Errata

Title & Document Type: **8695A 8696A 8697A RF Units Operating and Service Manual**

Manual Part Number: **08695-90015**

Revision Date: **May 1973**

About this Manual

We've added this manual to the Agilent website in an effort to help you support your product. This manual provides the best information we could find. It may be incomplete or contain dated information, and the scan quality may not be ideal. If we find a better copy in the future, we will add it to the Agilent website.

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, life sciences, and chemical analysis businesses are now part of Agilent Technologies. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A. We have made no changes to this manual copy.

Support for Your Product

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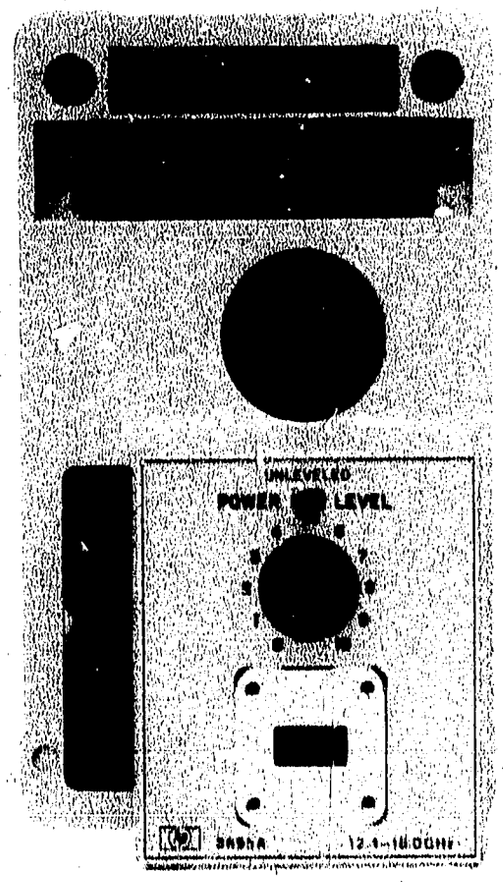
Search for the model number of this product, and the resulting product page will guide you to any available information. Our service centers may be able to perform calibration if no repair parts are needed, but no other support from Agilent is available.

Agilent Technologies

OPERATING AND SERVICE MANUAL

RF UNITS

8695A
8696A
8697A



HEWLETT PACKARD

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 Bureau of Standards, to the extent allowed by the Bureau'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. For conditions of warranty for backward wave oscillators and traveling wave tubes, refer to page 1-4 of this manual. 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 HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP 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. HP 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. HP 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. Addresses are provided at the back of this manual.

RF UNITS

8695A
8696A
8697A

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 1313A.

With changes described in Appendix A, this manual also applies to instruments with serial numbers prefixed 620, 636, 715, 724, 728, 822, 835, 838, 916, 984, 1140A, 1144A, 1210A and 1243A.

For additional important information about serial numbers, see INSTRUMENT IDENTIFICATION in Section I.

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Microfiche Part Number 08695-90016

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HEWLETT PACKARD

CONTENTS

ILLUSTRATIONS

TABLES

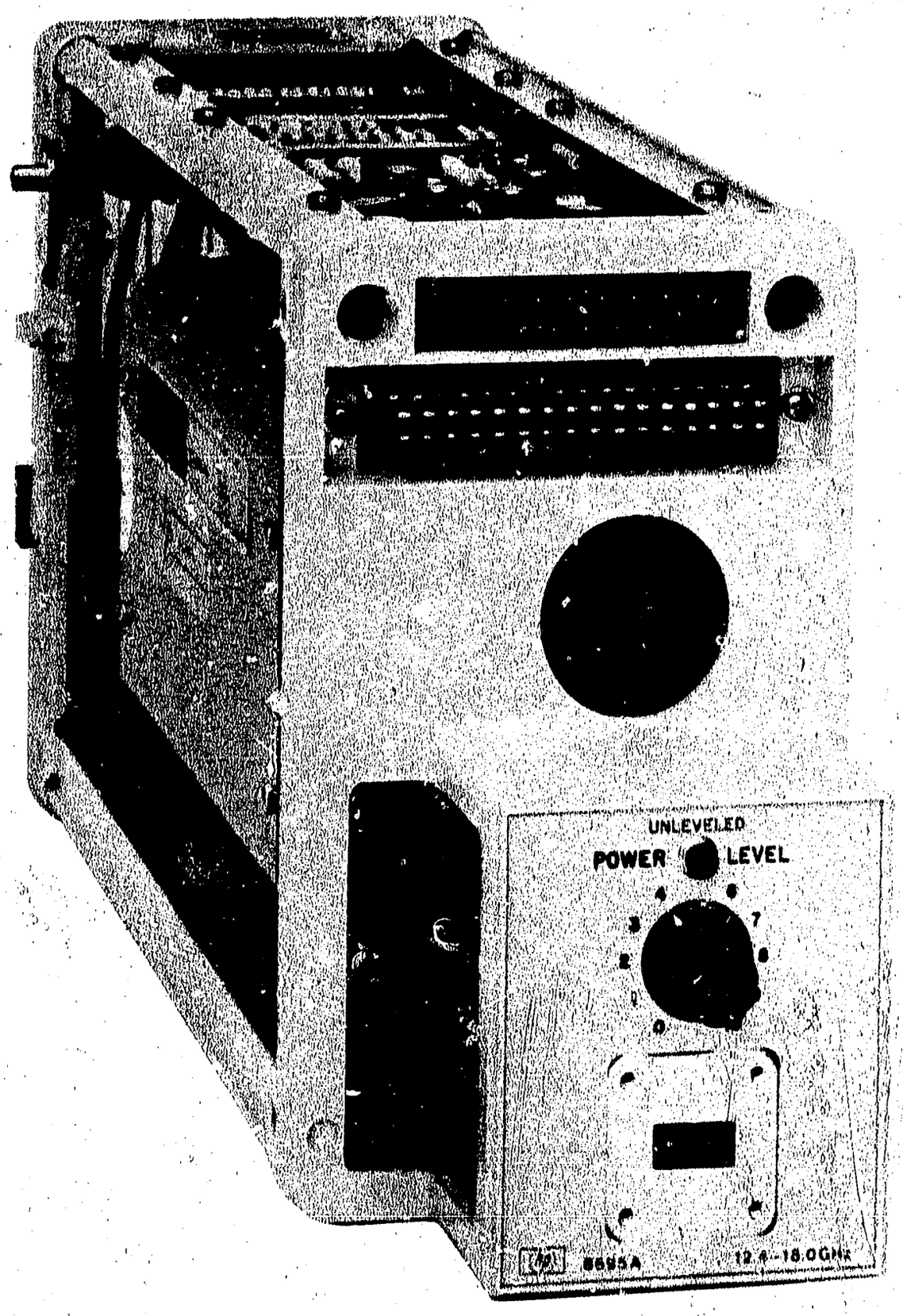


Figure 1-1. Typical 8695A-8697A RF Unit

SECTION I
GENERAL INFORMATION

1-1. DESCRIPTION

1-2. The Model 8695A through 8697A RF Units combine with the 8690B Sweep Oscillator to form an electronically-tuned microwave signal source with a frequency range of 12.4 GHz to 40 GHz. Individual RF Unit Model specifications are given in Table 1-1.

1-3. The 8695A - 8697A RF Units are grid modulated by circuits within the RF Unit, and have waveguide RF output.

1-4. INSTRUMENT IDENTIFICATION

1-5. This instrument has a two-part serial number. On newer model instruments, the first four digits and letter comprise the serial number prefix; on older model instruments, the first three digits form the serial number prefix. In either case, the last five digits form the sequential suffix that is unique to each instrument. The contents of this manual apply directly to instruments having the same serial number prefixes listed under SERIAL NUMBERS on the title page.

1-6. An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the instrument is different from those documented in this manual. The manual for this instrument is supplied with a yellow Manual Changes supplement that contains "change information" that documents the differences.

1-7. In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement for this manual is keyed to this manual's print date and part number, both of which appear on the title page. Complimentary copies of the supplement are available from Hewlett-Packard.

1-8. For information concerning a serial number prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

1-9. SAFETY CONSIDERATIONS

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. This product has been designed and tested in accordance with international standards.

SAFETY SYMBOLS

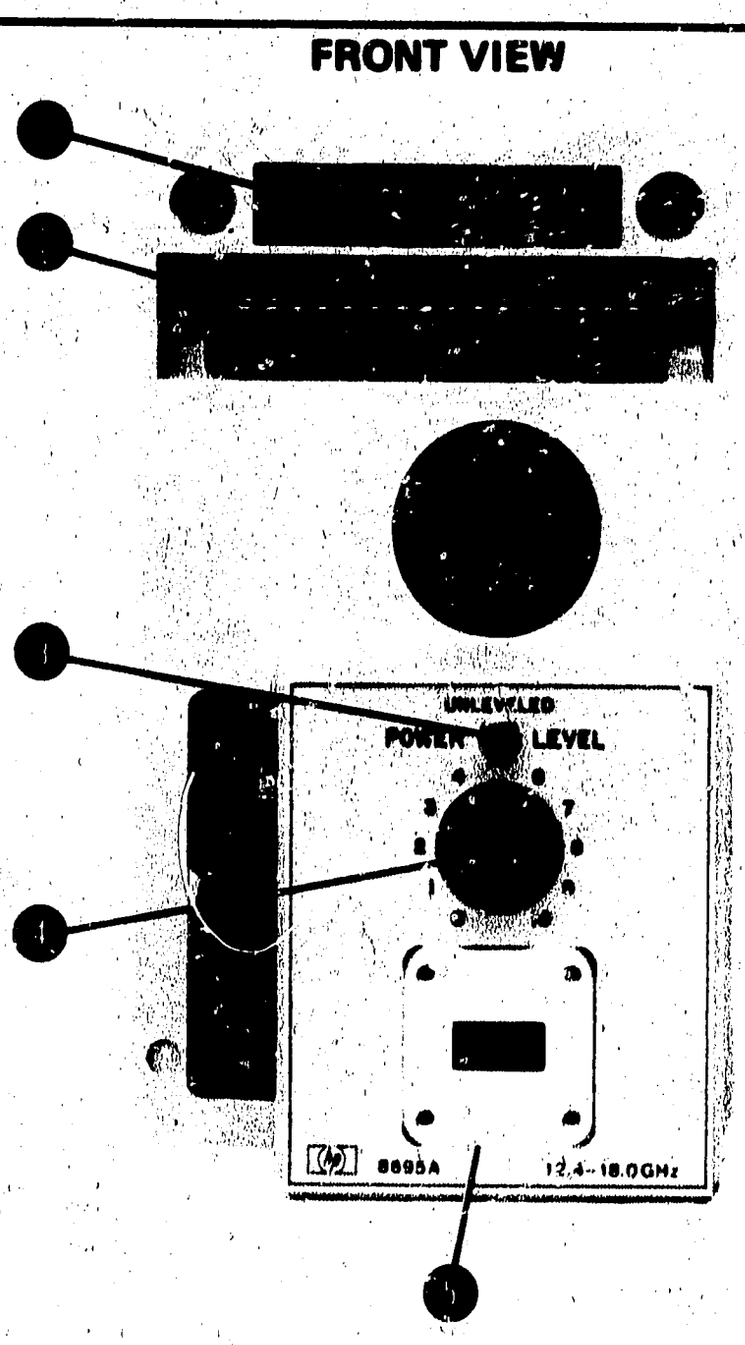
Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual

Indicates hazardous voltages.

Indicates earth (ground) terminal.

WARNINGS The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.



1. **P11.** Connects the BWO operating voltages from the 8690 mainframe to the RF Unit.

2. **P12.** Connects the RF Unit operating signals and voltages from the 8690 mainframe to the RF Unit.

3. **UNLEVELED Indicator.** Lights if POWER LEVEL set too high for leveling across selected frequency range.

4. **POWER LEVEL Control.** Adjust RF power amplitude.

5. **RF Output Waveguide Flange:**
   - 8695A: UG-419/U
   - 8696A: UG-595/U
   - 8697A: UG-599/U
   - 8695A: WR-75 (Option 100)

6. **EXT ALC GAIN.** Adjust gain of ALC circuit to control flatness of leveling.

7. **SWEEP REF OUTPUT.** Output voltage proportional to RF frequency.

CAUTION

Application of voltage greater than ± 15 volts may damage transistor A1Q1.

Figure 1-2. Front and Rear Panel Controls, Connectors, and Indicators

Table 1-1. Specifications

Residual AM: At least 40 dB below CW output.

Spurious Signals: Harmonics, at least 20 dB below CW output; non-harmonics, at least 40 dB below CW output.

Reference Output: Direct-coupled voltage proportional to RF frequency, approximately 0 V at the low end of the band, increasing approximately 40 V/octave. Output impedance, 30,000 ohms.

Leveling Indicator: Front panel indicator lights when power level set too high to permit leveling over entire selected sweep range or when operating in unleveled mode.

RF Power Control: BWO Grid.

Equivalent Source Match:

Externally Leveled: Depends upon coupler.

Unleveled: Less than 2.5:1

Power Variation, Unleveled: Less than 10 dB over the entire band.

Weight: 8695A - 8697A: Net, 10 lbs. (4,5 kg). Shipping, 18 lbs.

Furnished: 8690B dial scale corresponding to frequency range of RF Unit.

Option 004: Rear Panel RF Output.

MODELS 8695A/8696A/8697A RF UNITS
(Installed in 8690B Sweep Oscillator)

	8695A	8696A	8697A
Frequency Range	12.4 to 18 GHz	18 to 26.5 GHz	26.5 to 40 GHz
Frequency Range (Option 100)	10 to 15.5 GHz		
Frequency Accuracy (over a 6-dB power range)	± 1%	± 1%	± 1%
Maximum Leveled Power	⩾ 40 mW	⩾ 10 mW	⩾ 5 mW
Maximum Leveled Power (Option 100)	⩾ 25 mW		
Frequency Stability			
With Temperature	± 0.01%/°C	± 0.1%/°C	± 0.01%/°C
With 10% Change in Line Voltage	± 10 MHz	± 15 MHz	± 20 MHz
With 6 dB power level change down from maximum leveled power: typically < 0.25 GHz.			
Frequency Stability (Option 100)			
With Temperature	± 0.01%/°C		
With 10% change in line voltage	± 10 MHz		
Residual FM (unleveled)*	< 150 kHz	< 200 kHz	< 350 kHz
Power Variation, External Leveling**	± 0.2 dB	± 0.2 dB	± 0.2 dB
Output Connector, 25K ohms	UG-419/U	UG-595/U	UG-599/U
Output Connector (Option 100)	WR-75		

*Residual FM Specifications are degraded by 2 times normal specifications when RF units are installed in HP 8707A RF unit holder.
**Excluding coupler and detector variation.

General Note

Residual FM specifications noted in this table are intended for CW operation in Stop/Stop, ΔF, and Marker Sweep functions.

SERVICING

WARNING

Any servicing, adjustment, maintenance, or repair of this product must be performed only by qualified personnel.

Adjustments described in this manual may be performed with power supplied to the product while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside this product may still be charged even when disconnected from its power source.

1-10. INSTALLATION

1-11. The RF Unit is designed to be installed into the 8690B Sweep Oscillator from the rear. To install the RF Unit, perform the following steps:

a. Push the plastic retaining catch inward to release the handle on the rear of the RF Unit.

b. Raise the RF Unit handle 90 degrees to a position perpendicular to the RF Unit rear panel.

c. Gently push the RF Unit into the 8690B Sweep Oscillator from the rear.

d. Return the RF Unit handle to the locked position in line with the RF Unit rear panel. This step should firmly secure the RF Unit into the 8690B Sweep Oscillator mainframe.

1-12. OPERATION

1-13. Operating procedures of the Sweep Oscillator/RF Unit combinations are given in the 8690B Sweep Oscillator Manual. Allow 30 minutes warm-up. Figure 1-2 shows the front and rear views of a typical 8695A-8697A RF Unit. Front and rear panel controls, connectors, and indicators are described in Figure 1-2.

1-14. PRINCIPLES OF OPERATION

1-15. Principles of circuit operation of the Sweep Oscillator/RF Unit combinations are given in the 8690B Sweep Oscillator Manual. Circuit functions included in the RF Unit are: (1) microwave signal generation by the backward wave oscillator (BWO) tube, (2) BWO anode voltage and shaping for proper BWO currents, (3) BWO helix voltage shaping for frequency accuracy, (4) grid modulation, and (5) unleveled lamp control.

1-16. OPTIONS

1-17. The following options are available from Hewlett-Packard to extend the capability of the 8695A RF Unit:

Option 004 — Provides rear panel RF output capability.

Option 100 — Extends the frequency range of the 8695A model from 10 GHz to 15.5 GHz.

1-18. WARRANTY

1-19. The warranty for the bwo supplied with this RF unit and replacement bwo's purchased from Hewlett-Packard Company is on Figure 1-3 of this manual. For further information regarding warranty, contact your local Hewlett-Packard sales and service office. Addresses and telephone numbers are provided at the back of this manual.

CONDITIONS OF WARRANTY

FOR

BACKWARD WAVE OSCILLATOR TUBES

AND

TRAVELING WAVE TUBES

Microwave (BWO, TWT) tubes are warranted to be free from manufacturing defects. The operating tube warranty will be 12 months unconditional from date of shipment from Hewlett-Packard. If a tube carrying this warranty fails and must be replaced, only the applicable remaining warranty of the first tube is transferred to the replacement tube, or 90 days, which ever is greater. The Hewlett-Packard Company will process warranty claims for customers on tubes which were supplied by Hewlett-Packard for use in Hewlett-Packard instruments. The serial number of the tube failing and the serial number of the replacement tube must be noted on the warranty claim form.

"In Warranty" tubes purchased from Hewlett-Packard must be returned immediately (not to exceed 30 days from date of failure) with a completed Warranty Claim Form, to your local Hewlett-Packard Sales and Service Office. Addresses are listed in the Instrument Manual. Be sure to pack the tube in accordance with the Packing Instructions listed on the Warranty Claim Form; warranty allowance cannot be made on tubes received broken due to improper packaging or showing evidence of tampering.

