Errata

Title & Document Type: 8691B, 8692B, 8963B, 8964B, 8965B RF Unit Operating and Service Manual

Manual Part Number: 08691-90022

Revision Date: June 1970

HP References in this Manual

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

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Agilent Technologies

OPERATING AND SERVICE MANUAL

RF UNITS

8691B
8692B
8693B
8694B
8695B

HEWLETT hp PACKARD

HP 8691B–8695B

CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facility.

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RF UNITS

8691B
8692B
8693B
8694B
8695B

SERIAL PREFIX: 984-

This manual applies directly to HP RF Units having serial prefix number 984.

SERIAL PREFIXES NOT LISTED

For serial prefixes above 984, a yellow Manual Changes sheet is included with this manual.

For serial prefixes below 984 , see Appendix I.

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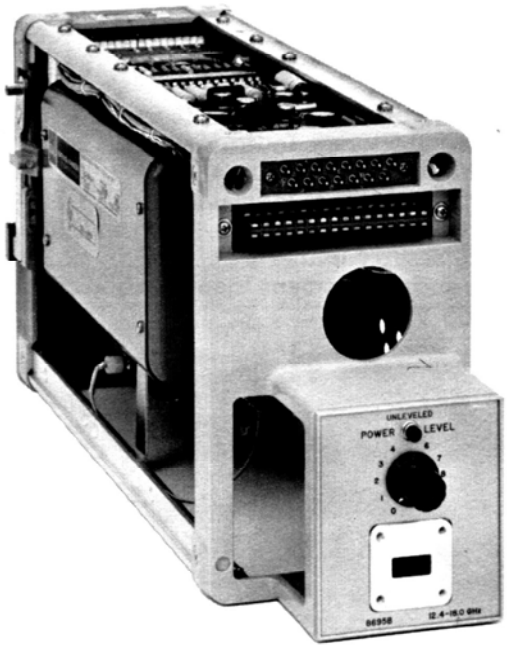


Figure 1-1. Typical Model 8691B—8695B RF Units

SECTION I

GENERAL INFORMATION

1-1. DESCRIPTION.

1-2. The Model 8691B through 8695B RF Units combine with the 8690A/B Sweep Oscillator to form an electronically tuned microwave signal source with a frequency range of 1 GHz to 18 GHz. Individual RF Unit Model specifications are given in Table 1-1.

1-3. The 8691B — 8695B RF Units are modulated by a solid-state PIN attenuator-modulator included within the RF Unit. The 8691B through 8694B Models have a coaxial RF output while the 8695B has a waveguide RF Output.

1-4. OPTIONS AVAILABLE.

1-5. Option 001 is available for Models 8693B and 8694B RF Units. It offers internal leveling that enables the Sweep Oscillator to hold RF Power constant as frequency is changed.

1-6. Option 004 is available for Models 8691B, 8692B, 8693B, and 8694B RF Units. It provides a rear panel RF output.

1-7. Option 100 is available for Models 8692B, 8693B, and 8694B RF Units. It extends the normal frequency band over a wider range (refer to Table 1-1).

1-8. Option 200 is available for Model 8694B RF Units.

1-9. INSTRUMENT IDENTIFICATION.

1-10. Each RF Unit carries a two-section, eight-digit serial number (000-00000) of which the first three digits are a prefix. The contents of this manual apply to those RF Units having the serial number prefix(es) listed on the title page.

1-11. MANUAL CHANGES.

1-12. Changes required to adapt this manual to serial number prefixes not listed on the title page are contained in a yellow Manual Changes sheet insert supplied with the manual, or in Appendix I located at the rear of this manual. For information concerning serial number prefixes not listed either on the title page in Appendix I, or in an insert, contact one of the Hewlett-Packard sales and service offices.

1-13. INSTALLATION.

1-14. The RF Unit is designed to be installed into the 8690A/B 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 8690A/B 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 8690A/B Sweep Oscillator.

1-15. OPERATION.

1-16. Operating procedures of the Sweep Oscillator-RF Unit combinations are given in the 8690A/B Sweep Oscillator Manual. Figures 1-2 and 1-3 show the front and rear views of a typical 8691B-8695B RF Unit. Front and rear panel controls, connectors, and indicators are also described in Figures 1-2 and 1-3.

1-17. PRINCIPLES OF OPERATION.

1-18. Principles of circuit operation of the Sweep Oscillator — RF Unit combinations are given in the 8690A/B 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) automatic leveling control (ALC) gain, (5) unleveled lamp control, (6) internal leveling in Option 001 8693B and 8694B Models, and (7) PIN attenuation and modulation.

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 0V 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.

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:
8691B, 8692B, Net, 20 lbs, (9 kg).
Shipping, 28 lbs. (12,6 kg)
8693B, 8694B, Net, 12 lbs, (5,4 kg)
Shipping, 20 lbs, (9 kg).
8695B, Net, 13 lbs, (6,9 kg).

Model 8691B RF Unit
(Installed in 8690B Sweep Oscillator)

	8691B
Frequency Range:	1 to 2 GHz
Frequency Accuracy (over ⩾6-dB range):	±10 MHz
Maximum Leveled Power	At least 70 mW (18.5 dBm)
RF Power Control	PIN Line
Frequency Stability	
With Temperature	±0.01%/°C
With 10% Change in Line Voltage	±500 kHz
With 10-dB Power Level Change	±500 kHz
Residual FM	< 10 kHz peak
Power Variation, External Leveling*	±0.1 dB
Output Impedance and/or Connector	50 ohms/Type N
Option 004. Rear panel RF Output	

Models 8692B, 8692B, Opt. 100 RF Units
(Installed in 8690B Sweep Oscillator)

	8692B	8692B, Opt. 100
Frequency Range	2 to 4 GHz	1.7 to 4.2 GHz
Frequency Accuracy (over ⩾ 6-dB range)	±20 MHz	±25 MHz
Maximum Leveled Power	At least 40 mW (16 dBm)	At least 15 mW (11.8 dBm)
RF Power Control	PIN Line	PIN Line
Frequency Stability		
With Temperature	±0.01%/°C	±0.01%/°C
With 10% Change in Line Voltage	±500 kHz	±500 kHz
With 10-dB Power Level Change	±4 MHz	±4 MHz
Residual FM	<15 kHz peak	< 20 kHz peak
Power Variation, External Leveling*	±0.1 dB	±0.1 dB
Output Impedance and/or Connector	50 ohms/Type N	50 ohms/Type N
Option 004, Rear panel RF Output		

*Excluding coupler and detector variation

Table 1-1. Specifications (cont'd)

Models 8693B, 8693B, Opt. 100 RF Units
(Installed in 8690B Sweep Oscillator)

	8693B	8693B, Opt. 100
Frequency Range	4 to 8 GHz	3.7 to 8.3 GHz
Frequency Accuracy (over ⩾ 6-dB range)	± 40 MHz	± 45 MHz
Maximum Leveled Power	At least 15 mW (11.8 dBm)	At least 5 mW (7 dBm)
RF Power Control	PIN Line	PIN Line
Frequency Stability		
With Temperature	± 0.01%/°C	± 0.01%/°C
With 10% Change in Line Voltage	± 1 MHz	± 1 MHz
With 10-dB Power Level Change	± 1 MHz	± 1 MHz
Residual FM	< 15 kHz peak	< 20 kHz peak
Power Variation, External Leveling*	± 0.1 dB	± 0.1 dB
Output Impedance and/or Connector	50 ohms/Type N	50 ohms/Type N
Option 001. Internal Leveling Power		
Power Variation (into matched load)	± 0.4 dB	± 0.4 dB
Equivalent Source Match (approx.)	1.25:1	1.25:1
Option 004. Rear Panel RF Output		

Models 8694B, 8694B, Opt. 100, 8694B, Opt. 200 RF Units
(Installed in 8690B Sweep Oscillator)

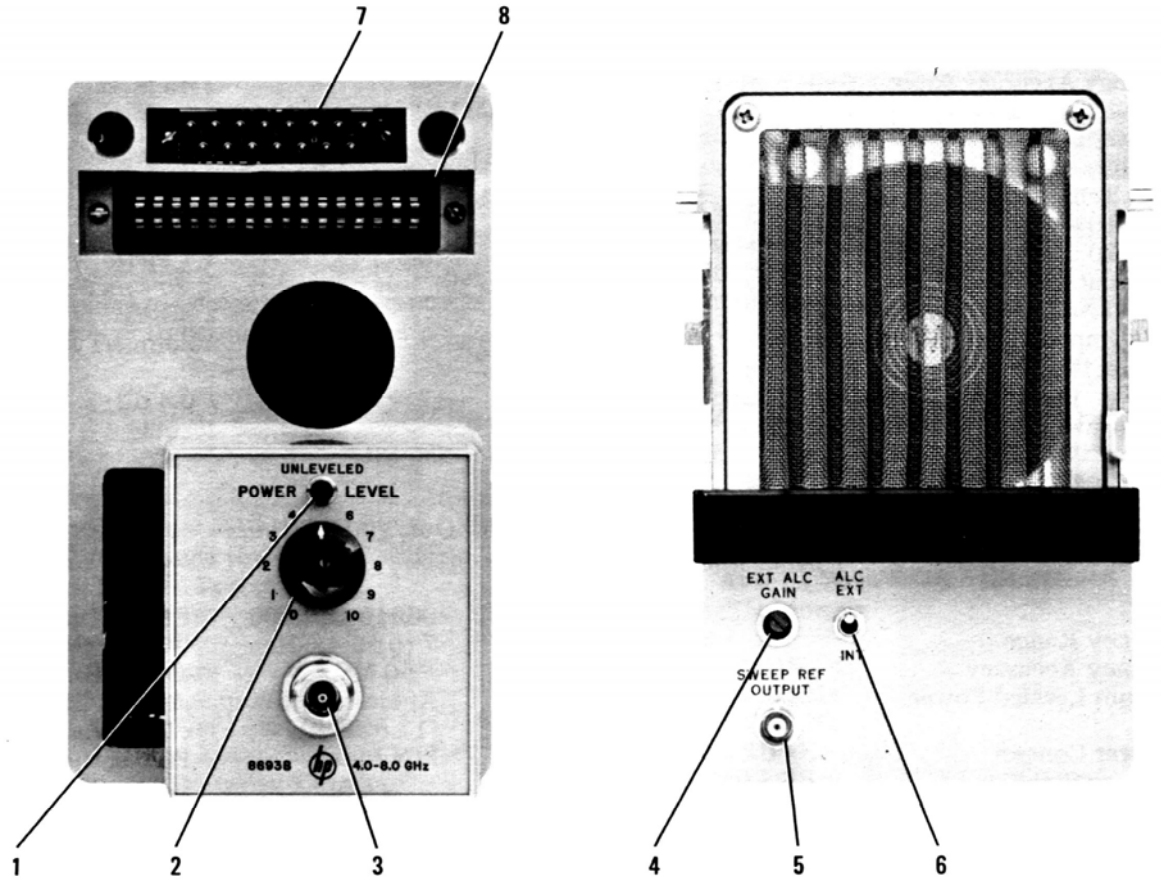
	8694B	8694B,Opt.100	8694B,Opt.200
Frequency Range	8 to 12.4 GHz	7 to 12.4 GHz	7 to 11 GHz
Frequency Accuracy	± 40 MHz	± 50 MHz	± 40 MHz
Maximum Leveled Power	At least 30 mW (14.8 dBm)	At least 15 mW (11.8 dBm)	At least 15 mW (11.8 dBm)
RF Power Control	PIN Line	PIN Line	PIN Line
Frequency Stability			
With Temperature	± 0.01%/°C	± 0.01%/°C	± 0.01%/°C
With 10% Change in Line Voltage	± 1 MHz	± 1 MHz	± 1 MHz
With 10-dB Power Level Change	± 1 MHz	± 1 MHz	± 1 MHz
Residual FM	< 15 kHz peak	< 20 kHz peak	< 20 kHz peak
Power Variation, External Leveling*	± 0.1 dB	± 0.1 dB	± 0.1 dB
Output Impedance and/or Connector	50 ohms/Type N	50 ohms/Type N	50 ohms/Type N
Option 001. Internal Leveling			
Power Variation (into matched load)	± 0.75 dB	± 0.75 dB	± 0.75 dB
Equivalent Source Match (approx.)	1.5:1	1.5:1	1.5:1
Opt. 004. Rear Panel RF Output			

Model 8695B RF Unit
(Installed in 8690B Sweep Oscillator)

	8695B
Frequency Range	12.4 to 18 GHz
Frequency Accuracy	± 50 MHz
Maximum Leveled Power	At least 15 mW (11.8 dBm)
RF Power Control	PIN Line
Frequency Stability	± 0.01%/°C
With Temperature	± 10 MHz
With 10% Change in Line Voltage	± 1 MHz
With 10-dB Power Level Change	< 50 kHz peak
Residual FM	± 0.1 dB
Power Variation, External Leveling*	Waveguide WG-419/U
Output Impedance and/or Connector	

*Excluding coupler and detector variation.

