20022	1	Rear Frame
13	0515-0381	3	Screw

# Rear View Identification



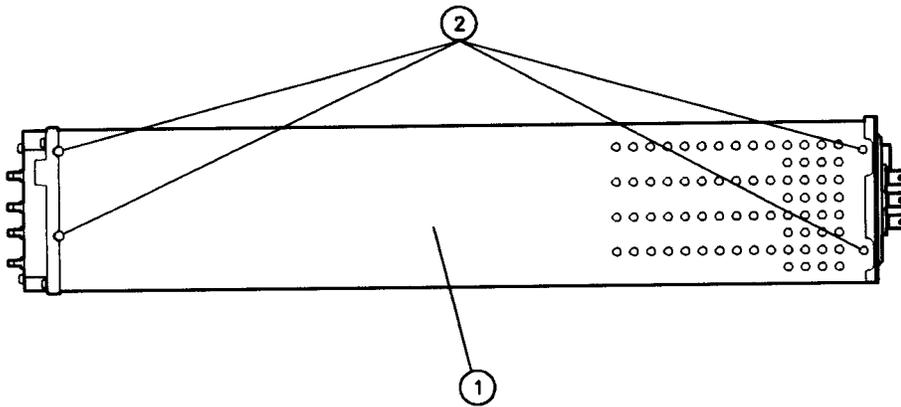
hdwrear

Figure 10-3. Overall Parts Identification Drawing, Rear View

## Top View Identification

Table 10-4. Overall Parts Identification Listing, Top View

Item	HP Part Number	Qty	Description
1	70911-00001	1	Cover
2	0515-1521	4	Screw



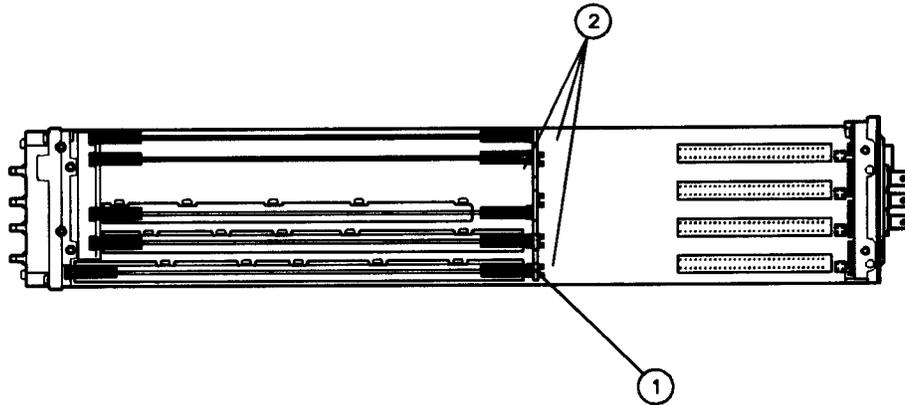
viewtop

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

**Top View, Cover Removed, Identification**

**Table 10-5.**  
**Overall Parts Identification Listing, Top View, Cover Removed**

Item	HP Part Number	Qty	Description
1	0515-0374	3	Screw, PC Wall Guide
2	70911-00004	1	PC Wall Guide



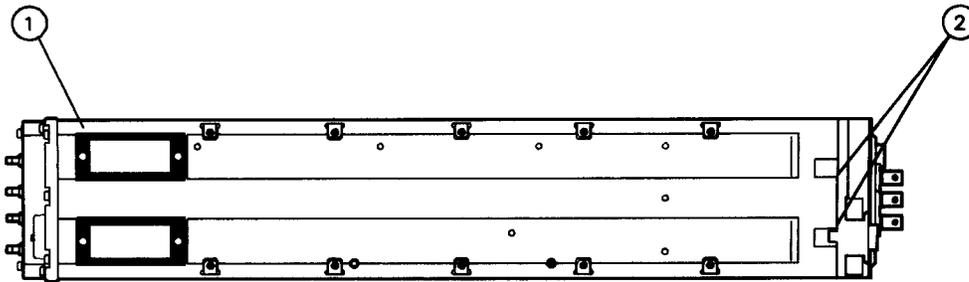
hdwtop

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

## Bottom View Identification

Table 10-6. Overall Parts Identification Listing, Bottom View

Item	HP Part Number	Qty	Description
1	70911-20023	1	Mounting Base
2	0515-0381	2	Screw