Instructions for filing a warranty claim are listed on the *"Microwave Tube Warranty Claim"* form which is included with the Operating and Service Manual for your instrument. This form is also included with replacement Microwave tubes supplied by Hewlett-Packard. Additional copies may be obtained from your local Hewlett-Packard Sales and Service Office. (Please ref: HP Stock No. 9320–1865.)

Hewlett-Packard specified replacement tubes can be obtained from your local Hewlett-Packard Sales and Service Office.

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Figure 1-3. Hewlett-Packard BWO and TWT Warranty

MAINTENANCE

SECTION II
MAINTENANCE

2-1. INTRODUCTION

2-2. This section provides adjustment procedures for circuits in the 8695A-8697A RF Unit. In addition, procedures for BWO replacement, and the required electrical adjustments after replacement, are given. Test equipment required for RF Unit maintenance is listed in Table 2-1.

2-3. PERFORMANCE TESTS

2-4. Front panel controlled performance tests in the 8690B Sweep Oscillator Manual include tests of the RF Unit electrical specifications given in Table 1-1. If the electrical performance of the Sweep Oscillator/RF Unit combination fails to meet any of the specifications listed in Table 1-1, and a circuit malfunction is not suspected, refer to the adjustment paragraphs. If substandard performance occurs, and a circuit malfunction is suspected, follow the instructions given in the troubleshooting section of the 8690B Sweep Oscillator Manual using a recently calibrated 8690 mainframe.

2-5. TROUBLESHOOTING

WARNINGS

Any maintenance performed with protective covers removed from the instrument should be performed only by service-trained personnel who are aware of the shock hazard involved.

2-6. Complete troubleshooting procedures for all Sweep Oscillator/RF Unit combinations are included in the 8690B Sweep Oscillator Manual. Where applicable, these troubleshooting procedures analyze the circuit functions contained in the RF Unit. If a circuit malfunction has occured in the RF Unit, sufficient detailed information is provided at that point in the troubleshooting analysis to define the smallest functional circuit block that contains the malfunctioning circuit. Appropriate references are then made to this Manual.

2-7. DETAILED COMPONENT MAINTENANCE

2-8. Information on etched circuit board repair, including component, transistor, and tube socket replacement, and etched conductor repair is given in the maintenance section of the 8690B Sweep Oscillator Manual.

2-9. BWO TUBE REPLACEMENT

2-10. Warranty

WARNINGS

BWO tubes are magnetic materials and, as such, are restricted articles for shipment by air. Packaging, documentation, and container markings must be in compliance with C.A.B. No. 82 and IATA Regulations.

2-11. BWO tube V1 is not covered by the RF Unit warranty. A separate warranty (Figure 1-3) covers the BWO. If the BWO tube fails within this warranty period, use the Warranty Claim form supplied with the BWO tube.

2-12. Ordering Replacement BWO Tube

2-13. When ordering a replacement BWO tube, use the HP Part Number printed on the label of the BWO being replaced.

NOTE

An equivalent substitute BWO may be the recommended replacement (refer to paragraph 2-28).

2-14. BWO TUBE REMOVAL

a. Disconnect Sweep Oscillator mainframe from AC line power.

b. Remove RF Unit from 8690B mainframe.

c. Disconnect BWO tube RF output.

Table 2-1. Test Equipment Required for Maintenance

Instrument	Critical Specifications	Recommended Models
Oscilloscope	Vertical Bandwidth: 5 MHz Vertical Sensitivity: 5 mV/cm Sweep Time Accuracy: ± 3%	HP 140 with 1402 and 1420 Plug-Ins
Crystal Detector	Frequency Range: Same as RF Unit used Sensitivity: 100 mV dc from < 0.35 mW, high level; > 0.4 mV dc/μW, low level Frequency Response: ± 0.5 dB or better	HP P424A, K422A, R422A
Waveguide Attenuator	Frequency Range: Same as RF Unit used Attenuation: nominal 10 dB nominal 20 dB	HP P382A, K382A, R382A
Frequency Meter	Frequency Range: Same as RF Unit used Accuracy: ± 0.1%	HP P532A, K532A, R532A
Power Meter	Frequency Range: Same as RF Unit used	HP 432A
Thermistor Mount	Power Range: 1 μW to 10 mW	HP P486A, K486A, R486A, M486A
Waveguide-to-Coaxial Adapter	Frequency Range: Same as RF Unit used	HP H281, X281
Directional Coupler	Frequency Range: 8.2 GHz to 40 GHz	HP X752, P752, K752, R752
DC Digital Voltmeter	Range: 0 to ± 300V Accuracy: ± 0.2% minimum Input Impedance: 10 megohms	HP 3440A
Leveling Amplifier	Leveled Output Variation: ⩾ 0.05 dB	HP 8404A
Clip-On DC Ammeter	Range: 10 mA to 5 amps Accuracy: ± 5%	HP 428

d. Disconnect BWO tube leads from terminal assembly A3.

e. Remove 4 screws fastening BWO tube to chassis.

f. Remove BWO tube.

2-15. BWO TUBE INSTALLATION

2-16. MECHANICAL

a. Be sure Sweep Oscillator mainframe is disconnected from AC line power.

b. Bolt BWO tube to RF Unit chassis. Tighten mounting bolts.

c. Connect BWO tube RF output as originally connected.

2-17. ELECTRICAL ADJUSTMENTS

a. Before connecting BWO tube leads to A3 assembly, adjust anode voltage as follows:

(1) Set Sweep Oscillator for CW (single-frequency) operation at some frequency above the middle of the RF tuning range.

(2) Adjust A1R40 (ANODE SHAPE ADJ) maximum CCW.

(3) Measure anode voltage at Test Point 2, on Assembly A3, and adjust A1R42 (ANODE ADJ) to place anode voltage within ± 5 volts of the operating value on the BWO tube label.

b. Remove RF Unit from 8690B mainframe, then connect BWO tube leads to appropriate A3 terminals. (Use tube data sheet to identify leads.)

c. Install RF Unit and turn on Sweep Oscillator and allow a few minutes for the BWO tube to reach operating temperature.

d. Set Sweep Oscillator for CW operation at the highest frequency in the RF tuning range. Set POWER LEVEL for maximum output.

e. Measure BWO tube anode voltage at Test Point 2, on Assembly A3, and monitor current in BWO tube cathode lead using clip-on DC Ammeter. Adjust A1R42 (ANODE ADJ) to obtain top frequency cathode current specified on tube data sheet.

f. Equalize RF power output over tuning range as follows:

(1) Connect equipment as in Figure 2-1. Omit connection to Power Meter Level Input. Set Sweep Oscillator for CW operation, and POWER LEVEL for maximum output.

(2) While measuring current in BWO tube cathode and helix leads, tune RF output to frequency in lower half of RF tuning range at which RF output is minimum. If RF output is below specifications, adjust A1R40 (ANODE SHAPE ADJ) for proper RF output without exceeding maximum cathode and helix currents specified in Table 2-2.

NOTE

Excessive helix current actuates 8690B Helix Over-current relay K3, starting a sequence which disconnects BWO operating voltages. To reconnect voltages, set LINE SWITCH to OFF position, then back to RF and wait for time delay to recycle.

(3) Manually tune through the full band checking that neither cathode nor helix current exceeds the maximum values listed in Table 2-2. If maximum values are exceeded, readjust A1R42, ANODE ADJ, and/or A1R40, ANODE SHAPE ADJ, to reduce current. ANODE SHAPE ADJ affects lower half of RF tuning range; ANODE ADJ affects full band.

(4) Repeat steps (2) and (3) to obtain best full-band RF power flatness within the current limits specified in Table 2-2.

g. Perform the adjustment procedures given in Table 2-3, except for the Crystal ALC Leveled Output Adjustment.

2-18. ADJUSTMENT

2-19. The adjustment procedures given in Table 2-3 are to be performed in the order listed, and should only be made with the RF Unit installed in an 8690B Sweep Oscillator known to be accurately calibrated. Accurate 8690B Sweep Oscillator calibration can be ensured by performing the adjustment procedures listed in the Sweep Oscillator Manual. If an adjustment requirement cannot be satisfied, refer to the troubleshooting paragraphs in the 8690B Sweep Oscillator Manual.

2-20. ADJUSTMENT CONTROL SETTINGS.

Unless otherwise specified, set the 8690B Sweep Oscillator controls for all adjustments as follows:

LINE	RF
START/CW MARKER 1 - START/CW MARKER 2 - STOP STOP/Δ F	Low end of specified range, any RF Unit
SWEEP SELECTOR	CW
FUNCTION pushbuttons	All Released
AMPLITUDE MOD pushbuttons	All Released
ALC	Released
MANUAL SWEEP	MAX CCW
SWEEP TIME (SEC)	100-10
VERNIER	LINE SYNC
INT SQ WAVE FREQ	MAX CCW
BLANKING	OFF
ALL BNC INPUTS and OUTPUTS	No connection

Table 2-2. Maximum BWO Currents in mA

RF Unit Model	Varian			Watkins-Johnson	
	Helix	Cathode	Anode	Helix	Cathode
8695A	20	28	10	3	15
8695A, Opt. 100	—	—	—	3	15
8696A	12	20	10	2	10
8697A	15	23	10	1.5	5

Table 2-3. Adjustments (1 of 10)

1. ANODE VOLTAGE

REFERENCE:

Figure 4-2 and manufacturers specification.

DESCRIPTION:

Adjust BWO anode voltage in conformance with the manufacturers specifications.

EQUIPMENT:

Sweep Oscillator	HP 8690B
DC Digital Voltmeter	HP 3440A

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	START STOP
SWEEP SELECTOR	CW
START/CW	High end of specified range

c. Set RF Unit POWER LEVEL control fully clockwise.

d. Connect Digital Voltmeter between RF Unit test point A2TP3 and chassis ground.

e. Adjust A1R42 (ANODE ADJ) for the voltage shown on the BWO tube label.

2. ANODE SHAPING

REFERENCE:

Figure 4-2 and manufacturers specifications.

DESCRIPTION:

Shape anode voltage to achieve optimum instrument performance.

Table 2-3. Adjustments (2 of 10)

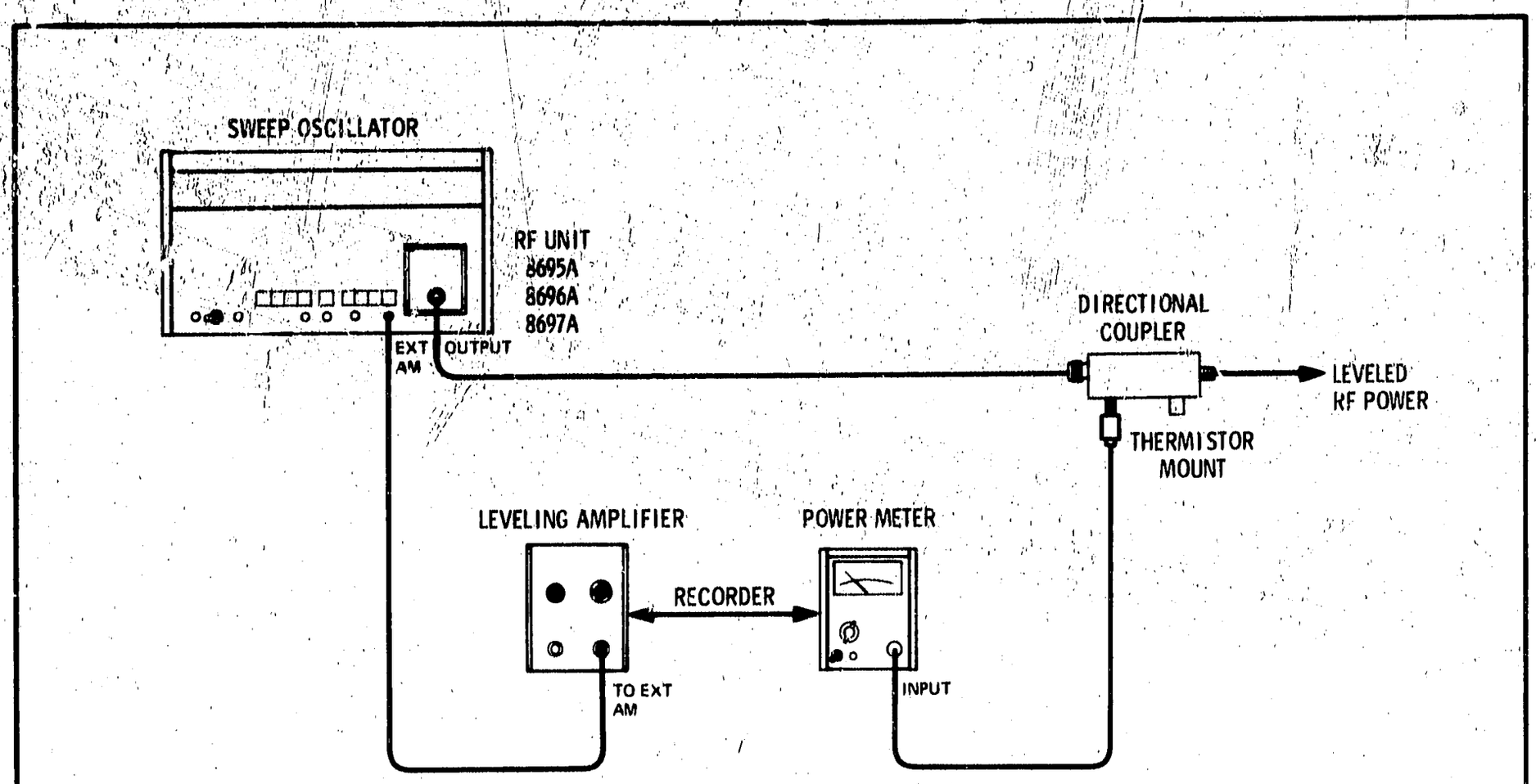


Figure 2-1. Adjustment Setup Number 1

EQUIPMENT:

Sweep Oscillator	HP 8690B
Power Meter	HP 432A
Leveling Amplifier	HP 8404A
Waveguide Attenuator (for use with 8695A)	P382A
Waveguide Attenuator (for use with 8696A)	K382A
Waveguide Attenuator (for use with 8697A)	R382A
Waveguide Attenuator (for use with 8695A, Opt. 100)	X382A
Thermistor Mount (for use with 8695A)	P486A
Thermistor Mount (for use with 8696A)	K486A
Thermistor Mount (for use with 8697A)	R486A
Thermistor Mount (for use with 8695A, Opt. 100)	M486A

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	START STOP
SWEEP SELECTOR	CW
ALC	Depressed
START/CW	Low end of specified range

c. Connect equipment as shown in Figure 2-1, according to RF Unit used.

Table 2-3. Adjustments (3 of 10)

2. ANODE SHAPING (Cont'd)

d. Measure leveled power output. If power level is not at least the appropriate minimum level tabulated below, proceed to step e.

RF Unit Model	Power Level, dBm
8695A	16.0
8696A	10.0
8697A	7.0

e. Adjust A1R40 (ANODE SHAPE ADJ) to achieve the appropriate power output specified in step d.

3. BWO CURRENTS

REFERENCE:

Table 2-2.

DESCRIPTION:

Adjust BWO currents to achieve optimum instrument performance.

EQUIPMENT:

Sweep Oscillator	HP 8690B
DC Ammeter (clip-on type)	HP 428

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	START STOP
SWEEP SELECTOR	CW
START/CW	Low end of specified range

c. Connect DC Ammeter clip-on probe around BWO helix lead (red).

d. Measure helix current with START/CW at low end of specified range; then at high end of specified range.

e. If high or low end current is greater than specified in Table 2-2, adjust A1R42 (ANODE ADJ) to bring current within limits.

f. Perform ANODE SHAPING adjustment procedure, and steps a through e of BWO CURRENTS adjustment procedure until further adjustments are not required.

Table 2-3. Adjustments (4 of 10)

3. BWO CURRENTS (Cont'd)

g. Connect DC Ammeter clip-on probe around BWO anode lead (blue).

h. Measure anode current with START/CW at low end of specified range; then at high end of specified range.

i. Repeat steps e and f.

4. HELIX VOLTAGE SHAPING

REFERENCE:

Figure 4-2 and manufacturers specification.

DESCRIPTION:

Shapt helix voltage to achieve optimum instrument performance.