MODEL 8691B–8694B FRONT AND REAR PANEL



1. UNLEVELED. Lights if POWER LEVEL set too high for leveling across selected frequency range or if leveling is not used.

2. POWER LEVEL. Adjusts RF power level.

3. RF Output Connector. Standard 50-ohm type N connector except on Option 001 Models which have HP precision 50-ohm type N connectors.

4. EXT ALC GAIN. Adjusts gain of ALC loop to control flatness of RF power output.

5. SWEEP REF OUTPUT. Output voltage proportional to RF frequency (40V/ octave). From approximately 1.4 to 41.4V across the sweep range.

CAUTION

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

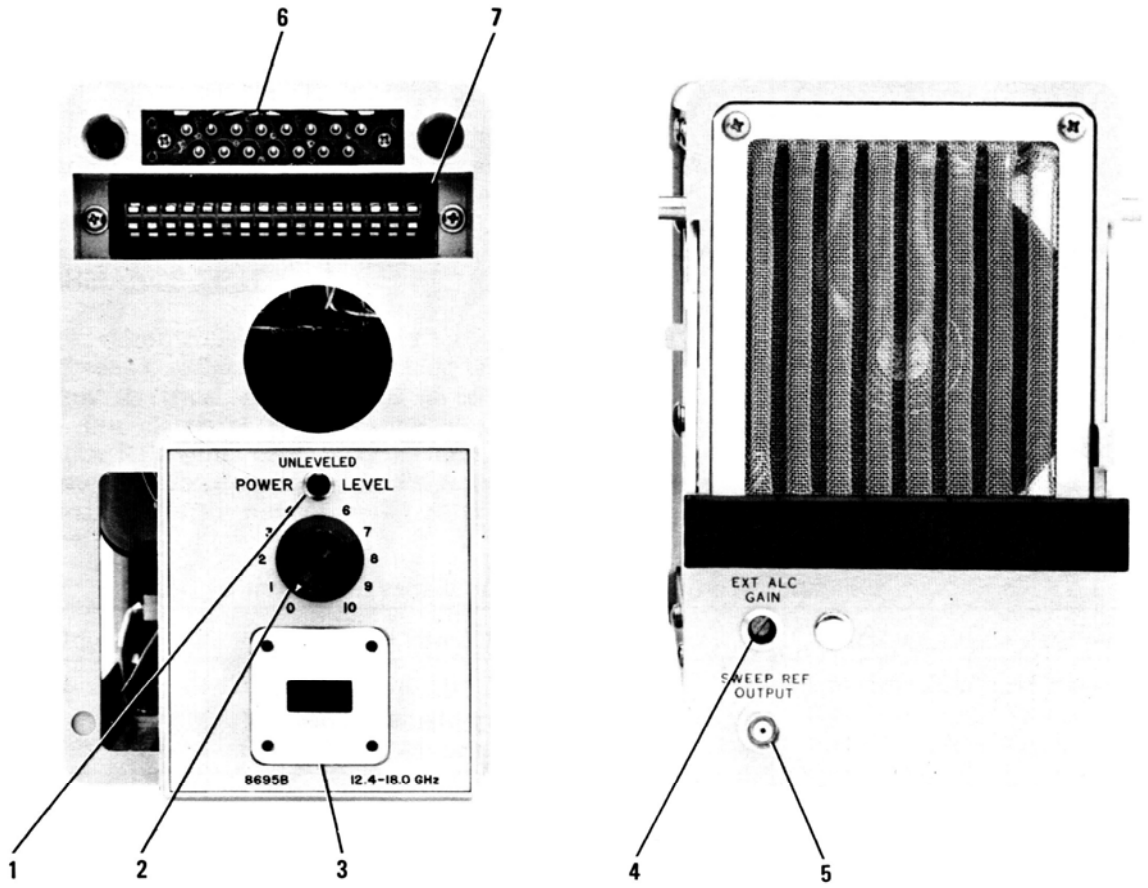
6. ALC EXT-INT. Switch installed on Option 001 RF Units. Selects or disables an internal leveling loop.

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

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

Figure 1-2. Model 8691B—8694B Front and Rear Panel Controls, Connectors and Indicators

MODEL 8695B FRONT AND REAR PANEL



1. UNLEVELED. Lights if POWER LEVEL set too high for leveling across frequency range or if automatic leveling is not used.
2. POWER LEVEL. Adjusts RF power level.
3. RF Output Waveguide Flange. 8695B: UG-419/U.
4. EXT ALC GAIN. Adjusts gain of ALC circuit to control flatness of leveling.
5. SWEEP REF OUTPUT. Output voltage proportional to RF frequency.

CAUTION

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

6. P11. Connects BWO operating voltages from the 8690 mainframe to the RF Unit.
7. P12. Connects RF Unit operating signals and voltages from the 8690 mainframe to the RF Unit.

Figure 1-3. Model 8695B Front and Rear Panel Controls, Connectors and Indicators

SECTION II
MAINTENANCE

2-1. INTRODUCTION.

2-2. This section provides adjustment procedures for the circuits included within the 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 8690A/B 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, refer to the troubleshooting paragraphs in the 8690A/B Sweep Oscillator Manual.

2-5. TROUBLESHOOTING.

2-6. Complete troubleshooting procedures for all Sweep Oscillator-RF Unit combinations are included in the 8690A/B Sweep Oscillator Manual. Where applicable, these troubleshooting procedures analyze the circuit functions contained in the RF Unit. If a circuit malfunction has occurred 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.

Table 2-1. Test Equipment Required for Maintenance

Instrument	Critical Specifications	Recommended HP Models
Oscilloscope	Vertical Bandwidth: 5 MHz Vertical Sensitivity: 5 mV/cm Sweep Time Accuracy: ±3%	140 with 1402 and 1420 Plug-ins 175 with 1752 Plug-in
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	423A, P424A
Fixed Attenuator	Frequency Range: Same as RF Unit used Attenuation: nominal 20 dB nominal 10 dB	8491 { Option 10:10 dB Option 20:20 dB
Frequency Meter	Frequency Range: Same as RF Unit used Accuracy: ±0.1%	536 537
Power Meter and Thermistor Mount	Frequency Range: Same as RF Unit used Power Range: 1 μW to 10 mW	431 with 478 and 486
Waveguide-to-Coaxial Adapter	Frequency Range: Same as RF Unit used	H, X281
DC Voltmeter	Range: 0 to ±300V Accuracy: ±02% minimum Input Impedance: 10 megohms	3440/3442
Clip-On DC Ammeter	Range: 10 mA to 5 amps Accuracy: ±5%	428

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 8690A/B Sweep Oscillator Manual.

2-9. ATTENUATOR-MODULATOR REPAIR.

2-10. The PIN modulator CANNOT be repaired in the field. If the PIN is found to be faulty, it should be returned to the factory through the nearest HP service office.

2-11. DIRECTIONAL DETECTOR REPAIR.

2-12. Instructions for repairing the Directional Detector Assembly (A5 in option 001 RF Units), are contained in the HP Model 788C Operating Note (HP Part No. 00786-90008).

2-13. BWO TUBE REPLACEMENT.

2-14. Warranty.

2-15. BWO tube V1 is not covered by the RF Unit warranty. A separate warranty covers the BWO for one full year from the date of purchase. If the BWO tube fails within this warranty period, use the Warranty Claim form supplied with the BWO tube.

2-16. Ordering Replacement BWO Tube.

2-17. 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 3-5).

2-18. BWO Tube Removal.

a. Disconnect Sweep oscillator from ac line power.

b. Remove RF Unit.

c. Disconnect BWO tube RF output.

NOTE

Watkins-Johnson (Stewart) BWO tubes used in 8691B-8694B RF Units are equipped with impedance-matching balun units attached to the two white RF output leads. IMPORTANT: Do not disassemble the balun unit or detach the adapter from the balun. Both units are part of the BWO tube and must be included when a BWO tube is returned for warranty. New and replacement BWO tubes are supplied with a balun and adapter attached.

d. Disconnect BWO tube leads from terminal assembly A3.

e. Remove 4 screws fastening BWO tube to chassis.

f. Remove BWO tube.

2-19. BWO Tube Installation.

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

b. Connect BWO tube RF output as originally connected.

c. Before soldering BWO tube leads to A3 assembly plug the RF Unit into the 8690 mainframe. Set Sweep Oscillator for CW operation (single-frequency) at some frequency in the middle of the RF tuning range.

d. Measure anode voltage at A3TP2, and adjust A1R42, ANODE ADJ, to obtain an anode voltage within ±5 volts of the value printed on the BWO label.

e. Remove RF Unit from 8690 mainframe. Solder the BWO tube leads to appropriate A3 terminals. (Use wire color code on A3 Assembly.)

f. Set Sweep Oscillator for CW operation at the highest frequency in the high end of the RF tuning range. Set POWER LEVEL for maximum output.

g. Measure BWO tube anode voltage at A3TP2, and monitor current in BWO tube cathode lead using clip-on dc Ammeter (Table 2-1). Adjust A1R42, Anode Adjust, to obtain cathode-current specified in Table 2-2.

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

(1) Connect equipment as shown in Figure 2-1.

(2) Set Sweep Oscillator for CW operation and maximum power output (POWER LEVEL fully clockwise).

(3) Tune Sweep Oscillator for frequency in lower half of RF tuning range, at which the RF power output is at a minimum.

(4) Monitor the helix and cathode currents with the dc clip-on Ammeter (Table 2-1).

(5) Adjust A1R40, ANODE SHAPE ADJ, for maximum RF output without exceeding the maximum helix and cathode currents specified in Table 2-2. (If anode shaping is required, remove capacitor C1 (0.05 μF) until adjustment is completed.

NOTE

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

(6) 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.)

(7) Repeat steps (5) and (6) to obtain best full-band RF power flatness within the current limits specified in Table 2-2.

i. Perform adjustment procedures given in Table 2-3.

2-22. ADJUSTMENT.

2-23. The adjustment procedures given in Table 2-3 include instructions to set the proper operation of the following RF Unit circuit functions: (1) BWO anode voltage and shaping for proper BWO currents, (2) BWO helix voltage shaping and frequency accuracy, and (3) crystal ALC leveled output.