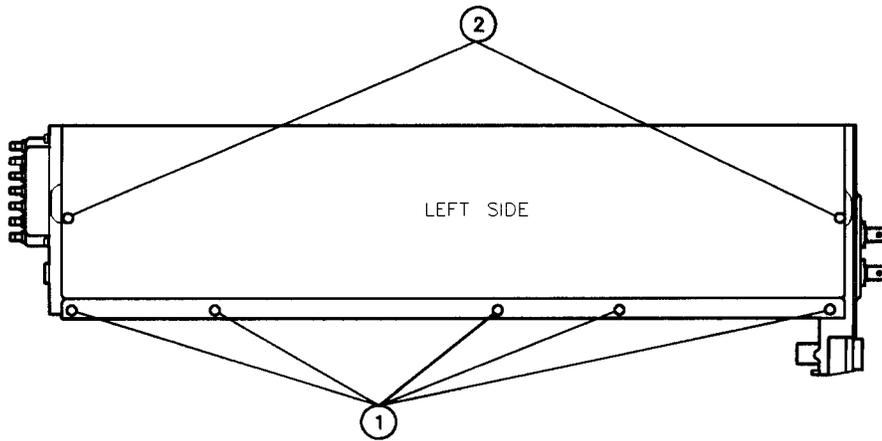
viewbottom

Figure 10-6. Overall Parts Identification Drawing, Bottom View

**Left Side View Identification**

**Table 10-7. Overall Parts Identification Listing, Left Side View**

Item	HP Part Number	Qty	Description
1	0515-2256	5	Screw
2	0515-1521	2	Screw



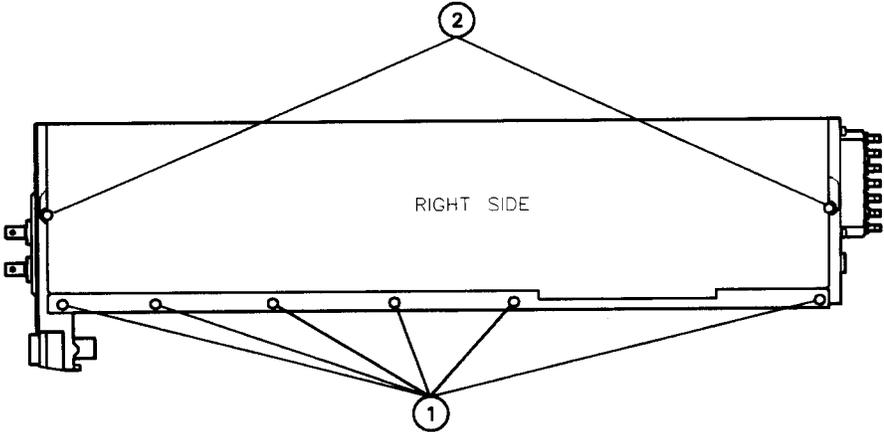
hdwleft

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

# Right Side View Identification

Table 10-8. Overall Parts Identification Listing, Right Side View

Item	HP Part Number	Qty	Description
1	0515-2256	6	Screw
2	0515-1521	2	Screw



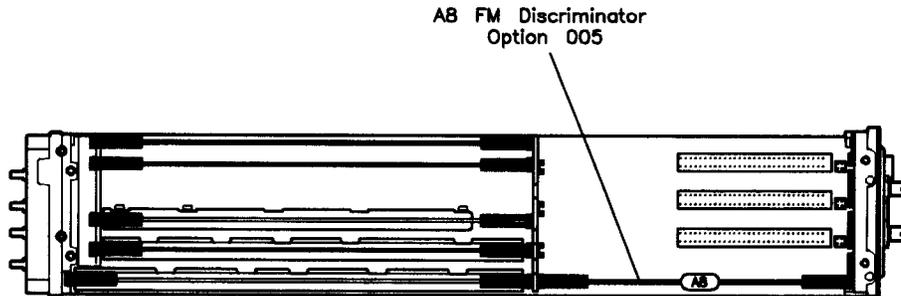
hdwright

Figure 10-8. Overall Parts Identification Drawing, Right Side View

**Option 005 Assembly and Cable Identification**

**Table 10-9. Option 005 Assembly and Cable Identification**

<b>Ref Des</b>	<b>HP Part Number</b>	<b>Description</b>
A8	70911-60011	Option 005 FM Discriminator
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W13	8120-6439	Cable (from A8J9 to rear-panel 300 MHZ OUT)
W14	8120-6440	Cable (from A8J8 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)



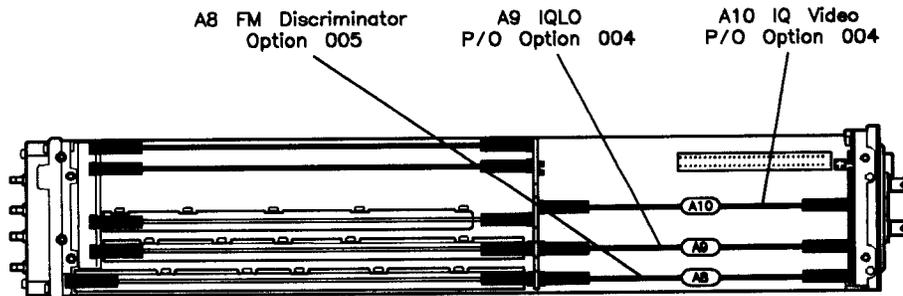
**Figure 10-9. Option 005 Assembly and Cable Identification**

opt5

## Option 004 and 005 Assemblies and Cable Identification

**Table 10-10. Option 004 and 005 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A10J2 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)
W16	8120-6394	Cable (from A8J9 to A9J4)
W17	8120-6384	Cable (from A8J8 to A10J1)
W22	8120-6401	Cable (from A9J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)