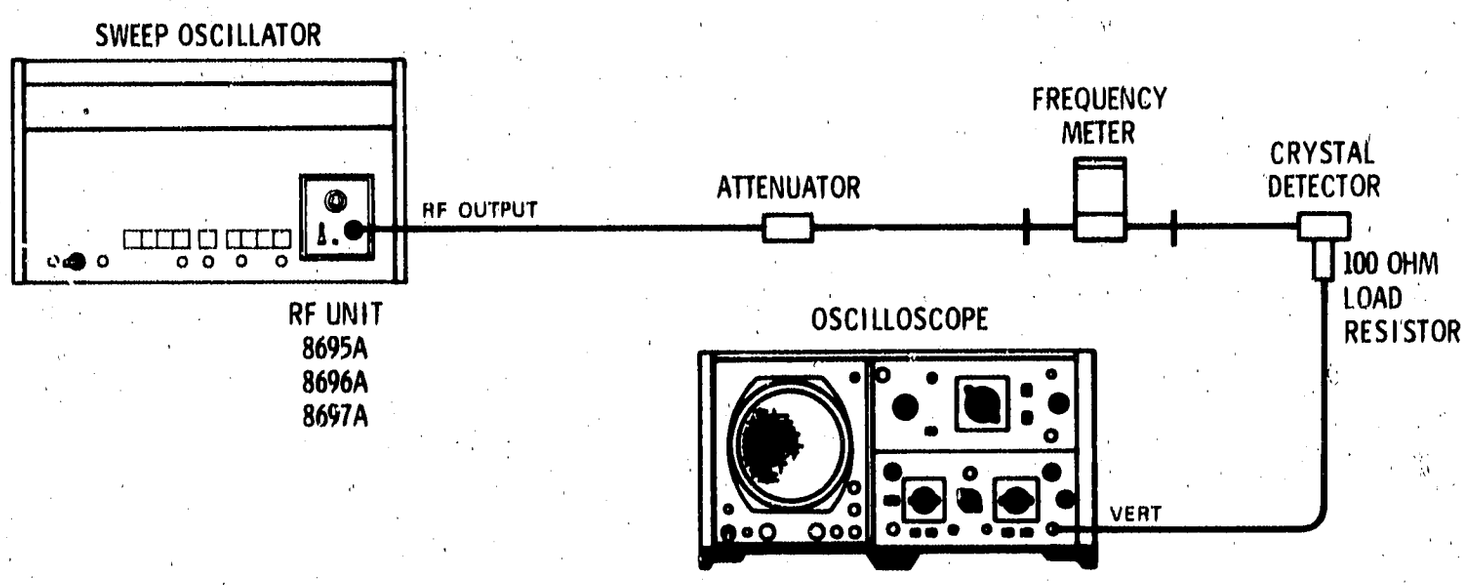


Figure 2-2. Adjustment Setup Number 2

EQUIPMENT:

Sweep Oscillator	HP 8690B
DC Digital Voltmeter	HP 3440/3441
Oscilloscope	HP 140
Waveguide Attenuator (for use with 8695A)	P382A
Waveguide Attenuator (for use with 8696A)	K382A
Waveguide Attenuator (for use with 8697A)	R382A
Waveguide Attenuator (for use with 8695A, Opt. 100)	X382A
Crystal Detector (for use with 8695A)	P424A
Crystal Detector (for use with 8696A)	K422A
Crystal Detector (for use with 8697A)	R422A
Crystal Detector (for use with 8695A, Opt. 100)	M424A
Frequency Meter (for use with 8695A)	P532A
Frequency Meter (for use with 8696A)	K532A
Frequency Meter (for use with 8697A)	R532A
Frequency Meter (for use with 8695A, Opt. 100)	X532B
100 Ohm Load Resistor	HP 11523

Table 2-3. Adjustments (5 of 10)

4. HELIX VOLTAGE SHAPING (Cont'd)

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	ΔF
SWEEP SELECTOR	MANUAL
STOP/ΔF	MAX CW

c. Connect Digital Voltmeter between test point A4TP4 and chassis ground.

d. Set START/CW and MANUAL SWEEP for 69.5 Vdc at test point A4TP4.

e. Adjust A1R24 (SHAPE ADJ) for approximately 0.0 Vdc across A1CR3.

f. Connect equipment as shown in Figure 2-2.

g. Set START/CW and MANUAL SWEEP for 3.00 ± 0.01 Vdc at A4TP4.

h. Adjust A2R12 for low end frequency of specified range. Use frequency meter and oscilloscope display to determine frequency setting.

i. Set START/CW and MANUAL SWEEP for 38.0 ± 0.01 Vdc at A4TP4.

j. Adjust A2R13 for midpoint frequency of specified range. Use frequency meter and oscilloscope display to determine frequency setting.

k. Repeat steps g through j until further adjustments are not necessary.

l. Set START/CW and MANUAL SWEEP for 73.0 ± 0.01 Vdc at A4TP4.

m. Adjust A1R24 (SHAPE ADJ) for high end frequency of specified range.

5. FREQUENCY ACCURACY

REFERENCE:

Table 1-1.

DESCRIPTION:

Adjust frequency accuracy in conformance with limits specified in this procedure.

Table 2-3. Adjustments (6 of 10)

5. FREQUENCY ACCURACY (Cont'd)

EQUIPMENT:

Sweep Oscillator	HP 8690B
DC Digital Voltmeter	HP 3440A
Oscilloscope	HP 140
Waveguide Attenuator (for use with 8695A)	P382A
Waveguide Attenuator (for use with 8696A)	K382A
Waveguide Attenuator (for use with 8697A)	R382A
Waveguide Attenuator (for use with 8695A ,Opt. 100)	X382A
Crystal Detector (for use with 8695A)	P424A
Crystal Detector (for use with 8696A)	K422A
Crystal Detector (for use with 8697A)	R422A
Crystal Detector (for use with 8695A, Opt. 100)	M424A
Frequency Meter (for use with 8695A)	P532A
Frequency Meter (for use with 8696A)	K532A
Frequency Meter (for use with 8697A)	R532A
Frequency Meter (for use with 8695A, Opt. 100)	X532B
100 Ohm Load Resistor	HP 11523

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	ΔF
SWEEP SELECTOR	MANUAL
STOP/ΔF	MAX CW

c. Connect equipment as shown in Figure 2-2.

d. Connect DC Digital Voltmeter between test point A4TP4 and chassis ground.

e. Set START/CW and MANUAL SWEEP for voltages at test point A4TP4, as listed in step g, according to RF Unit used.

f. Determine RF output frequency using frequency meter and oscilloscope display. Frequency accuracy test limits are given in step g of this procedure.

g. If necessary set frequency of RF output by compromise adjustment of A1R24, A2R12, and A2R13.

Table 2-3. Adjustments (7 of 10)

5. FREQUENCY ACCURACY (Cont'd)

Vdc at Test Point 4, 8690B Assembly A4	Frequency (GHz) 8695A	8696A	8697A	8695A Opt. 100
73.00 ± 0.01	18.00	26.50	40.00	15.50
66.00 ± 0.01	17.44	25.65	38.65	14.95
59.00 ± 0.01	16.88	24.80	37.30	14.40
52.00 ± 0.01	16.32	23.95	35.95	13.85
45.00 ± 0.01	15.76	23.10	34.60	13.30
38.00 ± 0.01	15.20	22.25	33.25	12.75
31.00 ± 0.01	14.64	21.40	31.90	12.20
24.00 ± 0.01	14.08	20.55	30.55	11.65
17.00 ± 0.01	13.52	19.70	29.20	11.10
10.00 ± 0.01	12.96	18.85	27.85	10.55
3.00 ± 0.01	12.40	18.00	26.50	10.00
TEST LIMIT (%)	±0.8	±0.8	±0.8	±0.8

6. BWO GRID LEVEL

REFERENCE:

Figure 4-2 and manufacturers specifications.

DESCRIPTION:

Adjust BWO grid voltage to ensure proper operation of RF oscillator.

EQUIPMENT:

Sweep Oscillator	HP 8690B
DC Digital Voltmeter	HP 3440A
Oscilloscope	HP 140
Waveguide Attenuator (for use with 8695A)	P382A
Waveguide Attenuator (for use with 8696A)	K382A
Waveguide Attenuator (for use with 8697A)	R382A
Waveguide Attenuator (for use with 8695A), Opt. 100)	X382A
Crystal Detector (for use with 8695A)	P424A
Crystal Detector (for use with 8696A)	K422A
Crystal Detector (for use with 8697A)	R422A
Crystal Detector (for use with 8695A, Opt. 100)	M424A
Frequency Meter (for use with 8695A)	P532A
Frequency Meter (for use with 8696A)	K532A
Frequency Meter (for use with 8697A)	R532A
Frequency Meter (for use with 8695A, Opt. 100)	X532B
100 Ohm Load Resistor	HP 11523

Table 2-3. Adjustments (8 of 10)

6. BWO GRID LEVEL (Cont'd)

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Set 8690B controls as follows:

FUNCTION	START STOP
SWEEP SELECTOR	AUTO
START/CW	Low end of specified range
STOP/ΔF	High end of specified range
AMPLITUDE MOD	INT SQ WAVE
SWEEP TIME (SEC)	0.1 SEC

c. Set RF Unit POWER LEVEL control fully clockwise.

d. Connect equipment as shown in Figure 2-2.

e. Connect 8690B SWEEP OUT to horizontal input of oscilloscope.

f. Adjust A1R14 (GRID LEVEL ADJ) so that power output is off during the negative-going portion of the square wave modulation signal across the specified range. The display base line should approximate a straight line.

7. CRYSTAL ALC LEVELED OUTPUT

REFERENCE:

Table 1-1.

DESCRIPTION:

Adjust ALC leveled output to maintain optimum operating performance.

Table 2-3. Adjustments (9 of 10)

7. CRYSTAL ALC LEVELED OUTPUT (Cont'd)

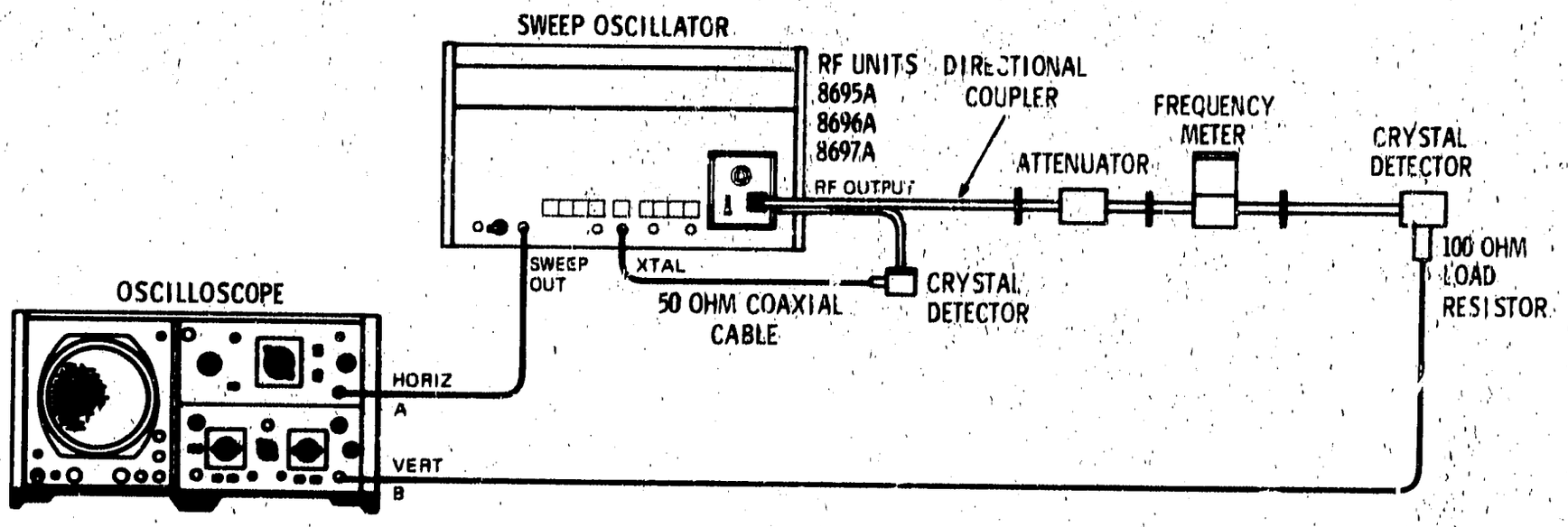


Figure 2-3. Adjustment Setup Number 3

EQUIPMENT:

Sweep Oscillator	HP 8690B
Oscilloscope	HP 140
Crystal Detector (for use with 8695A)	P424A
Crystal Detector (for use with 8696A)	K422A
Crystal Detector (for use with 8697A)	R422A
Crystal Detector (for use with 8695A, Opt. 100)	M424A
Directional Coupler (for use with 8695A)	P752
Directional Coupler (for use with 8696A)	K752
Directional Coupler (for use with 8697A)	R752
Directional Coupler (for use with 8695A, Opt. 100)	X752
Waveguide Attenuator (for use with 8695A)	P382A
Waveguide Attenuator (for use with 8696A)	K382A
Waveguide Attenuator (for use with 8697A)	R382A
Waveguide Attenuator (for use with 8695A, Opt. 100)	X382A
Frequency Meter (for use with 8695A)	P532A
Frequency Meter (for use with 8696A)	K532A
Frequency Meter (for use with 8697A)	R532A
Frequency Meter (for use with 8695A, Opt. 100)	X532B
100 Ohm Load Resistor	HP 11523

PROCEDURE:

a. Verify that RF Unit is properly installed in 8690B mainframe.

b. Connect equipment as shown in Figure 2-3.

c. Set 8690B controls as follows:

SWEEP SELECTOR	AUTO
START/CW	Low end of specified range
STOP/ΔF	High end of specified range

Table 2-3. Adjustments (10 of 10)

7. CRYSTAL ALC LEVELED OUTPUT (Cont'd)

ALC	Depressed
SWEEP TIME (SEC)	0.1 - 0.01
VERNIER	LINE SYNC
POWER LEVEL Control	7

d. Observe detected power on oscilloscope display.

e. Adjust A1R1 (LEVEL SHUNT) so that the maximum RF power output portion of the display curve just levels across band. (UNLEVELED lamp extinguishes.)

f. Vary the POWER LEVEL control from zero to 7 while observing oscilloscope. Adjust R3 (EXT ALC GAIN) for maximum possible gain without oscillations over the zero to 7 range.

g. Repeat steps e and f until both conditions are met.

2-21. MAINTENANCE NOTES

2-22. The following maintenance notes apply as indicated:

a. Adjust variable resistor A2R12 for proper calibration when RF Unit (serial prefix 620) is used with 8690A mainframe (serial prefix 615). When RF Unit prefixed 620 is used with 8690A mainframe serial prefixed 636, approximately −1% calibration error will occur. When this occurs, perform adjustments 4 and 5 of Table 2-3.

b. Adjust variable resistor A2R12 for proper calibration when RF Unit (serial prefix 636) is used with 8690A mainframe (serial prefix 636). When RF Unit prefixed 636 is used with 8690A mainframe serial prefixed 615, approximately +1% calibration error will occur. In this case perform adjustments 4 and 5 of Table 2-3.

2-23. BWO TUBES AND WAVEGUIDES

2-24. Figure 2-4 shows the various BWO tube and waveguide configurations employed when a Watkins-Johnson or Varian BWO tube is installed in the 8695A-8697A RF Unit. The Watkins-Johnson BWO tube is automatically grounded when it is bolted to the RF Unit frame. The Varian BWO tube is grounded via a conductor connected between the waveguide flange and RF Unit frame. The Watkins-Johnson BWO output connector is located near the end of the tube while the Varian BWO output connector is located at the center of the tube. The location of these output connectors creates a need for two different lengths of waveguides. Figure 2-4 illustrates in detail the tube type, waveguide type, grounding methods, and relative positions of the waveguides and BWO's when installed in the RF Unit.

2-25. SERVICE NOTES

2-26. To use RF Units prefixed 724- and above with 8690A mainframe serial numbers 641-00260 and below (including serial prefixes 636- and 615-) disconnect the two wires connected to pins 26 and 10 of J12 on the 8690A Mainframe. Disconnecting these two wires will ensure compatability and does not affect instrument calibration. The recommended procedure for removing these two wires is as follows:

a. The white-green-yellow wire (color 954) connected to pin 26 of J12 is routed to a push-on connector on the top side of A7. This wire connects to pin 20 of XA4 through a conductor on A7. Disconnect this wire from A7, then cut it off at the point where it enters the cable harness. Tape the cut end to the harness.

b. The white-brown-yellow (color 914) wire connected to pin 10 of J12 can best be disconnected by removing the RF Unit and locating the wire in the cable harness just below connector J12. Pull this wire out just far enough so that it can

conveniently be severed. Remove about a one-inch section and then tape the cut ends to the harness.

2-27. HELIX OVERCURRENT SHUNT RESISTORS

2-28. BWO tubes listed in Table 3-2 are equivalent substitutes when used with appropriate Shaping Board Assembly (A2) and Helix Overcurrent Shunt Resistor A1R17. Table 2-4 provides detailed information regarding the RF Unit Model Number, type of BWO, shaping board assembly, and overcurrent shunt resistor recommended for use in the configuration selected.

2-29. FIGURES

2-30. Figures 2-5 through 2-9 illustrate physical features and electrical characteristics of the 8695A-8697A RF Unit.

