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HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. In other documentation, to reduce potential confusion, the only change to product numbers and names has been in the company name prefix: where a product number/name was HP XXXX the current name/number is now Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

Installation and Verification Manual

HP 8566B Spectrum Analyzer

Includes Option 400, Option 462, and Option 857



HP Part No. 08566-90169
Printed in USA September 1993

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Chapter [cross reference to location of declaration of conformity & noise information] contains regulatory information.

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

Safety Notes

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

Caution

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

Warning

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

Instruction Manual



The **instruction manual** symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the manual.

General Safety Considerations

Warning

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

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

Warning

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

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

Caution

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

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

How to Use This Manual

This manual uses the following conventions:

Front-Panel Key	This represents a key physically located on the instrument.
Screen Text	This indicates text displayed on the instrument's screen.

HP 8566B Documentation Description

Included with the HP Model 8566B spectrum analyzer are manuals: The Installation and Verification, the Operating and Programming Manual, and the Performance Tests and Adjustments Manual.

HP 8566B Installation and Verification Manual

HP part number 08566-90169

Contents: General information, installation, specifications, characteristics, and operation verification.

HP 8566B Operating and Programming Manual

HP part number 08566-90040

Contents: Manual and remote operation, including complete syntax and command description. Accopanying this manual is the seperate, pocket-sized Quick Reference Guide, HP part number 59558970.

HP 8566B Performance Tests and Adjustments Manual

HP part number 08566-90168

Contents: Electrical performance tests and adjustment procedures.

HP 8566B RF Section Troubleshooting and Repair Manual

HP part number 08566-90210 Contents: RF section service information.

HP 8566B IF-Display Section Troubleshooting and Repair Manual

HP part number 08566-90085 Contents: IF-Display section service information.

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1

General Information

What You'll Find in This Chapter

This chapter introduces you to the HP 8566B spectrum analyzer and its options and accessories. Refer to Chapter 2 for information on inspecting and installing the HP 8566B. Refer to Chapter 3 and Chapter 4 for a complete listing of instrument specifications and characteristics. Refer to Chapter 5 for Operation Verification.

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Introducing the HP 8566B

The HP 8566B spectrum analyzer is capable of measuring signals from -135 dBm to +30 dBm over a frequency range of 100 Hz to 22 GHz. The HP 8566B provides preselection from 2 to 22 GHz. The frequency range of the instrument can be extended, unpreselected, to 110 GHz using HP 11970 Series mixers, and to 325 GHz using other commercially available mixers.

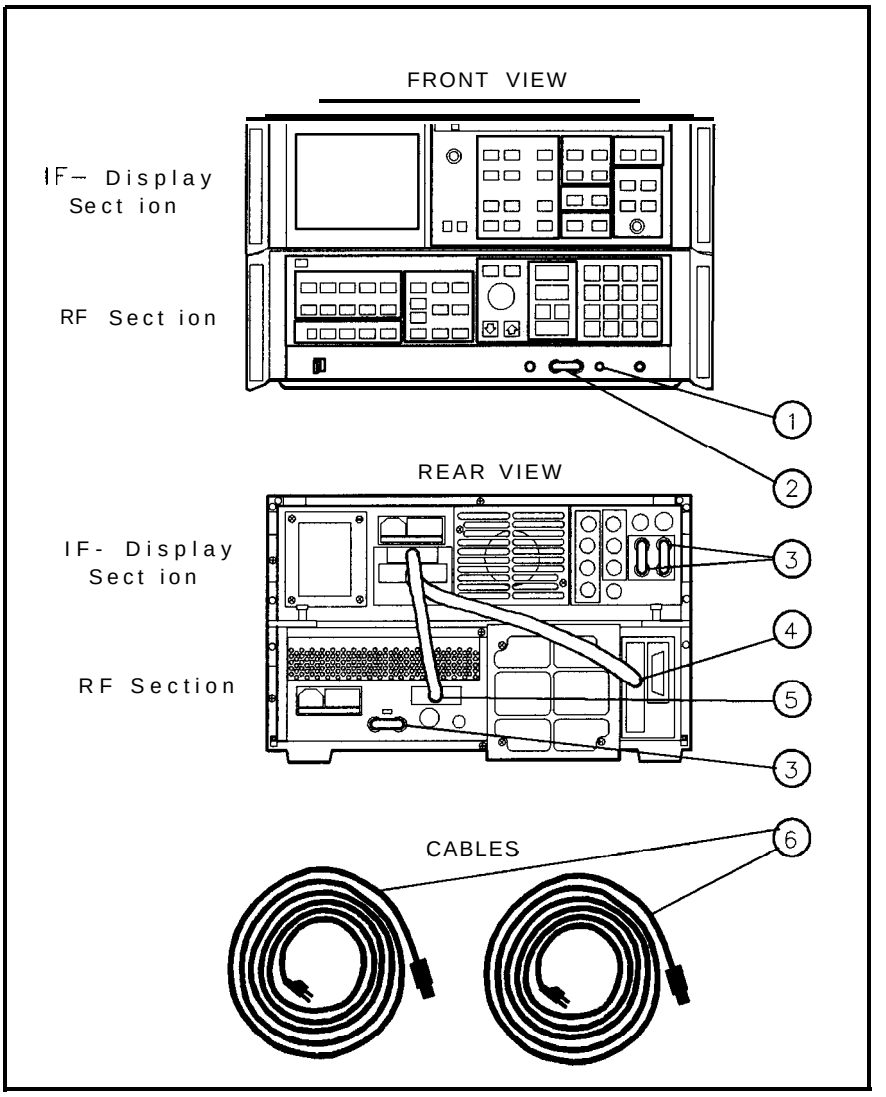
The HP 8566B is a complete, self-contained instrument that requires only an external ac power source for operation. A set of two ac power cables, suitable for use in the country to which the instrument is originally shipped, are included with the instrument.

Safety

Before installing or operating this instrument, you should familiarize yourself with the safety marking on the instrument and the safety instructions in the manuals. The instrument has been manufactured and tested in accordance with international safety standards. However, to ensure safe operation of the instrument and personal safety of the user, the cautions and warnings in the manuals must be followed. Refer to the summary of the safety information located near the front of this manual.

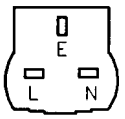
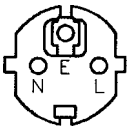
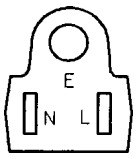
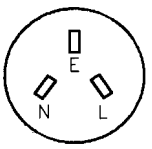
Accessories Supplied

Figure l-l illustrates the instrument with the supplied accessories. In accordance with international safety standards, both sections of this instrument are equipped with three-wire ac power cables. Various power cables are available to connect the HP 8566B to the types of ac power outlets unique to specific geographic areas. See Figure l-2. The cables appropriate for the area to which the instrument is originally shipped are included with the instrument.



Item	Description	HP Fart Number
1	1ST LO OUTPUT SMA termination	1810-0118
2	Front-panel IF semirigid jumper	85660-20101
3	BNC jumper cable (quantity 3)	85660-60117
4	Bus interconnect cable (W31)	85662-60220
5	Coax interconnect cable (W30)	85662-60093
6	Line power cables (2 each)	see Figure l-2

Figure l-l. HP 8566B with Accessories Supplied

PLUG TYPE * *	CABLE HP PART NUMBER	PLUG DESCRIPTION	CABLE LENGTH CM (INCHES)	CABLE COLOR	FOR USE IN COUNTRY
250V 	8120-1351 8120-1703	Straight* BS1363A 90°	229 (90) 229 (90)	Mint Gray Mint Gray	Great Britain, Cyprus. Nigeria, Singapore, Zimbabwe
250V 	8120-1369 8 120-0696	Straight* NZSS198/ASC11 90°	201 (79) 221 (87)	Gray Gray	Argentina, Australia, New Zealand, Mainland China
250V 	8120-1689 8120-1692	Straight * CEE7–Y11 90°	201 (79) 201 (79)	Mint Gray Mint Gray	East and West Europe, Central African Republic, United Arab Republic (unpolarized in many nations)
125V 	8120-1348 8120-1538	Straight* NEMA5–15P 90°	203 (80) 203 (80)	Block Black	United States Canada, Japan (100 V or 200 V), Brazil, Colombia, Mexico Philippines, Saudia Arabia, Taiwan
	8120-1378 8 120-4753 8120-1521 8120-4754	Straight* NEMA5–15P Straight 90° 90°	203 (80) 230 (90) 203 (80) 230 (90)	Jade Gray Jade Gray Jade Gray Jade Gray	
250V 	8120-5182 8120-5181	Straight* NEMA5–15P 90°	200 (78) 200 (78)	Jade Gray Jade Gray	Israel

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

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

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Figure 1-2. AC Power Cables Available

Accessories Available

A number of accessories are available from Hewlett-Packard to help configure the HP 8566B for your specific needs.

Preamplifiers	The HP 8447D preamplifier provides a minimum of 26 dB gain from 100 kHz to 1.3 GHz to enhance measurements of very low-level signals. The HP 8449B preamplifier provides a minimum of 28 dB gain from 1 to 26.5 GHz to enhance measurements of very low-level signals.
External Harmonic Mixers	The HP 11970 Series harmonic mixers extend the frequency range of the HP 8566B up to 110 GHz.
Microwave Power Amplifier	The HP 11975A microwave power amplifier boosts the LO power for external mixers. Its frequency range is from 2 to 8 GHz, and it provides an output leveled to ± 1 dB.
Close-Field Probes	The HP 11940A and HP 11941A close-field probes are small, hand-held, electromagnetic-field sensors. The probes can be used to make repeatable, absolute, magnetic-field measurements. When attached to a signal source, the probes can be used to generate a localized magnetic field for electromagnetic interference (EMI) susceptibility testing. The HP 11941A is specified over a frequency range of 9 kHz to 30 MHz. The HP 11940A operates from 30 MHz to 1 GHz.
75 to 50 Ohm Minimum-Loss Pad	The minimum-loss pad (dc to 2.0 GHz), HP part number 08568-60122, is a low-VSWR resistive matching device for making measurements in 75-ohm systems.
Microwave Limiters	The HP 11693A limiter protects the instrument input circuits from damage due to high power levels. It operates over a frequency range of 0.4 to 12.4 GHz and is rated 1 W continuous and 75 W peak power. The HP 11867A limiter is similar to the HP 11693A but has a frequency range of dc to 1.8 GHz and is rated 10 W continuous and 100 W peak power.
HP-IB Cable	Use HP 10833A/B/C/D HP-IB cables.
Controllers	The HP 8566B is fully HP-IB programmable. The preferred controllers are HP 9000 Series 300 computers. Consult your local Hewlett-Packard service representative for other recommended controllers and available software.

HP 85650A Quasi-Peak Adapter — The HP 85650A adds to the spectrum analyzer the resolution bandwidth filters and quasi-peak detection capability specified by CISPR. Together the quasi-peak adapter and the spectrum analyzer provide many of the elements needed for an EM1 receiver system.

HP 85685A RF Preselector — The HP 85685A RF preselector can be used with an HP 8566B to form a multi-purpose RF test receiver. It improves spectrum analyzer measurement sensitivity while providing overload protection from out-of-band signals. This enables low-level signals to be monitored in the presence of high-level ambients. Its frequency range is 20 Hz to 2 GHz.

Troubleshooting and Repair Manual — Service information for the HP 8566B is available in the *HP 85660B Troubleshooting and Repair Manual* and the *HP 85662A Troubleshooting and Repair Manual.* They include schematic diagrams, block diagrams, component location illustrations, circuit descriptions, repair procedures, and troubleshooting information.

Service Kits — A service kit is available containing troubleshooting and alignment accessories for the HP 8566B. The kit includes a test cable and extender boards. Order the kit as HP part number 08566-60001. A combined kit, HP part number 08566-60005, is available containing accessories for both the HP 8566B and HP 8568B instruments.

Options

Several options are available and can be ordered by option number when you order the instrument. Some of the options are also available as kits that can be ordered and installed after you have received your HP 8566B.

Option 010 — Rack Mount Slide Kit. This option supplies the necessary hardware and installation instructions for mounting an instrument on slides into a rack of 482.6 mm (19 inch) spacing. The heavy-duty slides are designed specifically to support the weight of the HP 8566B. Because of the weight of the HP 8566B, approximately 50 kg (112 lb), the use of this option is recommended. Option 010 is also available as a kit (HP part number 5062-6407).

Option 080 — Information Cards in Japanese

Option 081 — Information Cards in French

Option 400 — The standard HP 8566B requires that the power line frequency be 50 or 60 Hz. Option 400 allows the instrument to operate with a 400 Hz power line frequency.

Option 462	This option provides 6 dB bandwidths for making MIL-STD EM1 measurements. In addition to enhancing instrument capability for MIL-STD 461D and 462D EM1 measurements, Option 462 spectrum analyzers can still make all commercial EM1 and general-purpose measurements. Option 462 instruments with HP 85662A (top box) serial prefixes below 3341A were compatible with MIL-STD 462A/B/C (impulse bandwidths).
Option 857	The HP 8566B Option 857 is used in EMC receiver applications. This option provides the cumulative log fidelity and absolute amplitude performance necessary for EMC receivers to meet their system specs.
Option 908	Rack Mount Flange Kit (to mount without handles). This option supplies the necessary hardware and installation instructions for mounting an instrument in a rack of 482.6 mm (19 inch) spacing. Option 908 is also available as a kit (HP part number 5062-3986).
Option 910	Extra *HP 8566B Operating and Programming Manual* and an extra *HP 8566B Performance Tests and Adjustments Manual.*
Option 913	Rack Mount Flanges with Handles (handles provided). This option supplies the necessary hardware and installation instructions for mounting an instrument with handles in a rack of 482.6 mm (19 inch) spacing. Option 913 is also available as a kit (HP part number 5062-3986).
Option 915	This option supplies the HP 8566B troubleshooting and repair manuals.

Instruments Covered by This Manual

This manual contains information for setting up and verifying operation of HP 8566B spectrum analyzers, including those with Option 400 (400 Hz operation), Option 857, or Option 462 (6 dB bandwidths or impulse bandwidths) installed. The procedures in this manual can also be used to set up and verify the operation of HP 8566A spectrum analyzers that have been converted into HP 8566B spectrum analyzers through the installation of an HP 8566AB Retrofit Kit (formerly the HP 8566A+01K Retrofit Kit).

Serial Numbers

Hewlett-Packard makes frequent improvements to its products to enhance their performance, usability, or reliability. HP service personnel have access to complete records of design changes to each type of equipment, based on the equipment's serial number.

Whenever you contact Hewlett-Packard about your instrument, have the complete serial number available to ensure obtaining the most complete and accurate information possible.

A serial number label is attached to the rear of each instrument section. The serial number has two parts: the prefix (the first four

numbers and a letter), and the suffix (the last five numbers). See Figure l-3.

The first four numbers of the prefix are a code identifying the date of the last major design change incorporated in your instrument.

The letter identifies the country in which the instrument was manufactured. The five-digit suffix is a sequential number and is different for each instrument. Whenever you list the serial number or refer to it in obtaining information about your instrument section, be sure to use the complete number, including the full prefix and the suffix.

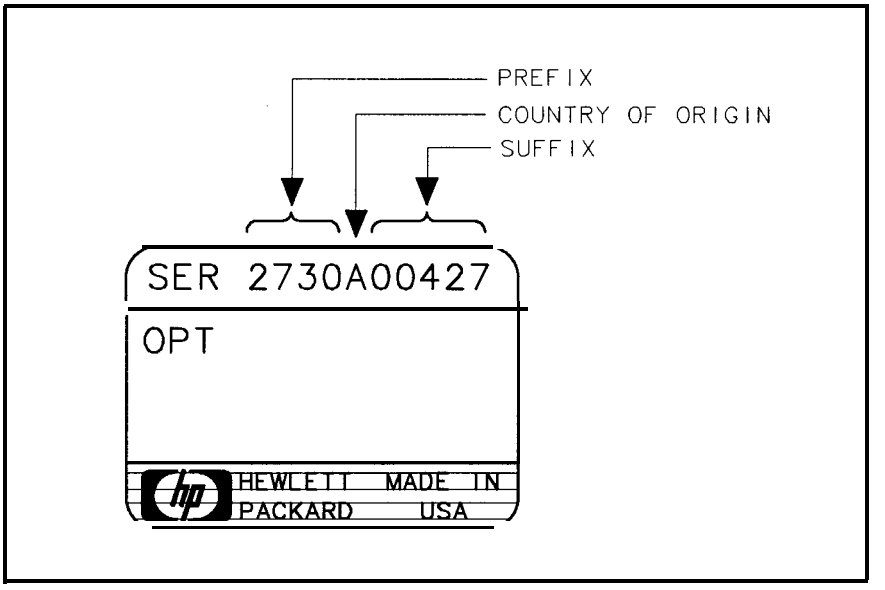


Figure 1-3. Typical Serial Number Label

Calibration Cycle

To ensure that the HP 8566B meets the specifications listed in Chapter 3, the operation verification listed in Chapter 5 should be performed every 6 months.

HP-IB Address Selection

The instrument is shipped with the HP-IB address preset to 18 (ASCII 2R). The instrument stores this address in internal RAM memory which is maintained by a lithium battery in STANDBY and when line power is removed. This stored address can be changed from the front panel or on switches located on the RF section's Al5 controller assembly. Refer to Chapter 2, Installation.

Bench Operation

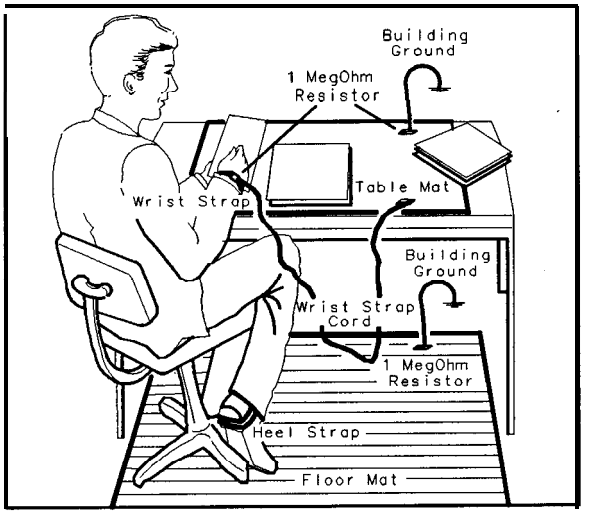
The instrument has plastic feet and foldaway tilt stands for convenience in bench operation. The plastic feet are shaped to make full-width modular instruments self-aligning when stacked. The instrument is shipped with front handles attached for ease of moving.

Electrostatic Discharge Information

Electrostatic discharge (ESD) can damage or destroy electronic components. Therefore, observe the following precautions:

- Be sure that all instruments are properly earth-grounded to prevent buildup of 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.
- Personnel should be grounded with a resistor-isolated wrist strap before touching the center pin of any connector and before removing any assembly from the instrument.
- When replacing the instrument's battery (refer to "Replacing the RF Section Battery" in this chapter), be sure to observe the following:
  - Perform the work at a static-safe workstation. See Figure l-4.
  - Store or transport PC boards only in static-shielding containers.
  - Always handle board assemblies by the edges. Do not touch the edge-connector contacts or trace surfaces with bare hands.

Figure l-4 shows an example of a static-safe work station. Two types of ESD protection are shown: a) conductive table mat and wrist strap combination, and b) conductive floor mat and heel strap combination. The two types *must* be used together to ensure adequate ESD protection. Refer to Table l-l for a list of static-safe accessories and their part numbers.



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Figure 1-4. Static-Safe Workstation

Static-Safe Accessories

Table 1-1. Static-Safe Accessories

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

Routine Maintenance

Cleaning the Display

The inside surface of the glass CRT shield is coated with a thin metallic film that can be easily damaged. To clean the glass CRT shield, use thin-film cleaner (HP part number 8500-2163) and a lint-free cloth. lb clean the inside surface of the display glass, remove the glass CRT shield using the following procedure:

1. Disconnect the ac line power from the instrument sections.
2. Remove the two screws securing the display bezel and CRT glass shield to the front panel. These screws are located on the bottom edge of the bezel. See Figure l-5.

Caution

While removing the two bezel screws, use caution to prevent the glass from falling.

3. Remove the bezel and CRT glass shield.

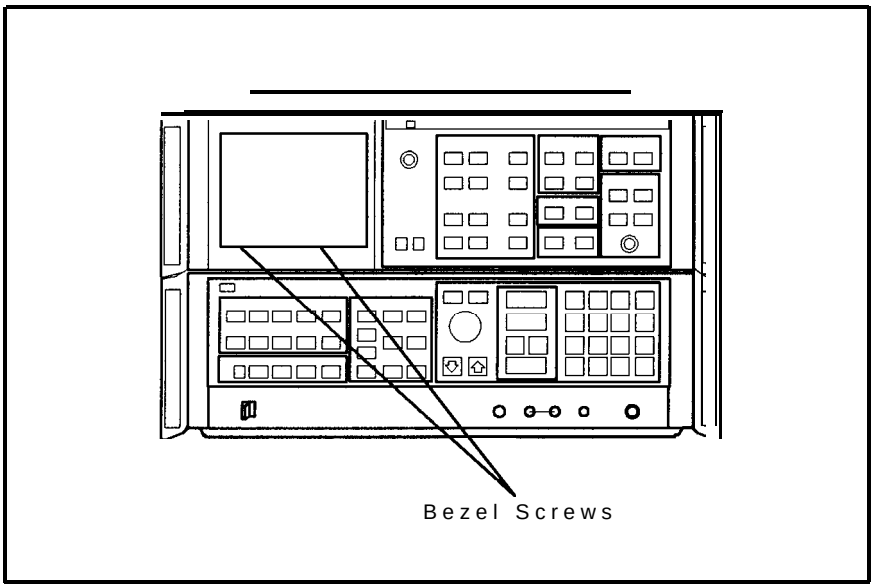


Figure 1-5. Display Bezel Screws

4. Clean the glass using the thin-film cleaner and a lint-free cloth.
5. Replace the glass shield. Place the side of the glass that has the silver edge towards the CRT.
6. Replace the bezel and two screws.