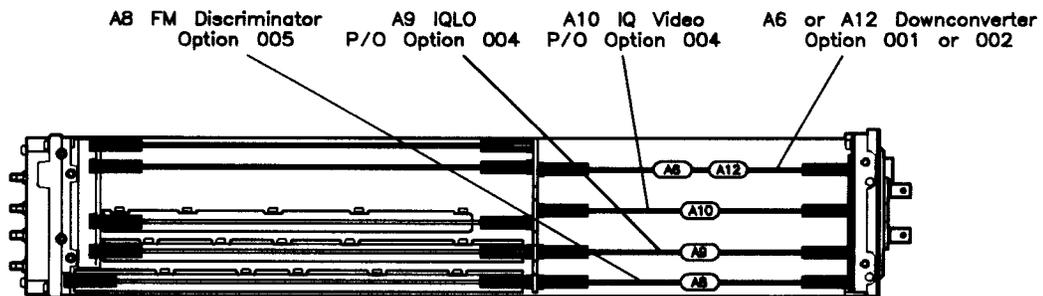
opt45

**Figure 10-10. Option 004 and 005 Assemblies and Cable Identification**

**Option 001, 004, and 005 Assemblies and Cable Identification**

**Table 10-11.**  
**Option 001, 004, and 005 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A11	70911-60013	Option 001 70 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)
W16	8120-6394	Cable (from A8J9 to A9J4)
W17	8120-6384	Cable (from A8J8 to A10J1)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A11J4)
W28	8120-6394	Cable (from A10J2 to A11J1)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHZ OUT)



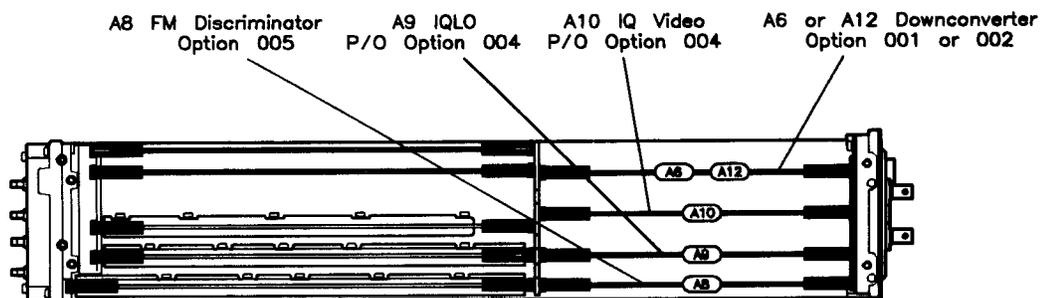
opt145cr

**Figure 10-11. Option 001, 004, and 005 Assemblies and Cable Identification**

## Option 002, 004 and 005 Assemblies and Cable Identification

Table 10-12.  
Option 002, 004, and 005 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHz IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHz OPT IN)
W16	8120-6394	Cable (from A8J9 to A9J4)
W17	8120-6384	Cable (from A8J8 to A10J1)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHz OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A12J4)
W28	8120-6394	Cable (from A10J2 to A12J1)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHz OUT)



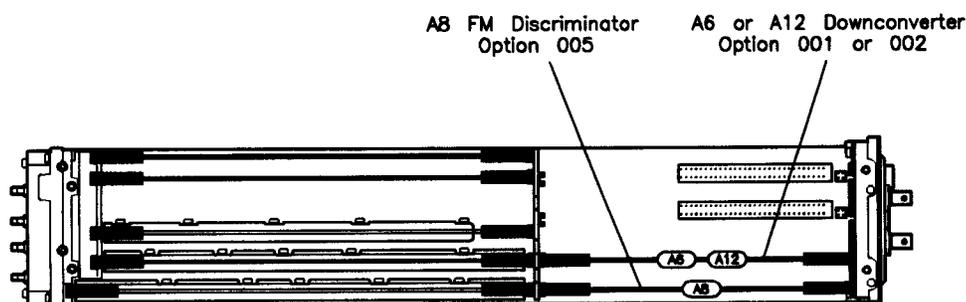
opt145or

Figure 10-12. Option 002, 004, and 005 Assemblies and Cable Identification

## Option 001 and 005 Assemblies and Cable Identification

Table 10-13. Option 001 and 005 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A11	70911-60013	Option 001 70 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHz IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHz OPT IN)
W18	8120-6394	Cable (from A8J8 to A11J1)
W19	8120-6394	Cable (from A8J9 to A11J4)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHz OUT)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHz OUT)