2-24. The adjustments 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 8690A/B Sweep Oscillator known to be accurately calibrated. Accurate 8690A/B 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 8690A/B Sweep Oscillator Manual.

2-25. Adjustment Control Settings. Unless otherwise specified, set the 8690A/B Sweep Oscillator controls for all adjustments as follows:

LINE	RF
START/CW MARKER 1 — START/CW MARKER 2 — STOP STOP/ΔF	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, mA

RF Unit Model	Watkins-Johnson		Varian		
	Helix	Cathode	Helix	Cathode	Anode
8691B	4.0	17.0	35.0	45.0	10.0
8692B	3.5	15.0	30.0	40.0	10.0
8692B, Opt. 100	3.5	15.0	30.0	40.0	10.0
8693B	3.0	12.0	30.0	40.0	10.0
8693B, Opt. 100	3.0	12.0	30.0	40.0	10.0
8694B	3.0	12.0	30.0	40.0	10.0
8694B, Opt. 100	3.0	12.0	30.0	40.0	10.0
8694B, Opt. 200	3.0	12.0	30.0	40.0	10.0
8695B	2.5	12.0	20.0	28.0	10.0

Table 2-3. Adjustments

ANODE VOLTAGE ADJUSTMENT

Procedure

a. Ensure that RF Unit is properly installed in 8690A/B and connect equipment as shown in Figure 2-1.

b. Set 8690A/B controls as follows:
FUNCTION . . . . . START-STOP
SWEEP SELECTOR . . . . . CW
START/CW High end of specified range

c. Set RF Unit POWER LEVEL control MAX CW.

d. Connect 3440 Voltmeter (Table 2-1) from A3TP2 to 8690A/B chassis ground.

e. Adjust A1R42, ANODE ADJUST (Figure 2-3) for the voltage shown on the BWO tube label.

f. Perform ANODE SHAPING and BWO currents adjustment procedures.

ANODE SHAPING ADJUSTMENT

Procedure

a. Ensure that RF Unit is properly installed in 8690A/B.

b. Set 8690A/B 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.

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
8691B	18.5
8692B	16.0
8692B, Opt. 100	11.8
8693B	11.8
8693B, Opt. 100	7.0
8694B	14.8
8694B, Opt. 100	11.8
8694B, Opt. 200	11.8
8695B	16.0

e. Adjust A1R40, ANODE SHAPE ADJ, to achieve the appropriate power output specified in step d. Do not adjust A1R40, ANODE SHAPE ADJUST, unless necessary. If anode shaping is necessary, remove capacitor C1 (.05 μF) until adjustment is completed.

BWO CURRENTS ADJUSTMENT

Procedure

a. Ensure that RF Unit is properly installed in the 8690A/B.

b. Set 8690A/B controls as follows:
FUNCTION . . . . . START/STOP
SWEEP SELECTOR . . . . . CW
START/CW Low end of specified range

c. Connect 428 DC Ammeter (Table 2-1) 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 low or high end current is greater than specified in Table 2-2, adjust A1R42, ANODE ADJUST, 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.

g. On Watkins-Johnson BWO, connect 428 DC Ammeter clip-on probe around cathode lead (yellow). On Varian BWO, connect 428 DC Ammeter clip-on probe around anode lead (blue).

h. Measure cathode (Watkins-Johnson BWO) or anode (Varian BWO) current with START/CW at low end of specified range; then at high end of specified range.

i. Repeat steps e and f.

HELIX VOLTAGE SHAPING ADJUSTMENT
(With 2 pot A2 Assembly)

Procedure:

a. Ensure that RF Unit is properly installed in the 8690A/B.

Table 2-3. Adjustments (cont'd)

b. Set 8690A/B controls as follows:

FUNCTION . . . . . ΔF
SWEEP SELECTOR . . . . . MANUAL
STOP/ΔF . . . . . MAX CW

c. Connect 3440 Voltmeter (Table 2-1) from A4TP4 on 8690A/B Helix Amplifier Assy A4 to 8690A/B chassis ground.

d. Set START/CW and MANUAL SWEEP for 69.5 Vdc at A4TP4 (8690A/B Assy A4).

e. Adjust A1R24, SHAPE ADJ, on "B" Modulator Assy A1, 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 (8690A/B Assy A4).

h. Adjust A2R12 on Freq Shape Assy A2 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 38.00 ±0.01 Vdc at A4TP4 (8690A/B Assy A4).

j. Adjust A2R13 on Freq Shape Assy A2 for midpoint frequency of specified range. Use frequency meter and oscilloscope display to determine frequency setting.

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

l. Set START/CW and MANUAL SWEEP for 73.00 ±0.01 VDC at A4TP4 (8690A/B Assy A4).

m. Adjust A1R24, SHAPE ADJ, on "B" Modulator Assy A1 for high end frequency of specified range.

FREQUENCY ACCURACY ADJUSTMENT

Procedure:

a. Ensure that RF Unit is properly installed in the 8690A/B.

b. Set 8690A/B controls as follows:

FUNCTION . . . . . ΔF
SWEEP SELECTOR . . . . . MANUAL
STOP/ΔF . . . . . MAX CW

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

d. Connect 3440 Voltmeter (Table 2-1) from A4TP4 (8690A/B Helix Amplifier Assy A4) to 8690A/B chassis ground.

e. Set START/CW and MANUAL SWEEP for voltages at A4TP4 (8690A/B Assy A4) as listed in Table 2-4.

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

POWER LEVEL CONTROL ADJUSTMENT

Procedure:

a. Ensure that RF Unit is properly installed in the 8690A/B.

b. Connect equipment as shown in Figure 2-1.

c. Set 8690A/B controls as follows:

SWEEP SELECTOR . . . . . AUTO
START/CW . . . Low end of frequency range
STOP/ΔF . . . . High end of frequency range
ALC . . . . . Depressed
LINE . . . . . RF

d. Set RF out for maximum leveled power (refer to leveling procedure in the 8690A or 8690B Operating and Service Manual).

e. Adjust A1R1, LEVEL SHUNT ADJ., fully counterclockwise.

f. Set RF Unit POWER LEVEL control to 7.

g. Adjust A1R1, LEVEL SHUNT ADJ, clockwise until UNLEVELED light comes on.

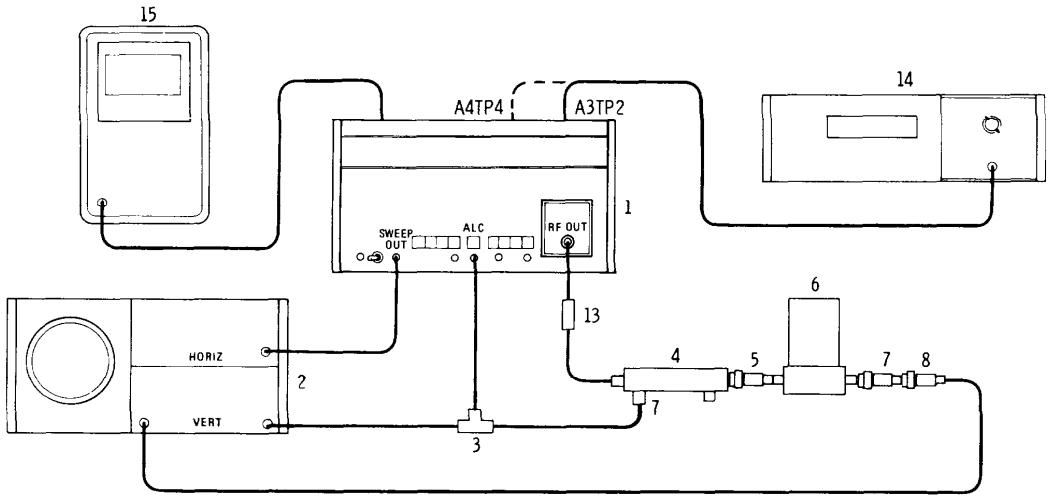
h. Readjust A1R1 slowly counterclockwise until the UNLEVELED light just goes out.

RF UNIT MODELS (See Note 4)

8691B
8692B
8693B
8694B

8692B, Opt. 100
8693B, Opt. 100
8694B, Opt. 100

8694B, Opt. 200



RF UNIT MODEL
8695B

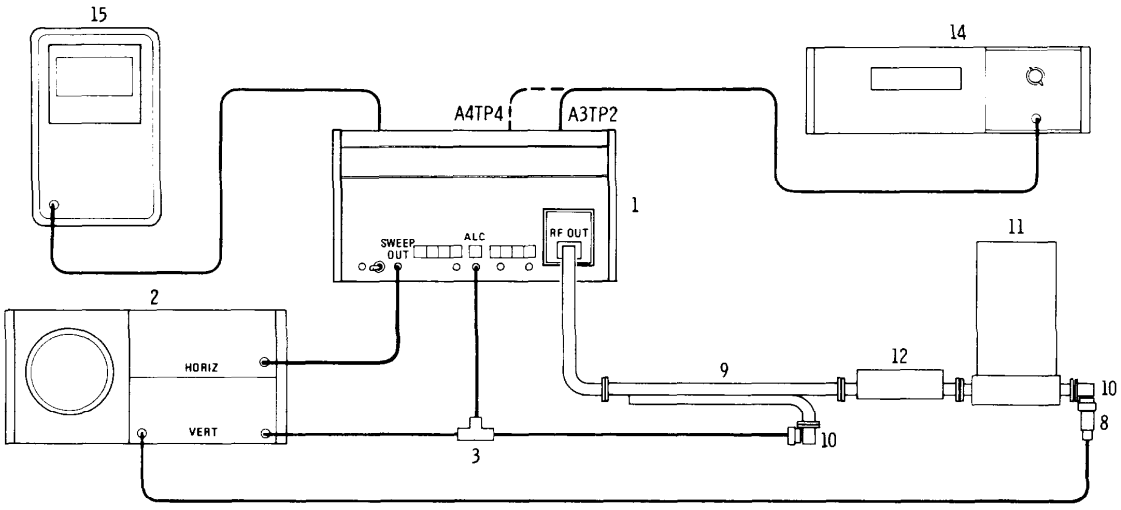


Figure 2-1. Maintenance Setup Number 1

1. SWEEP OSCILLATOR HP 8690A/B
2. OSCILLOSCOPE HP 140/1420/1402
3. BNC TEE CONNECTOR
4. DIRECTIONAL DETECTOR (Refer to Note 1)
5. ATTENUATOR HP 8691B (Refer to Note 2)
6. FREQUENCY METER (Refer to Note 1)
7. CRYSTAL DETECTOR HP 423
8. 100 OHM LOAD RESISTOR HP 11523
   (HP 422, 423, P424, Opt. 002)
9. DIRECTIONAL COUPLER HP 752
   (Refer to Note 2)
10. CRYSTAL DETECTOR HP P424
11. FREQUENCY METER HP P532
12. WAVEGUIDE ATTENUATOR HP 370, 375 (Refer to Note 2)
13. MALE N to MALE N ADAPTER (UG 57B)
    (Refer to Note 3)
14. DIGITAL VOLTMETER HP 3440A/3442A
15. CLIP ON DC AMMETER HP 428A

NOTES

1. Use the appropriate equipment.

RF UNIT	DIRECTIONAL DETECTOR	FREQUENCY METER
8691B	HP 786	HP 536
8692B	787	536
8692B, Opt. 100	787	536
8693B	788	537
8693B, Opt. 100	788	537
8694B	789	537
8694B, Opt. 100	Narda 22440	537
8694B, Opt. 200	with HP 423 Crystal Detector	537
8695B	P752D with HP P424 Crystal Detector	P 532

