

About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual is the best copy we could find; it may be incomplete or contain dated information. If we find a more recent copy in the future, we will add it to the Agilent website.

Support for Your Product

Agilent no longer sells this product. Our service centers may be able to perform calibration and repair if necessary, but no other support from Agilent is available. You will find any other available product information on the Agilent Test & Measurement website, www.tm.agilent.com.

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.

HP 83621B/31B/51B Synthesized Sweeper

Service Guide

SERIAL NUMBERS

This manual applies to any instrument with the following model number and serial number prefix combinations. You may have to modify this manual so that it applies directly to your instrument version. Refer to the “Instrument History” chapter.

HP 83621B/31B
3614A

HP 83651B
3614A



HP Part No. 08360-90137
Printed in USA May 1998

Notice

The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Restricted Rights Legend

Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights of Technical Data and Computer Software clause at DFARS 252.227-7013 for DOD agencies, and subparagraphs (c) (1) and (c) (2) of the Commercial Computer Software Restricted Rights clause at FAR 52.227-19 for other agencies.

Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Hewlett-Packard. Buyer shall prepay shipping charges to Hewlett-Packard and Hewlett-Packard shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Hewlett-Packard from another country.

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

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

NO OTHER WARRANTY IS EXPRESSED OR IMPLIED. HEWLETT-PACKARD SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES

THE REMEDIES PROVIDED HEREIN ARE BUYER'S SOLE AND EXCLUSIVE REMEDIES. HEWLETT-PACKARD SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, TORT, OR ANY OTHER LEGAL THEORY.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products. For any assistance, contact your nearest Hewlett-Packard Sales and Service Office.

© Copyright Hewlett-Packard Company 1996

All Rights Reserved. Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.
1400 Fountaingrove Parkway, Santa Rosa CA, 95403-1799, USA

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.

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 <i>not</i> proceed beyond a warning note until the indicated conditions are fully understood and met.
----------------	---

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

General Safety Considerations

- WARNING**
- These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.
 - The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.
 - The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch.
 - The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.
 - This is a Safety Class I product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside the instrument, is likely to make the instrument dangerous. Intentional interruption is prohibited.
 - For continued protection against fire hazard replace line fuse only with same type and rating (F 5A/250V). The use of other fuses or material is prohibited.
-

CAUTION

- Always use the three-prong ac power cord supplied with this instrument. Failure to ensure adequate earth grounding by not using this cord may cause instrument damage.
 - Before switching on this product, make sure that the line voltage selector switch is set to the voltage of the power supply and the correct fuse is installed. Assure the supply voltage is in the specified range.
 - This product is designed for use in Installation Category II and Pollution Degree 2 per IEC 1010 and 664 respectively.
 - **Ventilation Requirements:** When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4 °C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.
-

Before Applying Power

Verify that the product is configured to match the available main power source per the input power configuration instructions provided in this manual.

If this product is to be energized via an autotransformer make sure the common terminal is connected to the neutral (grounded side of the mains supply).

Preface

The HP 83621B/31B/51B Synthesized Sweepers

The HP 83621B/31B/51B synthesized sweepers are high performance, broadband frequency synthesizers that operate from 0.045 to 20 GHz, 26.5 GHz, and 50 GHz respectively. The figure below shows the front view of the HP 83631B synthesized sweeper.

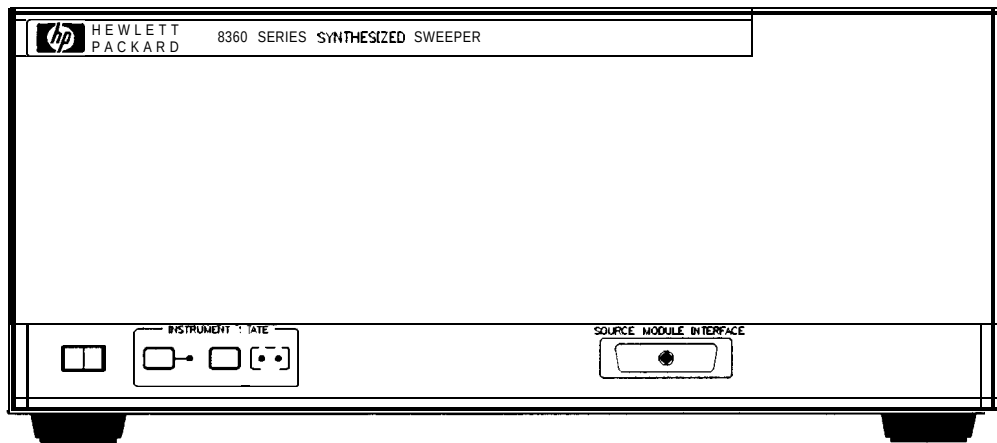


Figure O-1. HP 838318 Synthesized Sweeper

These three synthesized sweepers are part of the HP 8360 series product family, which includes synthesizers having many different configurations. As compared to the main HP 8360 B-Series product family, the HP 83621B/31B/51B synthesized sweepers feature:

- Limited specifications.
- A “blank” front panel.
- Rear panel RF output.
- No options.

Applications and Compatibility

The HP 83621B/31B/51B synthesized sweepers are specialized for use with HP 8510 network analyzer systems. The differences between these synthesizers and the other sources in their product family are important to the specialized applications intended for these synthesizers.

Limited specifications allow for quick performance testing at the customer site, while at the same time include all specifications required of a synthesized source used in an HP 8510 network analyzer system.

A “*blank*” *front panel* reduces instrument cost and is not required when the synthesized sweeper is operated in an HP 8510 network analyzer system. For performance tests, adjustments, and, troubleshooting, front panel emulation software is included with each synthesized sweeper. When run on an HP 200/300 series controller, the front panel emulator will access the full feature set of the synthesized sweeper.

Rear panel RF output is preferred for convenient RF connections in HP 8510 network analyzer systems.

No options are offered because HP 8510 network analyzer systems do not require the special features sometimes desirable with stand-alone synthesized sources. This also reduces instrument cost.

All HP 8510 systems must have firmware revision 4.0 or greater for compatibility with the HP 83621B/31B/51B synthesized sweepers. Revision 6.0 or greater is required to implement all capabilities (such as Quick Step). Refer to the HP 8510 system documentation for specifics.

Manual Conventions

<u>Front-Panel Key</u>	This represents a key physically located on the instrument.
Softkey	This indicates a “softkey,” a key whose label is determined by the firmware of the instrument.
Screen Text	This indicates text displayed on the instrument’s screen.

Instruments Covered By This Manual

This manual applies to instruments having a serial number prefix listed on the title page (behind the “Documentation Map” tab). Some changes may have to be made to this manual so that it applies directly to each instrument; refer to Chapter 13, “Instrument History,” to see what changes may apply to your instrument.

A serial number label is attached to the instrument’s rear panel. A prefix (four digits followed by a letter), and a suffix (five digits unique to each instrument), comprise the instrument serial number.

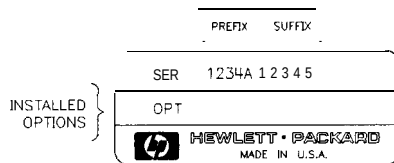


Figure O-2. Typical Serial Number Label

HP 8360 B-Series Documentation

Documentation Map

For a pictorial representation of this manual, refer the “*Documentation Map*” at the front of this manual.

Ordering Manuals

A manual part number is listed on the title page of this manual. You may use it to order extra copies of this manual. See Chapter 9, “Replaceable Parts” for a complete list of HP 8360 B-Series documentation and ordering numbers.

Regulatory Information

Compliance

This product has been designed and tested in accordance with IEC Publication 1010, Safety Requirements for Electronic Measuring Apparatus, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Manufacturer's Declaration

Note

This is to certify that this product meets the radio frequency interference requirements of Directive FTZ 1046/1984. The German Bundespost has been notified that this equipment was put into circulation and has been granted the right to check the product type for compliance with these requirements.

Note: If test and measurement equipment is operated with unshielded cables and/or used for measurements on open set-ups, the user must insure that under these operating conditions, the radio frequency interference limits are met at the border of his premises.

Model HP 83621B/31B/51B Synthesized Sweeper

Note

Hiermit wird bescheinigt, dass dieses Gerät/System in Übereinstimmung mit den Bestimmungen von Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Zustzinformation für Mess-und Testgeräte:

Werden Mess- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Messaufbauten verwendet, so ist vom Betreiber sicherzustellen, dass die Funk-Entstörbestimmungen unter Betriebsbedingungen an seiner Grundstücksgrenze eingehalten werden.

Notice for Germany: Noise Declaration

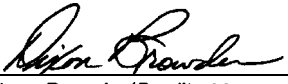
$L_{pA} < 70 \text{ dB}$

am Arbeitsplatz (operator position)

normaler Betrieb (normal position)

nach DIN 45635 T. 19 (per ISO 7779)

Declaration of Conformity

DECLARATION OF CONFORMITY <i>according to ISO/IEC Guide 22 and EN 45014</i>	
Manufacturer's Name:	<i>Hewlett-Packard Co.</i>
Manufacturer's Address:	<i>Microwave Instruments Division 1400 Fountaingrove Parkway Santa Rosa, CA 95403- 1799 USA</i>
declares that the product	
Product Name:	<i>Synthesized Sweeper</i>
Model Numbers:	<i>HP 836218, HP 836318, HP 836518</i>
Product Options:	<i>This declaration covers all options of the above products.</i>
conforms to the following Product specifications:	
<i>Safety: IEC 348:1978/HD 401 S1:1981 CAN/CSA-C22.2 No. 23.1 (Series M-89)</i>	
<i>EMC: CISPR 11:1990/EN 5501 1:1991 Group 1, Class A IEC 801-2:1984/EN 50082-1:1992 4 kV CD, 8 kV AD IEC 801-3:1984/EN 50082-1:1992 3 V/m, 27-500 MHz IEC 801-4:1988/EN 50082-1:1992 0.5 kV Sig. Lines, 1 kV Power Lines IEC 555-2:1982 + A1:1985 / EN 60555-2:1987 IEC 555-3:1982 + A1:1990 / EN 60555-3:1987 + A1:1991</i>	
Supplementary Information:	
<i>The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.</i>	
<i>Product safety qualification testing for these products was performed prior to 1 December 1993.</i>	
Santa Rosa, California, USA	<i>4 March 1996</i>
	 Dixon Browder/Quality Manager
<i>European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE, Herrenberger Strasse 130, D-71034 Böblingen, Germany (FAX +49-7031-14-3143)</i>	

Instrument Markings



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



The CE mark is a registered trademark of the European Community.



The CSA mark is a registered trademark of the Canadian Standards Association.

“ISM1-A”

This is a symbol of an Industrial Scientific and Medical Group 1 Class A product.



This is an ON symbol. The symbol ON is used to mark the position of the instrument power line switch.



This is an ON symbol. The symbol ON is used to mark the position of the instrument power line switch.



This is a STANDBY symbol. The STANDBY symbol is used to mark the position of the instrument power line switch.



This is an OFF symbol. The OFF symbol is used to mark the position of the instrument power line switch.



This is an AC symbol. The AC symbol is used to indicate the required nature of the line module input power.

Sales and Service Offices

Hewlett-Packard Sales and Service Offices

US FIELD OPERATIONS		
Headquarters Hewlett-Packard Co. 19320 Pruneridge Ave. Cupertino, CA 95014 (800) 752-0900	California, Northern Hewlett-Packard Co. 301 E. Evelyn Mountain View, CA 94041 (415) 694-2000	California, Southern Hewlett-Packard Co. 1421 South Manhattan Ave. Fullerton, CA 92631 (714) 999-6700
Colorado Hewlett-Packard Co. 24 Inverness Place, East Englewood, CO 80112 (303) 649-5512	Georgia Hewlett-Packard Co. 2124 Barrett Park Drive Kennesaw, GA 30144 (404) 648-0000	Illinois Hewlett-Packard Co. 5201 Tollview Drive Rolling Meadows, IL 60008 (708) 255-9800
New Jersey Hewlett-Packard Co. 150 Green Pond Rd. Rockaway, NJ 07866 (201) 586-5400	Texas Hewlett-Packard Co. 930 E. Campbell Rd. Richardson, TX 75081 (214) 231-6101	
EUROPEAN FIELD OPERATIONS		
Headquarters Hewlett-Packard S.A. 150, Route du Nant-d'Avril 1217 Meyrin 2/Geneva Switzerland (41 22) 780.8111	France Hewlett-Packard France 1 Avenue Du Canada Zone D'Activite De Courtaboeuf F-91947 Les Ulis Cedex France (33 1) 69 82 60 60	Germany Hewlett-Packard GmbH Hewlett-Packard Strasse 61352 Bad Homburg v.d.H Germany (49 6172) 16-0
Great Britain Hewlett-Packard Ltd. Eskdale Road, Winnersh Triangle Wokingham, Berkshire RG41 5DZ England (44 734) 696622		

Hewlett-Packard Sales and Service Offices (continued)

INTERCON FIELD OPERATIONS		
Headquarters Hewlett-Packard Company 3495 Deer Creek Road Palo Alto, California, USA 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 Tram-Canada Highway Kirkland, Quebec H9J 2X8 Canada (514) 697-4232
China China Hewlett-Packard Company 38 Bei San Huan XI Road Shuang Yu Shu Hai Dian District Beijing, China (86 1) 256-6888	Japan Hewlett-Packard Japan, Ltd. 1-27-15 Yabe, Sagamihara Kanagawa 229, Japan (81 427) 59-1311	Singapore Hewlett-Packard Singapore (Pte.) Ltd. 150 Beach Road #29-00 Gateway West Singapore 0718 (65) 291-9088
Taiwan Hewlett-Packard Taiwan 8th Floor, H-P Building 337 Fu Hsing North Road Taipei, Taiwan (886 2) 712-0404		

Contents

1. Equipment Required

2. Performance Tests

List of Tests	2-1
How To Use This Chapter	2-1
Calibration Cycle	2-2
Front Panel Emulation Software	2-2
HP 8510C	2-3
Front Panel Emulator Kit	2-4
Computer-Run Software	2-4
Menu Maps	2-4
Equipment Required	2-4
Operation Verification	2-5
1. Self-tests	2-6
2. CW Frequency Accuracy	2-7
3. Maximum Leveled Power	2-7
Performance Tests	2-8
1. CW Frequency Accuracy	2-9
Description and Procedure	2-9
Related Adjustments	2-10
In Case of Difficulty	2-10
2. Maximum Leveled Power	2-11
Description and Procedure	2-11
Related Adjustments	2-13
In Case of Difficulty	2-13
3. Swept Frequency Accuracy	2-14
Description and Procedure	2-14
Display Calibration	2-16
Swept Frequency Accuracy Measurement	2-17
Related Adjustments	2-20

In Case of Difficulty	2-20
---------------------------------	------

3. Adjustments

List of Adjustments	3-1
How To Use This Chapter	3-2
Menu Maps	3-2
Equipment Required	3-2
Cautions And Warnings	3-3
1. 10 MHz Standard	3-4
Description and Procedure	3-4
Related Performance Tests	3-6
In Case of Difficulty	3-6
Accuracy Versus Adjustment Interval	3-7
An Alternate Method	3-8
2. Fractional-N VCO	3-9
Description and Procedure	3-9
Related Performance Tests	3-10
In Case of Difficulty	3-10
3. Fractional-N Reference and API Spurs	3-11
Description and Procedure	3-11
125 kHz Reference Spur Adjustment	3-12
API 1 Spur Adjustment	3-14
API 2 Spur Adjustment	3-14
Related Performance Tests	3-15
In Case of Difficulty	3-15
4. Sweep Ramp	3-16
Description and Procedure	3-16
Related Performance Tests	3-16
In Case of Difficulty	3-16
5. Sampler Assembly	3-17
Description and Procedure	3-17
200 MHz Loop VCO Tune Check	3-18
Sampler Match Adjustment	3-19
200 MHz Loop Gain Adjustment	3-20
IF Gain Adjustment	3-20
Related Performance Tests	3-21
In Case of Difficulty	3-21
6. YO Driver +10V Reference	3-22

Description and Procedure	3-22
Related Performance Tests	3-23
In Case of Difficulty	3-23
7. YO Driver Gain and Linearity	3-24
Description and Procedure	3-24
Related Performance Tests	3-26
In Case of Difficulty	3-26
8. YO Loop Gain	3-27
Description and Procedure	3-27
Related Performance Tests	3-28
In Case of Difficulty	3-28
9. Amplifier/Multiplier Adjustments	3-29
Description	3-29
Adjustment Help	3-30
Offset and Gain Adjustments	3-30
Adjusting to the Center of the Passband	3-30
SRD Bias Adjustment	3-30
Single Band Delay Compensation Adjustments	3-31
Sweep Speed Related Adjustments	3-31
YTM Bandcross Delay Terms	3-31
General Techniques	3-31
Equipment Setup	3-32
YTM Gain Adjustment	3-38
Band 1 Adjustment	3-38
Band 2 Adjustment	3-39
Band 3 Adjustment	3-40
Band 4 Adjustment (HP 83631B/51B only)	3-42
Adjustment Check	3-43
Band 5 Adjustment (HP 83651B only)	3-44
Band 6 Adjustment (HP 83651B only)	3-45
Band 7 Adjustment (HP 83651B only)	3-46
YTM Single Band Adjustments	3-47
YTM Multi-band Adjustments	3-48
Related Performance Tests	3-51
In Case Of Difficulty	3-51
10. Amplifier/Filter Adjustments (HP 83651B Only)	3-52
Description	3-52
Adjustment Help	3-52

Offset and Gain Adjustments	3-52
Squegg Clamp Calibration Constants	3-53
Adjusting for the Center of the Passband	3-53
Single Band Delay Compensation Adjustments	3-53
Sweep Speed Related Adjustments	3-53
YTF Bandcross Delay Terms	3-54
Equipment Setup	3-54
Amplifier/Filter Offset and Gain Adjustment	3-59
Band 1 Adjustment	3-59
Band 2 Adjustment	3-62
Band 3 Adjustment	3-64
Band 4 Adjustment	3-67
Band 5 Adjustment	3-69
Band 6 Adjustment	3-70
Band 7 Adjustment	3-70
Auto Tracking Verification	3-71
YTF Single Band Adjustment	3-74
YTF Multi-Band Adjustment	3-77
Operation Check	3-79
Related Performance Tests	3-79
In Case Of Difficulty	3-79
11. Low Power SRD Bias	3-80
Description and Procedure	3-80
Related Performance Tests	3-81
In Case of Difficulty	3-81
12. Modulator Offset and Gain	3-82
Description and Procedure	3-82
Related Performance Tests	3-86
In Case of Difficulty	3-86
13. ALC Power Level Accuracy	3-87
Description and Procedure	3-87
Low Band ALC Power Accuracy Adjustment	3-89
High Band Power Accuracy Adjustment	3-91
Related Performance Tests	3-92
In Case of Difficulty	3-92

4. Calibration Constants

Introduction	4-1
Definition	4-2
Memory Areas	4-2
Working Data	4-2
Protected Data	4-2
Default Data	4-3
Checksum Verification	4-3
Calibration Constant Password	4-4
Entering a Password	4-4
Disabling a Password	4-5
Setting a Password	4-5
Bypassing the Password	4-6
Changing Working Data Calibration Constants	4-7
Saving Working Data Calibration Constants	4-8
Loading Protected Data Calibration Constants	4-9
Loading Default Data Calibration Constants	4-9
Calibration Constant Descriptions	4-10

5. Automated Tests

Introduction	5-1
Setting Up the System	5-2
Hardware Requirements	5-2
Operating System Requirements	5-2
Setting the SCPI Programming Language	5-3
Installing the Software	5-4
Disk Files	5-4
Make Working Copies	5-4
Installing the Program Onto a Hard Disk	5-4
Operating From a Floppy Disk	5-5
Running the Software	5-5
Configuration Limitations	5-5
Loading the Software	5-5
AUTOMATED ADJUSTMENTS	5-7
1. YO Delay Adjustment	5-7
Description	5-7
2. ADC Adjustment	5-8
Description	5-8

3. Power Flatness Adjustment	5-9
Description	5-9
Procedure	5-9
Utilities	5-11
1. Front Panel Emulation	5-11
Description	5-11
Procedure	5-11
2. Calibration Constants	5-14
Description	5-14
Procedure	5-14
3. Self-test	5-15
Description	5-15
6. Menu Maps	
ALC Menu	6-3
Frequency Menu	6-5
Marker Menu	6-7
Modulation Menu	6-9
Power Menu	6-11
Service Menu	6-13
Sweep Menu	6-15
System Menu	6-17
User Cal Menu	6-19
7. Disassembly and Replacement Procedures	
Introduction	7-1
Tools Required	7-2
Front Panel Disassembly and Reassembly	7-3
Tools Required	7-3
Description and Procedure	7-3
1. Preliminary Steps	7-4
2. Front Panel Removal	7-6
3. A2 Source Module Interface Removal	7-8
Rear Panel Disassembly and Reassembly	7-9
Tools Required	7-9
Description and Procedure	7-9
1. Preliminary Steps	7-11
2. B1 Fan Removal	7-12

3. J6, J7, and J10 Rear Panel BNC Connectors Removal	7-14
4. J1 RF Output Connector Removal	7-15
5. Rear Panel Removal	7-17
6. A23 10 MHz Reference Standard Removal	7-19
7. T1 Transformer Removal	7-20
8. A19 Rear Panel Interface Removal	7-21
9. Voltage Selector Switch Removal	7-22
10. Fuse Housing Removal	7-24
11. FL1 Line Filter Removal	7-25
12. Ext ALC Input Rear Panel BNC Connector Removal . . .	7-26
RF Deck Disassembly and Reassembly	7-27
Tools Required	7-27
Description and Procedure	7-27
1. Preliminary Steps	7-28
2. Lift Up the RF Deck	7-29
3. A20 RF Interface Removal	7-33
4. Microcircuit Removal	7-34
Motherboard Disassembly and Reassembly	7-38
Tools Required	7-38
Description and Procedure	7-38
1. Preliminary Steps	7-40
2. Front Panel Removal	7-42
3. J1 RF Output Connector Removal	7-44
4. Rear Panel Removal	7-46
5. Major Assemblies Removal	7-48
6. RF Deck Removal	7-49
7. Motherboard Removal	7-51

8. Post-Repair

9. Replaceable Parts

Introduction	9-1
Module-Exchange Program	9-1
Replacement Information	9-2
Ordering Information	9-2
How To Order Parts ... Fast!	9-2

10. Preventive Maintenance	
Introduction	10-1
How To Clean the Fan Filter	10-2
How To Replace the Line Fuse	10-4
How to Replace the CPU Battery (A15BT1)	10-5
Removal/Replacement	10-5
Connector Care	10-7
11. Specifications	
Dedicated HP 8510 System Source Models	11-1
Frequency	11-1
Output Power	11-2
General	11-3
Environmental	11-3
Warm-Up Time	11-3
Power Requirements	11-3
Weight and Dimensions	11-3
Inputs and Outputs	11-4
RF Output	11-4
External ALC Input	11-4
Trigger Input	11-4
Trigger Output	11-4
10 MHz Reference Input	11-4
10 MHz Reference Output	11-4
Sweep Output	11-5
Stop Sweep Input/Output	11-5
Z-Axis Blanking/Markers Output	11-5
Volts/GHz Output	11-5
Source Module Interface	11-5
Auxiliary Interface	11-5
12. Installation	
Introduction	12-1
Initial Inspection	12-1
Preparation for Use	12-2
Power Requirements	12-2
Line Voltage and Fuse Selection	12-2
Power Cable	12-2

Recalibrating the YIG Oscillator	12-4
Language and HP-IB Address Selection	12-4
HP 8510 System Firmware Requirements	12-6
HP 8510 System Cable Connections	12-6
10 MHz Frequency Reference Selection and Warm-up Time .	12-9
Operating Environment	12-9
Chassis Kits	12-10
Rack Mount Slide Kit (Option 806)	12-10
Rack Flange Kit for Synthesizers with Handles Removed (Option 908)	12-13
Rack Flange Kit for Synthesizers with Handles Attached (Option 913)	12-15
13. Instrument History	
Introduction	13-1
Index	

Figures

O-1. HP 83631B Synthesized Sweeper	ix
O-2. Typical Serial Number Label	xi
2-1. CW Accuracy Test Setup	2-9
2-2. Maximum Leveled Power Setup	2-11
2-3. Swept Frequency Accuracy Setup	2-15
2-4. Bandswitch Transition Location	2-18
3-1. 10 MHz Standard Adjustment Setup	3-5
3-2. 10 MHz Standard Adjustment Location	3-6
3-3. Accuracy Versus Adjustment Interval	3-7
3-4. A4L1 Location	3-9
3-5. Fractional-N Reference and API Spur Adjustment Setup . . .	3-12
3-6. Fractional-N Reference and API Spurs Adjustment Locations .	3-13
3-7. FL2 Location	3-17
3-8. Sampler Match Adjustment Locations	3-19
3-9. IF Gain Adjustment Location	3-20
3-10. YO Driver +10V Reference Adjustment Location	3-22
3-11. YO Gain and Linearity Break Points	3-24
3-12. YO Gain and Linearity Adjustment Locations	3-25
3-13. Switch and Adjustment Locations	3-27
3-14. HP 83651B Amplifier/Multiplier Adjustments Setup	3-32
3-15. HP 83621B/31B Amplifier/Multiplier Adjustments Setup . .	3-33
3-16. Al2 Assembly Potentiometer Locations - HP 83651B	3-40
3-17. Al2 Assembly Potentiometer Locations - HP 83621B/31B . .	3-41
3-18. YTM Single Band Risettime Compensation	3-48
3-19. YTM Multi-Band Delay and Risettime Compensation	3-50
3-20. Amplifier/Filter Adjustments Setup	3-55
3-21. XA10J2 Location	3-56
3-22. Al2 Assembly Potentiometer Locations	3-65
3-23. YTF Single Band Delay Compensation	3-76
3-24. YTF Multi-Band Delay and Rise Time Compensation	3-78

3-25. Low Power SRD Bias Adjustment Setup	3-80
3-26. A9R85 Location	3-81
3-27. Modulator Offset and Gain Adjustment Setup	3-82
3-28. ALC Power Level Accuracy Adjustment Setup	3-87
3-29. A10R125 Location	3-90
5-1. HP-IB Switch with SCPI Setting	5-3
6-1. ALC Menu	6-3
6-2. Frequency Menu	6-5
6-3. Marker Menu	6-7
6-4. Modulation Menu	6-9
6-5. Power Menu	6-11
6-6. Service Menu	6-13
6-7. Sweep Menu	6-15
6-8. System Menu	6-17
6-9. User Cal Menu	6-19
7-1. Cable Routing Locations	7-2
7-2. Front Panel Disassembly Flowchart	7-3
7-3. Front Edge Trim Strip	7-5
7-4. Front Panel Screw Locations	7-6
7-5. Front Panel Coaxial and Ribbon Cable Locations	7-7
7-6. Source Module Interface Removal	7-8
7-7. Rear Panel Disassembly Flowchart	7-10
7-8. B1 Rear Panel Fan Assembly	7-13
7-9. J6, J7, J9, and J10 Rear Panel BNC Connector Locations	7-14
7-10. Removing RF Output Connector	7-15
7-11. Rear Panel Removal	7-17
7-12. Rear Panel Cable Locations	7-18
7-13. Reference Standard Mountings	7-19
7-14. Transformer Removal	7-20
7-15. A19 Rear Panel Interface Removal	7-21
7-16. Voltage Selection Switch Removal	7-22
7-17. Fuse, Line Filter, and Ground Wires	7-23
7-18. Rear Panel Fuse Housing	7-24
7-19. Line Filter Removal	7-25
7-20. Ext ALC Input BNC Connector Removal	7-26
7-21. RF Deck Disassembly Flowchart	7-27
7-22. Removing RF Output Connector	7-29
7-23. W51 RF Cable Location	7-30

7-24. RF Deck in the Service Position	7-32
7-25. A20 RF Interface Removal	7-33
7-26. RF Deck Cable Locations – HP 83651B	7-35
7-27. RF Deck Cable Locations – HP 83621B/31B	7-36
7-28. RF Deck Screw Locations	7-37
7-29. Motherboard Disassembly Flowchart	7-39
7-30. Front Edge Trim Strip	7-41
7-31. Front Panel Screw Locations	7-42
7-32. Front Panel Coaxial and Ribbon Cable Locations	7-43
7-33. Removing RF Output Connector	7-44
7-34. Rear Panel Removal	7-46
7-35. Rear Panel Cable Locations	7-47
7-36. Major Assemblies	7-48
7-37. W51 RF Cable Location	7-49
7-38. Motherboard Cables	7-51
7-39. Motherboard Screws	7-52
9-1. Module Exchange Program	9-4
9-2. Major Assemblies	9-5
9-3. Cables	9-11
9-4. Front Panel	9-18
9-5. Front Panel, Attaching Hardware	9-19
9-6. Rear Panel	9-20
9-7. Rear Panel Fan Assembly	9-22
9-8. Bottom View, Attaching Hardware	9-24
9-9. Top View, Attaching Hardware	9-25
9-10. Left Side View, Attaching Hardware	9-27
9-11. Right Side View, Attaching Hardware	9-28
9-12. RF Deck Right Side View, Attaching Hardware	9-29
9-13. RF Connector and Attaching Hardware	9-30
9-14. Chassis Parts	9-31
10-1. Removing the Fan Filter	10-3
10-2. Replacing the Line Fuse	10-4
10-3. A15BT1 Battery Location	10-5
12-1. AC Power Cables Available	12-3
12-2. Rear Panel HP-IB Switch	12-5
12-3. HP 8510B to 8360 Series Cabling Diagram HP 8510 Firmware Revision < 6.0	12-7

12-4. HP 8510B/C to 8360 Series Cabling Diagram HP 8510	
Firmware Revision $\geq$ 6.0	12-8
12-5. Removing the Side Straps and Feet	12-11
12-6. Chassis Slide Kit	12-12
12-7. Rack Mount Flanges for Synthesizers with Handles Removed .	12-14
12-8. Rack Mount Flanges for Synthesizers with Handles Attached .	12-16

Tables

1-1. Required Test Equipment	1-2
2-1. HP 83621B/31B/51B Operation Verification Form	2-5
2-2. HP 83621B/31B/51B Performance Test Record	2-21
3-1. Summary of Fractional-N Reference & API Spurs Adjustment	3-11
3-2. Calibration Constant Descriptions	3-34
3-3. Single Band Frequency Ranges	3-47
3-4. Multi-Band Frequency Ranges	3-49
3-4. Amplifier/Filter Calibration Constants and Default Values . .	3-57
3-5. Auto Tracking Verification Band Frequencies	3-73
3-6. YTF Single Band Adjustment Band Frequencies	3-74
3-7. YTF Multi-Band Adjustment Band Frequencies	3-77
3-8. ALC Offset Calibration Constant Default Values	3-83
3-9. Center Frequencies and Calibration Constants	3-86
3-10. ALC Calibration Constants and Default Values	3-89
3-11. Power Level and Calibration Constant Adjustment	3-90
3-12. Power Level and Calibration Constant Adjustment	3-91
4-9. Calibration Constant Descriptions	4-11
4-10. Hardware Configuration Cal Constants #463 and #464 . . .	4-34
4-11. Assemblies and Corresponding Cal Constant ID Numbers and Revisions	4-35
5- 1. Required Binaries	5-2
5-2. Synthesizer Hardkey Emulation	5-12
8-1. Adjustments and Performance Tests Required After Repair or Replacement of an Assembly	8-2
9-1. Reference Designations and Abbreviations	9-3
9-2. Major Assemblies	9-7
9-3. Cables	9-15
9-4. Front Panel	9-18
9-5. Front Panel, Attaching Hardware	9-19
9-6. Rear Panel	9-20

9-7. Rear Panel Fan Assembly	9-23
9-8. Bottom View, Attaching Hardware	9-24
9-9. Top View, Attaching Hardware	9-26
9-10. Left Side View, Attaching Hardware	9-27
9-11. Right Side View, Attaching Hardware	9-28
9-12. RF Deck Right Side View, Attaching Hardware	9-29
9-13. RF Connector and Attaching Hardware	9-30
9-14. Chassis Parts	9-32
9- 15. Miscellaneous Replaceable Accessories	9-33
12-1. Rack Mount Slide Kit	12-10
12-2. Rack Flange Kit for Synthesizers with Handles Removed . . .	12-13
12-3. Rack Flange Kit for Synthesizers with Handles Attached . . .	12-15

Equipment Required

Table I-I. Required Test Equipment

Instrument	Critical Specifications	Recommended Model	Use ¹
Spectrum Analyzer		IP 8566B ²	Fractional-N Reference and API Spurs (A)
Frequency Counter	Frequency Range: 45 MHz to 26.5 GHz Stability: Aging Rate 5×10^{-10} /day	IP 5343 Option 001	3W Frequency Accuracy (P)
Controller	2.25 Mbyte RAM BASIC 5.1 HP-IB	IP 9836/HP 9920/ IP 310/HP 320	CO Delay (AA) ADC (AA) Power Flatness (AA)
Software	No Substitute (Included in this manual)	IP P/N 08360-10002	CO Delay (AA) ADC (AA) Power Flatness (AA)
DVM	Range: -50 to +10 VDC Accuracy: $\pm 0.01\%$ Input Impedance: $\geq 10 \text{ M}\Omega$	IP 3456A	Low Power SRD Bias (A) ADC (AA)
Digital Oscilloscope	Dual Channel Bandwidth: DC to 100 MHz Input Impedance: $1 \text{ M}\Omega$ and $50 \text{ M}\Omega$ Vertical Sensitivity: $\leq 5 \text{ mV/Div}$ Horizontal Sensitivity: 50 ns/Div Trigger: Event Triggerable	IP 54501A/ IP 54111D ²	0 MHz Standard (A) Modulator Offset and Gain (A)
Oscilloscope Probes	Division Ratio: 10:1	IP 10431A	
Analog Oscilloscope	A vs B Sweep Mode Vertical Sensitivity: 5 mV/Div Bandwidth: 100 MHz	IP 1740A	Amplifier/Multiplier Adjustments (A) Amplifier/Filter Adjustments (A)
Frequency Standard	Frequency: 10 MHz Stability: $> 1 \times 10^{-10}/\text{yr}$	IP 5061A	0 MHz Standard (A)

¹ A – Manual Adjustment AA – Automated Adjustment P – Manual Performance Test

² Recommended model is part of the microwave test station.

Table I-I. Required Test Equipment (continued)

Instrument	Critical Specifications	Recommended Model	Use¹
Power Meter	Power Range: 1 μ W to 100 mW Accuracy: ± 0.02 dB	IP 436A/HP 437A/ IP 438A	Maximum Levelled Power (P) Amplifier/Filter Adjustments (A) ALC Power Level Accuracy (A) Power Flatness (AA)
Power Sensor	Frequency Range: 45 MHz to 2.3 GHz Power Range: 1 μ W to 100 mW	IP 8481A	Power Flatness (AA) Maximum Levelled Power (P)
Power Sensor	Frequency Range: 50 MHz to 26.5 GHz Power Range: 1 μ W to 100 mW	IP 8485A	ALC Power Level Accuracy (A)
Power Sensor	Frequency Range: 50 MHz to 50 GHz Power Range: 1 μ W to 100 mW	IP 8487A	Amplifier/Filter Adjustments (A) ALC Power Level Accuracy (A) Power Flatness (A) Power Flatness (AA) Maximum Levelled Power (P)
Network Analyzer	No Substitution	IP 8510	Swept Frequency Accuracy (P)
Test Set	System Specific	IP 8512 IP 8513 IP 8514 IP 8515 IP 8516 IP 8517	Swept Frequency Accuracy (P)
Attenuator	Frequency Range: 45 MHz to 50 GHz Maximum Input Power: 200 mW Attenuation: 10 dB	IP 8490D Option 010	Maximum Levelled Power (P) Amplifier/Multiplier Adjustments (A) Amplifier/Filter Adjustments (A)
Coaxial Detector	Frequency Range: 45 MHz to 50 GHz Maximum Input: 200 mW Polarity: Negative	IP 33330E	Amplifier/Multiplier Adjustments (A)
Tool Kit	No Substitute	IP P/N 08360-60060	

The following list of adapters and cables is provided for convenience. They may be used in equipment setups for performance tests or adjustments.

SMA (m) to SMA (m) adapter	1250-1159
SMA (f) to SMA (f) adapter	1250-1158
SMB (m) to SMB (m) adapter	1250-0669
SMB (f) to SMB (f) adapter	1250-0672
SMB tee (f) (m) (m)	1250-1391
3.5 mm (f) to 3.5 mm (f) adapter	5061-5311
3.5 mm (f) to N-type (m) adapter	1250-1745
2.4 mm (f) to 2.92 mm (f) adapter	1250-2187
2.4 mm (f) to 2.4 mm (f) adapter	1250-2188
2.4 mm (m) to 3.5 mm (f) adapter	11901C
BNC (f) to BNC (f) adapter	1250-0080
BNC (m) to BNC (m) adapter	1250-0216
BNC (f) to SMA (m) adapter	1250-1200
BNC (f) to SMB (m) adapter	1250-1237
BNC tee (m) (f) (f)	1250-0781
SMB (f) to BNC (m) flexible cable	85680-60093
SMA semi-rigid cable (2 feet)	08340-20124
BNC male cable (2 feet)	8120-3446
BNC cable	8120-2582
HP-IB cable (2 meters)	HP 10833B

Performance Tests

List of Tests

This chapter contains the following tests:

Operation Verification	2-5
1. Self-tests	2- 6
2. CW Frequency Accuracy	2- 7
3. Maximum Leveled Power	2-7
Performance Tests	2- 8
1. CW Frequency Accuracy	2- 9
2. Maximum Leveled Power	2-11
3. Swept Frequency Accuracy	2-14
HP 83621B/31B/51B Performance Test Record	2-21

How To Use This Chapter

Performance verification for the HP 83621B/31B/51B synthesized sweepers is accomplished during the system verification when the synthesized sweeper is part of an HP 8510 system.

When the synthesized sweeper is part of such a system, refer to the HP 8510 *On-Site Service* manual performance test section for system performance tests, whenever the HP 8510 system is re-verified (at least one year after installation.) Also, perform “Operation Verification” when the synthesized sweeper must be verified by itself. These are performance test procedures, and meet the needs of most incoming inspections (80% verification) by providing a reasonable assurance that the instrument is functioning properly.

Following the operation verification procedure in this chapter are the performance tests which test the electrical performance of the HP 83621B/31B/51B synthesized sweepers as published in “Specifications” in this manual. These tests do not require access to the interior of the instrument.

When used in an HP 8510 system, the electrical performance of the synthesizer is confirmed when the system is calibrated and verified according to the procedure outlined in the HP 8510 system documentation.

Caution The synthesized sweeper must warm up for at least one hour before the electrical specifications are valid.

Calibration Cycle

When used in an HP 8510 system, consult the system documentation to determine the calibration cycle of the entire system and perform the system verification *instead* of these synthesizer performance tests. Whenever used as a stand-alone instrument, perform the tests in this chapter at least once every 24 months.

Front Panel Emulation Software

Front panel emulation software is required to perform the tests in this chapter. The “Automated Tests” chapter explains how to run the front panel emulator software and lists all required hardware.

Whenever a hardkey is mentioned in these performance test procedures, the software-defined “hardkey”, associated with the original front panel key, must be pressed. A table listing each of these keys appears in “Utilities” in the “Automated Tests” chapter. The following is a list of common keystrokes in these performance tests and their equivalent front panel emulator software keystrokes.

Instrument	USER CAL Tracking Menu AutoTrack Peak RF Always
Controller	C Kn Kn Kn Kn (Proceed)
Instrument	FREQUENCY CW 45 MHz
Controller	W 45 M

Instrument **SERVICE** Selftest (Full)
Controller **S** **Kn**

Instrument **START** **45** **MHz**
Controller **A** **45** **M**

Instrument **STOP** **20** **GHz**
Controller **o** **20** **G**

Instrument SWEEP(e) Manual Sweep
Controller **E** **Kn**

Note There are some differences between the front panel emulation software supplied with the synthesized sweeper manual and the HP 8510 front panel emulator software. The five softkeys below the display are designated either with a **K** or an **F**. The hardkeys **USER CAL** and **SERVICE** appear as softkeys in the HP 8510 version; however, they are designated the same as other hardkeys in the software supplied with the manual.

There are several ways to implement front panel emulation software:

HP 8510C

Front panel emulation software is contained in the HP 8510C. The keypad overlay that is needed for the network analyzer is a part of the front panel emulator kit that is shipped with each HP 83621B/31B/51B synthesized sweeper.

To run the front panel emulation software, on the network analyzer, press:

AUXILIARY MENUS **SYSTEM**

SERVICE FUNCTIONS

TEST MENU

(22) (RUN SERVICE PROGRAM) **=MARKER**

4 (8360 TESTS) **=MARKER**

2 (FRONT PANEL EMULATOR) **=MARKER**

Front Panel Emulator Kit

The front panel emulator kit (shipped with each HP 83621B/31B/51B synthesized sweeper) contains the software on tape for use with the HP 8510B. The kit also includes the network analyzer overlay and instructions for using the software. Some early versions of the HP 83621B/31B were shipped before the creation of the front panel emulator kit. See “Replaceable Parts” for the part number to order the front panel emulator kit.

Computer-Run Software

Front panel emulation software that runs on an HP 9000 series 200/300 computer is shipped with each HP 83621B/31B/51B as part of the manual set.

Menu Maps

Fold-out menu maps are located in Chapter 6.

Some menus have more than one page of softkeys. Select the [more softkey to view the next page of softkeys; **more** is not included in the keystrokes given in these procedures.

Note	In all cases where you are instructed to preset the synthesizer, use the factory preset mode only.
-------------	--

Equipment Required

The equipment required to perform the tests in this chapter is listed in Chapter 1, “Equipment Required”. You may use any equipment that meets the critical specifications given.

Operation Verification

The following procedures meet the needs of most incoming inspections (80% verification), and provide a reasonable assurance that the instrument is functioning properly. The Operation Verification Form for the HP 83621B/31B/51B synthesized sweepers is located below.

Perform these operation verification procedures in the order given and record the pass/fail results in the Operation Verification Form.

Table 2-1. HP 83621B/31B/51B Operation Verification Form

Test Facility _____	Date _____
Model _____	Customer _____
Serial Number _____	Tested By _____
Options _____	Firmware Revision _____
Test	Results (Pass/Fail)
1. Self-Tests	_____
2. CW Frequency Accuracy	_____
3. Maximum Leveled Power	_____

1. Self-tests

1. Perform the full self-tests contained in the instrument firmware using the front panel emulator software. No additional test equipment is required. Press **SERVICE Selftest (Full)** .

The synthesizer executes a series of self-tests. When completed, the following message is displayed if all the tests passed:

ALL SELF-TESTS HAVE PASSED!

Note

Occasionally, the self-tests may fail when it is run remotely or when external cables are connected to the instrument. If the self-tests fail, remove all cables and run the self-tests from the front panel. If the self-tests pass under these conditions, the instrument is operating properly.

External connections to the instrument during self-test may not allow the lines to change conditions within the limits of the self-test's parameters.

2. Record Pass on the operation verification form and continue to the next test, "CW Frequency Accuracy".

If the synthesizer fails one or more self-tests, a different message is displayed listing the most independent test that failed and a reference to the best entry point into the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*. Record *Fail* on the operation verification form and refer to the troubleshooting guide. After repair, repeat operation verification from the beginning.

2. CW Frequency Accuracy

1. Follow the “CW Frequency Accuracy” procedure given in “Performance Tests” in this manual.
2. If the synthesizer passes this test, record *Pass* on the operation verification form and continue to the next test, “Maximum Leveled Power”.

If the synthesizer fails, record *Fail* on the operation verification form and then follow the “In Case of Difficulty” instructions given for this performance test. After repair, repeat operation verification from the beginning.

3. Maximum Leveled Power

1. Follow the procedure given in “Performance Tests” in this manual.
2. If the synthesizer passes this test, record *Pass* on the operation verification form. Operation verification is completed.

If the synthesizer fails, record *Fail* on the operation verification form and then follow the “In Case of Difficulty” instructions given for this performance test. After repair, repeat operation verification from the beginning.

Performance Tests

Perform the tests in the order that they appear using the front panel emulation software. (Refer to the beginning of this chapter for more information on front panel emulation software.)

A performance test record is supplied at the end of this chapter. Use the performance test record when you perform a full calibration of your synthesizer. The performance test record gives the acceptable limits of the performance tests and a column to record worst-case measurements.

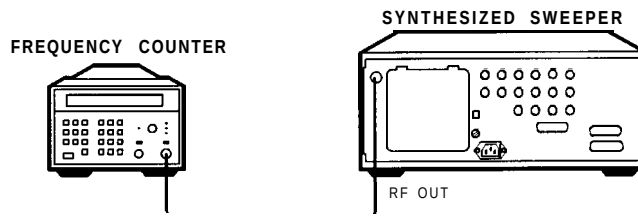
1. CW Frequency Accuracy

Description and Procedure

In this procedure, a frequency counter is used to measure the minimum and maximum synthesizer frequencies in CW. In the HP 83651B, an internal frequency doubler is used to generate frequencies of ≥ 26.5 GHz through 50 GHz. Since the highest frequency that the frequency counter can measure is 26.5 GHz, the doubler is disabled for the measurement at 50 GHz providing an RF output of 25 GHz. This verifies a 50 GHz output except for the operation of the doubler. Since the doubler is engaged to produce the 26.5 GHz RF output, the operation of the doubler is verified in the 26.5 GHz measurement.

Self-tests then verify that the internal hardware is properly maintaining frequency accuracy over the full frequency range.

1. Connect the equipment as shown in Figure 2-1. Preset the instruments and let them warm up for at least one hour.



so73b

Figure 2-1. CW Accuracy Test Setup

2. On the synthesizer, set:

CW **45** **MHz**

Measure the frequency with the counter and record this value in the test record located at the end of this chapter.

3. ■ On the HP 83621B, set:

CW **20** **GHz**

- On the HP 83631B/51B, set:

CW **26.5** **GHz**

Measure the frequency with the counter and record this value in the test record located at the end of this chapter.

4. On the HP 83651B, set:

CW **50** **GHz**

SERVICE Tools Menu Disable Doubler (asterisk on)

Measure the frequency with the counter and record this value in the test record located at the end of this chapter.

5. Run the self-tests to verify that the instrument hardware is functioning properly, indicating that frequency accuracy is maintained over the remaining frequency range of the synthesizer.

On the synthesizer, set:

SERVICE **Selftest** (Full)

Run the self-tests using the front panel emulator software to verify that the instrument hardware is functioning properly.

Related Adjustments

10 MHz Standard

In Case of Difficulty

1. Make sure the frequency counter has a current calibration sticker and that it meets its published specifications.
2. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

2. Maximum Levelled Power

Description and Procedure

This procedure uses a power meter to measure the maximum leveled power of the synthesizer at periodic frequencies across the band. Using the front panel emulator, an auto track is invoked so that the YTM and the YIG oscillator are tracked to obtain the maximum output power. The up and down arrow keys are used to set the maximum leveled power out of the synthesized sweeper across the band.

Power level is increased in swept mode until the unleveled message comes on. The power is then decreased until the message disappears. Manual sweep is used to verify that an unleveled condition does not occur at slow sweep speeds. The minimum leveled power point is identified by measuring the power level in 200 MHz steps across the frequency range.)

1. Connect the equipment as shown in Figure 2-2. Let the power meter warm up for at least one hour. Calibrate and zero the power meter.

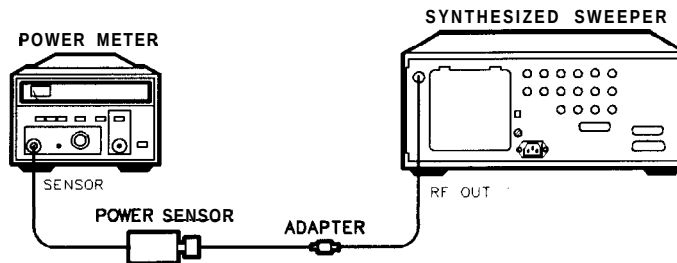


Figure 2-2. Maximum Levelled Power Setup

Note

Before continuing, make sure that the power sensor is attached to the synthesizer RF output connector. A good match for the synthesizer RF output connector is necessary in order for the synthesizer power leveling circuitry to operate properly.

2. On the synthesizer, set:
(PRESET) (USER CAL) Tracking Menu **AutoTrack** Proceed

This initiates a synthesizer autotrack. Wait until the autotrack is completed. The front panel emulator software may or may not indicate that autotrack is running. When it is done, the caution message on the computer display will be replaced by a frequency and power level display.

3. On the synthesizer, set:

START **45** **MHz**
STOP **200** **GHz**

4. Press **[POWER LEVEL] TO** make power level the active function. The left and right arrow keys in this step select the significant digit to change; the up and down arrow keys increase or decrease the value respectively.

Press the arrow keys to increase the power level until the unleveled indicator comes on. When the unleveled message appears, it will be located under the power level indication at the right-hand side of the emulated front panel “display”.

5. Decrease the power until the unleveled message disappears. Select 0.1 dB resolution and set the power level to 0.1 dB less than the level at which the unleveled message disappears.

6. On the synthesizer set:

SWEEP **MENU** Manual Sweep

Manually sweep over the full frequency range and note any unleveled messages. Decrease the power level so that no unleveled messages appear.

Note

The left and right arrow keys used in this step select the significant digit to change; the up and down arrow keys increase or decrease the value respectively.

Change the power meter sensor calibration factor as necessary to keep the power reading calibrated.

7. Use the up/down arrow keys on the keyboard to manually sweep across the full frequency range of the synthesizer in 200 MHz steps. Observe the power meter (*not* the indicator on the computer screen generated by the front panel emulator software) as this is done and note the minimum power point.

8. Record this minimum power point as the maximum leveled power level on the test record at the end of this section.
9. On the synthesizer, set **CONT** SWEEP.
10. ■ For the HP 83631B only:
 - a. On the synthesizer, set (STOP) (26.5) **GHz**
 - b. Repeat steps 4 through 8 *except* in step 7 manually sweep from **20 GHz** to 26.5 GHz in 200 MHz steps.
- For the HP 83651B only:
 - a. On the synthesizer, set **STOP**, **26.5** **GHz**
 - b. Repeat steps 4 through 9 *except* in step 7 manually sweep from **20 GHz** to 26.5 GHz in 200 MHz steps.
 - c. On the synthesizer, set [STOP) **40** **GHz**
 - d. Repeat steps 4 through 9 *except* in step 7 manually sweep from **26.5 GHz** to 40 GHz in 200 MHz steps.
 - e. On the synthesizer, set **STOP**, **50** **GHz**
 - f. Repeat steps 4 through 8 *except* in step 7 manually sweep from **40 GHz** to 50 GHz in 200 MHz steps.

Related Adjustments

1. Amplifier/Multiplier Adjustments
2. Amplifier/Filter Adjustments
3. Modulator Offset and Gain

In Case of Difficulty

Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

3. Swept Frequency Accuracy

Description and Procedure

The HP 8510 network analyzer system is set up for a phase measurement using a cable to connect the test ports together. This test relies on the electrical length of the cable being sufficiently different from the reference path so a small change in frequency will cause a measurable phase shift.

The display is calibrated to 10 MHz/division: A reference point is set at a specific CW frequency. The synthesizer is then shifted 5 MHz in frequency, and the display scale is adjusted for a 5 division change in the display (1 MHz per division). The display scale is then increased by a factor of 10. This scale is maintained throughout the remainder of the procedure.

The synthesizer is then put into stepped sweep mode. Since the source is synthesized, the result is a trace with zero frequency error. This trace is stored into memory and subtracted from the reference. The result is a straight line. The synthesizer is then put into ramp sweep mode and sweep span cal is automatically invoked to minimize frequency errors. The resultant display indicates swept frequency accuracy.

1. Connect the equipment as shown in Figure 2-3. Preset the instruments and let them warm up for at least one hour.

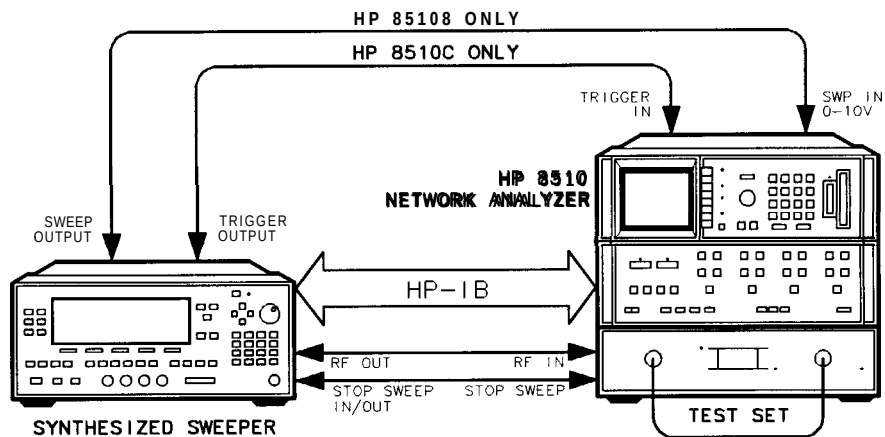


Figure 2-3. Swept Frequency Accuracy Setup

2. On the synthesizer, set:

(PRESET) (USER CAL) Tracking Menu AutoTrack Proceed

This initiates a synthesizer autotrack. Wait for the autotrack to complete. The front panel emulator software may or may not indicate that autotrack is running. When it is done, the caution message on the computer display will be replaced by a frequency and power level display.

3. Follow the instructions on the display to exit the front panel emulator software.

During the rest of the procedure the HP 8510 is used to control the synthesizer.

4. On the HP 8510, set:

CHANNEL 1

STIMULUS **(START)** **(2.3)** **(G/n)**

STIMULUS **(STOP)** **(20)** **(G/n)**

STIMULUS **(MENU)** **(SWEEP TIME)** **(200)** **(k/m)**

STIMULUS **(MENU)** **(SINGLE POINT)**

The center CW frequency should be 11.15 GHz as shown at the bottom of the display. On the HP 8510, set:

PARAMETER **S12**

FORMAT **PHASE**

Display Calibration

Note This is a sensitive calibration to achieve and may require several repetitions of the next steps. The following table may help to reduce adjustment time during these iterations.

Frequency (GHz)	Adjustment	Trace Position
11.150	Ref Value	Center
11.155	Scale	Display Edge ¹
11.145	Scale	Display Edge ¹

1 Either top or bottom of display.

5. Press RESPONSE **REF VALUE**. Turn the RPG (rotary pulse generator) to center the trace on the display horizontal reference line.
6. Press RESPONSE **SCALE**, **10**, **x1** to expand the display scale.
7. Press RESPONSE **REF VALUE**. Readjust the RPG to center the trace on the reference line.
8. Press STIMULUS (**CENTER**) **11.155** **G/n** to increase the center frequency by 5 MHz.
9. The trace will move above or below the center reference established in step 7. Press RESPONSE **SCALE** and move the RPG to position the trace on the closest display edge (top or bottom of the screen).

Note Vary the RPG only so much as to put the trace on the screen edge and no farther. The trace should appear “jumpy”. If it does not, back off on the RPG until it is.

10. Press STIMULUS **CENTER** (11.145) **G/n** to set the center frequency 5 MHz less than that represented on the center reference line. The trace should move to the display edge opposite that in steps 8 and 9.
11. If necessary, select RESPONSE **SCALE** and adjust the RPG to position the trace on the closest display edge (top or bottom).
12. Set stimulus center to 11.15 GHz.
13. Repeat steps 7 through 12 until the change in center frequency places each trace on the appropriate graticule with no further adjustment.

Note If a “Phase Lock Lost” error appears on the display, repeat this procedure beginning with step 6.

14. Press RESPONSE **SCALE** and enter a value that is ten times the present value. For example, if the scale value is now 420 milli-degree/div, then increase it to 4.2 degrees/div. The display is now calibrated for $\Delta F = 10 \text{ MHz/div}$.

Swept Frequency Accuracy Measurement

15. Press STIMULUS **MENU** **STEP** to select stepped sweep mode.
16. Press STIMULUS **START** **45** **M/μ** to set the start frequency to 45 MHz.
Press STIMULUS **STOP** **20** **G/n** (HP 83621B) or
STIMULUS **STOP** (26.5) **M/μ** (HP 83631B and 83651B) to set the stop frequency.
17. Wait for the HP 8510 to complete the sweep (the asterisk in the upper left corner of the display turns off), and then press **DISPLAY** **Data→Memory** n to store the trace data.
18. Press MATH **(/)**. The HP 8510 mathematically subtracts memory from the trace to provide a flat reference.
19. Press RESPONSE **REF VALUE** **0** (xl) to set the center reference line to 0 degrees.
20. Press STIMULUS **MENU** **RAMP** to choose ramp sweep mode.

21. Press STIMULUS (MENU) (SWEEP) **500** (k/m to set the sweep time to **500** ms.
22. Figure 2-4 shows a typical response at two scale sensitivities. Locate the portion of the trace farthest from the center reference graticule. This is the worst-case swept frequency accuracy. Record this value in the performance test record at the end of this section. The scale is set in this procedure to 10 MHz per division. However, if this scale does not provide enough resolution you can change the sensitivity as follows:

For any change in MHz/division, make a proportional change in scale.
For example:

To change the frequency/division from 10 MHz/division to 5 MHz/division, divide the scale by 2 (for example, if it was $4.2^\circ/\text{division}$, change it to $2.1^\circ/\text{division}$).

Or, to change the frequency/division from 10 MHz/division to 1 MHz/division, divide the scale by 10 (for example, if it was $4.2^\circ/\text{division}$, change it to $0.42^\circ/\text{division}$).

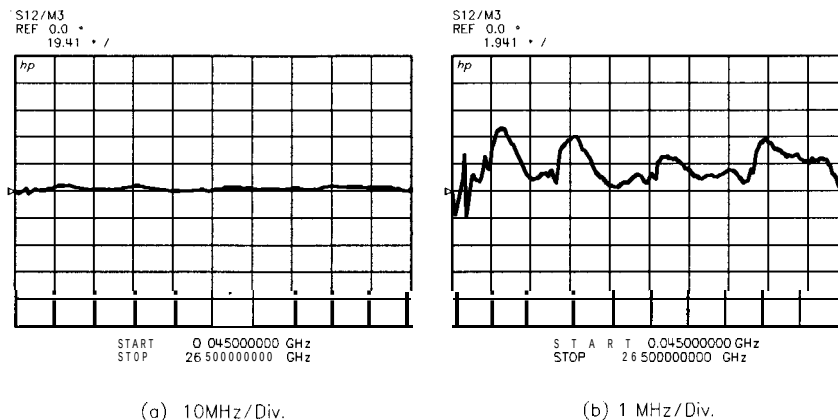


Figure 2-4. Bandswitch Transition Location

For the HP 83651B Only:

23. Reset the scale, if you have changed it, so that the frequency/division is 10 MHz/division.
24. Press STIMULUS (MENU) (STEP) to select stepped sweep mode.
25. Press STIMULUS (START) (45) (M/ μ) to set the start frequency to 45 MHz.
Press STIMULUS (STOP) (50) (G/n) to set the stop frequency.
26. Wait for the HP 8510 to complete the sweep, and then press DISPLAY **Data→Memory** n to store the trace data.
27. Press MATH (/) . The HP 8510 mathematically subtracts memory from the trace to provide a flat reference.
28. Press RESPONSE (REF VALUE) (0) (x1) to set the center reference line to 0 degrees.
29. Press STIMULUS (MENU) (RAMP) to choose ramp sweep mode.
30. Press STIMULUS (MENU) (SWEEP TIME) (1) (x1) to set the sweep time to 1 second.
31. Locate the portion of the trace farthest from the center reference graticule. This is the worst-case swept frequency accuracy. Record this value in the performance test record at the end of this section. The scale is set in this procedure to 10 MHz per division. However, if this scale does not provide enough resolution you can change the sensitivity as follows:

For any change in MHz/division, make a proportional change in scale.
For example:

To change the frequency/division from 10 MHz/division to 5 MHz/division, divide the scale by 2 (for example, if it was 4.2°/division, change it to 2.1°/division).

Or, to change the frequency/division from 10 MHz/division to 1 MHz/division, divide the scale by 10 (for example, if it was 4.2°/division, change it to 0.42°/division).