Table 2-4. BWO Tube, Shaping Board Assembly and Helix Overcurrent Shunt Resistor Combinations

RF Unit Model	BWO Tube Part No.	BWO Manufacturer	Shaping Board Assembly (A2)	Helix Overcurrent Shunt Resistor (A1R17)
8695A	1951-0080 1951-0059	Watkins-Johnson Varian	08695-6105 08695-60109	19.6k ohm 1.0k ohm
8695A Opt. 100	1951-0088	Watkins-Johnson	08695-60107	23.7k ohm
8696A	1951-0081 1951-0060	Watkins-Johnson Varian	08696-60103 08696-60104	34.8k ohm 1.0k ohm
8697A	1951-0082 1951-0061	Watkins-Johnson Varian	08696-60103 08697-60103	34.8k ohm 1.0k ohm

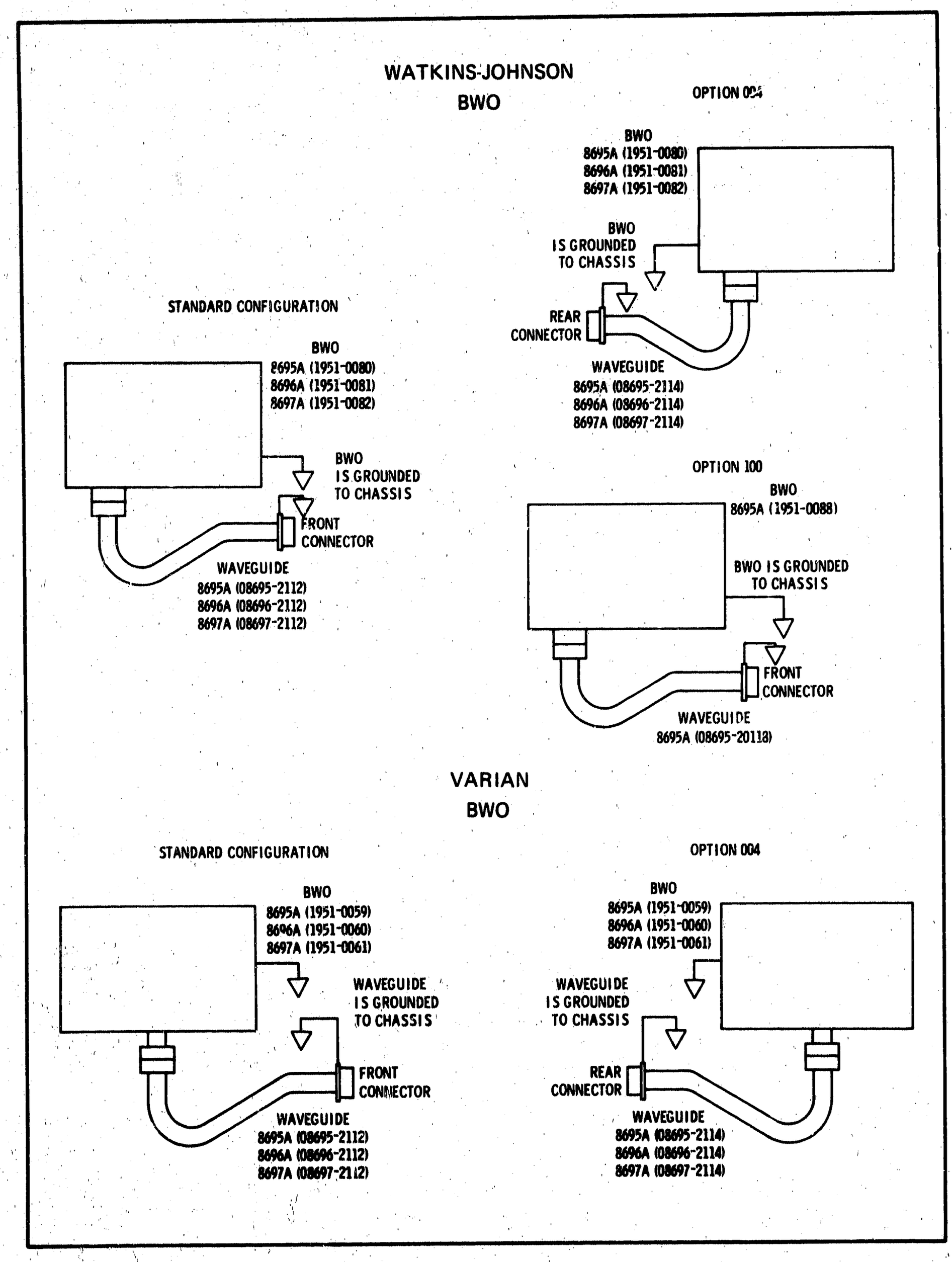


Figure 2-4. BWO Tubes and Waveguides

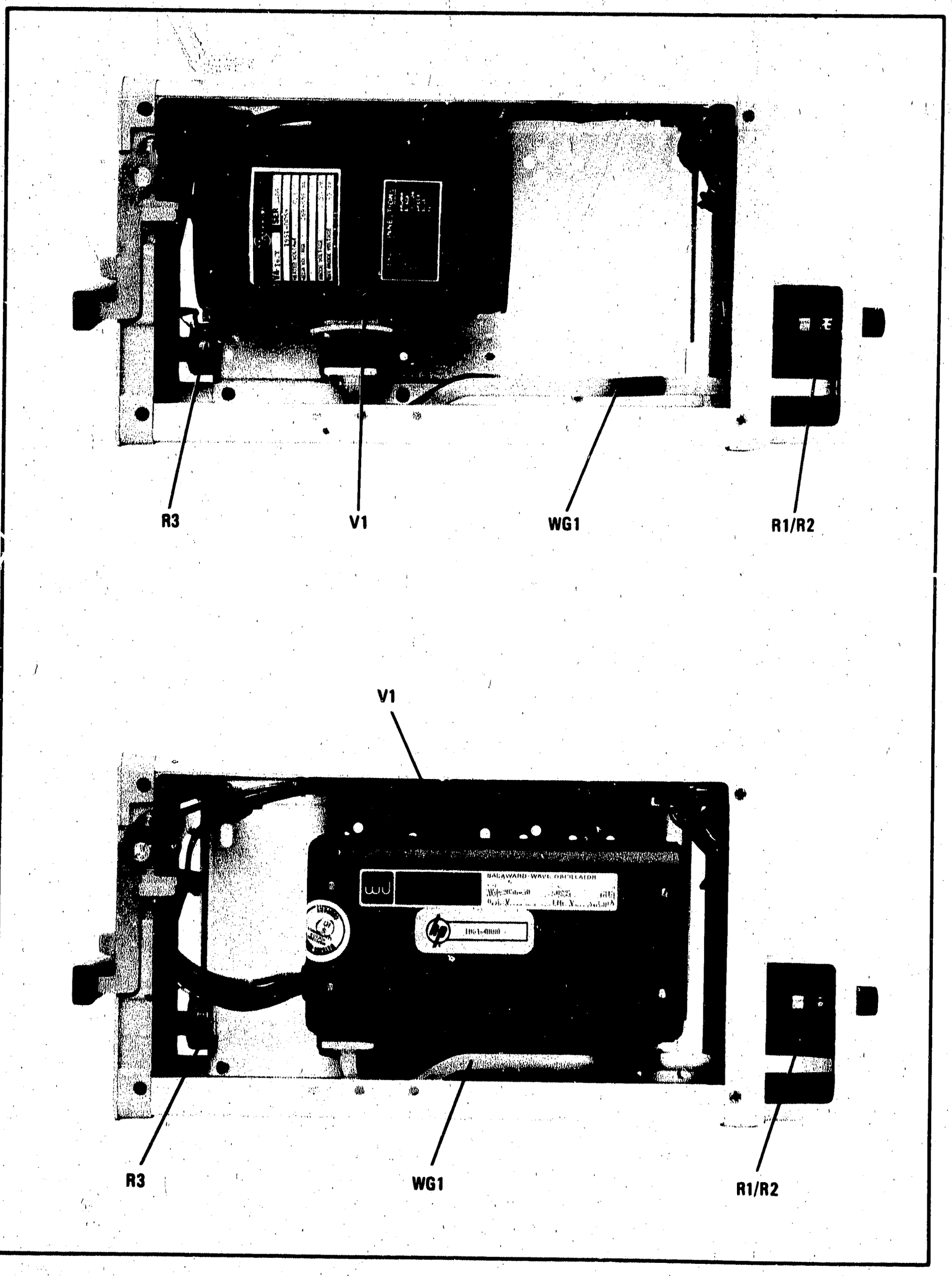


Figure 2-5. Component Identification, Interior Left Side

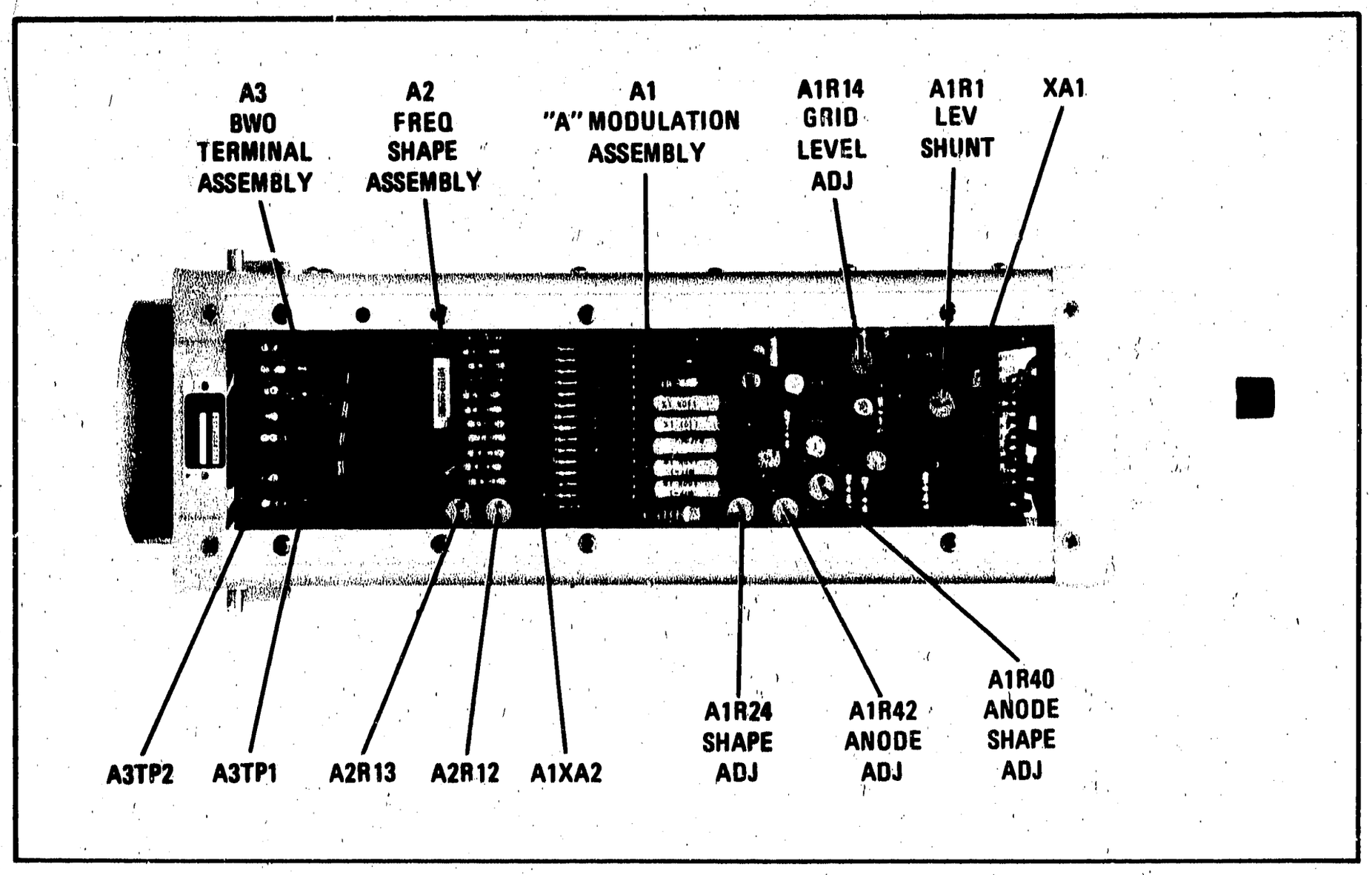


Figure 2-6. Component and Adjustment Identification, Interior Top View

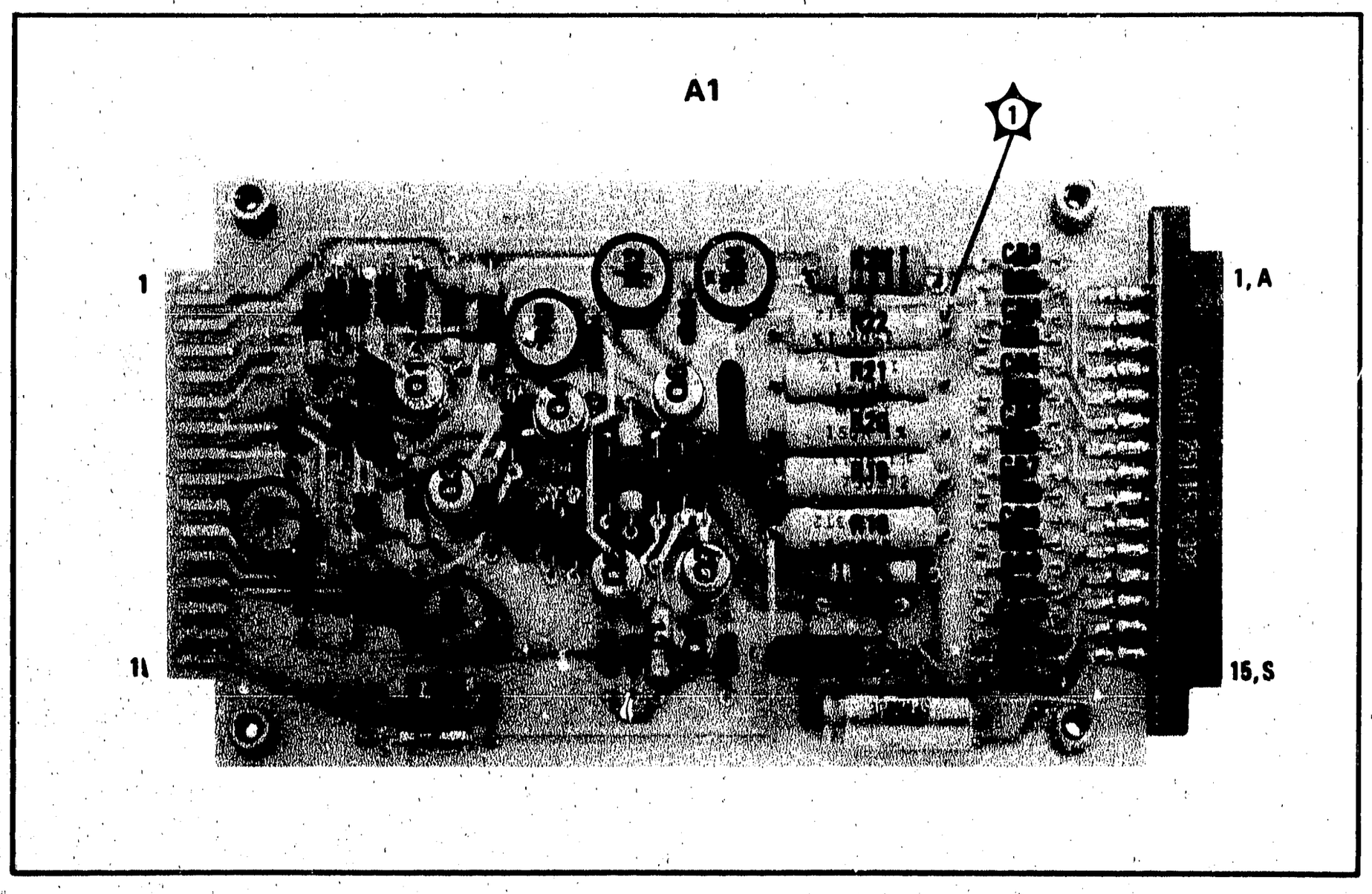


Figure 2-7. Component Identification, Assembly A1

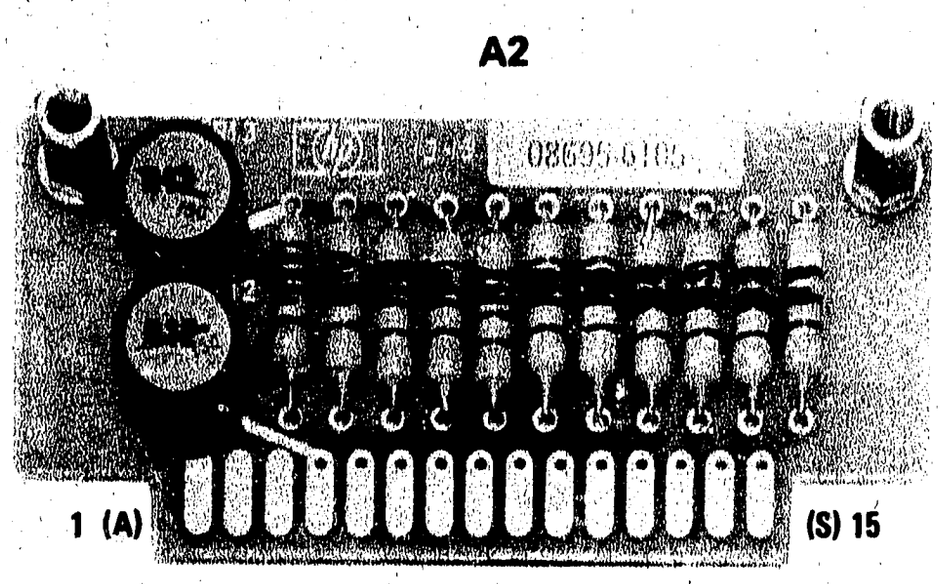
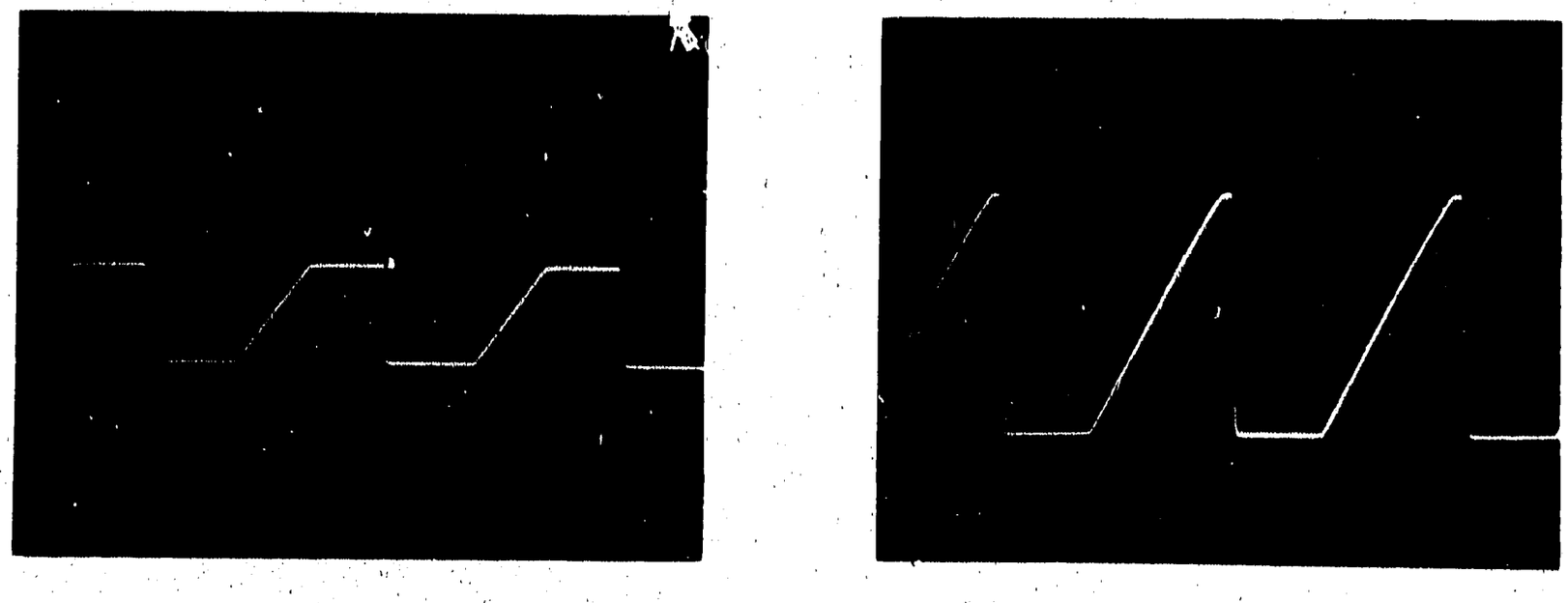


Figure 2-8. Component Identification, Assemblies A2 and A3



Junction A1R38, A1R39
20 V/div 5 ms/div

Emitter A1Q1
20 V/div 5 ms/div

Figure 2-9. Waveforms

PARTS LIST

SECTION III
REPLACEABLE PARTS

3-1. INTRODUCTION

3-2. This section contains information for ordering parts. Table 3-1 lists abbreviations used in the parts list and throughout the manual, Table 3-2 lists all replaceable parts in reference designator order, and Table 3-3 contains the names and addresses that correspond to the manufacturers code numbers.