Cleaning the RF Section's Fan Filter

The fan on the RF section has a air filter that should be regularly inspected and cleaned. lb clean the air filter, perform the following:

1. Disconnect the ac line power from the RF section.
2. Remove the four screws securing the filter cover to the fan on the RF Section. Remove the filter.
3. Clean the filter using mild soap and water. Dry the filter thoroughly. If it is damaged, replace it with a new filter (HP part number 85660-00049).
4. Replace the filter and its cover.

Replacing the RF Section's Battery

The RF section's Al5 controller assembly has a battery for maintaining internal RAM memory. This memory is primarily used for storing instrument states, error correction data, and DLPs (downloadable programs). Under normal conditions, the battery should typically last a minimum of 3 years. Refer to the *HP 85660B Troubleshooting and* Repair *Manual* for the HP part number. Use the following procedure to replace the battery.

Warning

Battery BT1 contains lithium iodide. Do not incinerate, puncture, or attempt to recharge this battery. Dispose of discharged battery in a safe manner.

Warning

Changing the battery BT1 on the Al5 controller assembly requires the removal of the RF' Section's protective bottom cover. This should be performed only by a qualified service person. Refer all such servicing of the instrument to qualified service persons.

Caution

ESD (electrostatic discharge) can damage or destroy electronic components. Work at a static-safe workstation when replacing the battery.

1. Place the HP 8566B on a static-safe workstation. Refer to "Electrostatic Discharge Information" in this chapter.
2. Disconnect the ac line power from the instrument sections. Place the HP 8566B RF section upside down on the work surface so the bottom of the RF section faces up.
3. Using a Pozidriv screw driver, remove the two bottom RF-Section rear-panel bumpers. See ① in Figure l-6.

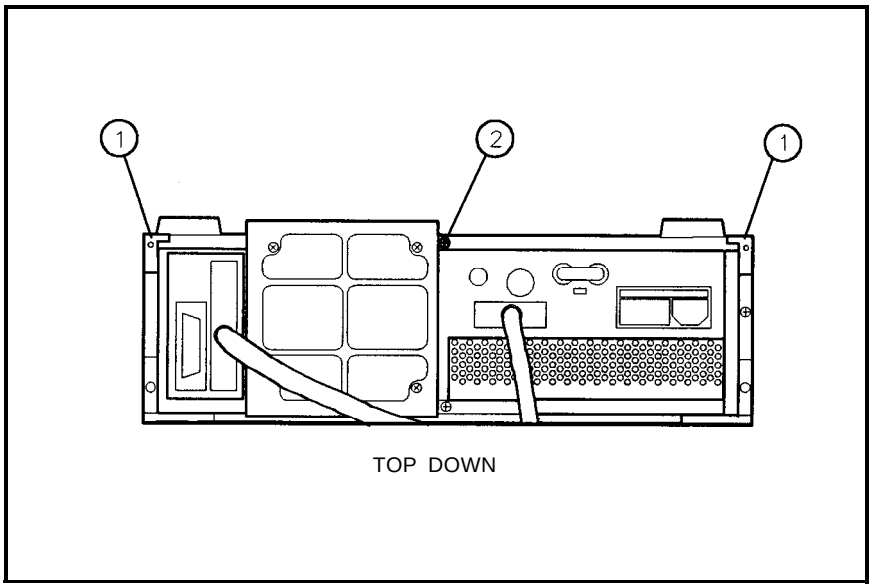


Figure 1-6. Removing the Bottom Cover

4. Back out screw ② (Figure l-6) causing the cover to unseat from the front frame. When the cover is clear of the front frame, lift the cover up to remove it.

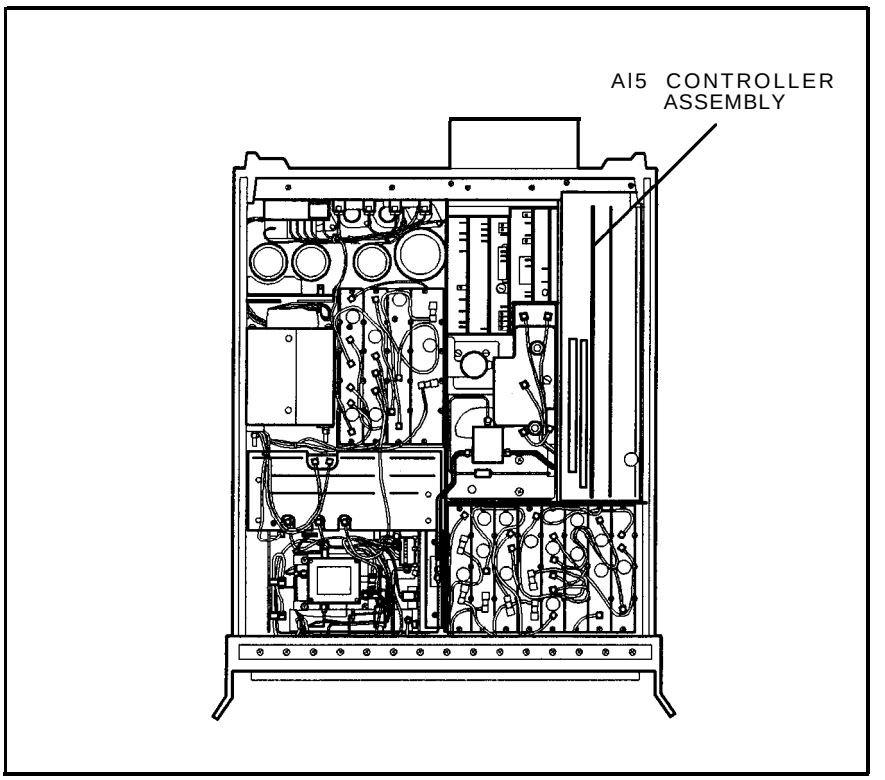


Figure 1-7. Location of Al5 Controller Assembly

5. Remove the cover from the Al5 controller assembly. See Figure l-7.
6. Remove the Al5 controller assembly. Locate the battery on the Al5 assembly. Figure 1-8 shows the location of the battery.

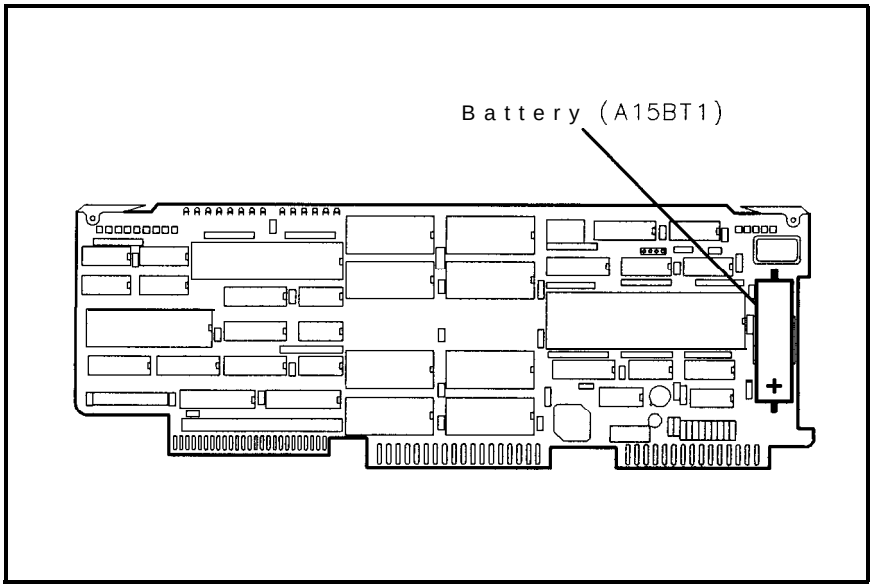


Figure 1-8. Location of Battery on Al5 Controller Assembly

7. Replace the battery with a new one (HP part number 1420-0331). Be sure to install the battery with the polarity shown in Figure l-8.
8. Replace the Al5 controller assembly.
9. Reconnect the power cables to the IF and RF sections.
10. Connect a jumper wire between the Al5 controller test points **A15TP1-8** T3 and **A15TP1-9** ST (to erase and initialize Al5 controller nonvolitile memory).
11. Set LINE switch to ON. The Al5 controller LED's **A15DS1** through **A15DS14** should all turn on, then turn off, sequentially, indicating the Al5 controller has **sucessfully** executed self-test. If they do not the Al5 controller might be damaged or improperly installed. In addition, all front panel LED's should turn on momentarily, indicating the HP 8566B has performed its' power-on pretest.

    In addition to normal HP 8566B power-up HP-IB address and firmware revision information, a BATTERY flag should appear on the CRT, indicating that information previously stored in the Al5 controller nonvolitile memory has been lost or erased. Normally the BATTERY flag appears after several years of use to indicate that the lithium battery **A15BT1** needs to be replaced.
12. Remove the jumper wire between **A15TP1-8** T3 and **A15TP1-9** ST.
13. Set the LINE switch to STANDBY and then to ON. The HP 8566B should power up normally, without any flags displayed on the CRT.

14. Set the LINE switch to STANDBY and remove the power cable from the rear of the RF section.
15. Install the controller cover.
16. Replace the RF section bottom cover and the two rear feet.
17. Place the HP 8566B top side up and reconnect the power cable to the RF section.
18. Set the LINE switch to ON and allow a 2-hour warm-up.
19. Recalibrate the instrument with the following steps. (For a more complete description of the calibration, refer to the *HP 8566B Operating and Programming Manual.)*
    a. Connect the front-panel CAL OUTPUT signal to the RF INPUT.
    b. Press (RECALL) (8), and then adjust the front-panel AMPTD CAL adjust for a marker amplitude of -10.00 dBm.
    c. Press (RECALL) (9), and then adjust the front-panel FREQ ZERO adjust for maximum signal amplitude.
    d. Press (SHIFT) [FREQUENCY SPAN] $^{-W}$ to load the error correction data in the instrument's memory.

Ordering Information

Parts can be ordered from any Hewlett-Packard Sales and Service Office. Refer to Table l-3 for a listing of sales and service offices. lb order a part or assembly, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard Office.

To order a part that is not listed in the replaceable parts table, include the instrument model number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard Sales and Service Office.

Direct Mail Order System

Within the USA, Hewlett-Packard can supply parts through a direct mail order system. Advantages of using the system are as follows:

- Direct ordering and shipment from the HP Support Materials Organization in Roseville, California.
- No maximum or minimum on any mail order. (There is a minimum order amount for parts ordered through a local Hewlett-Packard Sales and Service Office when the orders require billing and invoicing.)
- Prepaid transportation. (There is a small handling charge for each order.)
- No invoices.

‘lb provide these advantages, a check or money order must accompany each order. Mail-order forms and specific ordering information is available through your local Hewlett-Packard Sales and Service Office.

Direct Phone-Order System

Within the USA, a phone order system is available for regular and hotline replacement parts service. A toll-free phone number is available, and Mastercard and Visa are accepted.

Regular Orders: The toll-free phone number, (800) 227-8164, is available 6 AM to 5 PM, Pacific time, Monday through Friday. Regular orders have a 4 day delivery time.

Hotline Orders: Hotline service for ordering emergency parts is available 24 hours a day, 365 days a year. There is an additional hotline charge to cover the cost of freight and special handling.

The toll-free phone number, (800) 227-8164, is available 6 AM to 5 PM, Pacific time, Monday through Friday and (916) 785-8HOT is available after-hours, weekends, and holidays. Hotline orders are normally delivered the following business day.

Returning the Instrument for Service

The instrument may be shipped in environments within the following limits:

Temperature . . . . . .-40°C to +75°C
Humidity . . . . . 5% to 90% at 0° to 40°C
Altitude . . . . . Up to 15,240 meters (50,000 feet)

The instrument should be protected from temperature extremes which might cause condensation within the instrument.

Service Tags

If you are returning the instrument to Hewlett-Packard for servicing, fill in and attach a blue service tag to each instrument section. Service tags are supplied at the end of this chapter.

Please be as specific as possible about the nature of the problem. If you have recorded any error messages that appeared on the screen or have any other specific data on the performance of the instrument, please send a copy of this information with the instrument.

Original Packaging

Note lb protect the front panel, the front handles must be attached to each instrument section before shipping.

It is recommended that the original factory packaging materials be retained for use when shipping the instrument. Because the combined weight of the two instrument sections is approximately 50 kg (112 lb), do not package the instrument sections fastened together as one unit. The instrument sections must be separated and packaged in separate containers. Pack each section in the original factory packaging materials if they are available (see Figure l-9). Refer to Table l-2 for the part numbers of items listed in the figure. Original materials are available through any Hewlett-Packard Sales and Service Office.

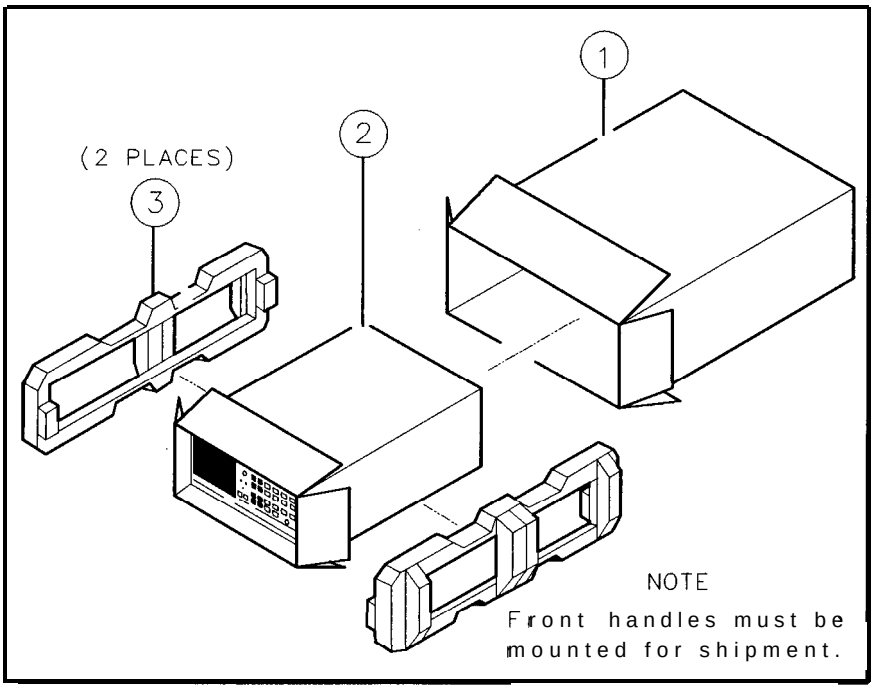


Figure l-9. Factory Packaging Materials for each Section

Table l-2. Factory Packaging Materials

Item	Description	Qty	HP Part Number
1	Outer Box	1	92 1 l-4487
2	Inner Box	1	5180-2320
3	Inner Foam Pad	2	5180-2319

Other Packaging

Caution Instrument damage can result from using packaging materials other than those specified. Never use styrene pellets as packaging materials. They do not adequately cushion the instrument nor prevent it from shifting in the carton. They cause instrument damage by generating static electricity.

Note To protect the front panel, the front handles should be attached to each instrument section before shipping.

You can repackage the instrument with commercially available materials, as follows:

1. Separate the two instrument sections.
2. Attach a completed service tag to each of the sections.
3. Wrap each section in antistatic plastic to reduce the possibility of damage caused by electrostatic discharge.

4. Use a strong shipping container. A double-walled, corrugated cardboard carton of 159-kg (350-lb) bursting strength is adequate. The carton must be large enough and strong enough to accommodate the instrument. Allow at least 3 to 4 inches on all sides of the instrument for packing material.

5. Surround the instrument with 3 to 4 inches of packing material, to protect the instrument and prevent it from moving in the carton. If packing foam is not available, the best alternative is S.D.-240 Air Cap from Sealed Air Corporation (Commerce, California 90001). Air Cap looks like a plastic sheet filled with 1-1/4 inch air bubbles. Use the pink (antistatic) Air Cap to reduce static electricity. Wrapping the instrument section several times in this material should both protect the instrument section and prevent it from moving in the carton.

6. Seal the carton with strong nylon adhesive tape.

7. Mark the carton FRAGILE, HANDLE WITH CARE.

8. Retain copies of all shipping papers.

Sales and Service Offices

Hewlett-Packard Sales and Service Offices provide worldwide support for Hewlett-Packard products. lb obtain servicing information or to order replacement parts, contact the nearest Hewlett-Packard Sales and Service Office listed in Table l-3. In any correspondence, always provide essential information, which includes model numbers, serial numbers, and assembly part numbers.

Table 1-3. 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) 255-9800

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

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 B/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
6380 Bad Homburg v.d.H
Germany
(49 6172) 16-O

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
Blackburn, Victoria 3130
(61 3) 895-2895

Canada
Hewlett-Packard (Canada) Ltd.
17500 South Service Road
Trams-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 Xl Road
Shuang Yu Shu
Hai Dian District
Beijing, China
(86 1) 256-6888

Singapore
Hewlett-Packard Singapore
Pte. Ltd.
1150 Depot Road
Singapore 04 10
(65) 273 7388

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

2

Installation

What You'll Find in This Chapter

This chapter describes the process of getting the HP 8566B spectrum analyzer ready to use. The process includes initial inspection and installing the unit. Before installing the HP 8566B, be sure to read all the warnings, cautions, and notes listed in "Safety" below.

- If you're *not* installing the instrument in a rack, refer to "To Install Standard Instruments" in this chapter.
- To install Option 908 or 913 instruments, refer to "To Install Option 908 and 913 Instruments" in this chapter.
- To install Option 010 instruments, refer to "To Install Option 010 Instruments" in this chapter.

Safety 2-1
Preparation for Use 2-2
Initial Inspection 2-3
Operating Environment 2-3
Power Requirements 2-3
To Install Standard Instruments 2-4
lb Install Option 908 and 913 Instruments 2-7
To Install Option 010 Instruments 2-11
To Set the HP-IB Address 2-18
From the Front Panel 2-18
From the HP-IB Bus 2-18
From the HP-IB Address Switch 2-18

Safety

Before installing or operating this instrument, you should familiarize yourself with the safety marking on the instrument and the safety instructions in the manuals. The instrument has been manufactured and tested in accordance with international safety standards. However, to ensure safe operation of the instrument and personal safety of the user, the cautions and warnings in the manuals must be followed. Refer to the summary of the safety information located near the front of this manual.

Warning — **Failure to ground the instrument properly can result in personal injury. Before turning on the HP 8566B, you must connect its protective earth terminals to the protective conductor of the main power cable. Insert the main power cable plug only into a socket outlet that has a protective earth contact. DO NOT defeat the earth-grounding protection by using an extension cable, power cable, or autotransformer without a protective ground conductor. If you are using an autotransformer, make sure its common terminal is connected to the protective earth contact of the power source outlet socket.**

Warning — **Power is still applied to this instrument with the (LINE) switch in STANDBY. There is no off position for the (LINE) switch. To remove power from the instrument, it is necessary to remove the power cable from the rear of each of the instrument sections.**

Warning — **Because the combined weight of the instrument sections is approximately 112 pounds, use appropriate caution when moving or installing.**

Caution — Before switching on this instrument, make sure it is adapted to the voltage of the ac power source as described in the following procedures. 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.

Preparation for Use

Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, keep it until you have verified that the contents are complete and you have tested the instrument mechanically and electrically.

Contents of the shipment are shown in Figure l-l. If the contents are incomplete or if the instrument does not pass the operation verification tests (procedures are provided in Chapter 5), notify the nearest Hewlett-Packard office. If the shipping container is damaged or the cushioning material shows signs of stress, also notify the carrier. Keep the shipping materials for the carrier's inspection. The HP office will arrange for repair or replacement without waiting for a claim settlement.

If the shipping container and cushioning material are in good condition, retain them for possible future use. You may wish to ship the instrument to another location or to return it to Hewlett-Packard for service. Chapter 1 provides instructions for repackaging and shipping the instrument.

Operating Environment

The instrument may be operated in environments within the following limits:

Temperature . . . . . 0°C to +55°C
Humidity . . . . . 5% to 90% at 0° to 40°C
Altitude . . . . . Up to 4,572 meters (15,000 feet)

The instrument should be protected from temperature extremes which might cause condensation within the instrument.

Power Requirements

The HP 8566B requires a power source of 100, 120, 220, or 240 V ac +5% −10%, 50 to 60 Hz. Power consumption for the instrument sections combined is less than 650 volt-amperes.

To Install Standard Instruments

1. Place the RF section right side up on a level work surface.
2. Place the IF-Display section on top of the RF section, offset far enough forward to allow the RF section hooks to engage the IF-Display Section frame when slid back. Slide the IF-Display section back until the RF section hooks catch the bottom of the IF-Display Section.
3. Line up the rear-panel lock feet, and tighten the thumb screws on both lock feet.
4. Connect cable W31 between IF-Display section **J2 and** RF section J6. See Figure 2-l.
5. Connect cable **W30** between IF-Display section **J1** and RF section **J1**.