Related Adjustments

1. YO Driver +10V Reference
2. YO Gain and Linearity
3. YO Delay Compensation
4. Sweep Ramp Calibration

In Case of Difficulty

1. Make certain that the phase difference between the test set reference path and the cable connecting the test set ports causes at least a scale of 200 milli-degrees/division.
2. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

Table 2-2.
HP 83621B/31B/51B Performance Test Record (1 of 3)

Test Facility: _____		Report Number _____	
		Date _____	
		Customer _____	
		Tested by _____	
Model _____		Ambient temperature _____ °C	
Serial Number _____		Relative humidity _____ %	
Options _____		Line frequency _____ Hz (nominal)	
Firmware Revision _____			
Special Notes:			

Table 2-2. HP 83621B/31B/51B Performance Test Record (2 of 3)

Model _____		Report Number _____		Date _____
Test Equipment Used	Model Number	Trace Number	Cal Due Date	
1. Frequency Counter	_____			
2. Oscilloscope	_____			
3. Power Sensor	_____			
4. Power Meter	_____			
5. Network Analyzer	_____			
6. Test Set	_____			
7. _____	_____			
8. _____				
9. _____				
10. _____				
11. _____				
12. _____				
13. _____				
14. _____				
15. _____				
16. _____				
17. _____				

Table 2-2. HP 83621B/31B/51B Performance Test Record (3 of 3)

Model		Report Number			Date
Test No.	Test Description	Minimum Spec.	Results	Maximum Spec.	Measurement Uncertainty ¹
1.	CW Frequency Accuracy Worst Case Value:				
2.	45 MHz	14.999955 MHz		45.000045 MHz	±10 Hz
3.	20 GHz ²	19.99998 GHz		10.00002 GHz	±4 kHz
	26.5 GHz ³	16.4999735 GHz		16.5000265 GHz	±5 kHz
	50 GHz ⁴	14.999975 GHz		15.000025 GHz	±5 kHz
2.	Maximum Leveled Power				
9.	45 MHz to 20 GHz	±10 dBm			±0.44 dB
11.	20 GHz to 26.5 GHz ³	±4 dBm			±0.4 dB
	26.5 GHz to 40 GHz ⁴	±3 dBm			±0.5 dB
	40 GHz to 50 GHz ⁴	±1 dBm			±0.9 dB
3.	Swept Frequency Accuracy Worst Case Value:				
22.	Start Freq_____			±0.1% of sweep	±150 kHz
	Stop Freq_____				
	Worst Case Value: ⁴				
30.	Start Freq_____			±0.1% of sweep	±150 kHz
	Stop Freq_____				

¹ The measurement uncertainty is quoted for these performance tests using only the recommended models specified in the "Equipment Required" chapter. The measurement uncertainty quoted represents limits of ±3 times the equivalent standard deviation (3σ) and is intended to represent a 99% confidence level.

² HP 83621B only.

³ HP 83631B/51B only.

⁴ HP 83651B only.

Adjustments

List of Adjustments

This chapter contains the following adjustments:

1. 10 MHz Standard	3-4
2. Fractional-N VCO	3-9
3. Fractional-N Reference and API Spurs	3-11
4. Sweep Ramp	3-16
5. Sampler Assembly	3-17
6. YO Driver +10V Reference	3-22
7. YO Driver Gain and Linearity	3-24
8. YO Loop Gain	3-27
9. Amplifier/Multiplier Adjustments	3-29
10. Amplifier/Filter Adjustments (HP 83651B Only)	3-52
11. Low Power SRD Bias	3-80
12. Modulator Offset and Gain	3-82
13. ALC Power Level Accuracy	3-87

For the following automated adjustments, see Chapter 5 “Automated Tests”:

- YO Delay Adjustment
- ADC Adjustment
- Power Flatness

How To Use This Chapter

Perform these adjustments only if directed by the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide* or if a performance test fails.

Menu Maps

Fold-out menu maps are located in Chapter 6.

Some menus have more than one page of softkeys. Select the More softkey to view the next page of softkeys. More is *not* included in the keystrokes given in these procedures.

Note	In all cases where you are instructed to preset the synthesizer, use the factory preset mode only.
-------------	--

If a password is set, it will have to be disabled before the adjustment menu can be accessed. See “Calibration Constants” in this manual for instructions.

Equipment Required

The equipment required to perform the adjustments in this chapter is listed in the Chapter 1 of this manual. You may use any equipment that satisfies the critical specifications given. Use a *non-metallic* adjustment tool.

Cautions And Warnings

Although this instrument has been designed in accordance with international safety standards, for safe operation you must follow the cautions and warnings in this manual.

Warning	Voltages in the instrument can cause personal injury; be extremely careful. Capacitors can be charged even if the instrument has been disconnected from line power.
----------------	---

1. 10 MHz Standard

Description and Procedure

This procedure adjusts the frequency accuracy of the internal 10 MHz time base. This adjustment should be done on a regular basis if absolute frequency accuracy is important (see Figure 3-3.)

For best accuracy, readjust the 10 MHz timebase oscillator after the synthesizer has been on or in standby for 24 hours. See “Accuracy Versus Adjustment Interval,” following this adjustment, for information on how to determine a periodic adjustment schedule.

After the timebase is adjusted, the timebase frequency should stay within the aging rate if the following things happen:

- The time base oven does not cool down.
- The instrument keeps the same orientation with respect to the earth’s magnetic field.
- The instrument stays at the same altitude.
- The instrument does not receive any mechanical shock.

If the time base oven cools (the instrument is disconnected from ac power), you may have to readjust the time base frequency after a new warm-up cycle. Typically, however, the time base frequency returns to within ± 1 Hz of the original frequency.

Note	You can adjust the internal timebase after reconnecting ac power for 10 minutes, but for best accuracy, test again after the instrument has been on or in standby for 24 hours.
-------------	---

Frequency changes, due either to a change in orientation with respect to the earth’s magnetic field or to a change in altitude, are usually eliminated when the instrument is returned to its original position. A frequency change due to mechanical shock usually appears as a fixed frequency error.

1. Connect the equipment as shown in Figure 3-1. Preset all instruments and let them warm up for one hour.

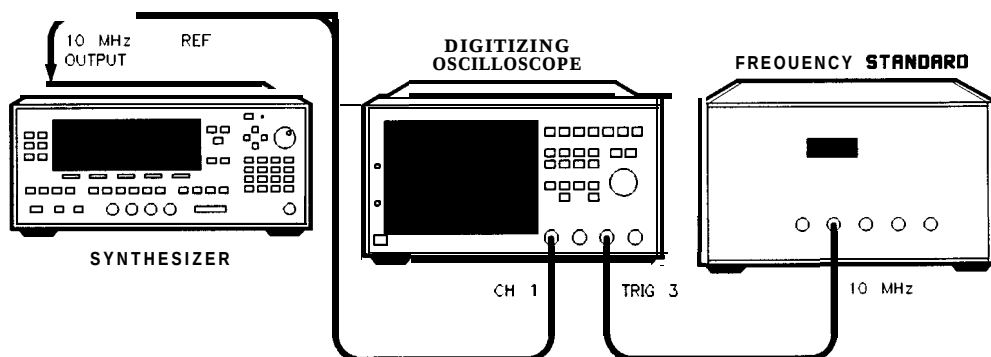


Figure 3-1. 10 MHz Standard Adjustment Setup

Note If the oscilloscope does not have a 50 Ω input impedance, connect channel 1 through a 50 Ω feedthrough.

2. On the oscilloscope, set:

Channel 1:

Display	On
Volts/Division	200 mV
Input Coupling	dc
Input Impedance	50 Ω

Channel 2:

Display	Off
---------	-----

Timebase:

Time/Division	10 ns
Trigger	External

Trigger:

Trigger Mode	Edge
Trigger Source	Trig 3
Input Coupling	ac

Display:

Display Mode	Real Time
--------------	-----------

3. On the oscilloscope, adjust the trigger level so that the sweep is synchronized to the synthesizer's internal standard. The waveform will appear to drift.
4. Using a non-metallic tool, adjust the A23 10 MHz standard (see Figure 3-2) for minimum horizontal movement of the oscilloscope waveform.

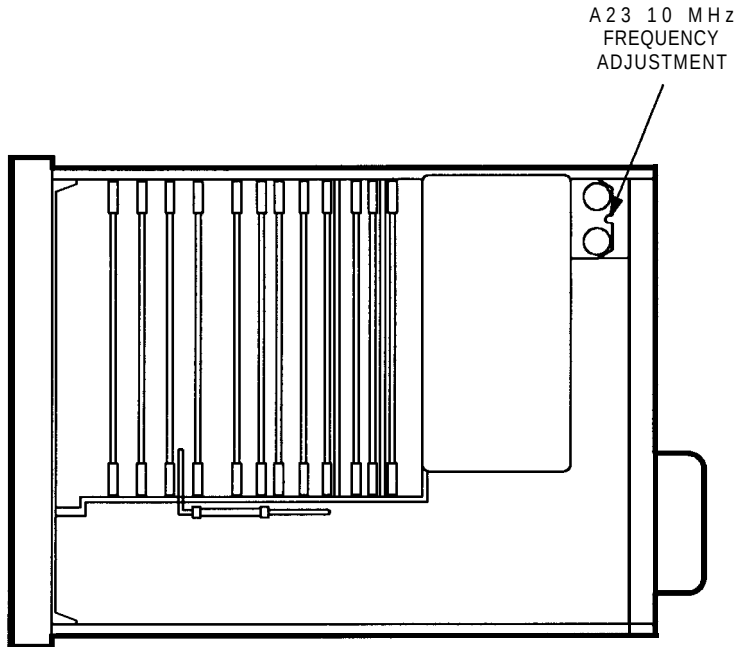


Figure 3-2. 10 MHz Standard Adjustment Location

Related Performance Tests

Internal Timebase: Aging Rate

In Case of Difficulty

1. Ensure that an external standard is not connected. (At instrument preset the synthesizer automatically chooses the external standard as the reference if one is connected to the 10 MHz REF INPUT.)
2. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

Accuracy Versus Adjustment Interval

Figure 3-3 shows the required adjustment interval to maintain a given accuracy. If you know the aging rate, you can determine a more precise adjustment interval.

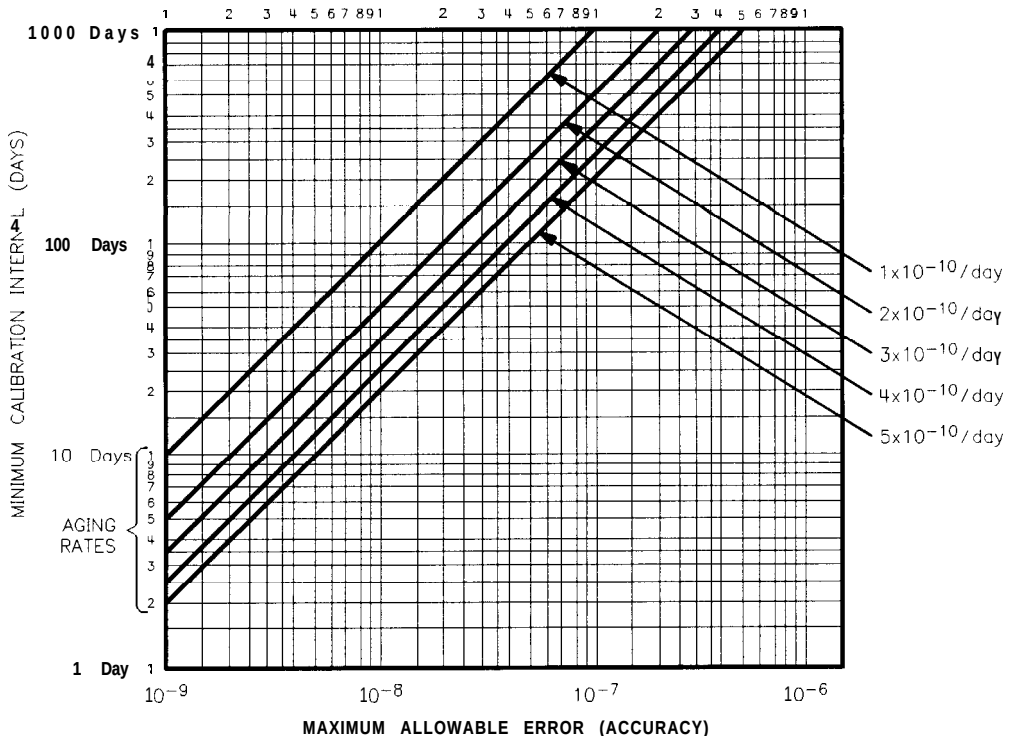


Figure 3-3. Accuracy Versus Adjustment Interval

1. Find the line on Figure 3-3 that corresponds to the 10 MHz timebase oscillator aging rate (to determine the aging rate, see "Performance Tests").
2. On the horizontal axis, find the maximum allowable error (accuracy) that you want.
3. Follow the maximum allowable error vertically until it intersects the known aging rate.

4. From the point of intersection, move horizontally to the left and read the minimum calibration interval measured in days.

An Alternate Method

You can also determine the minimum calibration interval using the following formula:

$$\frac{\text{maximum allowable error}}{\text{known aging rate (per day)}} = \text{calibration interval in days}$$

2. Fractional-N VCO

Description and Procedure

No test equipment is required for this procedure.

This adjustment sets the VCO tuning voltage to -6.0 V for a VCO output of 60 MHz.

1. Leaving all cables connected, place the A4 fractional-N assembly on an analog extender board.
2. Turn the synthesizer on and press **PRESET**. Let the instrument warm up for at least one hour.
3. Select the A4 VCO tune adjustment. On the synthesizer, set:
SERVICE Adj **Menu AssyAdj** Menu A4 VCO Tune
4. Using a non-metallic tool, adjust A4L1 (see Figure 3-4) to center the needle on the display.

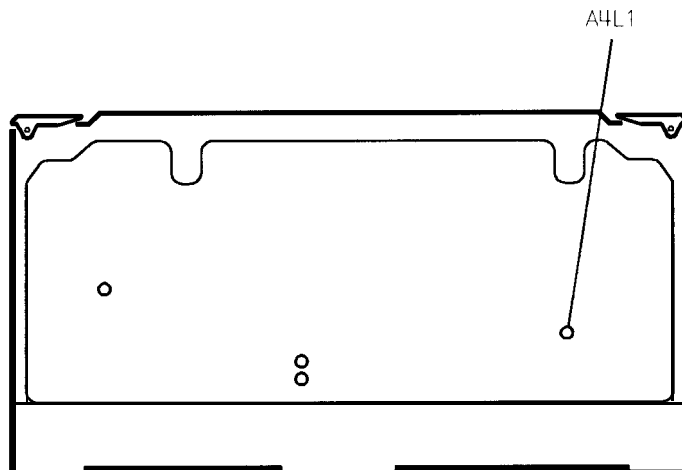


Figure 3-4. A4L1 Location

5. Turn the synthesizer to standby, and reinstall the A4 assembly.

Related Performance Tests

Self-tests

In Case of Difficulty

1. Verify that an analog extender board is used.
2. Make sure the 125 kHz reference cable, W11, is connected to A4J1.
3. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

3. Fractional-N Reference and API Spurs

Note Do *not* perform this adjustment on a new or rebuilt replacement assembly. The A4 assembly is factory-adjusted, and is *not* instrument dependent.

Description and Procedure

This adjustment minimizes three known spurs (125 kHz reference, API1, and API2). At each spur frequency, the spectrum analyzer is phase locked to the synthesizer, connected directly to the A4 fractional-N assembly output, and operated in zero span. A4R70, R31, and R30 are adjusted for minimum spur level. Table 3-1 summarizes this adjustment.

Table 3-1.
Summary of Fractional-N Reference & API Spurs Adjustment

Spur	Fractional-N CW Frequency (MHz)	Analyzer Frequency (MHz)	Potentiometer	Minimum (dBc)
kHz Reference	44.125	44.0	A4R70	−75
API 1	44.005	44.0	A4R31	−70
API 2	44.0005	44.0055	A4R30	−80

1. With the A4 assembly on an analog extender board, connect the equipment as shown in Figure 3-5. Preset the instruments, and let them warm up for at least one hour.

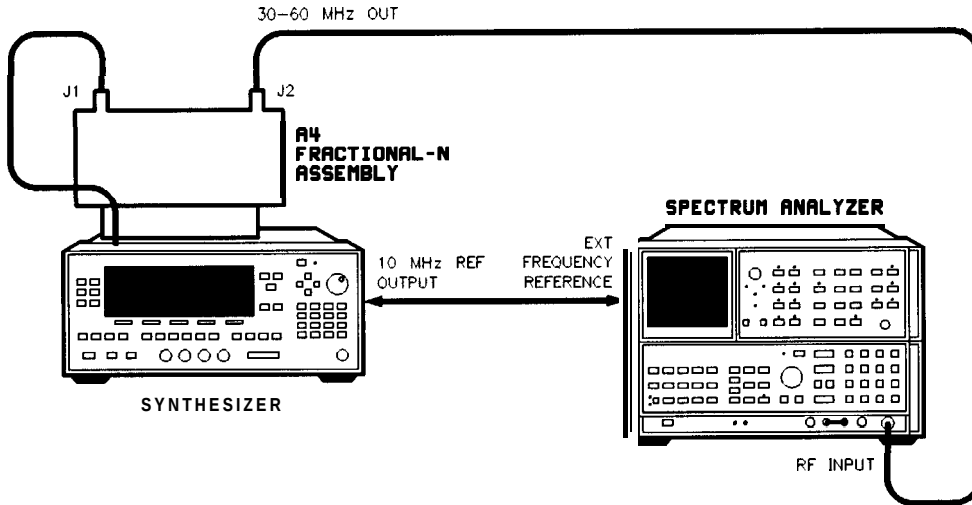


Figure 3-5. Fractional-N Reference and API Spur Adjustment Setup

2. On the spectrum analyzer, set:

Frequency Span: 0 Hz
 Resolution Bandwidth: 10 Hz
 Sweep Time: 10 s
 Reference Level: -10 dBm
 Scale Log: 10 dB/Division
 Video Averaging: Off
 Clear Write A: Selected

125 kHz Reference Spur Adjustment

3. On the synthesizer, set:

(CW)

(SERVICE) Tools Menu **Cnt1PLL** Menu **Frac N** Menu

(CW) **(44.125)** **(MHz)**

4. On the spectrum analyzer, set:

Center Frequency: 44.125 MHz

Frequency Span: **500** Hz

Adjust the frequency offset to center the signal on the display.

Frequency Span: 0 Hz

Peak the signal on the display.

Note the signal level: _____dBm

Center Frequency: **44.0** MHz

Reference Level: -40 dBm

5. On the synthesizer, adjust **A4R70** (see Figure 3-6) for minimum signal on the spectrum analyzer.

The difference in level between the signal noted in step 4 and the signal in this step should be at least -75 dBc.

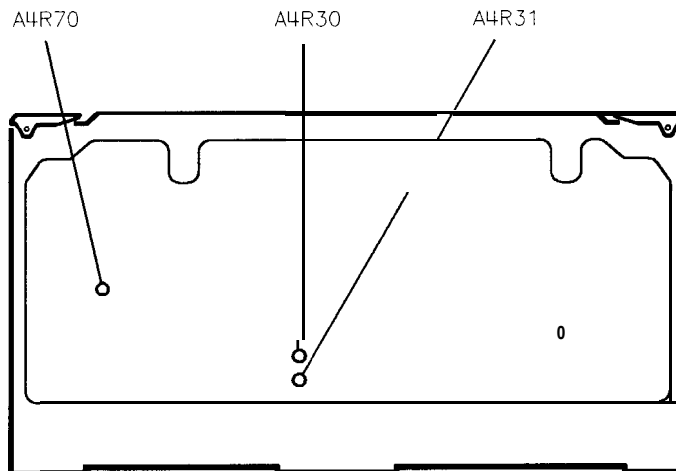


Figure 3-6. Fractional-N Reference and API Spurs Adjustment Locations

API 1 Spur Adjustment

6. On the synthesizer, change the fractional-N to CW 44.005 MHz. Press:

(MHz) _____

7. On the spectrum analyzer, set:

Center Frequency: 44.005 MHz

Reference Level: \$10 dBm

Note the signal level: _____dBm

Center Frequency: 44.0 MHz

Reference Level: -40 dBm

8. On the synthesizer, adjust A4R31 (see Figure 3-6) for minimum signal on the spectrum analyzer.

The difference in level between the signal noted in step 7 and the signal in this step should be at least -70 dBc.

API 2 Spur Adjustment

9. On the synthesizer, change the fractional-N to CW 44.0005 MHz. Press

(MHz) 5 _____

10. On the spectrum analyzer, set:

Center Frequency: 44.0005 MHz

Reference Level: \$10 dBm

Note the signal level: _____dBm

Center Frequency: 44.0055 MHz

Reference Level: -40 dBm

11. On the synthesizer, adjust A4R30 (see Figure 3-6) for minimum signal on the spectrum analyzer.

The difference in level between the signal noted in step 10 and the signal in this step should be at least -80 dBc.

12. Turn the synthesizer to standby and reinstall the A4 assembly.

3-14 Adjustments

Fractional-N Reference and API Spurs

HP 83621B/31B/51B

Related Performance Tests

None

In Case of Difficulty

1. Ensure that the spectrum analyzer is locked to the external reference.
2. You may need to use video averaging on the spectrum analyzer if the spur level is low enough to be hidden by phase noise.
3. If you cannot adjust spurs below the recommended levels, the problem is probably with the A4 fractional-N assembly. Refer to the *HP 83621 B/31 B/51 B Synthesized Sweeper Troubleshooting Guide*.

4. Sweep Ramp

Description and Procedure

No test equipment is required for this adjustment.

This is an automatic adjustment. The synthesizer's internal DVM measures the sweep ramp voltage at the end of the sweep. The synthesizer then sets the sweep time calibration constants to calibrate the sweep ramp.

1. Turn the synthesizer on and press **PRESET**. Let the synthesizer warm up for at least one hour.
2. Select the A14 sweep ramp adjustment. On the synthesizer, set:
(SERVICE) Adjust Menu AssyAdj Menu A14 SwpRmp

The synthesizer will measure, calculate, and store the sweep time calibration constants. When the adjustment is complete, the following message appears on the display:

```
SweepRampCalCompleted  
Calibrationconstantsweremodified.
```

3. If this is the last calibration constant you will be adjusting, see "Calibration Constants" to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

Self-Tests
Swept Frequency Accuracy

In Case of Difficulty

Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

5. Sampler Assembly

Description and Procedure

No test equipment is required for this procedure.

There are three sampler assembly adjustments:

- In the sampler match adjustment, as the internal DVM monitors the loop input to the sampler, trim capacitors are adjusted to optimize the sampler match over the full frequency range of the loop.
- The 200 MHz loop gain adjustment is automatic. When this adjustment is selected in the A6 adjustment menu, the synthesizer selects internal calibration constants for optimum loop gain over the full frequency range of the loop.
- In the IF gain adjustment, the IF amplifier gain is adjusted as the internal DVM monitors the IF output level to the YO loop.

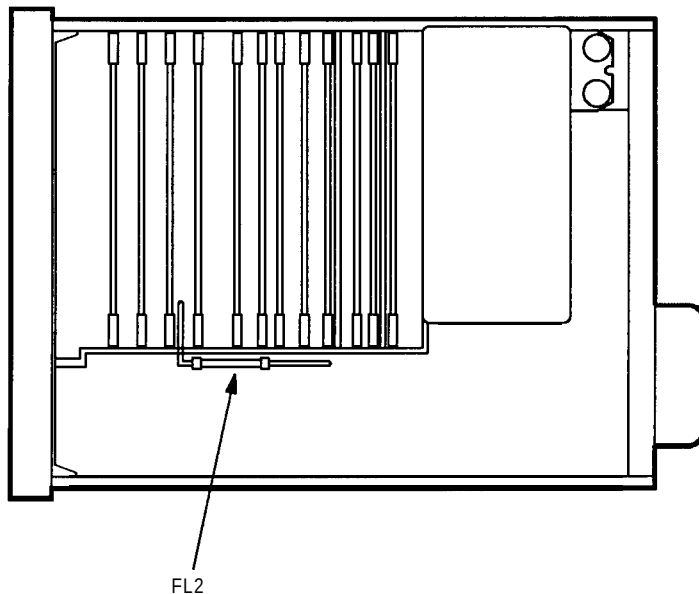


Figure 3-7. FL2 Location

1. Turn the synthesizer to standby. At FL2 (see Figure 3-7), disconnect the semi-rigid cable between FL2 and the A6 assembly.
2. Leaving the flexible cable connected to A6J1 (40 MHz reference), place the A6 assembly on the analog extender board.
3. Turn the synthesizer on and press **PRESET**. Let it warm up for at least one hour.
4. Select the A6 adjustment menu. Press:
SERVICE Adjust Menu **AssyAdj** Menu A6 Adj Menu

200 MHz Loop VCO Tune Check

5. In the A6 adjustment menu, select the A6 VCO tune check A6 VCO Tune .
6. The following message should be displayed:
 C t r i m a n d C 6 0 a r e O K .

If this message is not displayed, refer to *HP 83621B/31 B/51B Synthesized Sweeper Troubleshooting Guide*.

Note	If the three tuning voltages at the bottom of the display (V200, Vavg, and V220) are all equal, the 200 MHz phase-locked loop is unlocked.
-------------	--

7. Select Done.

Sampler Match Adjustment

8. In the A6 adjustment menu, select the A6 sampler match adjustment, A6 Smplr Match.

Note

The sampler match display is a graphic representation of the sampler match over the full frequency range of the 200 MHz loop. The more asterisks displayed at a frequency, the more output signal (and the better the match) at that frequency. Make the adjustment for best match over the full frequency range of the loop.

9. Adjust A6C82 and A6C83 (Figure 3-8) for best overall sampler match.

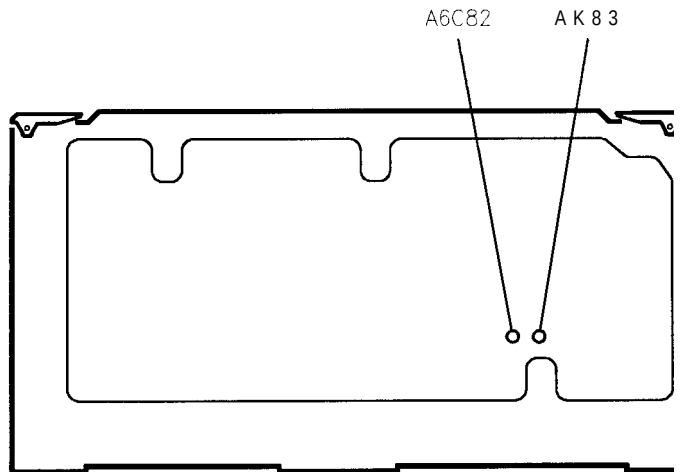


Figure 3-8. Sampler Match Adjustment Locations

10. Select Done.

200 MHz Loop Gain Adjustment

11. In the A6 adjustment menu, select the A6 loop gain adjustment, A6 Loop Gain. The synthesizer automatically performs the adjustment. When the message `Calibration Constants should be SAVED` is displayed, the adjustment is complete. Continue with the next step.
12. Set the synthesizer to standby. Reinstall the A6 assembly in the instrument, and connect all cables.

IF Gain Adjustment

13. Turn the synthesizer on. Select A6 IF Gain.
14. Adjust A6R73 (see Figure 3-9) to center the “needle” on the display.

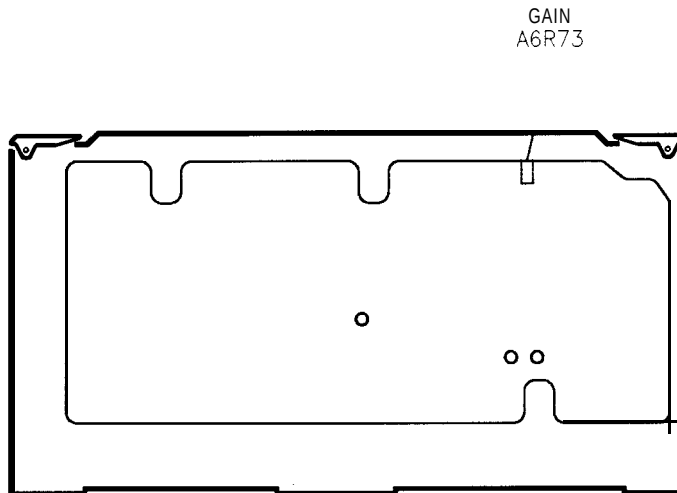


Figure 3-9. IF Gain Adjustment Location

15. Select Done.
16. If this is the last calibration constant you will be adjusting, see “Calibration Constants” to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

Self-tests

In Case of Difficulty

1. Make sure the 40 MHz reference input cable is connected while the A6 assembly is on the analog extender board.
2. For the IF gain adjustment, if the needle registers on the far left or right, ensure that all coax cables (including semi-rigid) are connected and that no unlocked message is displayed.
3. There is some interaction between the adjustments in this procedure. Try an alternate order of adjustments.
4. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

6. YO Driver +10V Reference

Description and Procedure

No test equipment is required for this procedure.

As the internal DVM monitors the +10V reference, you make the adjustment.

1. Turn the synthesizer on and press **PRESET**. Let the instrument warm up for at least one hour.
2. Select the A13 adjustment menu. On the synthesizer, set:
SERVICE Adjust Menu **AssyAdj** Menu A13 Adj Menu
3. Select the A13 +10V reference adjustment, **A13+10V Ref** .
4. Adjust A13R11 (see Figure 3-10) to center the “needle” on the display.

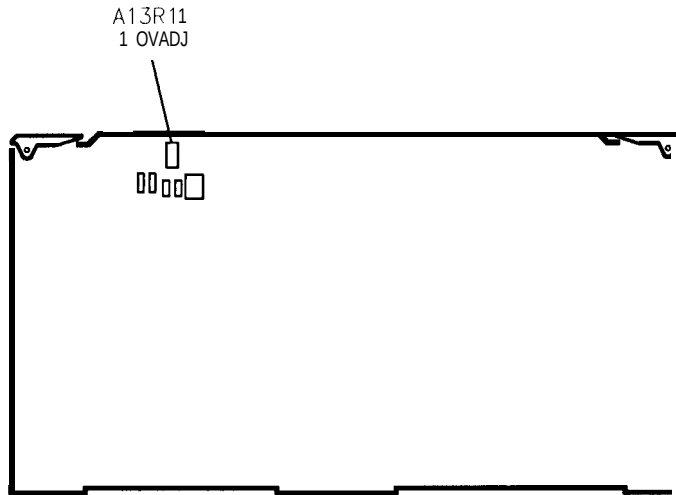


Figure 3-10. YO Driver +10V Reference Adjustment Location

5. Select Done.

Related Performance Tests

Self-tests

In Case of Difficulty

Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

7. YO Driver Gain and Linearity

Description and Procedure

No test equipment is required for these adjustments.

For the gain adjustment, the synthesizer's internal DVM monitors the YO loop error voltage at two frequencies (points B and C in Figure 3-11). When you select the gain potentiometer adjustment, the synthesizer displays the difference in voltage between points B and C as a “needle” with arrows on either side. By adjusting A13R54 to center the “needle”, you equalize the voltage between the two frequency points.

The linearity adjustment has two parts (each of which is selected and adjusted similarly to the gain adjustment). The low break point adjustment equalizes the voltage between points A and B in Figure 3-11. The high break point adjustment equalizes the voltage between points C and D.

Note You must adjust the gain first; then adjust the break points.

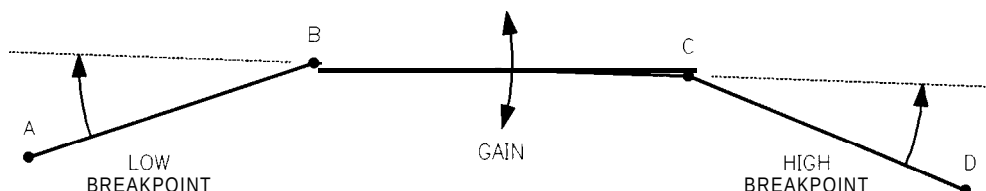


Figure 3-11. YO Gain and Linearity Break Points

1. Turn the synthesizer on and press **PRESET**. Let it warm up for at least one hour.
2. Select the A13 gain menu. Press:
SERVICE Adjust Menu **AssyAdj** Menu A13 Adj Menu A13 Gain **Menu**

Note

If the following message is displayed: Adjust A13 pot. until "locked"., adjust the potentiometer until the locked indication is displayed. Continue with step 3.

3. Select the gain potentiometer adjustment, Gain Pot .
4. Adjust A13R54 (see Figure 3-12) to center the “needle” on the display.

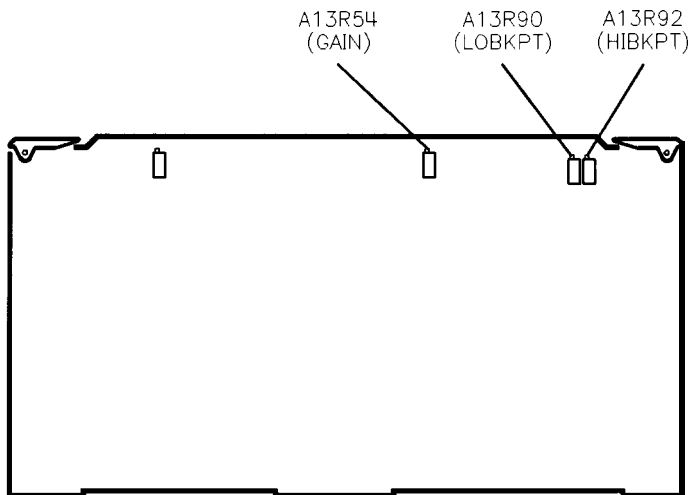


Figure 3-12. YO Gain and Linearity Adjustment Locations

5. Select the low break point potentiometer adjustment, Lo Bk Pot.
6. Adjust A13R90 (see Figure 3-12) to center the “needle” on the display.
7. Select the high break point potentiometer adjustment, Hi Bk Pot .
8. Adjust A13R92 (see Figure 3-12) to center the “needle” on the display.
9. Select Done.
10. If this is the last calibration constant you will be adjusting, see “Calibration Constants” to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

Self-tests

In Case of Difficulty

Refer to the *HP 83621 B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

8. YO Loop Gain

Description and Procedure

No test equipment is required for this procedure.

1. Turn the synthesizer on and press **PRESET**. Let the instrument warm up for at least one hour.
2. Select the assembly adjustment menu. Press:
SERVICE Adjust Menu **AssyAdj** Menu
3. Select the A5 loop gain adjustment, A5 Loop Gain.
4. On the A5 assembly, set all five switches on A5S1 to the closed position (see Figure 3-13).

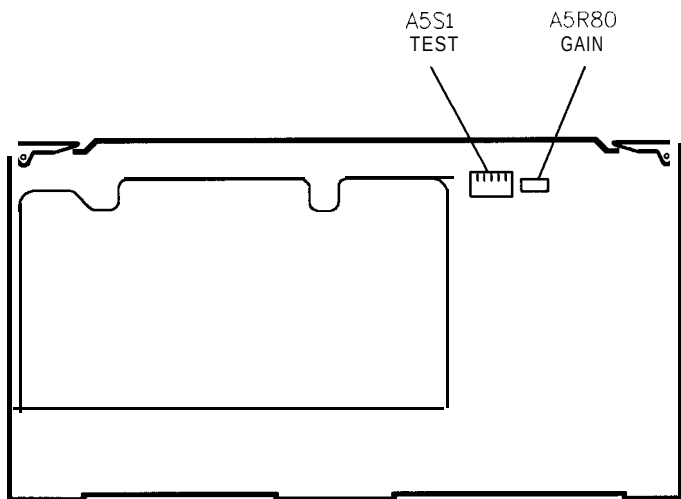


Figure 3-13. Switch and Adjustment Locations

5. Adjust A5R80 (see Figure 3-13) to center the “needle” on the display.
6. Select Done.
7. Set all A5 switches to open and select Done .

Related Performance Tests

None

In Case of Difficulty

1. Be sure to close the A5S1 switches before making the adjustment and open the switches when the adjustment is complete.
2. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

9. Amplifier/Multiplier Adjustments

Description

This procedure maximizes RF power by tracking the tuned filter in the amplifier/multiplier to the RF output frequency. The amplifier/filter output is also monitored on the HP 83651B. Initial tracking is done in single band sweeps at slow sweep speeds to eliminate the effects of bandcross and hysteresis in the tuning coil. (Those will be corrected with delay and risetime calibration constants.) The squegging clamp adjustment is adjusted for maximum output power without squegging. A “squegg” is a distortion in the RF output caused by too much power to the amplifier/multiplier and characterized by a power dropout in a portion of the trace, or a power dropout over a broad frequency range. For the HP 83651B, the power is fixed into the multiplier and the clamp is used to take out gain reversal. The SRD bias adjustments are made to optimize the efficiency of the frequency multiplication. The YTM delay compensation adjustments maximize power for fast single band and multi-band sweeps.

Note

If you have replaced either the YO, the YO driver, or the multiplier/filter driver, first initiate an auto tracking (press **USER CAL** Tracking Menu Auto Track .) If auto tracking passes and the instrument passes the “Maximum Leveled Power” performance test, *do not* continue with this procedure. If auto tracking fails, (an error message is displayed), continue with this procedure.

Adjustment Help

The following explanations are provided for a better understanding of the amplifier/multiplier adjustments. Refer to these explanations as often as necessary. They will help make these adjustments easier. (The adjustment procedure follows.)

Offset and Gain Adjustments.

- For all offset and gain adjustments, adjust through the bandpass. Keep adjusting until the power peaks and then drops off. Then reset the adjustment to the peaked point.
- For all offset and gain adjustments, if power stays peaked over several calibration constant values, set the calibration constant to the middle value of the peaked range.

Adjusting to the Center of the Passband.

- The amplifier/multiplier has a tracking filter on its output. Its purpose is to pass the selected RF output frequency and reject harmonics. The objective of this procedure is to track the bandpass filter with the RF output frequency over a variety of sweep conditions and frequency ranges. Effects of the auxiliary output may mask the true center of the bandpass. Always tune to the lower peak (lower calibration constant value).

SRD Bias Adjustment.

- Adjust these calibration constants into *squegging* and then back off until peak power is achieved.
- After reaching peak power, decrease power by 15 counts when adjusting the A term and decrease power by 1/2 dB (approximately 1/3 division) when adjusting the B term.

Single Band Delay Compensation Adjustments.

- If a drop in power greater than 1 division occurs when in single sweep, increase the A delay term to put the A term at the high end of the peak. For example, for the following calibration constant values:

Start of the peak = 1800

Middle of the peak = 1950

End of the peak = 2100

Set the A term to 2050

Sweep Speed Related Adjustments.

- Delay compensation adjustments are affected by sweep speed. The adjustments are performed at fast sweep speeds which are the worst case. All other adjustments are performed at slow sweep speeds; they are not affected by sweep speed.

If you have a power problem that occurs only for fast sweep rates, it is probably affected by delay compensation or risetime adjustments.

YTM Bandcross Delay Terms.

- The YTM Bx Dly terms are either offset or gain terms used only during multi-band sweeps. A1 denotes the offset term for band 1. B1 denotes the gain term for band 1. The offset (A) should be adjusted to maximize power at the beginning of the band. The gain (B) is adjusted to maximize power toward the end of the band.

General Techniques.

- In some adjustments power may peak twice. This is caused by the auxiliary output masking the true peak. Always adjust to the first peak (lowest value of the calibration constant).
- If the adjustment has a wide range without any apparent improvement, leave it set to the default value.

Equipment Setup

1. Connect the equipment as shown in Figure 3-14 using an analog oscilloscope with A versus B sweep capability. Power on all the instruments and let them warm up for at least one hour.
2. On the synthesizer, press **PRESET**.

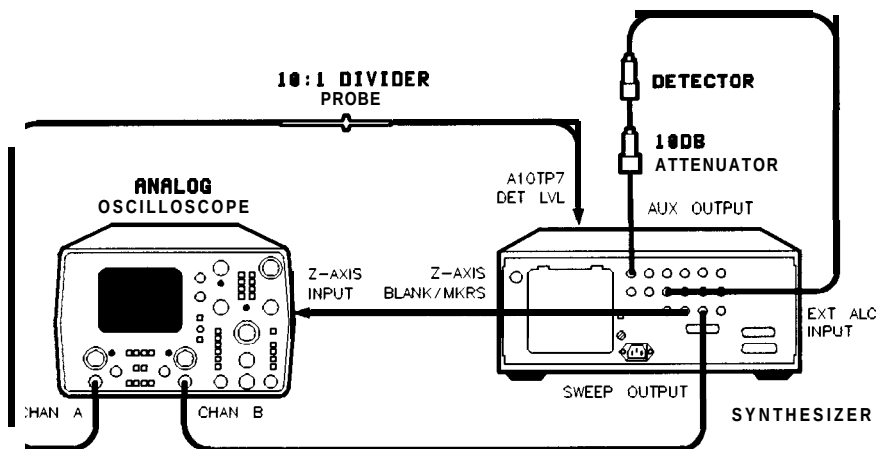


Figure 3-14. HP 836518 Amplifier/Multiplier Adjustments Setup

Equipment for the HP 836518

Analog Oscilloscope	HP 1740A
Oscilloscope Probes	HP 10431A
Detector	HP 333303
Attenuator 10 dB	HP 8490D Option 010

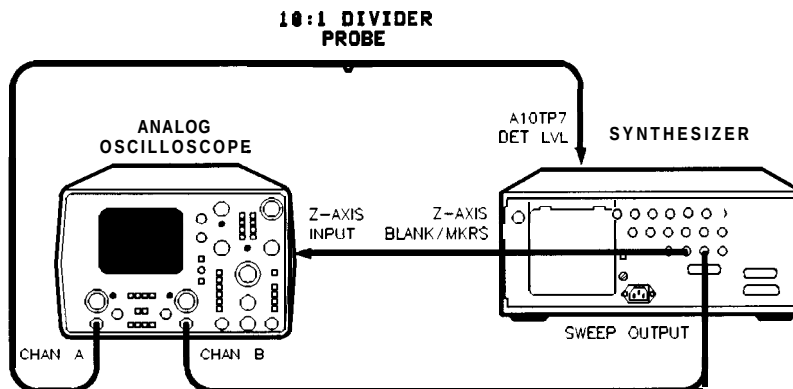


Figure 3-15. HP 83621B/31B Amplifier/Multiplier Adjustments Setup

Equipment for the HP 83621B/31B

Analog Oscilloscope	HP 1740A
Oscilloscope Probes	HP 10431A

- Set the default values given in Table 3-2 into the corresponding YTM calibration constants. On the synthesizer, press:

(SERVICE) Adjust **Menu Calib** Menu

Select Cal Enter the number of the first calibration constant from Table 3-2 and terminate the entry with **(ENTER)**. When using the front panel emulator software, pressing the up arrow key will allow you to move to the next calibration constant. The calibration constant shown at the *top* of the “display” window is the active constant.

Modify Cal Enter the default value from Table 3-2 and terminate the entry with **(ENTER)**.

Using the up/down arrow keys, select each of the rest of the calibration constants in Table 3-2 and set their default values by entering the value on the numeric keypad. Terminate your entry with the **(ENTER)** key.

Table 3-2. Calibration Constant Descriptions

Number	Description	Default Value	Adjustment Description
105	SRD Bias A; Band 1	45 (HP 83621B/31B) 255 (HP 83651B)	Maximize power over lower 30% of band. Sweep speed is not a factor. Adjust for 0.5 dB below maximum power.
106	SRD Bias A; Band 2	100	
107	SRD Bias A; Band 3	100	
108	SRD Bias A; Band 4	100	
109	SRD Bias A; Band 5	100	
110	SRD Bias A; Band 6	100	
111	SRD Bias A; Band 7	100	
118	SRD Bias B; Band 1	60 (HP 83621B/31B) 255 (HP 83651B)	Maximize power over higher 30% of band. Sweep speed is not a factor. Adjust for 0.5 dB below maximum power.
119	SRD Bias B; Band 2	140	
120	SRD Bias B; Band 3	140	
121	SRD Bias B; Band 4	140	
122	SRD Bias B; Band 5	140	
123	SRD Bias B; Band 6	140	
124	SRD Bias B; Band 7	140	
131	Squegg Clamp 1A	255	Default values are not altered. Numbers should remain unchanged (#131 is adjusted in another procedure).
132	Squegg Clamp 2A	255	
133	Squegg Clamp 3A	255	
134	Squegg Clamp 4A	255	
135	Squegg Clamp 5A	255	
136	Squegg Clamp 6A	255	
137	Squegg Clamp 7A	255	
144	YTM Delay Term A Hrm 1	1000	Default values are not altered. Numbers should remain unchanged. Maximize power over first 20% of band. Affects fast sweeps only. Single sweep mode is also critical.
145	YTM Delay Term A Hrm 2	1000	
146	YTM Delay Term A Hrm 3	1000	
147	YTM Delay Term A Hrm 4	1000	
148	YTM Delay Term A Hrm 5	1000	
149	YTM Delay Term A Hrm 6	1000	
150	YTM Delay Term A Hrm 7	1000	

Table 3-2. Calibration Constant Descriptions (continued)

Number	Description	Default Value	Adjustment Description
157	YTM Delay Term B Hrm 1	300	Default values are not altered. Numbers should remain unchanged. Maximize power over higher 30% of band. Affects fast sweeps only.
158	YTM Delay Term B Hrm 2	300	
159	YTM Delay Term B Hrm 3	300	
160	YTM Delay Term B Hrm 4	300	
161	YTM Delay Term B Hrm 5	300	
162	YTM Delay Term B Hrm 6	300	
163	YTM Delay Term B Hrm 7	300	
170	YTM Bx Dly Term A1	1000	Default values for all terms except A3 and A4. Delay compensation for multi-band sweeps only. Adjust for maximum power at lower 50% of band. Affects fast sweep speeds only.
171	YTM Bx Dly Term A2	1000	
172	YTM Bx Dly Term A3	1000	
173	YTM Bx Dly Term A4	1000	
174	YTM Bx Dly Term A5	1000	
175	YTM Bx Dly Term A6	1000	
176	YTM Bx Dly Term A7	1000	
183	YTM Bx Dly Term B1	300	Default values for all terms except B3 and B4. Delay compensation for multi-band sweeps only. Adjust for maximum power at upper 50% of band. Affects fast sweep speeds only.
184	YTM Bx Dly Term B2	300	
185	YTM Bx Dly Term B3	300	
186	YTM Bx Dly Term B4	300	
187	YTM Bx Dly Term B5	300	
188	YTM Bx Dly Term B6	300	
189	YTM Bx Dly Term B7	300	
195	YTM Kick Threshold	110	Default values are not altered. Numbers should remain unchanged.
196	YTM CW Kick Max	3600	
197	YTM Mono Band Kick	2000	
198	YTM Stereo Band Kick	2000	
199	YTM Slew Rate	400	
200	YTM Slew Max	50	
201	YTM Slew Min	0	
202	YTM Neg Kick Wait	2	
203	YTM Fwd Kick Pct	50	
204	YTM Fwd Kick Wait	30	

Table 3-2. Calibration Constant Descriptions (continued)

Number	Description	Default Value	Adjustment Description
205	YTM Rise; Band 1	15	Minimize power dropouts at the start of band. Adjustment is only effective at fast sweep speeds. Adjusted in the Amplifier/Filter Adjustments.
206	YTM Rise; Band 2 A1	20	
207	YTM Rise; Band 2 B1	2	
208	YTM Rise; Band 2 A2	15	
209	YTM Rise; Band 3 A1	70	
210	YTM Rise; Band 3 B1	7	
211	YTM Rise; Band 3 A2	15	
212	YTM Rise; Band 3 B2	15	
213	YTM Rise; Band 3 A3	15	
214	YTM Rise; Band 4	15	
215	YTM Rise; Band 5	15	
216	YTM Rise; Band 6	10	
217	YTM Rise; Band 7	10	
225	*YTM Gain Band 1	2048	Maximize power over higher 10% of band. Adjust at slow sweep speeds.
226	*YTM Gain Band 2	2048	
227	*YTM Gain Band 3	2048	
228	*YTM Gain Band 4	2048	
229	*YTM Gain Band 5	2048	
230	*YTM Gain Band 6	2048	
231	*YTM Gain Band 7	2048	
238	*YTM Offset Band 1	2048	Maximize power over lower 10% of band. Adjust at slow sweep speeds.
239	*YTM Offset Band 2	2048	
240	*YTM Offset Band 3	2048	
241	*YTM Offset Band 4	2048	
242	*YTM Offset Band 5	2048	
243	*YTM Offset Band 6	2048	
244	*YTM Offset Band 7	2048	
248	YTM B2 Offset	0	Default values are not altered. Numbers should remain unchanged.

Table 3-2. Calibration Constant Descriptions (continued)

Number	Description	D e f a u l t Value	Adjustment Description
373	YTM Dly Term C Hrm 1	0	Default values are not altered. Numbers should remain unchanged.
374	YTM Dly Term C Hrm 2	0	
375	YTM Dly Term C Hrm 3	0	
376	YTM Dly Term C Hrm 4	0	
377	YTM Dly Term C Hrm 5	0	
378	YTM Dly Term C Hrm 6	0	
379	YTM Dly Term C Hrm 7	0	
382	YTM Bx Dly Term C1	0	Default values are not altered. Numbers should remain unchanged.
383	YTM Bx Dly Term C2	0	
384	YTM Bx Dly Term C3	0	
385	YTM Bx Dly Term C4	0	
386	YTM Bx Dly Term C5	0	
387	YTM Bx Dly Term C6	0	
525	Hibernation Time	90	Default values are not altered. Numbers should remain unchanged.
526	Bandcross 1	42	
527	Bandcross 2	32	
528	Bandcross 3	28	
529	Bandcross 4	26	
530	Bandcross 5	28	
531	Bandcross 6	20	
532	Bandcross 7	20	

YTM Gain Adjustment

Band 1 Adjustment.

1. On the synthesizer, press:

START **2.0** **GHz**

STOP **7** **GHz**

SWEEP TIME **200** **msec**

ALC Leveling Point Ext Det (asterisk on) - HP 83651B only

ALC Leveling Point **Intrnl** (asterisk on) - HP 83621B/31B only

[POWER LEVEL] **125)** **dBm**

Note that the synthesizer has unlevelled output power.

2. On the oscilloscope, set:

Channel A:

Volts/Division: 5 **mV/Division**

Offset: As required

Input Coupling: DC

Input Impedance: 1 **MΩ**

Channel B

Volts/Division: 1 **V/Division**

Offset: As required

Input Coupling: DC

Input Impedance: 1 **MΩ**

Sweep Mode: A versus B

Adjust Channel B offset, volts/division, and horizontal position controls for a trace that fills the full horizontal display. Adjust the vertical position with the A vertical position control.

3. Make certain that calibration constant #131, Squegg Clamp 1A, is set to 255. Then adjust A12R69, YTMG (HP 83651B) or V Ref Gain (HP 83621B/31B), to maximize high end power (last two horizontal display divisions).
4. Modify calibration constant #238, YTM Offset; Band 1, to maximize low end power.
5. Repeat steps 3 and 4 until the entire band is peaked.

3-38 Adjustments

Amplifier/Multiplier Adjustments

HP 83621B/31B/51B

6. Record the value of calibration constant #238, YTM Offset; Band 1

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 3 through 5 again. Change calibration constant #238 back to its original value.

Band 2 Adjustment.

1. On the synthesizer, press:

START **7** **GHz**
STOP **13.5** **GHz**

2. Adjust band 2 SRD bias calibration constants as follows:
 - a. Increment calibration constant #106, SRD Bias A; Band 2, to maximize low end power. Then decrease the power by 15 counts.
 - b. Increment calibration constant #119, SRD Bias B; Band 2, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
3. Set the oscilloscope vertical position as necessary to display the trace.
4. Modify calibration constant #226, YTM Gain; Band 2, to maximize high end power. The high end power may peak twice. If it does, adjust the calibration constant to the lower peak (where the value of the calibration constant is the lower number).
5. Modify calibration constant #239, YTM Offset; Band 2, to maximize low end power. Power may peak twice. Adjust to the lower peak.
6. Repeat steps 2 through 5 until the entire band is peaked.
7. Record the value of calibration constant #239, YTM Offset; Band 2

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 6. Change calibration constant #239 back to its original value.

Band 3 Adjustment.

1. On the synthesizer, press:

START **13.5** **GHz**
STOP **20** **GHz**

2. Set A12R25, B3S1 (HP 83651B) or B3SL1 (HP 83621B/31B), fully clockwise (see Figure 3-16/Figure 3-17).

Note

There are two sets of potentiometers on the A12 assembly with identical names. Make certain you are adjusting the correct ones.

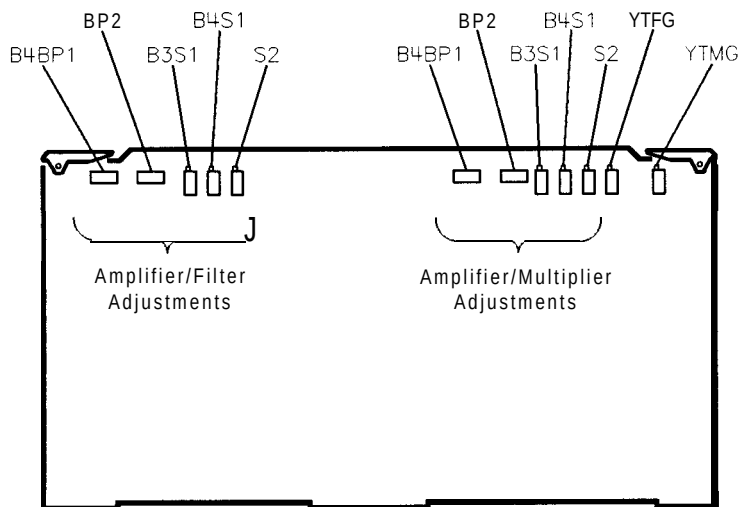


Figure 3-18. A12 Assembly Potentiometer Locations - HP 83851B

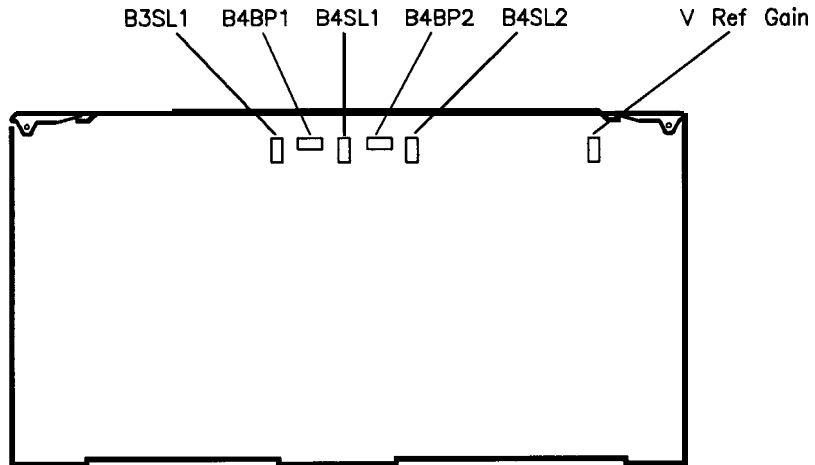


Figure 3-17. AI2 Assembly Potentiometer Locations - HP 83621B/31B

3. Set calibration constant #227, YTM Gain; Band 3, to 2048.
4. Set the band 3 SRD bias calibration constants as follows:
 - a. Increment calibration constant #107, SRD Bias A; Band 3, to maximize low end power. Then decrease power by 15 counts.
 - b. Increment calibration constant #120, SRD Bias B; Band 3, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
5. Modify calibration constant #240, YTM Offset; Band 3, to maximize power at the beginning of the sweep. Power may peak twice. Adjust to the lower peak.
6. Adjust A12R25, B3S1 (HP 83651B) or BSL1 (HP 83621B/31B), (see Figure 3-16/Figure 3-17) for maximum power at the high end. The high end power may peak twice. If it does, adjust the potentiometer to the lower peak (where the adjustment is furthest counterclockwise).
7. Repeat steps 4 through 6 until power is optimized over the full band.
8. Record the value of calibration constant #240, YTM Offset; Band 3

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 7. Change calibration constant #240 back to its original value.

For the HP 83621B only, skip ahead to “Adjustment Check”.

Band 4 Adjustment (HP 83631B/51B only).

1. On the synthesizer, press:

START 20 GHz
STOP 26.5 GHz

2. See Figure 3-16/Figure 3-17 and set:

HP 83651B		HP 83621B/31B	
Potentiometer	Setting	Potentiometer	Setting
A12R23 B4BP1	Centered	A12R23 B4BP1	Centered
A12R24 BP2	Fully clockwise	A12R24 B4BP2	Fully clockwise
A12R26 B4S1	Fully clockwise	A12R26 B4SL1	Fully clockwise
A12R27 S2	Fully clockwise	A12R27 B4SL2	Fully clockwise

3. Set the oscilloscope vertical position as necessary to display the trace.
4. Modify calibration constant #241, YTM Offset; Band 4, to maximize power at the very low end. Power may peak twice. Adjust to the lower peak.
5. Modify calibration constant #228, YTM Gain; Band 4, to maximize power at the first division on the display. Power may peak twice. Adjust to the lower peak.

Note

If there is no noticeable increase in power in the next two adjustments, leave the potentiometers at their preset position (fully clockwise).

6. Adjust A12R23 B4BP1 for maximum power to optimize the 3rd through the 7th divisions. Stop when the power begins to decrease. Power may peak twice. Adjust to the lower peak.
7. Adjust A12R26 B4S1 for maximum high-end power. Power may peak twice. Adjust to the lower power peak.
8. Repeat step 7.
9. Adjust band 4 SRD bias calibration constants as follows:
 - a. Increment calibration constant #108, SRD Bias A; Band 4, to maximize low end power. Then decrease power by 15 counts.
 - b. Increment calibration constant #121, SRD Bias B; Band 4, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
10. Repeat steps 4 through 9 until the entire band is peaked.
11. Record the value of calibration constant #241, YTM Offset; Band 4

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 10. Change calibration constant #241 back to its original value.

Adjustment Check.

In this adjustment check you will save the current calibration constants, perform an auto track, check the waveform, and review the auto track calibration constants. If the results are correct, you will recall the calibration constants and continue the adjustment. If not, you will repeat the previous adjustments.

1. Save the calibration constants. On the synthesizer, press:
SERVICE Adjust Menu **Calib** Menu Cal Util Menu Save Cal Yes
 (START)@@@
2. On the synthesizer, set:

STOP	20	GHz	(HP 83621.B)
STOP	26	GHz	(HP 83631.B)
STOP	50	GHz	(HP 83651.B)

then press:

(S W E E P) @ @

3. Initiate auto tracking on the synthesizer as follows. Terminate the RF OUTPUT with a good 50 Ω impedance match such as a 10 dB attenuator or a power sensor. Press:

USER CAL Tracking Menu Auto Track Proceed

4. Compare the auto tracked waveform to the manually tracked waveform. The auto tracked trace should be at the same or higher power level. If the power level drops, redo the YTM adjustments from the start.
5. Review the YTM gain and offset calibration constants. The gain and offset values should fall between 1000 to 3000. If the values fall below 500 or above 3500, readjust the YTM gains and offsets, break points and slopes. Large variations between calibration constants determined by auto track and manual adjustment are normal.
6. Recall the calibration constants. On the synthesizer, press:

SERVICE Adj Adjust Menu Calib Menu Cal **Util** Menu Recall Cal Yes

Attention! For bands 5 through 7, perform only the SRD bias adjustments (steps 1 and 2) *unless* a problem is found in the “Amplifier/Filter Adjustments” auto tracking verification. (If so, you will be instructed to repeat the adjustments performing all of the steps.)

For the HP 83621B/31B only, skip ahead to “YTM Single Band Adjustments”.

Band 5 Adjustment (HP 836518 only).

1. On the synthesizer, press:

START **26.5** **GHz**
STOP **33.4** **GHz**

2. Set the band 5 SRD bias calibration constants as follows:
 - a. Increment calibration constant #109, SRD Bias A; Band 5, to maximize low end power. Then decrease power by 15 counts.

- b. Increment calibration constant #122, SRD Bias B; Band 5, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
3. Adjust calibration constant #229, YTM Gain; Band 5, for maximum power at the high end of band 5. The high end power may peak twice. If it does, adjust the calibration constant to the lower peak (where the value of the calibration constant is the lower number).
4. Modify calibration constant #242, YTM Offset; Band 5, to maximize low end power. Power may peak twice. Adjust to the lower peak.
5. Repeat steps 2 through 4 until power is optimized over the full band.
6. Record the value of calibration constant #242, YTM Offset; Band 5

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 5. Change calibration constant #242 back to its original value.

Band 6 Adjustment (HP 836518 only).

1. On the synthesizer, press:

START (33.4) **GHz**
STOP (38) **GHz**

2. Set the band 6 SRD bias calibration constants as follows:
 - a. Increment calibration constant #110, SRD Bias A; Band 6, to maximize low end power. Then decrease power by 15 counts.

 Increment calibration constant #123, SRD Bias B; Band 6, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
3. Adjust calibration constant #230, YTM Gain; Band 6, for maximum power at the high end of band 6. The high end power may peak twice. If it does, adjust the calibration constant to the lower peak (where the value of the calibration constant is the lower number).
4. Modify calibration constant #243, YTM Offset; Band 6, to maximize low end power. Power may peak twice. Adjust to the lower peak.

5. Repeat steps 2 through 4 until power is optimized over the full band.
6. Record the value of calibration constant #243, YTM Offset; Band 6

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 5. Change calibration constant #243 back to its original value.

Band 7 Adjustment (HP 836518 only).