2. As required to reduce power to Crystal Detector to less than 100 mW.

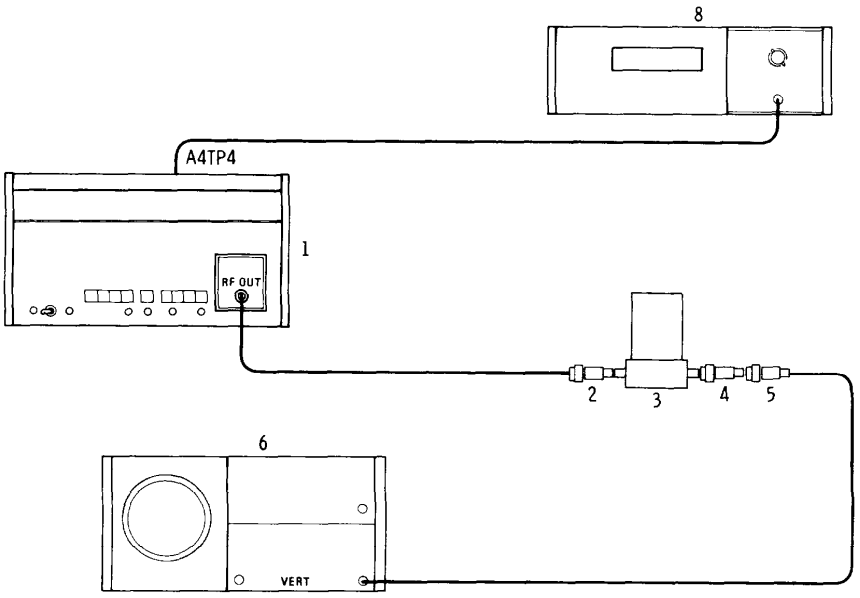
3. For use with Narda 22440 when testing 8694B, Opt. 100, Opt. 200 models

4. For internally leveled RF Units, omit the external leveling loop.

Figure 2-1. Maintenance Setup Number 1 (cont'd)

RF UNIT MODELS

8691B 8692B, Opt. 100
8692B 8693B, Opt. 100 8694B, Opt. 200
8693B 8694B, Opt. 100
8694B



RF UNIT MODEL
8695B

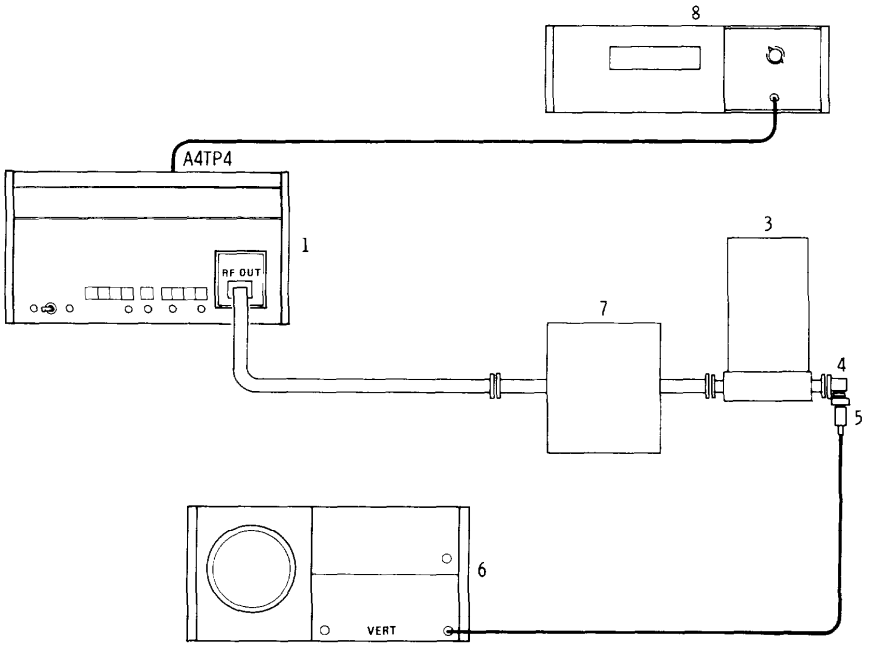


Figure 2-2. Maintenance Setup Number 2

1. SWEEP OSCILLATOR HP 8690A/B
2. ATTENUATOR HP 8691B – As required to reduce power to crystal detector to less than 100 mW
3. FREQUENCY METER (Refer to Note 1)
4. CRYSTAL DETECTOR HP 423 or HP P424A
5. 100 OHM LOAD RESISTOR HP 11523 (HP 422, 423 424, Option 002)
6. OSCILLOSCOPE HP 140/1420/1402
7. VARIABLE ATTENUATOR HP P382A
8. DIGITAL VOLTMETER HP 3440A/3442A

NOTE

1. Use the appropriate equipment

RF UNIT	FREQUENCY METER
8691B	HP 536
8692B	536
8692B	536
8693B	537
8693B, Opt. 100	537
8694B, Opt. 100	537
8694B, Opt. 200	537
8695B	P 532A

Figure 2-2. Maintenance Setup Number 2 (cont'd)

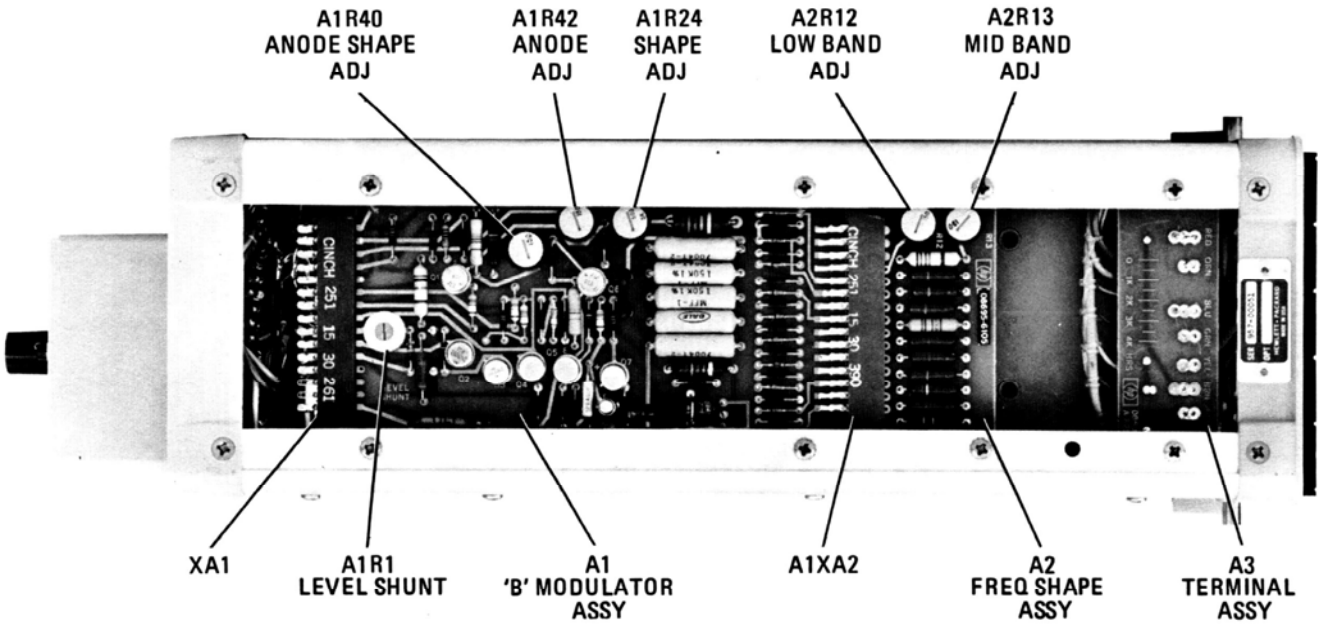


Figure 2-3. Component and Adjustment Identification Interior Top View

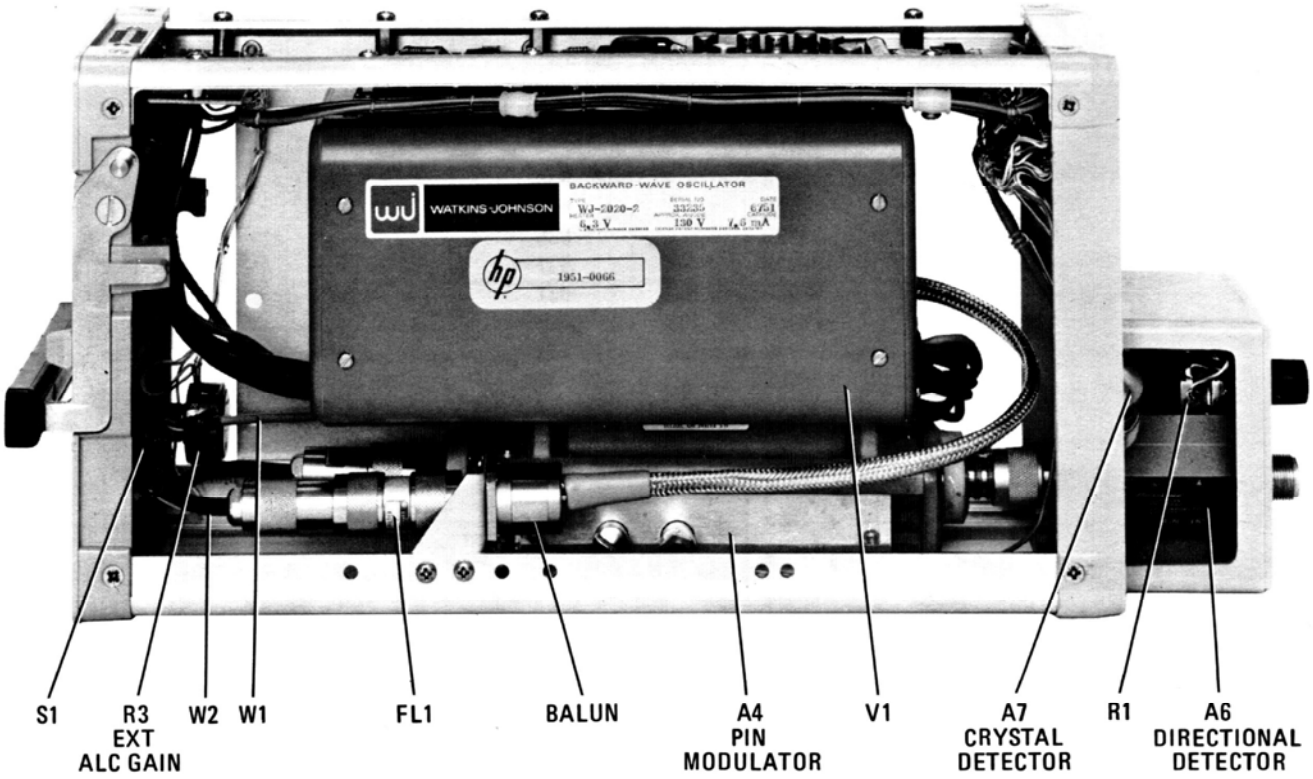


Figure 2-4. Component Identification, Option 001, 8694B

Table 2-4. Helix Voltage Shaping Adjustment Sequence

Vdc at Test Point 4 8690 Assembly A4	Adjust	8691B	8692B	8692B Opt. 100	8693B	8693B Opt. 100	8694B	8694B Opt. 100	8694B Opt. 200	8695B
73.00 ±0.01	A1R24	2.000	4.000	4.200	8.000	8.300	12.40	12.40	11.00	18.000
66.00 ±0.01		1.900	3.800	3.950	7.600	7.840	11.96	11.86	10.60	17.440
59.00 ±0.01		1.800	3.600	3.700	7.200	7.380	11.52	11.32	10.20	16.880
52.00 ±0.01		1.700	3.400	3.450	6.800	6.920	11.08	10.78	9.800	16.320
45.00 ±0.01		1.600	3.200	3.200	6.400	6.460	10.64	10.24	9.400	15.760
38.00 ±0.01	A2R13	1.500	3.000	2.950	6.000	6.000	10.20	9.700	9.000	15.200
31.00 ±0.01		1.400	2.800	2.700	5.600	5.540	9.760	9.160	8.600	14.640
24.00 ±0.01		1.300	2.600	2.450	5.200	5.080	9.320	8.620	8.200	14.080
17.00 ±0.01		1.200	2.400	2.200	4.800	4.620	8.880	8.080	7.800	13.520
10.00 ±0.01		1.100	2.200	1.950	4.400	4.160	8.440	7.540	7.400	12.960
3.00 ±0.01	A2R12	1.000	2.000	1.700	4.000	3.700	8.000	7.000	7.000	12.400
TEST LIMIT (MHz):		±10	±20	±25	±40	±45	±40	±50	±40	±50