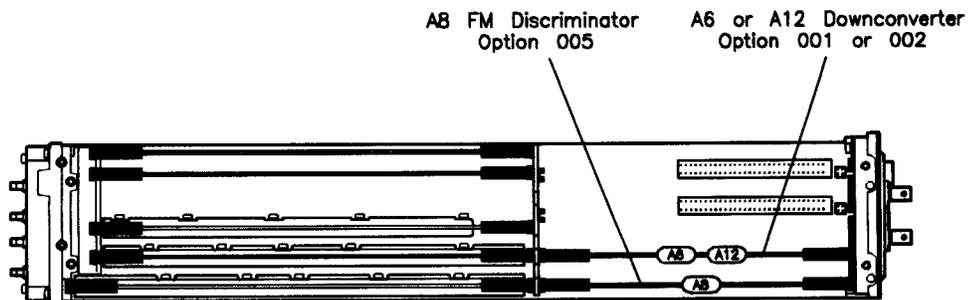
opt15or

Figure 10-13. Option 001 and 005 Assemblies and Cable Identification

## Option 002 and 005 Assemblies and Cable Identification

Table 10-14. Option 002 and 005 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHz IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHz OPT IN)
W18	8120-6394	Cable (from A8J8 to A12J1)
W19	8120-6394	Cable (from A8J9 to A12J4)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHz OUT)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHz OUT)



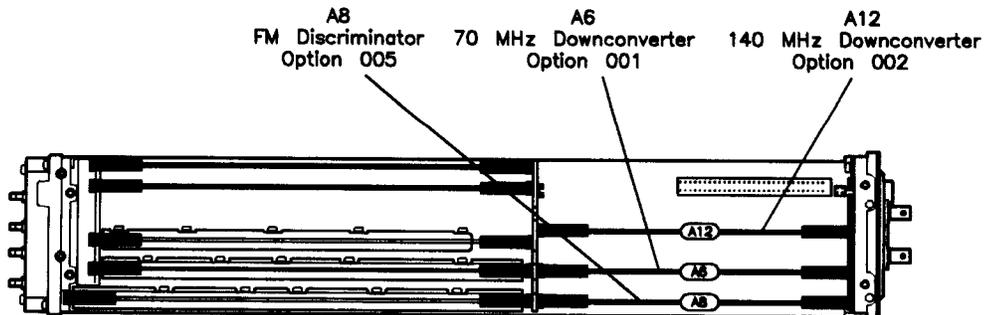
opt15or

Figure 10-14. Option 002 and 005 Assemblies and Cable Identification

**Option 001, 002, and 005 Assemblies and Cable Identification**

**Table 10-15.**  
Option 001, 002, and 005 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A11	70911-60013	Option 001 70 MHz IF Downconverter
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)
W18	8120-6394	Cable (from A8J8 to A11J1)
W19	8120-6394	Cable (from A8J9 to A11J4)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHZ OUT)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHZ OUT)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHZ OUT)
W37	8120-6399	Cable (from A11J5 to A12J1)
W38	8120-6384	Cable (from A11J6 to A12J4)



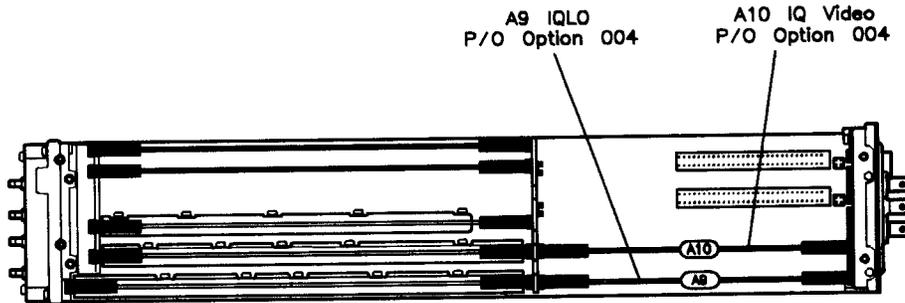
opt125

**Figure 10-15.** Option 001, 002, and 005 Assemblies and Cable Identification

# Option 004 Assemblies and Cable Identification

**Table 10-16. Option 004 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A10J2 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A10J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A9J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A9J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)