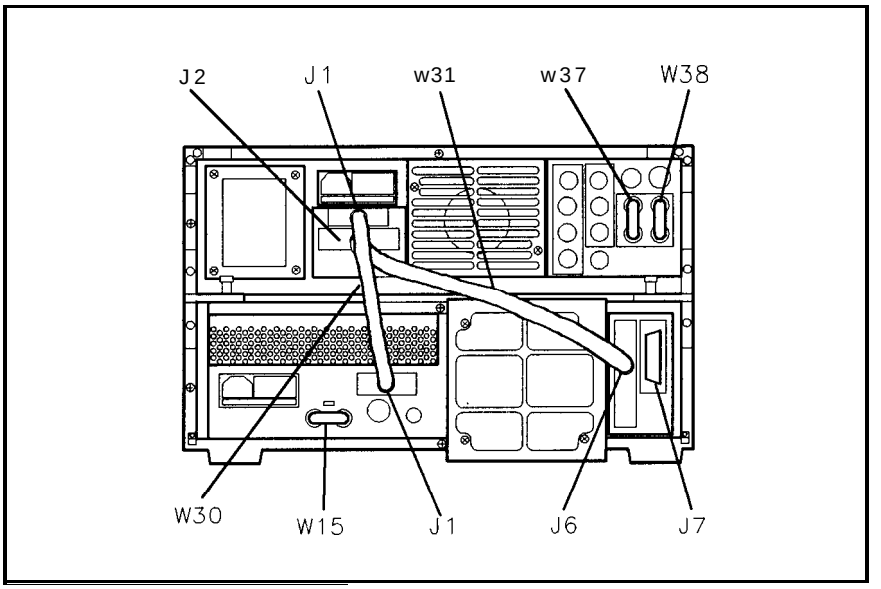


Figure 2-l. Rear-Panel Cable Connections

6. Determine the ac line voltage to be used.
7. On each instrument section, slide open the power module's fuse cover (located on the rear panel). See Figure 2-2. Push the fuse-pull lever to the left. Remove the fuse.

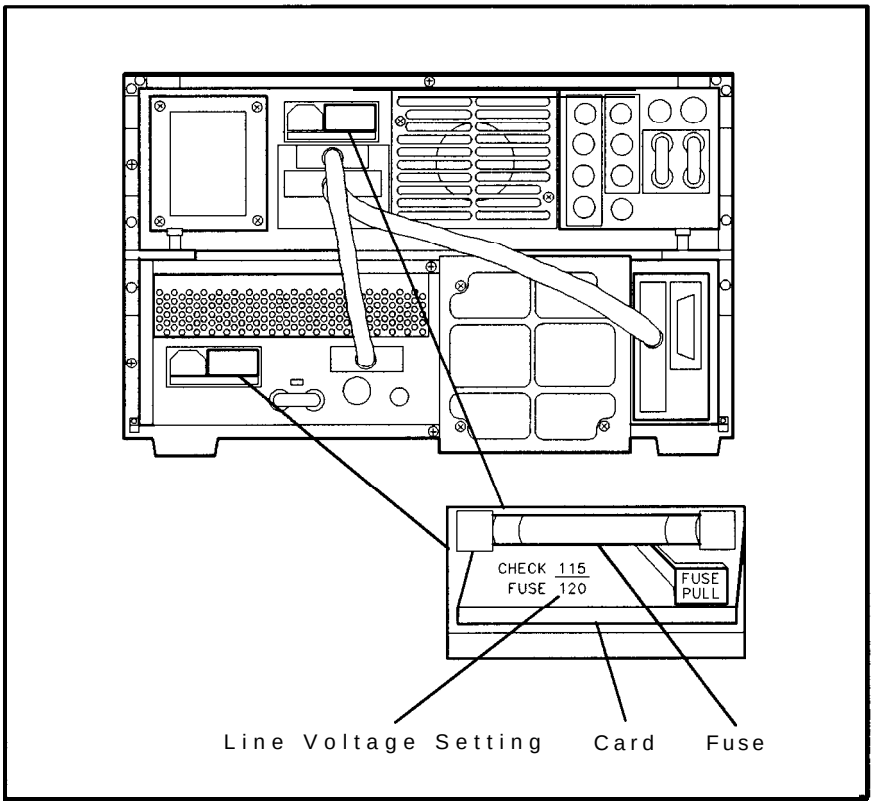


Figure 2-2. Voltage Selector Board and Fuse

8. On each power-line module, check the voltage selector card for the proper ac line voltage. The card's voltage setting should be visible on the card. See Figure 2-2. If you need to select a different ac line voltage setting, perform the following:

   a. Use needle-nose pliers to pull out the voltage-selector card. Rotate the card so that the voltage label corresponding to the actual line voltage will appear in the module window.

   b. Push the card back into its slot.

9. Check the fuse to make sure it is of the correct rating and type for the ac line voltage selected. Fuse ratings for different line voltages are indicated in the following table.

ac Line Voltage	IF-Display Section	RF section
100/120	2 amperes FAST BLO HP part number 2110-0002	4 amperes FAST BLO HP part number 21 lo-0055
220/240	1 ampere SLOW BLO HP part number 2110-0007	2 amperes SLOW BLO HP part number 2110-0006

10. Insert the correct fuse, and push the fuse-pull lever into its normal right-hand position.

11. Connect the ac line power cords.

12. If the HP 8566B will be remotely controlled, refer to "To Set the HP-IB Address" in this chapter.
13. When you turn your instrument on for the first time, you should perform the verification tests in Chapter 5. Refer to the *HP 8566B Operating and Programming Manual* for instructions on using the instrument.

Note

Cable W15 is normally connected between the FREQ REFERENCE EXT and INT BNC ports, providing the HP 8566B with its own internal 10 MHz frequency reference. W15 is removed when an external frequency reference is used. Cables W37 and W38 are removed for connection of the IF and VIDEO ports to the HP 85650A Quasi-Peak Adapter. If the instrument is used without the HP 85650A Quasi-Peak Adapter, W37 and W38 must be connected for the instrument to operate.

To Install Option 908 and 913 Instruments

Option 908 contains the necessary hardware to mount the HP 8566B without handles in a rack of 482.6 mm (19 inch) spacing. Option 913 mounts the HP 8566B with handles.

1. Remove the front-handle trim from each side of the RF and IF-Display sections. See ① of Figure 2-3.

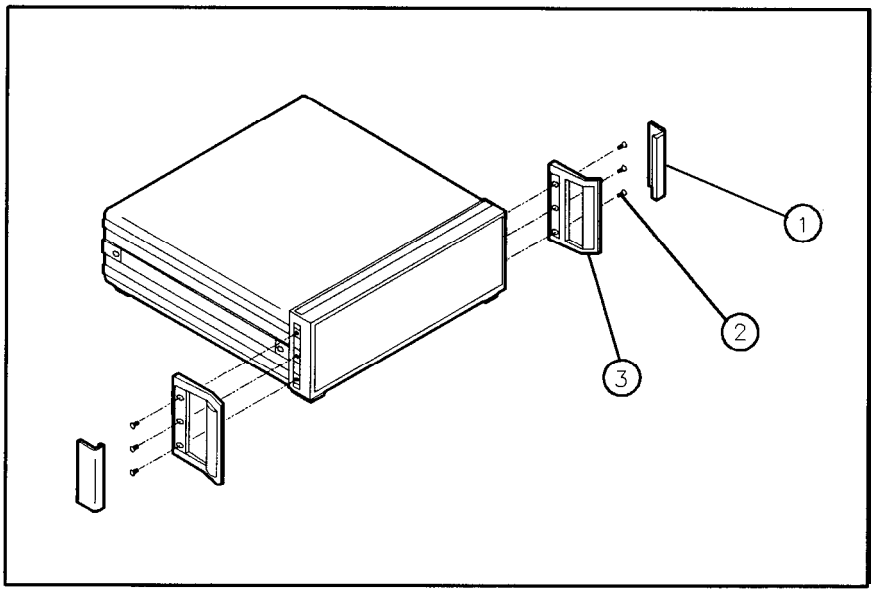


Figure 2-3. Removing the Handles and Trim

2. Remove the three screws securing each handle, and remove the handles. See ② and ③.
3. The information-card tray located on the bottom of the RF section requires a space of approximately 2 cm below the instrument when rack mounting. See ① of Figure 2-4. (No filler strip is provided.) If you wish to remove the information-card tray, remove the feet and tilt stands (② and ③ in Figure 2-4).

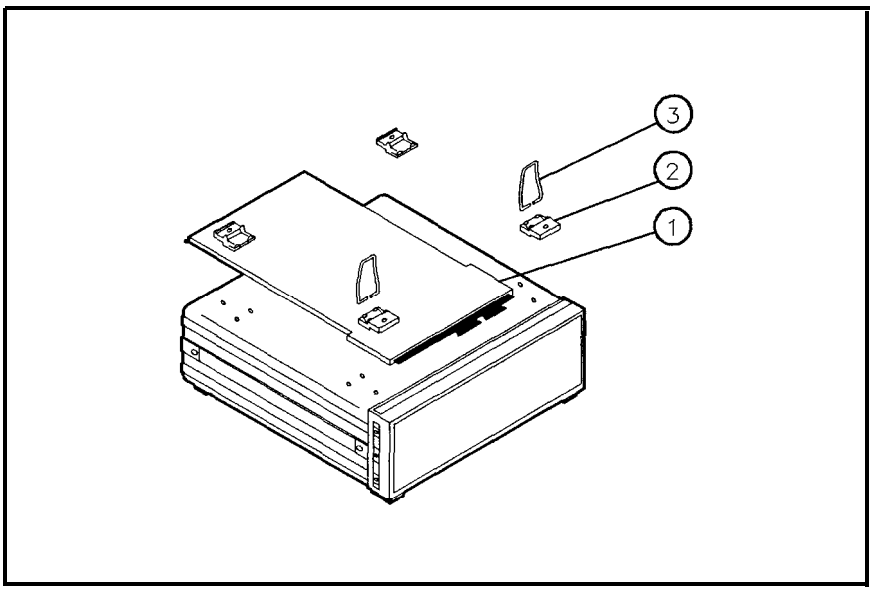


Figure 2-4. Removing the Information-Card Tray

4. On each instrument section, attach the rack mount flange (and front handles, for Option 913) using the three M4x0.7x16 pan-head screws provided in the kit. See Figure 2-5.

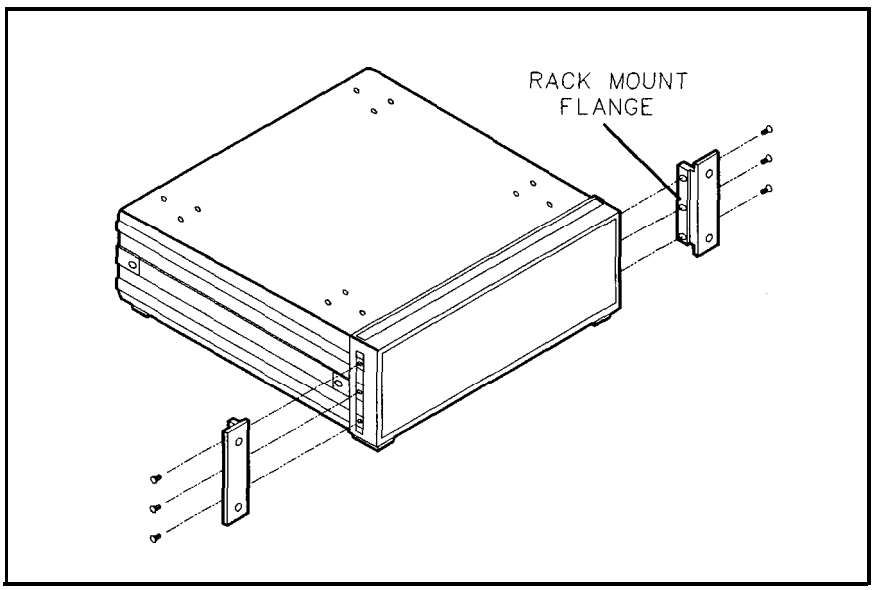


Figure 2-5. Attach the Rack Mount Flanges

5. Determine the ac line voltage to be used.
6. On each instrument section, slide open the power module's fuse door (located on the rear panel). See Figure 2-6. Push the fuse-pull lever to the left. Remove the fuse.

Note

Although Figure 2-6 shows the two instrument sections connected together, they will be mounted separately in the rack.

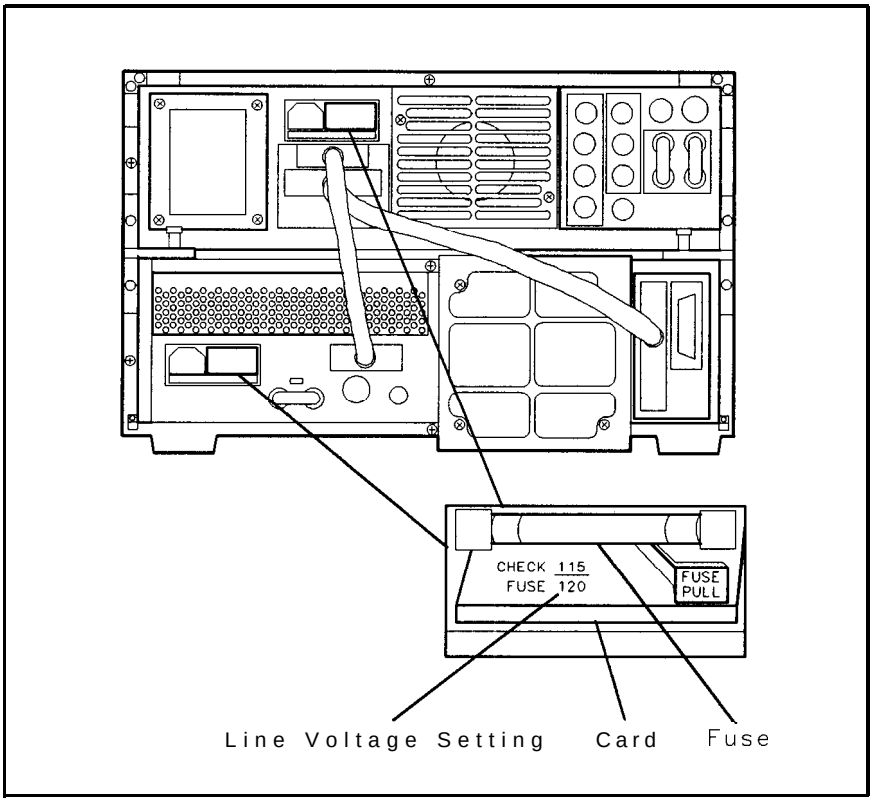


Figure 2-6. Voltage Selector Board and Fuse

7. On each power-line module, check the voltage selector card for the proper ac line voltage. The card's voltage setting should be visible on the card. See Figure 2-6. If you need to select a different ac line voltage setting, perform the following:

   a. Use needle-nose pliers to pull out the voltage-selector card. Rotate the card so that the voltage label corresponding to the actual line voltage will appear in the module window.

   b. Push the card back into its slot.

8. Check the fuse to make sure it is of the correct rating and type for the ac line voltage selected. Fuse ratings for different line voltages are indicated in the following table.

ac Line Voltage	IF-Display Section	RF Section
100/120	2 amperes FAST BLO HP part number 2110-0002	4 amperes FAST BLO HP part number 21 lo-0055
220/240	1 ampere SLOW BLO HP part number 2110-0007	2 amperes SLOW BLO HP part number 2110-0006

9. Insert the correct fuse, and push the fuse-pull lever into its normal right-hand position.
10. Bolt each instrument section into the rack from its rack mount flange. Place the IF-Display section just above the RF section.
11. Connect cable W31 between IF-Display section **J2** and RF section J6. See Figure 2-7.
12. Connect cable **W30** between IF-Display section **J1** and RF section **J1**.

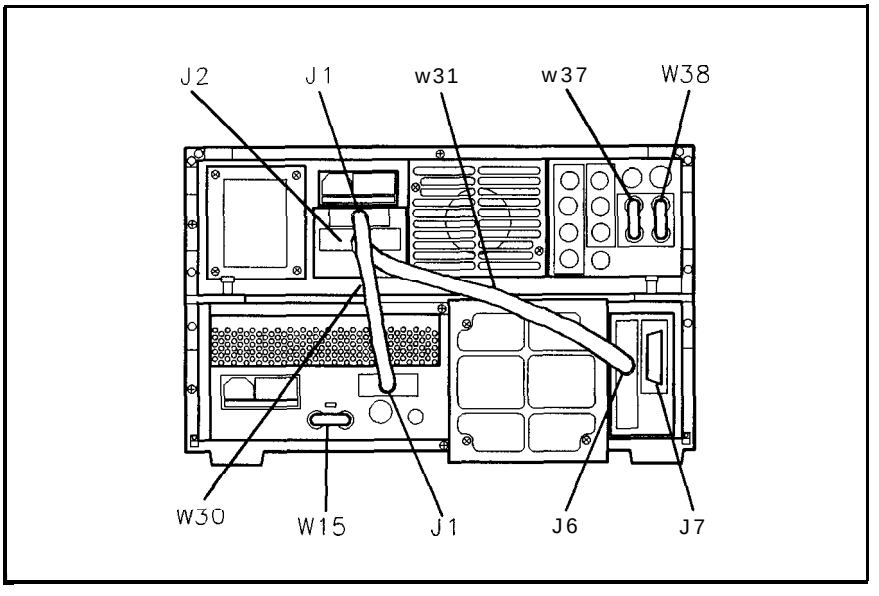


Figure 2-7. Rear-Panel Cable Connections

13. Connect the ac line power cords.
14. If the HP 8566B will be remotely controlled, refer to "To Set the HP-IB Address" in this chapter.
15. When you turn your instrument on for the first time, you should perform the verification tests in Chapter 5. Refer to the *HP 8566B Operating and Programming Manual* for instructions on using the instrument.

Note

Cable W15 is normally connected between the FREQ REFERENCE EXT and INT BNC ports, providing the HP 8566B with its own internal 10 MHz frequency reference. W15 is removed when an external frequency reference is used. Cables W37 and W38 are removed for connection of the IF and VIDEO ports to the HP 85650A Quasi-Peak Adapter. If the instrument is used without the HP 85650A Quasi-Peak Adapter, W37 and W38 must be connected for the instrument to operate.

To Install Option 010 Instruments

Option 010 mounts the HP 8566B on slides in a rack of 482.6 mm (19 inch) spacing. (Option 010 also contains adapters for mounting in non-HP racks.)

1. Remove the strap handle on the IF-Display section's left side panel.
2. Remove the right-rear lock foot and the right-rear top foot from the IF-Display section. Slide the right-side cover off to the rear. Install the right-side cover included in the kit, and replace the rear lock feet.
3. Remove the front-handle trim from each side of the RF and IF-Display sections. See ① of Figure 2-8.

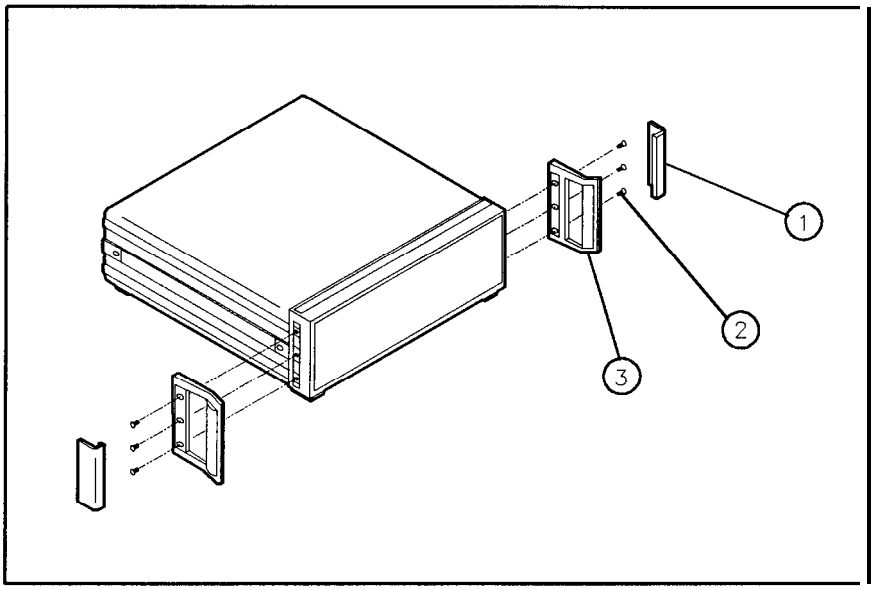


Figure 2-8. Removing the Handles and Trim

4. Remove the three screws securing each handle, and remove the handles. See ② and ③.
5. The information-card tray located on the bottom of the RF section requires a space of approximately 2 cm below the instrument when rack mounting. See ① of Figure 2-9. (No filler strip is provided.) If you wish to remove the information-card tray, remove the feet and tilt stands (② and ③ in Figure 2-9).