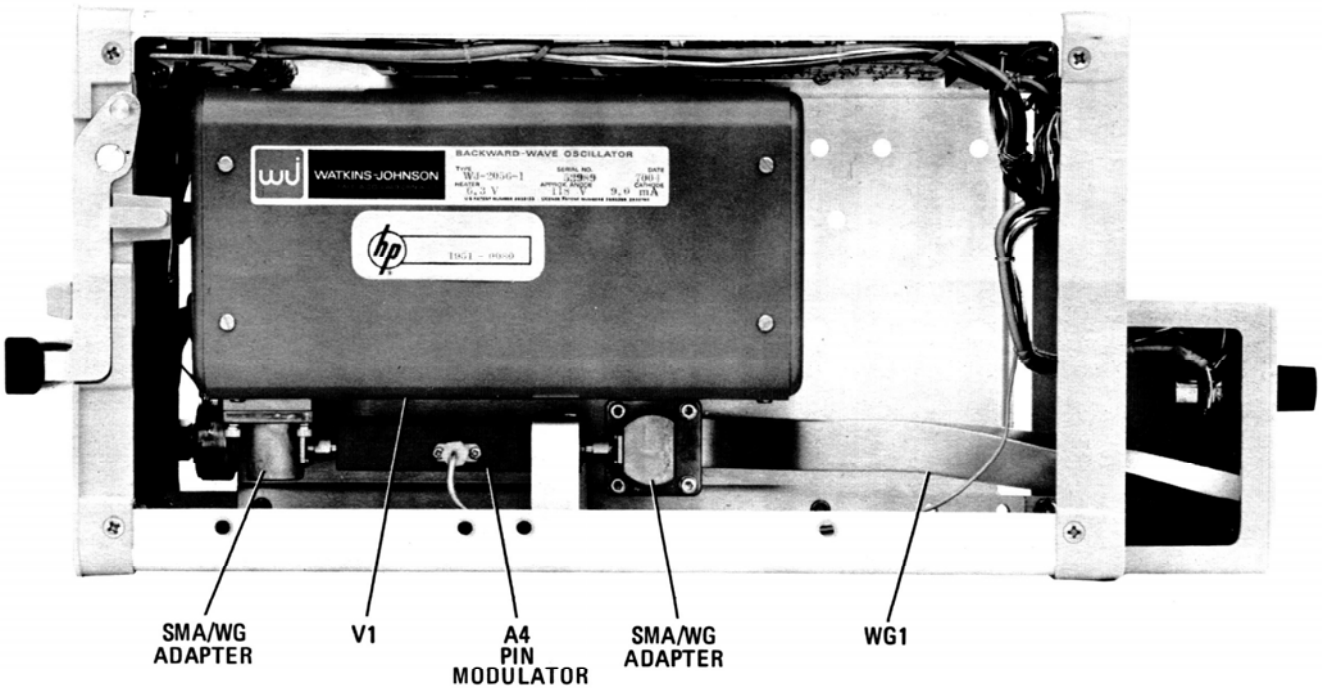


Figure 2-5. Component Identification, 8695B

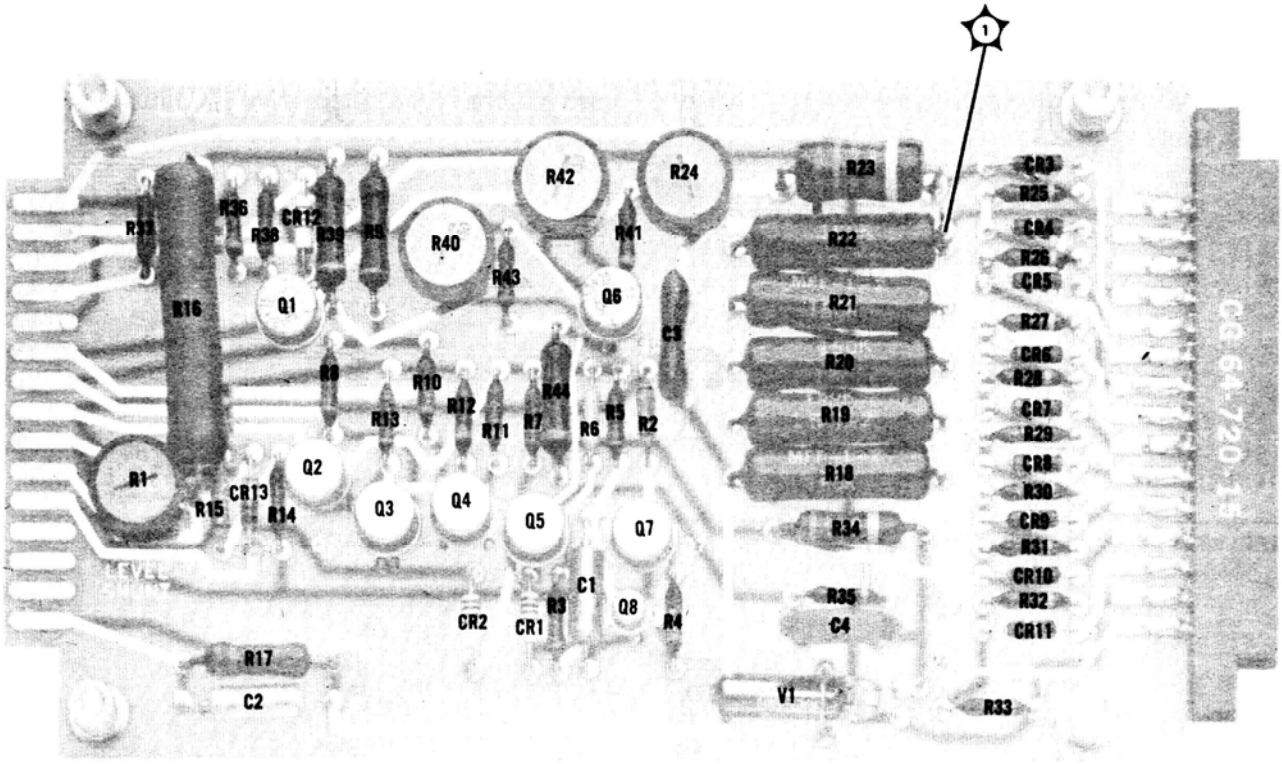
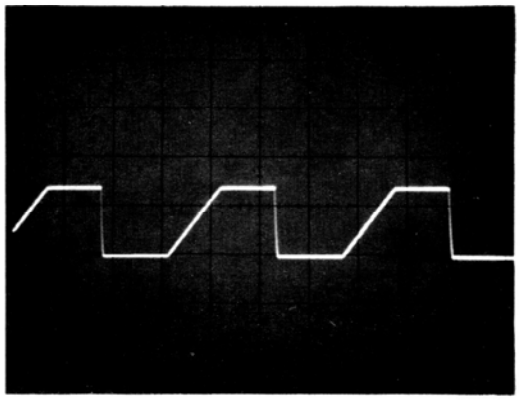
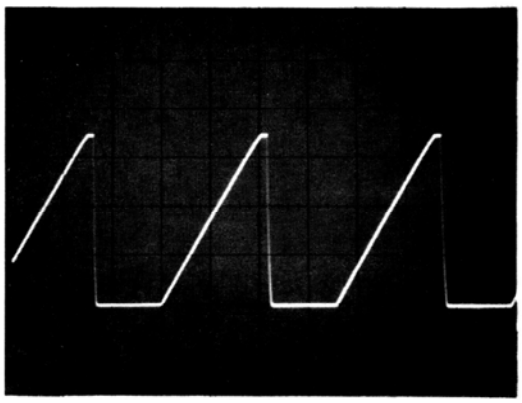


Figure 2-6. Component Identification Assembly A1

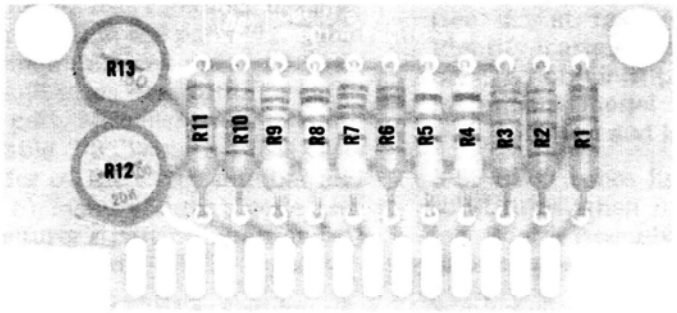


Junction A1R38, A1R39
20 V/div 5 ms/div

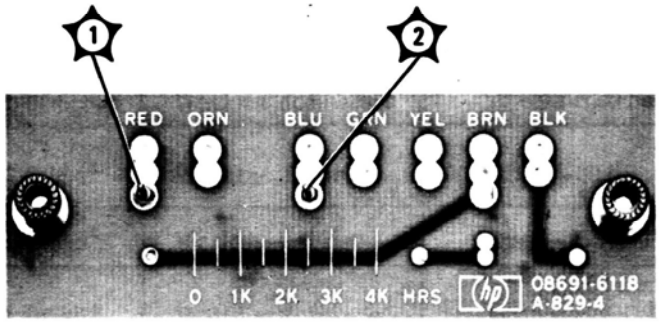


Emitter A1Q1
20 V/div 5ms/div

Figure 2-7. Waveforms



A2



A3

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

SECTION III
REPLACEABLE PARTS

3-1. INTRODUCTION

3-2. This section contains information for ordering replacement parts. Table 3-2 lists reference designations and abbreviations used in the parts list. Table 3-3 lists parts in alpha-numerical order of their reference designators and gives description and HP part number of each part. Miscellaneous parts are listed at the end of Table 3-3. Table 3-4 lists parts in alpha-numerical order of their part number and gives: a) description; b) manufacturer's code (see Table 3-5); c) manufacturer's part number; and d) total quantity used (TQ column).

3-3. ORDERING INFORMATION.

3-4. To obtain replacement parts, address order or inquiry to your local Hewlett-Packard field office (see list at rear of this manual for addresses). Identify parts by their Hewlett-Packard part numbers. To obtain a part that is not listed, include: a) instrument model and serial number; b) description, function and location of the part.

3-5. BWO tubes listed in parts list are equivalent substitutes when used with the appropriate Shaping Board Assembly (A2) and Helix Overcurrent Shunt Resistor (A1R17). Refer to Table 3-1.