3-3. ABBREVIATIONS

3-4. Table 3-1 lists abbreviations used in the parts list, schematics and throughout the manual. In some cases, two forms of the abbreviation are used, one all in capital letters, and one partial or no capitals. This occurs because the abbreviations in the parts list are always all capitals. However, in the schematics and other parts of the manual, other abbreviation forms are used with both lower case and upper case letters.

3-5. REPLACEABLE PARTS LIST

WARNING

BWO tubes are magnetic materials and, as such, are restricted articles for shipment by air. Packaging, documentation, and container markings must be in compliance with C.A.B. No. 82 and IATA Regulations.

3-6. Table 3-2 is the list of replaceable parts and is organized as follows:

a. Electrical assemblies and their components in alpha-numerical order by reference designation.

b. Chassis-mounted parts in alpha-numerical order by reference designation.

c. Miscellaneous parts.

d. Illustrated parts breakdowns, if appropriate.

The information given for each part consists of the following:

a. The Hewlett-Packard part number.

b. The total quantity (Qty) in the instrument.

c. The description of the part.

d. A typical manufacturer of the part in a five-digit code.

e. The manufacturer's number for the part.

The total quantity for each part is given only once - at the first appearance of the part number in the list.

3-7. ORDERING INFORMATION

3-8. To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office.

3-9. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.

NOTE

BWO tubes listed in Table 3-2 are equivalent substitutes when used with appropriate Shaping Board Assembly and Helix Overcurrent Shunt Resistor A1R17. For detailed information refer to Table 2-4.

Table 3-1. Reference Designations and Abbreviations

REFERENCE DESIGNATIONS

A . . . . . assembly
AT . . attenuator; isolator; termination
B . . . . . fan; motor
BT . . . . . battery
C . . . . . capacitor
CP . . . . . coupler
CR . . . . . diode; diode thyristor; varactor
DC . . . directional coupler
DL . . . . . delay line
DS . . . . . annunciator; signaling device (audible or visual); lamp; LED
E . . . . . miscellaneous electrical part
F . . . . . fuse
FL . . . . . filter
H . . . . . hardware
HY . . . . . circulator
J . . . electrical connector (stationary portion); jack
K . . . . . relay
L . . . . . coil; inductor
M . . . . . meter
MP . . . . . miscellaneous mechanical part
P . . . electrical connector (movable portion); plug
Q . . . . . transistor: SCR; triode thyristor
R . . . . . resistor
RT . . . . . thermistor
S . . . . . switch
T . . . . . transformer
TB . . . . . terminal board
TC . . . . . thermocouple
TP . . . . . test point
U . . . . . integrated circuit; microcircuit
V . . . . . electron tube
VR . . . . voltage regulator; breakdown diode
W . . . . cable; transmission path; wire
X . . . . . socket
Y . . . . crystal unit (piezo-electric or quartz)
Z . . . . tuned cavity; tuned circuit

ABBREVIATIONS

A . . . . . ampere
ac . . . . alternating current
ACCESS . . . . . accessory
ADJ . . . . . adjustment
A/D . . . . analog-to-digital
AF . . . . . audio frequency
AFC . . . . . automatic frequency control
AGC . . . . . automatic gain control
AL . . . . . aluminum
ALC . . . . . automatic level control
AM . . . amplitude modulation
AMPL . . . . . amplifier
APC . . . . automatic phase control
ASSY . . . . . assembly
AUX . . . . . auxiliary
avg . . . . . average
AWG . . . . American wire gauge
BAL . . . . . balance
BCD . . . . . binary coded decimal
BD . . . . . board
BE CU . . . . . beryllium copper
BFO . . . . . beat frequency oscillator
BH . . . . . binder head
BKDN . . . . . breakdown
BP . . . . . bandpass
BPF . . . . . bandpass filter
BRS . . . . . brass
BWO . . . . . backward-wave oscillator
CAL . . . . . calibrate
ccw . . counter-clockwise
CER . . . . . ceramic
CHAN . . . . . channel
cm . . . . . centimeter
CMO . . cabinet mount only
COAX . . . . . coaxial
COEF . . . . . coefficient
COM . . . . . common
COMP . . . . . composition
COMPL . . . . . complete
CONN . . . . . connector
CP . . . . . cadmium plate
CRT . . . cathode-ray tube
CTL . . . . complementary transistor logic
CW . . . . . continuous wave
cw . . . . . clockwise
cm . . . . . centimeter
D/A . . . . digital-to-analog
dB . . . . . decibel
dBm . . . . decibel referred to 1 mW
dc . . . . . direct current
deg . . degree (temperature interval or difference)
° . . . . . degree (plane angle)
°C . . . . . degree Celsius (centigrade)
°F . . . . degree Fahrenheit
°K . . . . . degree Kelvin
DEPC . . deposited carbon
DET . . . . . detector
diam . . . . . diameter
DIA . . . diameter (used in parts list)
DIFF AMPL . . differential amplifier
div . . . . . division
DPDT . . . . . double-pole, double-throw
DR . . . . . drive
DSB . . . . double sideband
DTL . . . . diode transistor logic
DVM . . . digital voltmeter
ECL . . . . emitter coupled logic
EMF . . electromotive force
EDP . . . . . electronic data processing
ELECT . . . . . electrolytic
ENCAP . . . . encapsulated
EXT . . . . . external
F . . . . . farad
FET . . . . . field-effect transistor
F/F . . . . . flip-flop
FH . . . . . flat head
FIL H . . . . . fillister head
FM . . frequency modulation
FP . . . . . front panel
FREQ . . . . . frequency
FXD . . . . . fixed
g . . . . . gram
GE . . . . . germanium
GHz . . . . . gigahertz
GL . . . . . glass
GRD . . . . . ground(ed)
H . . . . . henry
h . . . . . hour
HET . . . . . heterodyne
HEX . . . . . hexagonal
HD . . . . . head
HDW . . . . . hardware
HF . . . . . high frequency
HG . . . . . mercury
HI . . . . . high
HP . . . . . Hewlett-Packard
HPF . . . . . high pass filter
HR . . . . . hour (used in parts list)
HV . . . . . high voltage
Hz . . . . . Hertz
IC . . . . integrated circuit
ID . . . . . inside diameter
IF . . . . . intermediate frequency
IMPG . . . . . impregnated
in . . . . . inch
INCD . . . . . incandescent
INCL . . . . . include(s)
INP . . . . . input
INS . . . . . insulation
INT . . . . . internal
kg . . . . . kilogram
kHz . . . . . kilohertz
kΩ . . . . . kilohm
kV . . . . . kilovolt
lb . . . . . pound
LC . . . . . inductance-capacitance
LED . . light-emitting diode
LF . . . . . low frequency
LG . . . . . long
LH . . . . . left hand
LIM . . . . . limit
LIN . . . linear taper (used in parts list)
lin . . . . . linear
LK WASH . . . lock washer
LO . . . low; local oscillator
LOG . . . . logrithmic taper (used in parts list)
log . . . . . logrithm(ic)
LPF . . . . . low pass filter
LV . . . . . low voltage
m . . . . . meter (distance)
mA . . . . . milliampere
MAX . . . . . maximum
MΩ . . . . . megohm
MEG . . . . meg (10^6) (used in parts list)
MET FLM . . . . metal film
MET OX . . metallic oxide
MF . . . medium frequency; microfarad (used in parts list)
MFR . . . . . manufacturer
mg . . . . . milligram
MHz . . . . . megahertz
mH . . . . . millihenry
mho . . . . . mho
MIN . . . . . minimum
min . . . . . minute (time)
' . . . . . minute (plane angle)
MINAT . . . . . minature
mm . . . . . millimeter

NOTE

All abbreviations in the parts list will be in upper-case.

Table 3-1. Reference Designations and Abbreviations (Cont'd)

MOD . . . . . modulator
MOM . . . . . momentary
MOS . . . . . metal-oxide semiconductor
ms . . . . . millisecond
MTG . . . . . mounting
MTR . . . meter (indicating device)
mV . . . . . millivolt
mVac . . . . . millivolt, ac
mVdc . . . . . millivolt, dc
mVpk . . . . millivolt, peak
mVp-p . . . millivolt, peak-to-peak
mVrms . . . . millivolt, rms
mW . . . . . milliwatt
MUX . . . . . multiplex
MY . . . . . mylar
μA . . . . . microampere
μF . . . . . microfarad
μH . . . . . microhenry
μmho . . . . . micromho
μs . . . . . microsecond
μV . . . . . microvolt
μVac . . . . . microvolt, ac
μVdc . . . . . microvolt, dc
μVpk . . . microvolt, peak
μVp-p . . . microvolt, peak-to-peak
μVrms . . . . microvolt, rms
μW . . . . . microwatt
nA . . . . . nanoampere
NC . . . . . no connection
N/C . . . . normally closed
NE . . . . . neon
NEG . . . . . negative
nF . . . . . nanofarad
NI PL . . . . . nickel plate
N/O . . . . . normally open
NOM . . . . . nominal
NORM . . . . . normal
NPN . . . negative-positive-negative
NPO . . . . negative-positive zero (zero temperature coefficient)
NRFR . . not recommended for field replacement
NSR . . . . . not separately replaceable
ns . . . . . nanosecond
nW . . . . . nanowatt
OBD . . . order by description
OD . . . . . outside diameter
OH . . . . . oval head
OP AMPL . . . operational amplifier
OPT . . . . . option
OSC . . . . . oscillator
OX . . . . . oxide
oz . . . . . ounce
Ω . . . . . ohm
P . . . . peak (used in parts list)
PAM . . . . pulse-amplitude modulation
PC . . . . . printed circuit
PCM . . pulse-code modulation; pulse-count modulation
PDM . . . . . pulse-duration modulation
pF . . . . . picofarad
PH BRZ phosphor bronze
PHL . . . . . Phillips
PIN . . . positive-intrinsic-negative
PIV . . . . . peak inverse voltage
pk . . . . . peak
PL . . . . . phase lock
PLO . . . . . phase lock oscillator
PM . . . . phase modulation
PNP . . . positive-negative-positive
P/O . . . . . part of
POLY . . . . . polystyrene
PORC . . . . . porcelain
POS . . positive; position(s) (used in parts list)
POSN . . . . . position
POT . . . . . potentiometer
p-p . . . . . peak-to-peak
PP . . . peak-to-peak (used in parts list)
PPM . . . . pulse-position modulation
PREAMPL . . . preamplifier
PRF . . . . pulse-repetition frequency
PRR . . . . pulse repetition rate
ps . . . . . picosecond
PT . . . . . point
PTM . . . . . pulse-time modulation
PWM . . . . . pulse-width modulation
PWV . . . . . peak working voltage
RC . . . . . resistance-capacitance
RECT . . . . . rectifier
REF . . . . . reference
REG . . . . . regulated
REPL . . . . . replaceable
RF . . . . . radio frequency
RFI . . . . radio frequency interference
RH . . . . round head; right hand
RLC . . . . . resistance-inductance-capacitance
RMO . . . rack mount only
rms . . . . root-mean-square
RND . . . . . round
ROM . . read-only memory
R&P . . . . . rack and panel
RWV . . . reverse working voltage
S . . . scattering parameter
s . . . . . second (time)
. . . " . second (plane angle)
S-B . . . . . slow-blow (fuse) (used in parts list)
SCR . . . silicon controlled rectifier; screw
SE . . . . . selenium
SECT . . . . . sections
SEMICON . . . . . semiconductor
SHF . . . . . superhigh frequency
SI . . . . . silicon
SIL . . . . . silver
SL . . . . . slide
SNR . . signal-to-noise ratio
SPDT . . . . . single-pole, double-throw
SPG . . . . . spring
SR . . . . . split ring
SPST . . . . . single-pole, single-throw
SSB . . . . . single sideband
SST . . . . . stainless steel
STL . . . . . steel
SQ . . . . . square
SWR . . standing-wave ratio
SYNC . . . . . synchronize
T . . tined (slow-blow fuse)
TA . . . . . tantalum
TC . . . . . temperature compensating
TD . . . . . time delay
TERM . . . . . terminal
TFT . . thin-film transistor
TGL . . . . . toggle
THD . . . . . thread
THRU . . . . . through
TI . . . . . titanium
TOL . . . . . tolerance
TRIM . . . . . trimmer
TSTR . . . . . transistor
TTL . . transistor-transistor logic
TV . . . . . television
TVI television interference
TWT . . traveling wave tube
U . . . . . micro (10^{-6}) (used in parts list)
UF . . . microfarad (used in parts list)
UHF . . ultrahigh frequency
UNREG . . . . unregulated
V . . . . . volt
VA . . . . . voltampere
Vac . . . . . volts, ac
VAR . . . . . variable
VCO . . . voltage-controlled oscillator
Vdc . . . . . volts, dc
VDCW . . volts, dc, working (used in parts list)
V(F) . . . . . volts, filtered
VFO . . variable-frequency oscillator
VHF . . . . . very-high frequency
Vpk . . . . . volts, peak
Vp-p . . volts, peak-to-peak
Vrms . . . . . volts, rms
VSWR . . . voltage standing wave ratio
VTO . . . . . voltage-tuned oscillator
VTVM . . . . vacuum-tube voltmeter
V(X) . . . . . volts, switched
W . . . . . watt
W/ . . . . . with
WIV . . . . working inverse voltage
WW . . . . . wirewound
W/O . . . . . without
YIG . . yttrium-iron-garnet
Z_o . . . . . characteristic impedance

NOTE

All abbreviations in the parts list will be in upper-case.