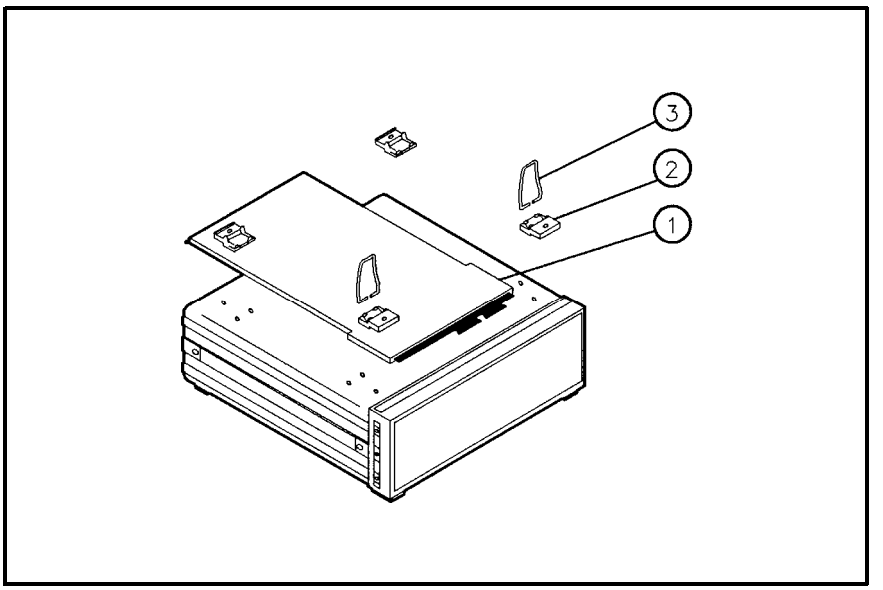


Figure 2-9. Removing the Information-Card Tray

6. Place the RF section right side up on a level work surface.
7. Place the IF-Display section on top of the RF section, offset far enough forward to allow the RF section hooks to engage the IF-Display section frame when slid back. Slide the IF-Display section back until the RF section hooks catch the bottom of the IF-Display section.
8. Line up the rear-panel lock feet, and tighten the thumb screws on both lock feet.
9. Attach the 10 1/2-inch handles with flanges as shown in Figure 2-10.

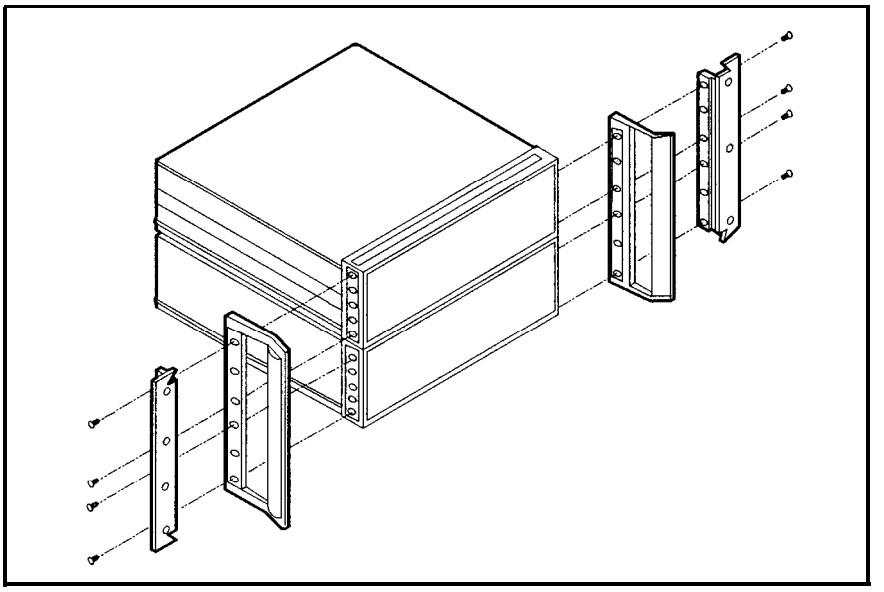


Figure 2-10. Attaching the Rack Handles and Flanges

10. Connect cable W31 between IF-Display section J2 and RF section J6. See Figure 2-l 1.
11. Connect cable W30 between IF-Display section J1 and RF section J1.

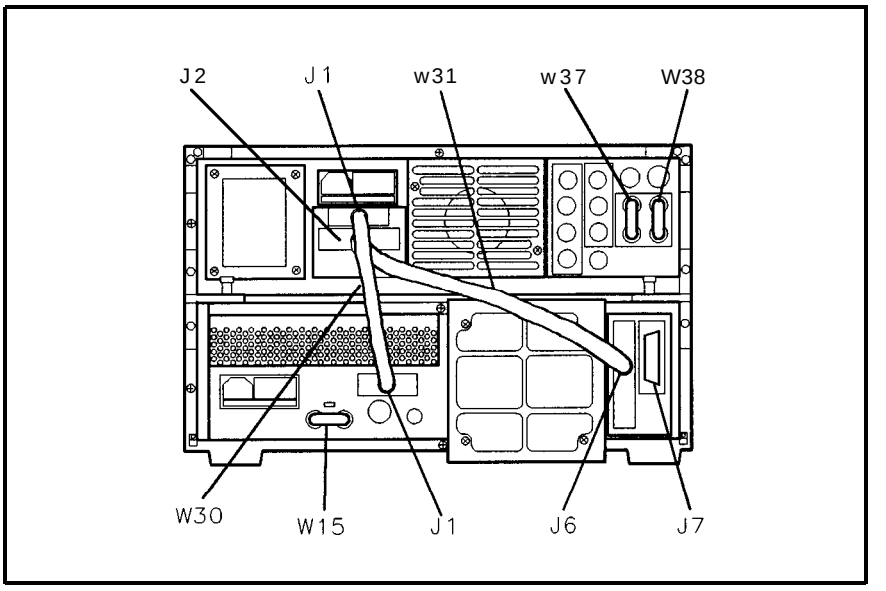


Figure 2-11. Rear-Panel Cable Connections

12. Determine the ac line voltage to be used.
13. On each instrument section, slide open the power module's fuse door (located on the rear panel). See Figure 2-12. Push the fuse-pull lever to the left. Remove the fuse.

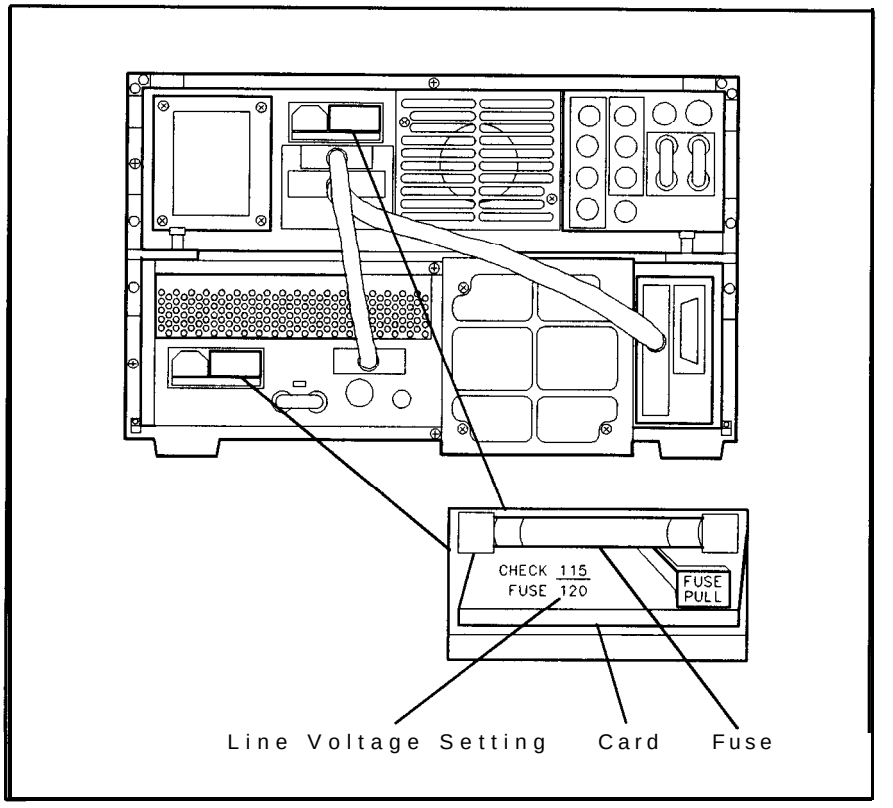


Figure 2-12. Voltage Selector Board and Fuse

14. On each power-line module, check the voltage selector card for the proper ac line voltage. The card's voltage setting should be visible on the card. See Figure 2-l 1. If you need to select a different ac line voltage setting, perform the following:

    a. Use needle-nose pliers to pull out the voltage-selector card. Rotate the card so that the voltage label corresponding to the actual line voltage will appear in the module window.

    b. Push the card back into its slot.

15. Check the fuse to make sure it is of the correct rating and type for the ac line voltage selected. Fuse ratings for different line voltages are indicated in the following table.

ac Line Voltage	IF-Display Section	RF Section
100/120	2 amperes FAST BLO HP part number 2110-0002	4 amperes FAST BLO HP part number 21 lo-0055
220/240	1 ampere SLOW BLO HP part number 2110-0007	2 amperes SLOW BLO HP part number 2110-0006

16. Insert the correct fuse, and push the fuse-pull lever into its normal right-hand position.

17. Attach one slide inner-member bracket to each side of the instrument using two M5x0.8x10 pan-head screws per side. See ① of Figure 2-13.

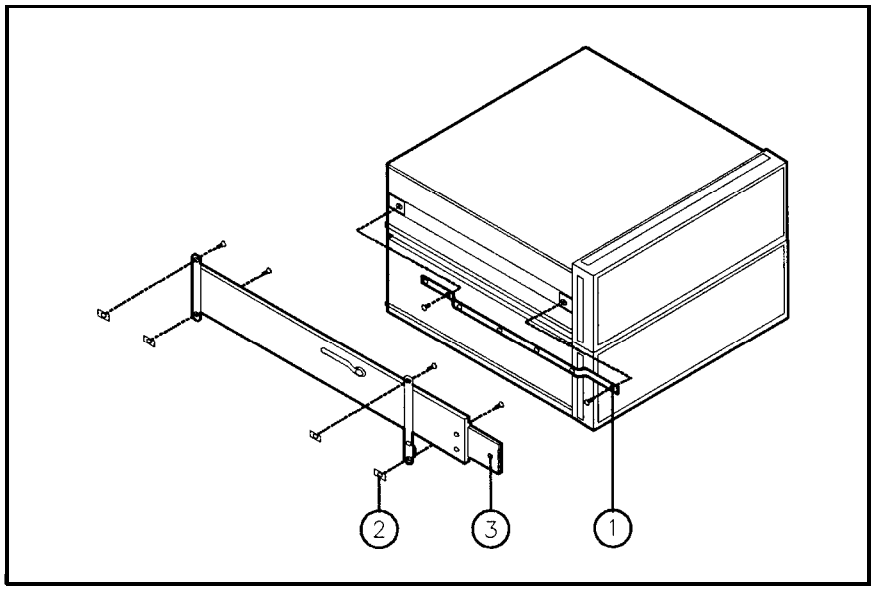


Figure 2-13. Attaching the Inner-Member Brackets

18. Mounting in an HP System Rack Cabinet:

    a. Insert two Unistrut nuts, item ② of Figure 2-13, into each of the two vertical columns on the left side of the system cabinet. Insert two Unistrut nuts into each of the two vertical columns on the right side of the system cabinet.

    b. Bolt an outer slide mount to the Unistrut nuts in each side of the systems cabinet, using four M5x0.8xl2 pan-head screws per side. See ③ of Figure 2-13.

    c. Expand the outer slide mounts to their full length. Mount the instrument onto the system cabinet by bolting the outer slide mount to the inner-member bracket on the instrument, using three M5x0.8xl2 flat-head screws per side.

Note

If any binding is encountered in the slides after mounting, it will be necessary to move the Unistrut nuts slightly. While supporting the instrument, loosen one of the Unistrut nuts. Adjust the slides slightly until they operate freely. Retighten the Unistrut nut.

19. Mounting in a non-HP System Rack Cabinet:

    a. Using hole pattern B, see Figure 2-14, attach one adapter bracket to the front of each outer slide mount, using two M4x0.8xl2 flat-head screws and nuts per bracket.

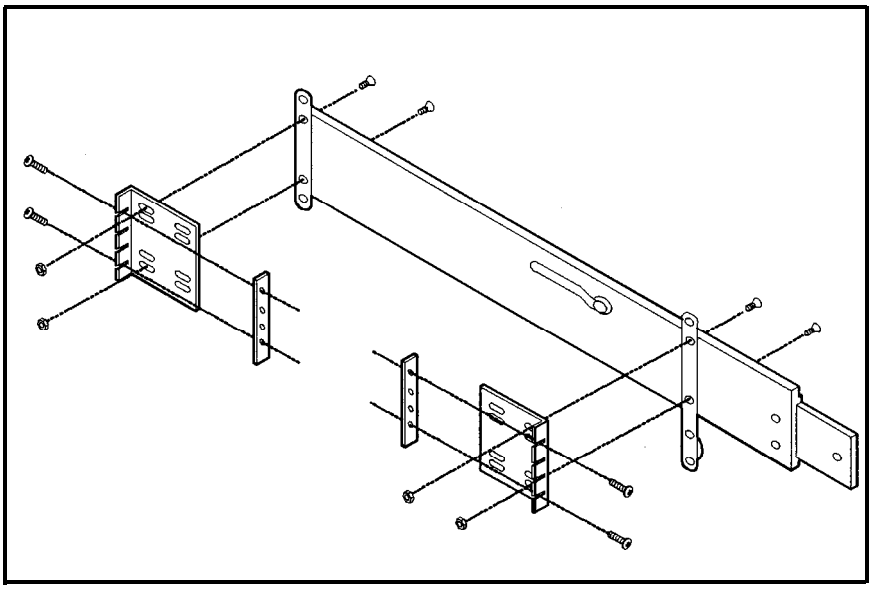


Figure 2-14. Slide Adapter for Non-HP System Rack Cabinets

b. Using hole pattern B, attach one adapter bracket to the rear of each outer slide mount, using two M5x0.8xl2 pan-head screws and nuts per bracket.

c. Bolt an outer slide mount to each side of the system rack cabinet using M5x0.8xl2 pan-head screws. Use the bar nuts provided in the kit if the rack mounting strips have through-holes.

Note

If any binding is encountered in the slides after mounting, it will be necessary to slightly move the adapter brackets. While supporting the instrument, loosen one of the adapter brackets. Adjust the slides slightly until they operate freely. Retighten the adapter brackets.

20. Connect the ac line power cords.

21. If the HP 8566B will be remotely controlled, refer to "To Set the HP-IB Address" in this chapter.

22. When you turn your instrument on for the first time, you should perform the verification tests in Chapter 5. Refer to the *HP 8566B Operating and Programming Manual* for instructions on using the instrument.

Note

Cable W15 is normally connected between the FREQ REFERENCE EXT and INT BNC ports, providing the HP 8566B with its own internal 10 MHz frequency reference. W15 is removed when an external frequency reference is used. Cables W37 and W38 are removed for connection of the IF and VIDEO ports to the HP 85650A Quasi-Peak Adapter. If the instrument is used without the HP 85650A Quasi-Peak Adapter, W37 and W38 must be connected for the instrument to operate.

To Set the HP-IB Address

The HP-IB address is used in remote programming to identify the instrument. The decimal address is preset at the factory to 18 (ASCII 2R). Addresses may be decimal 0 through 30. The HP-IB address can be changed manually from the instrument's front panel, remotely via the HP-IB bus, or by setting the instrument's internal address switch.

The internal address switch is comprised of five switches located on the Al5 controller assembly in the RF section. These switches (A15SW1 A2 through A6) determine the HP-IB address to be used at instrument power-up. These switches are preset at the factory to binary 11111 (decimal 31), which sets the instrument to the last HP-IB address stored in RAM memory (or to the default value 18, if the contents of RAM memory are ever lost due to a battery failure or other cause). If the switches are set to a value other than 31, the instrument will always reset the HP-IB address to this value at power-up.

From the Front Panel

lb enter a new address from the front panel:

1. Press (SHIFT) (ZOOM) P.
2. Use the number keypad to enter the new decimal address.
3. Terminate the entry by pressing (Hz). This changes the current HP-IB address and stores the new address value in RAM memory.

From the HP-IB Bus

To enter a new address via the HP-IB bus, refer to the KSP command in the *HP 8566B Operating and* Programming *Manual.*

From the HP-IB Address Switch

Warning

Changing the HP-IB address by resetting the address switch on the Al5 Controller Assembly requires the removal of the RF section's protective bottom cover. This should be performed only by a qualified service person. Refer all such servicing of the instrument to qualified service persons.

1. Disconnect the ac line cord from the RF section.
2. Using a Pozidriv screw driver, remove the two RF section rear-panel bumpers. See ① in Figure 2-15.

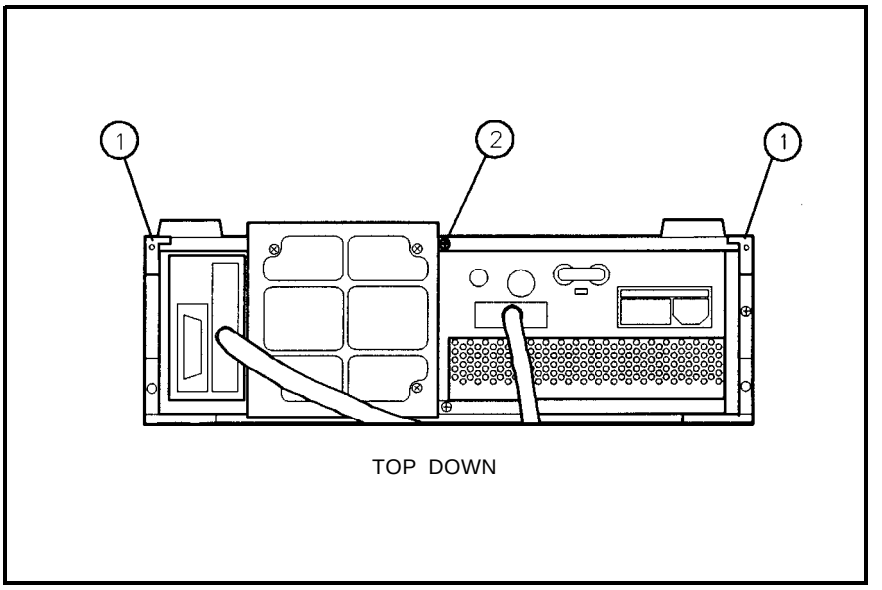


Figure 2-15. Removing the Bottom Cover

3. Back out screw ② (Figure 2-15) and the cover unseats from the front frame. When the cover is clear of the rear frame, remove the cover by lifting up.
4. Remove the cover from the Al5 controller assembly. See Figure 2-16 to locate the assembly.

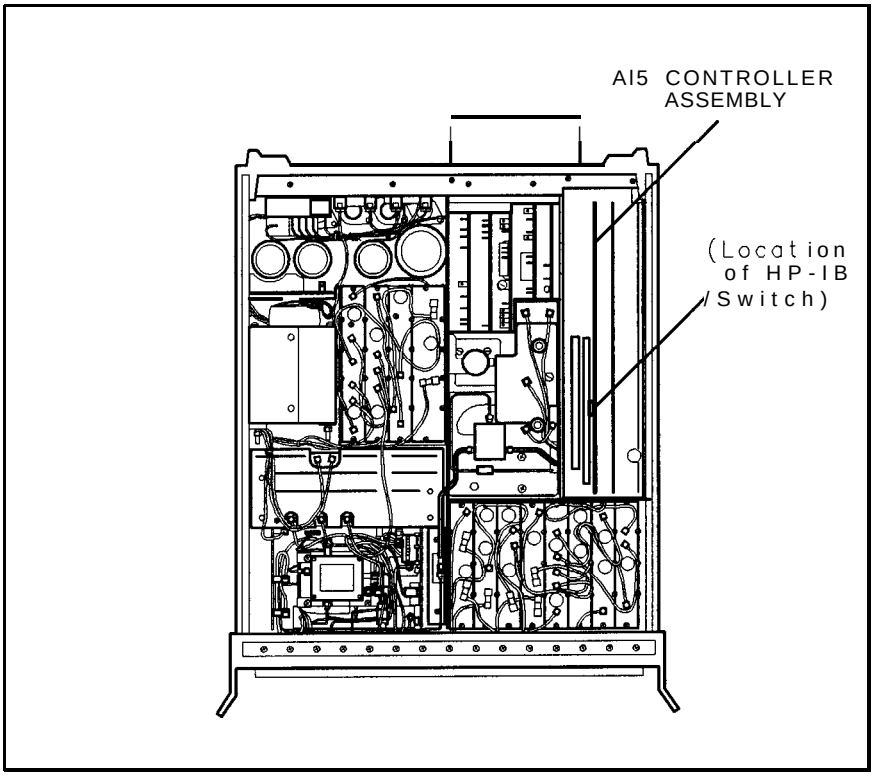


Figure 2-16. Location of Al5 Controller Assembly

5. Locate the address switch **A15SW1** as shown in Figure 2-16 and Figure 2-17. Change the switch's setting according to the information given below.

   The switch comprises six segments, Al through A6. Al must always be set to logic 1. Each of the remaining five segments, A2 through A6, corresponds to one of the digits of a 5-digit binary equivalent of the address. See Figure 2-17. The switch is preset at the factory to binary 11111 (decimal 31). This is a special code which commands the instrument to use the last input address (stored in memory) either from the front panel or from HP-IB.

   You can reset the switch to correspond to the binary equivalent of any desired decimal value indicated in Table 2-l. For example, if the desired address is 4, the **A15SW1** would be set as shown in Figure 2-18.

Note

Observe that 2^0 is represented by the far-left segment of the address switch.