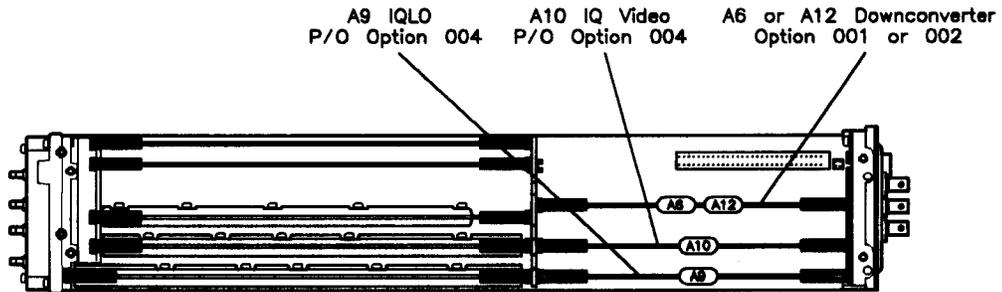
opt4

**Figure 10-16. Option 004 Assemblies and Cable Identification**

Option 001 and 004 Assemblies and Cable Identification

Table 10-17. Option 001 and 004 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A11	70911-60013	Option 001 70 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A10J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A9J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A11J4)
W28	8120-6394	Cable (from A10J2 to A11J1)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHZ OUT)



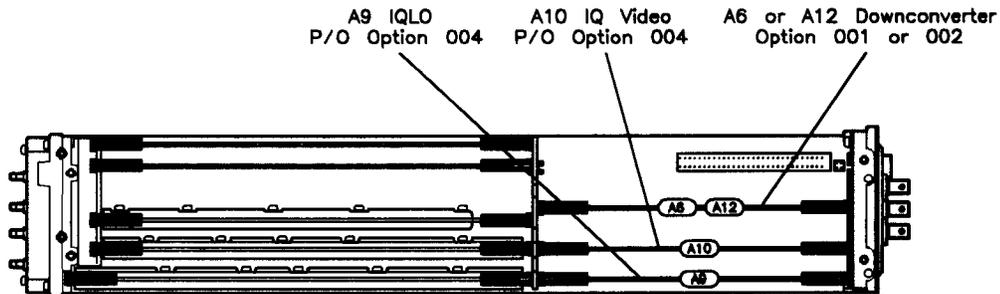
opt14or

Figure 10-17. Option 001 and 004 Assemblies and Cable Identification

## Option 002 and 004 Assemblies and Cable Identification

Table 10-18. Option 002 and 004 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A10J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A9J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A12J4)
W28	8120-6394	Cable (from A10J2 to A12J1)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHZ OUT)



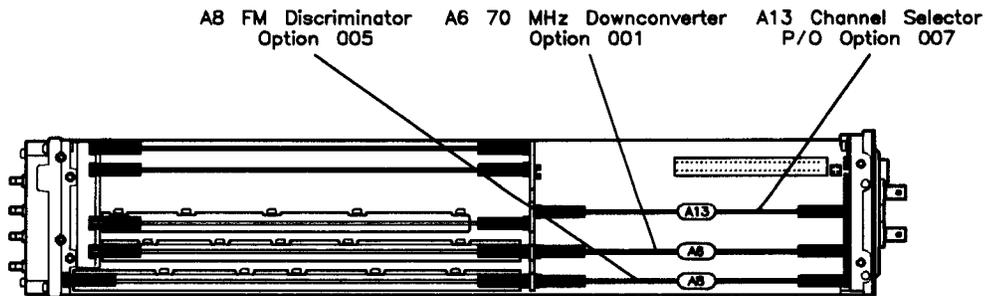
opt14or

Figure 10-18. Option 002 and 004 Assemblies and Cable Identification

**Option 001, 005, and 007 Assemblies and Cable Identification**

**Table 10-19.**  
**Option 001, 005, and 007 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A11	70911-60013	Option 001 70 MHz IF Downconverter
A13	70911-60012	Option 007 BPF Select
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)
W18	8120-6394	Cable (from A8J8 to A11J1)
W19	8120-6394	Cable (from A8J9 to A11J4)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHZ OUT)
W31	8120-6400	Cable (from A13J2 to rear-panel 70 MHZ OUT)
W32	8120-6394	Cable (from A11J2 to A13J1)