1. On the synthesizer, press:

START

38

GHz

STOP

50

GHz
2. Set the band 7 SRD bias calibration constants as follows:
 - a. Increment calibration constant #111, SRD Bias A; Band 7, to maximize low end power. Then decrease power by 15 counts.
 - b. Increment calibration constant #124, SRD Bias B; Band 7, to maximize high end power. Then decrease the power by one third division ($\approx 1/2$ dB).
3. Adjust calibration constant #231, YTM Gain; Band 7, for maximum power at the high end of band 7. The high end power may peak twice. If it does, adjust the calibration constant to the lower peak (where the value of the calibration constant is the lower number).
4. Modify calibration constant #244, YTM Offset; Band 7, to maximize low end power. Power may peak twice. Adjust to the lower peak.
5. Repeat steps 2 through 4 until power is optimized over the full band.
6. Record the value of calibration constant #244, YTM Offset; Band 7

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 2 through 5. Change calibration constant #244 back to its original value.

YTM Single Band Adjustments

During this adjustment single band performance is checked. Then rise time calibration constants are adjusted if necessary.

1. Set up the synthesizer, press:
(START) and enter the start frequency for band 1 from Table 3-3.
(STOP) and enter the stop frequency for band 1 from Table 3-3.
(CONT) [SWEEP] (200) (msec)

Table 3-3. Single Band Frequency Ranges

Band	Start Frequency (GHz)	Stop Frequency (GHz)
1	2	7
2	7	13.5
3	13.5	20
4 ¹	20	26.5
5 ²	26.5	33.4
6 ²	33.4	38
7 ²	38	50

1 HP 83631B/51B only.

2 HP 83651B only.

Note

The oscilloscope vertical sensitivity is initially set to 50 mV/division (5 mV/division with a 10:1 probe) providing a logarithmic scale of ≈ 1.5 dB/division. If necessary, decrease the vertical sensitivity for some frequency bands to 100 mV/division in order to display the entire trace on the CRT. If you do change the vertical sensitivity by half, remember that the logarithmic scale must change by half also.

2. Switch between the fastest sweep time and a 200 ms sweep time and check that the power changes less than $2/3$ division (≈ 1 dB). If not, adjust the appropriate calibration constants (YTM Delay Term A/B Hrm (n), where (n) is the number of the band being adjusted) and repeat this step.

However, if fast sweep has more power than slow sweep, do not readjust and continue with the next step. To determine the calibration constant, refer to Figure 3- 18.

- On the synthesizer, set:
SWEEP TIME **0** **msec**
- Press **(SINGLE)** several times to initiate several sweeps and check that the power changes less than 2/3 division (≈ 1 dB). If not, adjust the same calibration constants used for continuous sweep and repeat this step.
- Repeat steps 1 through 4 for each band in Table 3-3.

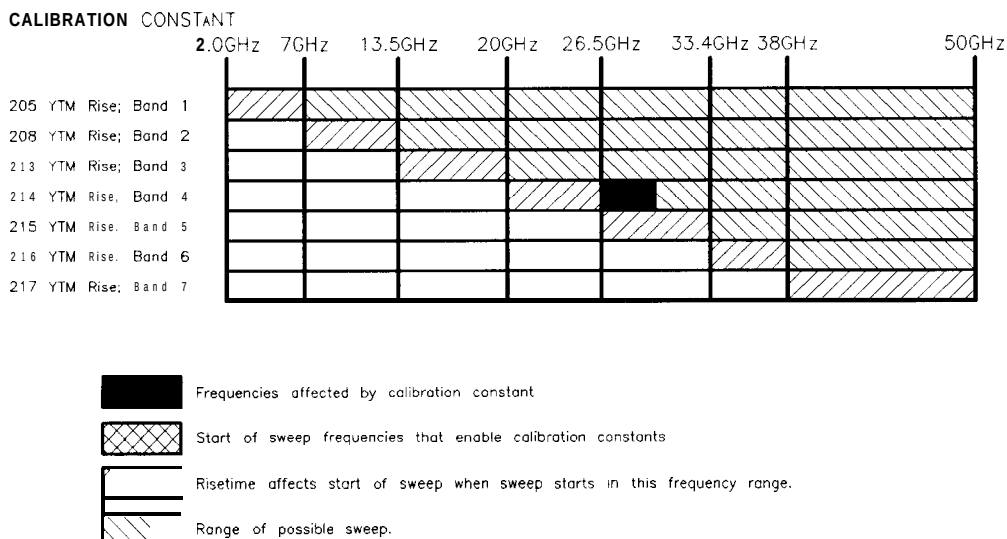


Figure 3-18. YTM Single Band Risetime Compensation

YTM Multi-band Adjustments

During this adjustment multi-band performance is checked. Then rise time and Bx calibration constants are adjusted if necessary.

- Set up the synthesizer, press:
(START) and enter the start frequency for range 1 from Table 3-4.
(STOP) and enter the stop frequency for range 1 from Table 3-4.
(CONT) **SWEEP TIME** **200** **msec**

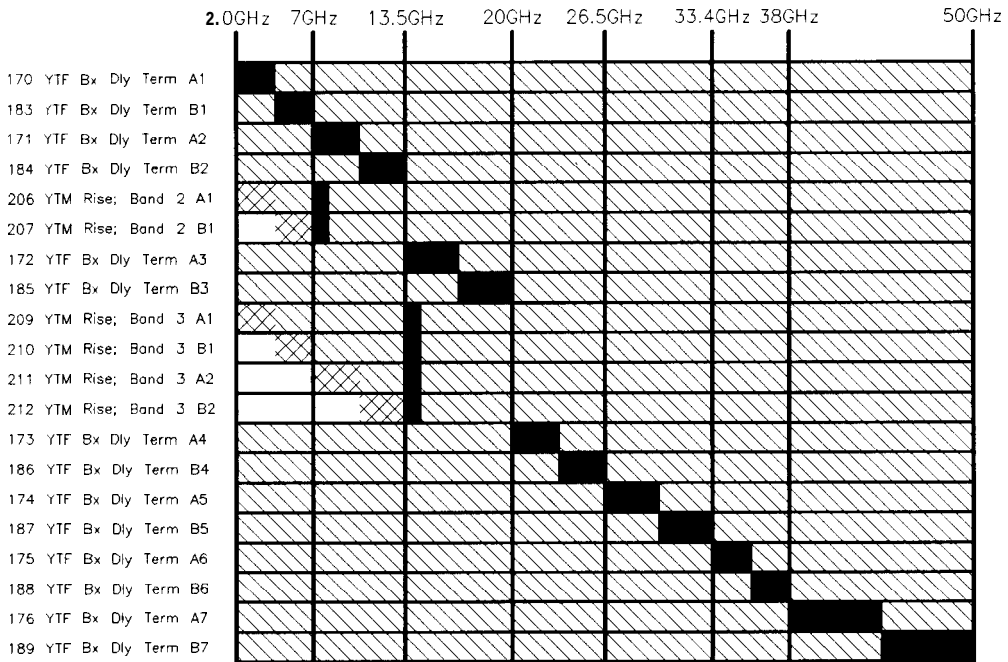
Table 3-4. Multi-Band Frequency Ranges

Range	Start Frequency (GHz)	Stop Frequency (GHz)
1	13	20
2	7	20
3	10	20
4	2	20
5	5	20
6 ¹	2	26.5
7 ¹	15	26.5

1 HP 83631B/51B only.

- Switch between the fastest sweep time and a 200 ms sweep time and check that the power changes less than 2/3 division (≈ 1 dB). If not, adjust the appropriate calibration constants (YTM Bx Dly Term A/B and Risettime) and repeat this step. However, if fast sweep has more power than slow sweep, do not readjust and continue with the next step. To determine the calibration constant, refer to Figure 3-19.
- On the synthesizer, set:
SWEEP TIME 0 msec
- Press SINGLE several times to initiate several sweeps and check that the power changes less than 2/3 division (≈ 1 dB). If not, adjust the same calibration constants used for continuous sweep and repeat this step.
- Repeat steps 1 through 4 for each band in Table 3-4.

CALIBRATION CONSTANT



-  Frequencies affected by calibration constant
-  Start of sweep frequencies that enable calibration constants
-  Risetime affects start of sweep when sweep starts in this frequency range
-  Range of possible sweep

Example 1 YTM Rise; Band 3 B1 affects the beginning of Band 3 when the sweep starts in the second half of Band 1 and end* in Bands 3 through 7.

Example 2 YTM Rise; Band 4 affects the beginning of Band 4 when the sweep starts in Bands 1 through 3 or it affects the frequency of the start of sweep when the start of sweep is anywhere in Band 4.

Figure 3-19. YTM Multi-Band Delay and Risetime Compensation

Related Performance Tests

Maximum Leveled Power

In Case Of Difficulty

1. See “Adjustment Help” in this procedure.
2. Verify that the equipment setup is correct.
3. Verify the oscilloscope ALC board calibration. When calibrated, the voltage on the oscilloscope is scaled to ≈ 33 mV/dB.
4. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

10. Amplifier/Filter Adjustments (HP 83651B Only)

Description

This procedure maximizes RF power by tracking the YIG tuned filter to the RF output frequency. Initial tracking is done in single band sweeps at slow sweep speeds to eliminate the effects of bandcross and hysteresis in the tuning coil. (Those will be corrected with delay calibration constants.) Auto tracking is initiated to optimize the slow sweep tracking.

The YTF delay compensation adjustments maximize power for fast single band and multi-band sweeps. The YTM rise time adjustments are done in multi-band fast sweeps to optimize power at the start of each frequency band.

A squegging clamp adjustment limits the power and is adjusted for maximum output power and takes out gain reversal.

Note

If you have replaced either the YO or the YO driver, first initiate an auto tracking (press **USER CAL** Tracking Menu Auto Track .) If auto tracking passes and the instrument passes the “Maximum Leveled Power” performance test, do not continue with this procedure. If auto tracking fails, (an error message is displayed), continue with this procedure.

Adjustment Help

The following explanations are provided for a better understanding of the amplifier/filter adjustments. Refer to these explanations as often as necessary. They will help make these adjustments easier. (The adjustment procedure follows.)

Offset and Gain Adjustments.

- For all offset and gain adjustments, adjust *through* the bandpass. Keep adjusting until the power peaks and then drops off. Then reset the adjustment to the peaked point.
- For all offset and gain adjustments, if power stays peaked over several calibration constant values, set the calibration constant to the middle value of the peaked range.

Squegg Clamp Calibration Constants.

Squegg clamp calibration constants are available to limit the power into the amplifier/filter. The band 1 adjustment is set for a specific output power at the start of band 1. All other squegg clamp adjustments are set to a default value to allow maximum output power.

- When increasing any squegg clamp calibration constant, power is increased too far when any of the following occurs:
 - Any portion of the trace is distorted or power drops out in a portion of the trace.
 - Power drops over a broad frequency range.
 - Power stops increasing on any portion of the trace.

Adjusting for the Center of the Passband.

- The passband and tuning linearity of the amplifier/filter varies with frequency. The amplifier/filter adjustments track the amplifier/filter passband with the amplifier/multiplier output frequency over the full frequency range of the synthesizer.

Single Band Delay Compensation Adjustments.

- If a drop in power greater than 1.5 dB occurs when in single sweep, increase the A delay term to put the A term at the high end of the peak. For example, for the following calibration constant values:

Start of the peak = 1800

Middle of the peak = 1950

End of the peak = 2100

Set the A term to 2050

Sweep Speed Related Adjustments.

- Delay compensation and rise time adjustments are affected by sweep speed. The adjustments are performed at fast sweep speeds which are the worst case. All other adjustments are performed at slow sweep speeds; they are not affected by sweep speed.

If you have a sweep speed problem, it is probably affected by delay compensation or rise time adjustments.

YTF Bandcross Delay Terms. The YTF Bx Dly terms are either offset or gain terms. A1 denotes the offset term for band 1. B1 denotes the gain term for band 1. The offset (A) should be adjusted to maximize power at the beginning of the band. The gain (B) is adjusted to maximize power toward the end of the band.

Equipment Setup

1. Connect the equipment as shown in Figure 3-20 using an analog oscilloscope with A versus B sweep capability. Do not connect the power meter yet. (See Figure 3-21 for location detail of XA10J2 pin 55 on the motherboard.) Power on all the instruments and let them warm up for at least one hour.
2. On the synthesizer, set:
PRESET (SERVICE) Tools Menu Disable Doubler (asterisk on)
3. On the power meter:
Zero and calibrate the power meter/sensor.
Set the power meter to dBm mode.

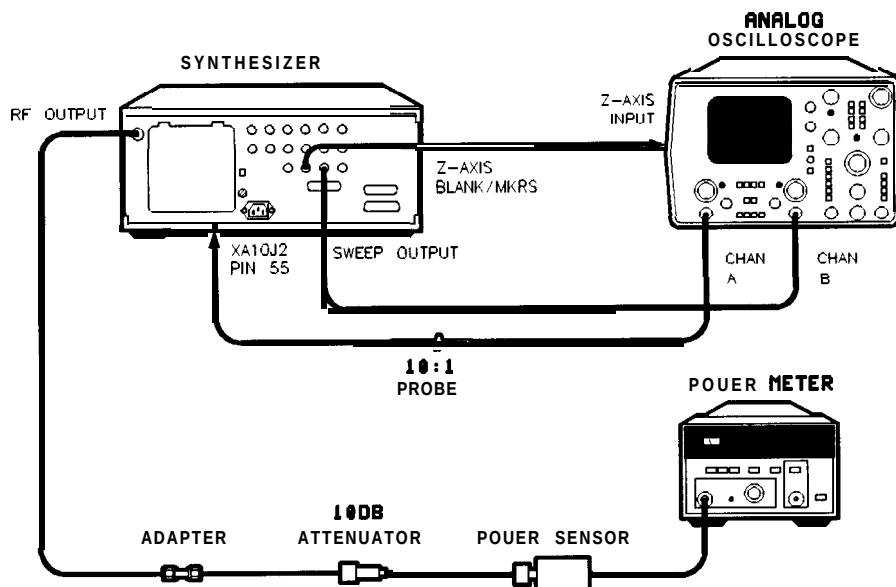


Figure 3-20. Amplifier/Filter Adjustments Setup

Equipment

Analog Oscilloscope	HP 1740A
Oscilloscope Probes	HP 10431A
Power Meter	HP 436A/437A/438A
Power Sensor	HP 8487A
Attenuator 10 dB	HP 8490D Option 010

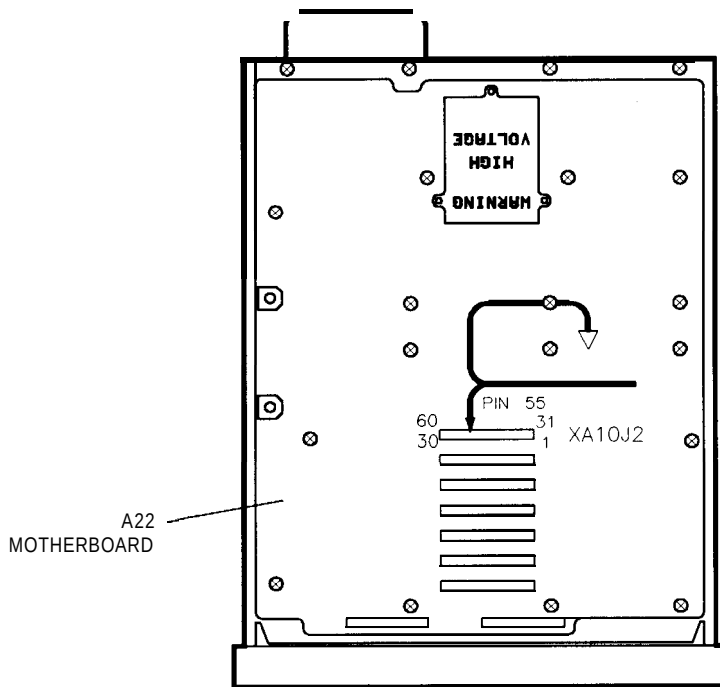


Figure 3-21. XA10J2 Location

4. Set the default values given in Table 3-4 into the corresponding amplifier/filter calibration constants. On the synthesizer, set:

SERVICE Adjust Menu Calib Menu

Select Cal Enter the number of the first calibration constant from Table 3-4 and terminate the entry with (ENTER). When using the front panel emulator software, pressing the arrow keys will allow you to vary the calibration constants. The calibration constant shown at the top of the “display” window is the active constant.

Modify Cal Enter the default value from Table 3-4 and terminate the entry with (ENTER).

Using the up/down arrow keys, select each of the rest of the calibration constants in Table 3-4 and set their default values by entering the value on the numeric keypad. Terminate your entry with the (ENTER) key.

Table 3-4.
Amplifier/Filter Calibration Constants and Default Values

Number	Description	Default. Value	Adjustment Description
131	Squegg Clamp 1A	255	Maximize power across the band without squegging. Adjusted at slow sweep speeds and single sweep mode where the SYTM sphere is most likely to squegg.
132	Squegg Clamp 2A	255	
133	Squegg Clamp 3A	255	
134	Squegg Clamp 4A	255	
135	Squegg Clamp 5A	255	
136	Squegg Clamp 6A	255	
137	Squegg Clamp 7A	255	
205	YTM Rise; Band 1	15	Minimize power dropouts at the start of band. Adjustment is only effective at fast sweep speeds.
206	YTM Rise; Band 2 A1	20	
207	YTM Rise; Band 2 B1	2	
208	YTM Rise; Band 2 A2	15	
209	YTM Rise; Band 3 A1	70	
210	YTM Rise; Band 3 B1	7	
211	YTM Rise; Band 3 A2	15	
212	YTM Rise; Band 3 B2	15	
213	YTM Rise; Band 3 A3	15	
214	YTM Rise; Band 4	15	
215	YTM Rise; Band 5	15	
216	YTM Rise; Band 6	10	
217	YTM Rise; Band 7	10	
449	Damp Clamp 1	255	Protect the bridge detector from excessive power when doubler amp mode is selected.
450	Damp Clamp 2	255	
451	Damp Clamp 3	255	
452	Damp Clamp 4	255	
453	Damp Clamp 5	255	
454	Damp Clamp 6	255	
455	Damp Clamp 7	255	

Table 3-4.
Amplifier/Filter Calibration Constants and Default Values
(continued)

Number	Description	Default Value	Adjustment Description
561	YTF Delay Term A Hrm 1	1000	Maximize power over first 20% of band. Affects fast sweeps only. Single sweep mode is also critical.
562	YTF Delay Term A Hrm 2	1000	
563	YTF Delay Term A Hrm 3	1000	
564	YTF Delay Term A Hrm 4	1000	
565	YTF Delay Term A Hrm 5	1000	
566	YTF Delay Term A Hrm 6	1000	
567	YTF Delay Term A Hrm 7	1000	
571	YTF Delay Term B Hrm 1	300	Maximize power over higher 30% of band. Affects fast sweeps only.
572	YTF Delay Term B Hrm 2	300	
573	YTF Delay Term B Hrm 3	300	
574	YTF Delay Term B Hrm 4	300	
575	YTF Delay Term B Hrm 5	300	
576	YTF Delay Term B Hrm 6	300	
577	YTF Delay Term B Hrm 7	300	
591	YTF Bx Dly Term A1	1000	Delay compensation for multi-band sweeps only. Adjust for maximum power at lower 50% of band. Affects fast sweep speeds only.
592	YTF Bx Dly Term A2	1000	
593	YTF Bx Dly Term A3	1000	
594	YTF Bx Dly Term A4	1000	
595	YTF Bx Dly Term A5	1000	
596	YTF Bx Dly Term A6	1000	
597	YTF Bx Dly Term A7	1000	
601	YTF Bx Dly Term B1	300	Delay compensation for multi-band sweeps only. Adjust for maximum power at higher 30% of band. Affects fast sweep speeds only.
602	YTF Bx Dly Term B2	300	
603	YTF Bx Dly Term B3	300	
604	YTF Bx Dly Term B4	300	
605	YTF Bx Dly Term B5	300	
606	YTF Bx Dly Term B6	300	
607	YTF Bx Dly Term B7	300	

Table 3-4.
Amplifier/Filter Calibration Constants and Default Values
(continued)

Number	Description	Default Value	Adjustment Description
621	*YTF Gain Band 1	2048	Maximize power over higher 10% of band. Adjust at slow sweep speeds.
622	*YTF Gain Band 2	2048	
623	*YTF Gain Band 3	2048	
624	*YTF Gain Band 4	2048	
625	*YTF Gain Band 5	2048	
626	*YTF Gain Band 6	2048	
627	*YTF Gain Band 7	2048	
631	*YTF Offset Band 1	2048	Maximize power over lower 10% of band. Adjust at slow sweep speeds.
632	*YTF Offset Band 2	2048	
633	*YTF Offset Band 3	2048	
634	*YTF Offset Band 4	2048	
635	*YTF Offset Band 5	2048	
636	*YTF Offset Band 6	2048	
637	*YTF Offset Band 7	2048	

Amplifier/Filter Offset and Gain Adjustment

Band 1 Adjustment.

1. On the synthesizer, set:

START 2.0 GHz

STOP 7 GHz

SWEEP TIME 200 msec

ALC Leveling Mode ALCoef (asterisk on)

POWER LEVEL 25 dBm

Note that the synthesizer has unleveled output power.

2. On the oscilloscope, set:

Channel A:

Volts/Division: 5 mV/Division
Offset: As required
Input Coupling: DC
Input Impedance: 1 M Ω

Channel B

Volts/Division: 1 V/Division
Offset: As required
Input Coupling: DC
Input Impedance: 1 M Ω
Sweep Mode: A versus B

Adjust Channel A offset, volts/division, and horizontal position controls for a trace that fills the full horizontal display. Adjust the vertical position with the A vertical position control.

Note	In the following adjustment power dropouts may occur due to gain reversal. Ignore the squegging (the squegg clamp will be adjusted later) and peak the adjustment for maximum power.
-------------	--

3. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop (≈ -20 dBm).
4. Adjust A12R126 YTFG to maximize high end power (last two horizontal display divisions).

Caution	If the YTMG potentiometer is adjusted by mistake, the amplifier/multiplier adjustment must be repeated.
----------------	---

5. Modify calibration constant #631, YTF Offset; Band 1, to maximize low end power.
 6. Repeat steps 4 and 5 until the entire band is peaked.
 7. Record the value of calibration constant #631, YTF Offset; Band 1
-

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 3 through 6 until it is. Then change calibration constant #631 back to the recorded value.

8. On the synthesizer, set:

POWER LEVEL **0** **dBm**

Note

For band 1 only, clamp most of the band to ensure no gain reversal.

9. Adjust calibration constant #131, Squegg Clamp 1A, to maximize RF output power across the band. The clamp is adjusted correctly when the following is true:
- a. An increase in the calibration constant value decreases the output power.
 - b. A small decrease in the calibration constant value results in no change in output power.
10. Adjust calibration constant #131, Squegg Clamp 1A as described here, to protect the bridge detector from excessive power:
- a. Set the oscilloscope vertical position as necessary to display the trace.
 - b. On the synthesizer, set:
SWEEP **MENU** Manual Sweep (asterisk on)
 - c. Using the rotary knob, find the peak of the sweep as displayed by the oscilloscope (generally found at the high end of the sweep).
 - d. If the power level of the peak point is greater than 23.5 dBm, as displayed on the power meter, decrease Squegg Clamp 1A until the power level is less than these values but not so low that the 2 GHz point fails maximum leveled power.

If the power level of the peak point is already less than these values, return the synthesizer to continuous sweep and decrease Squegg Clamp 1A just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).

11. Adjust calibration constant #449, DAmP Clamp 1 as described here, to protect the bridge detector from excessive power while in doubler amp mode:
 - a. On the synthesizer, set:
SERVICE Tools Menu Disable Doubler (asterisk off)
POWER **MENU** Dblr **Amp Menu** Doubler Amp Mode On (asterisk on)
 - b. Set the oscilloscope vertical position as necessary to display the trace.
 - c. On the synthesizer, set:
SWEEP **MENU** Manual Sweep (asterisk on)
 - d. Using the synthesizer rotary knob, find the peak of the sweep as displayed by the oscilloscope.
 - e. If the power level of the peak point is greater than 23.5 dBm, as displayed on the power meter, decrease DAmP Clamp 1 until the power level is less than this level.

If the power level of the peak point is already less than this level, set the synthesizer back to continuous sweep and decrease DAmP Clamp 1 just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).
12. Disable the doubler, turn doubler amp mode off, and return the synthesizer to continuous sweep if you are still in manual sweep.

Band 2 Adjustment.

1. On the synthesizer, set:

 - START 7 GHz
 - STOP 13.5 GHz
 - POWER LEVEL 25 dBm
2. Set the oscilloscope vertical position as necessary to display the trace.
3. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop (≈ -13 dBm).
4. Modify calibration constant #622, YTF Gain; Band 2, to maximize high end power.

5. Modify calibration constant #632, YTF Offset; Band 2, to maximize low end power.
6. Repeat steps 4 and 5 until the entire band is peaked.
7. Record the value of calibration constant #632, YTF Offset; Band 2

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 3 through 6 until it is. Then change calibration constant #632 back to the recorded value.

8. On the synthesizer, set:

POWER LEVEL 0 dBm

9. Adjust calibration constant #132, Squegg Clamp 2A, to protect the bridge detector from excessive power:

- a. Set the oscilloscope vertical position as necessary to display the trace.

- b. On the synthesizer, set:

SWEEP MENU Manual Sweep (asterisk on)

- c. Using the rotary knob, find the peak of the sweep as displayed by the oscilloscope (generally found at the start of the sweep).

- d. If the power level of the peak point is greater than 22.7 dBm, as displayed on the power meter, decrease Squegg Clamp 2A until the power level is less than these values.

If the power level of the peak point is already less than these values, return the synthesizer to continuous sweep and decrease Squegg Clamp 2A just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).

10. Adjust calibration constant #450, DAmP Clamp 2 as described here, to protect the bridge detector from excessive power while in doubler amp mode:

- a. On the synthesizer, set:

SERVICE Tools Menu Disable Doubler (asterisk off)

POWER MENU Dblr Amp Menu Doubler Amp Mode On (asterisk on)

- b. Set the oscilloscope vertical position as necessary to display the trace.
- c. On the synthesizer, set:
SWEEP **(MENU)** Manual Sweep (asterisk on)
- d. Using the synthesizer rotary knob, find the peak of the sweep as displayed by the oscilloscope.
- e. If the power level of the peak point is greater than 22.7 dBm, as displayed on the power meter, decrease DAmP Clamp 2 until the power level is less than these values.

If the power level of the peak point is already less than these values, set the synthesizer back to continuous sweep and decrease DAmP Clamp 2 just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).

11. Disable the doubler, turn doubler amp mode off, and return the synthesizer to continuous sweep if you are still in manual sweep.

Band 3 Adjustment.

1. On the synthesizer, set:
(START) **(13.5)** **(GHz)**
(STOP) **(20)** **(GHz)**
(POWER LEVEL) **(25)** **(dBm)**
2. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop.
3. Set A12R108 B3S1 fully clockwise (see Figure 3-22).

Note There are two sets of potentiometers on the A12 assembly with identical names. Make certain you are adjusting the correct ones.

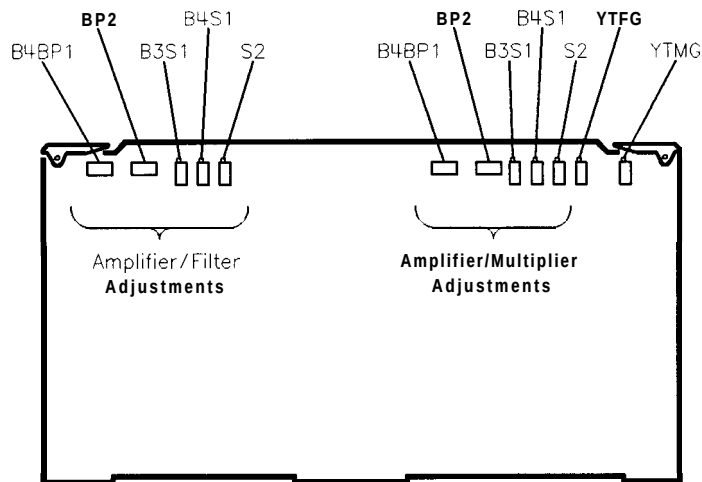


Figure 3-22. A12 Assembly Potentiometer Locations

4. Set calibration constant #623, YTF Gain; Band 3, to 2048.
5. Modify calibration constant #633, YTF Offset; Band 3, to maximize low end power.
6. Adjust A12R108 B3S1 (see Figure 3-22) for maximum power over the rest of the sweep (3 to 10 divisions).
7. Repeat steps 5 and 6 until power is optimized over the full band.
8. Record the value of calibration constant #633, YTF Offset; Band 3

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 3 through 7 until it is. Then change calibration constant #633 back to the recorded value.

9. On the synthesizer, set:

POWER LEVEL 0 dBm
10. Adjust calibration constant #133, Squegg Clamp 3A, to protect the bridge detector from excessive power:
 - a. Set the oscilloscope vertical position as necessary to display the trace.

- b. On the synthesizer, set:
SWEEP **MENU** Manual Sweep (asterisk on)
- c. Using the rotary knob, find the peak of the sweep as displayed by the oscilloscope.
- d. If the power level of the peak point is greater than 22.3 dBm, as displayed on the power meter, decrease Squegg Clamp 3A until the power level is less than these values.

If the power level of the peak point is already less than these values, return the synthesizer to continuous sweep and decrease Squegg Clamp 3A just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).

11. Adjust calibration constant #451, DAmP Clamp 3 as described here, to protect the bridge detector from excessive power while in doubler amp mode:

- a. On the synthesizer, set:
SERVICE Tools Menu Disable Doubler (asterisk off)
POWER **MENU** Dblr **Amp Menu** Doubler Amp Mode On (asterisk on)

- b. Set the oscilloscope vertical position as necessary to display the trace.

- c. On the synthesizer, set:
SWEEP **MENU** Manual Sweep (asterisk on)

- d. Using the synthesizer rotary knob, find the peak of the sweep as displayed by the oscilloscope.
- e. If the power level of the peak point is greater than 22.3 dBm, as displayed on the power meter, decrease DAmP Clamp 3 until the power level is less than these values.

If the power level of the peak point is already less than these values, set the synthesizer back to continuous sweep and decrease DAmP Clamp 3 just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).

12. Disable the doubler, turn doubler amp mode off, and return the synthesizer to continuous sweep if you are still in manual sweep.

Band 4 Adjustment.

1. On the synthesizer, set:

START **20** **GHz**
STOP **26.5** **GHz**
(POWER LEVEL) **(25)** **dBm**

2. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop.
3. Set the following potentiometers, located on the left side of the board, as follows:
 - A12R109 B4S1 fully clockwise
 - A12R110 S2 fully clockwise
 - A12R105 B4BP1 centered
 - A12R106 BP2 fully clockwise
4. Set the oscilloscope vertical position as necessary to display the trace.
5. Modify calibration constant #634, YTF Offset; Band 4, to maximize low end power.
6. Modify calibration constant #624, YTF Gain; Band 4, to maximize power at the first division on the display.

Note

If there is no noticeable increase in power in the next two adjustments, leave the potentiometers at their preset position.

7. Adjust A12R105 B4BP1 for maximum power to optimize the 3rd through the 7th divisions. Stop when the power begins to decrease.
8. Adjust A12R109 B4S1 for maximum high-end power. (If the potentiometer hits the stop, back it off slightly.)
9. Repeat step 6.
10. Adjust A12R106 BP2 for the highest power in the last one half division.
11. Repeat steps 2 through 7 until the entire band is peaked.

- 12 Record the value of calibration constant #634, YTF Offset; Band 4

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 5 through 11 until it is. Then change calibration constant #634 back to the recorded value.

- 13 On the synthesizer, set:

(POWER LEVEL) 0 dBm

14. Adjust calibration constant #134, Squegg Clamp 4A, to maximize RF output power across the band.
15. Adjust calibration constant #452, DAmpl Clamp 4 as described here, to protect the bridge detector from excessive power while in doubler amp mode:
- On the synthesizer, set:
(SERVICE) Tools Menu Disable Doubler (asterisk off)
POWER (MENU) Dblr Amp Menu Doubler Amp Mode On (asterisk on)
 - Set the oscilloscope vertical position as necessary to display the trace.
 - On the synthesizer, set:
SWEEP (MENU) Manual Sweep (asterisk on)
 - Using the synthesizer rotary knob, find the peak of the sweep as displayed by the oscilloscope.
 - If the power level of the peak point is greater than 23.5 dBm, as displayed on the power meter, decrease DAmpl Clamp 4 until the power level is less than these values.

If the power level of the peak point is already less than these values, set the synthesizer back to continuous sweep and decrease DAmpl Clamp 4 just until the peak point begins to drop (this indicates that power to the bridge detector is clamped).
16. Disable the doubler, turn doubler amp mode off, and return the synthesizer to continuous sweep if you are still in manual sweep.

Attention! For bands 5 through 7, perform only the SRD bias adjustments (steps 1 and 2) *unless* a problem is found in the auto tracking verification. Auto tracking will set the other calibration constants. (If so, you will be instructed to repeat the adjustments performing all of the steps.)

Band 5 Adjustment.

1. On the synthesizer set:

START 26.5 GHz
STOP 33.4 GHz
(POWER LEVEL) 0 dBm

2. Set the oscilloscope vertical position as necessary to display the trace.
3. Adjust calibration constant #135, Squegg Clamp 5A, to maximize RF output power across the band.
4. On the synthesizer, set:
POWER LEVEL (25) dBm
5. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop.
6. Modify calibration constant #625, YTF Gain; Band 5, to maximize high end power.
7. Modify calibration constant #635, YTF Offset; Band 5, to maximize low end power.
8. Repeat steps 6 and 7 until the entire band is peaked.
9. Note the value of calibration constant #635, YTF Offset; Band 5

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 6 through 8 until it is. Then change calibration constant #635 back to the recorded value.

Band 6 Adjustment.

1. On the synthesizer set:
START **33.4** **GHz**
STOP **38** **GHz**
POWER LEVEL **0** **dBm**
2. Set the oscilloscope vertical position as necessary to display the trace.
3. Adjust calibration constant #136, Squegg Clamp 3A, to maximize RF output power across the band.
4. On the synthesizer, set:
POWER LEVEL **(25)** **dBm**
5. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop.
6. Modify calibration constant #626, YTF Gain; Band 6, to maximize high end power.
7. Modify calibration constant #636, YTF Offset; Band 6, to maximize low end power.
8. Repeat steps 6 and 7 until the entire band is peaked.
9. Note the value of calibration constant #636, YTF Offset; Band 6

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 6 through 8 until it is. Then change calibration constant #636 back to the recorded value.

Band 7 Adjustment.

1. On the synthesizer set:
START **38** **GHz**
STOP **50** **GHz**
POWER LEVEL **0** **dBm**
2. Set the oscilloscope vertical position as necessary to display the trace.
3. On the synthesizer, set:
POWER LEVEL **(125)** **dBm**

4. Adjust calibration constant #137, Squegg Clamp 7A, to maximize RF output power across the band.
5. Decrease the synthesizer power level until the level of the entire trace on the oscilloscope begins to drop.
6. Modify calibration constant #627, YTF Gain; Band 7, to maximize high end power.
7. Modify calibration constant #637, YTF Offset; Band 7, to maximize low end power.
8. Repeat steps 6 and 7 until the entire band is peaked.
9. Note the value of calibration constant #637, YTF Offset; Band 7

Step down the calibration constant in 100 count steps and verify that the entire trace shifts down evenly. If the power change is not uniform, repeat steps 6 through 8 until it is. Then change calibration constant #637 back to the recorded value.

Auto Tracking Verification.

If failures occur at any point in this verification procedure, determine the frequency of the failure and perform the YTM offset and gain adjustments (in the “Amplifier/Multiplier Adjustments”) *and* the YTF offset and gain adjustments (in this adjustment procedure) for that frequency band.

1. Initiate auto tracking on the synthesizer as follows. Terminate the RF OUTPUT with a good 50 Ω impedance match such as a 10 dB attenuator or a power sensor (not required for synthesizers with a step attenuator).

Press:

USER CAL Tracking Menu Auto Track

Wait for the synthesizer to complete auto tracking. If auto tracking fails (an error message is displayed) repeat the offset and gain adjustments for the failed frequency.

2. On the synthesizer, set:

START **2.0** **GHz**
STOP **20** **GHz**
CONT **SWEEP TIME** **1.5** **sec**

ALC Leveling Point **Intnl** (asterisk on)

POWER LEVEL (25) **dBm**

SERVICE Tools Menu Disable Doubler (asterisk off)

3. Connect the power meter to the synthesizer RF OUTPUT through the power sensor and 10 dB attenuator (see Figure 3-20). Adjust the oscilloscope horizontal control to place the low power point on a vertical graticule and note the position.
4. Select manual sweep. Press SWEEP **MENU** Manual Sweep (asterisk on). Use the arrow keys to adjust the CW frequency to the minimum power point on the oscilloscope.
5. On the power meter, check that the power at this point is not less than the specified maximum leveled power (note that power is attenuated by 10 dB). If it is, note the level and frequency, and check the following:
 - a. Review the YTF gain and offset calibration constants. The gain and offset values should fall between approximately 1000 to 3000. If the values fall below 500 or above 3500, readjust the YTF gains and offsets. Large variations between calibration constants determined by auto track and manual adjustment are normal.
 - b. If the problem continues, it is most likely hardware-related. Refer to the *HP 83621 B/31 B/51 B Synthesized Sweeper Troubleshooting Guide*.
6. Repeat steps 2 through 5 for each frequency range listed and a sweep time of 1.5 seconds.
 - **20** to 26.5 GHz
 - **26.5** to 40 GHz
 - **40** to 50 GHz

7. On the synthesizer, set:

START **2.0** **GHz**

STOP **20** **GHz**

CONT **SWEEP TIME** **1.5** **sec**

8. Set the synthesizer power level to the specified maximum leveled power. Check for ALC oscillations or level squegging.
 - a. The SRD bias A or B calibration constants for the affected band might eliminate oscillation. The problem is with the A term if the oscillations are near the beginning of the band. It is with the B term if the oscillations are near the end of the band. SRD bias has a range. It can be overbiased which causes level squegging. If so, decrease the value of the SRD bias calibration constants and repeat the adjustment.
 - b. If the SRD bias calibration constants have no effect, check the ALC Mod Gain calibration constant for the appropriate band.
9. Repeat step 8 for the same frequency ranges listed in step 3 and a sweep time of 1.5 seconds.
10. Set the synthesizer power level to 25 dBm and then set various frequency ranges such as 5 GHz to 50 GHz or 10 GHz to 45 GHz.

Set the sweep times to greater than 200 ms for single band sweeps and less than 1.5 seconds for multi-band sweeps since delay compensation has not yet been adjusted.

For each frequency range set, compare the signal levels of single sweep to continuous sweep. Band frequency ranges are as follows:

Table 3-5. Auto Tracking Verification Band Frequencies

Band	Frequency Range (GHz)
0	0.01 to < 2.0
1	2.0 to 7.0
2	7.0 to < 13.5
3	13.5 to 20.0
4	> 20.0 to 26.5
5	≥ 26.5 to < 33.4
6	≥ 33.4 to < 38
7	≥ 38 to 50

Problems here are typically associated with sphere heating while awaiting the start of sweep trigger. If necessary adjust the squegging clamp calibration constant for the appropriate band.

YTF Single Band Adjustment

During this adjustment single band performance is checked. Then rise time calibration constants are adjusted if necessary.

Attention! Adjust band 1 by performing steps 1 through 5. Then adjust bands 2 through 7 by performing steps 1 through 10 for each band.

- 1. Set up the synthesizer, press:
(START) and enter the start frequency for band 1 from Table 3-6.
(STOP) and enter the stop frequency for band 1 from Table 3-6.
(CONT) (SWEEP TIME) (200) (msec)
(POWER LEVEL) (25) (dBm)
(SERVICE) Tools Menu Disable Doubler (asterisk on)

Table 3-6. YTF Single Band Adjustment Band Frequencies

Band	Start Frequency (GHz)	Stop Frequency (GHz)
1	2	7
2	7	13.5
3	13.5	20
4	20	26.5
5	26.5	33.4
6	33.4	38
7	38	50

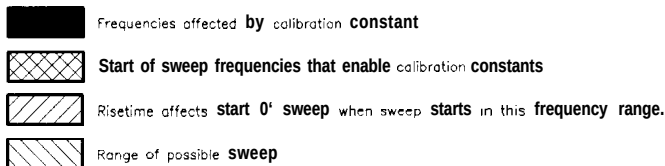
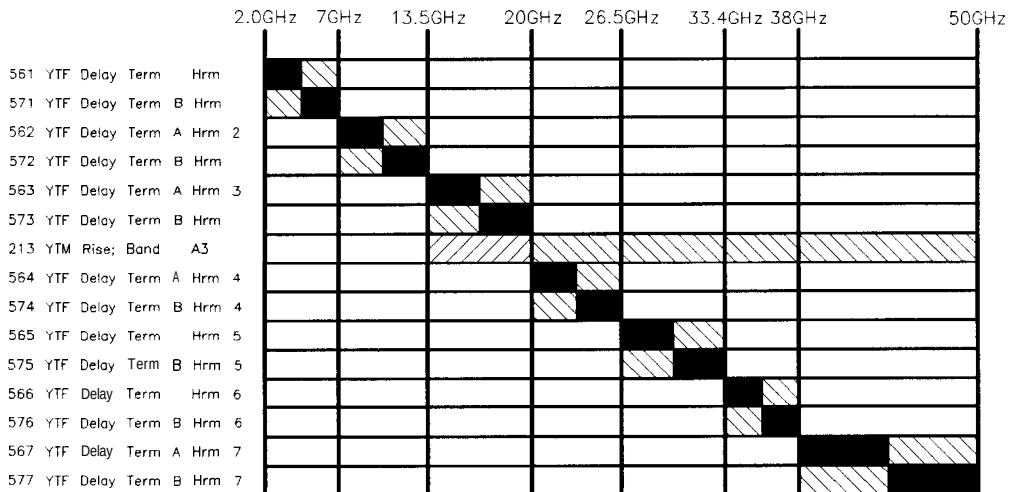
- 2. Decrease the synthesizer’s power level until the level of the entire trace on the oscilloscope begins to drop.

Note

The oscilloscope vertical sensitivity is initially set to 50 mV/division (5 mV/division with a 10:1 probe) providing a logarithmic scale of ≈ 1.5 dB/division. If necessary, decrease the vertical sensitivity for some frequency bands to 100 mV/division in order to display the entire trace on the CRT. If you do change the vertical sensitivity by half, remember that the logarithmic scale must change by half also.

3. Switch between the fastest sweep time and a 200 ms sweep time and check that the power changes less than $2/3$ division (≈ 1 dB). If not, adjust the appropriate calibration constants (YTF Delay Term A/B Hrm (n), where (n) is the number of the band being adjusted) and repeat this step. However, if fast sweep has more power than slow sweep, do not readjust and continue with the next step. To determine the appropriate calibration constant, refer to Figure 3-23.
4. On the synthesizer, set:
The image shows a control panel with three buttons: "SWEEP TIME", "0", and "msec". The "0" button is highlighted with a black border.
5. Press  several times to initiate several sweeps and check that the power changes less than $2/3$ division (≈ 1 dB). If not, adjust the same calibration constants used for continuous sweep and repeat this step.
6. If the power loss in step 5 is less than 1 dB, skip the rest of the steps in this adjustment and begin adjusting the next band at step 1.
7. Adjust the YTF Dly Term A Hrm (n), where (n) is the number of the band being adjusted, to maximize low end power.
8. Adjust the YTF Dly Term B Hrm (n), where (n) is the number of the band being adjusted, to maximize high end power.
9. Adjust the YTM Rise: Band (n) A, where (n) is the number of the band being adjusted, to minimize power drop out at the start of the band. (Risetimes rarely need adjusting.)
10. Readjust this band starting with step 2.

CALIBRATION CONSTANT



Example 1: YTM Rise; Band 3 B1 affects the beginning of Band 3 when the sweep starts in the second half of Band 1 and ends in Bands 3 through 7

Example 2: YTM Rise. Band 4 affects the beginning of Band 4 when the sweep starts in Bands 1 through 3 or it affects the frequency of the start of sweep when the start of sweep is anywhere in Band 4

Figure 3-23. YTF Single Band Delay Compensation

YTF Multi-Band Adjustment

1. Set up the synthesizer, press:

[START] and enter the start frequency for band 1 from Table 3-7.

[STOP] and enter the stop frequency for band 1 from Table 3-7.

[CONT] [SWEEP TIME] [200] [msec]

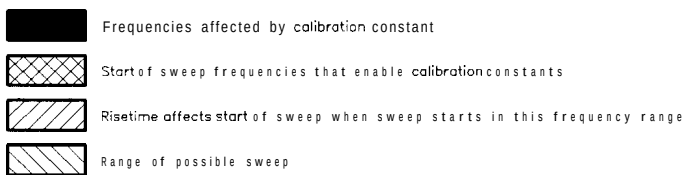
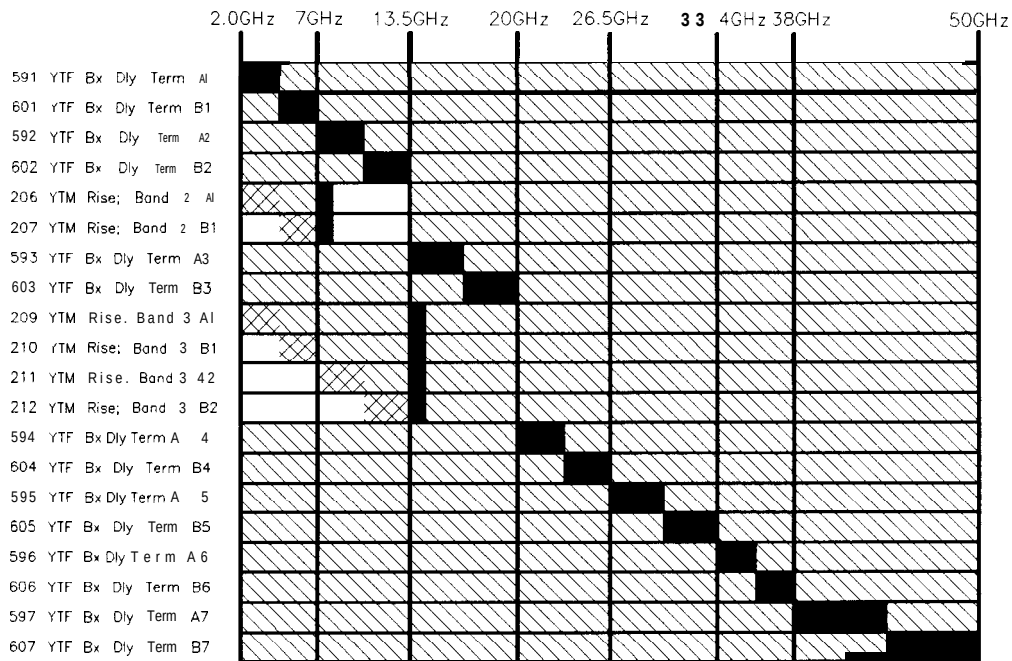
[POWER LEVEL] (25) [dBm]

Table 3-7. YTF Multi-Band Adjustment Band Frequencies

Band	Start Frequency (GHz)	Stop Frequency (GHz)
1	13	20
2	7	20
3	10	20
4	2	20
5	5	20
6	2	26.5
7	15	26.5

2. Decrease the synthesizer's power level until the level of the entire trace on the oscilloscope begins to drop.
3. Switch between the fastest sweep time and a 200 ms sweep time. Check that the power changes less than $2/3$ division (≈ 1 dB). If not, adjust the appropriate calibration constants (YTF Bx Dly Term A or B) and repeat this step. However, if fast sweep has more power than slow sweep, do not readjust and continue with the next step. To determine the appropriate calibration constants, see Figure 3-24.
4. On the synthesizer, set: [SWEEP TIME] [0] [msec]
5. Press [SINGLE] several times to initiate several sweeps and check that the power changes less than $2/3$ division (≈ 1 dB). If not, adjust the same calibration constants used for continuous sweep and repeat this step.
6. Repeat steps 1 through 5 for each range in Table 3-7.

CALIBRATION CONSTANT



Example 1 YTM Rise; Band 3 B1 affects the beginning of Band 3 when the sweep starts in the second half of Band 1 and ends in Bands 3 through 7.

Example 2 YTM Rise; Band 4 affects the beginning of Band 4 when the sweep starts in Bands 1 through 3 or it affects the frequency of the start of sweep when the start of sweep is anywhere in Band 4

Figure 3-24. YTF Multi-Band Delay and Rise Time Compensation

Operation Check.

1. Using the following start and stop frequencies, compare sweeps of 0 ms and 1 s and also single sweeps at fast speed. If a power drop of 0.5 division or greater is noted, readjust the appropriate calibration constant.
 - 0.045 to 50 GHz
 - 4.5 to 33 GHz
 - 10 to 45 GHz
 - 2 to 23 GHz
2. If this is the last calibration constant you will be adjusting, see Chapter 4, “Calibration Constants” to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

Maximum Leveled Power

In Case Of Difficulty

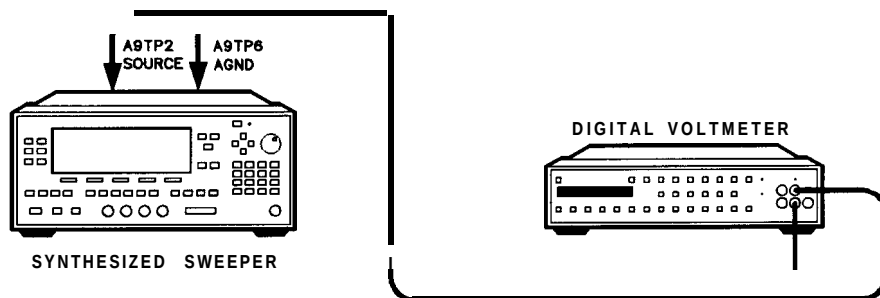
1. See “Adjustment Help” in this procedure.
2. Verify the oscilloscope ALC board calibration. When calibrated, the voltage on the oscilloscope is scaled to ≈ 33 mV/dB.
3. Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

11. Low Power SRD Bias

Description and Procedure

The synthesizer is set to 10 GHz. Then the A9 pulse board MIN adjustment sets the source voltage of the FET for the proper SRD bias level.

1. Connect the equipment as shown in Figure 3-25. Preset all instruments and let them warm up for at least one hour.



so714b

Figure 3-25. Low Power SRD Bias Adjustment Setup

Equipment

DVM	HP 3456A
-----	----------

2. On the synthesizer set:
CW **10** **GHz**.
3. Set the DVM to measure DC volts.

4. Adjust A9R85 MIN (see Figure 3-26) for -0.54 Vdc.

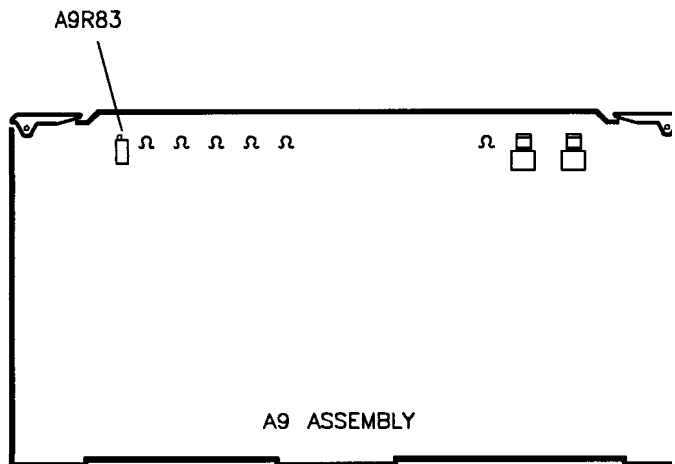


Figure 3-26. A9R85 Location

Related Performance Tests

None

In Case of Difficulty

Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

12. Modulator Offset and Gain

Description and Procedure

In this procedure, the ALC modulation offset and gain calibration constants are adjusted to set the ALC modulator response linear with the ALC power level reference voltage. Default values are entered for the modulator offset calibration constants and internal firmware is activated to set the modulator gain calibration constants. The synthesizer is then set for a power sweep across the entire leveled ALC range (-20 dBm to the maximum leveled power). The integrator level signal on the ALC board is monitored to verify linearity. If necessary, the modulator offset values are modified.

1. Connect the equipment as shown in Figure 3-27. Preset the instruments and let them warm up for at least one hour.

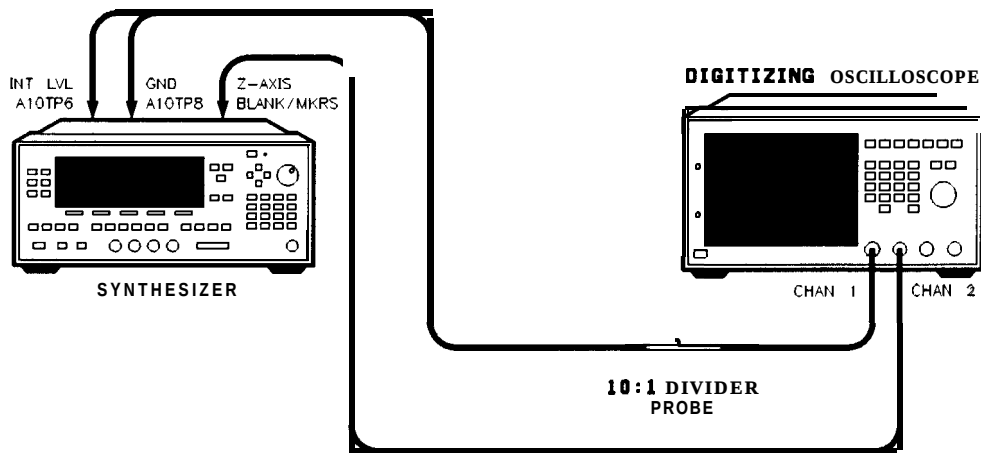


Figure 3-27. Modulator Offset and Gain Adjustment Setup

Equipment

Digitizing Oscilloscope	HP 54111D
Oscilloscope Probes	HP 10431A

2. On the synthesizer, set:

SERVICE Adjust **Menu Calib Menu**

3. If you have replaced the low band assembly (A24) or the dual modulator assembly (A38), set the ALC offset calibration constants to the default values given in Table 3-8. Otherwise, skip to step 7.

Select **Select Cal** . Using the numeric keypad, enter the number of the first calibration constant in Table 3-8. Terminate your entry with the **(ENTER)**y .

Select **Modify Cal** . Use the numeric keypad to enter the corresponding default value in Figure 3-27. Terminate your entry with the **(ENTER)** key.

4. Using the up/down arrow keys, select each of rest of the calibration constants in Figure 3-27 and set their default values by entering the value on the numeric keypad. Terminate your entry with the **(ENTER)** key.

Table 3-8. ALC Offset Calibration Constant Default Values

Calibration Constant	Description	Default Value
315	ALC Mod Ofs; Band 0	100
316	ALC Mod Ofs; Band 1	100
317	ALC Mod Ofs; Band 2	100
318	ALC Mod Ofs; Band 3	100
319	ALC Mod Ofs; Band 4	100
320	ALC Mod Ofs; Band 5	150
321	ALC Mod Ofs; Band 6	150
322	ALC Mod Ofs; Band 7	150

5. Connect the oscilloscope as shown in Figure 3-27.

6. On the oscilloscope, set:

Channel 1:

Display	On
Volts/Division	50 mV
Offset	As necessary
Input Coupling	dc
Input Impedance	1 M Ω

Channel 2:

Display	On
Volts/Division	2v
Input Coupling	dc
Input Impedance	1 M Ω

Timebase:

Time/Division	10 ms
Delay	5 ms
Delay Reference	At left
Sweep	Triggered

Trigger:

Trigger Mode	Edge
Trigger Source	Channel 2
Trigger Level	2v
Trigger Slope	Negative

Display:

Display Mode	Repetitive
Averaging	On
Number of Averages	2
Screen	Single

7. On the synthesizer, set:

CENTER	1	GHz
SPAN	0	GHz

8. Set the synthesizer power level to -20 dBm. Press:

POWER LEVEL | - | **20** **dBm**

Now set the synthesizer for a power sweep of its full ALC range. For example, if your synthesizer's specified maximum leveled power at this frequency is +10 dBm then set the power sweep to 30 dB/sweep (-20 dBm to +10 dBm = 30 dB). Press:

POWER **MENU** **POWER SWEEP** **30** **dB**

9. Continue to set up the synthesizer as follows:

SWEEP TIME **100** **msec**

USER CAL Tracking Menu Peak RF Always (asterisk on)

10. Adjust the oscilloscope timebase so the Z-axis input goes high at the right edge of the display. This signal is low during the power sweep.
11. Change the value of the band 0 calibration constant #315 to adjust the signal variation during the power sweep (while Z-axis is low) as follows:

Adjust the calibration constant so that the trace in the last three (farthest right) graticules is as flat as possible. Initiate an AM bandwidth calibration, press: **USER CAL** AM Cal Menu AM BW Cal Once.

Repeat the adjustment and calibration until the last three graticules are as flat as possible.

12. Set the synthesizer to each of the center frequencies in Table 3-9. Change the power sweep as appropriate to sweep the full ALC range. Perform an AM bandwidth calibration and then repeat step 14 for each corresponding calibration constant.

Table 3-9. Center Frequencies and Calibration Constants

Center Frequencies (GHz)	Calibration Constants
5.0	#316 Band 1
9.0	#317 Band 2
19.0	#318 Band 3
25.0 ¹	#319 Band 4
30.01	#320 Band 5
35.01	#321 Band 6
45.01	#322 Band 7

1 Disregard if beyond your synthesizer's capability.

13. On the synthesizer, set:

(SERVICE) Adjust Menu **AssyAdj** Menu A10 Adj Menu **A10** Mod Gain

The synthesizer will measure, calculate, and store the modulator gain calibration constants.

When the adjustment is completed the following message appears on the display:

```
ModulatorGainCalCompleted
Calibrationconstantsweremodified.
```

14. If this is the last calibration constant you will be adjusting, see Chapter 4, "Calibration Constants" to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

Maximum Leveled Power

In Case of Difficulty

Refer to the *HP 83621B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

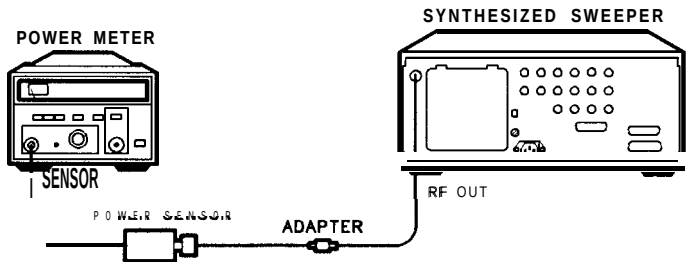
13. ALC Power Level Accuracy

Description and Procedure

This adjustment sets the absolute power accuracy in each frequency band at a CW frequency. The digital ALC calibration array is loaded with zeros for the 0 dB attenuator setting to eliminate any power offset from this source. Calibration constants set the power accuracy at four power levels. A potentiometer sets the power accuracy at an 18 dBm level in the low band (not applicable for all models).

Note This adjustment procedure zeros the digital ALC calibration array at the 0 dB attenuator setting. The “Power Flatness” adjustment must be performed after this procedure.

1. Preset the equipment shown in Figure 3-28 and let them warm up for at least one hour. Do *not* connect the power sensor to the synthesizer RF OUTPUT yet.



so72b

Figure 3-28. ALC Power Level Accuracy Adjustment Setup

Equipment

Power Meter	HP 436A/437A/438A
Power Sensor	HP 8485A (HP 83621B/31B)
Power Sensor	HP 8487A (HP 83651-e)

2. Zero and calibrate the power meter/sensor and set the power meter to dBm mode. Connect the power sensor to the synthesizer's RF OUTPUT.
Set the CAL FACTOR % for the power sensor 1.9 GHz calibration factor.
3. On the synthesizer, set:
USER CAL Tracking Menu RF Peak Always (asterisk on)
4. On the synthesizer, zero the digital ALC calibration for the 0 dB attenuator setting for all frequency ranges:
SERVICE Adjust Menu **DigALC** Menu
AtnStep To Cal **0** **dB**
Cal Freq Range Lo Band ALC Cal Array (**Atn**, **Freq**) Zero
Cal Freq Range Hi Band ALC Cal Array (**Atn**, **Freq**) Zero

Note The default values given in the next step are a general starting point. If the current ALC power accuracy is within 1 dB, fewer repetitions are required if you start with the existing calibration constants unchanged.

5. Set the default values given in Table 3-10 into the corresponding ALC calibration constants. On the synthesizer, set:
SERVICE Adjust Menu Calib Menu

Select Cal Enter the number of the calibration constant from Table 3-10 and terminate the entry with **(ENTER)**.

Modify Cal Enter the default value from Table 3-10 and terminate the entry with **(ENTER)**.