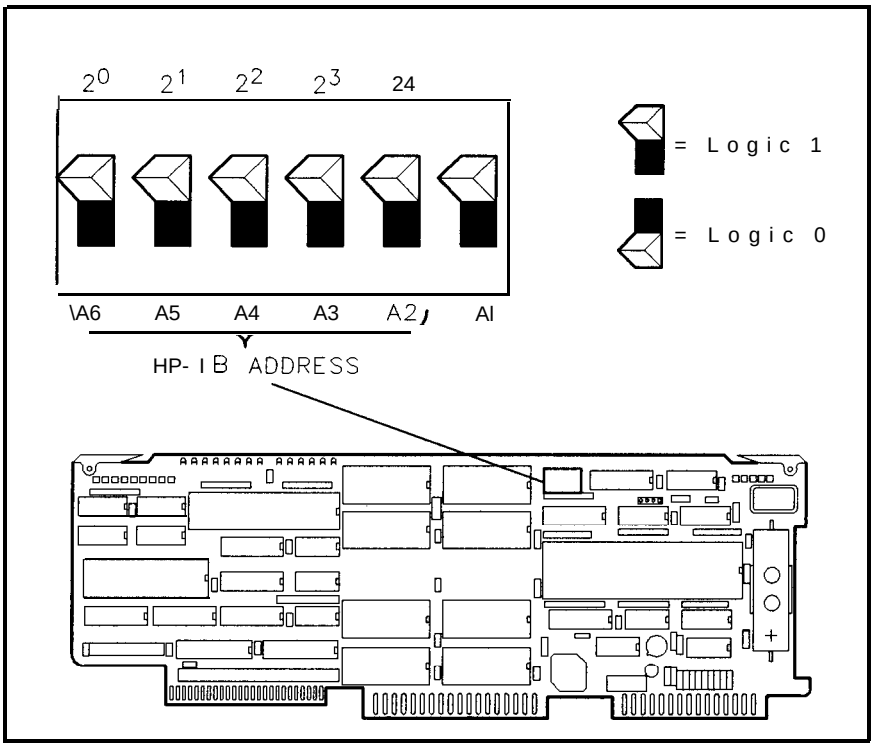


Figure 2-17. Address Switch (Shown In Factory Preset Position)

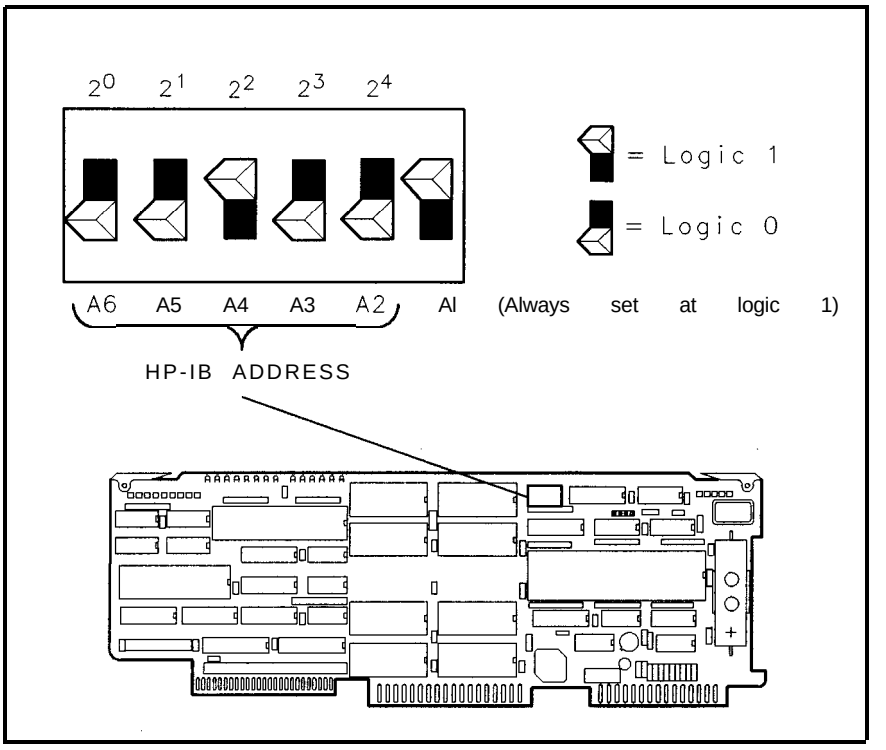


Figure 2-18. Address Switch Set to 4

6. Replace the cover on the Al5 controller assembly.
7. Replace the RF section's bottom cover.

Table 2-1. Decimal and Binary Address Codes

Decimal Value	B-Bit Binary Equivaleni
0	**00000**
1	0000 1
2	00010
3	00011
4	00100
5	00101
6	00110
7	00111
8	01000
9	01001
10	01010
11	01011
12	01100
13	01101
14	01110
15	01111
16	10000
17	10001
18	10010
19	10011
20	10100
21	10101
22	10110
23	10111
24	11000
25	11001
26	11010
27	11011
28	11100
29	11101
30	11110

3

Specifications

Introduction

Unless noted, all specifications are for AUTOCOUPLED FUNCTION operation and are with the preselector tracking optimized using the MARKER PRESELECTOR PEAK function. Where specifications are subject to minimization with the error-correction routine, corrected limits are given unless noted. Nominal values provide useful, but nonwarranted, information about functional performance.

Frequency

Measurement Range

100 Hz to 22 GHz, dc coupled input

Displayed Values

Frequency Reference Error and Accuracy

	Accuracy
Aging rate	$<1 \times 10^{-9}$/day and $< 2.5 \times 10^{-7}$/year
Temperature stability	$<7 \times 10^{-9}$ over 0°C to 55°C range (25°C reference)

Note

The term **frequency reference error,** when used later in this manual, is defined as: ± [aging rate/day x number of days since calibration + temperature stability].

Note

When the analyzer is in STANDBY, the frequency reference temperature is maintained at a steady state. Frequency accuracy is then subject to the standard instrument warm-up period indicated in "General" in this chapter.

Note

Changes in line voltage, gravitational field, and other environmental conditions will affect the frequency reference accuracy.

Center Frequency

0 Hz to 22 GHz

Center Frequency Readout Accuracy

	Accuracy*
Spans ≤n x 5 **MHz**	±(2% of frequency span + frequency reference error x center frequency + 10 Hz)
Spans >n x 5 **MHz**	±(2% of frequency span + n x 100 kHz + frequency reference error x center frequency) where *n* is the harmonic mixing number, depending on center frequency
Where: n = 1 for 100 Hz to 5.8 GHz center frequency. n = 2 for 5.8 GHz to 12.5 GHz center frequency. n = 3 for 12.5 GHz to 18.6 GHz center frequency. n = 4 for > 18.6 GHz center frequency.	
Zero Span	± freauencv reference error x center freauencv
*After adjusting FREQ ZERO at stabilized temperature. Add 30% of the resolution bandwidth setting if error correction is not used.	

Frequency Span

0 Hz, 100 Hz to 22 GHz over 10 division CRT horizontal axis; variable in approximately 1% increments. Two FULL SPAN keys select spans from 0 to 2.5 GHz and 2 to 22 GHz.

Frequency Span Readout Accuracy

	Accuracy
Range	100 Hz to 20 GHz
Readout Accuracy	
Spans ≤ n x 5 MHz	± 1% of indicated frequency separation
Spans > n x 5 MHz	±3% of indicated frequency separation
Start or Stop Frequency	Same as center frequency.

Resolution

Resolution Bandwidth

3 dB bandwidths of 10 Hz to 3 MHz in a 1, 3, 10 sequence. Bandwidth may be selected manually or coupled to frequency span (AUTO mode).

3 dB Bandwidth Accuracy*

Bandwidths	Accuracy
3 MHz	±20%
3 kHz to 1 MHz	±10%
10 Hz to 1 kHz	±20%
*30 kHz and 100 kHz bandwidth accuracy figures only applicable ≤90% relative humidity, ≤40°C.	

60 dB/3 dB Bandwidth Selectivity Ratio*

Bandwidths	Selectivity
100 kHz to 3 MHz	<15:1
3 kHz to 30 kHz	<13:1
30 Hz to 1 kHz	<12:1
*60 dB points on 10 Hz bandwidth are separated by <100 Hz.	

Resolution Bandwidth (Option 462 6 dB Bandwidths)

6 dB bandwidths of 10 Hz to 3 MHz in 1, 3, 10 sequence. Bandwidth may be selected manually or coupled to frequency span (AUTO mode).

6 dB Bandwidth Accuracy*

Bandwidths	Accuracy
3 MHz	±20%
30 Hz to 1 MHz	±10%
10 Hz	+50, -0%
*30 kHz and 100 kHz bandwidth accuracy figures only applicable ≤90% relative humidity ≤40°C.	

60 dB/6 dB Bandwidth Selectivity Ratio'

Bandwidths	Selectivity
100 kHz to 3 MHz	<11:1
30 Hz to 30 kHz	<8:1
*60 dB points on 10 Hz bandwidth are separated by <100 Hz.	

Resolution Bandwidth (Option 462 Impulse Bandwidth)

Impulse bandwidth of 1 kHz to 3 MHz and 6 dB bandwidth of 10 Hz to 300 Hz in 1, 3, 10 sequence. Bandwidth may be selected manually or coupled to frequency span (AUTO mode).

Impulse Bandwidth Accuracy*

Bandwidths	Accuracy
3 MHz (Impulse Bandwidth)†	±20%
1 kHz to 1 MHz (Impulse Bandwidth)†	±10%
10 Hz to 300 Hz (6 dB Bandwidth)	+50, -0%
*30 kHz and 100 kHz bandwidth accuracy figures only applicable ≤90% relative humidity ≤40°C. † Applicable in 10 dB/DIV	

60 dB/6 dB Bandwidth Selectivity Ratio*

Bandwidths	Selectivity
100 kHz to 3 MHz	<11:1
30 Hz to 30 kHz	<8:1
*60 dB points on 10 Hz bandwidth are separated by <100 Hz.	

Bandwidth Shape

Synchronously-tuned, five-pole filters for 10 Hz to 30 kHz bandwidths; four-poles, 100 kHz to 3 MHz bandwidth. Approximate Gaussian shape optimized for minimum sweep time and smooth pulse response with calibrated display.

Spectral Purity

Noise Sidebands'

Offset from Carrier	Sideband Level
320 Hz	-80 dBc/Hz
1 kHz	-85 dBc/Hz
10 kHz	-90 dBc/Hz
100 kHz	-105 dBc/Hz
*For frequency span ≤25 kHz (except 100 kHz offset) and center frequency from 100 Hz to 5.8 GHz.	

Power-Line-Related Sidebands *

	Center Frequency	
Offset from Carrier	≤100 MHz	>100 MHz to 5.8 GHz
<360 Hz	-70 dBc	-60 dBc
360 Hz to 2 kHz	-75 dBc	—
*For line conditions specified in "Power Requirements" under "General" at the end of this chapter.		

Amplitude

Measurement Range

Measurement range is the total amplitude range over which the analyzer can measure signal responses. The low value is determined by sensitivity (10 Hz resolution bandwidth and 0 dB input attenuation), and the high value by damage level.

Amplitude Measurement Range

Tuned Frequency	Range
Non-Preselected	
100 Hz to 50 kHz	-95 dBm to +30 dBm
50 kHz to 1 MHz	-112 dBm to +30 dBm
1 MHz to 2.5 GHz	-134 dBm to +30 dBm
Preselected	
2.0 GHz to 5.8 GHz	–132 dBm to + 30 dBm
5.8 GHz to 12.5 GHz	–125 dBm to + 30 dBm
12.5 GHz to 18.6 GHz	-119 dBm to +30 dBm
18.6 GHz to 22 GHz	-114 dBm to +30 dBm

Displayed Values

Scale

Over a lo-division CRT vertical axis with reference level (0 dB) at the top graticule line.

Calibration

	Calibration
Log	10 dB/div for 90 dB display from reference level. Expanded from reference level: 5 dB/div for 50 dB display 2 dB/div for 20 dB display 1 dB/div for 10 dB display
Linear	10% of reference level/div when calibrated in voltage.

Reference Level Range

	Range
Log	+30.0 to -99.9 dBm or equivalent in dBmV, dBμV, volts. Readout expandable to +60.0* dBm to -119.9 dBm (-139.9 dBm for ≤1 kHz resolution bandwidth) using SHIFT, ATTEN (KSI).
Linear	7.07 V to 2.2 μV full scale. Readout expandable to 223.6 V* to 2.2 μV (0.22 μV for <1 kHz resolution bandwidth) using SHIFT, ATTEN (KSI).

*Maximum total input power not to exceed +30 dBm damage level.

Accuracy

The sum of several factors, listed in "Amplitude Uncertainty," determines the accuracy of the reference level readout. Refer to the "Amplitude Uncertainty" section in this chapter.

Reference Lines Accuracy

Equals the sum of reference level accuracy plus the scale fidelity between the reference level and the reference line level.

Dynamic Range

Spurious Responses

Spurious responses are signals generated by the analyzer due to input signals. For total signal power ≤ -40 dBm at the input mixer, all harmonic and intermodulation distortion >70 dB below input signal.

Note Input mixer level is defined as the input attenuation subtracted from the total signal power at the input connector.

Second Harmonic Distortion

Frequency Range	Distortion
100 Hz to 50 MHz (non-preselected)	<-70 dBc
50 MHz to 700 MHz (non-preselected)	<-80 dBc
700 MHz to 2.5 GHz (non-Dreselected)	<-70 dBc
2 GHz to 22 GHz (preselected) For mixer levels <– 10 dBm	<-100 dBc

Third Order Intermodulation Distortion and Third Order Intercept

Frequency Range	TO1
100 Hz to 5 MHz	>+5 dBm
5 MHz to 5.8 GHz	>+7 dBm
5.8 GHz to 18.6 GHz	>+5 dBm

Note For typical second and third order distortion characteristics, see Figure 4-4 in Chapter 4, "Performance Characteristics."

Note Dynamic range due to TO1 and noise level can be calculated from 2/3 [TOI – displayed average noise level]. For example, at 18 GHz the analyzer's specified dynamic range when using the 10 Hz resolution BW is: 2/3 [+ 5 dBm – (-120 dBm)] = 2/3(125) = 83 dB.

Note Two tone intermodulation distortion products can be calculated from 2 (TO1 – signal level). For example, for two tones at – 33 dBm, the intermodulation products for a +5 dBm TO1 will be:
2 [+5 dBm –(–33)] = 76 dB down.

Image, Multiple, and Out-of-Band Responses

Image responses are due to input signals that are two times the IF frequency above or below the tuned frequency. Multiple responses are due to input signals mixing with more than one LO harmonic. Out-of-band responses are due to input signals outside of the selected frequency band.

Image, Multiple, and Out-of-Rand Responses

	Tuned Frequency (GHz)				
Applied Frequency (GHz)	**0—2.5**	**2.0—5.8**	**5.8—12.5**	**12.5—18.6**	**18.6—22.0**
0—2.5	NA	−60 dBc	−60 dBc	−60 dBc	−60 dBc
2.0—5.8	−60 dBc	−70 dBc	−60 dBc	−60 dBc	−60 dBc
5.8—12.5	−50 dBc	−60 dBc	−70 dBc	−60 dBc	−60 dBc
12.5—18.6	−45 dBc	−60 dBc	−60 dBc	−70 dBc	−60 dBc
18.6—22.0	−40 dBc	−60 dBc	−60 dBc	−60 dBc	−70 dBc*

*Image Responses: -60 dBc, 18.6-20.0 GHz; -50 dBc, 20.0-22 GHz

Residual Responses

Residual responses are signals generated by the analyzer independent of input signals.

Residual Responses†

Frequency Range	Residual Responses
100 Hz to 5.8 GHz	<−100 dBm ‡
5.8 GHz to 12.5 GHz	<−95 dBm
12.5 GHz to 18.6 GHz	<−85 dBm
18.6 GHz to 22 GHz	<−80 dBm

†With 0 dB input attenuation and no input signal.

‡For 100 Hz to 5.8 GHz range, residual responses are limited by the appropriate displayed average noise level or -100 dBm, whichever is greater.

Gain Compression

<1.0 dB, 100 Hz to 22 GHz with ≤−5 dBm at input mixer

Displayed Average Noise Level (Sensitivity)

Average Noise *

Tuning Range	Level
Non-preselected	
100 Hz to 50 kHz	<−95 dBm
50 kHz to 1.0 MHz	<−112 dBm
1.0 MHz to 2.5 GHz	<−134 dBm
Preselected	
2.0 GHz to 5.8 GHz	<−132 dBm
5.8 GHz to 12.5 GHz	<−125 dBm
12.5 GHz to 18.6 GHz	<−119 dBm
18.6 GHz to 22 GHz	<−114 dBm

*0 dB input attenuation and 10 Hz resolution bandwidth.

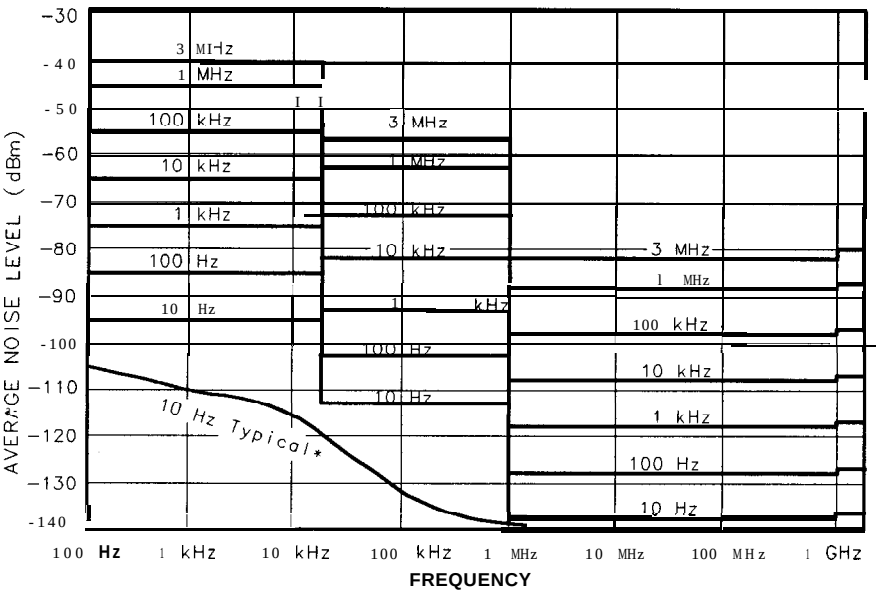


Figure 3-1.
Specified Average Displayed Noise Level, 100 Hz to 2.5 GHz Non-preselected Tuning Range

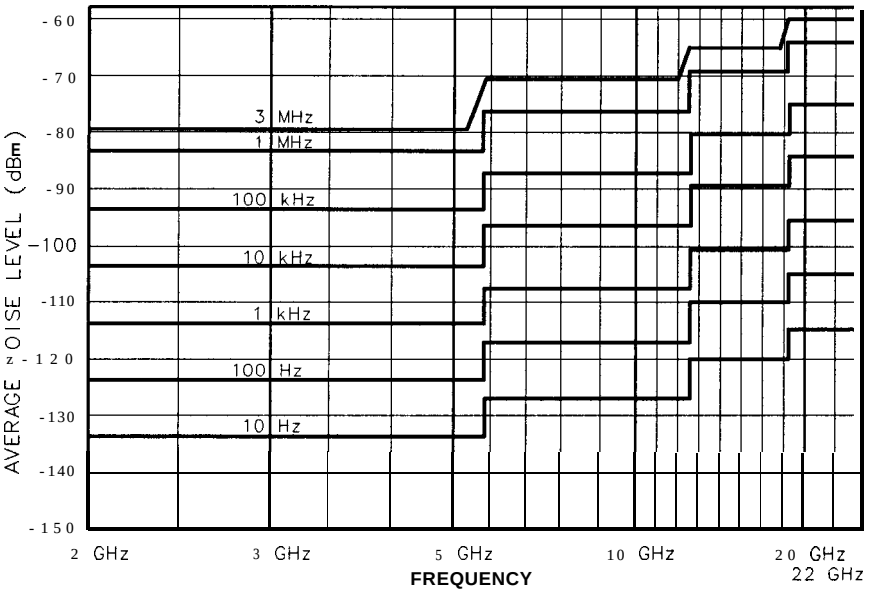


Figure 3-2.
Specified Average Displayed Noise Level, 2.0 GHz to 22 GHz Preselected Tuning Range

Amplitude Uncertainty

The following table summarizes the amplitude measurement uncertainties along with their respective dependent variables (such as tuned frequency or reference level range) versus corrected and uncorrected conditions and ambient temperature ranges.