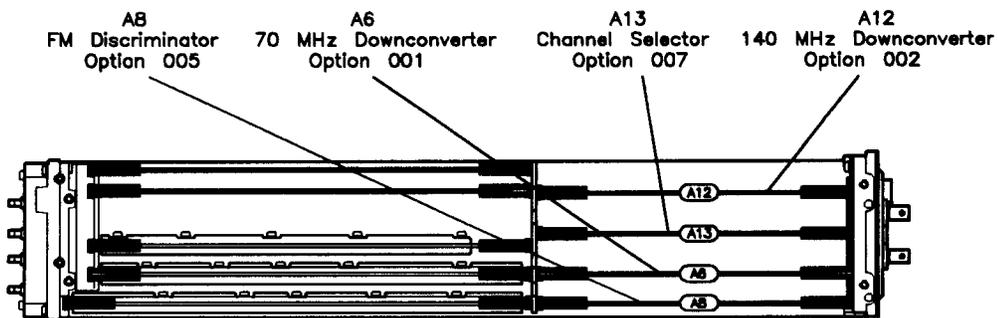
opt157

**Figure 10-19. Option 001, 005, and 007 Assemblies and Cable Identification**

# Option 001, 002, 005, and 007 Assemblies and Cable Identification

**Table 10-20.**  
**Option 001, 002, 005, and 007 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A8	70911-60011	Option 005 FM Discriminator
A11	70911-60013	Option 001 70 MHz IF Downconverter
A12	70911-60014	Option 002 140 MHz IF Downconverter
A13	70911-60012	Option 007 BPF Select
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W11	8120-6439	Cable (from A8J2 to rear-panel 300 MHZ IN)
W12	8120-6395	Cable (from A8J7 to front-panel FM)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A8J1 to rear-panel 321.4 MHZ OPT IN)
W18	8120-6394	Cable (from A8J8 to A11J1)
W19	8120-6394	Cable (from A8J9 to A11J4)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHZ OUT)
W31	8120-6400	Cable (from A13J2 to rear-panel 70 MHZ OUT)
W32	8120-6394	Cable (from A11J2 to A13J1)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHZ OUT)
W37	8120-6399	Cable (from A11J5 to A12J1)
W38	8120-6384	Cable (from A11J6 to A12J4)



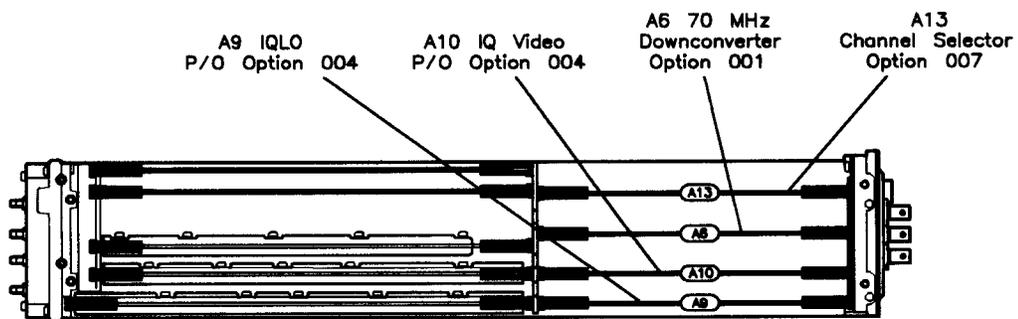
opt1257

**Figure 10-20. Option 001, 002, 005, and 007 Assemblies and Cable Identification**

**Option 001, 004, and 007 Assemblies and Cable Identification**

**Table 10-21.**  
**Option 001, 004, and 007 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A11	70911-60013	Option 001 70 MHz IF Downconverter
A13	70911-60012	Option 007 BPF Select
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A10J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A9J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHZ OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A11J4)
W28	8120-6394	Cable (from A10J2 to A11J1)
W31	8120-6400	Cable (from A13J2 to rear-panel 70 MHZ OUT)
W32	8120-6394	Cable (from A11J2 to A13J1)