Table 3-10. ALC Calibration Constants and Default Values

ALC Calibration Constant	Default Value
Low Band 0.01 to 2.0 GHz	
#265 LVL DAC Ofs Lo Bnd	120
#252 LVL DAC Gain Lo Bnd	20
#284 ALC Det Ofs; Lo	142
#293 ALC Log Brkpt; Lo	140
High Band 2.0 to 20 GHz	
#264 LVL DAC Ofs Hi Bnd	0
#251 LVL DAC Gain Hi Bnd	20
#283 ALC Det Ofs; Hi	134
#292 ALC Log Brkpt; Hi	131

Low Band ALC Power Accuracy Adjustment

- On the synthesizer, set:

CW **1** **GHz**

SERVICE **Adjust Menu Calib Menu**

- On the synthesizer, set:

[POWER LEVEL] First power level in Table 3-11

- Select the first calibration constant in Table 3-11:

Select Cal **265** **(ENTER)**

- On the synthesizer, select Modify Cal and, using the rotary knob, modify the calibration constant so that the power meter and the power level setting are the same.
- Repeat steps 8 through 10 for each power level and calibration constant given in Table 3-11.

Table 3-11. Power Level and Calibration Constant Adjustment

Power Level (dBm)	Calibration Constant Adjustment
0.0	#265 LVL DAC Ofs Lo Bnd
-10.0	#252 LVL DAC Gain Lo Bnd
-20.0	#284 ALC Det Ofs; Lo
+10.0	#293 ALC Det Log Brkpt; Lo

11. On the synthesizer, set:

(POWER LEVEL) **18** **dBm**

Adjust A10R125, +20 dBm, until the power meter and the power level setting are the same. Figure 3-29 shows the location of A10R125.

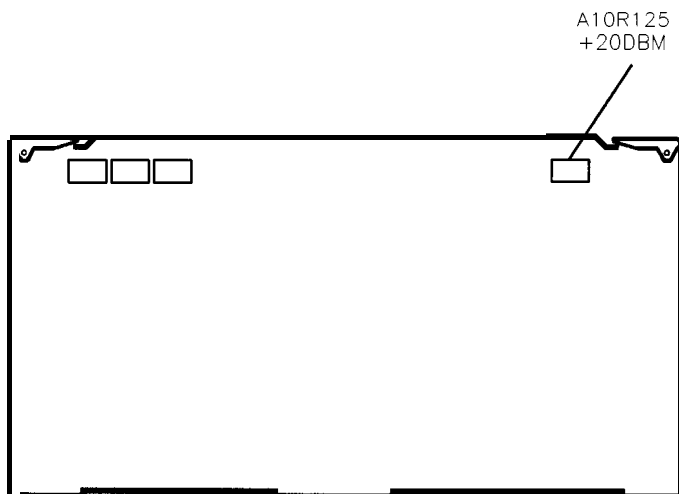


Figure 3-29. AI OR 125 Location

12. Repeat steps 8 through 12 until the power accuracy for each calibration constant is within ± 0.01 dBm for power levels ≤ 10 dBm. The +20 dBm adjustment should be within ± 0.2 dB.

High Band Power Accuracy Adjustment

13. On the synthesizer, set:
CW 10 GHz
SERVICE Adjust Menu **Calib** Menu
14. On the power meter, set the CAL FACTOR % for the power sensor 10 GHz calibration factor.
15. On the synthesizer, set:
[POWER LEVEL] First power level in Table 3-12
16. Select the first calibration constant in Table 3-12:
 Select Cal (264) [ENTER]
17. On the synthesizer, select Modify Cal and, using the rotary knob, modify the calibration constant so that the power meter and the power level setting are the same.
18. Repeat steps 16 through 18 for each power level and calibration constant given in Table 3-12.
19. Repeat steps 16 through 19 until the power accuracy for each calibration constant is within ± 0.01 dBm.

Table 3-12. Power Level and Calibration Constant Adjustment

Power Level (dBm)	Calibration Constant Adjustment
0.0	#264 LVL DAC Ofs Hi Bnd
-10.0	#251 LVL DAC Gain Hi Bnd
-20.0	#283 ALC Det Ofs; Hi
+10.0	#292 ALC Det Log Brkpt; Hi

20. If this is the last calibration constant you will be adjusting, see Chapter 4, “Calibration Constants” in this manual to store the calibration constants as protected data (in EEPROM).

Related Performance Tests

None

In Case of Difficulty

Refer to the *HP 83621 B/31B/51B Synthesized Sweeper Troubleshooting Guide*.

Calibration Constants

Introduction

Viewing and editing the calibration constants of the synthesizer may be done using an automated test utility in software provided with this manual. These calibration constants may be protected with a user-defined password to prevent unauthorized access.

Refer to “Automated Tests” in this manual for an explanation of the calibration constants and front panel emulator utility software, and the program hardware and language requirements for running the software. Use the front panel emulator software to access the calibration constants, service menu, and password. This chapter describes the password and other specific information about the calibration constants.

This section contains the following information on calibration constants and how to use them:

- Definition.
- Memory Areas.
- Checksum Verification.
- Calibration Constant Password.
- Changing Working Data Calibration Constants.
- Saving Working Data Calibration Constants.
- Loading Protected Data Calibration Constants.
- Loading Default Data Calibration Constants.
- Calibration Constant Descriptions.

Definition

Calibration constants are data which describe your individual instrument. Calibration constants contain serial number prefix, hardware configuration, and board revision information. Calibration constants also contain calibration information specific to the operation of each instrument that is used to make sure that the instrument meets specifications.

Note	Changing calibration constants can cause your instrument to <i>not</i> meet specifications.
-------------	---

Memory Areas

The synthesizer has three memory areas reserved for calibration constants:

Working Data

Working data is the set of calibration constants accessed during normal operation and contains the calibration information required for optimum instrument performance. Working data is stored in RAM, and is maintained by a battery.

Protected Data

Protected data resides in EEPROM. This calibration data is essentially the same as working data, but is not dependent on the battery. If the synthesizer's checksum test fails, or if the battery dies and working data is lost, the synthesizer copies protected data values into working data RAM.

Default Data

Default data resides in UVEPROM. This data differs from working and protected data in that it cannot be changed. This data represents a typical synthesizer, and is not optimized for your instrument. The default calibration constants are a starting point for calibration. The synthesizer will probably not meet specifications. The synthesizer uses default data if a problem exists in both working and protected data or if you select Default Cal in the calibration utility menu.

Checksum Verification

At instrument power on, the calibration constants stored in RAM are added and compared with the checksum value. If the two values match, the current calibration constants are maintained in RAM.

If the RAM checksum does not verify, the calibration constants are loaded into RAM from EEPROM. These calibration constants are added and compared with their checksum value. If the two values match, these calibration constants (from EEPROM) are maintained in RAM.

If the RAM checksum still does not verify, the default calibration constants are loaded into RAM from UVEPROM. A message is displayed on the synthesizer indicating that the default calibration constants are in use. The synthesizer will probably not meet performance specifications. All the performance tests should be run.

Calibration Constant Password

The synthesizer is shipped with a factory-set password. A password disables access to the adjustment menu unless the password is entered (see “Entering a Password”). Calibration constants cannot be manually altered without accessing the adjustment menu.

The following is the factory-set password: 8360

You can set a new password. See “Setting a Password”.

You can eliminate the password. See “Disabling a Password”.

If you have forgotten the password, or if you require access to the calibration constant adjustments for calibration purposes and do not know the password, see “Bypassing the Password”.

Entering a Password

An asterisk on the Disable Adjust softkey in the service menu indicates that a password is set. In order to access the adjustment menu you must enter that password:

1. Run the front panel emulator software and press **SERVICE** Adjust Menu.

The following message is displayed: ENTER PASSWORD: 0

2. Enter the correct password using the numeric keypad and press **ENTER**.

The asterisk on the Disable Adjust softkey turns off.

3. Select Adjust Menu again to access the adjustment menu.

Entering the password allows permanent access to the adjustment menu, even if line power is cycled. To disable access again, set another password.

Disabling a Password

If you wish to eliminate a password (either the factory-set password or one you set yourself), perform the following:

1. Run the front panel emulator software and press **SERVICE** Disable Adjust .

The following message is displayed: ENTER PASSWORD: 0

2. Enter the current password using the numeric keypad and press **ENTER**.

The asterisk on the Disable Adjust softkey turns off.

Disabling the password allows permanent access to the adjustment menu, even if line power is cycled.

Setting a Password

If a password is already set on the synthesizer and you wish to change it, first follow the “Disabling a Password” procedure. This eliminates the current password. Then continue with this procedure.

If no password is set on the synthesizer (there is no asterisk on the Disable Adjust softkey), and you wish to set a password, perform the following:

1. Press **SERVICE** Disable Adjust.

The following message is displayed: SET PASSWORD: 0

2. Enter the desired password using the numeric keypad. Up to 14 numeric digits are allowed. Terminate the entry by pressing: **ENTER**.
3. A warning message is displayed informing you that the adjustment menus will no longer be accessible. To verify that you do wish to set the password, select Yes, Confirm .

The asterisk on the Disable Adjust softkey turns on, indicating the password is set.

Bypassing the Password

If you require access to the adjustment menu for calibration purposes, a password is set, and you do not know the password, perform the following:

1. Turn off line power to the synthesizer.
2. Open A15S1 switch 5 (set the switch to the "1" position).
3. Turn on line power to the synthesizer and press **SERVICE**.

The asterisk on the **Disable Adjust** softkey turns off enabling access to the adjustment menu.

When access to the adjustment menu is no longer desired, enable the previously set password. Perform the following:

4. Turn off line power to the synthesizer.
5. Close A15S1 switch 5 (set the switch to the "0" position).
6. Turn on line power to the synthesizer and press **SERVICE**.

The asterisk on the **Disable Adjust** softkey turns on indicating that you cannot access the adjustment menu.

If you have forgotten the password and wish to set a new one, perform steps 1 through 3 and then steps 7 through 10.

7. On the synthesizer, select **Disable Adjust** .

The following message is displayed: SET PASSWORD: 0

8. Enter the desired password using the numeric keypad. Up to 14 numeric digits are allowed. Terminate the entry by pressing: (**ENTER**).
9. A warning message is displayed informing you that the adjustment menus will no longer be accessible. To verify that you do wish to set the password, select Yes, Confirm .
10. Another warning message is displayed informing you that the A15S1 switch 5 is set open. Complete steps 4 through 6 to close the switch and enable the password.

Changing Working Data Calibration Constants

If you need to modify the working data calibration constants, the following procedure accesses the calibration constants and lets you change them.

1. Run the front panel emulator software and press **SERVICE** Adjust Menu Calib Menu.

2. Select Select Cal.

Enter the number of the calibration constant you wish to change using the up/down arrow keys, the rotary knob, or the numeric keypad. Terminate numeric keypad entries by pressing [ENTER].

3. Select Modify Cal .

Change the value of the calibration constant using the right/left arrow keys, the rotary knob, or the numeric keypad. Terminate numeric keypad entries by pressing (ENTER).

4. Exit the calibration menu using the **PRIOR** key or by pressing **PRESET**.

Saving Working Data Calibration Constants

In some adjustment procedures you will change working data calibration constants. The following procedure stores the calibration constants as protected data (in EEPROM).

1. Run the front panel emulator software and press **SERVICE** Adjust Menu
Calib Menu Cal Util Menu.

2. Select Save Cal .

A warning is displayed informing you that changing the calibration constants may drastically affect instrument performance. To verify that you do wish to save the new calibration constants, select yes .

The working data calibration constants are now stored as protected data (in EEPROM).

3. Exit the calibration utility menu using the **PRIOR** key or pressing (**PRESET**).

Loading Protected Data Calibration Constants

If your working data calibration constants have been altered or deleted, the following procedure loads the protected calibration constants from EEPROM into working data memory.

1. Run the front panel emulator software and press **SERVICE** Adjust Menu Calib Menu Cal Util Menu.

2. Select Recall Cal.

A warning is displayed informing you that changing the calibration constants may drastically affect instrument performance. To verify that you do wish to recall the protected data calibration constants, select yes .

The protected data calibration constants are now loaded into working data.

3. Exit the calibration utility menu using the **PRIOR** key or pressing (**PRESET**).

Loading Default Data Calibration Constants

If you want to use the generic synthesizer calibration constants as working data, the following procedure loads the default calibration constants from UVEPROM into working data memory.

1. Run the front panel emulator software and press **SERVICE** Adjust Menu Calib Menu Cal Util Menu.

2. Select Default1 Cal .

A warning is displayed informing you that changing the calibration constants may drastically affect instrument performance. To verify that you do wish to recall the default calibration constants, select yes .

The default data calibration constants are now loaded into working data.

3. Exit the calibration utility menu using the (**PRIOR**) key or pressing (**PRESET**).

Calibration Constant Descriptions

Table 4-9 provides the following information for each calibration constant:

- The calibration constant number in ascending order.
- The calibration constant name. An asterisk indicates that this calibration constant is adjusted by an automated adjustment.
- The range of realistic adjustment (adjustment outside of the range may be possible but will probably cause the synthesizer to be severely misadjusted) or the default value (some calibration constants are set to a default value and are not adjustable).
- The related adjustment procedure, manual, automated, or front panel, that adjusts that calibration constant.

Note	Blank calibration constants are reserved for future use.
-------------	--

Table 4-9. Calibration Constant Descriptions

Number	Description	Range or Default	Related Adjustment
1	Identifier Response	0 — HP 83620A 1 — HP 83621A 2 — HP 83622A 3 — HP 83623A 4 — HP 83624A 5 — HP 83640A 6 — HP 83642A 7 — HP 8340B 8 — HP 83631A 9 — HP 8341B 10 — HP 83650A 11 — HP 83651A 12 — HP 83652A 13 — HP 83630A 14 — HP 83632A 15 — HP 83620B 16 — HP 83621B 17 — HP 83622B 18 — HP 83623B 19 — HP 83624B 20 — HP 83640B 21 — HP 83631B 22 — HP 83650B 23 — HP 83651B 24 — HP 83630B 25 — HP 836231, 26 — HP 836301, 27 — HP 83640L 28 — HP 83650L	
2	Delay After RF On	2	
3	User Configuration	0	
4	Lockout Features	0	
5	Display Field Lock	0	
6	Retrace Dwell Time	0	
7			
8			
9			
10			
11			
12			
13			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
14			
15			
16	Production Info 1	0	
17	Production Info 2	0	
18	Production Info 3	Instrument specific	
19	Production Info 4	Instrument specific	
20	Production Info 5	Instrument specific	
21	Lock Dwell Time	2	
22	Max Ph Lk Wait	100	
23	YO Slew Rate	500	
24	YO Kick Max	6000	
25	YO Settle Rate	20	
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36	YO Dly Term A Bnd 0	400 to 800	YO Delay Adjustment
37	YO Dly Term A Bnd 1	400 to 800	YO Delay Adjustment
38	YO Dly Term A Bnd 2	400 to 800	YO Delay Adjustment
39	YO Dly Term A Bnd 3	400 to 800	YO Delay Adjustment
40	YO Dly Term A Bnd 4	400 to 800	YO Delay Adjustment
41	YO Dly Term A Bnd 5	400 to 800	YO Delay Adjustment
42	YO Dly Term A Bnd 6	400 to 800	YO Delay Adjustment
43	YO Dly Term A Bnd 7	400 to 800	YO Delay Adjustment
44			
45			
46			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range o Default	Related Adjustment
47			
48			
49			
50	YO Dly Term B Bnd 0	300 to 700	YO Delay Adjustment
51	YO Dly Term B Bnd 1	300 to 700	YO Delay Adjustment
52	YO Dly Term B Bnd 2	300 to 700	YO Delay Adjustment
53	YO Dly Term B Bnd 3	300 to 700	YO Delay Adjustment
54	YO Dly Term B Bnd 4	300 to 700	YO Delay Adjustment
55	YO Dly Term B Bnd 5	300 to 700	YO Delay Adjustment
56	YO Dly Term B Bnd 6	300 to 700	YO Delay Adjustment
57	YO Dly Term B Bnd 7	300 to 700	YO Delay Adjustment
58			
59			
60			
61			
62			
63			
64			
65			
66			
67			
68			
69			
70			
71			
72	*CW Offset	-500 to +500	YO Driver Gain And Linearity
73	YO Off Ver; Band 0	0	
74	YO Off Ver; Band 1	0	
75	YO Off Ver; Band 2	0	
76	YO Off Ver; Band 3	0	
77	YO Off Ver; Band 4	0	
78	YO Off Ver; Band 5	0	
79	YO Off Ver; Band 6	0	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
80	YO Off Ver; Band 7	0	
81			
82			
83			
84			
85			
86			
87	YO Swp Ver; Band 0	0	
88	YO Swp Ver; Band 1	0	
89	YO Swp Ver; Band 2	0	
90	YO Swp Ver; Band 3	0	
91	YO Swp Ver; Band 4	0	
92	YO Swp Ver; Band 5	0	
93	YO Swp Ver; Band 6	0	
94	YO Swp Ver; Band 7	0	
95			
96			
97			
98			
99			
100			
101	YTM Temp Coefficient	0	
102			
103			
104			
105	SRD Bias A; Band 1	0 to 255	Amp/Multiplier Adjustments
106	SRD Bias A; Band 2	30 to 200	Amp/Multiplier Adjustments
107	SRD Bias A; Band 3	30 to 200	Amp/Multiplier Adjustments
108	SRD Bias A; Band 4	30 to 200	Amp/Multiplier Adjustments
109	SRD Bias A; Band 5	30 to 200	Amp/Multiplier Adjustments
110	SRD Bias A; Band 6	30 to 200	Amp/Multiplier Adjustments
111	SRD Bias A; Band 7	30 to 200	Amp/Multiplier Adjustments

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
112			
113			
114			
115			
116			
117			
118	SRD Bias B; Band 1	0 to 255	Amp/Multiplier Adjustments
119	SRD Bias B; Band 2	30 to 230	Amp/Multiplier Adjustments
120	SRD Bias B; Band 3	30 to 230	Amp/Multiplier Adjustments
121	SRD Bias B; Band 4	30 to 230	Amp/Multiplier Adjustments
122	SRD Bias B; Band 5	30 to 230	Amp/Multiplier Adjustments
123	SRD Bias B; Band 6	30 to 230	Amp/Multiplier Adjustments
124	SRD Bias B; Band 7	30 to 230	Amp/Multiplier Adjustments
125			
126			
127			
128			
129			
130			
131	Squegg Clamp 1A	15 to 200	Amplifier/Filter Adjustments
132	Squegg Clamp 2A	255	Amplifier/Filter Adjustments
133	Squegg Clamp 3A	255	Amplifier/Filter Adjustments
134	Squegg Clamp 4A	255	Amplifier/Filter Adjustments
135	Squegg Clamp 5A	255	Amplifier/Filter Adjustments
136	Squegg Clamp 6A	255	Amplifier/Filter Adjustments
137	Squegg Clamp 7A	255	Amplifier/Filter Adjustments
138			
139			
140			
141			
142			
143			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
144	1/TM Dly Term A Hrm 1	300 to 2000	Amplifier/Filter Adjustments
145	1/TM Dly Term A Hrm 2	300 to 2500	Amplifier/Filter Adjustments
146	1/TM Dly Term A Hrm 3	300 to 3000	Amplifier/Filter Adjustments
147	1/TM Dly Term A Hrm 4	300 to 2500	Amplifier/Filter Adjustments
148	1/TM Dly Term A Hrm 5	300 to 3000	Amplifier/Filter Adjustments
149	1/TM Dly Term A Hrm 6	300 to 3000	Amplifier/Filter Adjustments
150	1/TM Dly Term A Hrm 7	300 to 3000	Amplifier/Filter Adjustments
151			
152			
153			
154			
155			
156			
157	1/TM Dly Term B Hrm 1	100 to 500	Amplifier/Filter Adjustments
158	1/TM Dly Term B Hrm 2	200 to 500	Amplifier/Filter Adjustments
159	1/TM Dly Term B Hrm 3	100 to 500	Amplifier/Filter Adjustments
160	1/TM Dly Term B Hrm 4	200 to 500	Amplifier/Filter Adjustments
161	1/TM Dly Term B Hrm 5	200 to 500	Amplifier/Filter Adjustments
162	1/TM Dly Term B Hrm 6	200 to 500	Amplifier/Filter Adjustments
163	1/TM Dly Term B Hrm 7	200 to 500	Amplifier/Filter Adjustments
164			
165			
166			
167			
168			
169			
170	1/TM Bx Dly Term A 1	300 to 2000	Imp/Multiplier Adjustments
171	1/TM Bx Dly Term A 2	300 to 2500	Imp/Multiplier Adjustments
172	1/TM Bx Dly Term A 3	300 to 3000	Imp/Multiplier Adjustments
173	1/TM Bx Dly Term A 4	300 to 2500	Imp/Multiplier Adjustments
174	1/TM Bx Dly Term A 5	300 to 3000	Imp/Multiplier Adjustments
175	1/TM Bx Dly Term A 6	300 to 3000	Imp/Multiplier Adjustments
176	1/TM Bx Dly Term A 7	300 to 3000	Imp/Multiplier Adjustments

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
177			
178			
179			
180			
181			
182			
183	YTM Bx Dly Term B 1	200 to 500	Amp/Multiplier Adjustments
184	YTM Bx Dly Term B 2	200 to 500	Amp/Multiplier Adjustments
185	YTM Bx Dly Term B 3	200 to 500	Amp/Multiplier Adjustments
186	YTM Bx Dly Term B 4	200 to 500	Amp/Multiplier Adjustments
187	YTM Bx Dly Term B 5	200 to 500	Amp/Multiplier Adjustments
188	YTM Bx Dly Term B 6	200 to 500	Amp/Multiplier Adjustments
189	YTM Bx Dly Term B 7	200 to 500	Amp/Multiplier Adjustments
190			
191			
192			
193			
194			
195	YTM Kick Threshold	110	Amp/Multiplier Adjustments
196	YTM CW Kick Max	3600 to 9000	Amp/Multiplier Adjustments
197	YTM Mono Band Kick	2000	Amp/Multiplier Adjustments
198	YTM Stereo Baud Kick	2000	Amp/Multiplier Adjustments
199	YTM Slew Rate	400	Amp/Multiplier Adjustments
200	YTM Slew Max	50	
201	YTM Slew Min	3	
202	YTM Neg Kick Wait	2	
203	YTM Fwd Kick Pct	50	
204	YTM Fwd Kick Wait	30	
205	YTM Rise; Band 1	1 to 20	Amplifier/Filter Adjustments
206	YTM Rise; Band 2 A1	20 to 25	Amplifier/Filter Adjustments
207	YTM Rise; Band 2 B1	1 to 4	Amplifier/Filter Adjustments
208	YTM Rise; Band 2 A2	10 to 20	Amplifier/Filter Adjustments
209	YTM Rise; Band 3 A1	5 to 255	Amplifier/Filter Adjustments

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
210	YTM Rise; Band 3 B1	0 to 50	Amplifier/Filter Adjustments
211	YTM Rise; Band 3 A2	5 to 255	Amplifier/Filter Adjustments
212	YTM Rise; Band 3 B2	0 to 50	Amplifier/Filter Adjustments
213	YTM Rise; Band 3 A3	1 to 20	Amplifier/Filter Adjustments
214	YTM Rise; Band 4	1 to 50	Amplifier/Filter Adjustments
215	YTM Rise; Band 5	1 to 50	Amplifier/Filter Adjustments
216	YTM Rise; Band 6	1 to 50	Amplifier/Filter Adjustments
217	YTM Rise; Band 7	1 to 50	Amplifier/Filter Adjustments
218			
219			
220			
221			
222			
223			
224			
225	*YTM Gain; Band 1	1500 to 2500	Amp/Multiplier Adjustments; Auto Track
226	*YTM Gain; Band 2	1000 to 2500	Amp/Multiplier Adjustments; Auto Track
227	*YTM Gain; Band 3	500 to 2500	Amp/Multiplier Adjustments; Auto Track
228	*YTM Gain; Band 4	500 to 2500	Amp/Multiplier Adjustments; Auto Track
229	*YTM Gain; Band 5	500 to 2500	Amp/Multiplier Adjustments; Auto Track
230	*YTM Gain; Band 6	500 to 2500	Amp/Multiplier Adjustments; Auto Track
231	*YTM Gain; Band 7	500 to 2500	Amp/Multiplier Adjustments; Auto Track
232			
233			
234			
235			
236			
237			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
238	*YTM Offset; Band 1	1500 to 2500	Amp/Multiplier Adjustments; Auto Track
239	*YTM Offset; Band 2	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
240	*YTM Offset; Band 3	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
241	*YTM Offset; Band 4	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
242	*YTM Offset; Band 5	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
243	*YTM Offset; Band 6	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
244	*YTM Offset; Band 7	1500 to 3000	Amp/Multiplier Adjustments; Auto Track
245			
246			
247			
248	YTM B2 Offset Offset	-50 to +50	Amp/Multiplier Adjustments
249	Auto Track DAC Setting	2048	
250			
251	*LVL DAC Gain Hi Bnd	-100 to +100	ALC Power Level Accuracy; Detector Cal
252	*LVL DAC Gain Lo Bnd	-100 to +100	ALC Power Level Accuracy; Detector Cal
253	*LVL DAC Gain Xtal	-100 to +100	Detector Cal
254	*LVL DAC Gain 2ndOut	0	
255	*LVL DAC Gain PwrMtr	-100 to +100	
256	*LVL DAC Gain Module	-100 to +100	
257	*LVL DAC Gain ALC Off	0	
258			
259			
260			
261			
262			
263			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
264	*LVL DAC Ofs Hi Bnd	-50 to +300	ALC Power Level Accuracy; Detector Cal
265	*LVL DAC Ofs Lo Bnd	100 to 250	
266	*LVL DAC Ofs Xtal	-1000 to +1000	
267	*LVL DAC Ofs 2ndOut	0	
268	*LVL DAC Ofs PwrMtr	-100 to +100	
269	*LVL DAC Ofs Module	-100 to +100	
270	*LVL DAC Ofs ALC Off	0	
271			
272			
273			
274	Internal FM Flat	-10,000 to +10,000	Modulation Gen Flatness
275	FM DAC Gain Trim	-1000 to +1000	
276	AM DAC Gain Trim	-1000 to +1000	
277	AM Offset	-20 to +20	
278			
279			
280			
281			
282			
283	*ALC Det Ofs; Hi	100 to 160	ALC Power Level Accuracy; Detector Cal
284	*ALC Det Ofs; Lo	100 to 160	
285	*ALC Det Ofs; Xtal	100 to 160	
286	*ALC Det Ofs; 2nd Out	100 to 160	
287			
288			
289			
290			
291			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
292	*ALC Log Brkpt; Hi	0 to 255	ALC Power Level Accuracy; Detector Cal
293	*ALC Log Brkpt; Lo	0 to 255	
294	*ALC Log Brkpt; Xtal	0 to 255	
295	*ALC Log Brkpt; 2nd	0 to 255	
296			
297			
298			
299			
300			
301	*ALC Mod Gain; Band 0	100 to 200	Modulator Offset And Gain
302	*ALC Mod Gain; Band 1	100 to 200	
303	*ALC Mod Gain; Band 2	50 to 120	
304	*ALC Mod Gain; Band 3	50 to 90	
305	*ALC Mod Gain; Band 4	0 to 255 (HP 83621B) 50 to 120 (HP 83631B/51B)	
306	*ALC Mod Gain; Band 5	0 to 255 (HP 83621B/31B) 50 to 120 (HP 83651B)	
307	*ALC Mod Gain; Band 6	0 to 255 (HP 83621B/31B) 50 to 120 (HP 83651B)	
308	*ALC Mod Gain; Band 7	0 to 255 (HP 83621B/31B) 50 to 120 (HP 83651B)	
309			
310			
311			
312			
313			
314			
315	ALC Mod Ofs; Band 0	50 to 150	
316	ALC Mod Ofs; Band 1	50 to 150	
317	ALC Mod Ofs; Band 2	150 to 220	
318	ALC Mod Ofs; Band 3	150 to 220	
319	ALC Mod Ofs; Band 4	100 to 200	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
320	4LC Mod Ofs; Band 5	00 to 200	
321	4LC Mod Ofs; Band 6	00 to 200	
322	4LC Mod Ofs; Band 7	.00 to 200	
323			
324			
325			
326			
327			
328			
329	Slow Sym Low Band	.00 to 160	
330	Slow Sym High Band	.00 to 160	
331	Attenuator Sw Point	-1000	
332			
333			
334			
335	Squegg Clamp 1B	100	
336	Squegg Clamp 2B	100	
337	Squegg Clamp 3B	100	
338	Squegg Clamp 4B	100	
339	Squegg Clamp 5B	100	
340	Squegg Clamp 6B	100	
341	Squegg Clamp 7B	100	
342			
343			
344			
345			
346			
347			
348			
349			
350			
351	ADC 5V Range +OFF	-5000 to +5000	.DC Adjustment

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
352	ADC 15V Range +OFF	-5000 to +5000	ADC Adjustment
353	ADC 5V Range +GAIN	-1950 to +1950	ADC Adjustment
354	ADC 15V Range +GAIN	-750 to +750	ADC Adjustment
355	ADC 5V Range -OFF	-5000 to +5000	ADC Adjustment
356	ADC 15V Range -OFF	-5000 to +5000	ADC Adjustment
357	ADC 5V Range -GAIN	-750 to +750	ADC Adjustment
358	ADC 15V Range -GAIN	-1750 to +1950	ADC Adjustment
359			
360			
361			
362			
363			
364			
365			
366			
367	PwrMtr Gain; Lo Band	0	
368	PwrMtr Gain; Hi Band	0	
369	Pwr Mtr Offset	0	
370			
371			
372			
373	YTM Dly Term C Hrm 1	0	
374	YTM Dly Term C Hrm 2	0	
375	YTM Dly Term C Hrm 3	0	
376	YTM Dly Term C Hrm 4	0	
377	YTM Dly Term C Hrm 5	0	
378	YTM Dly Term C Hrm 6	0	
379	YTM Dly Term C Hrm 7	0	
380			
381			
382	YTM Bx Dly Term C 1	0	
383	YTM Bx Dly Term C 2	0	
384	YTM Bx Dly Term C 3	0	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
385	YTM Bx Dly Term C 4	0	
386	YTM Bx Dly Term C 5	0	
387	YTM Bx Dly Term C 6	0	
388	YTM Bx Dly Term C 7	0	
389			
390			
391			
392			
393	*Loop Gain: 200.0 MHz	10 to 20	Sampler Assembly
394	*Loop Gain: 200.5 MHz	10 to 20	Sampler Assembly
395	*Loop Gain: 201.0 MHz	10 to 20	Sampler Assembly
396	*Loop Gain: 201.5 MHz	10 to 20	Sampler Assembly
397	*Loop Gain: 202.0 MHz	10 to 20	Sampler Assembly
398	*Loop Gain: 202.5 MHz	10 to 20	Sampler Assembly
399	*Loop Gain: 203.0 MHz	10 to 20	Sampler Assembly
400	*Loop Gain: 203.5 MHz	10 to 20	Sampler Assembly
401	*Loop Gain: 204.0 MHz	10 to 20	Sampler Assembly
402	*Loop Gain: 204.5 MHz	10 to 20	Sampler Assembly
403	*Loop Gain: 205.0 MHz	10 to 20	Sampler Assembly
404	*Loop Gain: 205.5 MHz	10 to 20	Sampler Assembly
405	*Loop Gain: 206.0 MHz	10 to 20	Sampler Assembly
406	*Loop Gain: 206.5 MHz	10 to 20	Sampler Assembly
407	*Loop Gain: 207.0 MHz	10 to 20	Sampler Assembly
408	*Loop Gain: 207.5 MHz	10 to 20	Sampler Assembly
409	*Loop Gain: 208.0 MHz	10 to 20	Sampler Assembly
410	*Loop Gain: 208.5 MHz	10 to 20	Sampler Assembly
411	*Loop Gain: 209.0 MHz	10 to 20	Sampler Assembly
412	*Loop Gain: 209.5 MHz	10 to 20	Sampler Assembly
413	*Loop Gain: 210.0 MHz	10 to 20	Sampler Assembly
414	*Loop Gain: 210.5 MHz	10 to 20	Sampler Assembly
415	*Loop Gain: 211.0 MHz	10 to 20	Sampler Assembly
416	*Loop Gain: 211.5 MHz	12 to 24	Sampler Assembly
417	*Loop Gain: 212.0 MHz	13 to 26	Sampler Assembly

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
418	*Loop Gain: 212.5 MHz	14 to 28	Sampler Assembly
419	*Loop Gain: 213.0 MHz	14 to 28	
420	*Loop Gain: 213.5 MHz	15 to 30	
421	*Loop Gain: 214.0 MHz	16 to 32	
422	*Loop Gain: 214.5 MHz	17 to 34	
423	*Loop Gain: 215.0 MHz	18 to 36	
424	*Loop Gain: 215.5 MHz	18 to 36	
425	*Loop Gain: 216.0 MHz	19 to 38	
426	*Loop Gain: 216.5 MHz	20 to 40	
427	*Loop Gain: 217.0 MHz	22 to 44	
428	*Loop Gain: 217.5 MHz	23 to 46	
429	*Loop Gain: 218.0 MHz	24 to 48	
430	*Loop Gain: 218.5 MHz	28 to 56	
431	*Loop Gain: 219.0 MHz	30 to 60	
432	*Loop Gain: 219.5 MHz	32 to 64	
433	*Loop Gain: 220.0 Mhz	32 to 64	
434			
435			
436			
437			
438			
439			
440	Doubler Amp Mode	3 — HP 83651B 0 — HP 83621B/31B	Sweep Ramp
441	Phuoc Magic Enable	0	
442	*Sweep time Range 0	3750 to 6250	
443	*Sweep time Range 1	19655 to 32755	
444	*Sweep time Range 2	9360 to 15600	
445			
446			
447			
448			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
449	Damp Clamp 1	75 to 250	Amplifier/Filter Adjustments
450	Damp Clamp 2	75 to 250	
451	Damp Clamp 3	75 to 250	
452	Damp Clamp 4	75 to 250	
453	Damp Clamp 5	75 to 255	
454	Damp Clamp 6	75 to 255	
455	Damp Clamp 7	75 to 255	
456			
457			
458			
459			
460	Debugs	0	
461	Serial Numb Prefix	See footnote 1	
462			
463	Hardware Config 1	See footnote 1	
464	Hardware Config 2	See footnote 1	
465			
466			
467			
468			
469			
470			
471			
472			
473	Power Spec Band 0	See footnote 2	
474	Power Spec Band 1	See footnote 2	
475	Power Spec Band 2	See footnote 2	
476	Power Spec Band 3	See footnote 2	
477	Power Spec Band 4	See footnote 2	
478	Power Spec Band 5	See footnote 2	
479	Power Spec Band 6	See footnote 2	
480	Power Spec Band 7	See footnote 2	
481			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
482			
483			
484			
485			
486			
487	Max Sweep Rate	300	
488	Max Sweep Rate 8516	100	
489			
490			
491			
492			
493	A1 Revision	See footnote 3	
494	A2 Revision	See footnote 3	
495	A3 Revision	See footnote 3	
496	A4 Revision	See footnote 3	
497	A5 Revision	See footnote 3	
498	A6 Revision	See footnote 3	
499	A7 Revision	See footnote 3	
500	A8 Revision	See footnote 3	
501	A9 Revision	See footnote 3	
502	A10 Revision	See footnote 3	
503	A11 Revision	See footnote 3	
504	A12 Revision	See footnote 3	
505	A13 Revision	See footnote 3	
506	A14 Revision	See footnote 3	
507	A15 Revision	See footnote 3	
508	A16 Revision	See footnote 3	
509	A17 Revision	See footnote 3	
510	A18 Revision	See footnote 3	
511	A19 Revision	See footnote 3	
512	A20 Revision	See footnote 3	
513	A21 Revision	See footnote 3	
514	A22 Revision	See footnote 3	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
515	A23 Revision	See footnote 3	
516			
517			
518			
519			
520			
521			
522			
523			
524			
525	Hibernation Time	90	
526	Bandcross Time 1	42	
527	Bandcross Time 2	32	
528	Bandcross Time 3	28	
529	Bandcross Time 4	50 — HP 83621B/31B 26 — HP 83651B	
530	Bandcross Time 5	28	
531	Bandcross Time 6	20	
532	Bandcross Time 7	20	
533			
534			
535			
536	Special Option 1	0	
537	Special Option 2	0	
538	Special Option 3	0	
539	Special Option 4	0	
540	Special Option 5	0	
541	Special Option 6	0	
542	Special Option 7	0	
543	Special Option 8	0	
544	Special Option 9	0	
545	Special Option 10	0	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
546			
547			
548			
549			
550			
551			
552			
553			
554	Display FIFO Time	345	
555	Display FSCC Time		
556			
557			
558			
559			
560			
561	√TF Dly Term A Hrm 1	1000	Amplifier/Filter Adjustments
562	√TF Dly Term A Hrm 2	1000	Amplifier/Filter Adjustments
563	√TF Dly Term A Hrm 3	1000	Amplifier/Filter Adjustments
564	√TF Dly Term A Hrm 4	1000	Amplifier/Filter Adjustments
565	√TF Dly Term A Hrm 5	1000	Amplifier/Filter Adjustments
566	√TF Dly Term A Hrm 6	1000	Amplifier/Filter Adjustments
567	√TF Dly Term A Hrm 7	1000	Amplifier/Filter Adjustments
568			
569			
570			
571	√TF Dly Term B Hrm 1	100	Amplifier/Filter Adjustments
572	√TF Dly Term B Hrm 2	100	Amplifier/Filter Adjustments
573	√TF Dly Term B Hrm 3	100	Amplifier/Filter Adjustments
574	√TF Dly Term B Hrm 4	100	Amplifier/Filter Adjustments
575	√TF Dly Term B Hrm 5	100	Amplifier/Filter Adjustments
576	√TF Dly Term B Hrm 6	100	Amplifier/Filter Adjustments
577	√TF Dly Term B Hrm 7	100	Amplifier/Filter Adjustments

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
578			
579			
580			
581	YTF Dly Term C Hrm 1	0	
582	YTF Dly Term C Hrm 2	0	
583	YTF Dly Term C Hrm 3	0	
584	YTF Dly Term C Hrm 4	0	
585	YTF Dly Term C Hrm 5	0	
586	YTF Dly Term C Hrm 6	0	
587	YTF Dly Term C Hrm 7	0	
588			
589			
590			
591	YTF Bx Dly Term A 1	1000	Amplifier/Filter Adjustments
592	YTF Bx Dly Term A 2	1000	Amplifier/Filter Adjustments
593	YTF Bx Dly Term A 3	600 to 2500	Amplifier/Filter Adjustments
594	YTF Bx Dly Term A 4	600 to 2500	Amplifier/Filter Adjustments
595	YTF Bx Dly Term A 5	1000	Amplifier/Filter Adjustments
596	YTF Bx Dly Term A 6	1000	Amplifier/Filter Adjustments
597	YTF Bx Dly Term A 7	1000	Amplifier/Filter Adjustments
598			
599			
600			
601	YTF Bx Dly Term B 1	300	Amplifier/Filter Adjustments
602	YTF Bx Dly Term B 2	300	Amplifier/Filter Adjustments
603	YTF Bx Dly Term B 3	200 to 450	Amplifier/Filter Adjustments
604	YTF Bx Dly Term B 4	200 to 450	Amplifier/Filter Adjustments
605	YTF Bx Dly Term B 5	300	Amplifier/Filter Adjustments
606	YTF Bx Dly Term B 6	300	Amplifier/Filter Adjustments
607	YTF Bx Dly Term B 7	300	Amplifier/Filter Adjustments

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
608			
609			
610			
611	YTF Bx Dly Term C 1	0	
612	YTF Bx Dly Term C 2	0	
613	YTF Bx Dly Term C 3	0	
614	YTF Bx Dly Term C 4	0	
615	YTF Bx Dly Term C 5	0	
616	YTF Bx Dly Term C 6	0	
617	YTF Bx Dly Term C 7	0	
618			
619			
620			
621	*YTF Gain; Band 1	1500 to 2500	Amplifier/Filter Adjustments
622	*YTF Gain; Band 2	1000 to 2500	Amplifier/Filter Adjustments
623	*YTF Gain; Band 3	500 to 2500	Amplifier/Filter Adjustments
624	*YTF Gain; Band 4	500 to 2500	Amplifier/Filter Adjustments
625	*YTF Gain; Band 5	500 to 2500	Amplifier/Filter Adjustments
626	*YTF Gain; Band 6	500 to 2500	Amplifier/Filter Adjustments
627	*YTF Gain; Band 7	500 to 2500	Amplifier/Filter Adjustments
628			
629			
630			
631	*YTF Offset; Band 1	1500 to 2500	Amplifier/Filter Adjustments
632	*YTF Offset; Band 2	1500 to 3000	Amplifier/Filter Adjustments
633	*YTF Offset; Band 3	1500 to 3000	Amplifier/Filter Adjustments
634	*YTF Offset; Band 4	1500 to 3000	Amplifier/Filter Adjustments
635	*YTF Offset; Band 5	1500 to 3000	Amplifier/Filter Adjustments
636	*YTF Offset; Band 6	1500 to 3000	Amplifier/Filter Adjustments
637	*YTF Offset; Band 7	1500 to 3000	Amplifier/Filter Adjustments
638			
639			
640			

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
641	A24 Rev;Low Band	See footnote 3	
642	A25 Rev;Mod Splitter	See footnote 3	
643	A26 Rev;YIG Osc	See footnote 3	
644	A27 Rev;Isolator	See footnote 3	
645	A28 Rev;SYTM	See footnote 3	
646	A29 Rev;Amp-Det Filt	See footnote 3	
647	A30 Rev;Coupler	See footnote 3	
648	A31 Rev;Attenuator	See footnote 3	
649	A32 Rev;Doubler	See footnote 3	
650	A33 Rev;Amplifier	See footnote 3	
651	A34 Rev;RP Assembly	See footnote 3	
652	A35 Rev;Isolator	See footnote 3	
653	A36 Rev;Pulse Mod	See footnote 3	
654			
655	A38 Rev;Dual Mod	See footnote 3	
656			
657			
658			
659			
660	Quick Step Slew 0	120 — A13 Revision=4 5 — All others	
661	Quick Step Slew 1	120 — A13 Revision=4 5 — All others	
662	Quick Step Slew 2	60 — A13 Revision=4 10 — All others	
663	Quick Step Slew 3	40 — A13 Revision=4 15 — All others	
664	Quick Step Slew 4	30 — A13 Revision=4 17 — All others	
665	Quick Step Slew 5	20 — A13 Revision=4 26 — All others	
666	Quick Step Slew 6	20 — A13 Revision=4 26 — All others	
667	Quick Step Slew 7	15 — A13 Revision=4 35 — All others	

Table 4-9. Calibration Constant Descriptions (continued)

Number	Description	Range or Default	Related Adjustment
668			
669			
670	RF Interface ID	See footnote 3	
671	A9 Pulse Board ID	See footnote 3	
672	A12 YTM Driver ID	See footnote 3	
673	A28 Amp/Mult ID	See footnote 3	
674	A29 Amp/Filt ID	See footnote 3	
675	A38 Dual Mod ID	See footnote 3	
676	A36 PM/A42 PMSF ID	See footnote 3	
677	A32 Doubler ID	See footnote 3	
678	A10 ALC Board ID	See footnote 3	
679			
680			
681			
682			
683			
684			
685			
686			
687			
688			
689			
690			

¹ Specific to the synthesizer's hardware configuration. The calibration constant value is set at the factory. See Table 4-10.

² Specified maximum leveled power for the band (for example, 7 dBm equals 700, 10 dBm equals 1000).

³ Specific to the synthesizer's hardware configuration. The calibration constant ID number and revision vary depending on the assembly version. See Table 4- 11.

Table 4-10.
Hardware Configuration Cal Constants #463 and #464

Synthesizer Model Number	#463 Hardware Config 1						#464 Hardware Config 2	
	Starting Cal Constant	Option 001	Option 002	Option 004	Option 006	Option H10 ¹	Starting Value	Option 006
HP 83620B	+19,600	-128	+4	+4096	+2	-	+1	+2
HP 83622B	+19,584	-128	+4	+4096	+2	-	+1	+2
HP 83623B	+19,608	-128	+4	+4096	+2	-127	+1	-6
HP 83624B	+19,592	-128	+4	+4096	+2	-	+1	-6
HP 83630B	+19,600	-128	+4	+4096	+2		+1	+2
HP 83640B	+19,632	-128	+4	+4096	+2	-127	+1	+2
HP 83650B	+19,888	-128	+4	+4096	+2		+1	+2
HP 83621B	+30,864	-	-	-	-	-	-	-
HP 83631B	+30,864	-	-	-	-	-		-
HP 83651B	+32,176	-	-		-	-	-	-
HP 83623L	+27,792	-128		+4096	-		+1	-
HP 83630L	+27,792	-128	-	+4096	-	-	+1	-
HP 83640L	+27,824	-128	-	+4096	-		+1	
HP 83650L	+28,080	-128	-	+4096	-	-	+1	

¹ Option H10 and all other options are mutually exclusive.

Example: Calibration constant #463

$$\begin{aligned} \text{HP 83620B} + 001 + 004 &= ? \\ 19,600 - 128 + 4096 &= 23,568 \end{aligned}$$

Example: Calibration constant #464

$$\begin{aligned} \text{HP 83620B} + 006 &= ? \\ 1 + 2 &= 3 \end{aligned}$$

Table 4-11.
Assemblies and Corresponding Cal Constant ID Numbers and Revisions

Assembly	ID Number	Revision	Part Number	Description
A1	None	#493 0	08360-60001	Keyboard
A2	None	#493 0	08360-60002	Source Module Interface
A3	None	#495 0	08360-60003	Front Panel Processor
A4	None	#496 0	08360-60010	Fractional-N
A5	None	#497 1	08360-60209	YO Phase Detector
A6	None	#498 1	08360-60214	Sampler (No VCO Adj.)
A7	None	#499 0 1	08360-60008	Reference Future Use
A8	None	#500 0	08360-60166	Modulation Generator
A9	#671 1	#501 0	08360-60188	Pulse (HP 83621B/31B)
	1	0	08360-60232	Pulse (Self Bias SRD) (HP 83651B)
A10	#678 1	#502 0	08360-60206	ALC (HP 83640B/L, HP 83650B /L, and HP 83621B/31B/51B)
	0	0	08360-60222	ALC (HP 83620B/22B/24B, HP 83623B/L, and HP 83630B/L)
A11	None	#503 0	08360-60011	FM Driver
A12	#672 0	#504 0	08360-60012	Multiplier/Filter Driver (HP 83621B/31B)
	1	0	08360-60212	Multiplier/Filter Driver (HP 83651B)

Table 4-11.
Assemblies and Corresponding Cal Constant ID Numbers and
Revisions (continued)

Assembly	ID Number	Revision	Part Number	Description
A13	None	#505 3 4	08360-60213 08360-60207	YO Driver YO Driver (Quick Step) (HP 83621B/31B/51B)
A14	None	#506 0	08360-60014	Sweep Generator
A15	None	#507 1	08360-60264	CPU (Battery) 2 ROM Chip Set
A16	None	#508 0	08360-60016	Post Regulator
A17	None	#509 0	08360-60017	Rectifier/Filter
A18	None	#510 0	08360-60198	Switching Regulator
A19	None	#511 0	08360-60019	Rear Panel Interface
A20	#670 0	#512 2	08360-60266	RF Interface
A21	None	#513 0	1990-1295	Alphanumeric Display
A22	None	#514 0	08360-60196	Motherboard
A23	None	#515 0	HP 10811E	10 MHz Reference Standard
A24	None	#641 0	5086-7463	Low Band
A25	None	#642 1		Directional Coupler

Table 4-11.
Assemblies and Corresponding Cal Constant ID Numbers and
Revisions (continued)

Assembly	ID Number	Revision	Part Number	Description
A26	None	#643 0	5086-7515	YO
A27	None	#644 0		
A28	#673 1 2 2	#645 0 1 2	5086-7648 5086-7622 5086-7622	Switched Amp/Mult (HP 83621B/31B) Amp/Mult (HP 83630B/L and HP 83650B/L) Amp/Mult with Aux Out (HP 83620B, HP 83622B, HP 83623B/L, HP 83624B HP 83640B/L, and HP 83651B)
A29	#674 1 2 3 4	#646 1 1 0 1	5086-7623 5086-7636 5086-7616 5086-7637	Amp/Filter (HP 83630B/L, HP 83640B/L, HP 83650B/L, and HP 83651B) Amp/Filter (HP 83630B/40B/50B Option 006) Amp/Filter (HP 83620B/22B/23B/24B) Amp/Filter (HP 83623L)
A30	None	#647 0 0 0 0 0	0955.0148 5086-7645 5086-7605 5086-7656 5086-7603	Directional Coupler (HP 83623B/L and HP 83624B) Bridge Detector (HP 83620B/22B and HP 83630B/L) Directional Coupler (HP 83621B/31B) Bridge Detector (HP 83640B/L and HP 83650B/L) Directional Coupler (HP 83651B)

Table 4-11.
Assemblies and Corresponding Cal Constant ID Numbers and
Revisions (continued)

Assembly	ID Number	Revision	Part Number	Description
A31	None	#648		
		0	33326-60003	Step Attenuator (HP 83620B/22B/24B, HP 83623B/L, and HP 83630B/L)
		0	33326-60002	Step Attenuator (HP 83640B/L)
		0	33326-60005	Step Attenuator (HP 83650B/L)
A32	#677	#649		
	0	1	5086-7607	Frequency Doubler (HP 83640B/L)
	1	1	5086-7604	Frequency Doubler (HP 83650B/L)
	1	1	5086-7513	Frequency Doubler (HP 83651B)
A33	None	#650		
		0	5086-7465	Amplifier (High Power) (HP 83623B)
		0	50867510	Amplifier (High Power) (HP 836248)
A34	None	#651		
		0	08360-60061	RP Floating BNC (Option 004)
		0	08360-60186	RP Floating BNC (Option 002 and 004)
A35	None	#652		
		0		Not Used
A36	#676	#653		
		0		Not Used
A37				
A38	#675	#655		
	1	0	5086-7602	Dual Modulator (HP 83620B, HP 83622B, HP 83623B/L, HP 83624B, HP 83630B/L, HP 83640B/L, and HP 83650B/L)
	2	0	50867634	AM Modulator (Option 006 and HP 83621B/31B/51B)

Table 4-11.
Assemblies and Corresponding Cal Constant ID Numbers and
Revisions (continued)

Assembly	ID Number	Revision	Part Number	Description
A42	#676	#653		
	0	0		(HP 83620B/22B/24B and HP 83623B/L)
	1	1		(HP 83630B/L, HP 83640B/L, and HP 83650B/L)
	0	1	5086-7628	Pulse Mod Switched Filter (HP 83620B/22B Option 006)
	0	1	5086-7629	Pulse Mod Switched Filter (HP 83623B/24B Option 006)
	1	1	5086-7630	Pulse Mod Switched Filter (HP 83630B Option 006)
	1	1	5086-7631	Pulse Mod Switched Filter (HP 83640B/50B Option 006)

Automated Tests

Introduction

This chapter explains how to load and run the “HP 8360 Service Support Software” revision A.02.00. These tests require operator interaction.

This software requires that the synthesizer is set to the SCPI programming language. This is set by the rear panel switch or by the front panel. Refer to the “Installation” chapter of your synthesizer’s user’s guide for further information. After using the software, return the synthesizer to its original setting.

This software requires that the synthesizer is set to the SCPI programming language. This is set by the rear panel switch. Refer to “Setting Up the System” in this chapter for more information.

This chapter contains the following information on using the software:

- Setting Up the System
- Installing the Software
- Running the Software
- Automated Adjustments
 - YO Delay Adjustment
 - ADC Adjustment
 - Power Flatness Adjustment
- Utilities
 - Front Panel Emulation
 - Calibration Constants
 - Self-test

Setting Up the System

Hardware Requirements

The automated tests require an HP 9000 series 200/300 desktop computer with at least 2.25 megabytes of RAM, a disk drive, and an HP-IB interface. This program will not run with high resolution color monitors (> 512 x 390 pixels). Software is provided on two 3.5 inch disks, formatted double-sided, and are usable in double-sided disk drives only. Any required measurement instruments are listed in each test procedure.

Operating System Requirements

The test software requires BASIC version 5.1 and the following binaries.

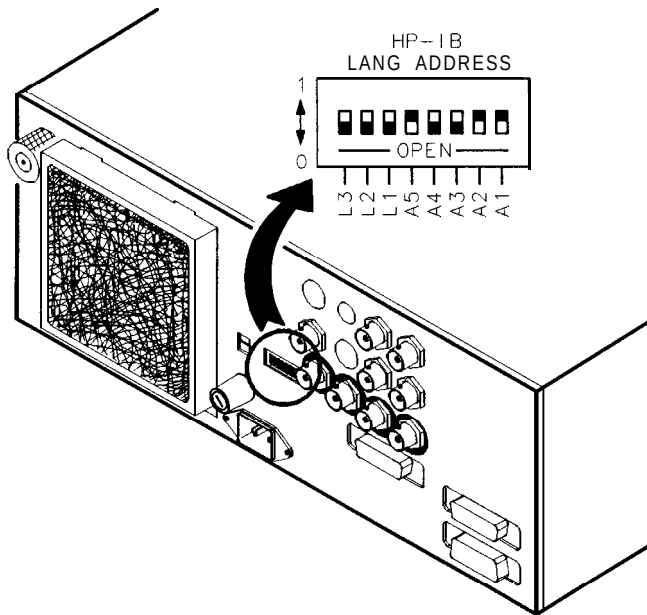
Table 5-1. Required Binaries

Language Extensions	Drivers
CLOCK	CRTA or CRTB (depends on CRT)
COMPLEX	CS80 or DISC (depends on disk)
CRTX	HFS
EDIT	HPIB
ERR	SRM
GRAPH	
GRAPHX	
IO	
KBD	
MAT	
MS	
PDEV	
TRANS	
XREF	

Refer to the BASIC user's documentation for instructions on loading the operating system and binaries.

Setting the SCPI Programming Language

The synthesizer is set to analyzer language when used in an HP 8510 system. When running automated tests or utilities, the synthesizer must be set to the SCPI programming language using the rear panel HP-IB switch. See Figure 5-1 and set the synthesizer to SCPI now.



so713b

Figure 5-1. HP-IB Switch with SCPI Setting

Remember to set the HP-IB switch back to analyzer language (with address 19) when the synthesizer is installed in an HP 8510 system.

That binary setting is: 00110011

Installing the Software

Disk Files

The automated tests are provided on two double-sided disks. Both disks are required for the software to operate properly.

Make Working Copies

Before doing anything else, make working copies of the two master disks!

Type: INITIALIZE “Address of drive containing blank floppy”

When making working copies, do not split up the files contained on Disk 1. These must all reside on the same mass storage medium. The files on Disk 2 must also reside together.

The master disks are shipped from the factory write-protected and cannot be written to or initialized in this mode. We recommend you maintain these master disks in write-protect mode. During execution of some tests, the program reads from and writes to one of the disks, use a working copy that is not write-protected when you run the software.

Installing the Program Onto a Hard Disk

We recommend that you run the software from a hard disk. It is possible to operate it from a single or dual floppy disk drive, however speed will be sacrificed.

To install the program onto your hard disk, create a directory that will contain the program and its associated files. (Refer to the BASIC user's documentation for instructions on creating directories.) After you create the directory, run the install program below to load all of the files onto your hard disk.

1. Insert master disk #1 into the floppy disk drive.
2. Type: COPY “OPV_8360:,700,0” TO “/TEST/OPV_8360:,1400,0”
3. Remove master disk #1 and insert master disk #2 into the disk drive.
4. Type LOAD “COPY_DISK:,700,0”

5. Press RUN and follow the prompts to copy all files from the second master disk to the hard disk. In this example, the source location is :700,0 and the destination location is :,1400,0

Your hard disk is now set up to run the automated tests.

Operating From a Floppy Disk

When you run the software from a floppy disk drive, be sure to leave master disk #2 in the disk drive while the program runs. If this is not done, the program will not run.

Running the Software

Caution	This software uses RAM memory volumes for fast access of data files. These volumes may also be used by other programs and could contain data that will be erased by this program. Make sure that the computer you are using does not have important data in any memory volumes before running this software.
----------------	--

Configuration Limitations

The computer containing the software must be the only controller on the bus. If more than one controller is present, the software will not run properly.

Loading the Software

1. Make sure the software has been copied into a directory (if running from a hard disk) or copied to a work disk (if running from a floppy disk).
2. Set the default mass storage to the directory or floppy disk that contains the test software. Use the BASIC MSI command. See the BASIC Language *Reference* for more information on setting the default mass storage.

Note CAPS LOCK ON or OFF cannot be changed while the program is running. Set the keyboard before you load the software.

3. Load the test software.

Insert master disk #1 in your default drive, or from your hard-drive directory, perform the following: Type:

LOAD "OPV-8360"

Press **RETURN**

- 4.** Press (RUN) to start the test program. If you are using floppy disks, the program will prompt you to install the second disk.
- 5.** Some important messages are displayed, then the program displays a menu with the available model numbers. Using the arrow keys, select the correct model to be tested. Press (SELECT).
- 6.** The program asks for the installed options and the serial number of the unit under test. Enter the appropriate information.
- 7.** A menu of the available tests is displayed. Using the arrow keys, select the appropriate test. Press (SELECT).

Note Refer to the following pages for a detailed description and specific operating information (if any) for a specific test.

- 8.** Follow the prompts in the individual tests for connection instructions and other relevant test information. When the test finishes, you are returned to the test menu.
- 9.** Either select another test to run or select the **QUIT** softkey to exit the program.

AUTOMATED ADJUSTMENTS

1. YO Delay Adjustment

Description

This adjustment uses the internal counter to measure swept frequency accuracy. YO Delay affects the swept frequency accuracy at fast sweep times (less than 100 ms). This procedure adjusts the calibration constants for the YIG oscillator to achieve consistent swept frequency accuracy over the entire operating range of the instrument.

Select the YO delay adjustment and follow the prompts on the display.

No test equipment is required.

2. ADC Adjustment

Description

This adjustment uses an external digital voltmeter (DVM) to measure VCOMP on the YO driver assembly and compares the reading to the ADC measurement. The ADC calibration constants are adjusted so that the DVM and ADC measurements are the same. The procedure is repeated for each voltage range (both plus and minus supplies).

Select the ADC adjustment and follow the prompts on the display.

The following test equipment is required for this adjustment. (The test setup is given in the software.)

Test Equipment Required

Instrument	HP Model Number
Digital Voltmeter	3456A, 3457A, or 3458A

3. Power Flatness Adjustment

Description

The test is provided as a softkey on the front panel, but cannot be run by the front panel emulation program because of it's interaction with the power meter.

This adjustment zeros the digital ALC array and measures the power from the RF output. The power is measured every 10 MHz in low band and every 100 MHz in high and millimeter bands. The calibration constants are adjusted to achieve a flat output.

The calibration factors for the power sensor must be added to the program.

The following test equipment is required for this adjustment. No substitutions are allowed. (The test setup is given in the software.)

Test Equipment Required

Instrument	HP Model Number
Power Meter	438A
Power Sensor (100 kHz to 4.2 GHz)	8482A
Power Sensor (50 MHz to 26.5 GHz)	8485A
Power Sensor (50 MHz to 50 GHz) ¹	8487A

1 For HP 83651B only.

Procedure

Select the power flatness adjustment and enter your power sensor data by following the steps below.

Note If the power sensor data was added previously, and is still current, skip the following steps and run the test.

1. Select the HELP softkey to access the power sensor configuration and calibration menus.

2. Select power meter configuration.
3. Select the sensor to edit.
4. Enter the power sensor configuration data (follow the prompts on the display).

Note

Do not edit the “Sensor ID”. The names set at the factory must remain unchanged for the program to run properly. The factory recommended “Zero Hr” is 1.00 and the “Cal Hr” is 24.00. Use the left and right arrows to move the cursor within a field and the up and down arrows to increment or decrement the value. (RETURN) selects the field.

5. When all changes have been made, select save power meter configuration.
6. Next select power meter calibration factors to add the power sensor calibration factors to the program.
7. Select current to change the active power sensor to the one for which you would like to enter the data.
8. Select edit header and enter the serial numbers of the power sensor.
9. Select edit calibration factors.
10. Enter the calibration factors from your power sensor (follow the prompts on the display).
11. When all of the calibration factors have been added, select store calibration factors to store the calibration factors for future use.
12. Exit the power meter calibration.
13. Run the power flatness adjustment.

Utilities

1. Front Panel Emulation

Description

This utility simulates an 8360 series instrument front panel keyboard in an instrument with a delete front panel option installed.

Procedure

Be sure that the HP-IB switch on the synthesizer rear panel is set to SCPI programming language. For more information, refer to “Setting the SCPI Programming Language” in this chapter.

To access the front panel emulation utility, select the front panel emulation program in the test menu.

The front panel emulation program cannot run front panel functions that use a power meter or printer. These functions cause the 8360 series instrument to act as a controller, which conflicts with the computer as the controller on the bus. Use a substitute front panel to run these functions, or use the tests provided with this software.