MULTIPLIERS

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

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08691-6102	1	ASSY:MODULATOR	28480	08691-6102
A1C1	0180-0161	1	C:FXD ELECT 3.3 UF 20% 35VDCW	56289	150D335X0035B2-DYS
A1C2	0180-0116	1	C:FXD ELECT 6.8 UF 10% 35VDCW	56289	150D685X9035B2-DYS
A1C3	0160-0383	1	C:FXD MICA 10 PF 10% 2500VDCW	28480	0160-0383
A1C4	0180-0089	1	C:FXD AL ELECT 10 UF +50-10% 150VDCW	56289	30D106F150DD2-DSM
A1C5	0160-2216	1	C:FXD MICA 820 PF 5%	28480	0160-2216
A1C6	0140-0199	9	C:FXD MICA 240 PF 5%	28480	0140-0199
A1CR1	1901-0033	4	DIODE:SILICON 100MA 180WV	07263	FD3369
A1CR2	1901-0033		DIODE:SILICON 100MA 180WV	07263	FD3369
A1CR3	1901-0096	9	DIODE:SILICON 120V	01295	UG-888
A1CR4	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR5	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR6	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR7	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR8	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR9	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR10	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR11	1901-0096		DIODE:SILICON 120V	01295	UG-888
A1CR12	1901-0033		DIODE:SILICON 100MA 180WV	07263	FD3369
A1CR13	1901-0033		DIODE:SILICON 100MA 180WV	07263	FD3369
A1Q1	1854-0079	3	TSTR:SI NPN	80131	2N3439
A1Q2	1853-0020	1	TSTR:SI PNP(SELECTED FROM 2N3702)	28480	1853-0020
A1Q3	1853-0037	1	TSTR:SI PNP	04713	SS 2109
A1Q4	1854-0079		TSTR:SI NPN	80131	2N3439
A1Q5	1854-0003	2	TSTR:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003
A1Q6	1854-0079		TSTR:SI NPN	80131	2N3439
A1Q7	1854-0003		TSTR:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003
A1Q8	1853-0010	1	TSTR:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010
A1R1	2100-1773	1	R:VAR WW 1K OHM 5% TYPE H 1W	28480	2100-1773
A1R2	0698-3428	1	R:FXD MET FLM 14.7 OHM 1% 1/8W	28480	0698-3428
A1R3	0757-0430	1	R:FXD MET FLM 2.21K OHM 1% 1/8W	28480	0757-0430
A1R4	0757-0280	10	R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R5	0757-0442	2	R:FXD MET FLM 10.0K OHM 1% 1/8W	28480	0757-0442
A1R6	0698-3157	1	R:FXD MET FLM 19.6K OHM 1% 1/8W	28480	0698-3157
A1R7	0757-0454	1	R:FXD MET FLM 33.2K OHM 1% 1/8W	28480	0757-0454
A1R8	0757-0428	1	R:FXD MET FLM 1.62K OHM 1% 1/8W	28480	0757-0428
A1R9	0757-0199	1	R:FXD MET FLM 21.5K OHM 1% 1/8W	28480	0757-0199
A1R10	0757-0416	3	R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A1R11	0698-3175	2	R:FXD MET FLM 147K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3175
A1R12	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A1R13	0757-0442		R:FXD MET FLM 10.0K OHM 1% 1/8W FACTORY SELECTED PART	28480	0757-0442
A1R14	2100-0969	9	R:VAR MET FLM 50K OHM 20%	75042	CT150
A1R15	0698-3151	1	R:FXD MET FLM 2.87K OHM 1% 1/8W	28480	0698-3151
A1R16	0757-0063	3	R:FXD MET FLM 196K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0063
A1R17	0698-3417	4	R:FXD MET FLM 23.7K OHM 1% 1/2W (8695A, WJ BWO)	28480	0698-3417
A1R17	0761-0021	3	R:FXD MET OX 1000 OHM 5% 1W (8695A, VARIAN BWO)	28480	0761-0021
A1R17	0698-3417		R:FXD MET FLM 23.7K OHM 1% 1/2W (8695A, OPTION 100, WJ BWO)	28480	0698-3417
A1R17	0698-3417		R:FXD MET FLM 23.7K OHM 1% 1/2W (8696A, WJ BWO)	28480	0698-3417
A1R17	0761-0021		R:FXD MET OX 1000 OHM 5% 1W (8696A, VARIAN, BWO)	28480	0761-0021
A1R17	0698-3417		R:FXD MET FLM 23.7K OHM 1% 1/2W (8697A, WJ BWO)	28480	0698-3417
A1R17	0761-0021		R:FXD MET OX 1000 OHM 5% 1W (8697A, VARIAN BWO)	28480	0761-0021
A1R18	0760-0023	5	R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023
A1R19	0760-0023		R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023
A1R20	0760-0023		R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023
A1R21	0760-0023		R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023
A1R22	0760-0023		R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023
A1R23	0764-0007	1	R:FXD MET FLM 27K OHM 5% 2W	28480	0764-0007
A1R24	2100-1775	1	R:VAR WW 5K OHM 5% TYPE H 1W	28480	2100-1775
A1R25	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R26	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R27	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R28	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R29	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R30	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R31	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R32	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R33	0757-0280		R:FXD MET FLM 1K OHM 1% 1/8W	28480	0757-0280
A1R34	0761-0032	1	R:FXD MET OX 56K OHM 5% 1W	28480	0761-0032
A1R35	0757-0416		R:FXD MET FLM 511 OHM 1% 1/8W	28480	0757-0416
A1R36	0757-0465	2	R:FXD MET FLM 100K OHM 1% 1/8W (8695A)	28480	0757-0465
A1R36	0757-0464	1	R:FXD MET FLM 90.9K OHM 1% 1/8W (8696A)	28480	0757-0464
A1R36	0757-0463	2	R:FXD MET FLM 82.5K OHM 1% 1/8W (8697A)	28480	0757-0463
A1R37	0757-0123	2	R:FXD MET FLM 34.8K OHM 1% 1/8W (12.4-18.0 GHZ, 8695A)	28480	0757-0123
A1R37	0757-0123		R:FXD MET FLM 34.8K OHM 1% 1/8W (18.0-26.5 GHZ, 8696A)	28480	0757-0123
A1R37	0698-3161	1	R:FXD MET FLM 38.3K OHM 1% 1/8W (26.5-40.0 GHZ, 8697A)	28480	0698-3161
A1R38	0757-0465		R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465
A1R39	0757-0137	3	R:FXD MET FLM 750K OHM 1% 1/2W	28480	0757-0137
A1R40	2100-0945	4	R:VAR MET FLM 500K 20% LIN 3/4W	75042	CT150
A1R41	0757-0463		R:FXD MET FLM 82.5K OHM 1% 1/8W	28480	0757-0463
A1R42	2100-0945		R:VAR MET FLM 500K 20% LIN 3/4W	75042	CT150
A1R43	0757-0458	1	R:FXD MET FLM 51.1K OHM 1% 1/8W	28480	0757-0458
A1R44	0757-0374	1	R:FXD MET FLM 485K OHM 1% 1/2W	28480	0757-0374
A1R45	0757-0063		R:FXD MET FLM 196K OHM 1% 1/2W	28480	0757-0063
A1V1	1940-0013	1	ELECTRON TUBE:Z82R7, DIODE, VOLTAGE REG.	74276	Z82R7
A2	08695-6105	1	ASSY:FREQ SHAPE (FOR USE WITH 1951-0080, WJ 8WO)	28480	08695-6105
A2 R1	0757-0858	1	R:FXD MET FLM 90.9K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0858
A2 R2	0757-0863	1	R:FXD MET FLM 243K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0863
A2 R3	0757-0313	1	R:FXD MET FLM 392K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0313
A2 R4	0757-0868	6	R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R5	0757-0133	4	R:FXD MET FLM 383K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0133
A2 R6	0757-0133		R:FXD MET FLM 383K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0133
A2 R7	0698-3425	5	R:FXD MET FLM 316K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3425
A2 R8	0757-0064	4	R:FXD MET FLM 261K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0064
A2 R9	0757-0064		R:FXD MET FLM 261K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0064
A2 R10	0757-0130	3	R:FXD MET FLM 162K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0130
A2 R11	0757-0310	3	R:FXD MET FLM 133K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0310
A2 R12	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2 R13	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2	08695-60109	1	ASSY:FREQUENCY SHAPE (USED WITH 1951-0059, VARIAN 8WO)	28480	08695-60109
A2 R1	0757-0127	2	R:FXD MET FLM 215K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0127
A2 R2	0757-0059	3	R:FXD MET FLM 1 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0059
A2 R3	0727-0278	1	R:FXD MET FLM 1.13 MEGOHM 1% 1/8W FACTORY SELECTED PART	28480	0727-0278

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2 R4	0757-0872	2	R:FXD MET FLM 1.30 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0872
A2 R5	0757-0870	3	R:FXD MET FLM 825K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0870
A2 R6	0757-0872		R:FXD MET FLM 1.30 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0872
A2 R7	0757-0870		R:FXD MET FLM 825K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0870
A2 R8	0757-0868		R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R9	0757-0869	2	R:FXD MET FLM 681K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0869
A2 R10	0757-0134	7	R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R11	0757-0136	2	R:FXD MET FLM 619K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0136
A2 R12	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2 R13	2100-0945		R:VAR MET FLM 500K 20% LIN 3/4W FACTORY SELECTED PART	75042	CT150
A2	08695-60107	1	ASSY:FREQUENCY SHAPE (USED WITH 1951-0088, WJ 8WD, OPT 100)	28480	08695-60107
A2 R1	0757-0367	1	R:FXD MET FLM 100K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0367
A2 R2	0757-0310		R:FXD MET FLM 133K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0310
A2 R3	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R4	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R5	0757-0133		R:FXD MET FLM 383K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0133
A2 R6	0698-3425		R:FXD MET FLM 316K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3425
A2 R7	0757-0154	2	R:FXD MET FLM 287K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0154
A2 R8	0698-3424	2	R:FXD MET FLM 237K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3424
A2 R9	0757-0129	3	R:FXD MET FLM 178K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0129
A2 R10	0757-0130		R:FXD MET FLM 162K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0130
A2 R11	0757-0310		R:FXD MET FLM 133K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0310
A2 R12	2100-1777	4	R:VAR WW 20K OHM 5% TYPE H 1W FACTORY SELECTED PART	28480	2100-1777
A2 R13	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2	08696-60103	1	ASSY:FREQUENCY SHAPE (USED WITH 1951-0081, WJ 8WD)	28480	08696-60103
A2 R1	0757-0859	3	R:FXD MET FLM 110K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0859
A2 R2	0757-0129		R:FXD MET FLM 178K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0129
A2 R3	0698-3426	5	R:FXD MET FLM 464K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3426
A2 R4	0757-0868		R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R5	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R6	0757-0135	3	R:FXD MET FLM 511K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0135
A2 R7	0698-3425		R:FXD MET FLM 316K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3425
A2 R8	0757-0064		R:FXD MET FLM 261K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0064
A2 R9	0698-3424		R:FXD MET FLM 237K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3424

See introduction to this section for ordering information

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2 R10	0757-0059		R:FXD MET FLM 1 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0059
A2 R11	0757-0859		R:FXD MET FLM 110K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0859
A2 R12	2100-1777		R:VAR WW 20K OHM 5% TYPE H 1W FACTORY SELECTED PART	28480	2100-1777
A2 R13	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2	08696-60104	1	ASSY:FREQUENCY SHAPE (USED WITH 1951-0060, VARIAN BWO)	28480	08696-60104
A2 R1	0757-0063		R:FXD MET FLM 196K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0063
A2 R2	0757-0137		R:FXD MET FLM 750K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0137
A2 R3	0757-0059		R:FXD MET FLM 1 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0059
A2 R4	0757-0194	1	R:FXD MET FLM 1.33 MEGOHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0194
A2 R5	0757-0139	1	R:FXD MET FLM 1.1 MEGOHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0139
A2 R6	0757-0137		R:FXD MET FLM 750K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0137
A2 R7	0757-0870		R:FXD MET FLM 825K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0870
A2 R8	0757-0869		R:FXD MET FLM 681K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0869
A2 R9	0698-3426		R:FXD MET FLM 464K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3426
A2 R10	0757-0868		R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R11	0698-3426		R:FXD MET FLM 464K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3426
A2 R12	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A2 R13	2100-0945		R:VAR MET FLM 500K 20% LIN 3/4W FACTORY SELECTED PART	75042	CT150
A2	08697-6102	1	ASSY:FREQ SHAPE (FOR USE WITH 1951-0082, WJ BWO)	28480	08697-6102
A2 R1	0757-0859		R:FXD MET FLM 110K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0859
A2 R2	0757-0064		R:FXD MET FLM 261K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0064
A2 R3	0757-0135		R:FXD MET FLM 511K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0135
A2 R4	0698-3426		R:FXD MET FLM 464K OHM 1% 1/2W FACTORY SELECTED PART	28480	C 3426
A2 R5	0757-0868		R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R6	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R7	0757-0133		R:FXD MET FLM 383K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0133
A2 R8	0698-3425		R:FXD MET FLM 316K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3425
A2 R9	0757-0195	1	R:FXD MET FLM 348K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0195
A2 R10	0757-0129		R:FXD MET FLM 178K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0129
A2 R11	0698-3425		R:FXD MET FLM 316K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3425
A2 R12	2100-1777		R:VAR WW 20K OHM 5% TYPE H 1W FACTORY SELECTED PART	28480	2100-1777
A2 R13	2100-0969		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150

See introduction to this section for ordering information

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2	08697-60103	1	ASSY:FREQUENCY SHAPE (USED WITH 1951-0061, VARIAN BWO)	28480	08697-60103
A2 R1	0757-0130		R:FXD MET FLM 162K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0130
A2 R2	0757-0154		R:FXD MET FLM 287K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0154
A2 R3	0757-0136		R:FXD MET FLM 619K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0136
A2 R4	0757-0138	1	R:FXD MET FLM 909K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0138
A2 R5	0757-0868		R:FXD MET FLM 562K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0868
A2 R6	0757-0135		R:FXD MET FLM 511K OHM 1% 1/2W FACTORY SELECTED PART	28480	0757-0135
A2 R7	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R8	0698-3426		R:FXD MET FLM 464K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3426
A2 R9	0757-0127		R:FXD MET FLM 215K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0127
A2 R10	0757-0134		R:FXD MET FLM 422K OHM 2% 1/2W FACTORY SELECTED PART	28480	0757-0134
A2 R11	0698-3175		R:FXD MET FLM 147K OHM 1% 1/2W FACTORY SELECTED PART	28480	0698-3175
A2 R12	2100-1777		R:VAR WW 20K OHM 5% TYPE H 1W FACTORY SELECTED PART	28480	2100-1777
A2 R13	2100-0569		R:VAR MET FLM 50K OHM 20% FACTORY SELECTED PART	75042	CT150
A3	08691-6118	1	BOARD ASSY:BWO TERN	28480	08691-6118
			CHASSIS PARTS		
CR1	1901-0026	1	DIODE:SILICON 0.75A 200PIV	04713	SR1358-8
DS1	2140-0092	1	LAMP:INCANDESCENT 5.0V 0.060A	71744	CM 685
DS1MP1	1450-0371	1	LENS:LAMPHOLDER, AMBER	08717	102-A(LENS)
DS1MP2	1450-0153	1	LAMPHOLDER:FOR T-1 SERIES	08717	102SR
J1	1250-0083	1	CONNECTOR:BNC	02660	31-221-1020
P1 THRU P10			NOT ASSIGNED		
P11	1251-1322	1	CONNECTOR:15 CONTACTS MALE	81312	SA-15P
P12	1251-0136	1	CONNECTOR:32 PIN MALE	02660	26-4100-32P
R1	2100-2675	2	R:VAR GANGED 2 X 1K OHM 20% LIN	28480	2100-2675
R2	2100-2675		R:VAR GANGED 2 X 1K OHM 20% LIN	28480	2100-2675
R3	2100-0051	1	R:VAR COMP 20K OHM 10% CWLOG 2W	28480	2100-0051
V1	1951-0080	1	ELECTRON TUBE:BWO P-BAND (8695A) W.J.	14482	A-1951-0080-1
V1	1951-0059	1	TUBE:BWO 12.4-18.0 GC (8695A) VAR.	99313	VA162Y
V1	1951-0081	1	ELECTRON TUBE:BWO K-BAND (8696A) W.J.	14482	A-1951-0081-1
V1	1951-0060	1	TUBE:BWO 18.0-26.5 GC (8696A) VAR.	99313	VA163Y
V1	1951-0082	1	ELECTRON TUBE:BWO R-BAND (8697A) W.J.	14482	A-1951-0082-1
V1	1951-0061	1	TUBE:BWO 26.5-40.0 GC (8697A) VAR.	99313	VA164Y
V1	1951-0088	1	ELECTRON TUBE:BWO 10-15.5 GHZ (8695A, OPT 100) W.J.	28480	1951-0088
WG1	08695-2112	1	WAVEGUIDE ASSY(8695A)	28480	08695-2112
WG1	08696-2112	1	WAVEGUIDE ASSY(8696A)	28480	08696-2112
WG1	08697-2112	1	WAVEGUIDE ASSY(8697A)	28480	08697-2112
WG1	08695-2114	1	WAVEGUIDE ASSY(8695A, OPTION 004)	28480	08695-2114
WG1	08696-2114	1	WAVEGUIDE ASSY(8696A, OPTION 004)	28480	08696-2114
WG1	08697-2114	1	WAVEGUIDE ASSY(8697A, OPTION 004)	28480	08697-2114
WG1	08695-20118	1	WAVEGUIDE ASSY (8695A, OPT. 100)	28480	08695-20118
XA1	1251-0159	1	CONNECTOR:PC EDGE 2 X 15 CONTACT	71785	251-15-30-261

Table 3-2. Replaceable Parts

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			MISCELLANEOUS		
	0370-0133	1	KNOB:SKIRTED FOR 0.250" DIA SHAFT	28480	0370-0133
	3150-0054	1	FILTER:AIR	28480	3150-0054
	08691-2003	1	HANDLE ASSY	28480	08691-2003
	08695-2110	1	SCALE:12.4-18.0 GHZ(8695A)	28480	08695-2110
	08696-2110	1	SCALE:18.0-26.5 GHZ(8696A)	28480	08696-2110
	08697-2110	1	SCALE:26.5-40 GHZ(8697A)	28480	08697-2110
	08695-20116	1	SCALE: (8695A, OPT. 100)	28480	08695-20116
	08695-6106		RF UNIT ASSY	28480	08695-6106
	08695-00005	1	PANEL:FRONT(MINT GRAY,STD)	28480	08695-00005
	08695-00006	1	PANEL:FRONT(MINT GRAY,STD, OPT 004)	28480	08695-00006
	08695-00007	1	PANEL:FRONT(MINT GRAY,STD, OPT 100)	28480	08695-00007
	08695-20010	1	HOUSING(MINT GRAY, STD, OPT 004)	28480	08695-20010
	08695-20012	1	HOUSING(MINT GRAY, STD, OPT 100)	28480	08695-20012
	08691-40005	1	HANDLE:LATCH(MINT GRAY, STD)	28480	08691-40005
	08691-4003	1	HANDLE:LATCH(LIGHT GRAY, OPT X95)	28480	08691-4003
	08691-20117	1	PANEL:REAR(MINT GRAY, STD, OPT 100)	28480	08691-20117
	08691-2112		PANEL:REAR(LIGHT GRAY, OPT 100)	28480	08691-2112
	08695-20011	1	PANEL:REAR(MINT GRAY, STD, OPT 004)	28480	08695-20011
	08696-00104	1	PANEL:FRONT(MINT GRAY, STD)	28480	08696-00104
	08696-0100	1	PANEL:FRONT(LIGHT GRAY, OPT X95)	28480	08696-0100
	08696-00105	1	PANEL:FRONT(MINT GRAY, STD, OPT 004)	28480	08696-00105
	08696-0103	1	PANEL:FRONT(LIGHT GRAY, OPT 004)	28480	08696-0103
	08697-00104	1	PANEL:FRONT(MINT GRAY, STD)	28480	08697-00104
	08697-0100	1	PANEL:FRONT(LIGHT GRAY, OPT X95)	28480	08697-0100
	08697-00105	1	PANEL:FRONT(MINT GRAY, STD, OPT 004)	28480	08697-00105
	08697-0103	1	PANEL:FRONT(LIGHT GRAY, OPT 004)	28480	08697-0103
	7120-4162	1	LABEL INFO	28480	7120-4162

Table 3-3. Code List of Manufacturers

MFR NO.	MANUFACTURER'S NAME	ADDRESS	ZIP CODE
	NO MFR DESCRIPTION FOR THIS MFG NUMBER		
01295	TEXAS INSTRUMENTS INC. SEMICONDUCTOR COMPONENTS DIV.	DALLAS, TEX.	75231
02660	AMPHENOL CORP.	BROADVIEW, ILL.	60153
04713	MOTOROLA SEMICONDUCTOR PROD.INC.	PHOENIX, ARIZ.	85008
07263	FAIRCHILD CAMERA & INST. CORP. SEMICONDUCTOR DIV.	MOUNTAIN VIEW, CALIF.	94040
08717	SLOAN CO. THE	SUN VALLEY, CALIF.	91352
14482	WATKINS-JOHNSON CO.	PALO ALTO, CALIF.	94304
28480	HEWLETT-PACKARD CO. CORPORATE HQ	YOUR NEAREST HP OFFICE	
56289	SPRAGUE ELECTRIC CO.	N. ADAMS, MASS.	01247
71744	CHICAGO MINIATURE LAMP WORKS	CHICAGO, ILL.	60640
71785	CINCH MFG. CO. DIV TRW INC.	ELK GROVE VILLAGE, ILL.	
74276	SIGNALITE INC.	NEPTUNE, N.J.	07753
75042	INTERNATIONAL RESISTANCE CO. INC.	PHILADELPHIA, PA.	19108
80131	ELECTRONIC INDUSTRIES ASSOCIATION	WASHINGTON D.C.	20006
81312	WINCHESTER ELECTRONICS DIV. LITTON IND. INC.	OAKVILLE, CONN.	06779
99313	VARIAN EIMAC DIV.	PALO ALTO, CALIF.	94303

SCHEMATIC DIAGRAMS

SECTION IV
SCHEMATIC DIAGRAMS

4-1. INTRODUCTION

4-2. This section of the manual contains an overall circuit diagram of the 8695A/8696A/8697A RF Unit, and Schematic Diagram Notes. The overall schematic diagram shows all of the interconnections between modules within the RF Unit as well as input and output connections with the associated 8690 mainframe. The Schematic Diagram Notes describe and explain all of the various signs and symbols found in a typical RF sweep oscillator unit.