Amplitude Uncertainty

Source of Uncertainty	Dependent Variable	With Uncorrected Readout (SHIFT) STOP FREQ (KSY)		With Corrected Readoul SHIFT (FREQUENCY SPAN) (KSW) SHIFT START FREQ (KSX)[1]
		20°C to 30°C	0°C to 55°C	20°C to 30°C
Calibrator Amplitude[6]	None	**f0.3** dB	±0.3 dB	**f0.3** dB
Frequency Response (flatness)[2,6]	**Tuned Frequency:**			
	100 Hz to 2.5 GHz	±0.6 dB	fl.O dB	**f0.6** dB
	2.0 GHz to 12.5 GHz	f1.7 dB	f1.7 dB	f1.7 dB
input attenuation 10 dB)	12.5 GHz to 18.6 GHz	±2.2 dB	**f2.2** dB	**i-2.2** dB
	18.6 GHz to 20.0 GHz	**f2.2** dB	**f3.3** dB	**f2.2** dB
	20.0 GHz to 22 GHz	**f3.0** dB	f4.1 dB	± **3.0** dB
Cumulative	100 Hz to 20 GHz	**f2.2** dB	**f3.3** dB	± **2.2** dB
kmulative	100 Hz to 22 GHz	**f3.0** dB	f4.1 dB	**f3.0** dB
Absolute Amplitude Calibration[4,6]	Applicable when making absolute amplitude measurements	±0.6 dB	**f0.6** dB	**f0.6** dB
Resolution Bandwidth Switching Referenced to 1 MHz RES BW	**Resolution BW:**			
	10 Hz	±2.0 dB	±4.0 dB	±1.1 dB
	30 Hz	f0.8 dB	**f2.3** dB	±0.4 dB
	100 Hz to 1 MHz	f0.5 dB	±2.0 dB	**f0.2** dB
	3 MHz	±1.0 dB	**f2.0** dB	±0.2 dB
Log Scale Switching	Changing Log Scale	**f0.5** dB	fl.O dB	fO.1 dB
Log Fidelity[6]	Incremental error for dB differential between calibration and measured signal, over 0 to 80 dB from reference level	≤±0.10 dB/dB	≤±0.15 dB/dB	≤±0.10 dB/dB
	Cumulative Error			
	10 Hz RES BW			
	Over 0 to 90 dB	≤±2.1 dB	≤±2.8 dB	32.1 dB
Option 857	Over 0 to 70 dB	≤±0.8 dB		≤±0.8 dB
	≥30 **Hz RES BW**			
	Over 0 to 90 dB	31.5 dB	≤±1.5 dB	≤±1.5 dB
	Over 0 to 80 dB	≤±1.0 dB		≤±1.0 dB
Option 857	Over 0 to 70 dB	≤±0.6 dB		≤±0.6 dB
Linear Fidelity[6]	Over top 9-1/2 divisions of display[8]	<±3% of Reference Level	<±3% of Reference Level	<±3% of Reference Level

Aplitude Uncetainty (continued)

Source of Uncertainty	Dependent Variable	With Uncorrected Readout (SHIFT) (STOP FREQ) (KSY)		With Corrected Readout (SHIFT) (FREQUENCY SPAN) (KSW) (SHIFT) (START FREQ) (KSX)[1]
		20°C to 30°C	0°C to 55°C	20°C to 30°C
IF Gain'	**RES BW ≥3 kHz**			
Reference	**Reference Level**			
to -10 dBm	0 to -59.9 dBm	≤±0.6 dB	≤±1.0 dB	≤±0.3 dB
Reference Level	-60 to -100 dBm	≤±1.0 dB	≤±1.5 dB	≤±1.0 dB
with 10 dB input				
attenuation	**RES BW 100 Hz—1 kHz**			
	Reference Level			
	0 to -79.9 dBm	≤±0.6 dB	≤±1.0 dB	≤±0.3 dB
	-80 to -100 dBm	≤±1.0 dB	≤±1.5 dB	≤±1.0 dB
	RES BW 30 Hz			
	Reference Level			
	0 to -79.9 dBm	≤±0.6 dB	≤±1.0 dB	≤±0.3 dB
	-80 to -100 dBm	≤±2.0 dB	≤±2.5 dB	≤±2.0 dB
	RES BW 10 Hz			
	Reference Level			
	0 to -79.9 dBm	≤±1.6 dB	≤±2.0 dB	≤±1.0 dB
	-80 to -100 dBm	≤±2.0 dB	<±2.5 dB	<±2.0 dB
Log Digitizing[6]	**Log Scale:**			
	10 dB	f0.2 dB	f0.2 dB	f0.2 dB
	5 dB	fO.l dB	fO.l dB	fO.l dB
	2 dB	±0.04 dB	±0.04 dB	f0.04 dB
	1 dB	±0.02 dB	±0.02 dB	±0.02 dB
Linear Digitizing[6]		±0.2% of ref. level	±0.2% of ref. level	±0.2% of ref. level
Error Correction[5]	Corr'd function off or on	N/A	N/A	f0.4 dB

Table Footnotes

1 Requires executing the error correction function ((SHIFT) (FREQUENCY SPAN)) after stabilization at new ambient temperature. Otherwise a typical amplitude drift may be f0.05 dB/°C (at -10 dBm reference level, 10 dB input attenuation and 1 MHz resolution SW.)

2 Includes input attenuator in 10 dB position, mixing mode, gain variations, and assuming PRESELECTOR PEAK in current instrument state. COUPLED FUNCTION not required as long as MEAS UNCAL message is not displayed.

3 Supplemental characteristic (typical, nonwarranted performance parameter).

4 Assuming internal calibration signal is used to calibrate the reference level at -10 dBm and the input attenuator is fixed at 10 dB.

5 When the error correction function is used, amplitude uncertainty is introduced because additional IF gain is used to offset the amplitude errors caused by resolution BW switching and display scale switching errors.

6 Unaffected by error correction.

7 Usable reference level range is a function of resolution bandwidth. Refer to Displayed Average Noise Level.

8 For IF-Display sections with serial prefixes 3014A and above, specification applies over entire display.

Marker

The marker is a bright dot placed upon the display trace and is positioned horizontally by the DATA controls. The marker amplitude and frequency are read out continuously.

Frequency Accuracy

Marker Type	Accuracy
Normal	same as center frequency accuracy.
A	same as frequency span accuracy.

Amplitude Accuracy

Marker Type	Accuracy
Normal	same as reference level accuracy plus scale fidelity between the reference level and marker position.
A	same as frequency response uncertainty and scale fidelity between two markers.

Sweep

Sweep Time Accuracy

Sweep Time	Accuracy
≤200 seconds sweep times	±10%
>200 seconds sweep times	±30%

Inputs

RF INPUT

Connector	Precision Type N female, front panel
Frequency Range	100 Hz to 22 GHz, dc coupled
Maximum Input	
ac	Continuous power: + 30 dBm from 50Ω source. Mixer protected by diode limiter, 100 Hz to 2.5 GHz. Pulse power: ≤100 W, 10 μs pulse width and ≤1% duty cycle with ≥50 dB input attenuation (≤0 dBm peak power to input mixer).
dc	<100 mA damage level
Input Attenuator	0 to 70 dB in 10 dB steps

Note +30 dBm (1 W) input damage level.

IF INPUT

I Connector	SMA female, front panel
Sensitivity	-30 dBm at 321.4 MHz produces 0 dB ±1.0 dB display on CRT when (SHIFT) ○ (KSU) is executed, reference level 0 dBm, conversion loss set to 30 dB, resolution bandwidth 1 MHz and a scale 1 dB/div.
Maximum Input	
ac	+ 10 dBm continuous power from 50Ω source.
dc	20 V with rise time of <1 V/μs.

outputs

CAL OUTPUT

Connector	BNC female, front panel
Impedance	500 nominal
Frequency	100 MHz *(frequency reference error x 100 MHz)
Amplitude	-10 dBm f0.3 dB

1ST LO OUTPUT

Connector	SMA female, front panel
Impedance	50Ω nominal
Frequency	2.3 to 6.1 GHz
Amplitude	>+5 dBm
Maximum Safe Reverse Level	+27 dBm (1/2 W) total power into 50Ω

SWEEP + TUNE OUTPUT

Connector	BNC female. rear panel
Impedance	10 kΩ nominal
Amplitude	-1 V/GHz of tuned frequency ±(2% + 10 mV)

400 Hz Power Line Frequency Operation Option 400

Power Line Related Sidebands*

Offset from Carrier	Sideband Level
<2 kHz	-55 dBc
2 kHz to 5.5 kHz	-65 dBc
*For Center Frequency from 100 Hz to 5.8 GHz	

Power Requirements

	Specification
Line Frequency	400 Hz ±10% line frequency (50 Hz to 60 Hz operation for servicing only)
Line Voltage	100 or 120 V (+5%, -10%)

Operating Temperature Range

Power Line Frequency	Temperature Range
50 Hz to 60 Hz (service only, not for extended periods)	0°C to 40°C
400 Hz	0°C to 55°C

General

HP-IB Interface Functions

SH1, AH1, T6, L4, SR1, RL1, PPO, DC1, DT1, Cl, C2, C3, C28, E2

Environmental

Temperature

Operation: 0°C to 55°C
Storage: -40°C to 75°C

Increased internal temperatures may result if the rear-panel air filters are not cleaned regularly.

Altitude

Operation: ≤4,572 m (15,000 feet)
Storage: 515,240 m (50,000 feet)

Power Requirements

50 to 60 Hz; 100, 120, 220, or 240 volts (+5%, -10%); approximately 650 VA (40 VA in standby). 400 Hz operation is available as Option 400.

Humidity

Operation

Except as noted in electrical specifications, type tested at <95% relative humidity, 25°C to 40°C for five days.

Storage

5% to 90% relative humidity, 0°C to 40°C.

EMI

Conducted and radiated interference is within the requirements of MIL-STD 461C, Part 7 RE02 and CEO3 (Air Force), and within the requirements of CISPR Publication 11 and Messempfaenger-Postverfuegung 526/527/79 (Kennzeichnung Mit F-Nummer/Funkschutzzeichen).

X-Rays

Serial Prefix 3004A and Above

X-rays generated by this instrument are sufficiently screened.

Die in diesem geraet entstehende roentgenstrahlung ist ausreichend abgeschirmt .

accel. voltage / beschl. spg < 20 kV

Serial Prefix 3001A and Below

When operating, this instrument emits x-rays; however, it is well shielded and meets safety and health requirements of various countries, such as the X-Ray Radiation Act of Germany. Radiation emitted by this instrument is less than 0.5 mR/hr at a distance of five (5) centimeters from the surface of the cathode-ray tube. The x-ray

radiation primarily depends on the characteristics of the cathode-ray tube and its associated low-voltage and high-voltage circuitry. To ensure safe operation of the instrument, adjust both the low-voltage and high-voltage power supplies as outlined in the Performance Tests and Adjustments manual (if applicable).

Replace the cathode-ray tube with an identical CRT only.

Number of German License: BW/50/79/ROE

Waehrend des Betriebs erzeugt dieses Geraet Roentgenstrahlung. Das Geraet ist so abgeschirmt, dass die Dosisleistung weniger als 36 pA/kg (0,5 mR/h) in 5cm Abstand von der Oberflaeche der Katodenstrahlroehre betraegt. Somit sind die Sicherheitsbestimmungen verschiedener Laender, u.A. der deutschen Roentgenverordnung eingehalten.

Die Staerke der Roentgenstrahlung haengt im Wesentlichen von der Bauart der Katodenstrahlroehre ab, sowie von den Spannungen, welche an dieser anliegen. Um einen sicheren Betrieb zu gewaehrleisten, duerfen die Einstellungen der Niederspannungsund des Hochspannungsnetzteils nur nach der Anleitung des Handbuches vorgenommen werden.

Die Katodenstrahlroehre darf nur durch die gleiche Type ersetzt werden.

Das Geraet ist in Deutschland zugelassen unter der Nummer: BW/50/79/ROE

Warm-Up Time

Operation

Requires 30-minute warm-up from cold start, 0°C to 55°C. Internal temperature equilibrium is reached after 2-hour warm-up at stabilized ambient temperature.

kequency Reference

From a cold start (no line power connected to HP 8566B), the following conditions apply:

- <72 hours to meet aging rate specification after <24-hour off period.
- <30 days to meet aging rate specification after indefinite off period.
- <30 minutes to be within 1 x 10^{-8} of 24-hour warm-up frequency (at 25°C).

Weight

	Weight
Total net	**50** kg (112 lb)
RF Section (net)	29 kg (65 lb)
IF-Display Section (net)	21 kg (47 lb)
RF Section (shipping)	**35** kg (78 lb)
IF-Display Section (shipping)	**27** kg (60 lb)

Dimensions

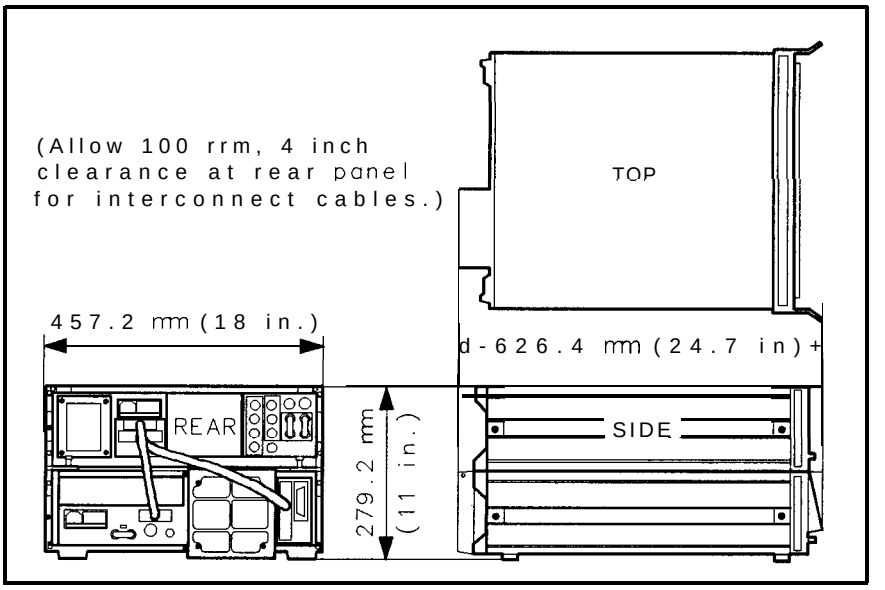


Figure 3-3. Instrument Dimensions with Handles

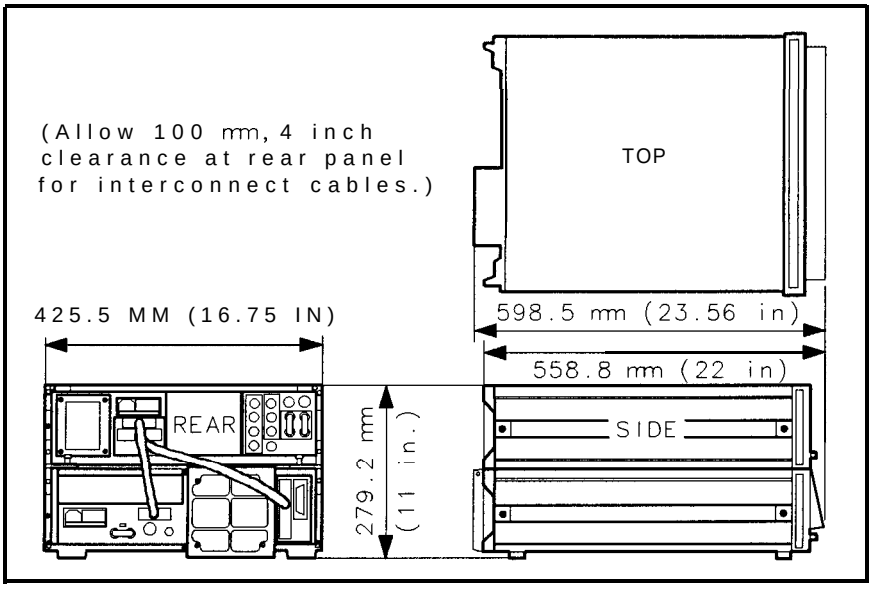


Figure 3-4. Instrument Dimensions without Handles

4

Performance Characteristics

Note

Supplemental characteristics are intended to provide information useful in applying the instrument by giving typical, nonwarranted, performance parameters.

Frequency

Resolution

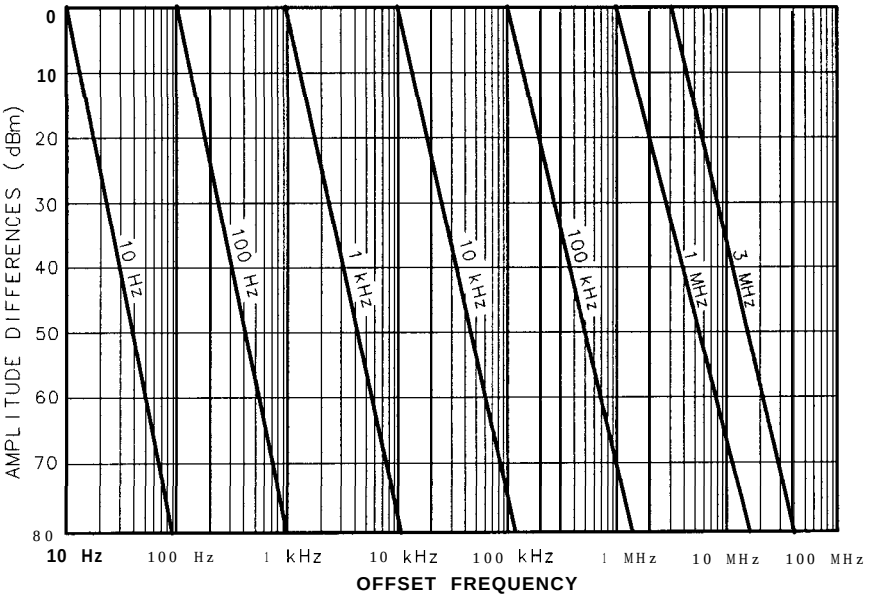


Figure 4-l. Typical Spectrum Analyzer Resolution

Spectral Purity

Noise Sidebands

Refer to Figures 4-2 and 4-3 for typical noise sideband performance.

Power-Line Related Sidebands

For line conditions specified in "Power Requirements" under "General" in Chapter 3.

Power-Line Related Sidebands

	Center Frequency		
Offset from Carrier	**5.8—12.6 GHz**	**12.6-18.6 GHz**	**18.6-22 GHz**
<360 Hz	-64 dBc	-60 dBc	-58 dBc
360 Hz to 2 kHz	-69 dBc	-65 dBc	-63 dBc
>2 kHz	-74 dBc	-70 dBc	-68 dBc

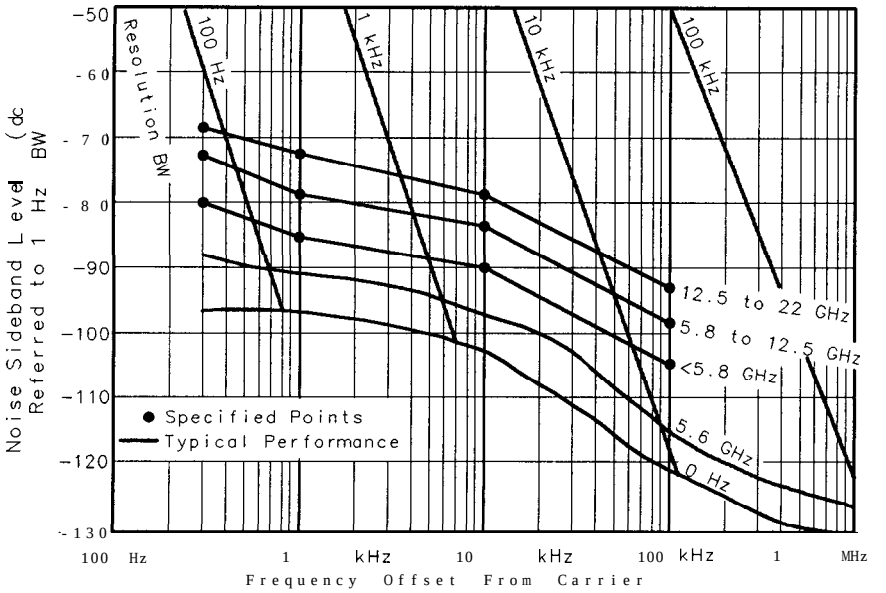


Figure 4-2.
Single Sideband Noise Normalized to 1 Hz BW versus Offset from Carrier

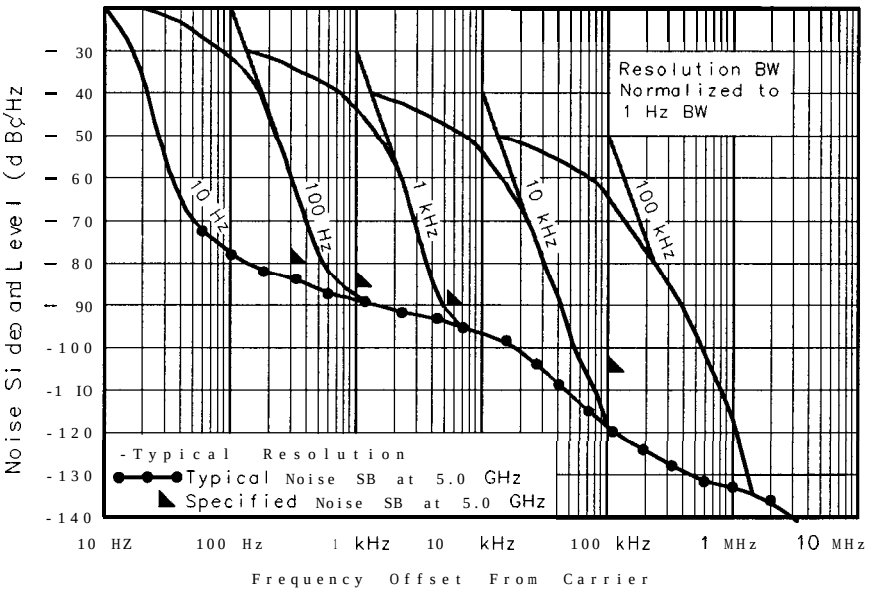


Figure 4-3.
Typical SSB Noise at 5.0 GHz Center Frequency Normalized to 1 Hz BW versus Offset from Carrier and Analyzer Resolution. May be Limited by Average Noise Level.