When using the front panel emulation program, enter the letter directly above the caret (A) to activate the function or key. Note that the keys are case sensitive (“L” means “ALC” and “1” means “LOCAL”). See Table 5-2 for a detailed listing of hardkey designations.

For numeric entry, two different terminator keys are combined on one hardkey. The actual terminator depends on the active mode of the synthesizer.

For example, when pulse width is the active entry, **10** **k** enters 10 ms. When frequency span is the active entry, **10** **k** enters 10 kHz.

Softkeys are designated by **menukey** X, where X is 1 through 5 and corresponds to the five softkey positions below the display. To activate the softkey, press

the function key on the keyboard that corresponds to the number X indicated by menukey.

Table 5-2. Synthesizer Hardkey Emulation

Hardkey	Program Display	To Activate Select
MENU SELECT		
MOD	mod	m
ALC	aLc	L
MARKER	mrK	K
USER CAL	C d	c
SERVICE	Srv	S
PRIOR	Prior	P
SYSTEM		
SAVE	saVe	V
RECALL	Rcl	R
MENU	meNu	N
USER DEFINED		
MENU	menU	U
ASSIGN	asgn	a
ENTRY		
ENTRY ON/OFF	entry off	f
GHz/dB(m)	GHz/dBm	G
MHz/uSec	MHz/uS	M
kHz/mSec	kHz/mS	k
Hz,sec/ENTER	Hz/ENT	H

Table 5-2. Synthesizer Hardkey Emulation (continued)

Hardkey	Program Display	To Activate Select
SWEEP		
[SWEEP TIME]	Time	T
[SINGLE]	sIng	I
[CONT]	cOnt	O
[MENU]	mEnu	E
FREQUENCY		
[CW]	cW	W
[START]	stArt	A
[STOP]	stop	0
[CENTER]	cent	C
[SPAN]	span	n
[MENU]	menu	u
POWER		
[POWER LEVEL]	level	v
[FLTNESS ON/OFF]	flat	t
[RF ON/OFF]	on/oFf	F
[MENU]	menu	e
INSTRUMENT STATE		
[PRESET]	preset	I
[LOCAL]	local	l

2. Calibration Constants

Description

The calibration constants utility provides a variety of ways to manipulate the calibration constants stored in the instrument.

Use this utility to print out a list of the calibration constants stored in the instrument, to make a back-up of the calibration constants, and to restore calibration constants from a backed-up file.

Procedure

Enter the password to allow access to the calibration constants by running the front panel emulation program provided with this software. See the “Calibration Constants” tab in this manual for information on accessing the calibration constants with the password.

You may need to perform several steps to reach your final goal. For example, to move the calibration constants from the instrument’s working memory to a disk for back-up, you must first move them to the computer memory, and then from computer memory to disk. To store the calibration constants, you may use the hard disk drive, Disk 2 of your working disks, or a separate data disk. When storing data on a new disk, be sure to format the disk before you begin the utility.

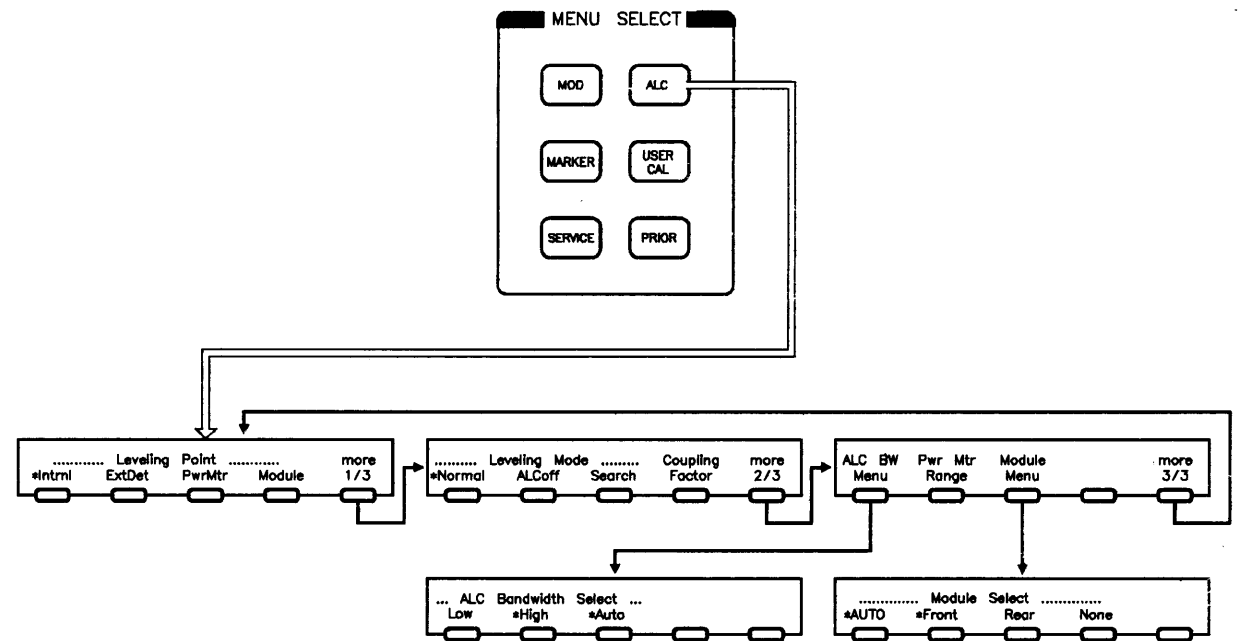
Select the calibration constants entry in the test menu and follow the prompts.

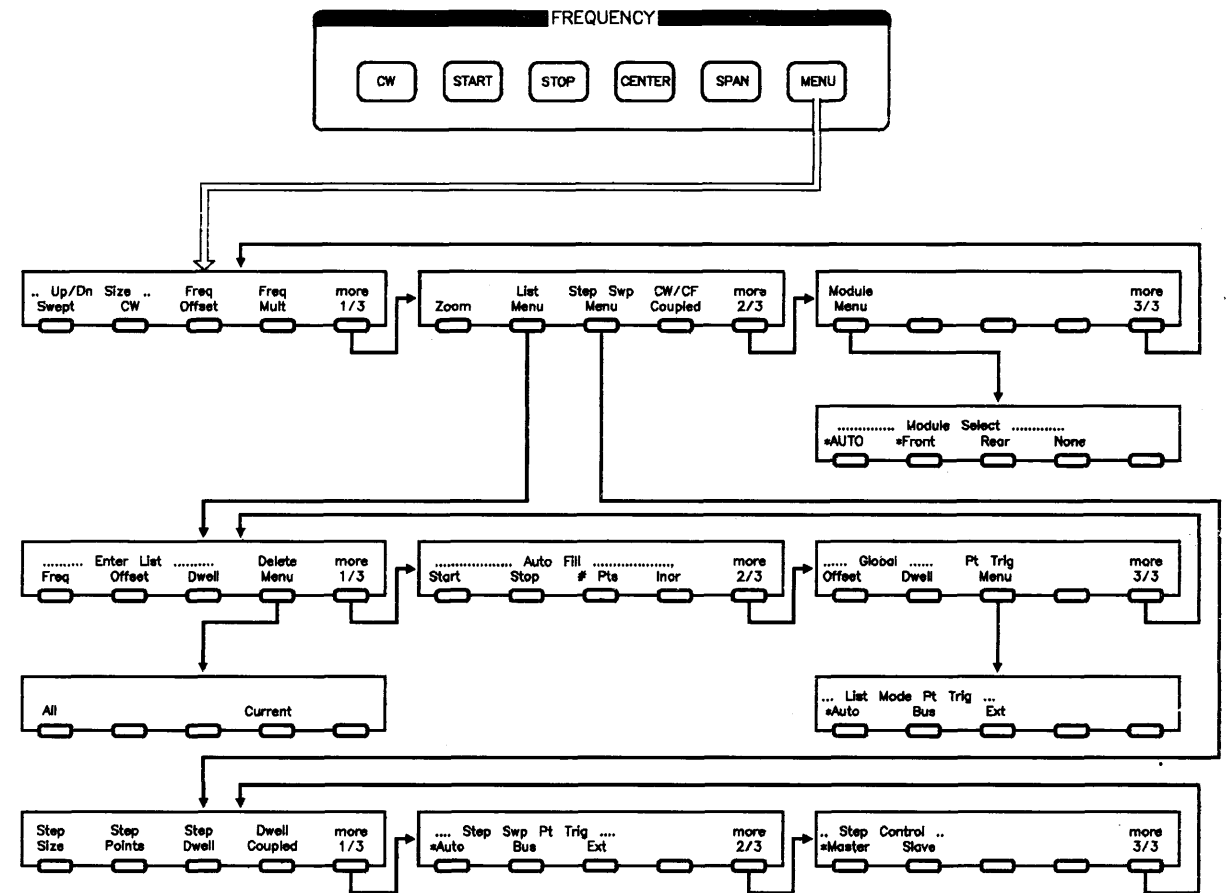
3. Self-test

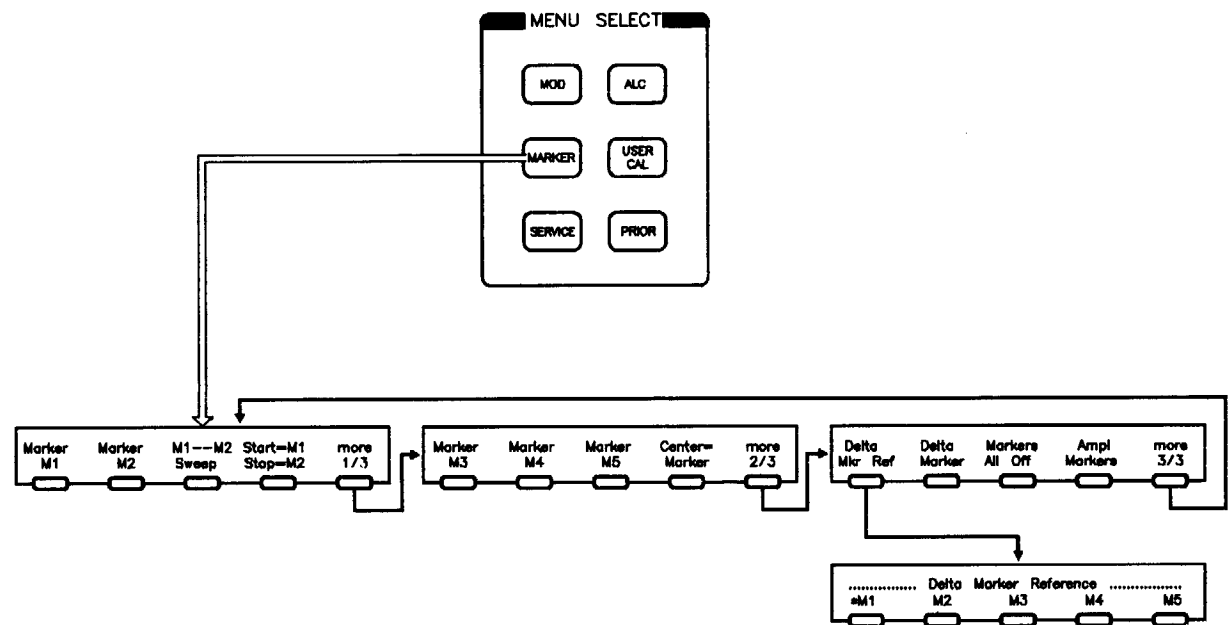
Description

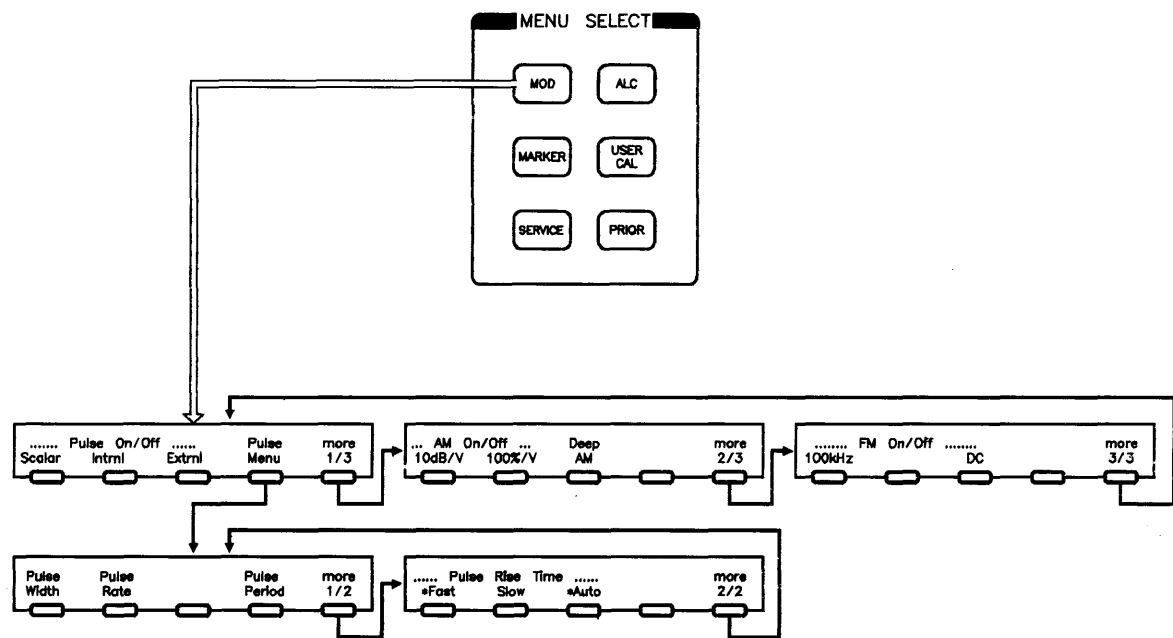
This utility is executed using the front panel emulation program. A full self-test of the synthesizer will be executed and the results displayed on the computer.

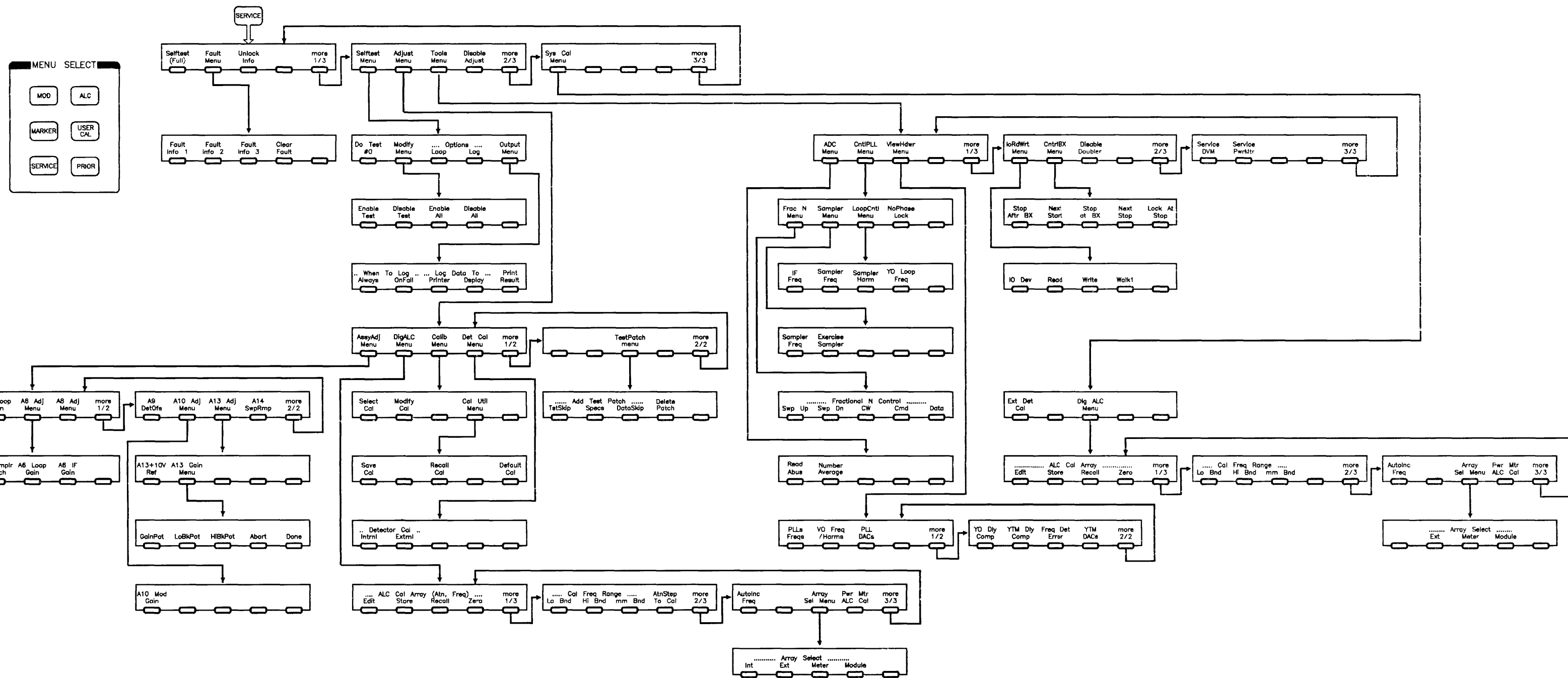
Menu Maps

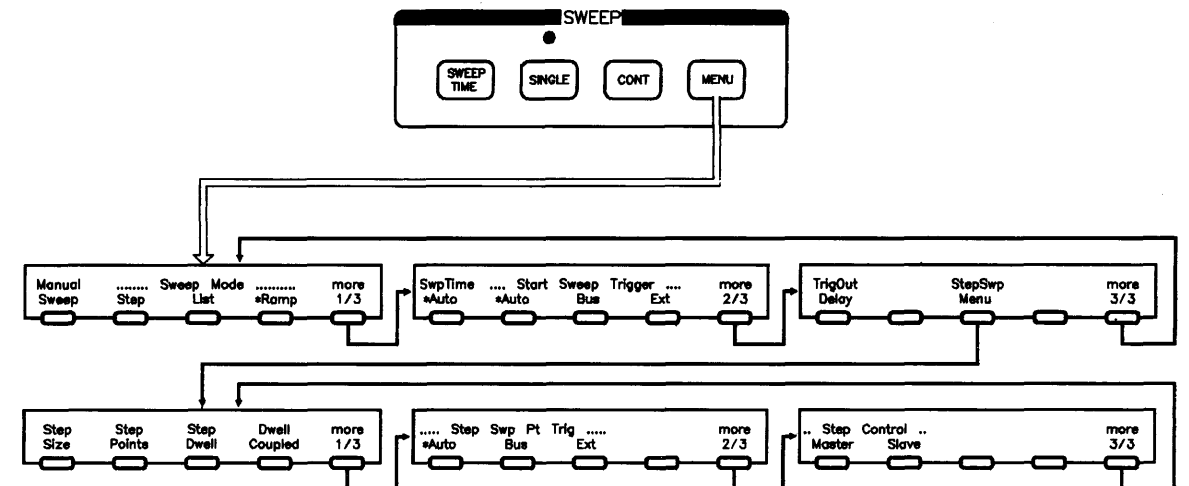


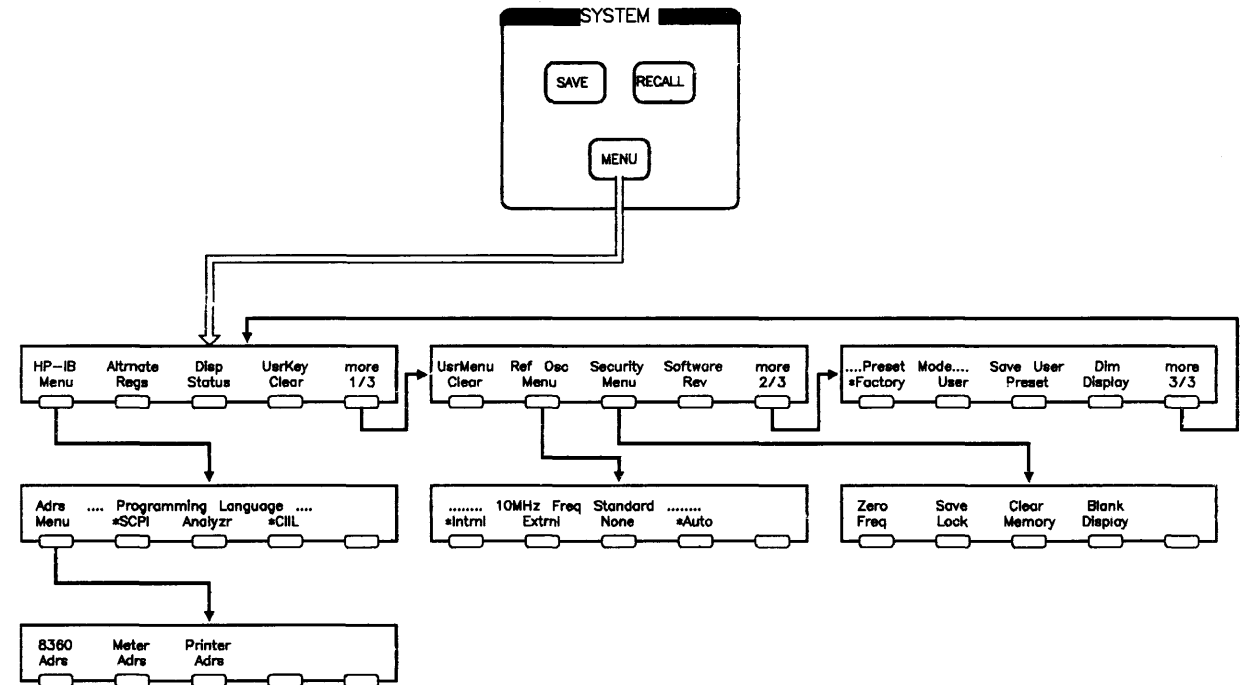


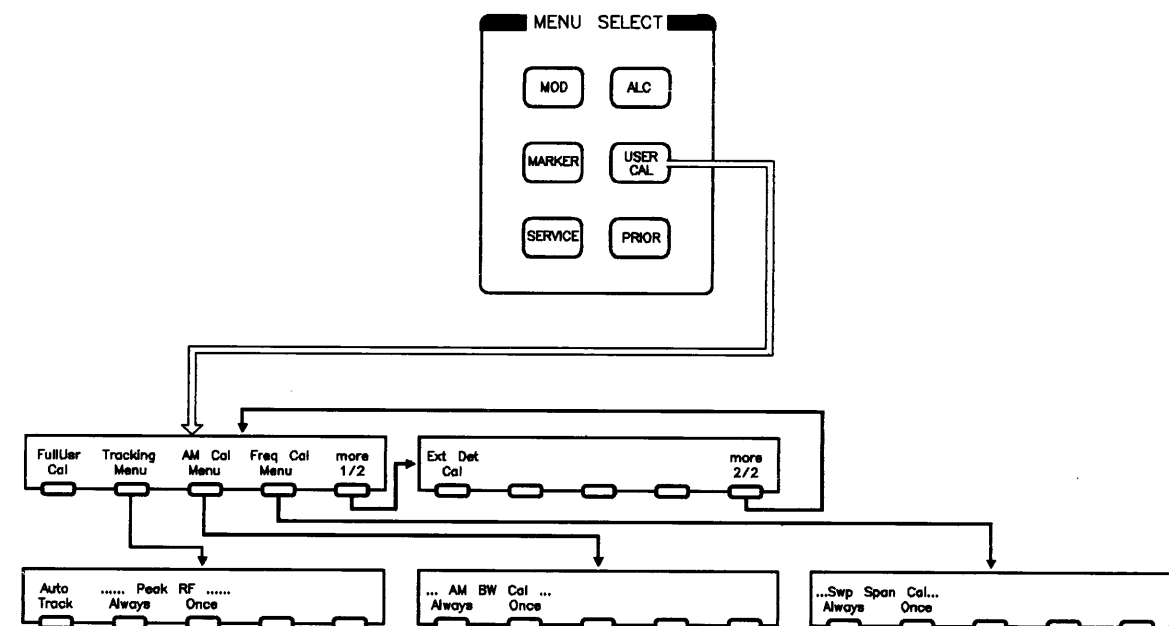












Disassembly and Replacement Procedures

Introduction

This chapter provides the following disassembly and reassembly procedures. Use these procedures while repairing or replacing an assembly.

- Front Panel Disassembly and Reassembly.
- Rear Panel Disassembly and Reassembly.
- RF Deck Disassembly and Reassembly.
- Motherboard Disassembly and Reassembly.

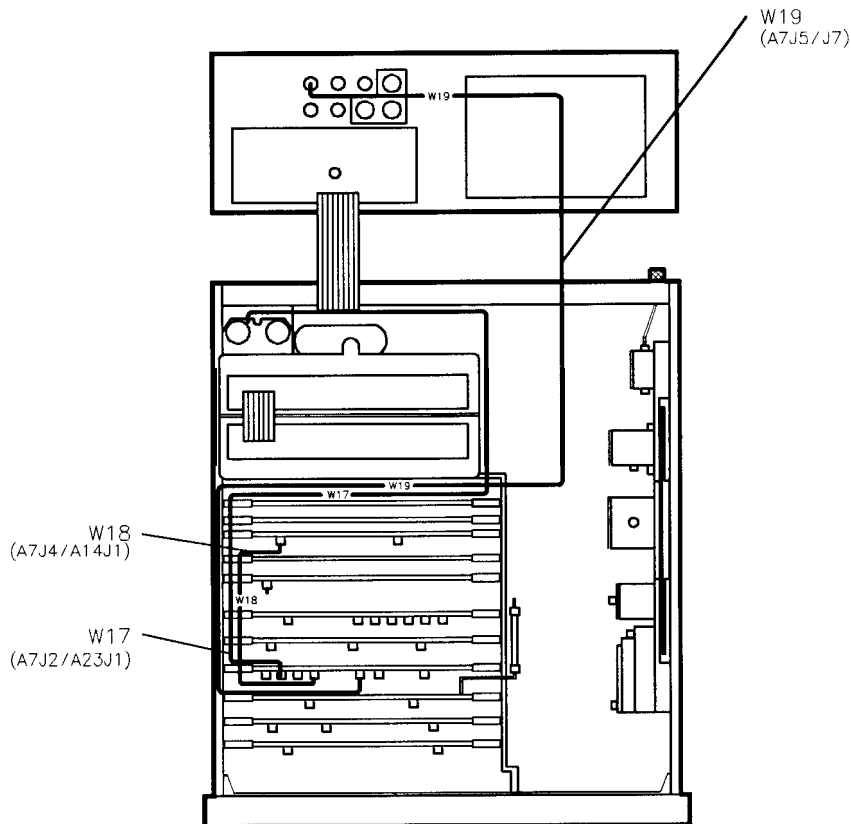
Warning

This instrument has been designed in accordance with international safety standards, however only a skilled person who is aware of the hazards involved should disassemble this instrument. Voltages in the instrument can, if contacted, cause personal injury; be extremely careful. Capacitors may be charged even if the instrument has been disconnected from line power.

Caution

Perform the following procedures only at a static safe work station. The attenuators and printed circuit assemblies in this instrument are very sensitive to static electricity damage. Wear an anti-static wrist strap that is connected to earth ground.

When reassembling the instrument, the cables shown in Figure 7-1 must be routed through the instrument as *shown* or instrument performance may be affected.



IMPORTANT!

W17 W18, W19 MUST BE ROUTED AS SHOWN

Figure 7-1. Cable Routing Locations

Tools Required

Each procedure lists the required tools at the beginning of that section. See the “Replaceable Parts” chapter for the associated part numbers.

Front Panel Disassembly and Reassembly

Tools Required

T-10 Torx Screwdriver (torque 10 in-lb).
0.050 Hex Driver.
9/16 in. Nut Driver.
5/16 in. Open End Wrench.
Coax Extractor Tool-Submin D Connector

Description and Procedure

To disassemble the front panel, follow this procedure in the order given.

To reassemble the front panel, follow this procedure in the reverse order.

Refer to the flowchart in Figure 7-2 to determine the necessary disassembly steps for a given assembly.

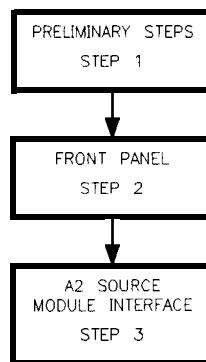


Figure 7-2. Front Panel Disassembly Flowchart

1. Preliminary Steps

Caution You can easily blow the fuse for the 13.5 V supply on the preregulator assembly if you do not disconnect the AC power cord. Also, the danger of shock is increased if the power cord is connected.

1. Disconnect the AC power line cord.
 2. Remove the screw from each of the top two feet on the rear panel.
 - 3.** Remove the top two feet.
 4. Remove the instrument top cover.
-

Note An RF braid is in each of the side channels on the top of the instrument. When you reassemble the instrument, be sure this braid remains in the channel.

5. Remove the vinyl trim strip from the top, front edge of the instrument.
(Place a flat screwdriver in either slot in the trim strip and lift to remove, see Figure 7-3.)

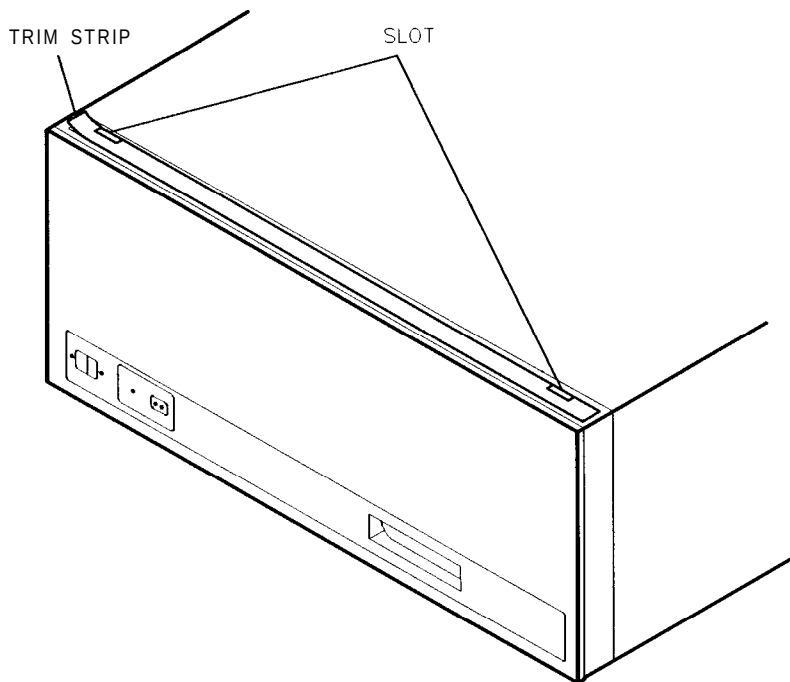


Figure 7-3. Front Edge Trim Strip

2. Front Panel Removal

Note Before continuing, complete “Preliminary Steps”.

1. Remove three of the four screws under the trim strip. Refer to Figure 7-4.
2. Remove *two* of the three screws on the lower, front frame edge.
3. Gently pry the front panel and display from the frame.

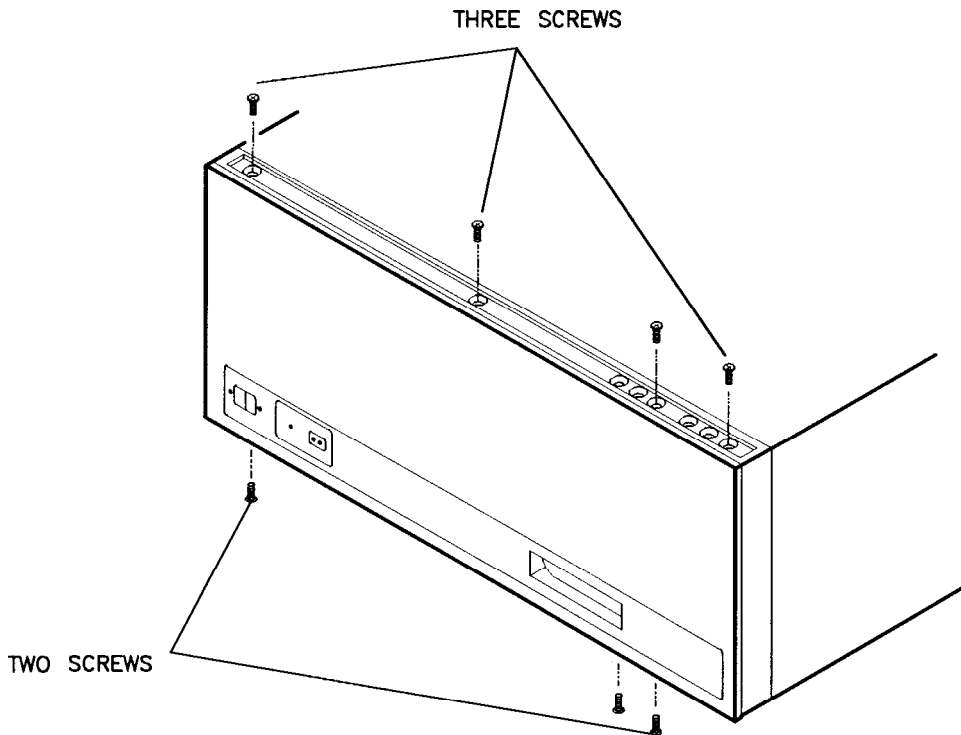


Figure 7-4. Front Panel Screw Locations

4. Disconnect coaxial cable W10 at the A10J2 SMB connection on the A10 ALC board assembly. Disconnect ribbon cable W2 at the A22J1 connector on the A22 motherboard assembly. Refer to Figure 7-5.

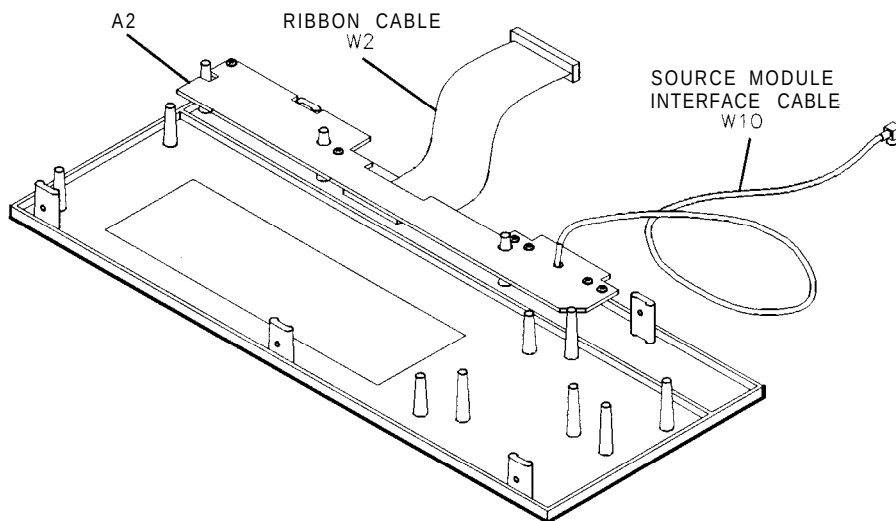


Figure 7-5. Front Panel Coaxial and Ribbon Cable Locations

3. A2 Source Module Interface Removal

Note Before continuing, complete “Preliminary Steps” and “Front Panel Removal”.

1. Remove the source module interface cable (W10). Refer to Figure 7-6.
2. Remove the four screws.
3. Remove the source module interface assembly.
4. Disconnect ribbon cable W2 from the source module interface assembly.
5. Remove the A2 source module interface assembly.

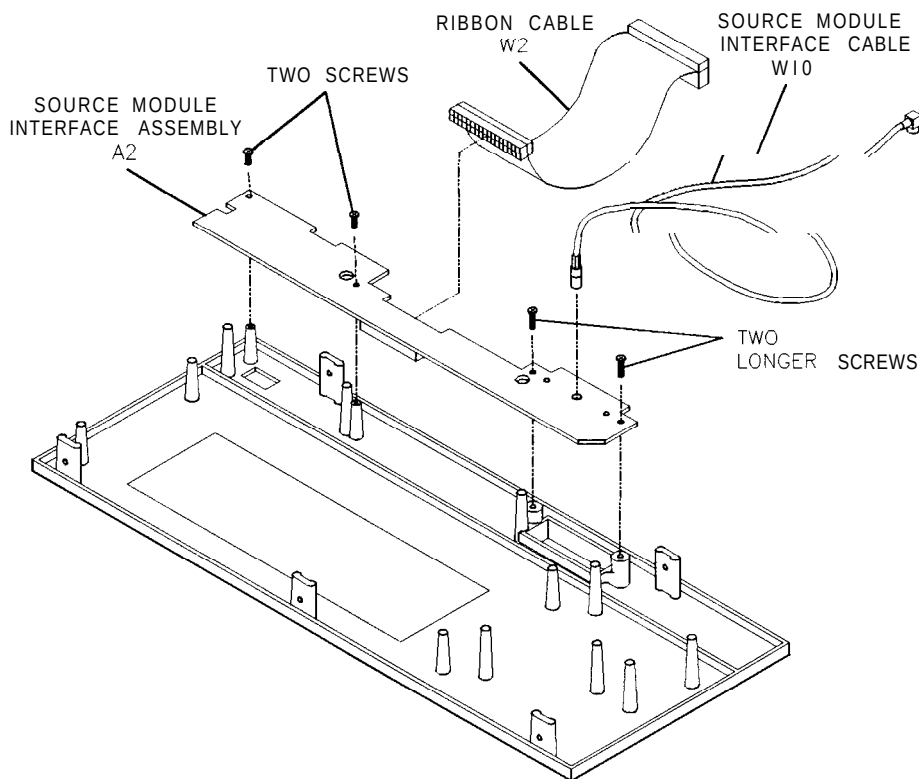


Figure 7-6. Source Module Interface Removal

Rear Panel Disassembly and Reassembly

Tools Required

9/16 in. Socket
T-10 Torx Screwdriver
T-15 Torx Screwdriver
5.5 mm Nut Driver
5/16 in. Open End Wrench
14 mm Open End Wrench
7 mm Nut Driver
#1 x 3 1/8 in. Pozidriv Screwdriver
#2 x 4 in. Pozidriv Screwdriver
Coax Extractor Tool-Submin D Connector

Description and Procedure

To disassemble the rear panel and associated assemblies, follow this procedure in the order given.

To reassemble the rear panel and associated assemblies, follow this procedure in the reverse order.

Caution	Cable routing may affect instrument performance. Refer to Figure 7-1 for a diagram of the instrument cable routing.
----------------	---

Refer to the flowchart in Figure 7-7 to determine the necessary disassembly steps for a given assembly.

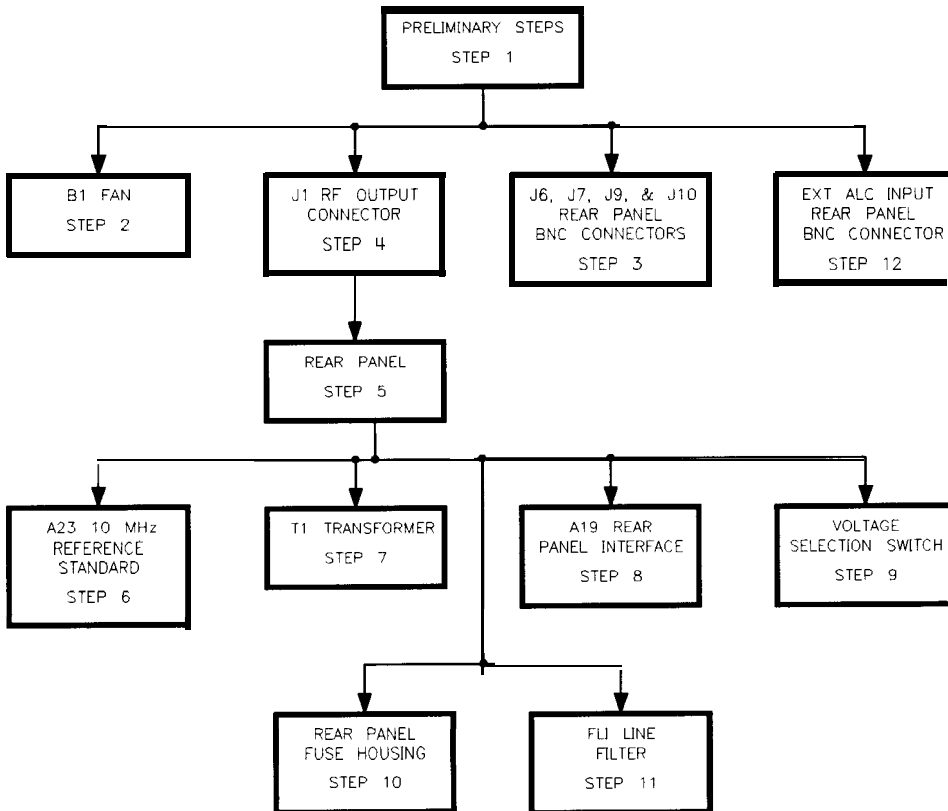


Figure 7-7. Rear Panel Disassembly Flowchart

1. Preliminary Steps

Caution You can easily blow the fuse for the 13.5 V supply on the preregulator assembly if you do not disconnect the AC power cord. Also, the danger of shock is increased if the power cord is connected.

1. Disconnect the AC power line cord.
 2. Remove the screw from each of the four feet on the rear panel.
 3. Remove the four feet.
 4. To remove the side straps, remove the two screws on each side panel.
 5. Remove the instrument top, bottom, and side covers.
-

Note An RF braid is in each of the side channels on the top and bottom of the instrument. When you reassemble the instrument, be sure the braids remain in the side cover channels.

2. B1 Fan Removal

Note Before continuing, complete “Preliminary Steps”.

1. Remove both screws (item 1) from the fan shroud. Refer to Figure 7-8.
2. Remove items 2 through 5.
3. Remove the four screws (item 7) from the rear panel/fan brackets.
4. Unplug the fan harness.
5. Tip the fan and angle it out through the opening in the rear panel.
6. Remove the four screws (item 7) attaching the two brackets to the fan and remove the brackets (item 10).

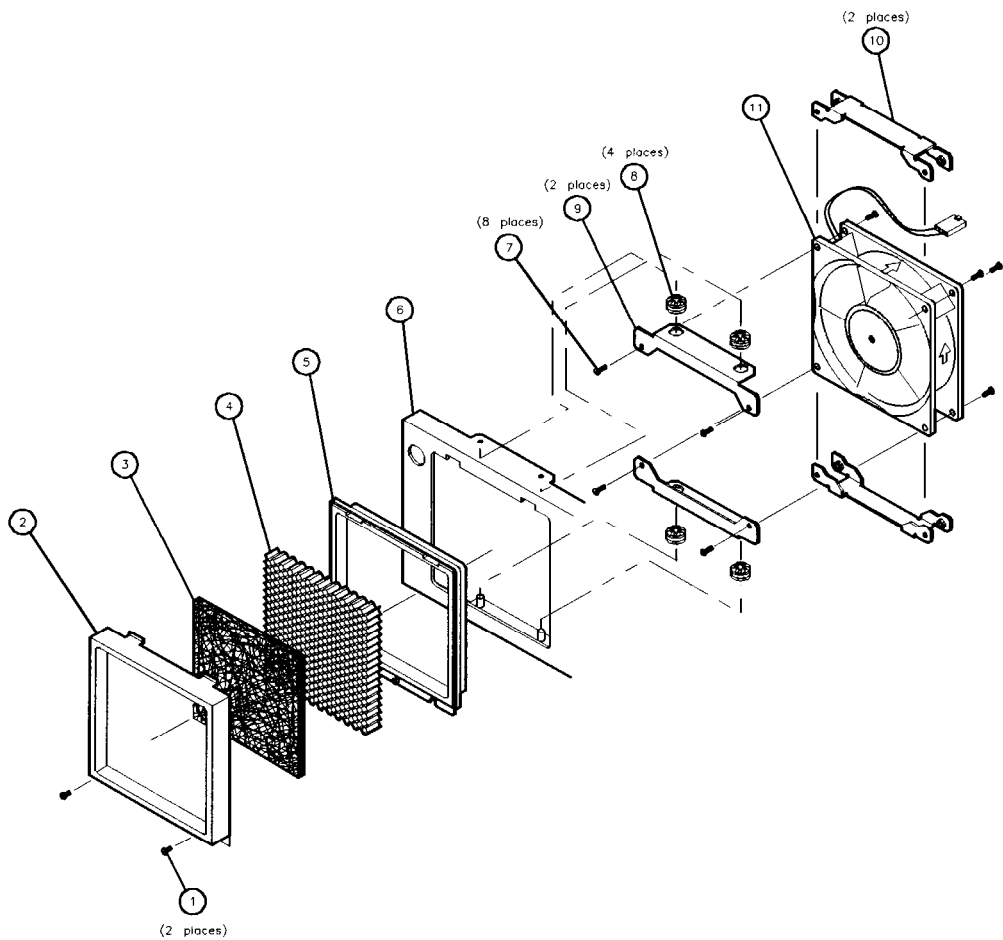


Figure 7-8. B1 Rear Panel Fan Assembly

3. J6, J7, and J10 Rear Panel BNC Connectors Removal

Note Before continuing, complete “Preliminary Steps”.

1. Remove the nuts and washers on the four BNC connectors, 10 MHz REF INPUT, 10 MHz REF OUTPUT, VOLTS/GHz, and TRIGGER OUTPUT. Refer to Figure 7-9.
2. Slide out the four connectors.

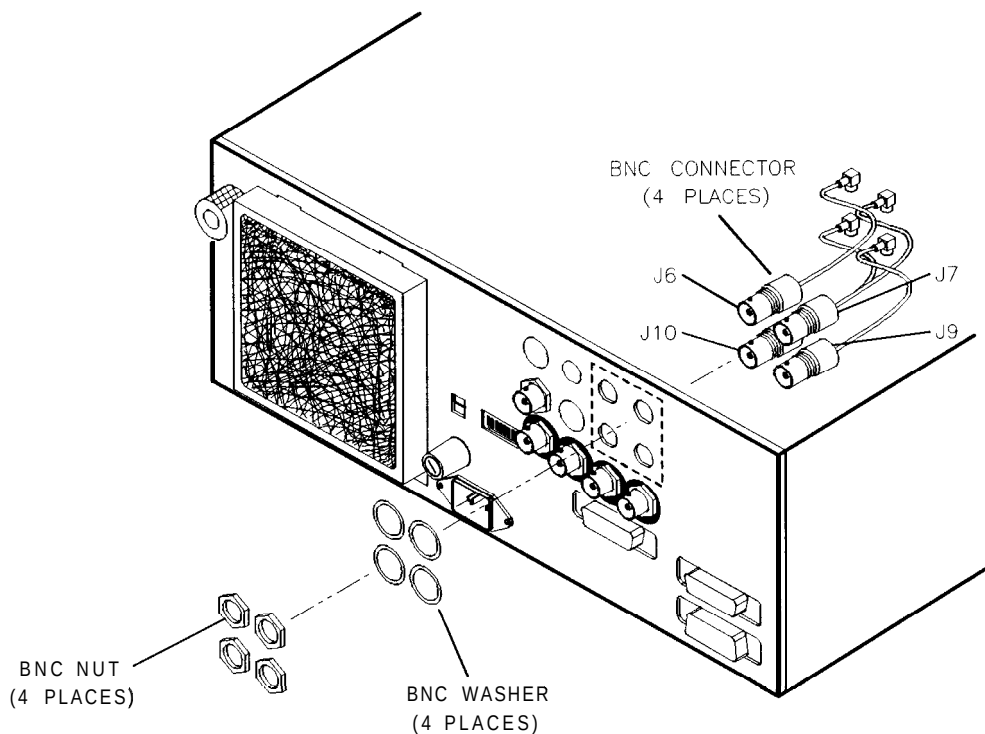


Figure 7-9. J6, J7, J9, and J10 Rear Panel BNC Connector Locations

4. J1 RF Output Connector Removal

Note Before continuing, complete “Preliminary Steps”.

Caution To avoid damaging the connector, do not disassemble the RF output connector assembly. Only unscrew the connector on the end of the semi-rigid cable.

1. Disconnect cable W43 at bridge detector A30. Refer to Figure 7-10.
2. Remove the two screws from the RF output connector plate on the rear panel.
3. Remove the RF connector with cable W43 attached.

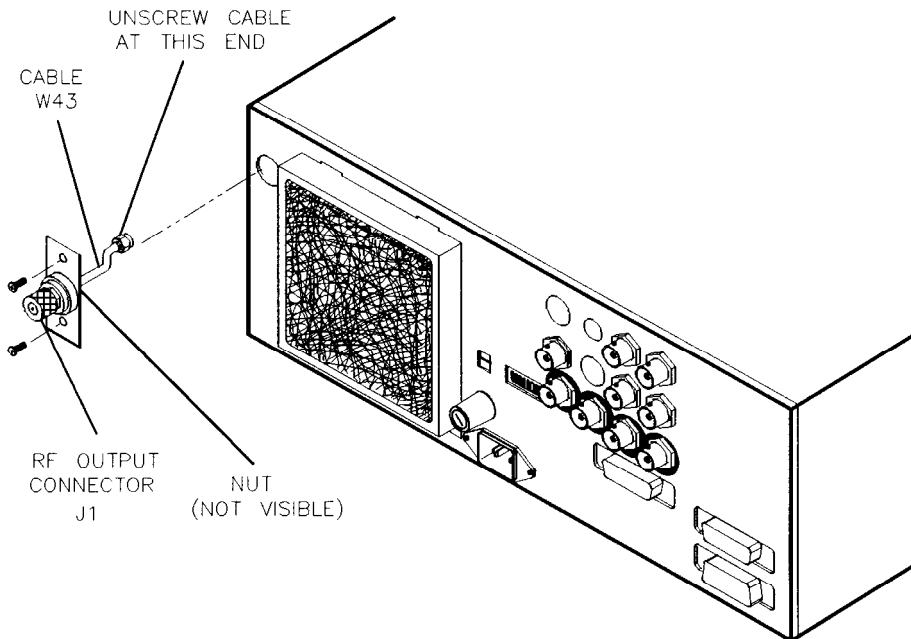


Figure 7-10. Removing RF Output Connector

Note

When you re-attach the connector and cable to the synthesizer, first, loosen the nut between cable W43 and the connector. Then perform the disassembly steps in reverse order. Finally, torque the nut between cable W43 and the connector J1 to 10 in-lb (112 N-cm).

5. Rear Panel Removal

Note Before continuing, complete “Preliminary Steps” and “J1 RF Output Connector Removal”.

1. Remove the four screws on the top back edge. Refer to Figure 7-11.
2. Remove the four screws on the bottom back edge.
3. Slide the rear panel out of the casting.

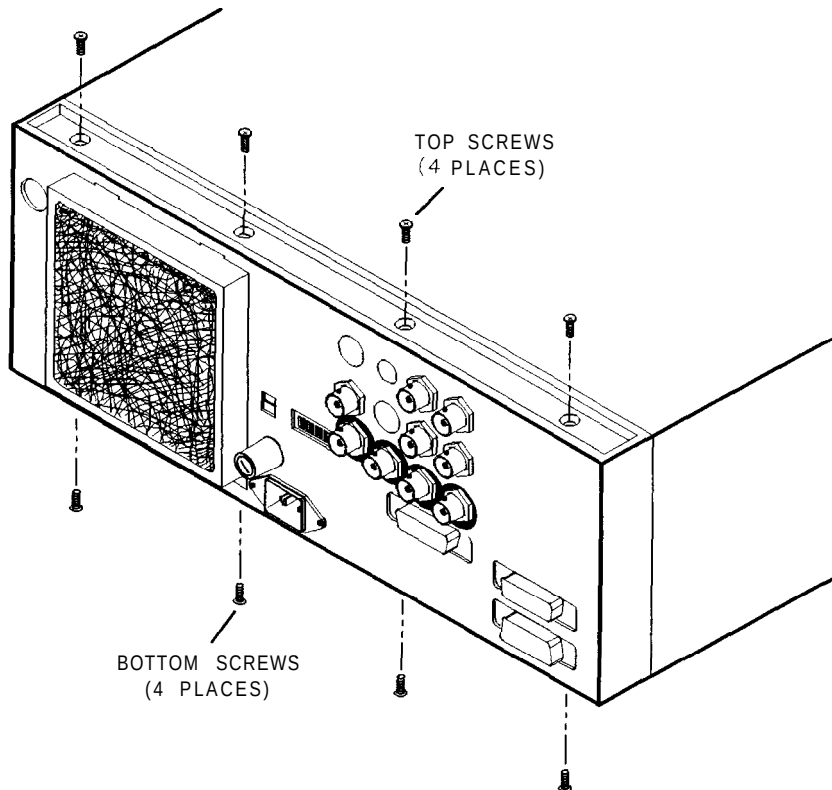


Figure 7-11. Rear Panel Removal

4. Disconnect ribbon cable W31 from the motherboard. Refer to Figure 7-12.
5. Disconnect the 8-pin line switch connector.
6. Disconnect the fan harness.
7. Cut the tie wraps holding the coaxial cables to the four BNC connectors and the source module interface.
8. Disconnect the coaxial cables from the A7, A10, A12, and A14 assemblies and disconnect the source module interface cable from the A19 assembly.

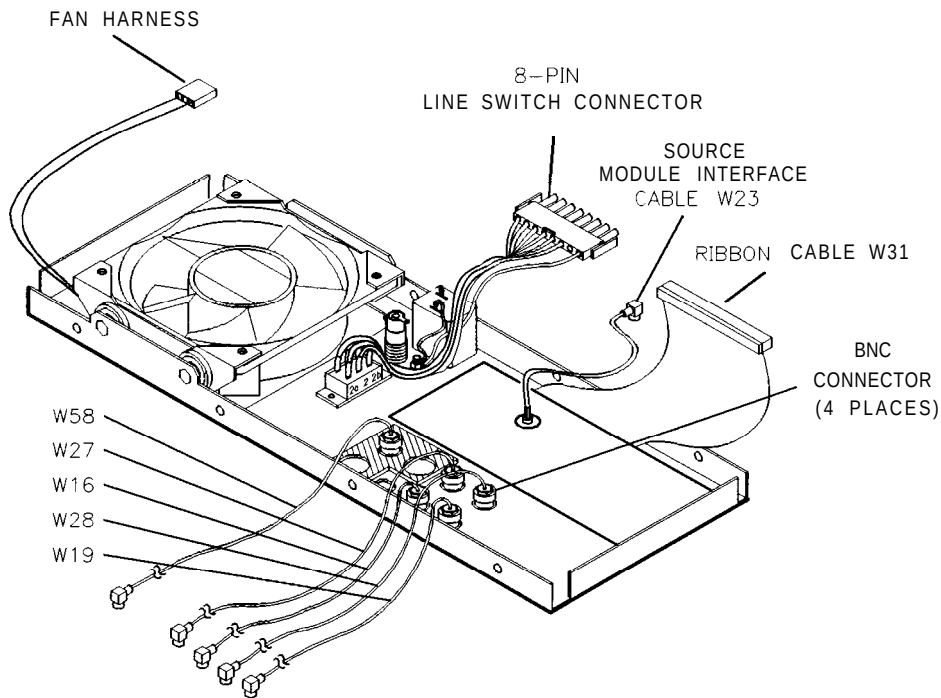


Figure 7-12. Rear Panel Cable Locations

6. A23 10 MHz Reference Standard Removal

Note Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Disconnect cable W17 and the pin-locking tab, W30. Refer to Figure 7-13.
2. Without removing the screws, press the shock-mount pads through the sheet metal holes.
3. Slide the reference standard out.

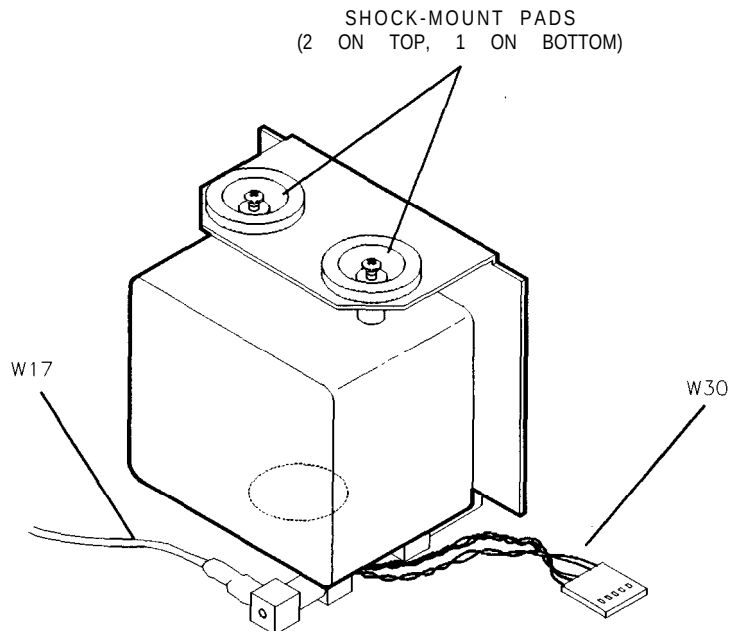


Figure 7-13. Reference Standard Mountings

7. T1 Transformer Removal

Note Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Disconnect the six-wire pin-locking tab. Refer to Figure 7-14.
2. Disconnect the center screw, plastic washer, two insulators, and plate.
3. Remove the toroidal transformer.

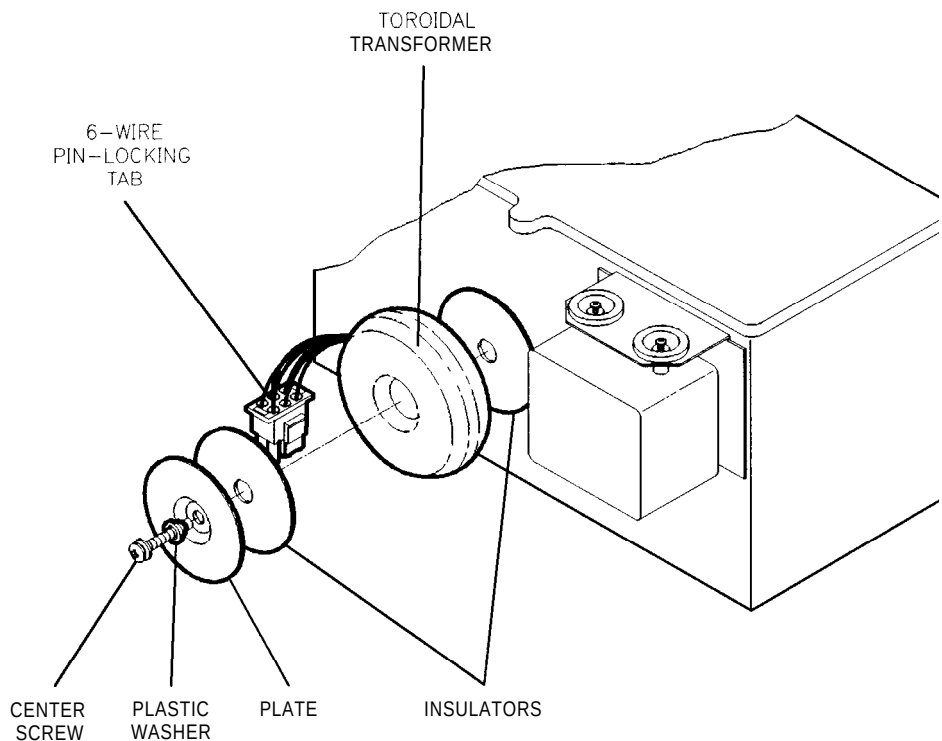


Figure 7-14. Transformer Removal

8. A19 Rear Panel Interface Removal

Note Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Disconnect the source module interface cable W23 from SMB connector A10J3 on the A10 ALC assembly. Refer to Figure 7-15.
2. Remove the five screws.
3. Remove A19 from the rear panel.

Note The source module interface cable, W23, is not included with replacement A19 assemblies.