4-3. Figure 4-2, the RF Unit, shows electrical circuit operation and is not intended to serve as a wiring diagram. To find a specific instrument component, refer to the "REFERENCE DESIGNATIONS" block which appears on the overall schematic diagram. Reference designations within assemblies are abbreviated. The full designation includes the assembly on which the component is mounted, and the individual component designation. For example, resistor R1 mounted on assembly A1 has the complete reference designation of A1R1. Certain parts are not included on assemblies, and are classified as Chassis Parts. Chassis parts are assigned only the reference designation shown on the schematic diagram.

4-4. An asterisk indicates a factory selected part; the component value shown is the typical or most commonly selected value.

4-5. Component procurement information and specific component descriptions are given in Section III of this manual. Refer to page 3-1 for information on how to order parts.

SCHEMATIC DIAGRAM NOTES

For symbols not showsn, refer to USA Standard Y32.2—1967 "Graphic Symbols for Electrical and Electronic Diagrams."

Logic Symbols used conform to MIL-STD-806B (Military Standard 806B) "Graphic Symbols for Logic Diagrams."

Resistance is in ohms, capacitance is in picofarads, and inductance is in micro-henries unless otherwise noted.

P/O = part of.

* Asterisk denotes a factory-selected value. Value shown is typical. Capacitors may be omitted or resistors jumpered.

Screwdriver adjustment

Panel control

Encloses front panel designations

Encloses rear panel designation

Circuit assembly borderline

Other assembly borderline

Heavy line with arrows indicates path and direction of main signal.

Heavy dashed line with arrows indicates path and direction of main feedback.

CW

Wiper moves toward CW with clockwise rotation of control as viewed from shaft or knob.

1

Numbers in stars on circuit assemblies show locations of test points.

Encloses wire color code. Code used (MIL-STD-681) is the same as the resistor color code. First number identifies the base color, second number the wider stripe, and the third number identifies the narrower strip, e.g., (947) denotes white base, yellow wide stripe, violet narrow stripe.

Operational Amplifier (integrated circuit)

Voltage regulator (breakdown diode).

Denotes Field Effect transistor (FET) with N-type base.

Denotes FET with P-type base.

Denotes Silicon Controlled Rectifier (SCR).

Figure 4-1. Schematic Diagram Notes (1 of 2)

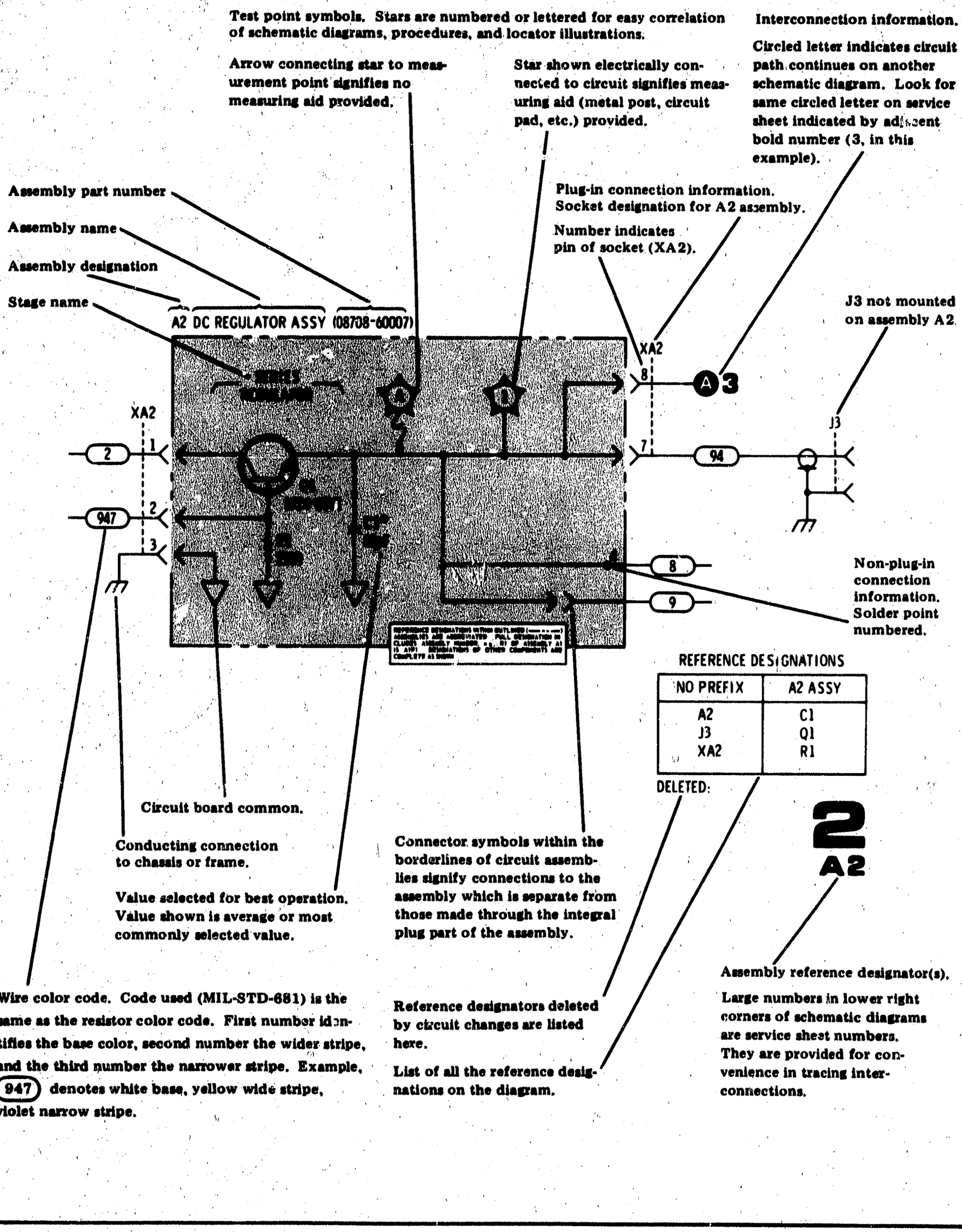
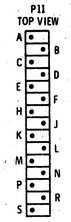


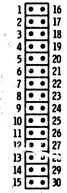
Figure 4-1. Schematic Diagram Notes (2 of 2)

P11 TOP VIEW



P12 TOP VIEW

XA1 CONNECTOR TOP VIEW



A1XA2 PC CONNECTOR TOP VIEW

NOTES

1. RESISTORS A1R36 AND A1R37 SELECTED FOR 40V P-P PER OCTAVE AT J1.
2. VALUE OF A1R17 DEPENDENT ON BWO MANUFACTURE.
3. LETTERED CONNECTIONS ARE ON P11. P11 CONNECTS TO 8690B J11. NUMBERED CONNECTIONS ARE ON P12. P12 CONNECTS TO 8690B J12.
4. FACTORY SELECTED PART.

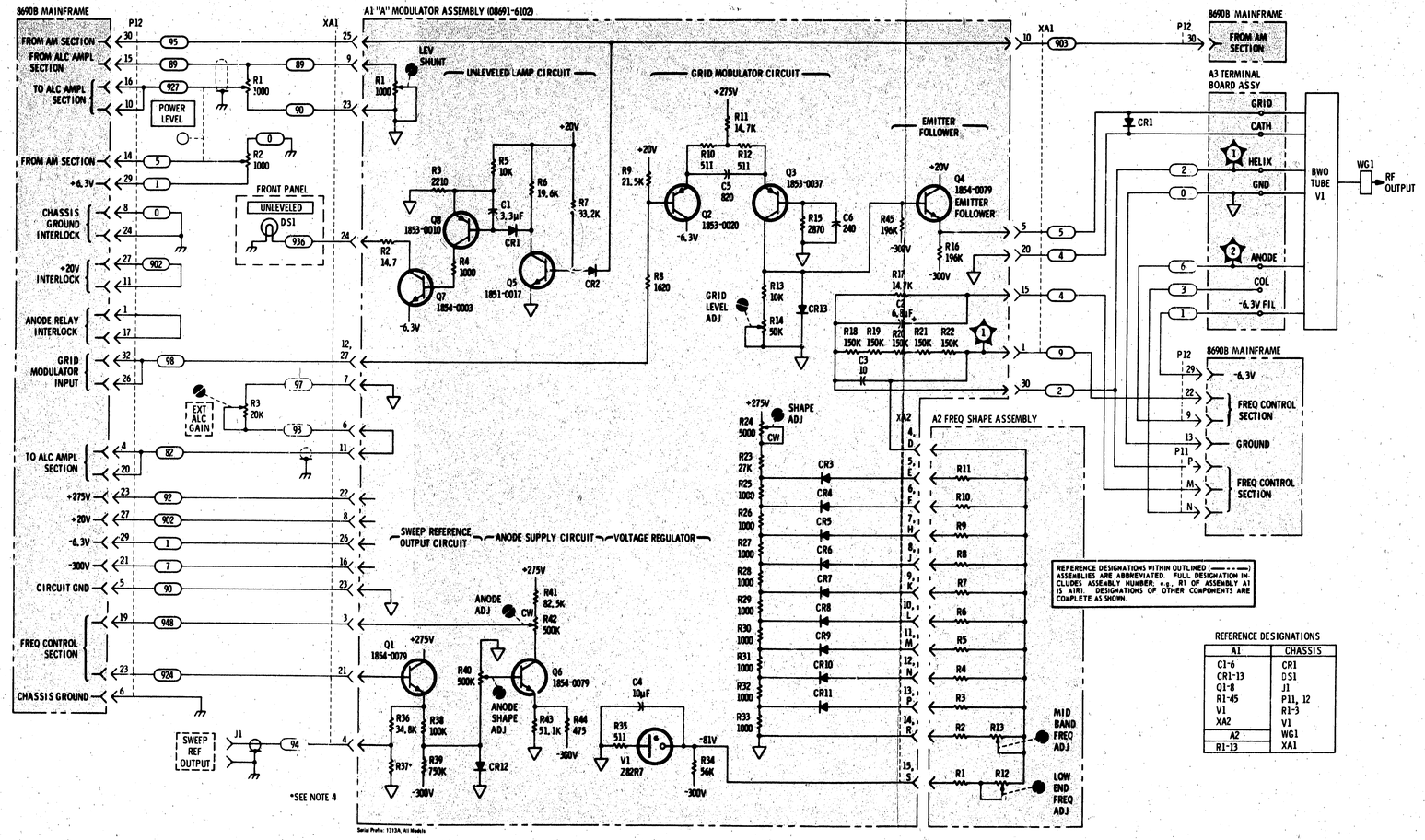


Figure 4-2. 8695A/8696A/8697A RF Unit Schematic Diagram

APPENDIX

APPENDIX A
MANUAL CHANGES

A-1. INTRODUCTION

A-2. This section contains information for adapting this manual to instruments for which the content does not apply directly.

A-3. To adapt this manual to your instrument, refer to Table 7-1 and make all of the manual changes listed opposite your instrument serial number. Perform these changes in the sequence listed.

A-4. If your instrument serial number is not listed on the title page of this manual, or in Table 7-1 below, it may be documented in a yellow MANUAL CHANGES supplement. For additional important information about serial number coverage refer to INSTRUMENT IDENTIFICATION in Section I.

Table A-1. Manua! Changes by Serial Number

Serial Prefix or Number	Make Manual Changes	Serial Prefix or Number	Make Manual Changes
1243A	A thru P	916	I thru P
1210A	B thru P	835	J thru P
1144A	B thru P	838	J thru P
1140A	D thru P	822	K thru P
984	F thru P	728	L thru P
916-01046 thru 916-01095	G thru P	724	M thru P
		715	N and P
916-00691 thru 916-01045	H thru P	636	O
		620	P

A-5. MANUAL CHANGE INSTRUCTIONS

CHANGE A

Page 3-4, Table 3-2:
Change A1R17 (HP Part No. 0698-3417) to HP Part No. 0698-3415.
(Preferred HP Part No. is 0698-3417.)

CHANGE B

Page 3-5, 3-6, 3-7, and 3-8, Table 3-2:
Delete the following (five) A2 Frequency Shaping Assy Replaceable Parts Lists:

Reference Designator	HP Part No.	Description
A2	08695-60109	Assy: Freq Shape (used with 1951-0059 Varian BWO)
A2R1*	0757-0127	R:FXD, MET FLM 215K 1% 1/2W
A2R2*	0757-0059	R:FXD, MET FLM 1M 1% 1/2W
A2R3*	0757-0278	R:FXD, MET FLM 1.13M 1% 1/2W
A2R4*	0757-0872	R:FXD, MET FLM 1.3M 1% 1/2W
A2R5*	0757-0870	R:FXD, MET FLM 825K 1% 1/2W
A2R6*	0757-0872	R:FXD, MET FLM 1.3M 1% 1/2W
A2R7*	0757-0870	R:FXD, MET FLM 825K 1% 1/2W

CHANGE B (Cont'd)

Reference Designator	HP Part No.	Description
A2R8*	0757-0868	R:FXD, MET FLM 562K 1% 1/2W
A2R9*	0757-0869	R:FXD, MET FLM 681K 1% 1/2W
A2R10*	0757-0134	R:FXD, MET FLM 422K 1% 1/2W
A2R11*	0757-0136	R:FXD, MET FLM 619K 1% 1/2W
A2R12*	2100-0969	R:VAR MET FLM 50K 20% 3/4W
A2R13*	2100-0945	R:VAR MET FLM 500K 5% 3/4W
A2	08695-60107	ASSY:FREQ SHAPE (used with 1951-0088 WJ BWO, OPT 100)
A2R1*	0757-0367	R:FXD, MET FLM, 100K 1% 1/2W
A2R2*	0757-0310	R:FXD, MET FLM, 133K 1% 1/2W
A2R3*	0757-0134	R:FXD, MET FLM, 422K 1% 1/2W
A2R4*	0757-0134	R:FXD, MET FLM, 422K 1% 1/2W
A2R5*	0757-0133	R:FXD, MET FLM, 383K 1% 1/2W
A2R6*	0698-3425	R:FXD, MET FLM, 316K 1% 1/2W
A2R7*	0757-0154	R:FXD, MET FLM, 287K 1% 1/2W
A2R8*	0698-3424	R:FXD, MET FLM, 237K 1% 1/2W
A2R9*	0757-0129	R:FXD, MET FLM, 178K 1% 1/2W
A2R10*	0757-0130	R:FXD, MET FLM, 162K 1% 1/2W
A2R11*	0757-0310	R:FXD, MET FLM, 133K 1% 1/2W
A2R12*	2100-1777	R:VAR WW 20K 5% 1W
A2R13*	2100-0969	R:VAR MET FLM 50K 20% 3/4W
A2	08696-60103	ASSY:FREQ SHAPE (Used with 1951-0081 WJ BWO)
A2R1*	0757-0859	R:FXD, MET FLM, 110K 1% 1/2W
A2R2*	0757-0129	R:FXD, MET FLM, 178K 1% 1/2W
A2R3*	0698-3426	R:FXD, MET FLM, 464K 1% 1/2W
A2R4*	0757-0868	R:FXD, MET FLM, 562K 1% 1/2W
A2R5*	0757-0134	R:FXD, MET FLM, 422K 1% 1/2W
A2R6*	0757-0135	R:FXD, MET FLM, 511K 1% 1/2W
A2R7*	0698-3425	R:FXD, MET FLM, 316K 1% 1/2W
A2R8*	0757-0064	R:FXD, MET FLM, 261K 1% 1/2W
A2R9*	0698-3424	R:FXD, MET FLM, 237K 1% 1/2W
A2R10*	0757-0059	R:FXD, MET FLM, 1M 1% 1/2W
A2R11*	0757-0859	R:FXD, MET FLM, 110K 1% 1/2W
A2R12*	2100-1777	R:VAR, WW 20K 5% 1W
A2R13*	2100-0969	R:VAR, MET FLM, 50K 20% 3/4W
A2	08696-60104	ASSY:FREQ SHAPE (Used with 1951-0060 Varian BWO)
A2R1*	0757-0063	R:FXD, MET FLM, 196K 1% 1/2W
A2R2*	0757-0137	R:FXD, MET FLM, 750K 1% 1/2W
A2R3*	0757-0059	R:FXD, MET FLM, 1M 1% 1/2W
A2R4*	0757-0194	R:FXD, MET FLM, 1.33M 1% 1/2W
A2R5*	0757-0139	R:FXD, MET FLM, 1.1M 1% 1/2W
A2R6*	0757-0137	R:FXD, MET FLM, 750K 1% 1/2W
A2R7*	0757-0870	R:FXD, MET FLM, 825K 1% 1/2W
A2R8*	0757-0869	R:FXD, MET FLM, 681K 1% 1/2W