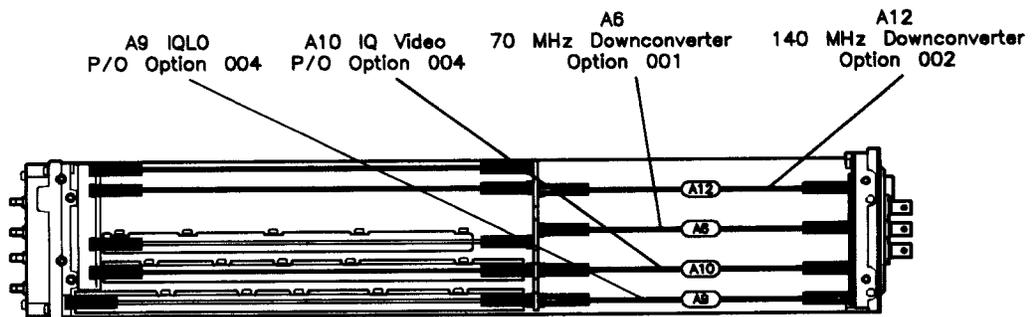
opt147

**Figure 10-21. Option 001, 004, and 007 Assemblies and Cable Identification**

# Option 001, 002, and 004 Assemblies and Cable Identification

**Table 10-22.**  
**Option 001, 002, and 004 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A9	70911-60017	Option 004 Analog IQ LO
A10	70911-60016	Option 004 Analog IQ Video
A11	70911-60013	Option 001 70 MHz IF Downconverter
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A10J1 to rear-panel 321.4 MHz OPT IN)
W21	8120-6401	Cable (from A9J4 to rear-panel 300 MHz IN)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHz OUT)
W23	8120-6394	Cable (from A9J2 to A10J5)
W24	8120-6397	Cable (from A10J6 to front-panel I)
W25	8120-6397	Cable (from A10J7 to front-panel Q)
W27	8120-6384	Cable (from A9J6 to A11J4)
W28	8120-6394	Cable (from A10J2 to A11J1)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHz OUT)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHz OUT)
W37	8120-6399	Cable (from A11J5 to A12J1)
W38	8120-6384	Cable (from A11J6 to A12J4)



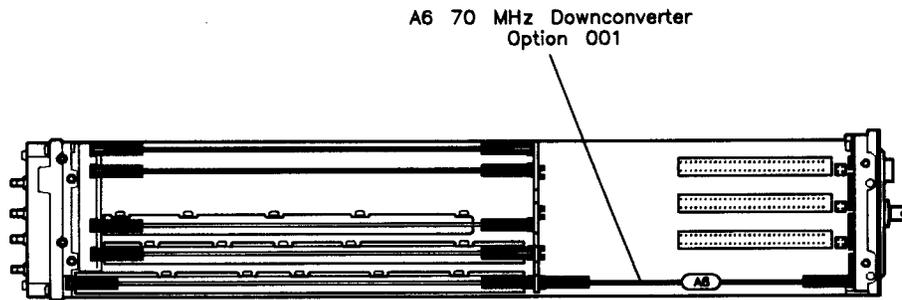
opt124

**Figure 10-22. Option 001, 002, and 004 Assemblies and Cable Identification**

**Option 001 Assembly and Cable Identification**

**Table 10-23. Option 001 Assembly and Cable Identification**

Ref Des	HP Part Number	Description
A11	70911-60013	Option 001 70 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A11J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A11J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHZ OUT)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHz OUT)

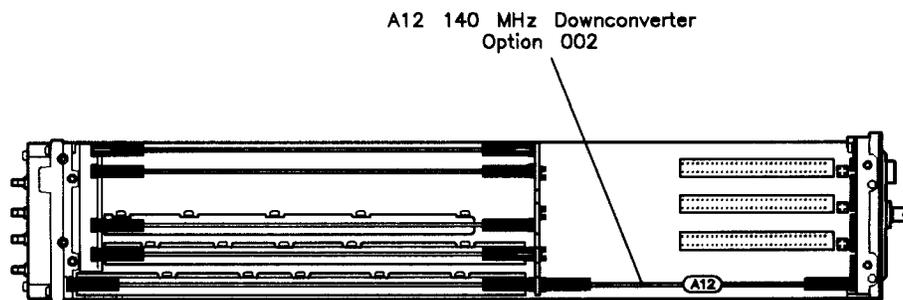


**Figure 10-23. Option 001 Assembly and Cable Identification**

## Option 002 Assembly and Cable Identification

Table 10-24. Option 002 Assembly and Cable Identification

Ref Des	HP Part Number	Description
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHZ OUT to 321.4 MHZ OPT IN)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHZ OPT OUT)
W15	8120-6439	Cable (from A12J1 to rear-panel 321.4 MHZ OPT IN)
W21	8120-6401	Cable (from A12J4 to rear-panel 300 MHZ IN)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHZ OUT)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHZ OUT)



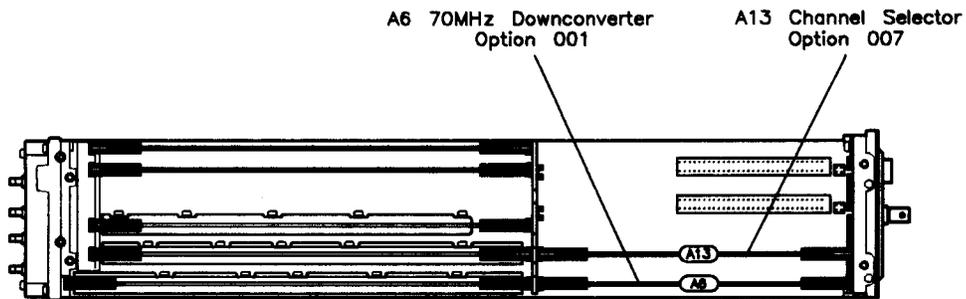
opt2

Figure 10-24. Option 002 Assembly and Cable Identification

**Option 001 and 007 Assemblies and Cable Identification**

**Table 10-25. Option 001 and 007 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A11	70911-60013	Option 001 70 MHz IF Downconverter
A13	70911-60012	Option 007 BPF Select
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W14	8120-6440	Cable (from A11J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A11J1 to rear-panel 321.4 MHz OPT IN)
W21	8120-6401	Cable (from A11J4 to rear-panel 300 MHz IN)
W22	8120-6401	Cable (from A11J6 to rear-panel 300 MHz OUT)
W31	8120-6400	Cable (from A13J2 to rear-panel 70 MHz OUT)
W32	8120-6394	Cable (from A11J2 to A13J1)