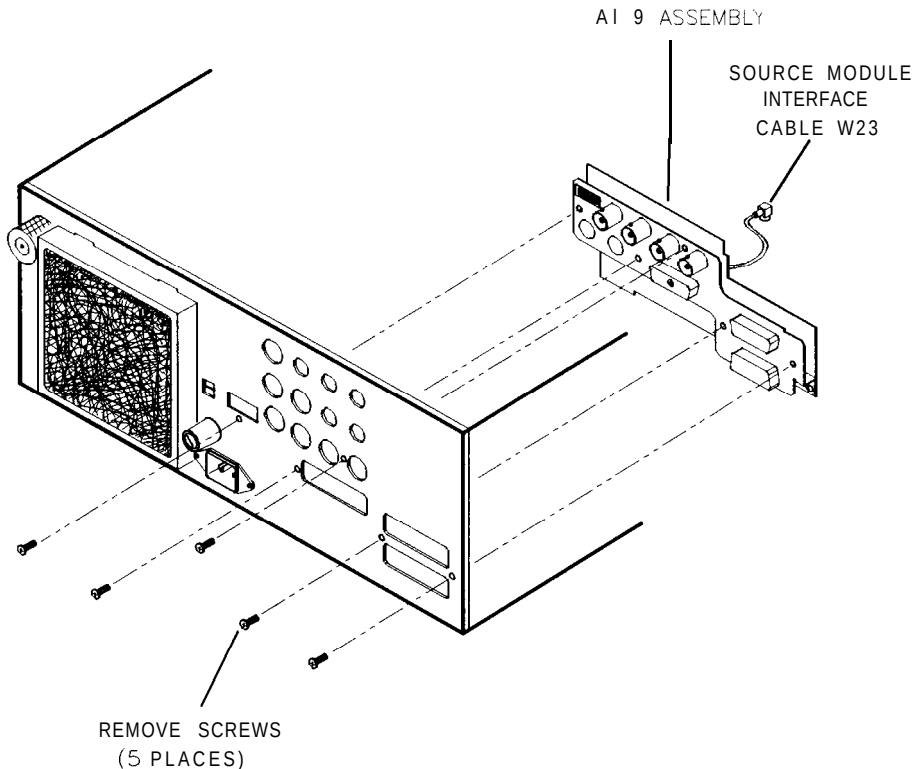


Figure 7-15. A19 Rear Panel Interface Removal

9. Voltage Selector Switch Removal

Note

Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Cut the tie wraps holding the wires. Refer to Figure 7-16.
2. Disconnect the 8-pin connector from the motherboard.
3. Remove the two nuts, bolts, and washers holding in the voltage selector switch.

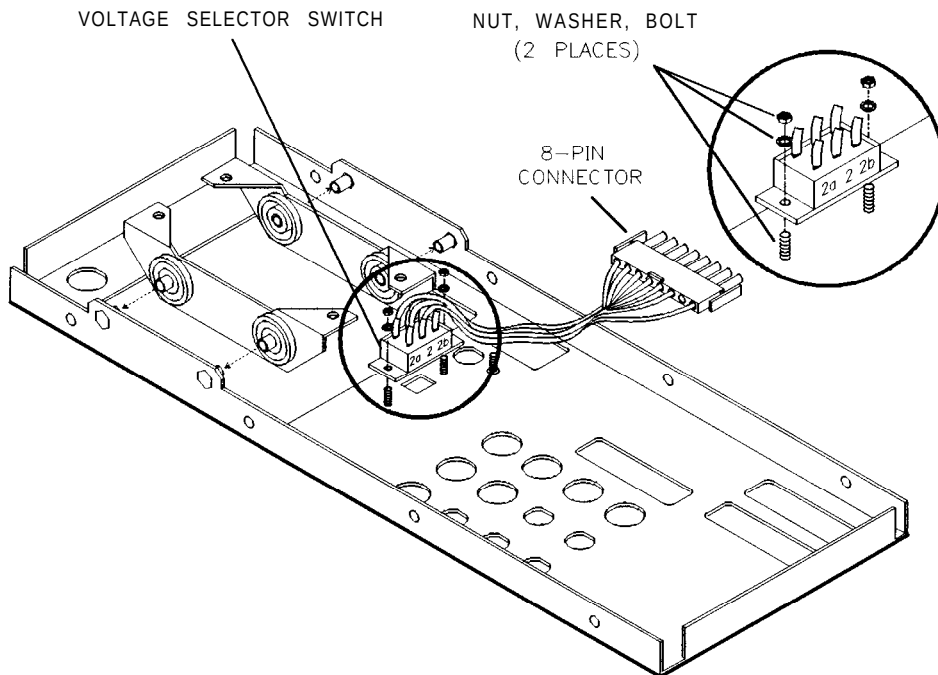


Figure 7-16. Voltage Selection Switch Removal

4. Unsolder the white/brown/grey wire from the fuse. Refer to Figure 7-17.
5. Unsolder the white/grey wire from the line filter.
6. Unscrew the green/white ground wire from the back panel.

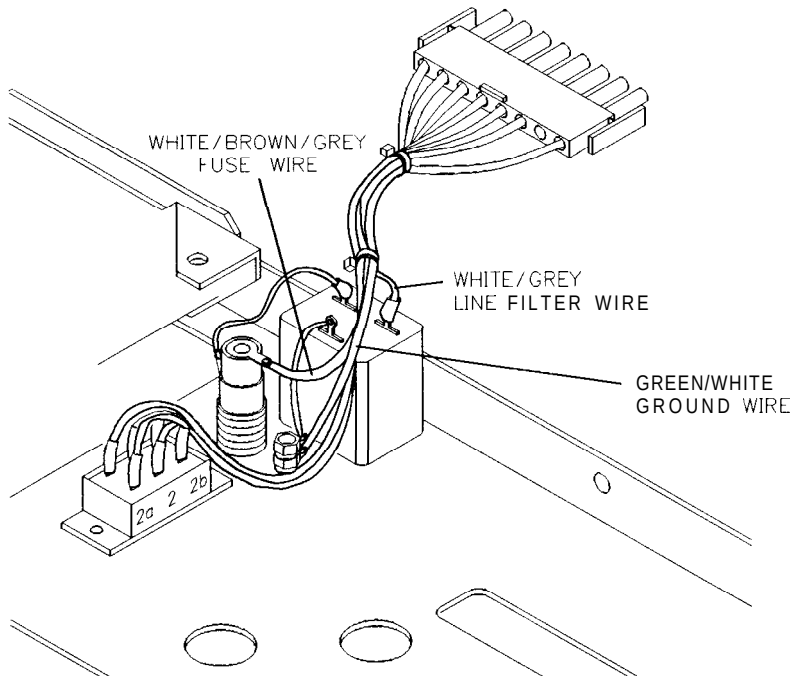


Figure 7-17. Fuse, Line Filter, and Ground Wires

Note	To reassemble, add 3/8 in. shrink tubing to each wire before soldering. Then perform the above steps in reverse order.
-------------	--

10. Fuse Housing Removal

Note

Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Remove the two nuts, bolts, and washers holding the voltage selector switch, and remove the switch (this provides clearance for the wrench to remove the fuse holder). Refer to Figure 7-18.
2. Unsolder the two fuse holder wires.
3. Unscrew the nut holding the fuse housing.
4. Slide the fuse housing out of the back panel.

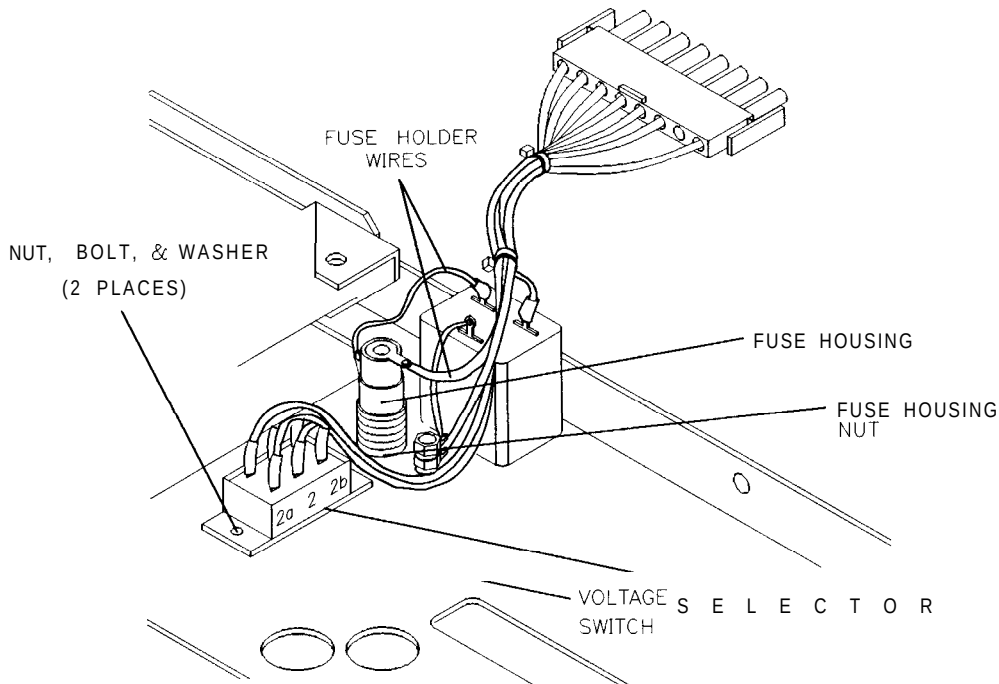


Figure 7-18. Rear Panel Fuse Housing

Note

To reassemble, add 3/8 in. shrink tubing to each wire before soldering. Then perform the above steps in reverse order.

11. FL1 Line Filter Removal

Note Before continuing, complete “Preliminary Steps”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Unsolder the three wires attached to the line filter. Refer to Figure 7-19.
2. Remove the two screws on the rear panel.
3. Slide out the line filter from the rear panel.

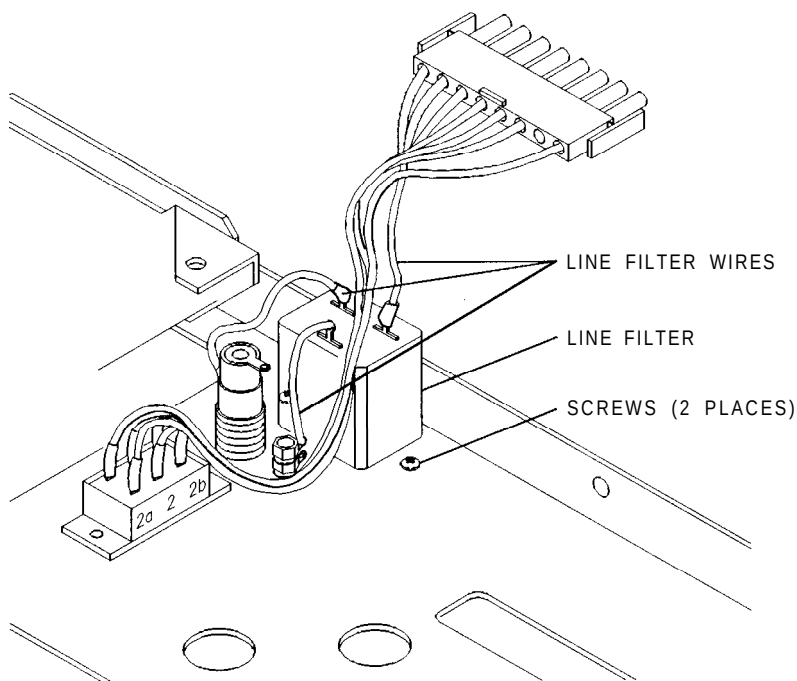


Figure 7-19. Line Filter Removal

Note To reassemble, add 3/8 in. shrink tubing to each wire before soldering. Then perform the above steps in reverse order.

12. Ext ALC Input Rear Panel BNC Connector Removal

Note Before continuing, complete “Preliminary Steps”.

1. Disconnect cable W58 from SMB connector A10J4 on the A10 ALC assembly. Refer to Figure 7-20.
2. Remove the five screws holding the A34 RP floating BNC board assembly to the rear panel.
3. Slide out the board with the connector.

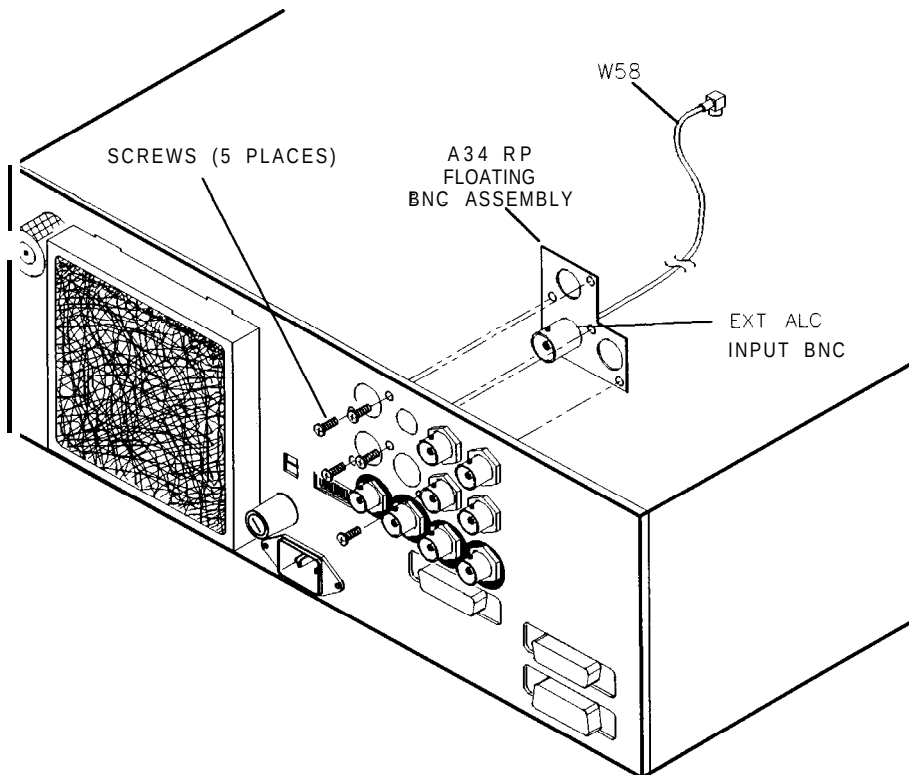


Figure 7-20. Ext ALC Input BNC Connector Removal

RF Deck Disassembly and Reassembly

Tools Required

#1 x 3 1/8 in. Pozidriv Screwdriver
T-10 Torx Screwdriver
5/16 in. Torque Wrench
5 mm Ball and Socket Driver

Note On the RF deck, all Pozidriv screws have English threads and all Torx screws have metric threads.

Description and Procedure

To disassemble the RF deck and associated assemblies, follow this procedure in the order given.

To reassemble the RF deck and associated assemblies, follow this procedure in the reverse order.

Refer to the flowchart in Figure 7-21 to determine the necessary disassembly steps for a given assembly.

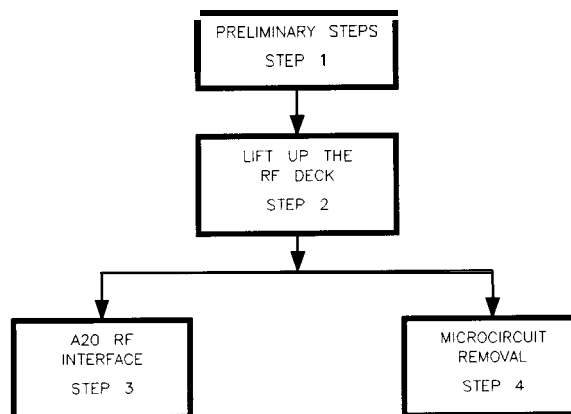


Figure 7-21. RF Deck Disassembly Flowchart

1. Preliminary Steps

Caution You can easily blow the fuse for the 13.5 V supply on the preregulator assembly if you do not disconnect the AC power cord. Also, the danger of shock is increased if the power cord is connected.

1. Disconnect the AC power line cord.
 2. Remove the screw from each of the top two feet on the rear panel.
 - 3.** Remove the top two feet.
 4. Remove the instrument top cover.
-

Note An RF braid is in each of the side channels on the top of the instrument. When you reassemble the instrument, be sure this braid remains in the channel.

2. Lift Up the RF Deck

Note Before continuing, complete “Preliminary Steps”.

Caution To avoid damaging the connector, do not disassemble the RF output connector assembly. Only unscrew the connector on the end of the semi-rigid cable.

1. Disconnect cable W43 at bridge detector A30. Refer to Figure 7-22.
2. Remove the two screws from the RF output connector plate on the rear panel.
3. Remove the RF connector with cable W43 attached.

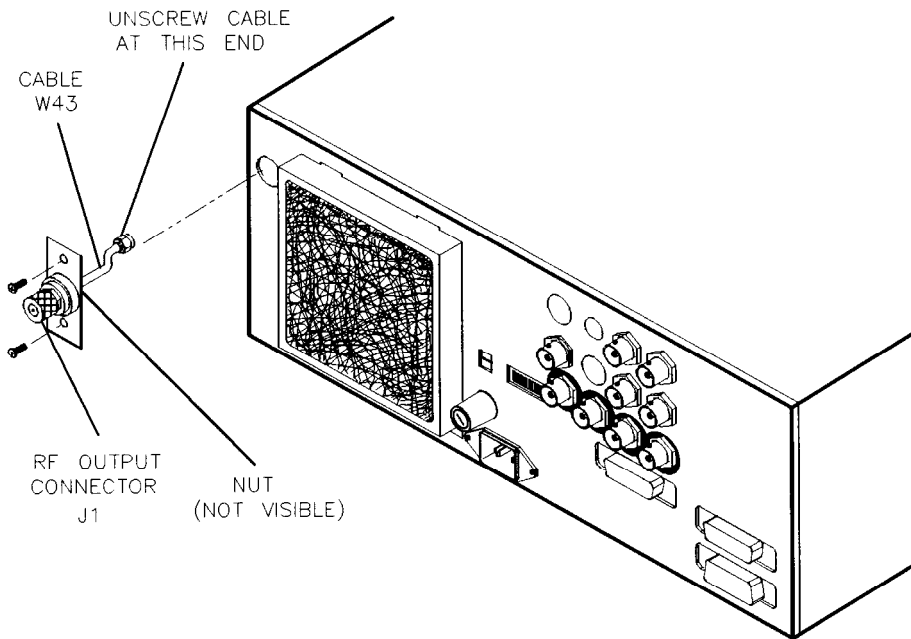


Figure 7-22. Removing RF Output Connector

Note

When you re-attach the connector and cable to the synthesizer, first loosen the nut between cable W43 and the connector. Then reverse steps 1 through 3. Finally, torque the nut between cable W43 and connector J1 to 10 in-lb (112 N-cm).

4. Disconnect cable W51 from low pass filter FL2. Refer to Figure 7-23.
5. Remove the two hex screws from the RF deck.

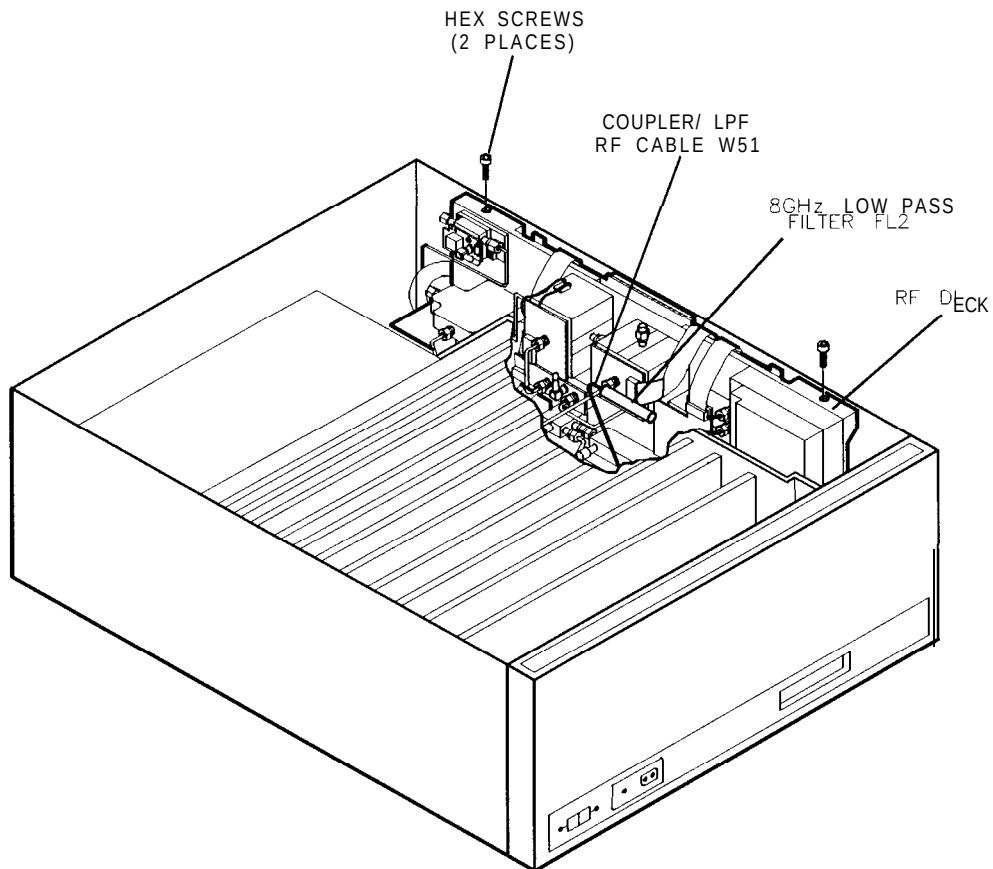


Figure 7-23. W51 RF Cable Location

Caution	Avoid damage to the various ribbon cables and their connectors attached to the RF deck assembly when removing that assembly in the next step. Move all flexible coaxial cables out of the way of the RF deck assembly components such as semi-rigid cable W51.
----------------	--

6. Carefully pull out the RF deck and rest it on the side of the instrument.

Note	Some flexible cables will still be attached preventing the RF deck from being completely removed from the instrument.
-------------	---

Note	The analog extender board and coax extender cable mentioned in the following steps are part of the service tool kit. Refer to “Replaceable Parts” for the part number of this kit.
-------------	--

7. For troubleshooting, insert an analog extender board into the motherboard connector for the RF deck. Place the RF deck on the extender board and use the two hex screws to attach the deck to the synthesizer frame (service position). If you are not troubleshooting and are lifting up the RF deck for disassembly purposes, attach the deck to the synthesizer without using the extender board. Refer to Figure 7-24.
8. For troubleshooting:
- a. Attach a coax extender cable between W51 and low pass filter FL2.
 - b. Reconnect the RF connector and W43.
 - i. Loosen the nut between cable W43 and the connector.
 - ii. Reconnect cable W43 at bridge detector A30.
 - iii. Torque the nut between cable W43 and connector J1 to 10 in-lb (112 N-cm).

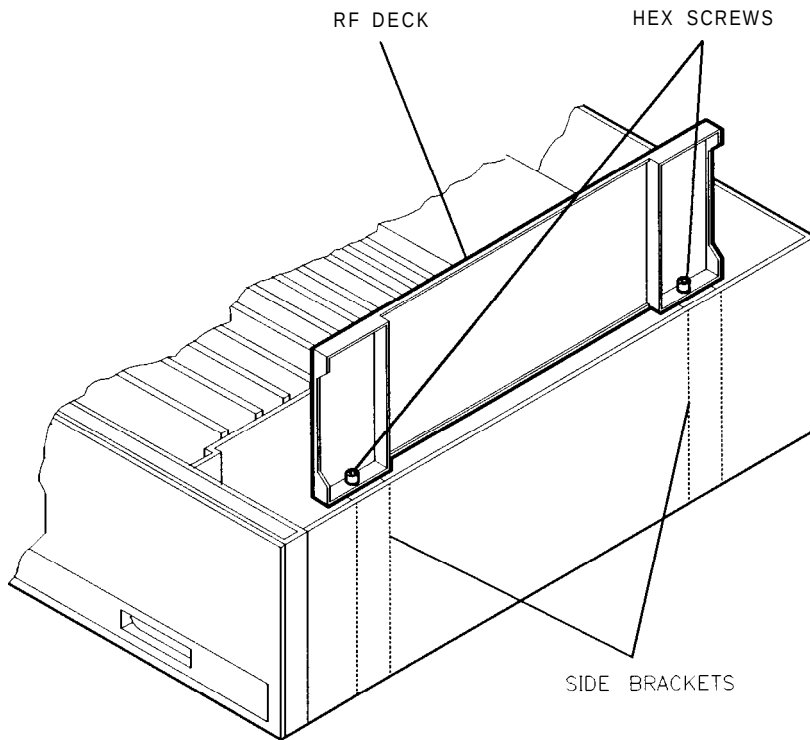


Figure 7-24. RF Deck in the Service Position

3. A20 RF Interface Removal

Note Before continuing, complete “Preliminary Steps” and “Lift Up the RF Deck”.

1. Disconnect ribbon cables W36, W37, W38, W39, W41, and W42. (You may need to loosen the two hex screws attaching the deck to the synthesizer frame in order to disconnect W38.) Refer to Figure 7-25.
2. Disconnect the 3-wire pin-locking tab.
3. Remove the four corner screws that attach the board to the casting.
4. Remove the A20 RF interface assembly.

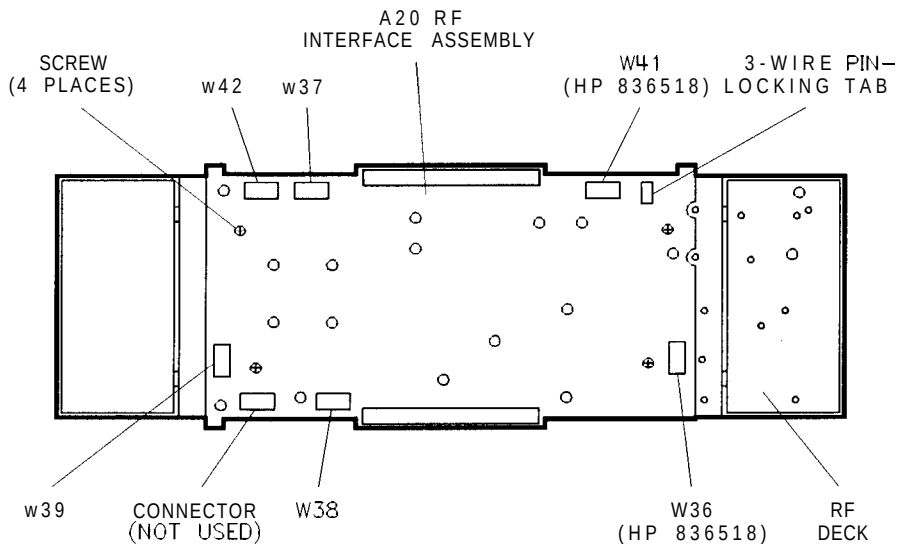


Figure 7-25. A20 RF Interface Removal

4. Microcircuit Removal

Note Before continuing, complete “Preliminary Steps” and “Lift Up the RF Deck”.

Refer to Figure 7-26 through Figure 7-28 for cable and screw locations.

1. With the RF deck up in the service position, any microcircuit can be removed:
 - a. Most microcircuits have a cable connecting them to the A20 RF interface assembly. Disconnect the cable from the A20 assembly (if you have already removed the A20 assembly, this step is not necessary).
 - b. Disconnect all semi-rigid and flexible cables from the microcircuit. Be sure to loosen all semi-rigid cables at their other connections also. If you do not, the cables may be damaged.
 - c. Remove the microcircuits by removing the screws that hold them to the RF deck.

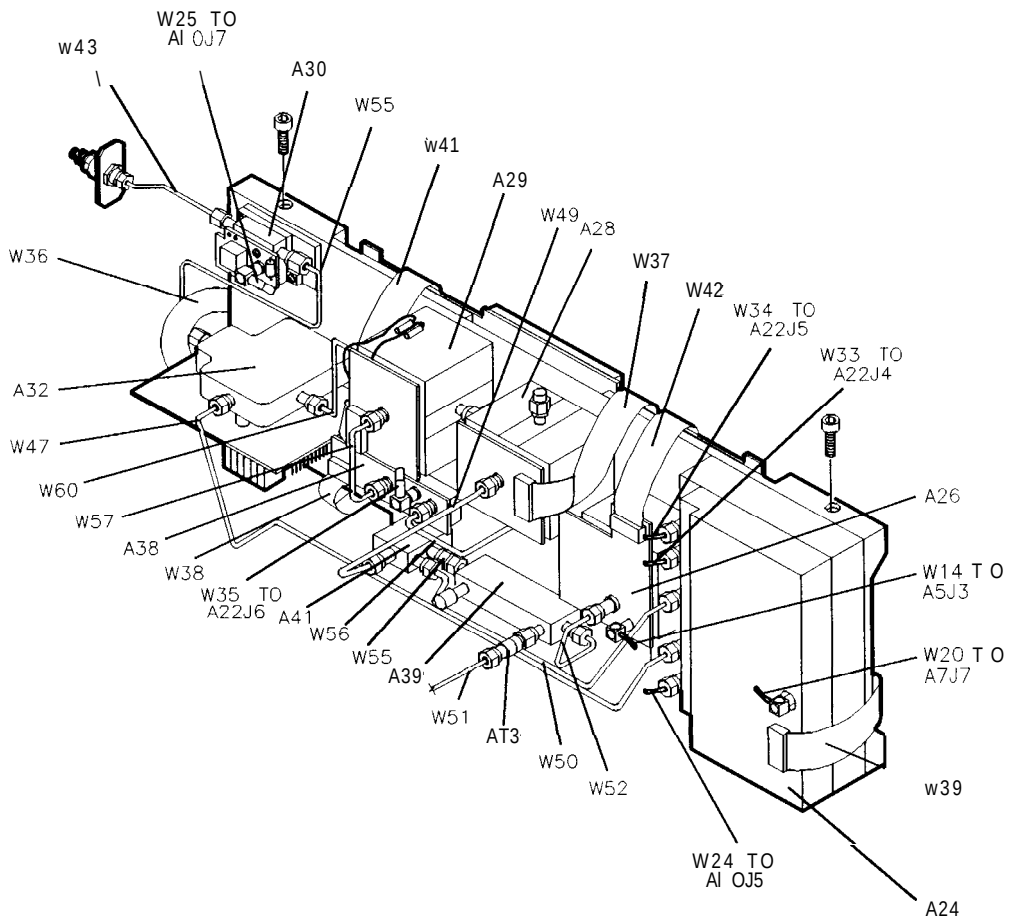


Figure 7-26. RF Deck Cable Locations - HP 836518

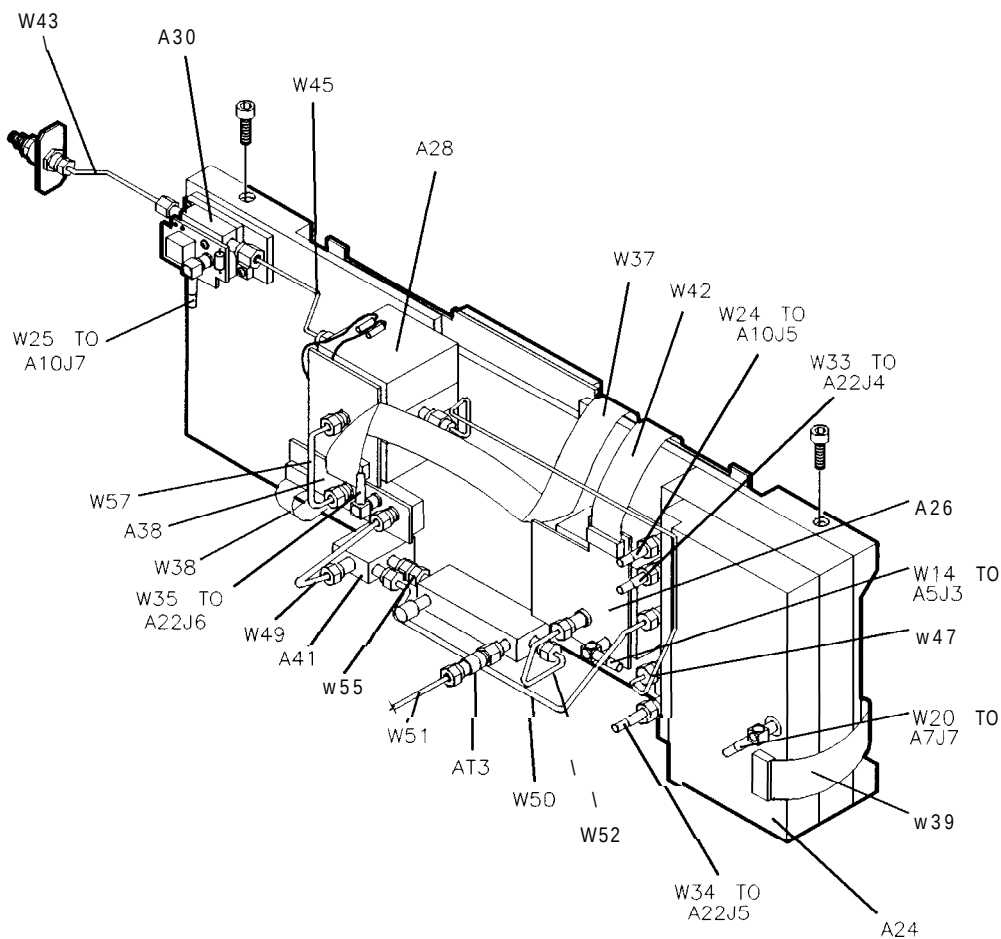
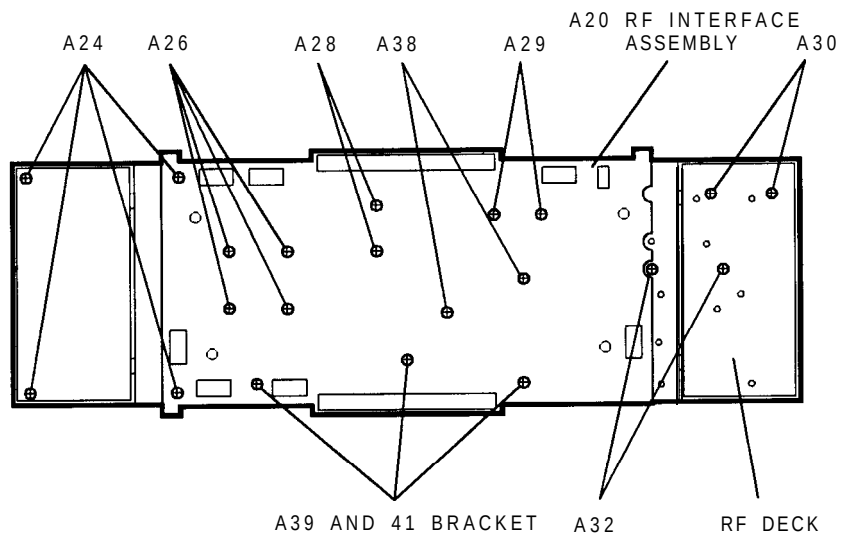
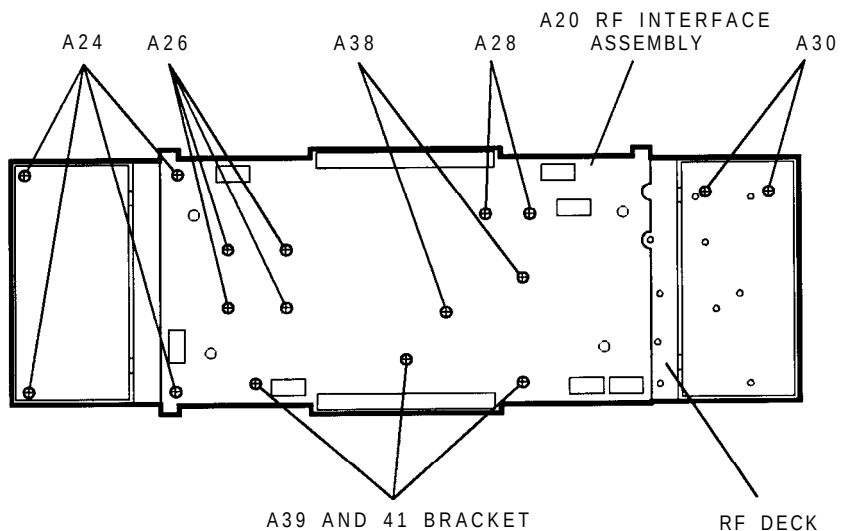


Figure 7-27. RF Deck Cable Locations - HP 83621B/31B



HP 83651B



HP 83621B/31B

Figure 7-28. RF Deck Screw Locations

Motherboard Disassembly and Reassembly

Tools Required

T- 15 Torx Screwdriver
#2 x 4 Pozidriv Screwdriver
5/16 in. Open End Wrench
5mm Ball and Socket Driver

Description and Procedure

To disassemble the motherboard, follow this procedure in the order given.

To reassemble the motherboard, follow this procedure in the reverse order.

Caution	Cable routing may affect instrument performance. Refer to Figure 7-1 for a diagram of the instrument cable routing.
----------------	---

Refer to the flowchart in Figure 7-29 to determine the necessary disassembly steps for a given assembly.

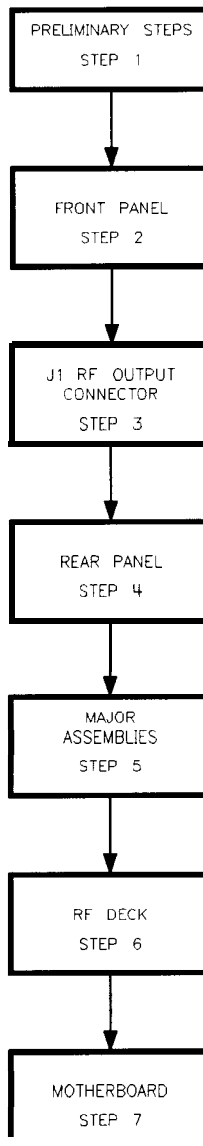


Figure 7-29. Motherboard Disassembly Flowchart

1. Preliminary Steps

Caution You can easily blow the fuse for the 13.5 V supply on the preregulator assembly if you do not disconnect the AC power cord. Also, the danger of shock is increased if the power cord is connected.

1. Disconnect the AC power line cord.
2. Remove the screw from each of the four feet on the rear panel.
3. Remove the four rear feet.
4. Remove the four bottom feet.
5. To remove the side straps, remove the two screws on each side panel.
6. Remove the vinyl trim strip from the top, front edge of the instrument.
(Place a flat screwdriver in either slot in the trim strip and lift to remove, see Figure 7-30).
7. Remove the instrument top, bottom, and side covers.

Note An RF braid is in each of the side channels on the top and bottom of the instrument. When you reassemble the instrument, be sure the braids remain in the side cover channels.

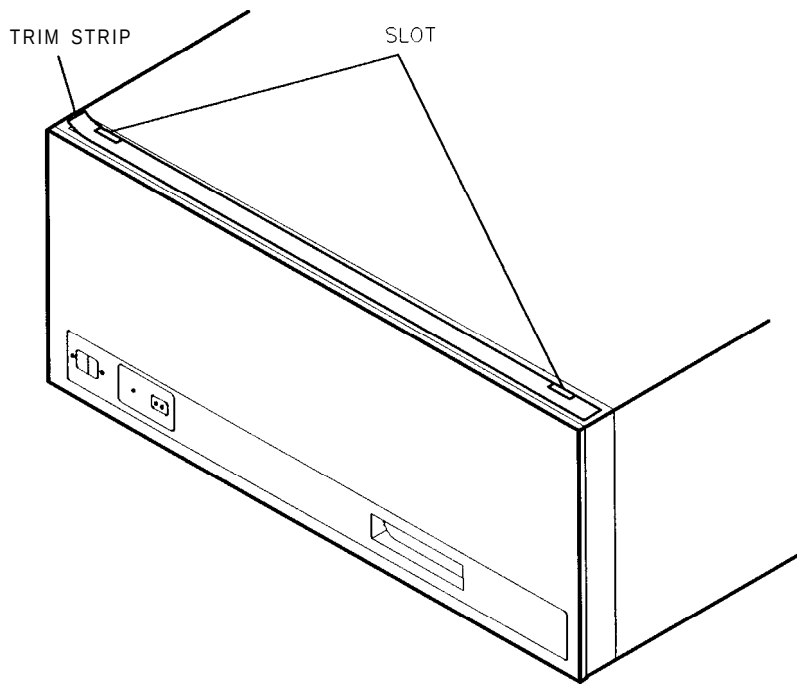


Figure 7-30. Front Edge Trim Strip

2. Front Panel Removal

Note Before continuing, complete “Preliminary Steps”.

1. Remove *three* of the four screws under the trim strip. Refer to Figure 7-31.
2. Remove *two* of the three screws on the lower, front frame edge.
3. Gently pry the front panel and display from the frame.

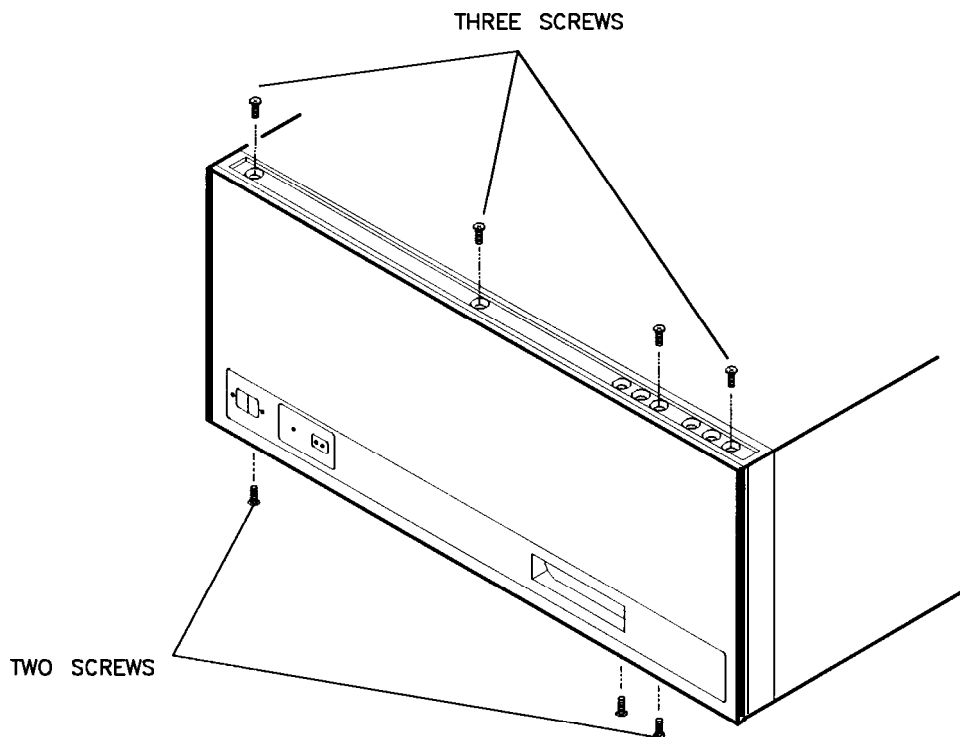


Figure 7-31. Front Panel Screw Locations

4. Disconnect coaxial cable W10 at the A10J2 SMB connection on the A10 ALC board assembly. Disconnect ribbon cable W2 at the A22J1 connector on the A22 motherboard assembly. Refer to Figure 7-32.

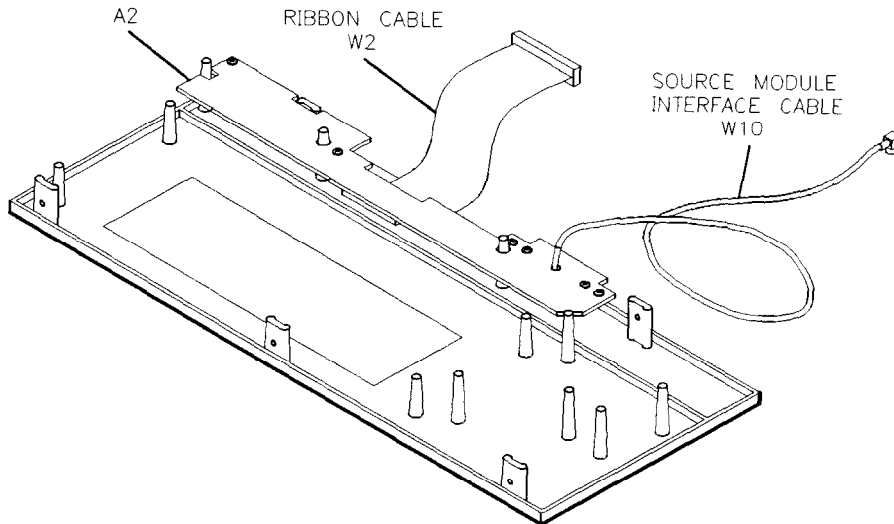


Figure 7-32. Front Panel Coaxial and Ribbon Cable Locations

3. J1 RF Output Connector Removal

Note Before continuing, complete “Preliminary Steps”.

Caution To avoid damaging the connector, do not disassemble the RF output connector assembly. Only unscrew the connector on the end of the semi-rigid cable.

1. Disconnect cable W43 at bridge detector A30. Refer to Figure 7-33.
2. Remove the two screws from the RF output connector plate on the rear panel.
3. Remove the RF connector with cable W43 attached.

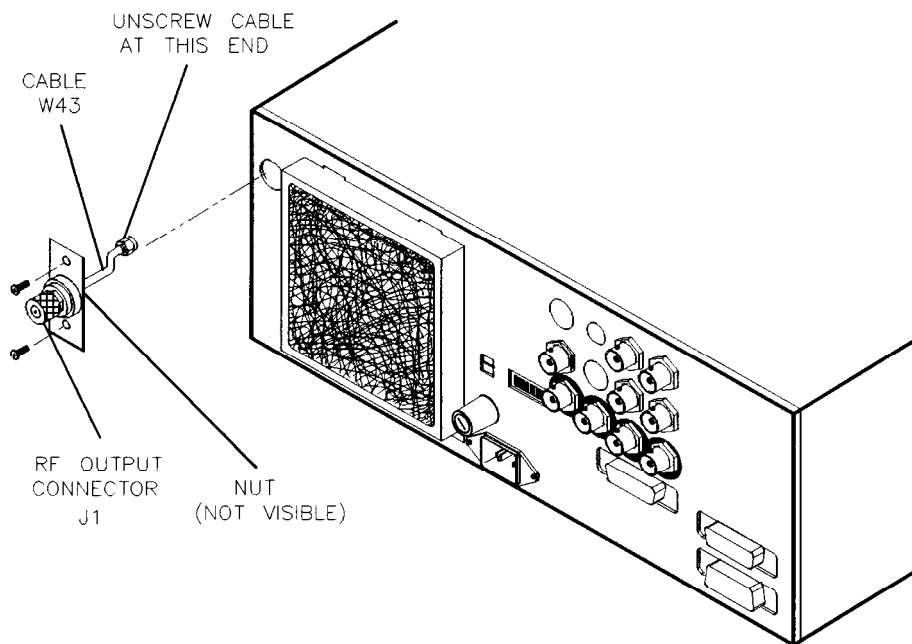


Figure 7-33. Removing RF Output Connector

Note

When you re-attach the connector and cable to the synthesizer, first, loosen the nut between cable W43 and the connector. Then reverse the steps above. Finally, torque the nut between cable W43 and the connector J1 to 10 in-lb (112 N-cm).

4. Rear Panel Removal

Note Before continuing, complete “Preliminary Steps” and “J1 RF Output Connector Removal”.

1. Remove the four screws on the top back edge. Refer to Figure 7-34.
2. Remove the four screws on the bottom back edge.
3. Slide the rear panel out of the casting.

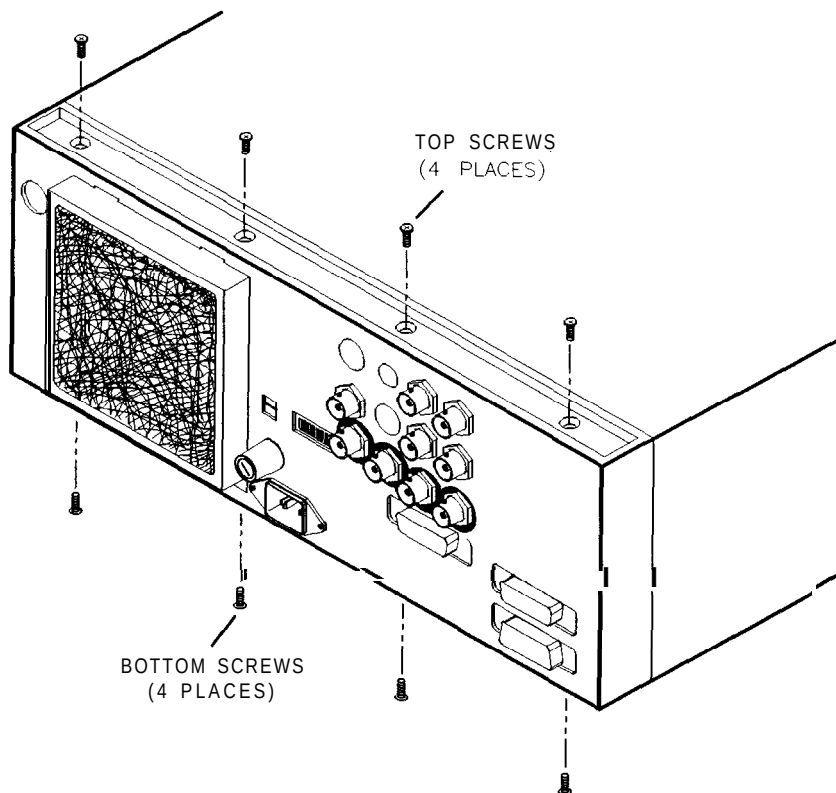


Figure 7-34. Rear Panel Removal

4. Disconnect ribbon cable W31 from the motherboard. Refer to Figure 7-35.
5. Disconnect the 8-pin line switch connector.
6. Disconnect the fan harness.
7. Cut the tie wraps holding the coaxial cables to the four BNC connectors and the source module interface.
8. Disconnect the coaxial cables from the A7, A10, A12, and A14 assemblies and disconnect the source module interface cable from the A19 assembly.

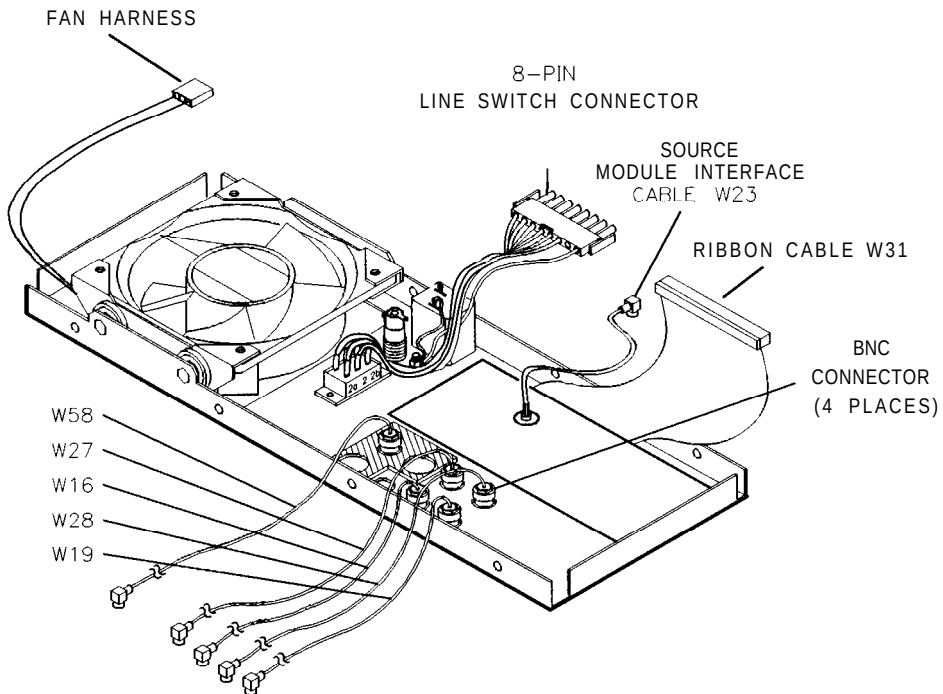


Figure 7-35. Rear Panel Cable Locations

5. Major Assemblies Removal

Note Before continuing, complete “Preliminary Steps”, “Front Panel Removal”, “J1 RF Output Connector Removal”, and “Rear Panel Removal”.

1. Remove the six screws from the regulator shield. Refer to Figure 7-36.
 2. Remove the shield.
 3. Cut the tie wraps holding the cables attached to the PC assemblies.
 4. Disconnect all cables attached to the PC assemblies.
 5. Disconnect semi-rigid cable W54 from the A6 assembly.
 6. Pull out all PC assemblies.
-

Note All cables are labeled for easy reassembly. Refer to “Special Cases” in *HP 83621 B/31 B/51 B Synthesized Sweeper Troubleshooting Guide* for a diagram of the cable locations.

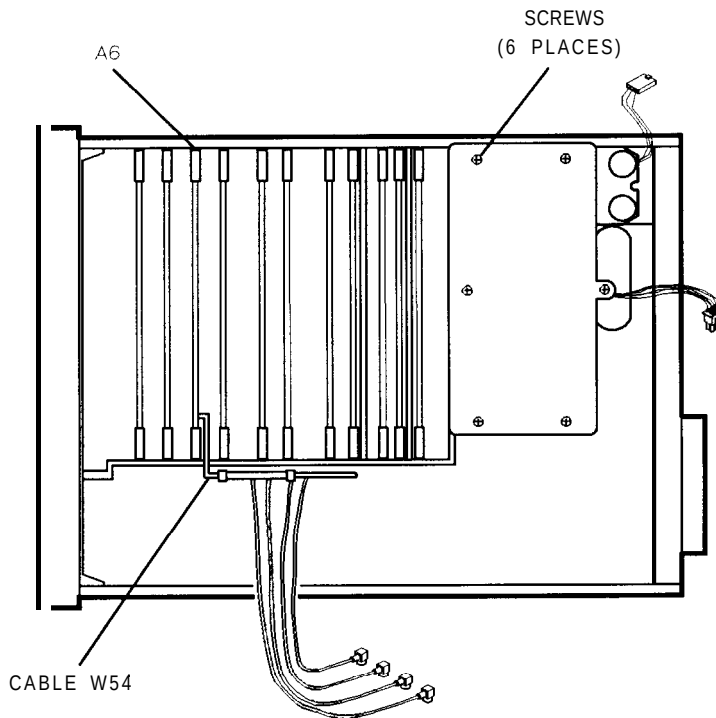


Figure 7-36. Major Assemblies

6. RF Deck Removal

Note

Before continuing, complete “Preliminary Steps” and “J1 RF Output Connector Removal”.

Refer to Figure 7-37.

1. Disconnect cable W51 from low pass filter FL2.
2. Remove the two hex screws from the RF deck.

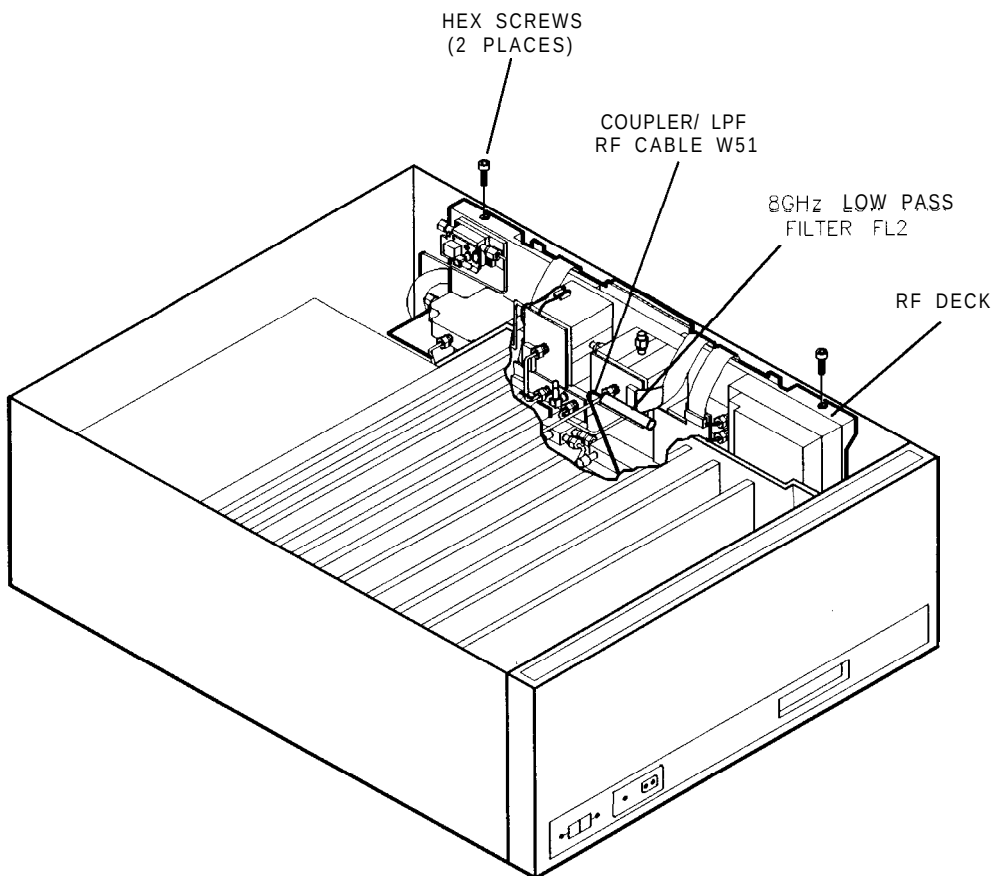


Figure 7-37. W51 RF Cable Location

Caution Avoid damage to the various ribbon cables and their connectors attached to the RF deck assembly when removing that assembly in the next step. Move all flexible coaxial cables out of the way of the RF deck assembly components such as semi-rigid cable W51.

3. Carefully pull out the RF deck and rest it on the side of the instrument.
4. Remove flexible cables W32, W33, W34, and W35 from the motherboard.

7. Motherboard Removal

Note Before continuing, complete “Preliminary Steps”, “Front Panel Removal”, “J1 RF Output Connector Removal”, “Rear Panel Removal”, “Major Assemblies Removal”, and “RF Deck Removal”.

1. Disconnect the transformer pin-locking tab and the reference oscillator pin-locking tab. Refer to Figure 7-38.

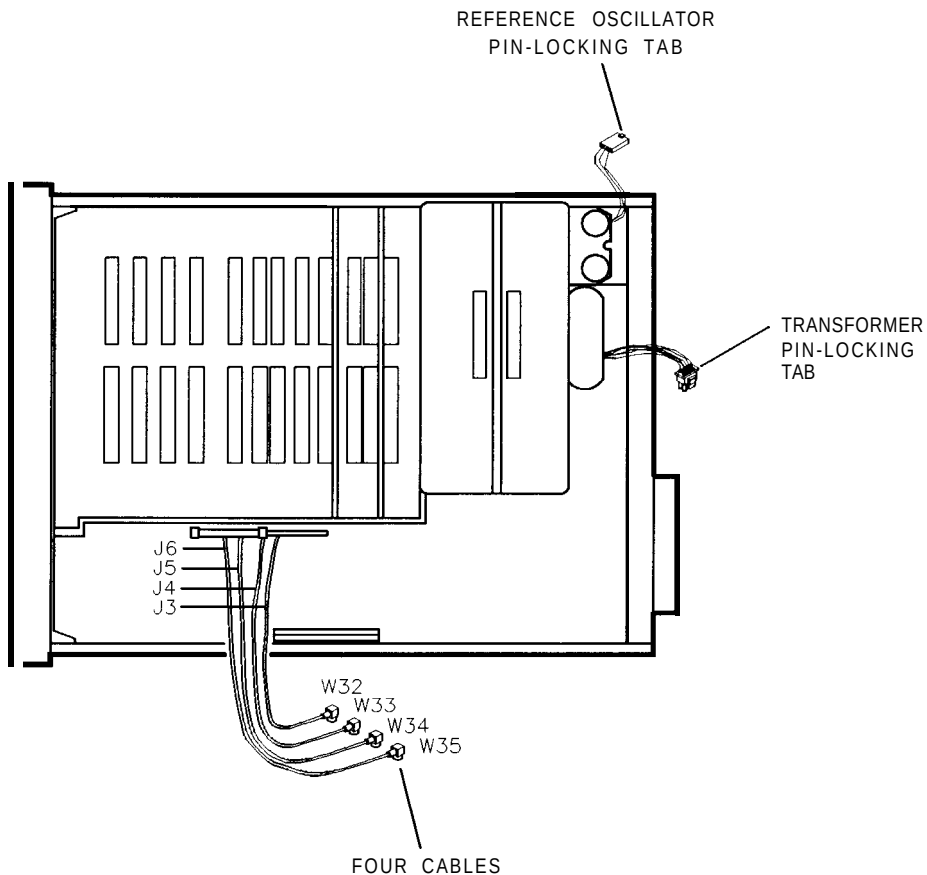


Figure 7-38. Motherboard Cables

2. Remove the 16 screws from the bottom side of the motherboard bottom side. Refer to Figure 7-39.
3. Lift off the motherboard.