Stability

Residual FM

For fundamental mixing (n = 1) <50 kHz peak-to-peak, frequency span >5 MHz

Drift

Because the analyzer is phase-locked at the beginning of each sweep, drift occurs only during the time of one sweep.

Frequency Drift

Frequency Span	Center Frequency Drift*
≤100 kHz	<10 Hz/minute of sweep time
100 kHz to 5 MHz	<500 Hz/minute of sweep time
≥5 MHz	<5 kHz/minute of sweep time
*Typical, after 1 hour warm-up at stabilized temperature. COUPLED FUNCTION not required.	

Amplitude

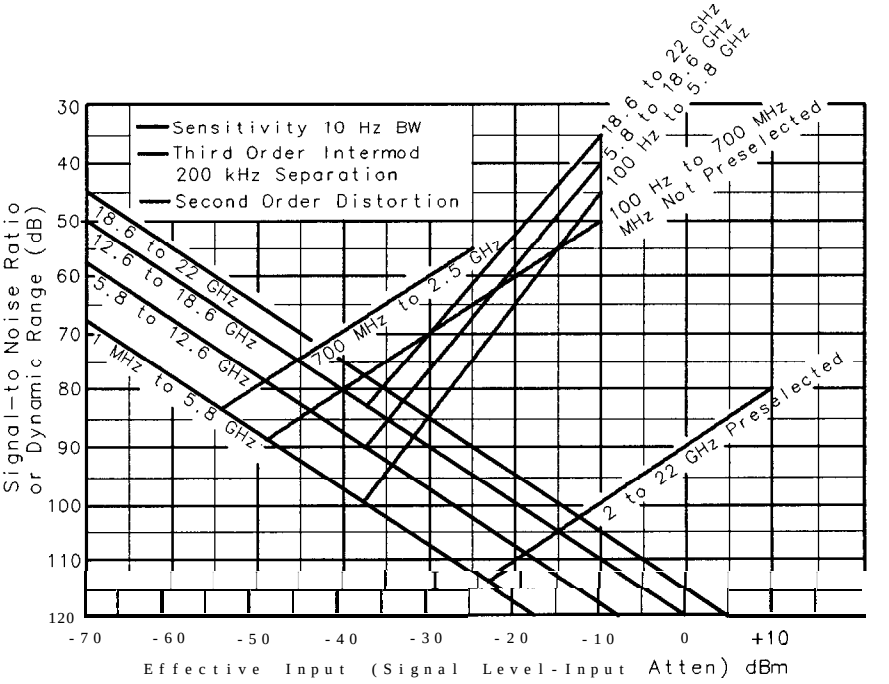


Figure 4-4. Typical Optimum Dynamic Range

Third Order Intermodulation Distortion

See Figure 4-4 for typical second and third order distortion characteristics.

Note

Dynamic range due to TO1 and noise level can be calculated from 2/3 [TOI – displayed average noise level]. For example, at 18 GHz the analyzer's specified dynamic range when using the 10 Hz resolution BW is: 2/3 [+ 5 dBm – (-120 dBm)] = 2/3 (125) = 83 dB.

Third Order Intercept (TOI)

Third Order Intercept

Frequency Range	TO1
18.6 GHz to 22 GHz	> + 5 dBm (typical)
2 to 22 GHz for >100 MHz signal separation	> + 50 dBm (typical)

Synthesis-Related Spurious Sidebands

<-90 dBc

Input Attenuator Uncertainties

Frequency Response Uncertainty (Flatness)

	Center Frequency			
Attenuator Setting	100 Hz to 2.5 GHz	2.0 GHz to 12.4 GHz	12.4 GHz to 18 GHz	18 GHz to 22 GHz
0 dB	not specified			
10	not specified, accounted for in Frequency Response Uncertainty			
20	f0.4 dB	f0.7 dB	f0.8 dB	f1.2 dB
30	f0.5 dB	f0.9 dB	f1.2 dB	f2.0 dB
40	f0.7 dB	f1.2 dB	f1.6 dB	f2.5 dB
50	±0.8 dB	±1.5 dB	±2.0 dB	±3.0 dB
60	f1.O dB	f1.8 dB	f2.4 dB	f3.5 dB
70	±1.0 dB	f2.1 dB	f2.8 dB	f4.0 dB

10 dB Step Uncertainty

	Center Frequency			
	100 Hz to 2.5 GHz	2.0 GHz to 12.4 GHz	12.4 GHz to 18 GHz	18 GHz to 22 GHz
10 to 70 dB attenuation range	± 0.2 dB	± 1.0 dB	± 1.0 dB	± 1.5 dB

Example: In changing the input attenuator from 40 to 60 dB the uncertainty of the input attenuator from 2 to 18 GHz is fl.O dB plus the worst case flatness up to 18 GHz for 60 dB attenuation, f2.4 dB, a total of f3.4 dB uncertainty.

RF Gain Uncertainty

RF Gain Uncertainty

Tuned Frequency	Uncertainty
100 Hz to 2.5 GHz	
20°C to 30°C	≤±0.2 dB
0°C to 55°C	≤±1.0 dB
2.0 GHz to 22 GHz	
20°C to 30°C	≤±0.7 dB
0°C to 55°C	≤±1.0 dB

Inputs

IF INPUT

SWR	<2.0:1 at 321.4 MHz ±10 MHz
Reference Level Calibration (external mixing bands)	The HP 8566B reference level defaults to a conversion loss offset associated with the HP 11970 family of mixers such that the conversion loss and reference level offset sum to -30 dBm. The default values are shown in the following table.

External Mixing Bands

Rand	Freq. Range (GHz)	Mixing Harmonic	Conv. Loss	Ref. Level Offset
6(K)	18.0-26.5	6+	18	-12
7(A)	25.5-40.0	8+	20	-10
8(Q)	33.0-50.0	10+	22	-8
9(U)	40.0-60.0	10+	24	-6
10(V)	50.0-75.0	14+	26	-4
11(E)	60.0-90.0	16+	28	-2
12(W)	75.0-110.0	18+	30	0
13(F)	90.0-140.0	24+	32	2
14(D)	110.0-170.0	30+	34	4
15(G)	140.0-220.0	36+	36	6
16(Y)	170.0-260.0	44+	38	8
17(J)	420.0-325.0	54+	40	10

RF INPUT

SWR

	Tune Frequency		
Input Attenuation	100 Hz to 2.5 GHz	2 GHz to 5.8 GHz	5.8 GHz to 22 GHz
10 dB	1.2	1.5	1.9
0 dB*	2.3	3.0	3.0
*When tuned to within ±3 MHz of signal			

LO Emission

Frequency Range	Emissions
≥2.0 GHz (preselected)	<−80 dBm
≤2.5 GHz (not preselected)	<−90 dBm

VIDEO INP

Connector	BNC female, rear panel
Impedance	139Ω
Amplitude	0 to 2 V

IF INP

Connector	BNC female, rear panel
Impedance	503
Frequency	21.4 MHz
Amplitude	-5 dBm with 10 dB input attenuation and 0 dB reference level for full screen signal

EXT TRIGGER

Connector	BNC female, rear panel
Impedance	1 kΩ, nominal
Trigger Level	> +2.4 V
Maximum Input	5 V

FREQ REFERENCE
EXT

Connector	BNC female, rear panel
Impedence	500, nominal
Frequency	5 MHz ±25 Hz or 10 MHz ±50 Hz
Amplitude	0 dBm to +lOdBm
Phase Noise and Spurious Signals	Analyzer performance will be degraded unless frequency reference phase-noise and spurious signals are ≤140 dBc/Hz, referred to 10 MHz at a 100 Hz to 10 kHz offset.

outputs

Display Outputs

X, Y, and Z outputs for auxiliary CRT displays. Compatible with HP 1300 series displays.

Connectors	BNC female, rear panel
4mplitude	
X	1 V for full deflection
Y	1 V for full deflection
Z	0 to 1 V intensity modulation, -1 V blank
BLANK	TTL level >2.4 V for blanking. Compatible with most oscilloscopes.
Rise Time	
X	<75 ns
Y	<75 ns
Z	<30 ns

Recorder Outputs

Outputs to drive all current HP X-Y recorders using positive pencoils or TTL penlift input.

(LOWER LEFT) and (UPPER RIGHT) keys calibrate the recorder SWEEP and VIDEO outputs with 0,0 and 10,1 V respectively, for adjusting X-Y recorders.

SWEEP

A voltage proportional to the horizontal sweep of the frequency sweep generator.

Connector	BNC female, rear panel
Amplitude	0 V for left edge, + 10 V for right edge
Impedance	1.7 kΩ nominal

VIDEO

Detected video output (before A-D conversion) proportional to vertical deflection of the CRT trace.

Connector	BNC female, rear panel
Amplitude	100 mV/div from 0 to 1 V
Impedance	≤475Ω nominal

PENLIFT

Connector	BNC female, rear panel
Amplitude	
During Sweep (pen down)	0 V from 10Ω source
During Retrace (pen up)	+ 15 V from 10 kΩ source

21.4 MHz IF OUTPUT

Connector	BNC female, rear panel
Impedance	50Ω nominal
Frequency	21.4 MHz
Amplitude	-20 dBm for a signal at the reference level. Controlled by the input attenuator and IF step gain positions.
Scaling	Logarithmically related to the RF input signal when in log scales. Linearly related to RF input signal when in linear scale.
Bandwidth	Controlled by the analyzer's resolution bandwidth setting.

FREQ REFERENCE INT

Connector	BNC female. rear panel
Impedance	500 nominal
Freauencv	10.000 MHz
Amplitude	0 dBm

10 MHz OUT

Connector	BNC female, rear panel
Impedance	50Ω nominal
Amplitude	≥5 dBm

VIDEO OUT

Connector	BNC female, rear panel
Impedance	>10Ω
Amplitude	0 to 2 V

IF OUT

Connector	BNC female, rear panel
Impedance	50Ω
Frequency	21.4 MHz nominal
Amplitude	−11 dBm nominal with 10 dB input attenuation

IF OUTPUT

Connector	SMA female, front panel
Impedance	500 nominal
Frequency	32 1.4 MHz nominal
Maximum Safe Reverse Level ac dc	 + 10 dBm continuous power from 503 source 20 V with rise time of <1 V/μs

General

Acoustic Noise Emission/ Geraeuschemession

This instrument is in conformance with the German Regulation on Noise Declaration For Machines (Laermangabe nach der Maschinenlaermrerordnung - 3. GSGV Deutschland).

	LpA(dB)
am Arbeitsplatz[1] (operator position)	47
fiktiver Arbeitsplatz[1] (bystander position)	47

1 Testing was conducted per ISO 7779 and DIN 45635 teil 1.

Function Descriptions

Sweep

Trigger

	Characteristics
Free Run	Sweep triggered by internal source.
Line	Sweep triggered by power line frequency.
Video	Sweep triggered by detected waveform of input signal at an adjustable level; signal must be ≥0.5 div peak-to-peak. For sweeps of 10 ms and less (zero span) the signal must have >40 Hz rate. [SHIFT] (VIDEO) (KSy) allows any envelope rate, but display will blank between triggers when sweep is <20 ms.
External	Sweep triggered by rising edge of signal input to rear-panel BNC connector; trigger source must be >2.4 V (10 V maximum). For sweep of 10 ms and less (zero span), trigger source must have >40 Hz rate. (SHIFT) (EXT) (KSx) allows any trigger source rate, but display will blank between low repetition rate trigger when sweep is <20 ms.
Continuou	sequential sweeps initiated by the trigger: 20 ms full span to 1500 s full span in approximately 1% increments.
Single	Single sweep armed on activation and initiated by trigger (sweep ≥20 ms only).

Sweep Time

Zero Frequency Span. 1 μs full sweep (10 divisions) to 10 ms full sweep in 1, 2, 5 sequence (no digital storage); 20 ms full sweep to 1500 s full sweep in approximately 1% increments.

Marker. Sweeps ≥20 ms only. Normal: displays time from beginning of sweep to marker position. A: Displays time difference between stationary and tunable marker

Video Bandwidth

Post-detection low-pass filter used to average displayed noise; bandwidth variable from 1 Hz to 3 MHz in a 1, 3, 10 sequence. All bandwidths are nominal except 3 MHz, which is a minimum. Video bandwidth may be selected manually or coupled to resolution bandwidth.

Cathode Ray Tube

Type: Post-deflection accelerator, aluminized P31 phosphor, electrostatic focus and deflection.

Viewing Area: Approximately 9.6 cm vertically by 11.0 cm horizontally (3.8 in x 4.7 in). The CRT is completely turned off with (SHIFT) (CLEAR WRITE) (trace B, KSg and on with [SHIFT) (MAX HOLD) (trace B, KSh) to avoid unnecessary aging of the CRT during long-term unattended operation of the analyzer.

Instrument State Storage

Up to six complete sets of user-defined control settings may be stored and recalled by pressing SAVE or RECALL and the desired register number (1 to 6) from the keyboard. Register 0 stores the current state while register 7 stores the instrument state prior to the last function change via the numeric/unit keyboard, step keys, or INSTR PRESET. Registers 8 and 9 store the two instrument calibration states.

To lock the save registers press (SHIFT) (SAVE) (KS( ). To unlock the save registers, press (SHIFT) (RECALL) (KS)).

Instrument state information stored in registers 0 through 7 is retained in memory for approximately 1 year in STANDBY mode or after line power is removed and analyzer is stored between 20°C and 30°C.

Remote Operation

The standard HP 8566B operates on the Hewlett-Packard Interface Bus (HP-IB). All analyzer control settings (with the exception of VIDEO TRIGGER LEVEL, FOCUS, ALIGN, INTENSITY, FREQ ZERO, AMPTD CAL, and LINE power) are remotely programmable. Function values, marker frequency/amplitude, and A/B traces may be output; CRT labels and graphics may be input.

LCL: Returns analyzer to local control, if not locked out by controller.

Service Request: (SHIFT) (LIN) (KSr) calls an HP-IB request for service.

5

Operation Verification

What You'll Find in This Chapter

This chapter describes the HP 8566A/B Operation Verification Software and how to use it to verify spectrum analyzer operation.

Test System Configuration 5-4
Equipment Connections 5-5
Program Loading 5-6
Program Operation 5-7
HP-IB Addresses 5-9
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Operation Verification is automatic performance test software designed to give a high confidence level in the operation of the HP 8566A/B Spectrum Analyzer in a reasonable time. It performs 80% to 85% of the manual performance tests in approximately 60 minutes and is designed to test an instrument operating within a temperature range of 20° to 30° C. Refer to Table 5-1 for a list of tests performed.

If an HP 8566A/B passes all Operation Verification Tests, be assured that the spectrum analyzer is performing within the specifications indicated in each test. These specifications are representative of the specifications listed in Chapter 3. Refer to Chapter 3 for the actual specifications. If a test does not pass, its related manual performance test needs to be run. Related manual performance test are located in the *HP 8566A/B Performance Tests and Adjustments Manual.*

The HP 8566A/B Operation Verification software automates the majority of the manual performance tests for performance verification. Table 5-2 lists the manual performance tests that are not included in the automated Operation Verification software.

Note The validity of the measurements in the Operation Verification program is based in part on the accuracy of the test equipment used to perform the test. Therefore, proper calibration of the test equipment must be verified before instrument operation can be checked using the Operation Verification program.

Note Measurement uncertainties may cause the Operation Verification program to indicate that an instrument specification is out of tolerance, even though the Performance Test in the Tests and Adjustments Manual indicates it to be within tolerance. In this event, the Performance Test Data is to be considered more valid.

Note The Option 462 6 dB Bandwidth instrument shares the same Operation Verification software as the Option 462 Impluse Bandwidth instrument. When testing the 6 dB version, Test 6 Impulse and Resolution Bandwidths must not be performed and the following manual tests must be performed:

- 6 dB Resolution Bandwidth Accuracy Test
- 6 dB Resolution Bandwidth Selectivity Test

The manual tests are located in the *HP 85668 Performance Tests and Adjustments Manual.*

Table 5-1. Tests Performed

Test Number and Name	Equipment Required
1. Input Attenuator Switching Check	HP 3335A
2. IF Gain Uncertainty	HP 3335A
3. Scale Fidelity (Log)	HP 3335A
4. Scale Fidelity (Linear)	HP 3335A
5. Log Scale Switching Uncertainty	HP 3335A
6. Resolution Bandwidths	none
6. Impulse and Resolution Bandwidths (Option 462 Impulse Bandwidth)*	HP 8112A or HP 8116A HP 3335A
7. Line-Related Sidebands	none
8. Average Noise Level	HP 909A, Option 012
9. Residual Responses	HP 909A, Option 012
10. Sweep + Tune Out Accuracy	HP 3456A or HP 3455A
11. Second Harmonic Distortion	HP 3335A 50 MHz Low Pass Filter
12. Frequency Span Accuracy	HP 83640A† APC 3.5 Low-Loss Microwave Cable HP part number 8120-4921

Table 5-1. Tests Performed (continued)

Test Number and Name	Equipment Required
13. Gain Compression	HP 83640A†
	HP 8902A or HP 436A or HP 438A
	HP 8485A or HP 8481A
	HP 11667B or HP 11667A
	APC 3.5 Low-Loss Microwave Cable HP part number 8120-4921
14. Frequency Response	HP 3335A
	HP 83640A†
	HP 8902A or HP 436A or HP 438A
	HP 8485A or HP 8481A‡
	HP 11667B or HP 11667A‡
	APC 3.5 Low-Loss Microwave Cable HP part number 8120-4921
15. Third Order Intermodulation	HP 3335A
	HP 83640A†
	HP 8721A
	APC 3.5 Low-Loss Microwave Cable HP part number 8120-4921
	50 MHz Low Pass Filters
16. Cal Output Amplitude Accuracy	HP 8902A or HP 436A or HP 438A
	HP 8485A or HP 8481A
17. First LO Output Power	HP 8902A or HP 436A or HP 438A
	HP 8485A or HP 8481A

'Option 462 6 dB Bandwidth instruments must be manually tested. See note.
† Alternate sources are : HP 83620A, HP 83623A, HP 83650A, HP 8340A/B, and HP 8341A/B. (Frequency Response testing is limited by the frequency range of the source)
‡ Testing limited to 18.0 GHz with HP 8481A and HP 11667A.

Table 5-2. Tests Not Performed

Center Frequency Readout Accuracy Test
Sweep Time Accuracy Test
Noise Sidebands Test
Harmonic and Intermodulation Distortion Test
Image, Multiple, and Out-of-Band Responses Test
Fast Sweep Time Accuracy Test (<20 ms)
Frequency Reference Error Test

Table 5-3. Equipment Summary

HP Fart Number	Equipment
HP 9000 Series 200 or HP 9000 Series 300	Computer*
HP 3335A	Frequency Synthesizer
HP 3455A or HP 3456A	System DVM
HP 83640A†	Synthesized Sweeper
HP 8902A	Measuring Receiver
or HP 436A or HP 438A	Power Meter
HP 8485A or HP 8481A‡	Power Sensor
HP 8112A or HP 8116A§	Pulse Generator
HP 909A Option 012	50 Ohm Termination
HP 8721A	Coaxial Directional Bridge
HP 11667B or HP 11667A‡	Power Splitter
HP part number 0955-0306	50 MHz Low Pass Filter (2 needed)
HP part number 8120-4921	APC 3.5 Low-Loss Microwave Test Cable
HP-IB Printer	
Miscellaneous Cables and Adapters	

'HP 98624A HP-IB Interface is needed for dual-bus systems. 300K of free memory is required for the test program.

† Alternate sources are HP 83620A, HP 83623A, HP 83650A, HP 8340A/B, and HP 8341A/B. (Testing limited by the frequency range of the source.)

‡ Testing limited to 18.0 GHz with HP 11667A and HP 8481A.

§ Required to test Option 462 Impulse Bandwidth.

Test System Configuration

The HP 8566A/B Operation Verification program requires an HP 9000 Series 200 or HP 9000 Series 300 Computer with HP BASIC 2.0 and Extensions 2.1 or BASIC 3.0 or higher. An HP 362 or HP 382 can also be used and requires BASIC 6.2 or higher. The program operates on either a single or dual HP-IB computer system. For a dual bus system it is also necessary to have an HP 98624A HP-IB Interface to connect the HP 8566A/B to the computer separately from the test equipment.

The Operation Verification software is designed for optimum operation with a dual bus system. The dual bus system is used with the Microwave Test Set (MTS). In this configuration, the bus for the test equipment has a select code of 7, while the bus for the instrument under test has a select code of 8. The software will adapt itself to a single bus system if an HP 98624A HP-IB Interface at select code 8 is not present.

The equipment needed to perform the HP 8566A/B Operation Verification is listed in both Table 5-l and Table 5-3. Table 5-l includes a test-by-test listing of the equipment needed, and Table 5-3 includes a test equipment summary. To obtain a permanent record of the test results an HP-IB printer is required. The HP 8566A/B CRT display may be selected to display the test results if a permanent test record is not desired.

Note

A change of the results for each test is expected over a period of time; therefore, Hewlett-Packard warrants only the specification range and not the repeatability of the data for any given specification.

Equipment Connections

For a dual bus system, connect the test equipment to the computer as shown in Figure 5-l. The instrument under test is connected separately to the HP 98624A Interface card. For a single bus system, connect the test equipment and instrument under test to the computer as shown in Figure 5-2.