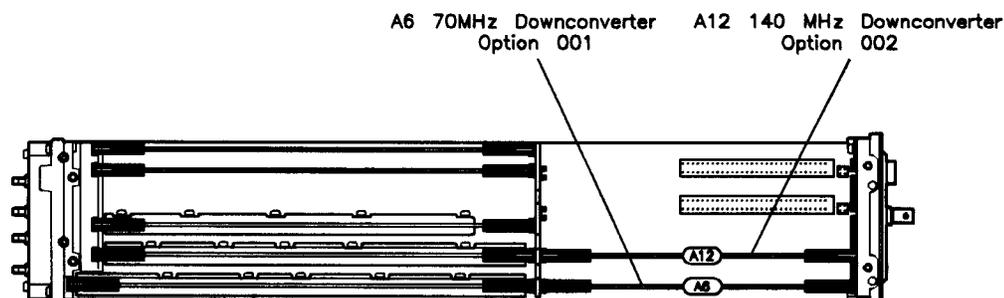
opt17

**Figure 10-25. Option 001 and 007 Assemblies and Cable Identification**

## Option 001 and 002 Assemblies and Cable Identification

Table 10-26. Option 001 and 002 Assemblies and Cable Identification

Ref Des	HP Part Number	Description
A11	70911-60013	Option 001 70 MHz IF Downconverter
A12	70911-60014	Option 002 140 MHz IF Downconverter
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A11J1 to rear-panel 321.4 MHz OPT IN)
W21	8120-6401	Cable (from A11J4 to rear-panel 300 MHz IN)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHz OUT)
W31	8120-6400	Cable (from A11J2 to rear-panel 70 MHz OUT)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHz OUT)
W37	8120-6399	Cable (from A11J5 to A12J1)
W38	8120-6384	Cable (from A11J6 to A12J4)



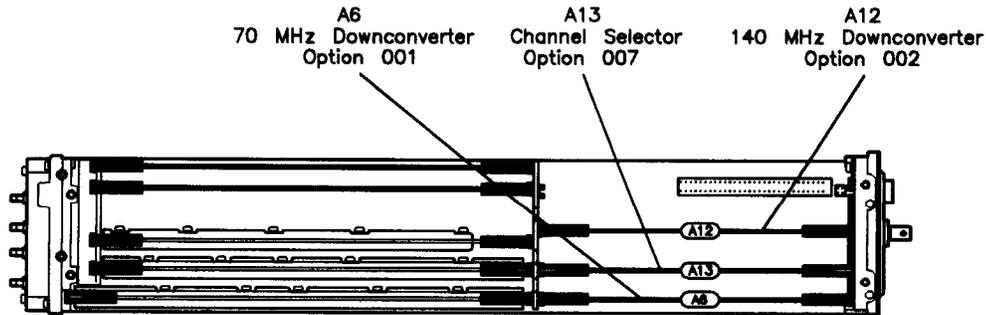
opt12

Figure 10-26. Option 001 and 002 Assemblies and Cable Identification

**Option 001, 002, and 007 Assemblies and Cable Identification**

**Table 10-27.**  
**Option 001, 002, and 007 Assemblies and Cable Identification**

Ref Des	HP Part Number	Description
A11	70911-60013	Option 001 70 MHz IF Downconverter
A12	70911-60014	Option 002 140 MHz IF Downconverter
A13	70911-60012	Option 007 BPF Select
W10	8120-5014	Cable, Rear Panel Jumper (from 321.4 MHz OUT to 321.4 MHz OPT IN)
W14	8120-6440	Cable (from A12J5 to rear-panel 321.4 MHz OPT OUT)
W15	8120-6439	Cable (from A11J1 to rear-panel 321.4 MHz OPT IN)
W21	8120-6401	Cable (from A11J4 to rear-panel 300 MHz IN)
W22	8120-6401	Cable (from A12J6 to rear-panel 300 MHz OUT)
W31	8120-6400	Cable (from A13J2 to rear-panel 70 MHz OUT)
W32	8120-6394	Cable (from A11J2 to A13J1)
W34	8120-6400	Cable (from A12J2 to rear-panel 140 MHz OUT)
W37	8120-6399	Cable (from A11J5 to A12J1)
W38	8120-6384	Cable (from A11J6 to A12J4)



opt127

**Figure 10-27. Option 001, 002, and 007 Assemblies and Cable Identification**



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