Table 3-1. BWO Tube, Shaping Board Assembly and Helix Overcurrent Shunt Resistor Combinations

RF Unit Model	BWO Tube (V1)	BWO Manufacturer	Shaping Board Assembly (A2)	Helix Overcurrent[1] Shunt Resistor (A1R17)
8691B	1951-0020	Watkins Johnson	08691-6103	8.25K ohm
8692B	1951-0055	Varian	08692-6102	1.0K ohm
	1951-0064	Watkins Johnson	08692-6101	8.25K ohm
8692B Opt. 100	1951-0072[2]	Watkins Johnson	08692-6103	8.25K ohm
8693B	1951-0057	Varian	08693-6102	1.0K ohm
	1951-0065	Watkins Johnson	08693-6101	8.25K ohm
8693B Opt. 100	1951-0084[3]	Watkins Johnson	08693-6103	8.25K ohm
8694B	1951-0085[4]	Watkins Johnson	08694-60001	8.25K ohm
8694B Opt. 100	1951-0085[4]	Watkins Johnson	08694-60002	8.25K ohm
8694B Opt. 200	1951-0085[4]	Watkins Johnson	08694-60003	8.25K ohm
8695B	1951-0080	Watkins Johnson	08695-6105	14.7K ohm

[1]The 8.25K ohm helix overcurrent shunt resistor is HP Part No. 0757-0837. The 1.0K ohm helix overcurrent shunt resistor is HP Part No. 0761-0021. The 14.7K ohm helix overcurrent shunt resistor is HP Part No. 0698-3414.

[2]BWO (HP Part No. 1951-0072) is the recommended replacement for BWOs (1951-0055 and 1951-0064) used in all 8692B Option 100 RF Units (regardless of serial prefix).

[3]BWO (HP Part No. 1951-0084) is the recommended replacement for BWOs (1951-0057 and 1951-0065) used in all 8693B Option 100 RF Units (regardless of serial prefix or added options).

[4]BWO (HP Part No. 1951-0085) has higher output power and is the recommended replacement for BWOs (1951-0058 and 1951-0066) used in all 8694B RF Units (regardless of option or serial prefix).

Table 3-2. Reference Designators and Abbreviations Used in Parts List

REFERENCE DESIGNATORS

A	= assembly	F	= fuse	P	= plug	V	= vacuum tube, neon bulb, photocell, etc.
B	= motor	FL	= Filter	Q	= transistor		
BT	= battery	J	= jack	R	= resistor		
C	= capacitor	K	= relay	RT	= thermistor	VR	= voltage regulator
CP	= coupler	L	= inductor	S	= switch		
CR	= diode	LS	= loud speaker	T	= transformer	W	= cable
DL	= delay line	M	= meter	TB	= terminal board	X	= socket
DS	= device signaling (lamp)	MK	= microphone	TP	= test point	Y	= crystal
E	= misc electronic part	MP	= mechanical part	U	= integrated circuit	Z	= tuned cavity, network

ABBREVIATIONS

A	= amperes	H	= henries	N/O	= normally open	RMO	= rack mount only
AFC	= automatic frequency control	HDW	= hardware	NOM	= nominal	RMS	= root-mean square
		HEX	= hexagonal	NPO	= negative positive zero (zero temperature coefficient)	RWV	= reverse working voltage
AMPL	= amplifier	HG	= mercury			S-B	= slow-blow
		HR	= hour(s)			SCR	= screw
BFO	= beat frequency oscillator	Hz	= Hertz			SE	= selenium
		IF	= intermediate freq	NPN	= negative-positive-negative	SECT	= section(s)
BE CU	= beryllium copper	IMPG	= impregnated			SEMICON	= semiconductor
BH	= binder head	INCD	= incandescent	NRFR	= not recommended for field replacement	SI	= silicon
BP	= bandpass	INCL	= include(s)			SIL	= silver
BRS	= brass	INS	= insulation(ed)	NSR	= not separately replaceable	SL	= slide
BWO	= backward wave oscillator	INT	= internal			SPG	= spring
						SPL	= special
CCW	= counterclockwise	K	= kilo = 1000	OBD	= order by description	SST	= Stainless steel
CER	= ceramic			OH	= oval head	SR	= split ring
CMO	= cabinet mount only			OX	= oxide	STL	= steel
COEF	= coefficient	LH	= left hand				
COM	= common	LIN	= linear taper	P	= peak	TA	= tantalum
COMP	= composition	LK WASH	= lock washer	PC	= printed circuit	TD	= time delay
COMPL	= complete	LOG	= logarithmic taper	PF	= picofarads = 10^{-12} farads	TGL	= toggle
CONN	= connector	LPF	= low pass filter			THD	= thread
CP	= cadmium plate			PH BRZ	= phosphor bronze	TI	= titanium
CRT	= cathode-ray tube	M	= milli = 10^{-3}	PHL	= Phillips	TOL	= tolerance
CW	= clockwise	MEG	= meg = 10^{6}	PIV	= peak inverse voltage	TRIM	= trimmer
		MET FLM	= metal film			TWT	= traveling wave tube
DEPC	= deposited carbon	MET OX	= metallic oxide	PNP	= positive-negative-positive		
DR	= drive	MFR	= manufacturer				
		MHz	= mega Hertz	P/O	= part of	μ	= micro = 10^{-6}
ELECT	= electrolytic	MINAT	= miniature	POLY	= polystrene		
ENCAP	= encapsulated	MOM	= momentary	PORC	= porcelain		
EXT	= external	MOS	= metalized substrate	POS	= position(s)	VAR	= variable
				POT	= potentiometer	VDCW	= dc working volts
F	= farads	MTG	= mounting	PP	= peak-to-peak		
FH	= flat head	MY	= "mylar"	PT	= point		
FIL H	= Fillister head			PWV	= peak working voltage	W/	= with
FXD	= fixed					W	= watts
		N	= nano (10^{-9})	RECT	= rectifier	WIV	= working inverse voltage
G	= giga (10^{9})	N/C	= normally closed	RF	= radio frequency		
GE	= germanium	NE	= neon	RH	= round head or right hand	WW	= wirewound
GL	= glass	NI PL	= nickel plate			W/O	= without
GRD	= ground(ed)						