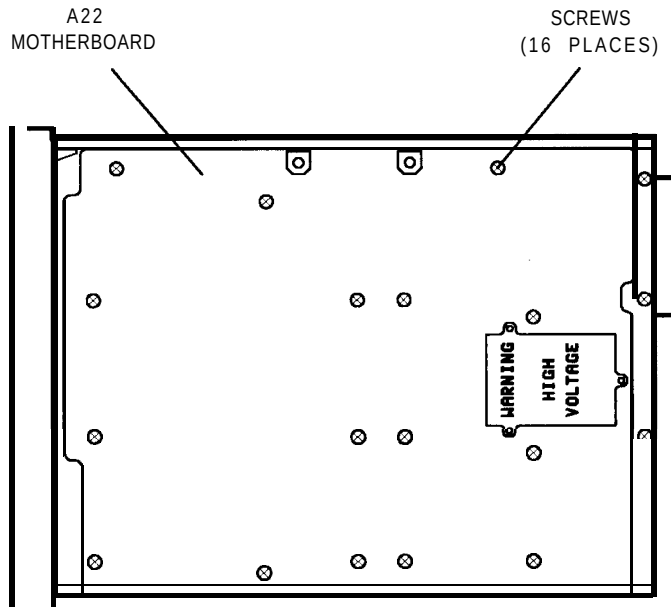


Figure 7-39. Motherboard Screws

Post-Repair

Table 8-1.
Adjustments and Performance Tests Required After Repair or
Replacement of an Assembly

Assembly	Adjustment	Performance Test
A2 Source Module Interface	None	Full Self-Test
A4 Fractional-N ¹	Fractional-N v c o Fractional-N Reference and API Spurs	Full Self-Test CW Frequency Accuracy
A5 YO Phase Detector	YO Loop Gain	Full Self-Test CW Frequency Accuracy
A6 Sampler	Sampler Assembly	Full Self-Test CW Frequency Accuracy
A7 Reference	None	Full Self-Test CW Frequency Accuracy
A9 Pulse (HP 83621B/31B)	Amp/Mult Adjustments	Full Self-Test Maximum Leveled Power
A9 Pulse (HP 83651B)	Amp/Mult Adjustments Amp/Filter Adjustments	Full Self-Test Maximum Leveled Power
A10 ALC	Modulator Offset and Gain ALC Power Level Accuracy Power Flatness	Full Self-Test Maximum Leveled Power
A12 SYTM Driver (HP 83621B/31B)	Amp/Mult Adjustments Low Power SRD Bias	Full Self-Test Maximum Leveled Power
A12 Mult/Filter Driver (HP 83651B)	Amp/Mult Adjustments Amp/Filter Adjustments Low Power SRD Bias	Full Self-Test Maximum Leveled Power
A13 YO Driver	YO Driver +IOV Reference YO Driver Gain and Linearity YO Delay (automated)	Full Self-Test CW Frequency Accuracy Swept Frequency Accuracy
A14 Sweep Generator	Sweep Ramp	Full Self-Test Swept Frequency Accuracy

¹ The adjustments listed are required only after *repair* of the assembly. The *replacement* assembly is adjusted at the factory and is not instrument-dependent.

Table 8-1.
Adjustments and Performance Tests Required After Repair or
Replacement of an Assembly (continued)

Assembly	Adjustment	Performance Test
415 CPU	ADC (automated)	Full Self-Test HP-IB Self-Test
416 Postregulator	None	Full Self-Test
417 Rectifier/Filter	None	Full Self-Test
418 Switching Regulator	None	Full Self-Test
419 Rear Panel Interface	None	Full Self-Test HP-IB Self-Test
A20 RF Interface	None	Full Self-Test Operation Verification
A22 Motherboard	None	Full Self-Test Operation Verification
A23 10 MHz Reference¹	10 MHz Standard	Full Self-Test CW Frequency Accuracy
A24 Low Band	Modulator Offset and Gain ALC Power Level Accuracy Power Flatness	Full Self-Test Maximum Leveled Power
A26 YIG Oscillator	YO Driver Gain and Linearity YO Delay (Automated)	Full Self-Test CW Frequency Accuracy Maximum Leveled Power Swept Frequency Accuracy
A28 Amp/Multiplier	Amp/Mult Adjustments Amp/Filter Adjustments Low Power SRD Bias	Full Self-Test Maximum Leveled Power Spurious Signals (Harmonics)
A29 Amp/Filter (HP 83651B)	Amp/Mult Adjustments Amp/Filter Adjustments Low Power SRD Bias	Full Self-Test Maximum Leveled Power Spurious Signals (Harmonics)
A30 Bridge Detector	ALC Power Level Accuracy Power Flatness	Full Self-Test Maximum Leveled Power

¹ The adjustments listed are required only after repair of the assembly. The replacement assembly is adjusted at the factory and is not instrument-dependent.

Table 8-1.
Adjustments and Performance Tests Required After Repair or
Replacement of an Assembly (continued)

Assembly	Adjustment	Performance Test
A34 Rear Panel BNC	None	Full Self-Test
CR1 Detector (HP 83651B)	ALC Power Level Accuracy Power Flatness	Full Self-Test Power Accuracy Maximum Leveled Power
FL1 Line Module	None	Full Self-Test
FL2 8 GHz LPF	Sampler Assembly	Full Self-Test
J1 RF Output Connector	Power Flatness (automated)	Full Self-Test Maximum Leveled Power
T1 Toroid Power Transformer	None	Full Self-Test

Replaceable Parts

Introduction

Replaceable parts include major assemblies and all chassis hardware. Table 9-1 lists reference designations and abbreviations used in this chapter.

For information on removing and replacing assemblies, see Chapter 7, “Disassembly and Replacement Procedures”.

Module-Exchange Program

Many major assemblies are covered by the module-exchange program. Under the terms of the program, factory-repaired and tested assemblies are available on a trade-in basis (a defective assembly must be returned for credit). Exchange assemblies meet all new assembly specifications, but are less expensive. Figure 9-1 illustrates the module exchange procedure.

Order spare assembly stock using the new assembly part number.

If you have any questions, contact your Hewlett-Packard customer engineer for the latest information about this program.

Replacement Information

The following information is given in the tables in this chapter:

- Hewlett-Packard part number.
- Part quantity for that figure. There may be more of that part in other figures.
- Part description (see Table 9-1 for abbreviations).

Ordering Information

For any listed part, request the Hewlett-Packard part number and quantity required from the nearest Hewlett-Packard office.

How To Order Parts . . . Fast!

Hewlett-Packard parts specialists have direct on-line access to the replaceable parts listed in this manual. Four-day delivery is standard; there is a charge for hotline (one-day) delivery.

In the United States, call the following toll-free number:

(800) 227-8164

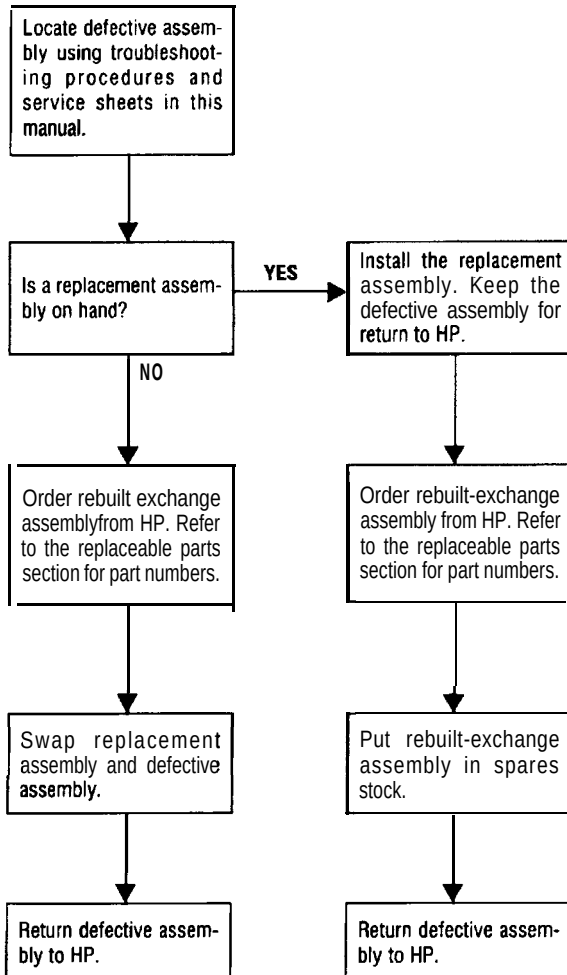
Monday through Friday, 6 am to 5 pm (Pacific Standard Time)

Outside the United States, contact your nearest Hewlett-Packard office.

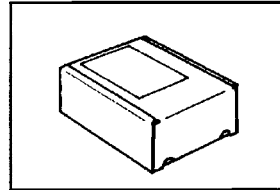
Table 9-1. Reference Designations and Abbreviations

4	Amperage; Assembly	LG	Long; Length
4T	Termination	LK	Lock
4 x	Axial Lead	LPF	Low Pass Filter
4Y	Assembly	M	Male; Maximum; Meter; Mil; Milli
B	Fan; Motor	MTG	Mounting
BI	Bipin	NTD	Non-Time Delay
BT	Battery	NYL	Nylon
CHAM	Chamfer	PAN-HD	Pan Head
COMPNT	Component	RF	Rear Panel
CONN	Connector	RPG	Rotary Pulse Generator
CR	Detector	SKT	Socket
CU	Copper	SN-PL	Tin Plated
D	Diameter	SRD	Step Recovery Diode
DEG	Degree	STD	Standard
F	Fuse	STL	Steel
FE	Ferrule	SW	Switch
FL	Filter	T	Transformer Thickness; Taper; Tooth
FLH	Flat Head	TD	Time Delay
FLTG	Floating	THD	Thread; Threaded
FP	Front Panel	THK	Thick
FR	Front	TPG	Tapping
HD	Hand; Hard; Heavy Duty; Head	TR-HD	Truss Head
HEX	Hexadecimal; Hexagon; Hexagonal	UL	Underwriters Laboratories
D	Inside Diameter	W	Cable; Wire
N	Inch	WD	Width
NTL	Internal; International	YIG	Yttrium Iron Garnate
I	Electrical Connector; Jack	YO	YIG Oscillator
LBL	Label		

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

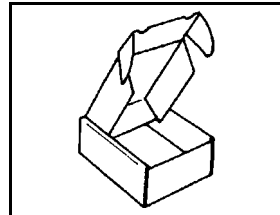


A.



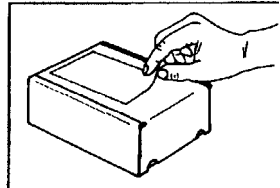
Rebuilt-exchange assemblies are shipped individually in boxes like this. In addition to the circuit assembly, the box contains:
Exchange assembly failure report
Return address label

B.



Open box carefully - it will be used to return defective assembly to HP. Complete failure report. Place it and defective assembly in box. Be sure to remove enclosed return address label.

C.



Seal box with tape. Inside U.S.A., stick preprinted return address label over label already on box, and return box to HP. Outside U.S.A., do not use address label; instead address box to the nearest HP office.

*HP pays postage on boxes mailed in U.S.A

Figure 9-1. Module Exchange Program

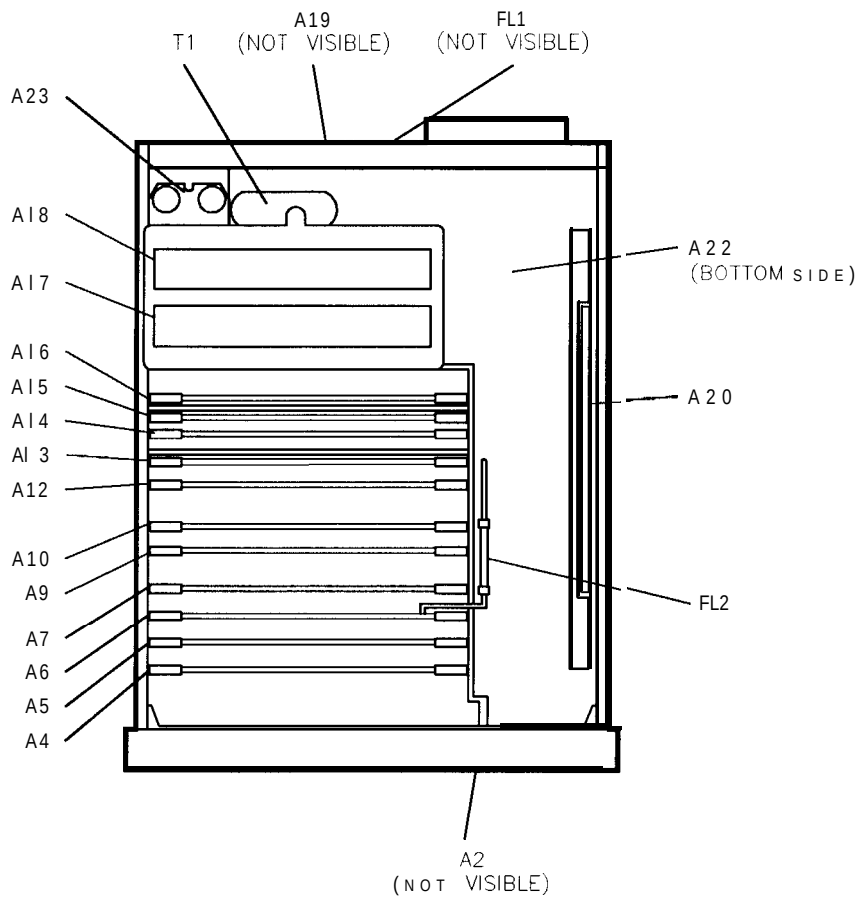
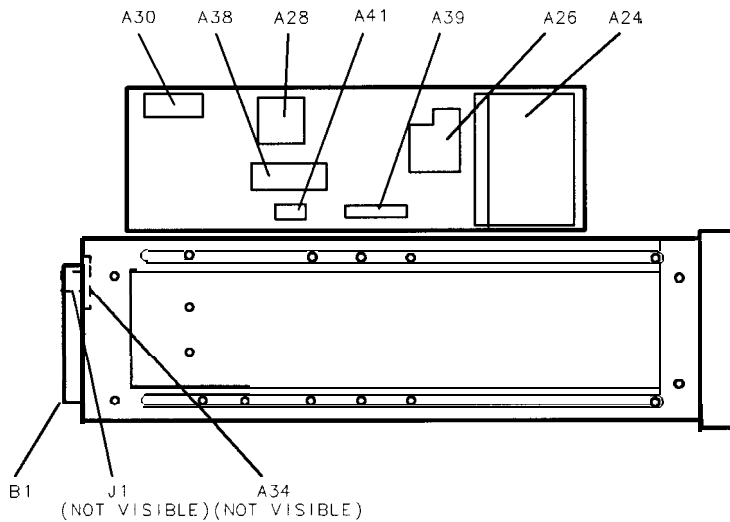
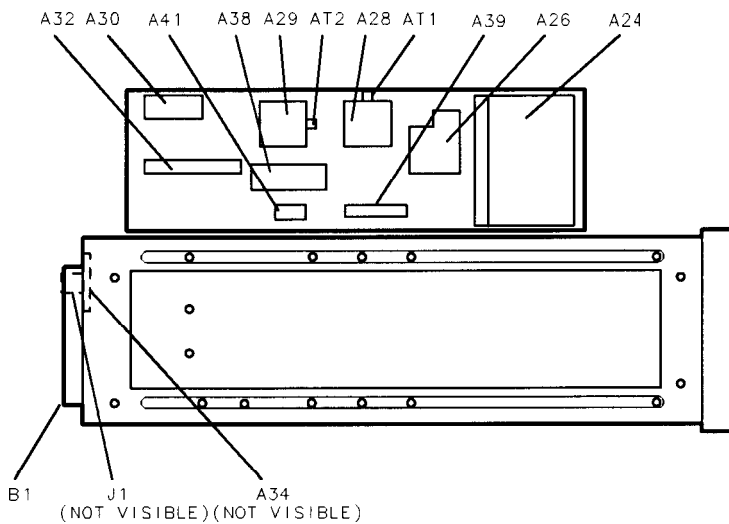


Figure 9-2. Major Assemblies (1 of 2)



HP 83621B/31B



HP 83651B

Figure 9-2. Major Assemblies (2 of 2)

Table 9-2. Major Assemblies (1 of 4)

Ref. Desig.	HP Part Number	Qty	Description
A1			NOT USED
A2	08360-60002	1	SOURCE MODULE INTERFACE ASSEMBLY
A3			NOT USED
A4	08360-60010	1	FRACTIONAL-N ASSEMBLY
A4	08360-69010		FRACTIONAL-N ASSEMBLY (Rebuilt-Exchange)
A5	08360-60209	1	YO LOOP ASSEMBLY
A5	08360-69209		YO LOOP ASSEMBLY (Rebuilt-Exchange)
A6	08360-60214	1	SAMPLER ASSEMBLY
A6	08360-69214		SAMPLER ASSEMBLY (Rebuilt-Exchange)
A7	08360-60008	1	REFERENCE ASSEMBLY
A7	08360-69008		REFERENCE ASSEMBLY (Rebuilt-Exchange)
A8			NOT USED
A9	08360-60188	1	PULSE ASSEMBLY
A10	08360-60206	1	ALC ASSEMBLY
A10	08360-69206		ALC ASSEMBLY (Rebuilt-Exchange)
A11			NOT USED
A12	08360-60012	1	SYTM DRIVER ASSEMBLY (HP 83621B/31B)
A12	08360-69012		SYTM DRIVER ASSEMBLY (Rebuilt-Exchange)
A12	08360-60212	1	MULTIPLIER/FILTER DRIVER ASSEMBLY (HP 83651B)
A12	08360-69212		MULTIPLIER/FILTER DRIVER ASSEMBLY (Rebuilt-Exchange)

Table 9-2. Major Assemblies (2 of 4)

Ref. Desig.	HP Part Number	Qty	Description
A13	08360-60207	1	YO DRIVER ASSEMBLY
A13	08360-69207		YO DRIVER ASSEMBLY (Rebuilt-Exchange)
A14	08360-60014	1	SWEEP GENERATOR ASSEMBLY
A14	08360-69014		SWEEP GENERATOR ASSEMBLY (Rebuilt-Exchange)
A15	08360-60215	1	CPU ASSEMBLY
A15	08360-69215		CPU ASSEMBLY (Rebuilt-Exchange)
	08360-60201	1	FIRMWARE UPGRADE KIT
A16	08360-60016	1	POSTREGULATOR ASSEMBLY
A16	08360-69016		POSTREGULATOR ASSEMBLY (Rebuilt-Exchange)
	0400-0018	1	GROMMET-CHAN .052 TH (Part of A16)
A16F1	2110-0047	1	FUSE (INCH) 1A 125V NTD BI
A16F2	2110-0618	3	FUSE (INCH) 5A 125V NTD BI
A16F3	2110-0713	2	FUSE-SUBMINIATURE 10A 125V NTD AX
A16F4	2110-0713		FUSE-SUBMINIATURE 10A 125V NTD AX
A16F5	2110-0618		FUSE (INCH) 5A 125V NTD BI
A16F6	2110-0618		FUSE (INCH) 5A 125V NTD BI
A16F7	2110-0425	2	FUSE (INCH) 2A 125V NTD BI
A16F8	2110-0425		FUSE (INCH) 2A 125V NTD BI
A17	08360-60017	1	RECTIFIER/FILTER ASSEMBLY
A17	08360-69017		RECTIFIER/FILTER ASSEMBLY (Rebuilt-Exchange)
A17F1	2110-0303	1	FUSE (INCH) 2A 250V TD FE UL
A18	08360-60198	1	SWITCHING REGULATOR ASSEMBLY
A18	08360-69198	1	SWITCHING REGULATOR ASSEMBLY (Rebuilt-Exchange)
A18F1	2110-0201	1	FUSE (INCH) 0.25A 250V TD FE UL

Table 9-2. Major Assemblies (3 of 4)

Ref. Desig.	HP Part Number	Qty	Description
A19	08360-60019	1	REAR PANEL INTERFACE ASSEMBLY
A20	08360-60266	1	RF INTERFACE ASSEMBLY
A20F1	2110-0425	1	FUSE (INCH) 2A 125V NTD BI
A21			NOT USED
A22	08360-60196	1	MOTHERBOARD ASSEMBLY
A23	10811E	1	10 MHZ REFERENCE STANDARD (Includes W30)
A24	5086-7463	1	LOWBAND ASSEMBLY
A24	5086-6463		LOWBAND ASSEMBLY (Rebuilt-Exchange)
A25			NOT USED
A26	5086-7515	1	YIG OSCILLATOR (2.0 – 7.5 GHz)
426	5086-6515		YIG OSCILLATOR (2.0 – 7.5 GHz) (Rebuilt-Exchange)
427			NOT USED
428	5086-7648	1	SWITCHED AMPLIFIER MULTIPLIER (HP 83621B/31B)
428	5086-6648	1	SWITCHED AMPLIFIER MULTIPLIER (Rebuilt— Exchange)
428	50867622	1	AMPLIFIER/MULTIPLIER (HP 83651B)
428	5086-6622		AMPLIFIER/MULTIPLIER (Rebuilt-Exchange)
429	5086-7623	1	AMPLIFIER/FILTER (HP 83651B)
429	50866623		AMPLIFIER/FILTER (Rebuilt-Exchange)
430	5086-7605	1	BRIDGE DETECTOR (HP 83621B/31B)
430	5086-6605	1	BRIDGE DETECTOR (Rebuilt-Exchange)
A30	50867603	1	BRIDGE DETECTOR (HP 83651B)
A30	50866603	1	BRIDGE DETECTOR (Rebuilt-Exchange)

Table 9-2. Major Assemblies (4 of 4)

Ref. Desig.	HP Part Number	Qty	Description
A31			NOT USED
A32	5086-7513	1	DOUBLER/AMPLIFIER (HP 83651B)
A33			NOT USED
A34	08360-60157	1	RP FLOATING BNC ASSEMBLY
A38	5086-7634	1	AM MODULATOR
A39	0955-0098	1	COUPLER (2.0 - 8.4 GHZ)
A41	5086-7327	1	DIODE SWITCH
AT1	0960-0053	1	TERMINATION SMA MALE 50Ω
AT2	0960-0053	1	TERMINATION SMA MALE 50Ω
AT3	0955-0216	1	ATTENUATOR 20 DB
B1	08360-80006	1	FAN
F1	2110-0227	1	FUSE (INCH) 5A 250V NTD FE UL
F1	2110-0003	1	FUSE (INCH) 3A 230V NTD FE UL
FL1	9135-0242	1	LINE MODULE – FILTERED
FL2	0955-0485	1	8 GHZ LOW PASS FILTER
J1	0867360040	1	RF OUTPUT CONNECTOR (HP 83621B/31B)
J1	5062-6610	1	RF OUTPUT CONNECTOR (HP 83651B)
T1	9100-4781	1	TOROID POWER TRANSFORMER

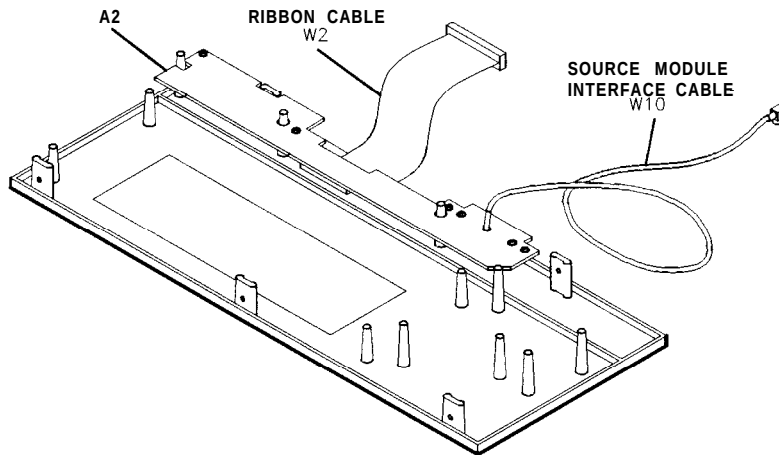


Figure 9-3. Cables (1 of 4)

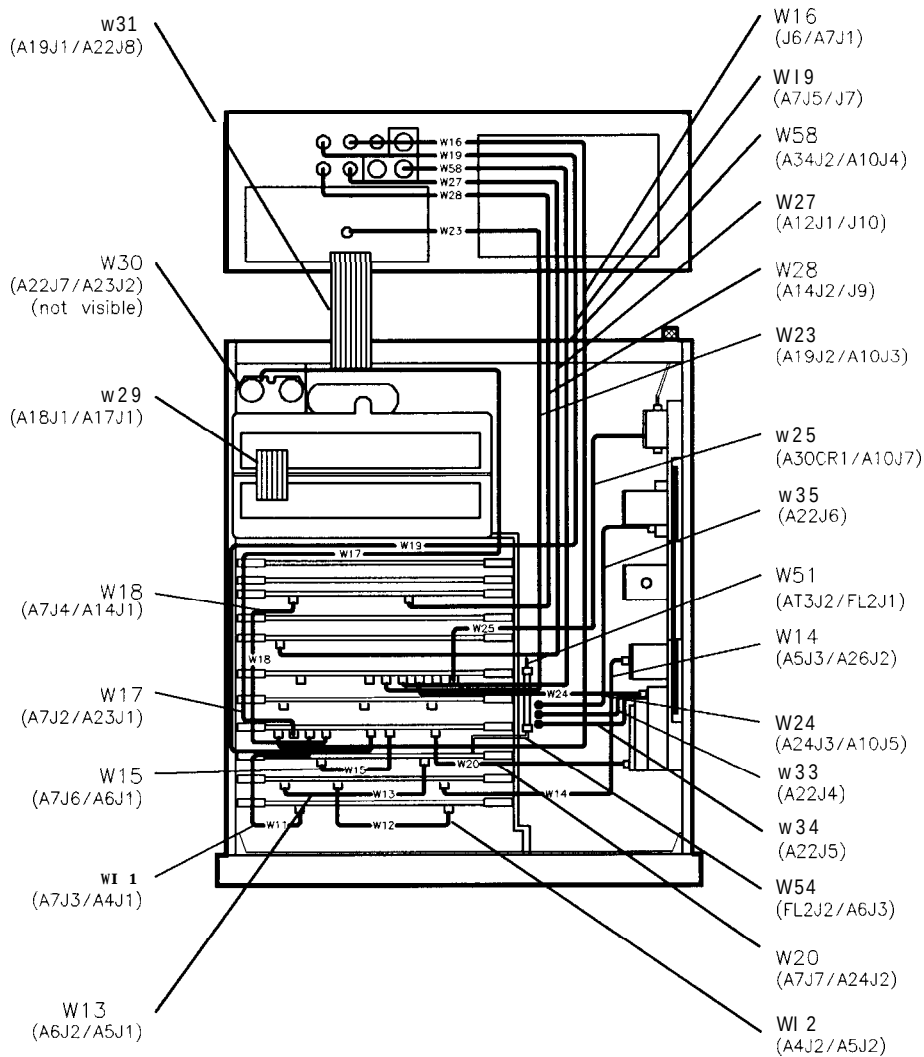


Figure 9-3. Cables (2 of 4)

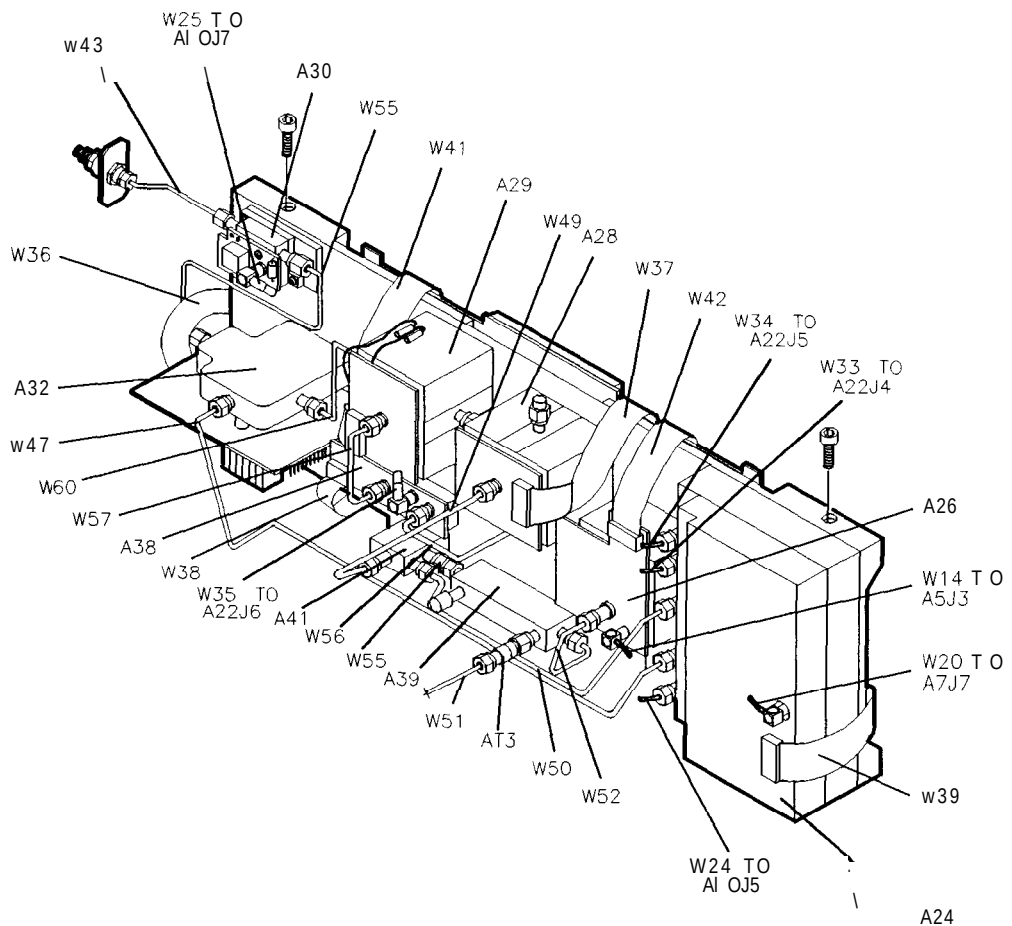


Figure 9-3.
Cables (3 of 4)
(HP 838518 RF Deck)

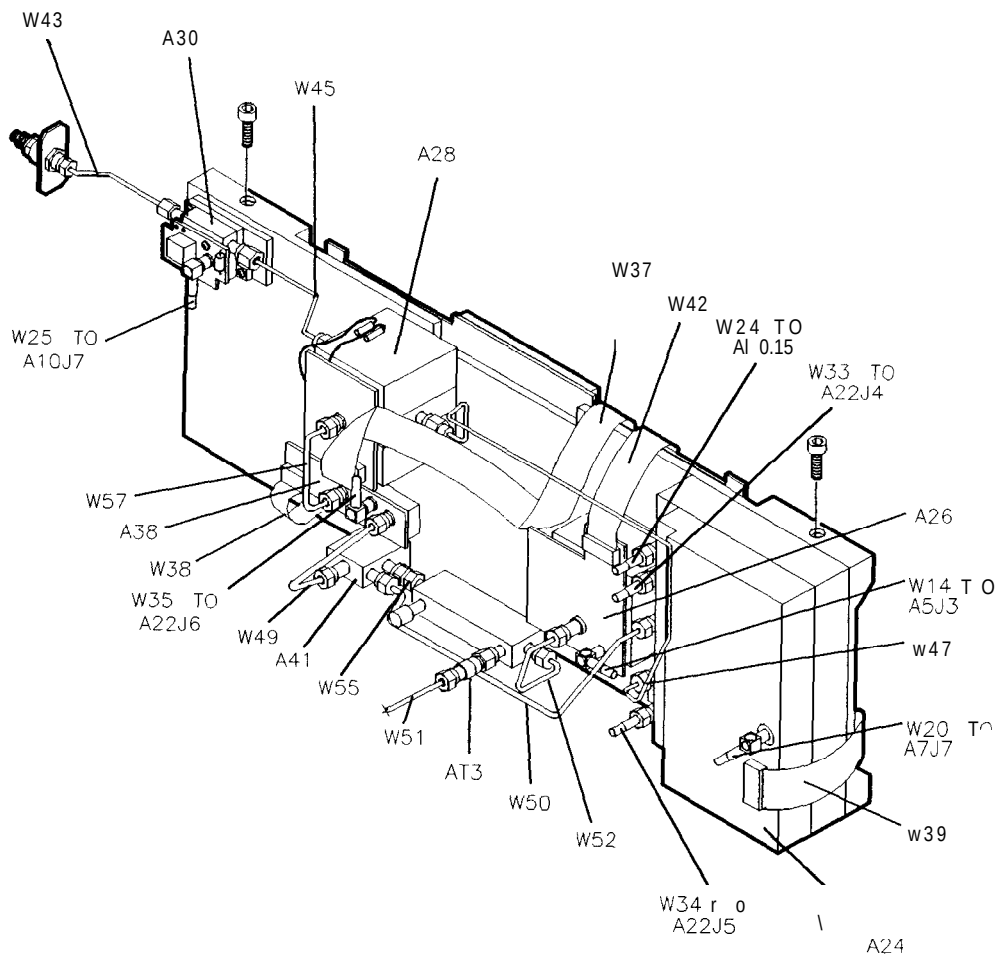


Figure 9-3.
Cables (4 of 4)
(HP 83621B/31B RF Deck)

Table 9-3. Cables (1 of 3)

Ref. Desig.	HP Part Number	Qty	Description
W1			NOT USED
W2	08360-60056	1	SMI/MOTHERBOARD-A2J1/A22J1
W3-W9			NOT USED
W10	08360-60092	1	FP SMI LEVELING-A2J2/A10J2
W11	08360-60074	1	125 kHz REF-A7J3/A4J1
W12	08360-60075	1	30-60 MHZ-A4J2/A5J2
W13	08360-60076	1	SAMPLER IF-A6J2/A5J1
W14	08360-60083	1	HIGH FREQ PLL-A5J3/A26J2
W15	08360-60072	1	40 MHZ REF-A7J6/A6J1
W16	08360-60095	1	EXTERNAL STD-J6/A7J1
W17	08360-60071	1	OVEN STD-A23J1/A7J2
W18	08360-60073	1	1 MHZ-A7J4/A14J1
W19	08360-60096	1	10 MHZ REAR PANEL -A7J5/J7
W20	08360-60082	1	100 MHZ REF-A7J7/A24J2
W21			NOT USED
W22			NOT USED
W23	08360-60093	1	RP SMI LEVELING-A19J2/A10J3
W24	08360-60107	1	LOWBAND DETECTOR-A24J3/A10J5
W25	08360-60106	1	HI BAND DETECTOR-A30CR1/A10J7

Table 9-3. Cables (2 of 3)

Ref. Desig.	HP Part Number	Qty	Description
W26			NOT USED
W27	08360-60097	1	V/GHZ-A12J1/J10
W28	08360-60098	1	TRIGGER OUTPUT-A14J2/J9
w 29	08360-60031	1	PREREG IN/PREREG OUT-A18J1/A17J1
W30	08360-60063	1	MOTHERBOARD/10MHZ STD-A22J7/A23J2
w 31	08360-60037	1	REAR PANEL/MOTHERBOARD-A19J1/A22J8
W32			NOT USED
w 33	08360-60088	1	PULSE MOD LO-A22J4/A24J6
w 34	08360-60087	1	ALC MOD LOW-A22J5/A24J7
w 35	08360-60225	1	ALC MOD HI-A22J6/A38J2
W36	08360-60191	1	RF INTERFACE/DOUBLER-A20J5/A32J1 (HP 83651B)
w 37	08360-60189	1	RF INTERFACE/AMP MULT-A20J9/A28J1 (HP 83651B)
w 37	08360-60230	1	RF INTERFACE/SWITCHED AMP MULT-A20J9/A28J1 (HP 83621B/31B)
W38	08360-60227	1	RF INTERFACE/AM MOD-A20J1/A38J1
w 39	08360-60046	1	RF INTERFACE/LOWBAND-A20J4/A24J1
W40			NOT USED
W41	08360-60190	1	RF INTERFACE/AMP FILTER-A20J8/A29J1 (HP 83651B)
W42	08360-60040	1	RF INTERFACE/YO-A20J8/A26J1 (HP 83621B/31B)
W42	08360-60040	1	RF INTERFACE/YO-A20J10/A26J1 (HP 83651B)

Table 9-3. Cables (3 of 3)

Ref. Desig.	HP Part Number	Qty	Description
w43	08360-20073	1	BRIDGE DET/RF OUT-A30J2/J1 (HP 83621B/31B)
w43	08360-20083	1	BRIDGE DET/RF OUT-A30J2/J1 (HP 83651B)
w44			NOT USED
w45	08360-20185	1	AMP MULT/BRIDGE DET-A28J3/A30J1 (HP 83621B/31B)
W46			NOT USED
w47	08360-20163	1	LOWBAND/AMP MULT-A24J4/A28J4 (HP 83621B/31B)
w47	08360-20139	1	LOWBAND/DOUBLER-A24J4/A32J3 (HP 83651B)
W48	08630-20235	1	AMP MULT/AUX OUTPUT-A28J4/J14
w49	08360-20267	1	DIODE SWITCH/AM MOD-A41J3/A38J8 (HP 83621B/31B)
w49	08360-20171	1	DIODE SWITCH/AMP MULT-A41J3/A28J2 (HP 83651B)
W50	08360-20169	1	DIODE SWITCH/LOWBAND-A41J2/A24J5
w51	08360-20172	1	ATTENUATOR/LPF-AT3J2/FL2J1
W52	08360-20147	1	YO/DIR COUPLER-A26J4/A39J1
w53			NOT USED
w54	08360-20087	1	LPF/SAMPLER-FL2J2/A6J3
w55	1250-1159	1	DIR COUPLER/DIODE SWITCH-A39J2/A41J1
W56	08360-20258	1	AMP MULT/AM MOD-A28J2/A38J15 (HP 83651B)
w57	08360-20203	1	AM MOD/AMP FILTER-A38J9/A29J2
W58	08360-60099	1	EXTERNAL LEVELING A34J2/A10J4
w59	08360-20194	1	DOUBLER/BRIDGE DET-A32J4/A30J1
W60	08360-20137	1	AMP FILTER/DOUBLER-A29J3/A32J2 (HP 83651B)
W61			NOT USED

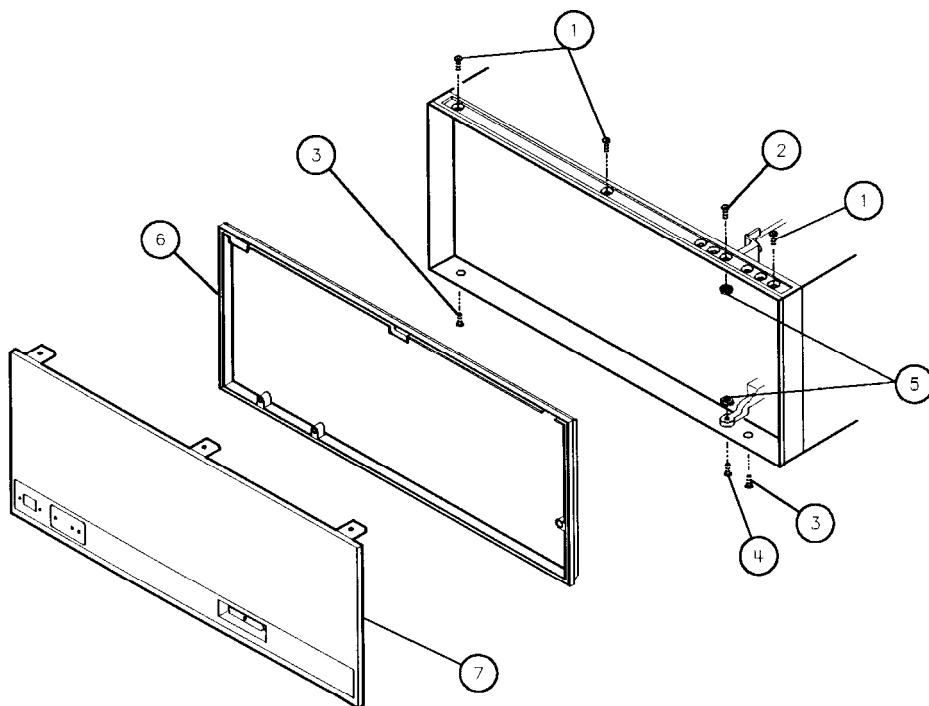


Figure 9-4. Front Panel

Table 9-4. Front Panel

Ref. Desig.	HP Part Number	Qty	Description
1	0515-2043	3	SCREW-MACH. M4 x 0.7 8MM-LG 90-DEG-FLH-HD
2	0515-0943	2	SCREW-MACH. M4 x 0.7 12MM-LG
	0535-0082	2	NUT-SPECIALTY M3.5 x 1.27 THD; 8.44MM
3	0515-2043	2	SCREW-MACH. 8MM-LG 90-DEG-FLH-HD
4	0515-0943		SCREW-MACH. M4 x 0.7 12MM-LG
	0535-0082	2	NUT-SPECIALTY M3.5 x 1.27 THD; 8.44MM
6	08360-40004	1	RFI SEAL (BLACK RUBBER GASKET)
7	08360-20052	1	FRONT PANEL CASTING
Also order front panel nameplate in Table 9-15, "Miscellaneous Replaceable Accessories"			

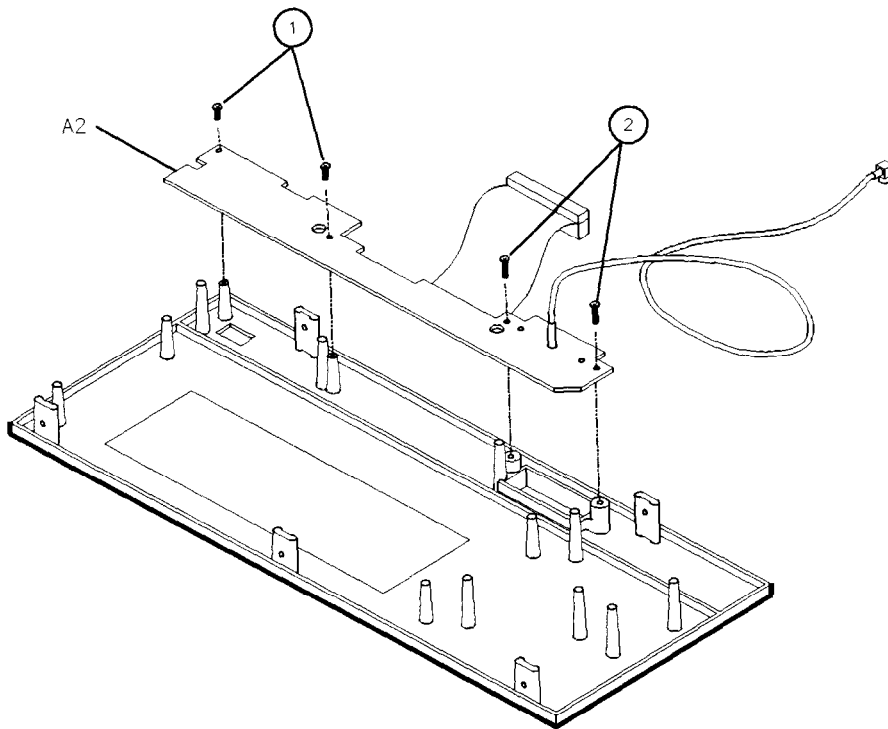


Figure 9-5. Front Panel, Attaching Hardware

Table 9-5. Front Panel, Attaching Hardware

Ref. Desig.	HP Part Number	Qty	Description
1	0515-0372	2	SCREW-MACHINE ASSEMBLY M3 x 0.5 8MM-LG
2	0515-0664	2	SCREW-MACHINE ASSEMBLY M3 x 0.5 12MM-LG

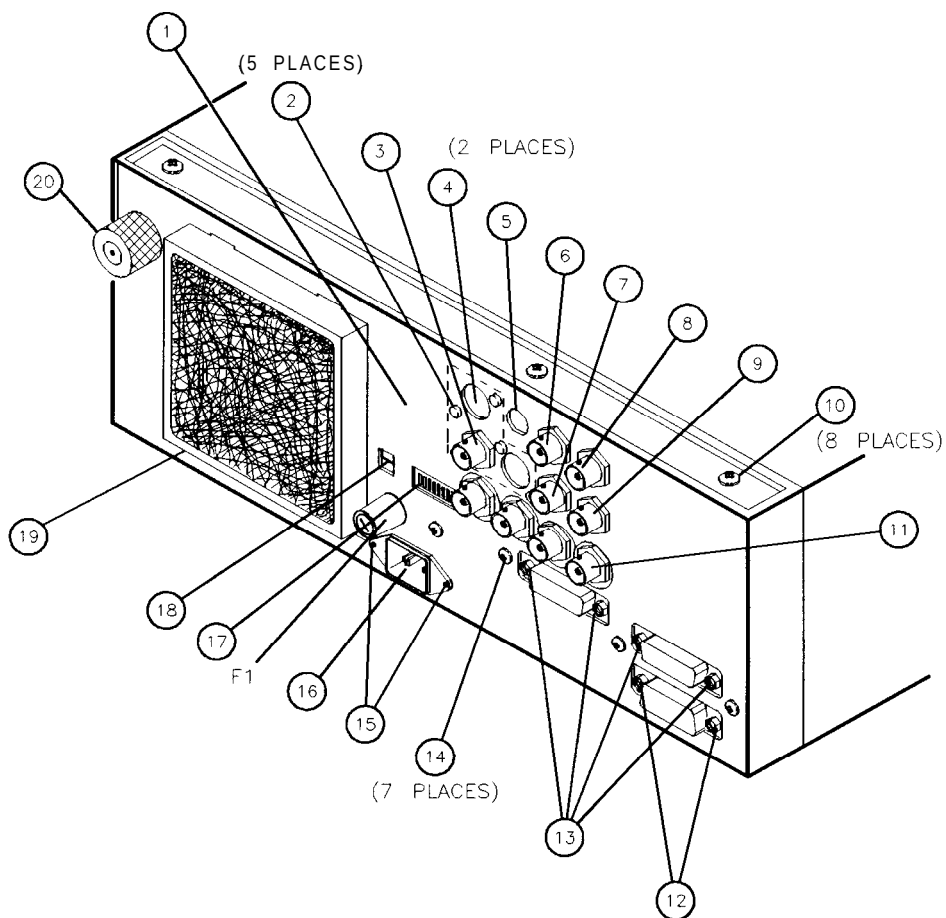


Figure 9-6. Rear Panel

Table 9-6. Rear Panel (1 of 2)

Ref. Desig.	HP Part Number	Qty	Description
1	08360-00001	1	REAR PANEL
2	0515-0372	5	SCREW-MACHINE ASSEMBLY M3 x 0.5 8MM-LG
3			BNC CONNECTOR (Order A34 of Table 9-2)
4	6960-0027	4	PLUG-HOLE TR-HD FOR .625-D-HOLE NYL

Table 9-6. Rear Panel (2 of 2)

Ref. Desig.	HP Part Number	Qty	Description
5	3960-0041	1	PLUG-HOLE TR-HD FOR .5-D-HOLE NYL
6			J6 - CA AY-10MHZ IN-See Table 9-3
	2950-0035	4	NUT-HEX DBL-CHAM 15/32-32-THD
	2190-0102	4	WASHER LK INTL T 15/32 IN .472-IN-ID
7			J10 - CA AY-VOLTS/GHZ-See Table 9-3
	2950-0035		NUT-HEX DBL-CHAM 15/32-32-THD
	2190-0102		WASHER LK INTL T 15/32 IN .472-IN-ID
8			J7 - CA AY-10MHZ OUT-See Table 9-3
	2950-0035		NUT-HEX DBL-CHAM 15/32-32-THD
	2190-0102		WASHER LK INTL T 15/32 IN .472-IN-ID
9			J9 - CA AY-ANAL INTFC-See Table 9-3
	2950-0035		NUT-HEX DBL-CHAM 15/32-32-THD
	2190-0102		WASHER LK INTL T 15/32 IN .472-IN-ID
10	1515-0380	8	SCREW-MACHINE ASSEMBLY M4 x 0.7 10MM-LG
11			BNC CONNECTOR (Order A19 of Table 9-2)
12	1380-0643	2	STANDOFF HEX .255-IN-LG 6/32-THD
13	1251-5436	4	SCREW LOCK KIT-AMP HD CONN
14	0515-0372	7	SCREW-MACHINE ASSEMBLY M3 x 0.5 8MM-LG
15	0515-1037	2	SCREW-MACHINE ASSEMBLY M3 x 0.5 45MM-LG
16			LINE MODULE - FILTERED (See Table 9-2)
17			HP-IB SWITCH (Order A19 of Table 9-2)
18	08360-60032	1	AC VOLTAGE SELECTION SWITCH/HARNESS
19			FAN (see Table 9-2)
20			RF CONNECTOR, CONNECTOR PLATE AND HARDWARE (see Table 9-13)
F1	2110-0227	1	FUSE (INCH) 5A 250V NTD FE UL
	2110-0003	1	FUSE (INCH) 3A 230V NTD FE UL
	2110-0564	1	FUSEHOLDER BODY
	2110-0565	1	FUSEHOLDER CAP
	2110-0569	1	FUSEHOLDER NUT

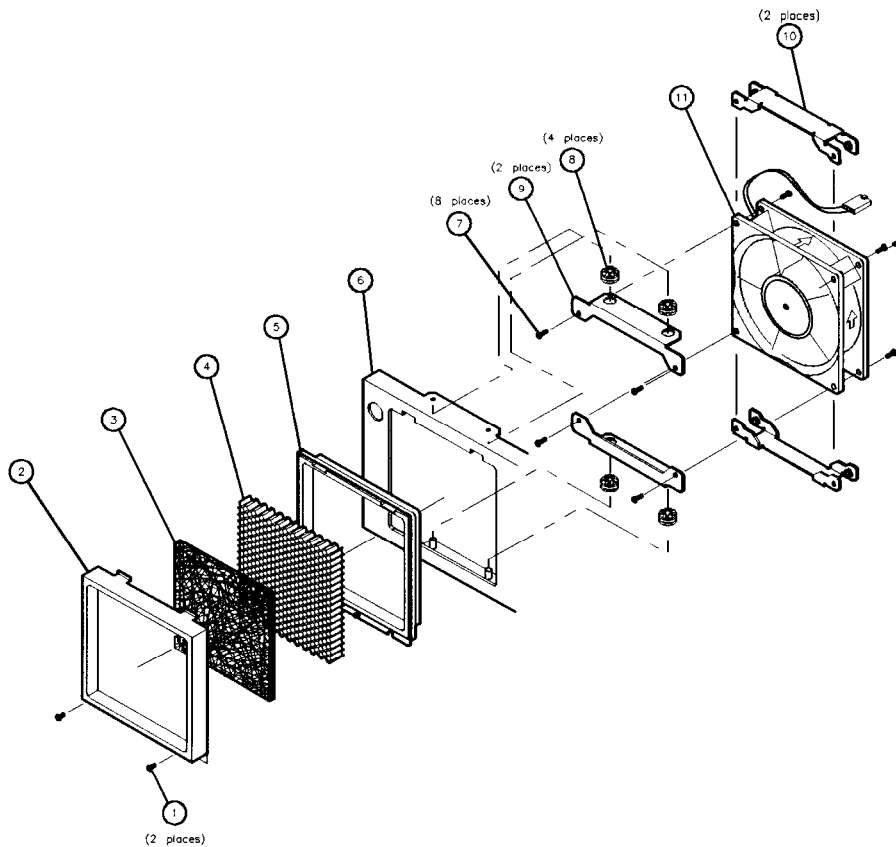


Figure 9-7. Rear Panel Fan Assembly

Table 9-7. Rear Panel Fan Assembly

Ref. Desig.	HP Part Number	Qty	Description
1	0515-0430	2	SMM 3.0 6 PM TX
2	08360-00059	1	FAN SHROUD
3	08360-20254	1	FOAM
4	08360-00058	1	HEXCELL HONEYCOMB
5	08360-40011	1	GROUND HEX SHROUD
6	08360-00060	1	REAR PANEL
7	0515-2011	8	SCREW-MACHINE ASSY M3.5 x 0.6
8	0400-0356	4	GROMMET
9	08360-00057	2	BRACKET FAN/REAR PANEL
10	08360-00061	2	BRACKET FAN
11	08360-80026	1	FAN

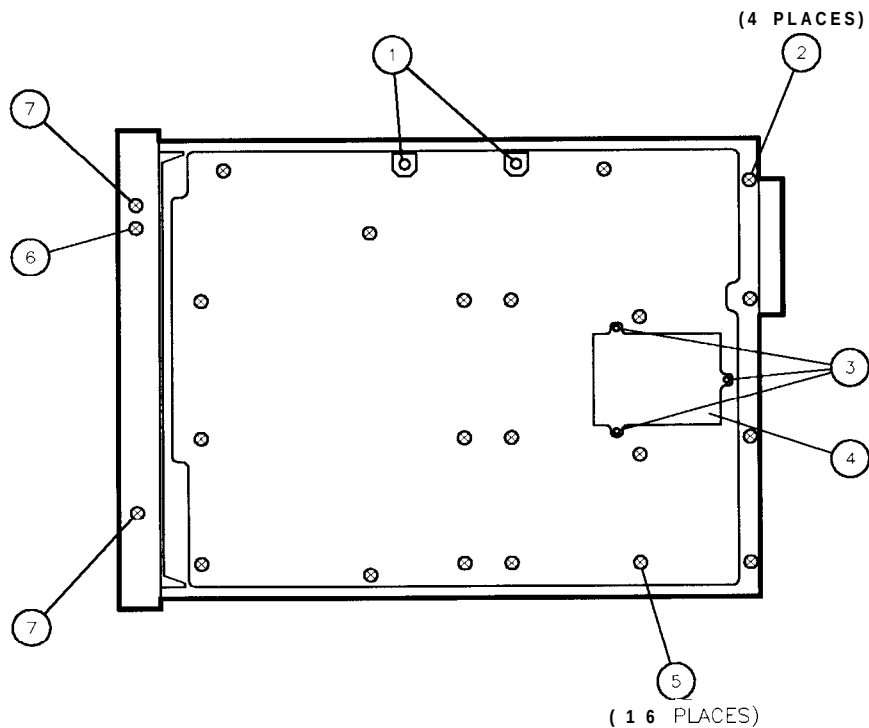
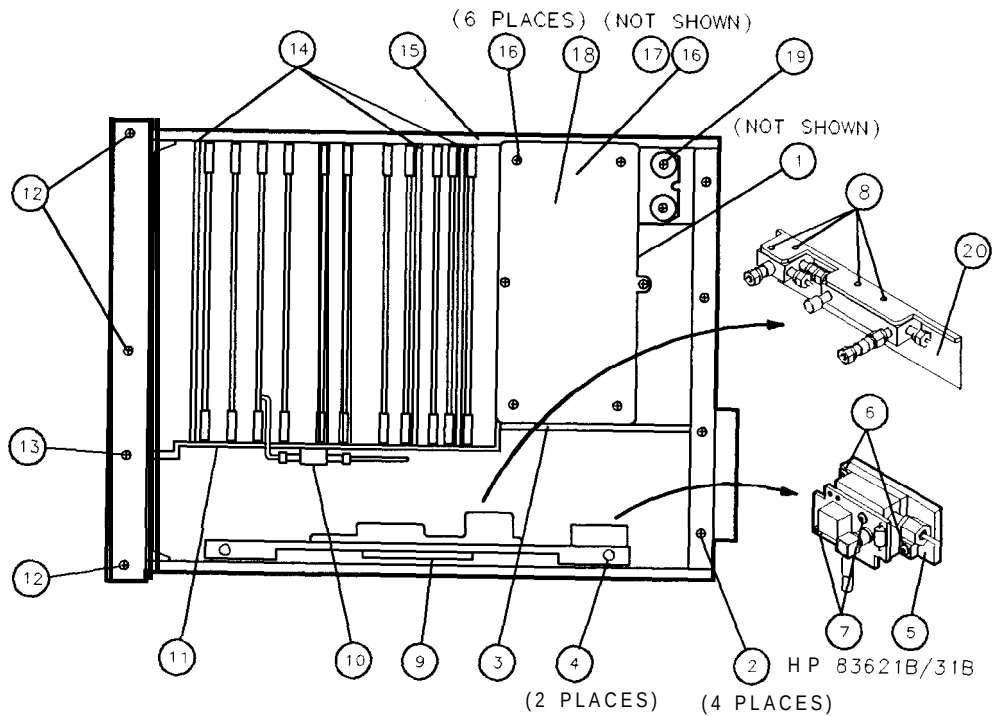


Figure 9-8. Bottom View, Attaching Hardware

Table 9-8. Bottom View, Attaching Hardware

Ref. Design.	HP Part Number	Qty	Description
1	6960-0016	2	PLUG-HOLE TR-HD FOR .125-D HOLE NYL
2			SCREW-MACHINE (See Table 9-6)
3	0624-0518	3	SCREW-TPG 6-19 .25-IN-LG PAN-HD-TORX T15
4	08360-40002	1	HIGH VOLTAGE COVER
5	0515-0382	16	SCREW-MACHINE ASSEMBLY M4 x 0.7 12MM-LG
6			SCREW-MACHINE (See Table 9-4)
7			SCREW-MACHINE (See Table 9-4)



so715b

Figure 9-9. Top View, Attaching Hardware

Table 9-9. Top View, Attaching Hardware

Ref. Desig.	HP Part Number	Qty	Description
1	08360-00015	1	POWER SUPPLY HOUSING
2			SCREW-MACHINE (See Table 9-7)
3	08360-20044	1	END SUPPORT
4	0515-0501	2	SCREW-SKT-HD-CAP M6 x 1.0 12MM-LG
5	5021-7872	1	MOUNTING BRACKET BRIDGE DETECTOR
6	0515-1246	2	SCREW-MACHINE M3 x 0.5 GMM-LG PAN-HD
7	0515-0430	2	SCREW-MACHINE ASSEMBLY M3 x 0.5 GMM-LG
8	0515-1539	4	SCREW MACHINE M3 x 0.5 16MM-LG
9	08360-00035	1	SUPPORT CONNECTORS
10	08360-20237	1	EXTRUSION-FILTER MOUNT
	0515-0383	1	SCREW-MACHINE ASSEMBLY M4 x 0.7 16MM-LG
11	08360-20042	1	CARD CAGE SUPPORT
12			SCREW-MACHINE (See Table 9-4)
13			SCREW-MACHINE (See Table 9-4)
14	08360-20043	3	DIVIDERS
15	8160-0539		RFI ROUND STRIP CU-CLD-STL SN-PL (2.56 FT)
16	0515-0382	6	SCREW-MACHINE ASSEMBLY M4 x 0.7 12MM-LG
17	08360-40004		RFI SEAL (3 FT)
18	08360-20045	1	POWER SUPPLY COVER
19	2200-0103	2	SCREW-MACH. 4-40 .25-IN-LG PAN-HD-POZI
	2190-0105	2	WASHER-LK HLCL NO. 6 .141-IN-ID
	1520-0205	3	SHOCK MOUNT .31-EFF-HGT
20	08360-00052	1	MOUNTING BRACKET COUPLER/DIODE SWITCH

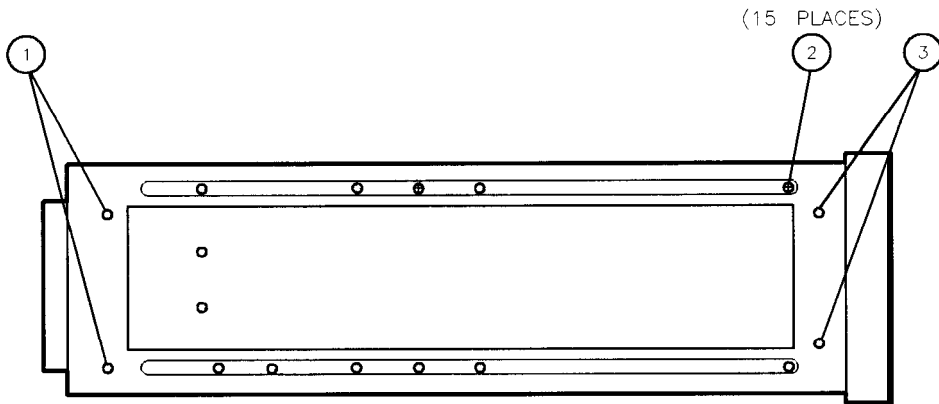
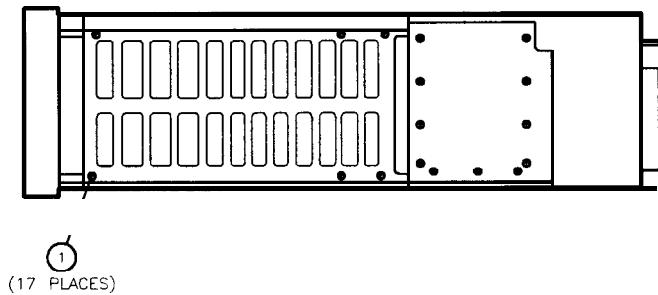


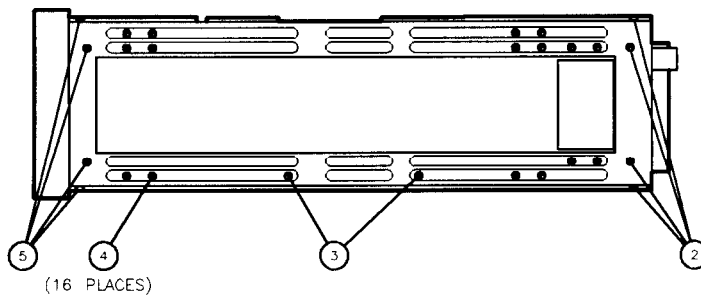
Figure 9-10. Left Side View, Attaching Hardware