*Factory Selected Part

CHANGE B (Cont'd)

Reference Designator	HP Part No.	Description
A2R9*	0698-3426	R:FXD, MET FLM, 464K 1% 1/2W
A2R10*	0757-0858	R:FXD, MET FLM, 562K 1% 1/2W
A2R11*	0698-3426	R:FXD, MET FLM, 464K 1% 1/2W
A2R12*	2100-0969	R:VAR, MET FLM, 50K 20% 3/4W
A2R13*	2100-0945	R:VAR, MET FLM, 500K 5% 3/4W
A2	09697-60103	ASSY:FREQ SHAPE (Used with 1951-0061 Varian BWO)
A2R1*	0757-0130	R:FXD, MET FLM, 162K 1% 1/2W
A2R2*	0757-0154	R:FXD, MET FLM, 287K 1% 1/2W
A2R3*	0757-0136	R:FXD, MET FLM, 619K 1% 1/2W
A2R4*	0757-0138	R:FXD, MET FLM, 909K 1% 1/2W
A2R5*	0757-0868	R:FXD, MET FLM, 562K 1% 1/2W
A2R6*	0757-0135	R:FXD, MET FLM, 511K 1% 1/2W
A2R7*	0757-0134	R:FXD, MET FLM, 422K 1% 1/2W
A2R8*	0698-3426	R:FXD, MET FLM, 464K 1% 1/2W
A2R9*	0757-0127	R:FXD, MET FLM, 215K 1% 1/2W
A2A10*	0757-0134	R:FXD, MET FLM, 422K 1% 1/2W
A1R11*	0698-3175	R:FXD, MET FLM, 422K 1% 1/2W
A2R12*	2100-1777	R:VAR, WW, 20K 5% 1W
A2R13*	2100-0969	R:VAR, MET FLM, 50K 20% 3/4W

*Factory Selected Value

Page 3-5, Table 3-2:
Add the following (three) A2 Frequency Shaping Assembly Replaceable Parts Lists:

Reference Designator	HP Part No.	Description
A2	08695-6101	ASSY:FREQ SHAPE(8695A)
A2R1	0757-0128	R:FXD MET FLM 200K OHM 2% 1/2W
A2R2	0757-0138	R:FXD MET FLM 909K OHM 1% 1/2W
A2R3	0757-0139	R:FXD MET FLM 1.1 MEGOHM 1% 1/2W
A2R4	0757-0059	R:FXD MET FLM 1.0 MEGOHM 1% 1/2W
A2R5	0698-0056	R:FXD MET FLM 931K OHM 1% 1/2W
A2R6	0757-0870	R:FXD MET FLM 825K OHM 1% 1/2W
A2R7	0757-0059	R:FXD MET FLM 1.0 MEGOHM 1% 1/2W
A2R8	0757-0155	R:FXD MET FLM 604K OHM 1% 1/2W
A2R9	0757-0870	R:FXD MET FLM 825K OHM 1% 1/2W
A2R10	0757-0155	R:FXD MET FLM 604K OHM 1% 1/2W
A2R11	0757-0870	R:FXD MET FLM 825K OHM 1% 1/2W
A1R12	2100-0969	R:VAR COMP 50K OHM 20% LIN 1/2W
A2R13	2100-0945	R:VAR MET FLM 500K OHM 20% TYPE H
A2	08696-6101	ASSY:FREQ SHAPE(8696A)
A2R1	0757-0862	R:FXD MET FLM 211K OHM 1% 1/2W
A2R2	0757-0137	R:FXD MET FLM 750K OHM 1% 1/2W
A2R3	0757-0871	R:FXD MET FLM 1.21 MEGOHM 1% 1/2W
A2R4	0757-0139	R:FXD MET FLM 1.1 MEGOHM 1% 1/2W
A2R5	0757-0139	R:FXD MET FLM 1.1 MEGOHM 1% 1/2W

CHANGE B (Cont'd)

Reference Designator	HP Part No.	Description
A2R6	0757-0870	R:FXD MET FLM 825K OHM 1% 1/2W
A2R7	0757-0137	R:FXD MET FLM 750K OHM 1% 1/2W
A2R8	0757-1083	R:FXD MET FLM 665K OHM 1% 1/2W
A2R9	0757-0868	R:FXD MET FLM 562K OHM 1% 1/2W
A2R10	0757-0135	R:FXD MET FLM 511K OHM 1% 1/2W
A2R11	0757-0134	R:FXD MET FLM 422K OHM 1% 1/2W
A2R12	2100-1777	R:VAR COMP 20K OHM 10% LIN 1/2W
A1R13	2100-0944	R:VAR MET FLM 200K OHM 20% TYPE M
A2	08697-6101	ASSY:FREQ SHAPE(8697A)
A2R1	0698-3176	R:FXD MET FLM 154K OHM 1% 1/2W
A2R2	0698-3425	R:FXD MET FLM 316K OHM 1% 1/2W
A2R3	0698-3121	R:FXD MET FLM 698K OHM 1% 1/2W
A2R4	0757-0136	R:FXD MET FLM 619K OHM 1% 1/2W
A2R5	0757-0868	R:FXD MET FLM 562K OHM 1% 1/2W
A2R6	0757-0135	R:FXD MET FLM 511K OHM 1% 1/2W
A2R7	0757-0307	R:FXD MET FLM 332K OHM 1% 1/2W
A2R8	0698-3121	R:FXD MET FLM 698K OHM 1% 1/2W
A2R9	0757-0307	R:FXD MET FLM 332K OHM 1% 1/2W
A2R10	0757-0307	R:FXD MET FLM 332K OHM 1% 1/2W
A2R11	0757-0864	R:FXD MET FLM 301K OHM 1% 1/2W
A2R12	2100-1777	R:VAR COMP 20K OHM 10% LIN 1/2W
A1R13	2100-0969	R:VAR COMP 50K OHM 20% LIN 1/2W

CHANGE C

Page 3-4, Table 3-2:
Change transistors A1Q1, A1Q4, and A1Q6 to HP Part No. 1854-0232. (Preferred HP Part No. is 1854-0079.)

Page 4-5/4-6, Figure 4-2:
Change transistors A1Q1, A1Q4, and A1Q6 to HP Part No. 1854-0232.

CHANGE D

Page 3-9/3-10, Table 3-2, Miscellaneous:
Delete all listings which have a "Standard" identification in the Description column. (i.e., the "Option" serves as a Standard for the RF Unit involved.)

CHANGE E

Front Page
Change serial prefix from 1140A to 984.

CHANGE F

Front Page
Change serial prefix from 984 to 916.

CHANGE G

Page 3-8, Table 3-2, Chassis Parts:
Delete DS1MP1 HP Part No. 1450-0371, Lens: Lamp, Amber.
Add DS1MP1 HP Part No. 1450-0152, Lens: Lamp, Red.

CHANGE H

Page 3-5, and 3-7, Table 3-2:
Delete the following (two) A2 Frequency Shaping Assembly Replaceable Parts Lists:

Reference Designator	HP Part No.	Description
A2	08695-6105	ASSY:FREQ SHAPE (For use with 1951-0080 WJ BWO)
A2R1*	0757-0458	R:FXD, 90.9K
A2R2*	0757-0863	R:FXD, 143K
A2R3*	0757-0313	R:FXD, 392K
A2R4*	0757-0868	R:FXD, 562K
A2R5*	0757-0133	R:FXD, 383K
A2R6*	0757-0133	R:FXD, 383K
A2R7*	0698-3425	R:FXD, 316K
A2R8*	0757-0064	R:FXD, 261K
A2R9*	0757-0064	R:FXD, 261K
A2R10*	0757-0130	R:FXD, 162K
A2R11*	0757-0310	R:FXD, 133K
A2R12*	2100-0969	R:VAR, 50K
A2R13*	2100-0969	R:VAR, 50K
A2	08697-6102	ASSY:FREQ SHAPE (For use with 1951-0081 WJ BWO)
A2R1*	0757-0859	R:FXD, 110K
A2R2*	0757-0064	R:FXD, 261K
A2R3*	0757-0135	R:FXD, 511K
A2R4*	0698-3426	R:FXD, 464K
A2R5*	0757-0868	R:FXD, 562K
A2R6*	0757-0134	R:FXD, 422K
A2R7*	0757-0133	R:FXD, 383K
A2R8*	0698-3425	R:FXD, 316K
A2R9*	0757-0195	R:FXD, 348K
A2R10*	0757-0129	R:FXD, 178K
A2R11*	0698-3425	R:FXD, 316K
A2R12*	2100-1777	R:VAR, 20K
A2R13*	2100-0969	R:VAR, 50K

*Factory Selected Part: Typical Value Given.

CHANGE I

Page 3-4, Table 3-2:
Change A1C4 to HP Part No. 0150-0052, C:FXD, CERMIC, 0.05 μF, 20%, 400 VDCW. (Preferred HP Part No. is 0180-0089.)

Page 3-4, Table 3-2:
Change A1R17 (HP Part No. 0761-0021) to HP Part No. 0698-3414, R:FXD, MET FLM, 14.7K, 1%, 1/2W. (Preferred HP Part No. is 0761-0021.)

CHANGE I (Cont'd)

Page 3-5, Table 3-2:
Change A1R35 (HP Part No. 0757-0416) to HP Part No. 0757-0401, R:FXD, MET FLM, 100 Ohm, 1% 1/8W. (Preferred HP Part No. is 0757-0416.)

Page 3-8, Table 3-2: Chassis Parts:
Delete the following BWO's:

Reference Designator	HP Part No.	Description
V1	1951-0080	Electron Tube: BWO, WJ (8695A)
V1	1951-0081	Electron Tube: BWO, WJ (8696A)
V1	1951-0082	Electron Tube: BWO, WJ (8697A)

Page 4-5/4-6, Figure 4-2:
Change A1C4 to HP Part No. 0150-0052.
Change A1R17 to HP Part No. 0698-3414.
Change A1R35 to HP Part No. 0757-0401.

CHANGE J

Page 3-8, Table 3-2, Chassis Parts:
Delete diode CR1 HP Part No. 1901-0026.

Page 3-8, Table 3-1:
Add A3M1 HP Part No. 1010-0005, Indicator: Elapsed Time.

Page 3-8, Table 3-1:
Add A3R1 HP Part No. 0686-2455, R:FXD, Composition, 2.4 Megohm, 5%, 1/2W.

Page 4-5/4-6, Figure 4-2:
Add A3R1 HP Part No. 0680-2455 as indicated in partial schematic shown in Figure A-1.

Page 4-5/4-6, Figure 4-2:
Delete (Chassis Part) diode CR1 HP Part No. 1901-0026.

Page 4-5/4-6, Figure 4-2:
Add A3M1 HP Part No. 1010-0005, Indicator: Elapsed Time in accordance with partial schematic shown in Figure A-1.

CHANGE K

Page 3-8, Table 3-2:
Change A3 BWO Terminal Board Assembly to HP Part No. 08691-6105.

CHANGE L

Page 3-4, Table 3-2:
Change A1Q2 to HP Part No. 1853-0015. (Preferred HP Part No. is 1853-0020.)

Page 4-5/4-6, Figure 4-2:
Change A1Q2 to HP Part No. 1853-0015.

CHANGE M

Page 4-5/4-6, Figure 4-2:
Delete the following jumper connections:
From P12, pin 16 to P12, pin 10
From P12, pin 32 to P12, pin 26
Change the chassis ground from P12, pin 6 to P12, pin 8.

CHANGE N

Page 3-4, and 3-5, Table 3-2:
Add A1CR14 HP Part No. 1901-0033.
Delete A1Q4 HP Part No. 1854-0079.
Delete A1R45 HP Part No. 0757-0063.

Page 4-5/4-6, Figure 4-2:
Delete Emitter Follower stage composed of A1Q4 and A1R45 and reconstruct the circuit as shown in Figure A-1 adding A1CR14 as indicated (HP Part No. 1901-0033).

CHANGE O

Page 2-13, paragraph 2-22:
Perform the calibration adjustments described for serial prefix 636.

CHANGE P

Page 2-13, paragraph 2-22:
Perform the calibration adjustments described for serial prefix 620.

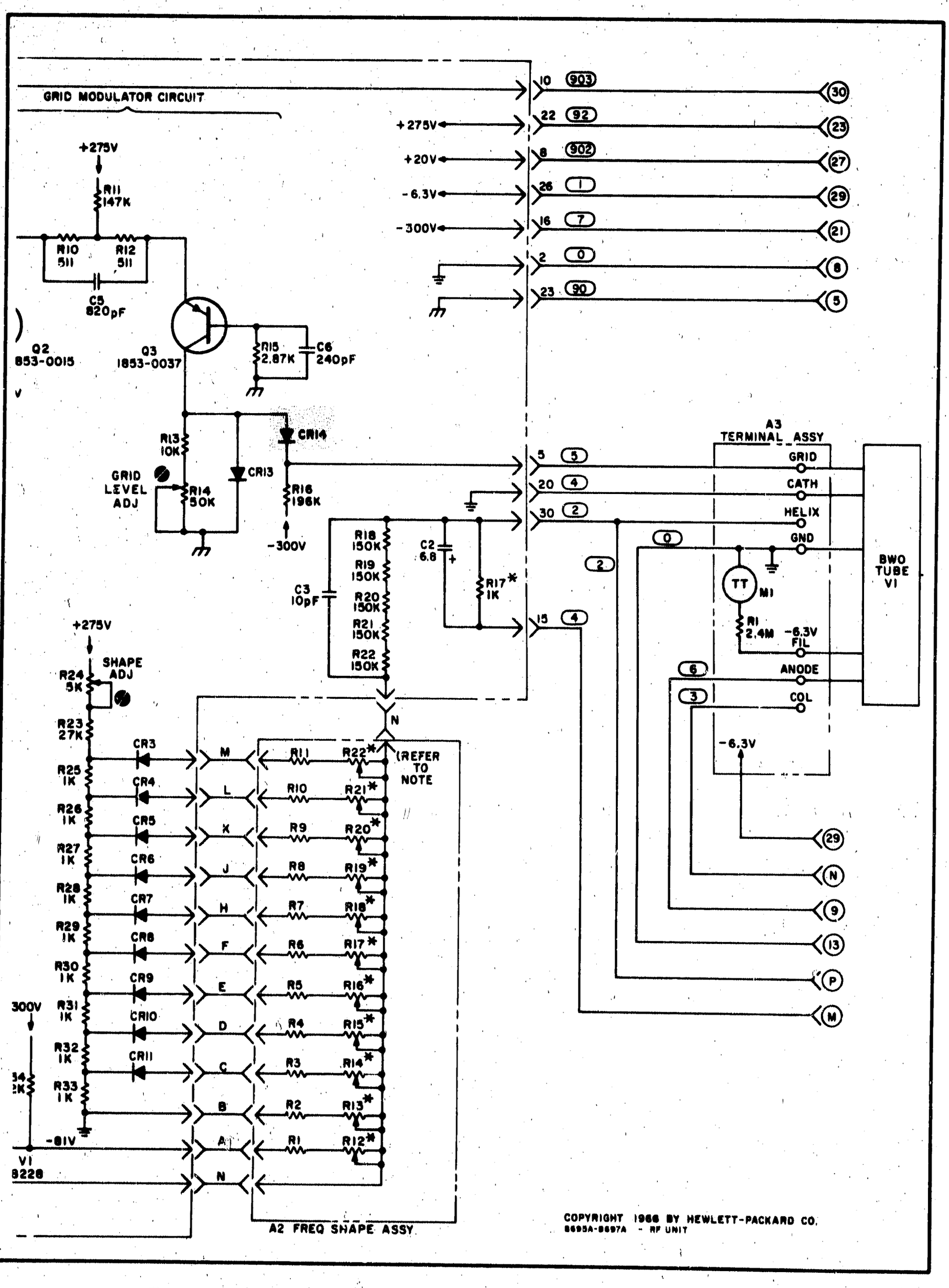


Figure A-1. Partial Schematic Diagram of 8695A/8696A/8697A RF Unit

MANUAL CHANGES

MANUAL CHANGES

MANUAL IDENTIFICATION

Model Number: 8695A-97A
Date Printed: May 1973
Part Number: 08695-90015

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections

Make all appropriate serial number related changes indicated in the tables below.

Serial Prefix or Number	Make Manual Changes
1335A, 1438A, 1445A, thru 1445A10455	None
1445A10456 thru 1445A10755	1
1501A, 1526A and 1547A	1, 2

Serial Prefix or Number	Make Manual Changes

► NEW ITEM

The following Service Notes are available from your local HP Sales and Service Office:

SERVICE NOTE	SERIAL NUMBER	DESCRIPTION
8691-4A-1, 8695-7A-1	Prefix 715- through 835-	Add A1CR15 Protection Diode. Modification for Improved Reliability and Added BWO Protection.
8691-4A-7, 8695-7A-6	Below 916-02256 Below 916-00616	Reduce Residual FM.
8691-94A-8B, 8695-97A-7B, 8691-95B-6B	All serials.	BWO Replacement. Lists all tubes and shaping boards used in each RF plug-in.
8691-4A/B-2 8695-7A-2	Below 835-01406 Below 835-00481	Reduce Residual AM.
8695-97A-8-S*	1210A07405 and Below	Elimination of a Potential Safety Hazard. Ground required on backward wave oscillator.

*S denotes Product.Safety Service Notes.

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

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2 pages

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HEWLETT PACKARD

ERRATA

Page 3-4, Table 3-2:
Change A1C3 to HP Part No. 0160-4940, CAPACITOR-FXD 10PF 10% 3KVDC CER MFR CODE 72982

Page 3-9, Table 6-2:
Under CHASSIS PARTS add HP Part Number 08695-20010 QTY 1 HOUSING PLUG-IN, FRONT 28480 08695-20010.

CHANGE 1

Page 3-9, Table 3-2:
Change PANEL: REAR (MINT GRAY, STD., OPT.100) to HP Part No. 08691-20018.

CHANGE 2

Serial Prefix change only. Does not affect performance of instrument.