Table 3-3. Parts List Indexed by Reference Designation

Reference Designation	Part No.	Description #	Note
A1	08692-6113	ASSY:"B" MODULATOR (8691B THRU 8695B)	
A1C1	0180-0161	C:FXD ELECT 5.3 UF 20% 35VDCW	
A1C2	0180-0116	C:FXD ELECT 6.8 UF 10% 35VDCW	
A1C3	0160-0383	C:FXD MICA 10 UF 10% 250CVDCW	
A1C4	0180-0089	C:FXD ELECT 100UF-10%+100% 150VDCW	
A1C5	0160-0158	C:FXD MY 0.0056 UF 10% 200VDCW FACTORY SELECTED PART	
A1CR1	1901-0033	DIODE:SILICON 100MA 180WV	
A1CR2	1901-0033	DIODE:SILICON 100MA 180WV	
A1CR3	1901-0096	DIODE:SILICON 120V	
A1CR4	1901-0096	DIODE:SILICON 120V	
A1CR5	1901-0096	DIODE:SILICON 120V	
A1CR6	1901-0096	DIODE:SILICON 120V	
A1CR7	1901-0096	DIODE:SILICON 120V	
A1CR8	1901-0096	DIODE:SILICON 120V	
A1CR9	1901-0096	DIODE:SILICON 120V	
A1CR10	1901-0096	DIODE:SILICON 120V	
A1CR11	1901-0096	DIODE:SILICON 120V	
A1CR12	1901-0033	DIODE:SILICON 100MA 180WV	
A1CR13	1910-0016	DIODE:GERMANIUM 100MA/0.85V 60PIV	
A1Q1	1854-0232	Q:SI NPN(SELECTED FROM 2N3440)	
A1Q2	1854-0039	Q:SI NPN	
A1Q3	1854-0003	Q:SI NPN(SELECTED FROM 2N1711)	
A1Q4	1854-0003	Q:SI NPN(SELECTED FROM 2N1711)	
A1Q5	1854-0003	Q:SI NPN(SELECTED FROM 2N1711)	
A1Q6	1854-0232	Q:SI NPN(SELECTED FROM 2N3440)	
A1Q7	1854-0003	Q:SI NPN(SELECTED FROM 2N1711)	
A1Q8	1853-0010	Q:SI PNP(SELECTED FROM 2N3251)	
A1R1	2100-1772	R:VAR WW 500 OHM 5% TYPE H 1W	
A1R2	0698-3428	R:FXD MET FLM 14.7 OHM 1% 1/8W	
A1R3	0757-0430	R:FXD MET FLM 2.21K OHM 1% 1/8W	
A1R4	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R5	0757-0442	R:FXD MET FLM 10.0K 1% 1/8W	
A1R6	0698-3157	R:FXD MET FLM 19.6K 1% 1/8W	
A1R7	0757-0454	R:FXD MET FLM 33.2K OHM 1% 1/8W	
A1R8	0757-0442	R:FXD MET FLM 10.0K 1% 1/8W	
A1R9	0757-0063	R:FXD MET FLM 196K OHM 1% 1/2W	
A1R10	0757-0442	R:FXD MET FLM 10.0K 1% 1/8W	
A1R11	0698-3151	R:FXD MET FLM 2.87K OHM 1% 1/8W	
A1R12	0757-0279	R:FXD MET FLM 3.16K OHM 1% 1/8W	
A1R13	0698-3157	R:FXD MET FLM 19.6K 1% 1/8W	
A1R14	0698-3425	R:FXD MET FLM 316K OHM 1% 1/2W	
A1R15	0698-3442	R:FXD MET FLM 237 OHM 1% 1/8W FACTORY SELECTED PART	
A1R16	0757-0442	R:FXD MET FLM 10.0K 1% 1/8W	
A1R17	0757-0837	R:FXD MET FLM 8.25K 1% 1/2W(WJ BWO TUBES)	*
A1R17	0761-0021	R:FXD MET FLM 1K OHM 5% 1W(VARIAN BWO TUBES)	*
A1R18	0760-0023	R:FXD MET FLM 150K OHM 1% 1W	
A1R19	0760-0023	R:FXD MET FLM 150K OHM 1% 1W	
A1R20	0760-0023	R:FXD MET FLM 150K OHM 1% 1W	
		* FACTORY SELECTED PART	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
A1R21	0760-0023	R:FXD MET FLM 150K OHM 1% 1W	
A1R22	0760-0023	R:FXD MET FLM 150K OHM 1% 1W	
A1R23	0764-0007	R:FXD MET FLM 27K OHM 5% 2W	
A1R24	2100-1775	R:VAR WW 5K OHM 5% TYPE H 1W	
A1R25	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R26	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R27	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R28	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R29	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R30	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R31	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R32	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R33	0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	
A1R34	0761-0032	R:FXD MET OX 56K OHM 5% 1W	
A1R35	0757-0416	R:FXD MET FLM 511 OHM 1% 1/8W	
A1R36	0698-3450	R:FXD MET FLM 42.2K OHM 1% 1/8W (8691B)	
	0698-3450	R:FXD MET FLM 42.2K OHM 1% 1/8W (8692B)	
	0757-0123	R:FXD MET FLM 34.8K OHM 1% 1/8W (8692B OPT 100)	
	0698-3450	R:FXD MET FLM 42.2K OHM 1% 1/8W (8693B)	
	0698-3161	R:FXD MET FLM 38.3K 1% 1/8W (8693B OPT 100)	
	0757-0463	R:FXD MET FLM 82.5K 1% 1/8W (8694B)	
	0757-0459	R:FXD MET FLM 56.2K OHM 1% 1/8W (8694B OPT 100)	
	0757-0462	R:FXD MET FLM 75.0K OHM 1% 1/8W (8694B OPT 200)	
	0757-0465	R:FXD MET FLM 100K 1% 1/8W (8695B)	
A1R37	0757-0459	R:FXD MET FLM 56.2K OHM 1% 1/8W (8691B)	
	0757-0459	R:FXD MET FLM 56.2K OHM 1% 1/8W (8692B)	
	0757-0464	R:FXD MET FLM 90.9K OHM 1% 1/8W (8692B OPT 100)	
	0757-0459	R:FXD MET FLM 56.2K OHM 1% 1/8W (8693B)	
	0757-0462	R:FXD MET FLM 75.0K OHM 1% 1/8W (8693B OPT 100)	
	0698-3161	R:FXD MET FLM 38.3K 1% 1/8W (8694B)	
	0698-3162	R:FXD MET FLM 46.4K OHM 1% 1/8W (8694B OPT 100)	
	0698-3161	R:FXD MET FLM 38.3K 1% 1/8W (8694B OPT 200)	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
	0757-0123	R:FXD MET FLM 34.8K OHM 1% 1/8W (8695B)	
A1R38	0757-0465	R:FXD MET FLM 100K 1% 1/8W	
A1R39	0757-0137	R:FXD MET FLM 750K OHM 1% 1/2W	
A1R40	2100-0945	R:VAR MET FLM 500K 20% LIN 3/4W	
A1R41	0757-0463	R:FXD MET FLM 82.5K 1% 1/8W	
A1R42	2100-0945	R:VAR MET FLM 500K 20% LIN 3/4W	
A1R43	0757-0458	R:FXD MET FLM 51.1K OHM 1% 1/8W	
A1R44	0757-0374	R:FXD MET FLM 485K OHM 1% 1/2W	
A1R45	0757-0279	R:FXD MET FLM 3.16K OHM 1% 1/8W	
A1V1	1940-0013	ELECTRON TUBE:82.0 +/- 1V	
A1XA1		NOT ASSIGNED	
A1XA2	1251-0494	CONNECTOR:PC 30 CONTACTS	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
A3	08691-6118	BOARD ASSY:BWO TERM	
A4	C05-33001C	MODULATOR:PIN (8695B)	
	08691-6111	MODULATOR:PIN (8691B)	
	08692-6111	MODULATOR:PIN (8692B & OPT 100)	
	08693-6111	MODULATOR:PIN (8693B, OPT 001, OPT 100)	
	08694-6111	MODULATOR:PIN (8694B, OPT 001, OPT 100, OPT 200)	
A5	08693-6110	DETECTOR:DIRECTIONAL (8693B, OPT 001, OPT 100)	
A6	1130-0032	DETECTOR:DIRECTIONAL (8694B, OPT 001, OPT 100, OPT 200)	
A7	08694-6110	DETECTOR:CRYSTAL (8694B, OPT 001, OPT 100, OPT 200)	
C1	0150-0052	C:FXD CER 0.05 UF 20% 400VDCW	
DS1	2140-0092	LAMP:5V 60 MA	
DS1	1450-0153	LAMPHOLDER:FOR T-1 SERIES	
DS1	1450-0157	LEN:LAMPHOLDER	
FL1	00693-604	FILTER:LOW PASS	
FL1		(8693B, OPT 001, OPT 100)	
FL1	00694-604	FILTER:LOW PASS	
FL1		(8694B, OPT 001, OPT 100, OPT 200)	
J1	1250-0083	CONNECTOR:BNC(SWEEP REF)	
P1-P10		NOT ASSIGNED	
P11	1251-1322	CONNECTOR:15 CONTACTS MALE	
P12	1251-0136	CONNECTOR:32 PIN MALE	
R1	2100-2675	R:VAR GANGED 2 X 1K OHM 20% LIN	
R2		PART OF R1	
R3	2100-0051	R:VAR COMP 20K OHM 10% CWLOG 2W	
R4		DELETED	
R5	0757-0273	R:FXD MET FLM 3.01K OHM 1% 1/8W	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
A2	08694-6101	ASSY:FREQ. SHAPE(8694B) (USED WITH 1951-0066 ALT BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-6102	ASSY:FREQ. SHAPE(8694B) (USED WITH 1951-0058 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-6103	ASSY:FREQ. SHAPE(8694B OPT 100) (USED WITH 1951-0066 ALT BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-6104	ASSY:FREQ. SHAPE(8694B OPT 100) (USED WITH 1951-0058 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-6105	ASSY:FREQ. SHAPE(8694B OPT 200) (USED WITH 1951-0066 ALT BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-6106	ASSY:FREQ. SHAPE(8694B OPT 200) (USED WITH 1951-0058 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-60001	ASSY:FREQ. SHAPE(8694B) (USED WITH 1951-0085 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-60002	ASSY:FREQ. SHAPE(8694B OPT 100) (USED WITH 1951-0085 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2	08694-60003	ASSY:FREQ. SHAPE(8694B OPT 200) (USED WITH 1951-0085 BWO) REFER TO PARAGRAPH 3-5.	
A2 R1- A2 R13		FACTORY SELECTED VALUE	
A2 A2 A2	08695-6105	ASSY:FREQ SHAPE(8695B) (USED WITH 1951-0080 BWO) REFER TO PARAGRAPH 3-5.	
A2R1- A2R13		FACTORY SELECTED VALUE	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
A3	08691-6118	BOARD ASSY:BWO TERM	
A4	C05-33001C	MODULATOR:PIN (8695B)	
	08691-6111	MODULATOR:PIN (8691B)	
	08692-6111	MODULATOR:PIN (8692B & OPT 100)	
	08693-6111	MODULATOR:PIN (8693B, OPT 001, OPT 100)	
	08694-6111	MODULATOR:PIN (8694B, OPT 001, OPT 100, OPT 200)	
A5	08693-6110	DETECTOR:DIRECTIONAL (8693B, OPT 001, OPT 100)	
A6	1130-0032	DETECTOR:DIRECTIONAL (8694B, OPT 001, OPT 100, OPT 200)	
A7	08694-6110	DETECTOR:CRYSTAL (8694B, OPT 001, OPT 100, OPT 200)	
C1	0150-0052	C:FXD CER 0.05 UF 20% 400VDCW	
DS1	2140-0092	LAMP:5V 60 MA	
DS1	1450-0153	LAMPHOLDER:FOR T-1 SERIES	
DS1	1450-0157	LEN:LAMPHOLDER	
FL1	00693-604	FILTER:LOW PASS	
FL1		(8693B, OPT 001, OPT 100)	
FL1	00694-604	FILTER:LOW PASS	
FL1		(8694B, OPT 001, OPT 100, OPT 200)	
J1	1250-0083	CONNECTOR:BNC(SWEEP REF)	
P1-P10		NOT ASSIGNED	
P11	1251-1322	CONNECTOR:15 CONTACTS MALE	
P12	1251-0136	CONNECTOR:32 PIN MALE	
R1	2100-2675	R:VAR GANGED 2 X 1K OHM 20% LIN	
R2		PART OF R1	
R3	2100-0051	R:VAR COMP 20K OHM 10% CWLOG 2W	
R4		DELETED	
R5	0757-0273	R:FXD MET FLM 3.01K OHM 1% 1/8W	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
V1	1951-0020	ELECTRON TUBE:BWO (8691B) REFER TO PARAGRAPH 3-5.	
V1	1951-0064	ELECTRON TUBE:BWO 2.0 TO 4.0 GC (8692B) REFER TO PARAGRAPH 3-5.	
V1	1951-0055	ELECTRON TUBE:BWO (8692B) REFER TO PARAGRAPH 3-5.	
V1	1951-0072	ELECTRON TUBE:BWO (ALL 8692B OPT 100 MODELS) REFER TO PARAGRAPH 3-5.	
V1	1951-0057	ELECTRON TUBE:BWO (8693B) REFER TO PARAGRAPH 3-5.	
V1	1951-0065	ELECTRON TUBE:BWO (8693B) REFER TO PARAGRAPH 3-5.	
V1	1951-0084	ELECTRON TUBE:BWO (ALL 8693B OPT 100 MODELS) REFER TO PARAGRAPH 3-5.	
V1	1951-0085	ELECTRON TUBE:BWO (ALL 8694B MODELS) REFER TO PARAGRAPH 3-5.	
V1	1951-0080	ELECTRON TUBE:BWO 12.4 TO 18.0 GC (8695B) REFER TO PARAGRAPH 3-5.	

 # See introduction to this section for ordering information

Table 3-3. Parts List Indexed by Reference Designation (cont'd)

Reference Designation	Part No.	Description #	Note
W1	08691-6003	ASSY:COAX CABLE	
W2	08691-6006	ASSY:RF CABLE	
W2		(ALL 8691B & 8692B MODELS)	
W2	08693-6112	ASSY:RF CABLE	
W2		(ALL 8693B & 8694B MODELS)	
WG1	08695-20007	WAVEGUIDE ASSY	
WG1		(8695B)	
XA1	1251-0159	CONNECTOR:2X15 CONTACT	
		MISCELLANEOUS	
	0370-0133	KNOB:SKIRTED FOR 0.250" DIA SHAFT	
		(POWER LEVEL)	
	3150-0054	FILTER:AIR	
	6960-0046	PLUG-HOLE(OPT 004 MODELS)	
	08691-0107	MOUNTING PLATE:BWO	
	08691-0101	PANEL:FRONT (8691B)	
	08691-310	NUT:KNURLED(P/O RF OUTPUT JACK)	
	08691-2010	HANDLE ASSY	
	08691-2110	SCALE(1.0-2.0GHZ)8691B	
	08691-2114	PANEL:REAR(8691B THRU 8694B OPT 004 MODELS)	
	08691-2112	PANEL:REAR(8691B THRU 8695B)	
	08692-0101	PANEL:FRONT(8692B)	
	08692-0110	PANEL:FRONT(8692B OPT 100)	
	08692-2110	SCALE(2.0-4.0GHZ)8692B	
	08692-2111	SCALE(1.7-4.2GHZ)8692B OPT 100	
	08693-0101	PANEL:FRONT(8693B OPT 001)	
	08693-0108	PANEL:FRONT(8693B OPT 001,& OPT 100)	
	08693-2110	SCALE(4.0-8.0GHZ)8693B & OPT 001	
	08693-2111	SCALE(3.7-8.3GHZ)8693B & OPT 001, 100	
	08694-0101	PANEL:FRONT	
	08694-0113	PANEL:FRONT(8694B OPT 001, 100)	
	08694-0115	PANEL:FRONT(8694B & OPT 001, 200)	
	08694-2110	SCALE(8.0-12.4GHZ)8694B & OPT C01	
	08694-2111	SCALE(7.0-12.4GHZ)8694B OPT 001, 100	
	08694-2112	SCALE(7.0-11.0GHZ)8694B & OPT 001, 200	
	08695-0100	PANEL:FRONT(8695A)	
	08695-00001	BRACKET:PIN MODULATOR(8695B ONLY)	
	08695-00002	PANEL:FRONT(8695B)	
	08695-2115	PANEL:REAR(8695B & OPT 004)	
	08695-2110	SCALE:12.4-18.0 GHZ(8695B)	
	08695-60005	ADAPTER :SMA/WAVEGUIDE(8695B)	