Table 9-10. Left Side View, Attaching Hardware

Ref. Desig.	HP Part Number	Qty	Description
1	0515-2086	4	SCREW-SPCL M4 x 0.7 7MM-LG 90-DEG-FLH-HD
2	0515-0382	15	SCREW-MACHINE ASSEMBLY M4 x 0.7 12MM-LG
3	0515-2086		SCREW-SPCL M4 x 0.7 7MM-LG 90-DEG-FLH-HD



CARDCAGE AND REGULATOR BOX SCREWS



CHASSIS SCREWS

Figure 9-11. Right Side View, Attaching Hardware

Table 9-11. Right Side View, Attaching Hardware

Ref. Design.	HP Part Number	Qty	Description
1	0515-0382	33	SCREW-MACHINE ASSEMBLY M4 x 0.7 12MM-LG
2	0515-2086	8	SCREW-SPCL M4 x 0.7 7MM-LG 90-DEG-FLH-HD
3	0515-0433	2	SCREW-MACHINE ASSEMBLY M4 x 0.7 8MM-LG
4	0515-0382		SCREW-MACHINE ASSEMBLY M4 x 0.7 12MM-LG
5	0515-2086		SCREW-SPCL M4 x 0.7 7MM-LG 90-DEG-FLH-HD

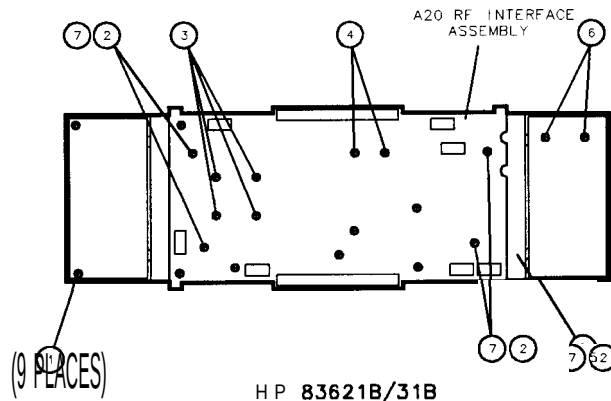
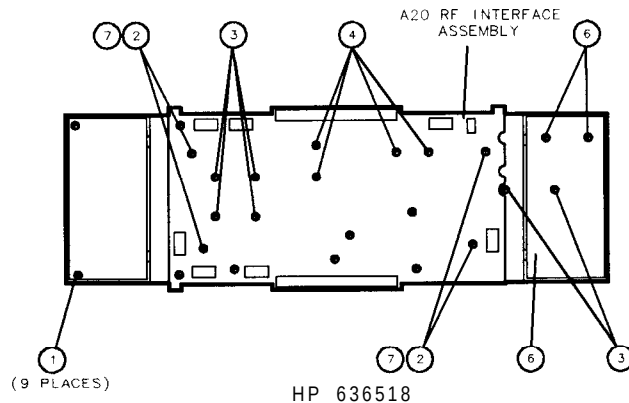
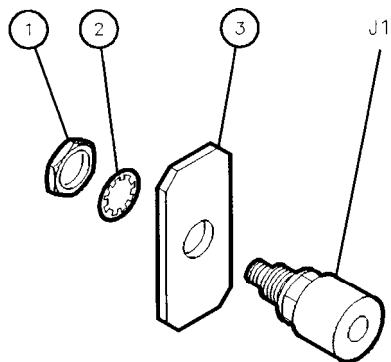


Figure 9-12. RF Deck Right Side View, Attaching Hardware

Table 9-12. RF Deck Right Side View, Attaching Hardware

Ref. Design.	HP Part Number	Qty	Description
1	0515-0372	18	SCREW-MACHINE ASSEMBLY M3 x 0.5 8MM-LG
2	3050-0169	8	WASHER-SPR CRVD NO.6 .143-IN-ID
3	0515-2011	10	SCREW-MACHINE ASSEMBLY M3.5 x 0.6
4	2360-0370	6	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI
5	08360-20141	1	RF DECK CASTING
6	0515-1246	4	SCREW-MACHINE M3 x 0.5 6MM-LG PAN-HD
7	0515-0374	8	SCREW-MACHINE ASSEMBLY M3 x 0.5 10MM-LG



REAR PANEL

Figure 9-13. RF Connector and Attaching Hardware

Table 9-13. RF Connector and Attaching Hardware

Ref. Desig.	HP Part Number	Qty	Description
1	08360-20133	1	NUT-HEX-DBL-CHAM M10 X1 (2.4 mm connector)
1	2950-0001	1	NUT-HEX-DBL-CHAM 3/8-32-THD (3.5 mm connector)
2	2190-0016	1	WASHER-LK INTL 3/8 IN
3	08360-00024	1	RF CONNECTOR PLATE - 2.4
J1			RF CONNECTOR (See Table 9-2)

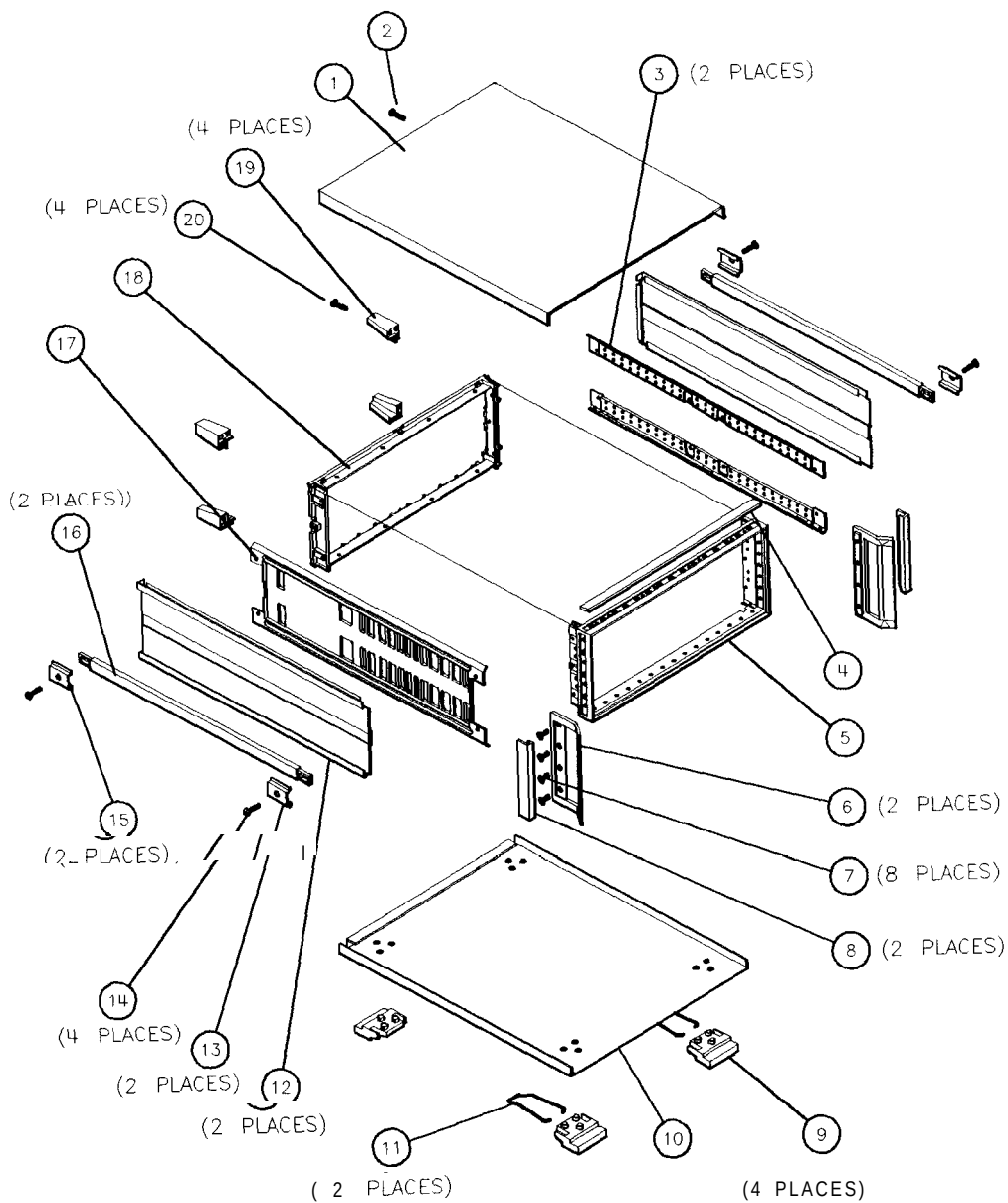


Figure 9-14. Chassis Parts

Table 9-14. Chassis Parts

Ref. Desig.	HP Part Number	Qty	Description
1	5062-3736	1	COVER-TOP
2	0515-1245	1	SCREW - COVER
3	5021-5838	2	SIDE RAILS
4	5041-8802	1	TRIM STRIP
5	5021-8405	1	FRONT FRAME
5	5062-3800	2	HANDLE ASSEMBLY
7	0515-0943	4	HANDLE SCREWS
8	5021-8497	2	TRIM FRONT HANDLE
9	5041-8801	4	FOOT -FM .5M
10	5062-3748	1	COVER-BOTTOM
11	1460-1345	2	TILT STAND
12	5062-3843	2	COVER-SIDE
13	5041-8819	2	CAP-FRONT
14	0515-0707	4	STRAP SCREW
15	5041-8820	2	CAP-REAR
16	5062-3705	2	STRAP HANDLE
17	08360-20040	1	SIDE FRAME
38	5021-5806	1	REAR FRAME
19	54110-40502	4	FOOT REAR
20	0515-1444	4	SCREW - REAR FOOT
21	08360-20253	1	INSULATED BOTTOM COVER

Table 9-15. Miscellaneous Replaceable Accessories (1 of 3)

Ref. Desig.	HP Part Number	Qty	Description
LABELS			
	7120-3737	1	LBL WRN HI VOLT
	83621-80002	1	NAMEPLATE HP 83621B
	83631-80002	1	NAMEPLATE HP 83631B
	83651-80002	1	NAMEPLATE HP 83651B
SERVICE TOOLS			
			T-10 TORX SCREWDRIVER T-15 TORX SCREWDRIVER #1 x 3 1/8 IN. POZIDRIV SCREWDRIVER #2 x 4 IN. POZIDRIV SCREWDRIVER 5.5 MM NUT DRIVER 7 MM NUT DRIVER .050 HEX DRIVER 9/16 IN. NUT DRIVER 5/16 IN OPEN END WRENCH 14 MM OPEN END WRENCH COAX EXTRACTOR TOOL-SUBMIN D CONNECTOR
	1251-2170		
	08360-60065		SUBSTITUTE FRONT PANEL
	08360-60060		TOOL KIT (Includes the following)
	08360-60086		EXTENDER BOARD-DIGITAL BOARDS
	08360-60085		EXTENDERBOARD-ANALOGBOARDS
	08360-60081		EXTENDER BOARD-POST REGULATOR
	08360-60077		EXTENDER BOARD-SWITCHING REGULATOR
	08360-60030		EXTENDER BOARD-RECTIFIER/FILTER
	08360-60084		EXTENDERBOARD-RFDECK
	08360-20286		RF TEST CABLE-FILTER TO DIRECTIONAL COUPLER
	08360-60108		EXTENDER CABLE-POWER SUPPLY
	8710-1787		5 MM HEX BALL DRIVER

Table 9-15. Miscellaneous Replaceable Accessories (2 of 3)

Ref. Desig.	HP Part Number	Qty	Description
ACCESSORIES			
	6010-1146		TOUCH-UP PAINT DOVE GRAY - FOR FRAME AROUND FRONT PANEL & PAINTED PORTIONS OF FRONT HANDLES
	6010-1147		FRENCH GRAY - FOR SIDE, TOP, & BOTTOM COVERS
	6010-1148		PARCHMENT GRAY - FOR RACK MOUNT FLANGES, RACK SUPPORT SHELVES, & FRONT PANEL
	5041-9148		PC BOARD EXTRACTORS
SOFTWARE			
	08360-10001	1	HP 83621B/31B/51B SERVICE SUPPORT SOFTWARE
	08510-60022	1	HP 8510/HP 8360 FRONT PANEL EMULATOR ASSEMBLY
ADAPTERS			
	1250-2187		ADAPTER 2.4 MM (F) TO K (F)
	1250-2188		ADAPTER 2.4 MM (F) TO 2.4 MM (F)
	1250-1745		ADAPTER TYPE-N TO 3.5 MM (F)
	5061-5311		ADAPTER 3.5 MM (F) TO 3.5 MM (F)
UPGRADE KITS			
	08360-60201		FIRMWARE UPGRADE KIT

Table 9-15. Miscellaneous Replaceable Accessories (3 of 3)

Ref. Desig.	HP Part Number	Qty	Description
DOCUMENTATION			
Documentation For HP 83621B/31B/51B			
	08360-90138		HP 83621B/31B/51B Manual Set (This includes the following manuals:)
	08360-90136		Troubleshooting Guide
	08360-90137		Service Guide
HP 8360 Component-Level Repair Manual			
	08360-90141		HP 8360 Component-Level Repair Manual
Documentation For HP 8360 B-Series Swept Signal Generator			
	08360-90128		HP 8360 B-Series Manual Set – For HP 83620B/22B/23B/24B/30B/40B/50B (This includes the following manuals:)
	08360-90127		User's Guide
	08360-90126		Quick Reference Guide
	08360-90125		Service Guide
	08360-90124		Troubleshooting Guide
Documentation For HP 8360 L-Series Swept CW Generator			
	08360-90135		HP 8360 L-Series Manual Set – For HP 83623L/30L/40L/50L (This includes the following manuals:)
	08360-90134		User's Guide
	08360-90126		Quick Reference Guide
	08360-90125		Service Guide
	08360-90124		Troubleshooting Guide

Preventive Maintenance

Introduction

This chapter contains the following information on care and maintenance of the synthesizer:

- How To Clean the Fan Filter
- How To Replace the Line Fuse
- How to Replace the CPU Battery
- Connector Care

How To Clean the Fan Filter

The cooling fan, located on the rear panel, has a thin foam filter. How often the filter must be cleaned depends on the environment in which the synthesizer operates. As the filter collects dust, the fan speed increases to maintain airflow (as the fan speed increases, so does the fan noise). If the filter continues to collect dust after the fan reaches maximum speed, airflow is reduced and the synthesizer's internal temperature increases. If the internal temperature reaches 90°C, the synthesizer automatically turns off and the amber standby LED turns on. Clean the fan filter as follows:

1. Turn off the synthesizer.
2. Remove the AC line cord.
3. Remove the two screws holding the fan shroud to the rear panel (see Figure 10-1).
4. Separate the fan shroud, the foam, and the honeycomb from the ground hex shroud.
5. Rinse the foam and honeycomb in warm water, then dry.
6. Reverse the removal procedure to reassemble the synthesizer.

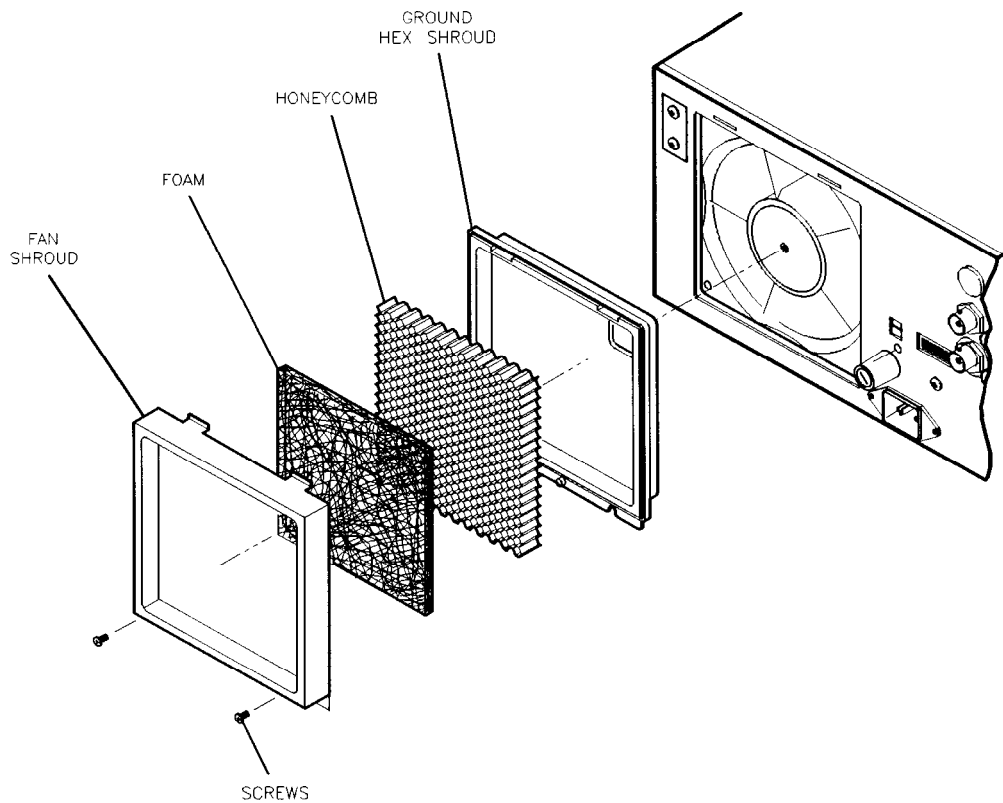


Figure 10-l. Removing the Fan Filter

How To Replace the Line Fuse

The line fuse is located on the instrument rear panel. Replace this fuse as follows:

1. Turn the synthesizer to standby (yellow LED on).
2. Remove the AC line cord.
3. Refer to Figure 10-2. Using a small flat-blade screwdriver, rotate the fuse cap counterclockwise, and remove the fuse holder.
4. Replace the original fuse.
5. Replace the fuse holder in the rear panel. Using the screwdriver, rotate the fuse cap clockwise to secure the fuse holder in place.
6. Reconnect the synthesizer to line power.

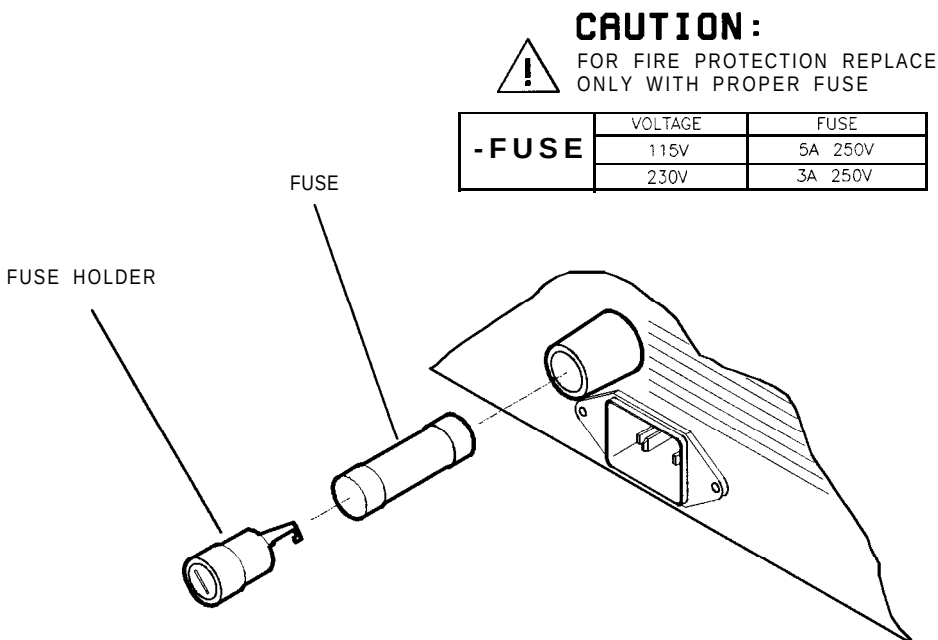


Figure 10-2. Replacing the Line Fuse

How to Replace the CPU Battery (A15BT1)

WARNING Danger of explosion if the battery is incorrectly replaced.
Replace only with the same or equivalent type recommended.

Battery **A15BT1** contains lithium iodide. Do not incinerate or puncture this battery. Dispose of the discharged battery in a safe manner.

Do not throw batteries away but collect as small chemical waste.

CAUTION The A15 CPU Assembly may be damaged if it is placed on a conductive surface. Use a static-safe work station. Ensure that the CPU Assembly is not placed on any conductive material.

Removal/Replacement

1. Remove the A15 CPU Assembly. Refer to Chapter 7.

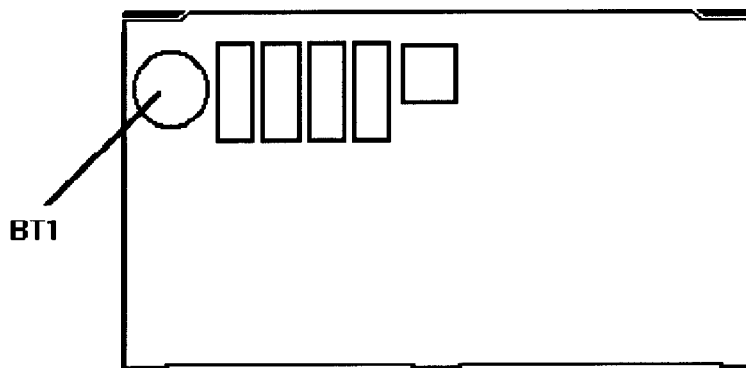


Figure 10-3. A15BT1 Battery Location

CAUTION Placing the bottom side of the A15 assembly on a conductive work surface without an insulator can result in loss of correction data stored in RAM. Protect the A15 assembly from contact with any conductive surface.

2. Locate the battery leads on the A15 assembly, unsolder them, and remove the old battery.
3. Replace and solder the leads on the new battery, ensuring proper polarity as silkscreened on the A15 assembly.
4. Record the battery-replacement date on the battery label.
5. Replace the A15 CPU Assembly.

Connector Care

Clean and gage the synthesizer's output connector periodically. For details, refer to *Application Note 326*, which documents the principles of microwave connector care.

Specifications

Dedicated HP 8510 System Source Models

Dedicated sources are optimized for use as HP 8510 system components. They are configured without modulation capabilities or front panel keyboards/displays, and with rear panel connectors and one-year on-site service (where available). Specifications for these models are the HP 8510 system specifications, plus the following:

Frequency

Range

HP 83621B: 45 MHz to 20 GHz
HP 83631B: 45 MHz to 26.5 GHz
HP 83651B: 45 MHz to 50 GHz

Resolution: 1 Hz

Frequency Bands:

Band	Frequency Range	n
0	10 MHz to < 2.0 GHz	1
1	2.0 to < 7 GHz	1
2	7 to < 13.5 GHz	2
3	13.5 to 20 GHz	3
4	> 20 to < 26.5 GHz	4
5	≥ 26.5 to < 33.4 GHz	6
6	≥ 33.4 to < 38 GHz	6
7	≥ 38 to 50 GHz	8

Accuracy

CW Mode: Same as time base (Internal time base verified to 1 ppm with standard on-site verification procedure.)

Swept Mode (sweep times ≥ 100 ms and ≤ 5 s):

Upper Frequencies ≤ 26.5 GHz

Sweep widths $\leq n \times 10$ MHz: 0.1% of sweep width $\pm$ time base accuracy

Sweep widths $> n \times 10$ MHz and ≤ 400 MHz: 1% of sweep width

Sweep widths > 400 MHz and ≤ 4 GHz: 4 MHz

Sweep widths > 4 GHz: 0.1% of sweep width

Upper Frequencies > 26.5 GHz

Sweep widths $\leq n \times 10$ MHz: 0.1% of sweep width $\pm$ time base accuracy

Sweep widths $> n \times 10$ MHz and ≤ 800 MHz: 1% of sweep width

Sweep widths > 800 MHz and ≤ 8 GHz: 8 MHz

Sweep widths > 8 GHz: 0.1% of sweep width

Output Power

Maximum Levelled

Frequencies ≤ 20 GHz: +10 dBm

Frequencies > 20 GHz and ≤ 26.5 GHz: +4 dBm

Frequencies > 26.5 GHz and ≤ 40 GHz: -3 dBm

Frequencies > 40 GHz: 0 dBm

Minimum Settable: -20 dBm

General

Environmental

Operating Temperature Range

0 to 55°C

EMC:

Within limits of CISPR Pub. 11/1990 Group 1, Class A, and Mil-Std-461C Part 7 RE02.

Warm-Up Time

Operation

Requires 30 minutes warm-up from cold start at 0 to 55°C. Internal temperature equilibrium reached after 2 hour warm-up at stable ambient temperature.

Frequency Reference

Reference time base is kept at operating temperature with the instrument connected to AC power. Instruments disconnected from AC power for more than 24 hours require 30 days to achieve time base aging specification. Instruments disconnected from AC power for less than 24 hours require 24 hours to achieve time base aging specification.

Power Requirements

48 to 66 Hz; 115 volts (+10/−25%) or 230 volts (+10/−15%); 400 VA maximum (30 VA in STANDBY).

Weight and Dimensions

Net Weight: 27 kg (60 lb)

Shipping Weight: 36 kg (80 lb)

Dimensions: 178 H x 425 W x 648 mm D (7.0 x 16.75 x 25.5 inches)

Inputs and Outputs

RF Output

Nominal output impedance 50 ohms. (Precision 2.4 mm male connector, rear panel — HP 83651B; Precision 3.5 mm male connector, rear panel — HP 83621B/31B).

External ALC Input

Nominal input impedance 100 kohms. Used for negative external detector or power meter leveling. (BNC female connector, rear panel.)

Trigger Input

Activated on a TTL rising edge. Used to externally initiate an analog sweep or to advance to the next point in step or list mode. (BNC female connector, rear panel.)

Trigger Output

Outputs a one microsecond-wide TTL-level pulse at 1601 points evenly spaced across an analog sweep, or at each point in step or list mode. (BNC female connector, rear panel.)

10 MHz Reference Input

Accepts 10 MHz ± 100 Hz, 0 to +10 dBm reference signal for operation from external time base. Nominal input impedance 50 ohms. (BNC female connector, rear panel.)

10 MHz Reference Output

Nominal signal level 0 dBm, nominal output impedance 50 ohms. (BNC female connector, rear panel.)

Sweep Output

Supplies a voltage proportional to the sweep ranging from 0 volts at start of sweep to +10 volts at end of sweep, regardless of sweep width. In CW mode, voltage is proportional to percentage of full instrument frequency range. Minimum load impedance 3 kohms. Accuracy $\pm 0.25\%$, ± 10 mV, typical. (BNC female connector, rear panel.)

Stop Sweep Input/Output

Sweep will stop when grounded externally. TTL-high while sweeping, TTL-low when HP 8360 stops sweeping. (BNC female connector, rear panel.)

Z-Axis Blanking/Markers Output

Supplies positive rectangular pulse (approximately +5 volts into 2 kohms) during the retrace and bandswitch points of the RF output. Also supplies a negative pulse (-5 volts) when the RF is at a marker frequency (intensity markers only). (BNC female connector, rear panel.)

Volts/GHz Output

Supplies voltage proportional to output frequency at 0.5 volts/GHz (internally switchable to 0.25 or 1 volt/GHz). Maximum output 18 volts. Minimum load impedance 2 kohms. Accuracy $\pm 0.5\%$, ± 10 mV, typical. (BNC female connector, rear panel.)

Source Module Interface

Provides bias, flatness correction, and leveling connections to HP 83550-series millimeter-wave Source Modules. (Special, front and rear panels.)

Auxiliary Interface

Provides control signal connections to HP 8516A S-parameter Test Set. (25-pin D-subminiature receptacle, rear panel.)

Installation

Introduction

This chapter provides installation instructions for the HP 83621B/31B/51B synthesized sweepers in an HP 8510 system. It also provides information about initial inspection, damage claims, preparation for use, packaging, storage, and shipment. Installation of all three models is the same unless otherwise noted.

Refer to the installation chapter in the HP 8510 documentation for overall system installation and preinstallation requirements for the HP 8510 system.

Initial Inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, keep it until the contents of the shipment have been checked for completeness and the synthesizer has been checked mechanically and electrically. The contents of the shipment should agree with the items noted on the packing slip. Refer to “Performance Tests” in this manual for electrical performance procedures.

If there are any electrical or mechanical defects, or if the shipment is incomplete, notify the nearest Hewlett-Packard office. If the shipping container is damaged, or if the cushioning material shows signs of stress, notify the carrier as well as the Hewlett-Packard office. Keep the shipping material for the carrier’s inspection. The HP office will arrange for repair or replacement without waiting for a claim settlement.

Preparation for Use

Power Requirements

The synthesizers require a power source of 115 V (+10/−25%) or 230 V (+10/−15%), 48 to 66 Hz, single-phase. Power consumption is 400 VA maximum (30 VA in standby).

Line Voltage and Fuse Selection

The synthesizer is provided with a voltage selector (located on the rear panel) to match the synthesizer to the AC line voltage. Both the line selector and fuse were selected at the factory to match the AC line voltage expected to be found at the shipping destination.

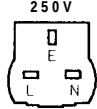
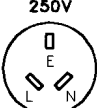
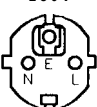
Caution	To prevent damage to the instrument, verify that the voltage selector is set to match the AC line voltage before applying power to the instrument.
----------------	--

Refer to the “Preventive Maintenance” chapter in this manual for information on changing fuses.

Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate power line outlet, this cable grounds the instrument chassis. Figure 12-1 shows the styles of plugs available on power cables supplied with Hewlett-Packard instruments. The HP part numbers indicated are part numbers for the complete power cable/plug set. The specific type of power cable/plug shipped with the instrument depends upon the country of shipment destination.

The offset prong of the three-prong connector is the grounding pin. The protective grounding feature is preserved when operating the synthesizer from a two contact outlet by using a three-prong to a two-prong adapter and connecting the green wire of the adapter to ground. An adapter is available (HP part number 1251-0048) for US connectors only.

PLUG TYPE **	CABLE HP PART NUMBER	PLUG DESCRIPTION	CABLE LENGTH CM (INCHES)	CABLE COLOR	FOR USE IN COUNTRY
	8120-1351 8120-1703	Straight* BS1363A 90"	229 (90) 229 (90)	Mint Gray Mint Gray	Great Britain, Cyprus, Nigeria, Singapore, Zimbabwe
	8120-1369 8120-0696	Straight* NZSS198/ASC112 90"	201 (79) 221 (87)	Gray Gray	Argentina, Australia, New Zealand, Mainland China
	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)
	8120-1348 8120-1538	Straight* NEMA5-15P 90"	203 (80) 203 (80)	Black Black	United States, Canada
	8120-1378 8120-4753 8120-1521 8120-4754	Straight* NEMA5-15P Straight 90" 90"	203 (80) 230 (90) 203 (80) 230 (90)	Jade Gray Jade Gray Jade Gray Jade Gray	Japan (100 V or 200 V), Brazil, Colombia, Mexico Philippines, Saudi Arabia, Taiwan
	8120-5182 8120-5181	Straight* NEMA5-15P 90"	200 (78) 200 (78)	Jade Gray Jade Gray	Israel
* Port 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.					

ORMAT80

Figure 12-I. AC Power Cables Available

Recalibrating the YIG Oscillator

The following internal automated procedure must be performed prior to using the synthesizer in an HP 8510 system. This procedure internally recalibrates the synthesizer to compensate for any magnetic field changes or performance differences of the YIG sphere incurred during shipment. The YIG sphere used with the synthesizers is sensitive to shock and to magnetic variances caused by the following:

- Magnetic fields in proximity to the instrument.
- A change in the earth's magnetic field.

Recalibration Procedure:

1. Set up the equipment required to run the front panel emulation software supplied with this manual. See “Utilities” in the “Automated Tests” chapter for specific information about requirements for running this software.
2. Connect the RF output of the synthesizer through a cable to the RF input of the test set used in the HP 8510 system. Do not connect any other cables between the HP 8510 system and the synthesizer at this time.
3. When the front panel emulator program is running, on the synthesizer set:

PRESET (USER) Tracking Menu Auto Track

The auto track automated procedure will recalibrate the YIG oscillator.

4. Disconnect the HP-IB cable from the controller and continue with this chapter.

Language and HP-IB Address Selection

The synthesizers use one of the following external interface languages: SCPI (Standard Commands for Programmable Instruments language) and Analyzer Language. Operation in an HP 8510 system requires that the synthesizer be set to Analyzer Language.

The language configuration and the synthesizer HP-IB address are both set with a switch located on the rear panel of the synthesizer. The factory default setting for this switch is Analyzer Language at an HP-IB address of 19. This is the setting normally used with HP 8510 system sources.

Check the rear panel switch Figure 12-2 to make sure that Analyzer Language and HP-IB address 19 have been set.

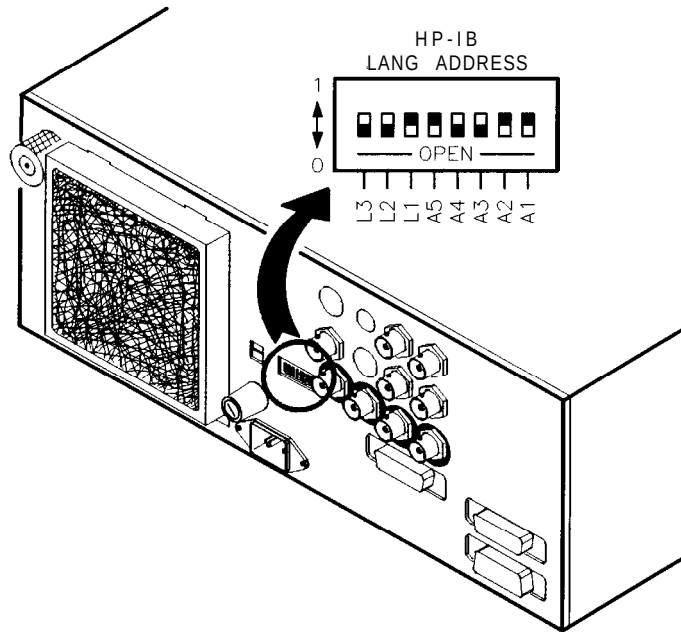


Figure 12-2. Rear Panel HP-IB Switch

SCPI is not used as the language for controlling the source in an HP 8510 system. Therefore, an explanation of that language is not included here. Order the *User's Guide*, (see Chapter 9) for a complete explanation of SCPI, which also includes equivalent Analyzer Language programming codes.

HP 8510 System Firmware Requirements

All HP 8510 systems must have firmware revision 4.0 or greater for compatibility with the HP 83621B/31B/51B synthesizers. Revision 6.0 or greater is required to implement all capabilities (such as Quick Step). Performance upgrade packages are available to upgrade the firmware on HP 8510 network analyzers. Contact your local Hewlett-Packard Sales and Support office.

HP 8510 System Cable Connections

Cable connections between the HP 8360 series synthesizers and any HP 8510 having a firmware revision less than 6.0 are identical to those using the HP 8340/8341 synthesizer. Figure 12-3 shows the cabling connections of a typical HP 8510B system using an HP 8360 series synthesizer as the source. Figure 12-4 shows the cabling connections of a typical HP 8510C system using an HP 8360 series synthesizer as the source.

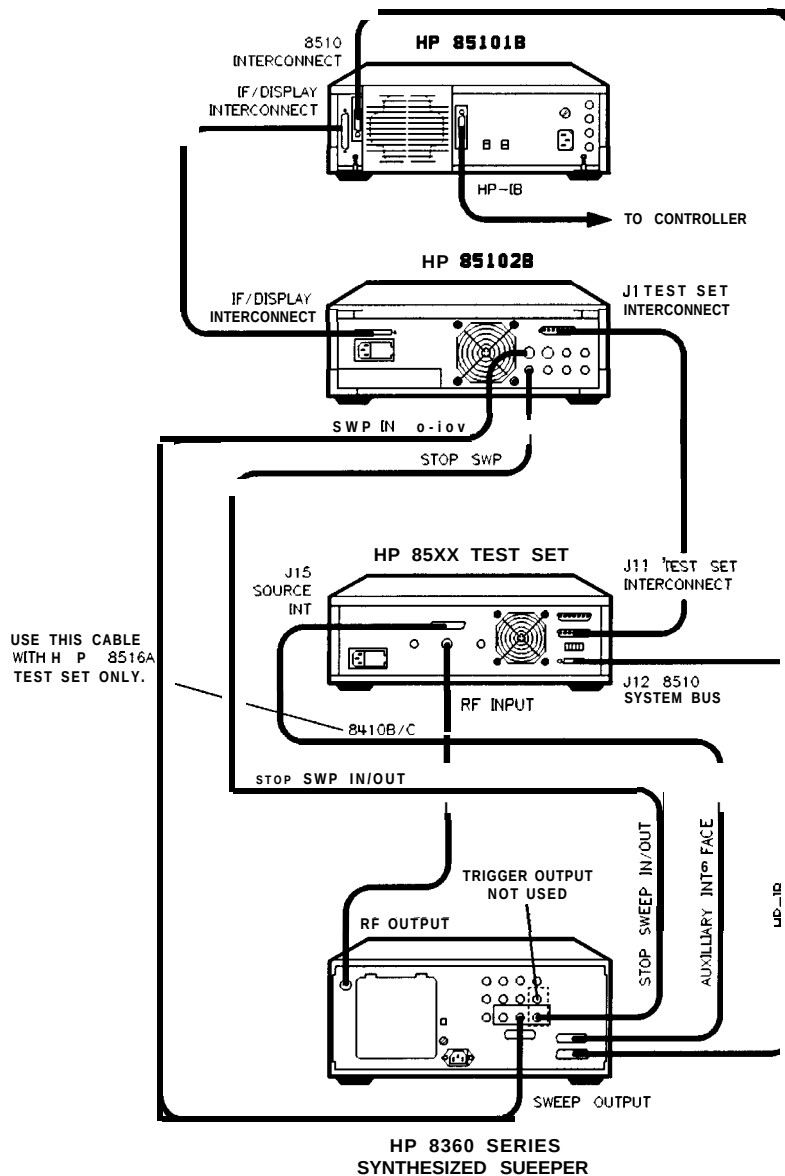


Figure 12-3.
HP 8510B to 8360 Series Cabling Diagram
HP 8510 Firmware Revision < 6.0

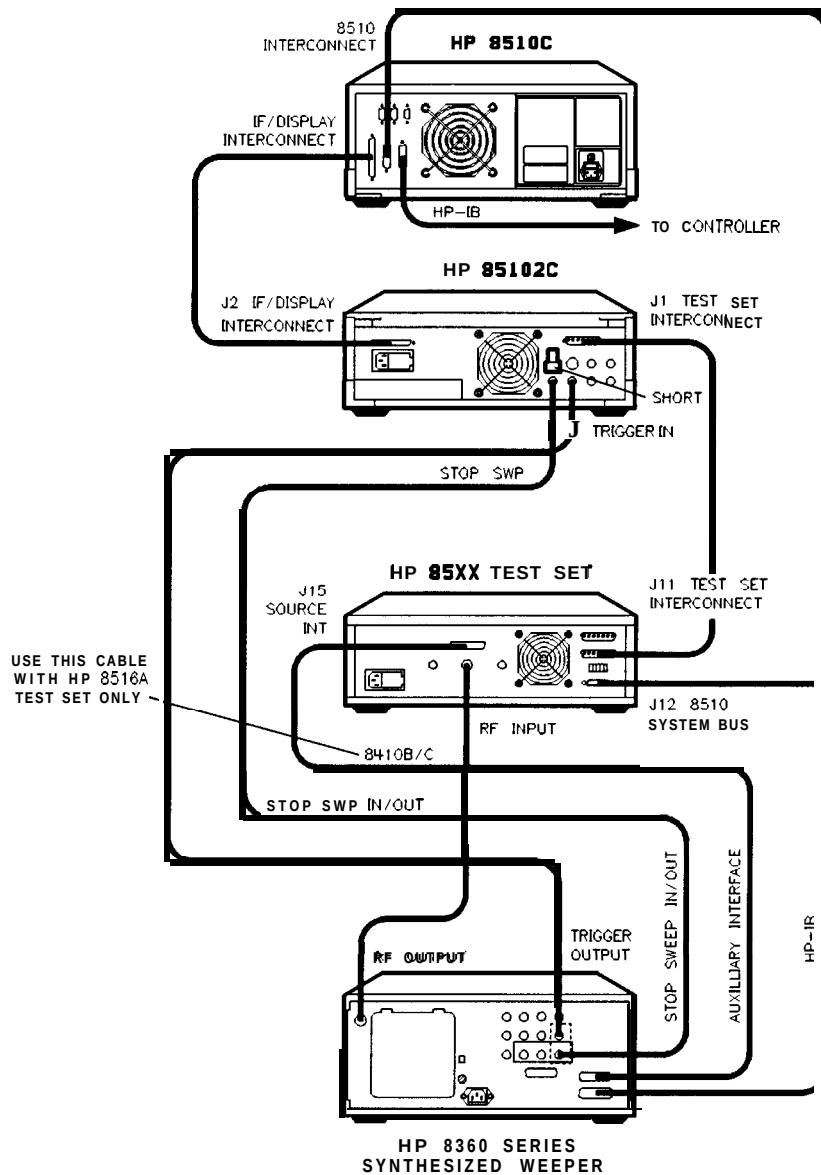


Figure 12-4.
HP 8510B/C to 8360 Series Cabling Diagram
 HP 8510 Firmware Revision $\geq$ 6.0

10 MHz Frequency Reference Selection and Warm-up Time

To keep the internal timebase frequency reference oven at operating temperature, the synthesizer must be connected to AC line power. The synthesizer requires up to 30 minutes to warm up from a cold start before the crystal oscillator temperature has stabilized. With a stable outside temperature, internal temperature equilibrium is reached after approximately two hours. For additional information on warm-up times, see “Specifications” in this manual.

Operating Environment

Temperature. The synthesizer may be operated in environments with temperatures from 0 to +55°C.

Humidity. The synthesizer may be operated in environments with humidity from 5 to 80% relative at +25 to 40°C. However, protect the synthesizer from temperature extremes, which can cause condensation within the instrument.

Altitude. The synthesizer may be operated at pressure altitudes up to 4572 meters (approximately 15,000 feet).

Cooling. The synthesizer obtains all cooling air flow by forced ventilation from the fan mounted on the rear panel. Information on cleaning the fan filter is located in the “Preventive Maintenance” chapter.

Caution	Ensure that all air flow passages at the rear and sides of the synthesizer are clear before installing the instrument in its operating environment. This is especially important in a rack mount configuration.
----------------	---

Chassis Kits

Rack Mount Slide Kit (Option 806)

Option 806 synthesizers are supplied with rack mount slides and the necessary hardware to install them on the synthesizer. The following table itemizes the parts in this kit.

Table 12-1. Rack Mount Slide Kit

Quantity	Description
Rack Mount Kit (Includes the following parts)	
2	Rack Mount Flanges
8	screws
Slide Kit (Includes the following parts)	
2	Slide Assemblies
4	Screws (Inner Slide Assembly)
8	Screws (Outer Slide Assembly)
8	Nuts (Outer Slide Assembly)
Slide Adapter Kit (Non-HP, includes the following parts)	
4	Adapter Brackets
4	Adapter Bar
8	Screws (Bracket to Bar)
8	Nuts (Bracket to Slide Assembly)

Installation Procedure

1. Refer to Figure 12-5. Remove the handle trim strips.
2. Remove four screws per side.
3. Using the screws provided, attach the rack mount flanges to the outside of the handles.
4. Remove the side straps and end caps.
5. Remove the bottom and back feet and the tilt stands.

6. Refer to Figure 12-6. Remove the inner slide assemblies from the outer slide assemblies.
7. To secure the side covers in place, mount the inner slide assemblies to the instrument with the screws provided.
8. With the appropriate hardware, install the outer slide assemblies to the system enclosure.
9. Lift the synthesizer into position. Align the inner and outer slide assemblies and slide the instrument into the rack. Realign the hardware as needed for smooth operation.

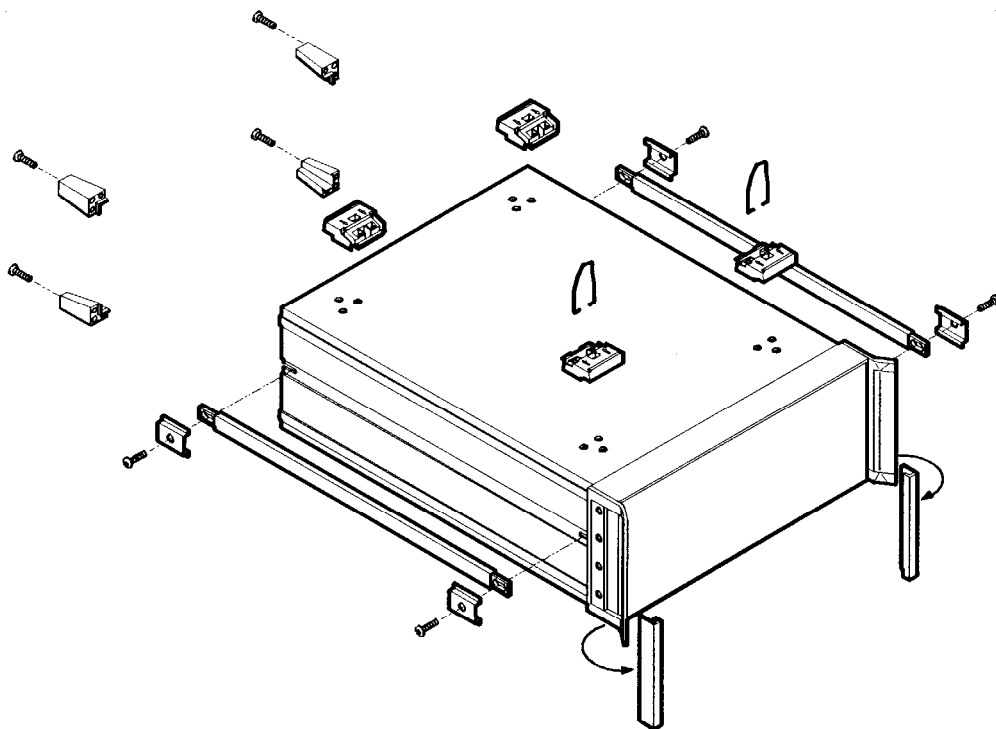


Figure 12-5. Removing the Side Straps and Feet

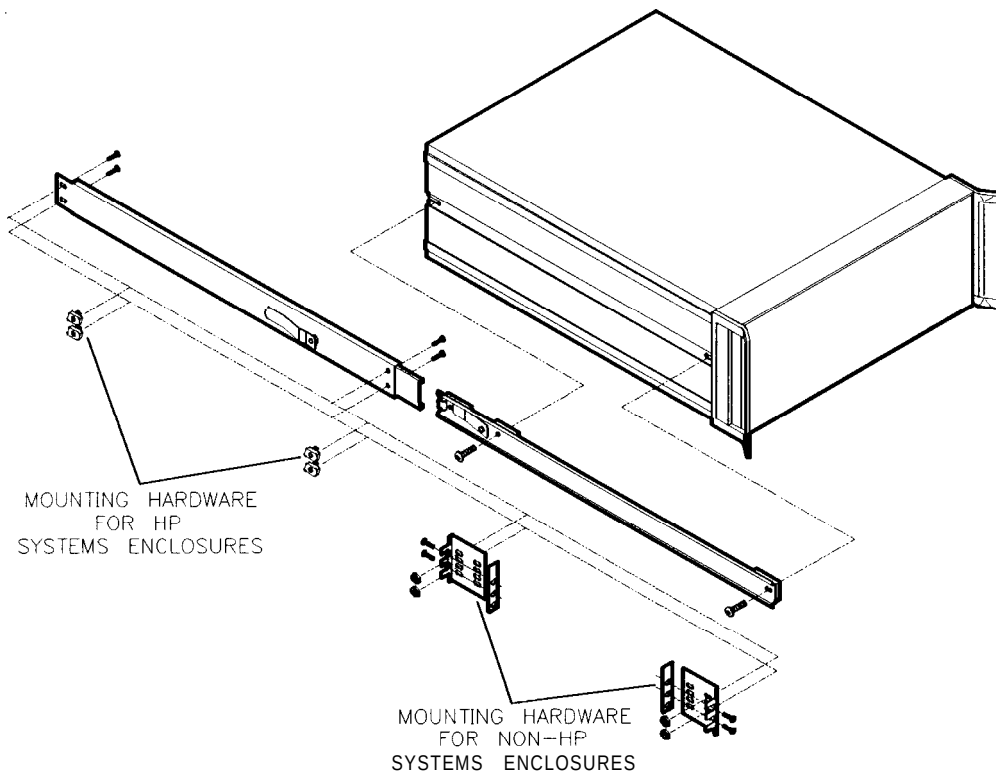


Figure 12-6. Chassis Slide Kit

Rack Flange Kit for Synthesizers with Handles Removed (Option 908)

Option 908 synthesizers are supplied with rack flanges and the necessary hardware to install them on the synthesizer after removing the instrument handles. The following table itemizes the parts in this kit.

Table 12-2.
Rack Flange Kit for Synthesizers with Handles Removed

Quantity	Description
2	Rack Mount Flanges
8	Screws

Installation Procedure

1. Refer to Figure 12-7. Remove the handle trim strips.
2. Remove the four screws on each side that attach the handles to the instrument; remove the handles.
3. Using the screws provided, attach the rack mount flanges to the synthesizer.
4. Remove the bottom and back feet and the tilt stands before rack mounting the instrument.

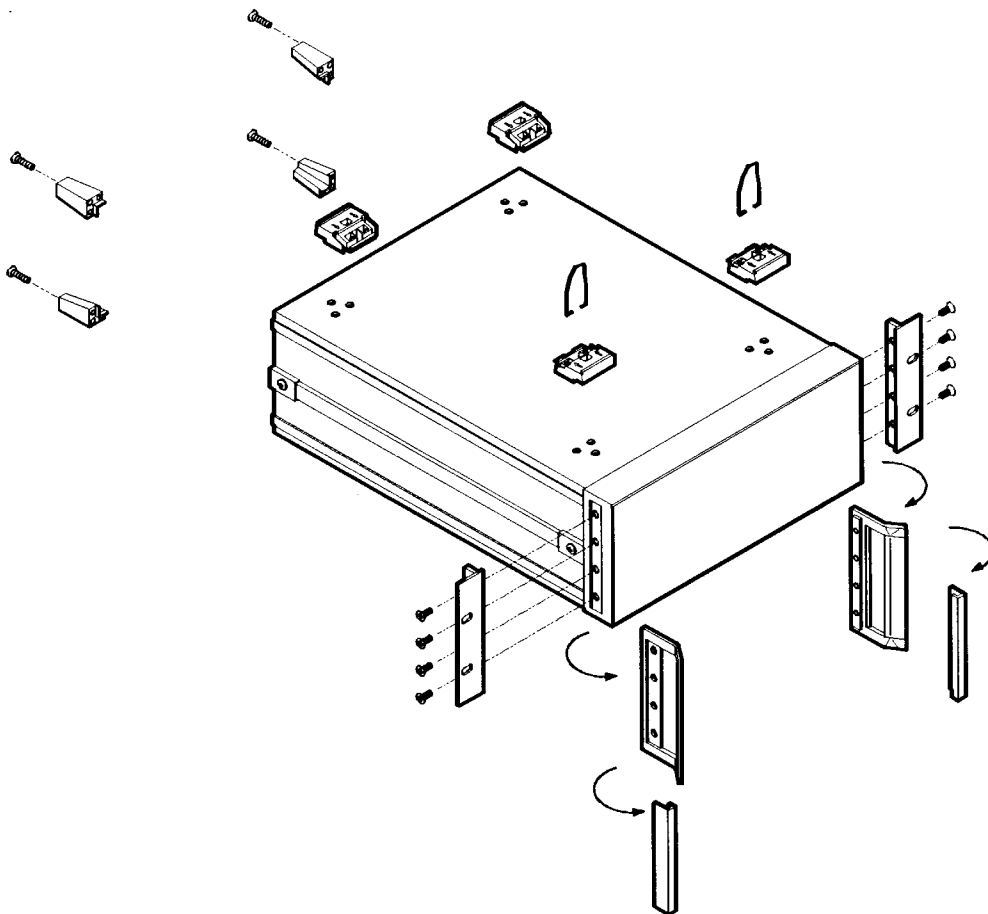


Figure 12-7. Rack Mount Flanges for Synthesizers with Handles Removed

Rack Flange Kit for Synthesizers with Handles Attached (Option 913)

Option 913 synthesizers are supplied with rack flanges and the necessary hardware to install them on the synthesizer without removing the instrument handles. The following table itemizes the parts in this kit.

Table 12-3.
Rack Flange Kit for Synthesizers with Handles Attached

Quantity	Description
2	Rack Mount Flanges
8	Screws

Installation Procedure

1. Refer to Figure 12-8. Remove the handle trim strips.
2. Remove the four screws on each side that attach the handles to the instrument.
3. Using the longer screws provided, attach the rack mount flanges to the outside of the handles.
4. Remove the bottom and back feet and the tilt stands before rack mounting the instrument.

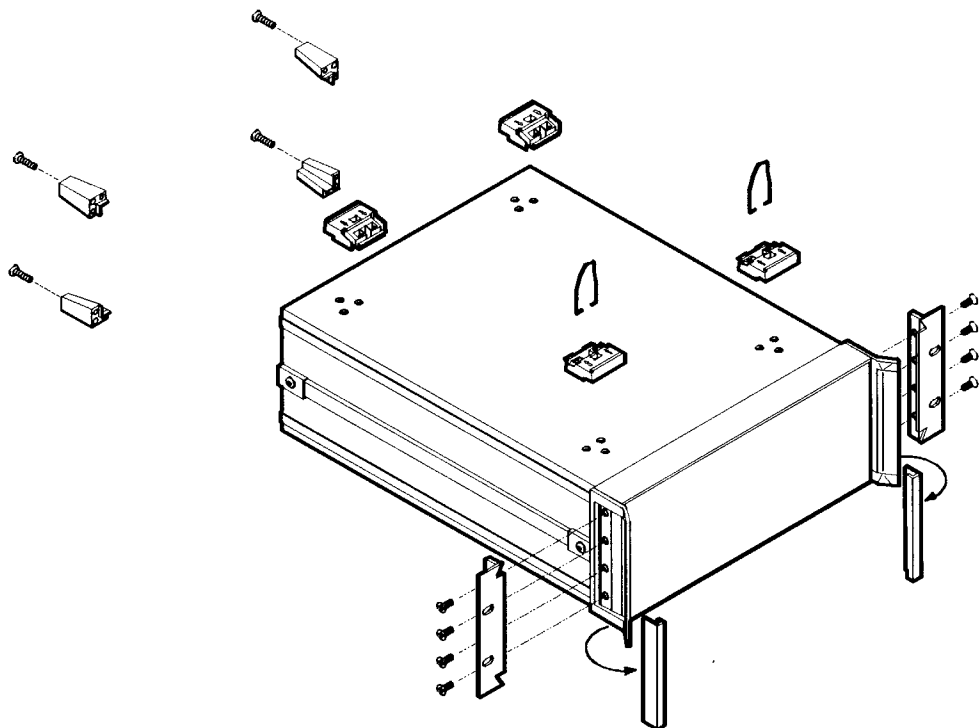


Figure 12-8. Rack Mount Flanges for Synthesizers with Handles Attached

Instrument History

Introduction

This chapter is left blank until this manual requires changes.

Index

1

10 MHz reference

input, 1 l-4

output, 1 l-4

standard removal, 7-19

10 MHz standard

adjustment, 3-4

adjustment interval, 3-7

125 kHz reference spur, 3-11

A

A19 rear panel interface removal, 7-21

A23 10 MHz reference standard removal,
7-19

A2 source module interface removal,
7-8

ADC adjustment, 5-8

adjustments

10 MHz standard, 3-4

ALC power level accuracy, 3-87

amplifier filter, 3-52

fractional-N reference and API spurs,
3-11

fractional-N VCO, 3-9

low power SRD bias, 3-80

modulator offset and gain, 3-82

sampler assembly, 3-17

sweep ramp, 3-16

YO driver +10V reference, 3-22

YO driver gain and linearity, 3-24

YO loop gain, 3-27

ALC power level accuracy adjustment,
3-87

AM modulator removal, 7-34

amplifier/filter

adjustment, 3-52

removal, 7-34

amplifier/multiplier removal, 7-34

API1 spur, 3-11

API2 spur, 3-11

automated tests

ADC adjustment, 5-8

BASIC, 5-2

binaries, 5-2

copying disks, 5-4

equipment, 5-2

power flatness adjustment, 5-9

software installation, 5-4

YO delay adjustment, 5-7

auxiliary interface, 11-5

B

B1 fan removal, 7-12

BASIC

automated tests, 5-2

binaries

automated tests, 5-2

BNC connectors

removal, 7-14, 7-26

bridge detector removal, 7-34

C

- calibration constants, 4-1
 - changing, 4-7
 - default, 4-9
 - definition, 4-2
 - descriptions, 4-10
 - loading, 4-9
 - memory areas, 4-2
 - saving, 4-8
 - utility, 5-14
- calibration cycle, 2-2
- checksum verification, 4-3
- connector care, 10-7
- coupler removal, 7-34
- CW frequency accuracy performance test, 2-9

D

- dimensions
 - synthesizer, 1 1-3
- diode switch removal, 7-34
- disassembly
 - front panel, 7-3
 - motherboard, 7-38
 - rear panel, 7-9
 - RF deck, 7-27
- doubler removal, 7-34

E

- EEPROM storage
 - calibration constants, 4-2
- external ALC input, 1 1-4
 - removal, 7-26

F

- fan
 - filter cleaning, 10-2
 - noise, 10-2
 - speed, 10-2
- FL1 line filter removal, 7-25

- fractional-N reference and API spurs
 - adjustment, 3-11
- fractional-N VCO adjustment, 3-9
- frequency reference, 1 1-3
- front panel
 - disassembly, 7-3
 - emulation, 5-11
 - removal, 7-6, 7-42
- fuse
 - housing removal, 7-24
 - line fuse replacement, 10-4
 - rear panel, 10-4

H

- Hewlett-Packard offices, xvi

I

- inputs
 - 10 MHz reference, 11-4
 - external ALC, 11-4
 - stop sweep, 11-5
 - trigger, 1 1-4

J

- J10 removal, 7-14
- J1 removal, 7-15
- J1 RF output connector removal, 7-44
- J6 removal, 7-14
- J7 removal, 7-14

L

- line filter removal, 7-25
- line fuse, 10-4
- low band removal, 7-34
- low power SRD bias adjustment, 3-80

M

- manual part number, xi
- maximum leveled power performance test, 2-11
- microcircuit removal, 7-34

modulator offset and gain adjustment,
3-82

motherboard

disassembly, 7-38

removal, 7-5 1

0

offices, xvi

operation verification, 2-5

operation verification form, 2-5

outputs

10 MHz reference, 11-4

stop sweep, 11-5

sweep, 1 l-5

trigger, 1 l-4

volts/GHz, 11-5

z-axis blanking/markers, 11-5

P

part number, manual, xi

password, 4-4

bypassing, 4-6

disabling, 4-5

entering, 4-4

setting, 4-5

performance tests, 2-l

CW frequency accuracy, 2-9

front panel emulation, 2-2

maximum leveled power, 2-l 1

swept frequency accuracy, 2-14

power flatness adjustment, 5-9

power requirements, **11-3, 12-2**

prefix number, xi

R

RAM checksum, 4-3

RAM storage

calibration constants, 4-2

rear panel

BNC connectors removal, 7-14

disassembly, 7-9

interface removal, 7-21

removal, 7-17, 7-46

replacement

front panel, 7-3

motherboard, 7-38

rear panel, 7-9

RF deck, 7-27

RF deck

disassembly, 7-27

lifting up, 7-29

removal, 7-49

RF output, 11-4

connector removal, 7-15, 7-44

S

sales offices, xvi

sampler assembly adjustment, 3-17

SCPI language selection, 5-3

self-test utility, 5-15

serial number, xi

service offices, xvi

service position

RF deck, 7-29

shipping weight, 1 l-3

software

loading, 5-5

source module interface, 11-5

specifications

environmental, 11-3

frequency, 11-l

frequency reference, 1 l-3

output power, 11-2

time base aging, 11-3

spur adjustments, 3-l 1

stop sweep input/output, 1 l-5

storage

calibration constants, 4-2

sweep output, 11-5

sweep ramp adjustment, 3-16

swept frequency accuracy performance

test, 2-14

switched-amplifier/multiplier removal,
7-34

T

T1 transformer removal, 7-20

time base aging, 11-3

timebase oscillator adjustment, 3-4

transformer removal, 7-20

trigger input, 11-4

trigger output, 1 1-4

U

UVEPROM

calibration constants, 4-3

V

VCO tuning voltage, 3-9

voltage selector switch removal, 7-22

volts/GHz output, 11-5

W

warm-up time, 11-3

weight

synthesizer, 11-3

Y

YIG oscillator removal, 7-34

YO delay adjustment, 5-7

YO driver

+10V reference adjustment, 3-22

gain and linearity adjustment, 3-24

YO loop gain adjustment, 3-27

Z

z-axis blanking/markers output, 1 1-5