Turn the HP 8566A/B (LINE) switch on and allow a 2 hour warm-up. Also, allow sufficient warm-up time for the other test equipment as indicated in the individual operating and service manuals.

Note

When connecting signals from the synthesized sweeper to the test setup, it is necessary to use a microwave test cable with minimum attenuation to 22 GHz.

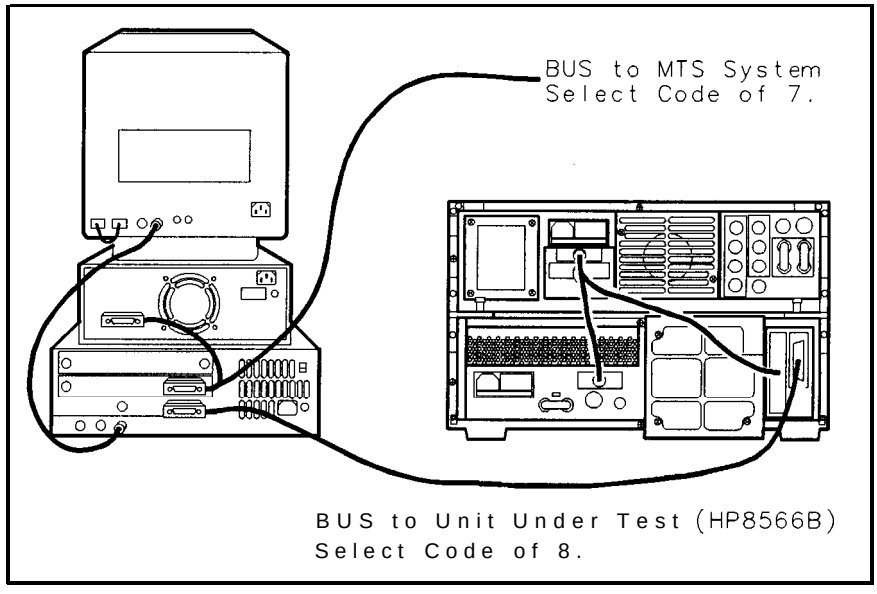


Figure 5-1. Dual Bus (MTS) System Connection

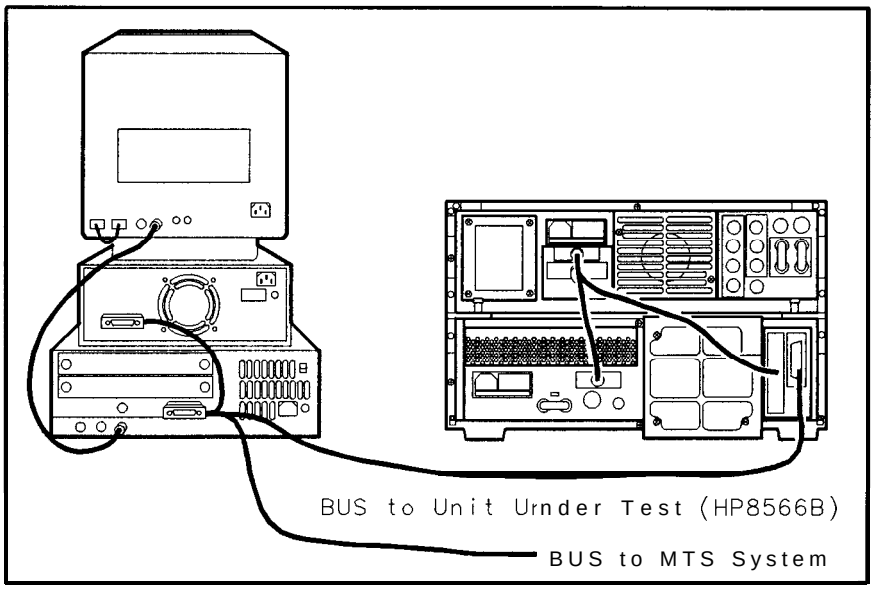


Figure 5-2. Single Bus System Connection

Program Loading

To load and run the HP 8566A/B Operation Verification program, one of the following HP BASIC Language Systems is required:

- BASIC 2.0 with Extensions 2.1
- BASIC 3.0 or higher including the following binaries:
  - •I MAT
  - □ IO
  - •I GRAPH
  - •I HPIB
  - •I ERR (not required but recommended)
- BASIC 6.2 or higher must be installed in the HP 362/382

For additional computer configuration instructions, refer to the Installation Reference Manual included with the HP BASIC Language System.

The HP 8566A/B Operation Verification program stores configuration and power sensor calibration data in files on the floppy disk. Inspect the floppy disk to verify that it is not write-protected, and insert it into the appropriate disk drive. Then type:

```
LOAD "VERIFY_66", 1
```

Press (EXECUTE) on HP 9000 Series 200 computers, or (RETURN) on HP 9000 Series 300 computers, to load and run the program.

Program Operation

The Operation Verification program uses the HP 8566A/B display to display program options and status, and allows the user to select options using the spectrum analyzer keyboard. The first few displays provide the user with selection menus for configuring the software to the available test equipment.

After the program name and revision is displayed for several seconds, the LIST OF DEFAULTS display appears, providing the user with a selection menu. At this point in the program, the user must enter the HP model numbers and HP-IB addresses of the test equipment that will be used, as well as the local ac power line frequency. lb change one of the entries, position the pointer using the frontpanel knob and press (Hz). Then, enter the appropriate HP-IB address, serial number, line frequency, or one of the valid model numbers listed in Table 5-4. It is sometimes desirable to perform specific Operation Verification tests without the full set of test equipment listed in Table 5-4. For example, several of the tests can be performed with no test equipment by using the spectrum analyzer CAL OUTPUT signal as an input signal. If an item of test equipment is not available, it is not necessary to change the corresponding default entries in the LIST OF DEFAULTS display. From the LIST OF DEFAULTS display, the user may proceed with the program by pressing (Hz). However, a valid power sensor calibration data file must exist on the software disk before the program will proceed with testing. If such a file does not exist, the program will prompt the user to enter calibration data through the computer keyboard. The sensor calibration data is then stored on the software disk. An existing power sensor calibration data file may be reviewed or modified by reentering the power sensor serial number in the LIST OF DEFAULTS display.

After the LIST OF DEFAULTS display, the next display allows the user to select whether the test results will be printed out or displayed on the spectrum analyzer CRT.

Next, the program checks to verify that each piece of test equipment responds at its designated HP-IB address. The user is prompted with a list of test equipment that does and does not respond, and is offered the choice of continuing with the program, repeating the equipment check, or returning to the LIST OF DEFAULTS display to change HP-IB addresses. The program will automatically limit the number of tests that can be performed, based on this list of available test equipment.

If the user chooses to proceed by pressing (Hz), the program attempts to measure the spectrum analyzer CAL OUTPUT signal, and prompts the user to connect the CAL OUTPUT to the RF INPUT and adjust the front-panel AMPTD CAL and FREQ ZERO controls as appropriate.

Refer to Figure 5-3 for the location of the AMPTD CAL and FREQ ZERO controls. Once these adjustments are within tolerance, the program activates the spectrum analyzer error correction (KSW) routine.

Once the error correction routine has completed, a test summary is displayed on both the computer and the spectrum analyzer. Both test summaries provide a status report on test progress. In addition, the test summary displayed on the spectrum analyzer provides the user with a selection menu of individual tests. The user enters the number

of the desired test, followed by (Hz) to perform the test one time, or (kHz) to perform the test repetitively. If the user selects "All Tests" (selection 0), the program will run each of the tests in sequence, skipping those tests that cannot be performed with the available test equipment.

Test results are printed or displayed at the completion of each individual test. Once a particular test is completed, the test summary displays are updated to reflect whether the test passed.

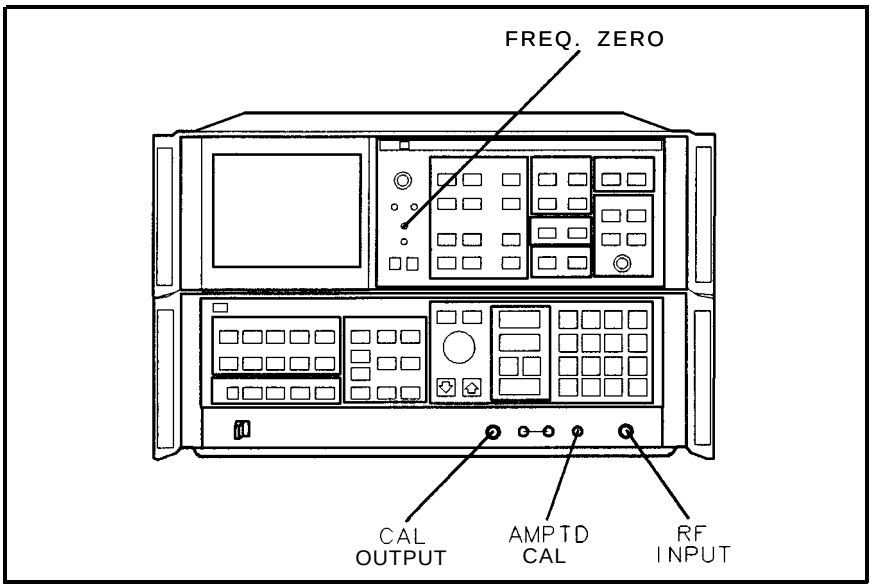


Figure 5-3. RF Input and Calibration Controls

HP-IB Addresses

Table 5-4 lists the default assigned addresses and test equipment. For dual bus systems, the select code for the test equipment is 7 and the select code for the instrument under test is 8. (The address for the HP 8566A/B under test is 818.) In single bus systems, the select code for the test equipment is 7 and the select code for the instrument under test is 7.

Table 5-4. HP-IB Addresses

Equipment	HP Model	Address
Frequency Synthesizer	HP 3335A	04
Pulse Generator'	HP 8112A or HP 8116A	16
System DVM	HP 3455 or HP 3456A	22
Synthesized Sweeper	HP 8340A/B	19
Measuring Receiver	HP 8902A	14
HP-IB Printer		01

1 Required to test Option 462 Impulse Bandwidth.

Error Messages

Self-explanatory error messages are incorporated into the Operation Verification program to assist you in identifying errors.

Test Descriptions

The following test descriptions list the Specifications, Related Performance Test, and Test Description for each test performed by the Operation Verification program. The specifications listed below are those of each Operation Verification test and are uncorrected (where applicable). Operation Verification is designed to test an instrument operating within a temperature range of 20°C to 30°C.

1. Input Attenuator Switching Check

Specification None

Related Performance Test: None

Description: This is included as an aid to verify operation only and to assist in troubleshooting.

A signal source of known amplitude is connected to the spectrum analyzer and the analyzer is adjusted for a reference. The input attenuator is stepped down from 10 dB to 70 dB, while the reference level and the signal source are stepped up. This maintains the signal peak at the same approximate location on the display. The amplitude of the signal is measured at each step using the marker function on the spectrum analyzer.

2. IF Gain Uncertainty

Specification

0.0 dBm to -55.9 dBm; f0.6 dB

-56.0 dBm to -129.9 dBm; fl.O dB

Related Performance Test

IF Gain Uncertainty Test

Description

A signal source of known amplitude is connected to the spectrum analyzer and the analyzer is adjusted for a reference level. The amplitude of the signal peak is measured in 0.1 dB steps from -0.1 dB to -1.9 dB, in 2 dB steps from -1.9 dB to -9.9 dB, and in 10 steps from -10 dB to -120 dB.

3. Scale Fidelity (Log)

Specification

≤ ± 1 .O dB max over 0 to 80 dB display

≤ f1.5 dB max over 0 to 90 dB display

Related Performance Test

Scale Fidelity Test

Description

The specification listed is for cumulative error. Only cumulative error is measured in this procedure.

A signal source of known amplitude is connected to the spectrum analyzer and the analyzer is adjusted for a reference. The signal source is stepped down in 1 dB steps and the displayed signal amplitude on the spectrum analyzer is measured at each step. This measurement is performed in both the 3 kHz and 300 kHz bandwidths,

4. Scale Fidelity (Linear)

Specification ± 3% of Reference Level

Related Performance Test: Scale Fidelity Test

Description: A signal source of known amplitude is connected to the spectrum analyzer and the analyzer is adjusted for a reference. The signal source is stepped down from -10 dB to -30 dB in 10 dB steps, and the amplitude of the displayed signal is measured using the marker function. This measured value is used to calculate the percent error from the established reference level.

5. Log Scale Switching Uncertainty

Specification ±0.5 dB (uncorrected)

Related Performance Test Log Switching Uncertainty Test

Description A signal source of known amplitude is connected to the spectrum analyzer and the analyzer is adjusted for a reference in the 1 dB per division log scale. The spectrum analyzer is then switched to each of the other LOG scales (2 dB, 5 dB, and 10 dB) and the LINEAR scale. The amplitude of the signal peak is measured at each setting.

6. Resolution Bandwidths

Note This procedure is only for instruments that do not have Option 462. For Option 462 instruments, perform the test on the following page.

Specification

Bandwidth	10 Hz to 3 MHz; ±20% 3 kHz to 1 MHz; ±10%
Amplitude	3 MHz to 10 Hz; ±1.0 dB 1 MHz to 30 Hz; ±0.5 dB 30 Hz; ±0.8 dB 10 Hz; f2.0 dB
Selectivity	(60 dB/3 dB Ratio) 3 MHz to 100 kHz; <15:1 30 kHz to 10 kHz; <13:1 3 kHz to 30 Hz; <11:1 10 Hz; <100 Hz separation of 60 dB points

Related Performance Tests

Resolution Bandwidth Accuracy Test

Resolution Bandwidth Selectivity Test

Resolution Bandwidth Switching Uncertainty Test

Description

A signal source is connected to the spectrum analyzer input. The analyzer steps through the bandwidths from 3 MHz to 10 Hz, centers the signal, sets signal peak near the reference level, and measures the frequency of the 3 dB points for each bandwidth. The 3 dB bandwidth is then calculated by determining the difference in frequency between the 3 dB points.

Next the spectrum analyzer steps through the bandwidths and measures the frequency of the 60 dB points of each bandwidth. The 60 dB bandwidth is then calculated by determining the frequency difference between the 60 dB points.

The shape factors are calculated by dividing the 60 dB bandwidths by the 3 dB bandwidths.

6. Impulse and Resolution Bandwidths (Option 462 Impulse Bandwidth)

Note This test is for Option 462 instruments only. For standard instruments, perform the test on the preceding page.

Specification

Bandwidth	3 MHz; ±20% 1 MHz to 1 kHz; ±20% 300 Hz to 10 Hz; +50%, -0%
Amplitude	3 MHz; fl.O dB 1 MHz to 100 Hz; f0.5 dB 30 Hz; ±0.8 dB 10 Hz; f2.0 dB
Selectivity	(60 dB/6 dB Ratio) 3 MHz to 100 kHz; <11:1 30 kHz to 30 kHz; <8:1 10 Hz; <100 Hz separation of 60 dB points

Related Performance Tests

Impulse & Resolution Bandwidth Accuracy Test

Impulse & Resolution Bandwidth Selectivity Test

Impulse & Resolution Bandwidth Switching Uncertainty Test

Description

A source outputting pulsed RF signals is connected to the spectrum analyzer input. The analyzer steps through the bandwidths from 3 MHz to 1 kHz, and the controller measures the frequency of the impulse response for each bandwidth. Next, a CW signal is connected to the spectrum analyzer input. The analyzer steps through all bandwidths from 3 MHz to 10 Hz, centers the signal, sets the signal peak near the reference level, and measures the frequency of the 6 dB points for each bandwidth. The 6 dB bandwidth is then calculated by determining the difference in frequency between the 6 dB points.

Last, the analyzer steps through the bandwidths and measures the 60 dB points for each bandwidth. The 60 dB bandwidth is calculated for each bandwidth. The selectivity of each bandwidth is then calculated by dividing the 60 dB bandwidth by the 6 dB bandwidth for each filter.

7. Line Related Sidebands

Specification

Line Frequency	Offset from Carrier	Sideband Level
60 Hz	<360 Hz	**-70** dBc
400 Hz	<2 **kHz**	**-55** dBc

Related Performance Test

Line Related Sidebands Test

Description

A signal source is connected to the spectrum analyzer input and the necessary front-panel control settings made for the test. The test calculates line frequency harmonics, sets the front-panel controls in order to view the frequencies, and measures the amplitude of the signal at each of the frequencies.

8. Average Noise Level

Specification

Level	Tuning Range
Non-Preselected	
<−95 dBm	100 Hz to 50 kHz
<−112 dBm	50 kHz to 1.0 MHz
<−134 dBm	1.0 MHz to 2.5 GHz
Preselected	
<−132 dBm	2.0 GHz to 5.8 GHz
<−125 dBm	5.8 GHz to 12.5 GHz
<−119 dBm	12.5 GHz to 18.6 GHz
<−114 dBm	18.6 GHz to 22.0 GHz

Related Performance Test

Average Noise Level

Description

The RF INPUT of the spectrum analyzer is terminated with a 50 ohm load or the synthesizer. The necessary front-panel control settings are made and the average noise level measured at four non-preselected and four preselected frequencies.

9. Residual Responses

Specification

-100 dBm	100 Hz to 5.8 GHz
-95 dBm	5.8 Hz to 12.5 GHz
-85 dBm	12.5 GHz to 18.6 GHz
–80 dBm	18.6 GHz to 22.0 GHz

Related Performance Test

Residual Responses Test

Description

The RF INPUT of the spectrum analyzer is terminated with a 50 ohm load or the synthesizer. The peak amplitude of the noise or responses is measured at various frequencies associated with residual responses caused by harmonics and mixing products of the first, second, and third local oscillator; the internal reference; and the HP-IB and digital storage clocks.

10. Sweep + Tune Out Accuracy

Specification	-1 V/GHz ±2% ±10 mv
Related Performance Test	Sweep + Tune Out Accuracy Test
Description	A digital voltmeter is used to monitor the rear-panel SWEEP + TUNE OUT voltage while the spectrum analyzer center frequency is set to nine arbitrary values. The output voltage for each center frequency setting is checked against the specification.

11. Second Harmonic Distortion

Specification

For mixer level ≤ -40 dBm:

< -70 dBc, 100 Hz to 2.5 GHz (non-preselected)

Related Performance Test

Harmonic and Intermodulation Distortion

Description

A 40 MHz signal is applied to the analyzer RF INPUT through a 50 MHz low pass filter. The spectrum analyzer is adjusted to measure the second harmonic at 80 MHz.

12. Frequency Span Accuracy

Specification

Where N is the harmonic mixing number:

For span/N >5 MHz; +3% of indicated frequency separation
For span/N ≤5 MHz; ±1% of indicated frequency separation

Related Performance Test

Frequency Span Accuracy

Description

A stable signal source is connected to the spectrum analyzer. The center frequency and span are set to measure spans from 100 kHz to 10 GHz in a 1, 2, 5 sequence.

13. Gain Compression

Specification

<1.0 dB, 100 Hz to 22 GHz with ≤−5 dBm at input mixer

Related Performance Test

Gain Compression Test

Description

Gain compression is measured by changing the power level at the input mixer from -15 dBm to -5 dBm and measuring the change in display level using the spectrum analyzer marker function. This is done at two frequencies: 100 MHz and 2.2 GHz to check both the first mixer and YIG-tuned mixer, respectively.

14. Frequency Response

Specification

Center Frequency	Flatness
Non-Preselected Band	
200 Hz to 2.5 GHz	±0.6 dB (1.2 dB)
Preselected band	
2.0 GHz to 5.8 GHz	f1.7 dB (3.4 dB)
5.8 GHz to 12.5 GHz	f1.7 dB (3.4 dB)
2.5 GHz to 18.6 GHz	f2.2 dB (4.4 dB)
18.6 GHz to 20.0 GHz	f2.2 dB (4.4 dB)
20.0 GHz to 22.0 GHz	f3.0 dB (6.0 dB)
Cumulative Flatness	
200 Hz to 22.0 GHz	6.0 dB

Related Performance Test

Frequency Response Test

Description

If this test is individually selected, a menu of the testable bands is displayed. For all bands, the test consists of 100 data points taken across the selected band. For the 200 Hz to 22 GHz test, six bands are tested (600 data points). First the sweeper is used to test from 20 MHz to 22 GHz, and then the synthesizer is used to test from 200 Hz to 20 MHz. The levels at 20 MHz are matched to guarantee continuity. If the Frequency Response test is entered from the ALL TESTS Mode, then the 200 Hz to 22 GHz is selected automatically.

15. Third Order Intermodulation Distortion

Specification

Intercept is greater than +7.0 dBm from 5 MHz to 5.8 GHz

Related Performance Test

Harmonic and Intermodulation Distortion Test

Description

Two signals with 1 MHz separation are applied to the first mixer. The frequencies of third order intermodulation products are calculated and the spectrum analyzer is set to measure the amplitude of these responses. The third order intercept is calculated from the measurements.

16. Calibrator Output Amplitude Accuracy

Specification	+10 dBm f0.3 dB
Related Performance Test	Calibrator Amplitude Accuracy Test
Description	The power sensor is connected to the spectrum analyzer CAL OUTPUT and the power is measured.

17. First LO Output Power

Specification Greater than +8 dBm

Related Performance Test 1ST LO Output Amplitude

Description The power sensor is connected to the spectrum analyzer 1ST LO OUTPUT and the output power is measured as the LO is stepped from 2.3 GHz to 6.2 GHz in 100 MHz steps.

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