 # See introduction to this section for ordering information

Table 3-4. Parts List Indexed by Part Number

℗ Part No.	Description #	Mfr.	Mfr. Part No.	TQ
0150-0052	C:FXD CER 0.05 UF 20% 400VDCW	56289	33C17A	1
0160-0158	C:FXD MY 0.0056 UF 10% 200VDCW	56289	192P56292-PTS	1
0160-0383	C:FXD MICA 10 UF 10% 2500VDCW	28480	0160-0383	1
0180-0089	C:FXD ELECT 10UF-10%+100% 150VDCW	56289	30D106G150DF4	1
0180-0116	C:FXD ELECT 6.8 UF 10% 35VDCW	28480	0180-0116	1
0180-0161	C:FXD ELECT 5.3 UF 20% 35VDCW	56289	150D335X0035B2-DYS	1
0370-0133	KNOB:SKIRTED FOR 0.250" DIA SHAFT	28480	0370-0133	1
0698-3151	R:FXD MET FLM 2.87K OHM 1% 1/8W	28480	0698-3151	1
0698-3157	R:FXD MET FLM 19.6K OHM 1% 1/8W	14674	C4	2
0698-3161	R:FXD MET FLM 38.3K OHM 1% 1/8W	14674	C4	3
0698-3162	R:FXD MET FLM 46.4K OHM 1% 1/8W	28480	0698-3162	1
0698-3425	R:FXD MET FLM 316K OHM 1% 1/2W	28480	0698-3425	1
0698-3428	R:FXD MET FLM 14.7 OHM 1% 1/8W	28480	0698-3428	1
0698-3442	R:FXD MET FLM 237 OHM 1% 1/8W	28480	0698-3442	1
0698-3450	R:FXD MET FLM 42.2K OHM 1% 1/8W	28480	0698-3450	3
0757-0063	R:FXD MET FLM 196K OHM 1% 1/2W	28480	0757-0063	1
0757-0123	R:FXD MET FLM 34.8K OHM 1% 1/8W	91637	MF-1/10-32	2
0757-0137	R:FXD MET FLM 750K OHM 1% 1/2W	28480	0757-0137	1
0757-0273	R:FXD MET FLM 3.01K OHM 1% 1/8W	28480	0757-0273	1
0757-0279	R:FXD MET FLM 3.16K OHM 1% 1/8W	14674	C4	2
0757-0280	R:FXD MET FLM 1K OHM 1% 1/8W	14674	C4	10
0757-0374	R:FXD MET FLM 485K OHM 1% 1/2W	28480	0757-0374	1
0757-0416	R:FXD MET FLM 511 OHM 1% 1/8W	14674	C4	1
0757-0430	R:FXD MET FLM 2.21K OHM 1% 1/8W	28480	0757-0430	1
0757-0442	R:FXD MET FLM 10.0K OHM 1% 1/8W	14674	C4	
0757-0454	R:FXD MET FLM 33.2K OHM 1% 1/8W	28480	0757-0454	1
0757-0458	R:FXD MET FLM 51.1K OHM 1% 1/8W	91637	MF-1/10-32	1
0757-0459	R:FXD MET FLM 56.2K OHM 1% 1/8W	91637	MF-1/10-32	4
0757-0462	R:FXD MET FLM 75.0K OHM 1% 1/8W	28480	0757-0462	2
0757-0463	R:FXD MET FLM 82.5K OHM 1% 1/8W	14674	C4	2
0757-0464	R:FXD MET FLM 90.9K OHM 1% 1/8W	28480	0757-0464	1
0757-0465	R:FXD MET FLM 100K OHM 1% 1/8W	28480	0757-0465	2
0757-0837	R:FXD MET FLM 8.25K OHM 1% 1/2W	28480	0757-0837	1
0760-0023	R:FXD MET FLM 150K OHM 1% 1W	28480	0760-0023	5
0761-0021	R:FXD MET FLM 1K OHM 5% 1W	28480	0761-0021	1
0761-0032	R:FXD MET OX 56K OHM 5% 1W	28480	0761-0032	1
0764-0007	R:FXD MET FLM 27K OHM 5% 2W	28480	0764-0007	1
1130-0032	DETECTOR:DIRECTIONAL	28480	1130-0032	1
1250-0083	CONNECTOR:BNC	28480	1250-0083	1
1251-0136	CONNECTOR:32 PIN MALE	02660	26-4100-32P	1
1251-0159	CONNECTOR:2X15 CONTACT	28480	1251-0159	1
1251-0494	CONNECTOR:PC 30 CONTACTS	71785	251-15-30-390	1
1251-1322	CONNECTOR:15 CONTACTS MALE	81312	SA-15P	1
1450-0157	LEN:LAMPHOLDER	08717	102XX-R	1
1450-0153	LAMPHOLDER:FOR T-1 SERIES	08717	102SR	1
1853-0010	Q:SI PNP(SELECTED FROM 2N3251)	28480	1853-0010	1
1854-0003	Q:SI NPN(SELECTED FROM 2N1711)	28480	1854-0003	4
1854-0039	Q:SI NPN	04713	2N3053	1
1854-0232	Q:SI NPN(SELECTED FROM 2N3440)	28480	1854-0232	2
1901-0033	DIODE:SILICON 100MA 180WV	07263	FD3369	3
1901-0096	DIODE:SILICON 120V	28480	1901-0096	9
1910-0016	DIODE:GERMANIUM 100MA/0.85V 60PIV	93332	D2361	1
1940-0013	ELECTRON TUBE:82.0 +/- 1V	74276	Z82R7	1
1951-0020	ELECTRON TUBE:BWO	28480	1951-0020	1
1951-0055	ELECTRON TUBE:BWO	28480	1951-0055	1

 # See introduction to this section for ordering information

Table 3-4. Parts List Indexed by Part Number (cont'd)

Part No.	Description #	Mfr.	Mfr. Part No.	TQ
1951-0057	ELECTRON TUBE:BWO	28480	1951-0057	1
1951-0058	ELECTRON TUBE:BWO	28480	1951-0058	1
1951-0064	TUBE:ELECTRON BWO 2.0 TO 4.0 GC	28480	1951-0064	1
1951-0065	ELECTRON TUBE:BWO	28480	1951-0065	1
1951-0066	ELECTRON TUBE:BWO	28480	1951-0066	1
1951-0072	ELECTRON TUBE:BWO	28480	1951-0072	1
1951-0080	TUBE:BWO 12.4-18.0 GC	28480	1951-0080	1
1951-0084	ELECTRON TUBE:BWO	28480	1951-0084	1
2100-0051	R:VAR COMP 20K OHM 10% CWLOG 2W	28480	2100-0051	1
2100-0945	R:VAR MET FLM 500K 20% LIN 3/4W	75042	CT150	2
2100-0969	R:VAR MET FLM 50K OHM 20%	75042	CT150	1
2100-1772	R:VAR WW 500 OHM 5% TYPE H 1W	28480	2100-1772	1
2100-1775	R:VAR WW 5K OHM 5% TYPE H 1W	28480	2100-1775	1
2100-1777	R:VAR WW 20K OHM 5% TYPE H 1W	28480	2100-1777	1
2100-2675	R:VAR GANGED 2 X 1K OHM 20% LIN	28480	2100-2675	1
2140-0092	LAMP:5V 60 MA	28480	2140-0092	1
3150-0054	FILTER:AIR	28480	3150-0054	1
6960-0046	PLUG-HOLE	00000	0BD#	1
0005-33001C	MODULATOR:PIN	28480	0005-33001C	1
00693-604	FILTER:LOW PASS	28480	00693-604	1
00694-604	FILTER:LOW PASS	28480	00694-604	1
08691-0101	PANEL:FRONT(8691B)	28480	08691-0101	1
08691-0107	MOUNTING PLATE:BWO	28480	08691-0107	1
08691-2010	HANDLE ASSY	28480	08691-2010	1
08691-2110	SCALE(1.0-2.0GHZ)8691B	28480	08691-2110	1
08691-2112	PANEL:REAR	28480	08691-2112	1
08691-2114	PANEL:REAR(8691B THRU 8694B)	28480	08691-2114	1
08691-6003	ASSY:COAX CABLE	28480	08691-6003	1
08691-6006	ASSY:RF CABLE	28480	08691-6006	1
08691-6103	ASSY:FREQ. SHAPE(8691B)	28480	08691-6103	1
08691-6111	MODULATOR:PIN	28480	08691-6111	1
08691-6118	BCARD ASSY:BWO TERM	28480	08691-6118	1
08692-0101	PANEL:FRONT(8692B)	28480	08692-0101	1
08692-0110	PANEL:FRONT(8692B OPT 100)	28480	08692-0110	1
08692-2110	SCALE(2.0-4.0GHZ)8692B	28480	08692-2110	1
08692-2111	SCALE(1.7-4.2GHZ)8692B	28480	08692-2111	1
08692-6101	ASSY:FREQ. SHAPE(8692B)	28480	08692-6101	1
08692-6102	ASSY:FREQ. SHAPE(8692B)	28480	08692-6102	1
08692-6103	ASSY:FREQ. SHAPE(8692B OPT 100)	28480	08692-6103	1
08692-6104	ASSY:FREQ. SHAPE(8692B OPT 100)	28480	08692-6104	1
08692-6111	MODULATOR:PIN	28480	08692-6111	1
08692-6113	ASSY:"B" MODULATOR(8691B-8695B)	28480	08692-6113	1
08693-0101	PANEL:FRONT(8693B& OPT 001)	28480	08693-0101	1
08693-0108	PANEL:FRONT(8693B & OPT 001, 100)	28480	08693-0108	1
08693-2110	SCALE(4.0-8.0GHZ)8693B & OPT 001	28480	08693-2110	1
08693-2111	SCALE(3.7-8.3GHZ)8693B & OPT 001, 100	28480	08693-2111	1
08693-6101	ASSY:FREQ. SHAPE(8693B)	28480	08693-6101	1
08693-6103	ASSY:FREQ. SHAPE(8693B OPT 100)	28480	08693-6103	1
08693-6104	ASSY:FREQ. SHAPE(8693B OPT 100)	28480	08693-6104	1
08693-6110	DETECTOR:DIRECTIONAL	28480	08693-6110	1
08693-6111	MODULATOR:PIN	28480	08693-6111	1
08693-6112	ASSY:RF CABLE	28480	08693-6112	1
08694-0101	PANEL:FRONT	28480	08694-0101	1
08694-0113	PANEL:FRONT(8694B & OPT 001, 100)	28480	08694-0113	1

 # See introduction to this section for ordering information

Table 3-4. Parts List Indexed by Part Number (cont'd)

Part No.	Description #	Mfr.	Mfr. Part No.	TQ
C8694-0115	PANEL:FRONT(8694B & OPT 001, 200)	28480	08694-0115	1
C8694-2110	SCALE(8.0-12.4GHZ)8694B & OPT 001	28480	08694-2110	1
08694-2111	SCALE(7.0-12.4GHZ)8694B OPT 001, 100	28480	08694-2111	1
08694-2112	SCALE(7.0-11.0GHZ)8694B & OPT 001, 200	28480	08694-2112	1
C8694-60001	ASSY:FREQ. SHAPE(8694B)	28480	08694-60001	1
08694-60002	ASSY:FREQ. SHAPE(8694B OPT 100)	28480	08694-60002	1
08694-60003	ASSY:FREQ. SHAPE(8694B OPT 200)	28480	08694-60003	1
08694-6101	ASSY:FREQ. SHAPE(8694B)	28480	08694-6101	1
08694-6102	ASSY:FREQ. SHAPE(8694B)	28480	08694-6102	1
08694-6103	ASSY:FREQ. SHAPE(8694B OPT 100)	28480	08694-6103	1
08694-6104	ASSY:FREQ. SHAPE(8694B OPT 100)	28480	08694-6104	1
C8694-6105	ASSY:FREQ. SHAPE(8694B OPT 200)	28480	08694-6105	1
08694-6106	ASSY:FREQ. SHAPE(8694B OPT 200)	28480	08694-6106	1
08694-6110	DETECTOR:CRYSTAL	28480	08694-6110	1
08694-6111	MODULATOR:PIN	28480	08694-6111	1
08695-00001	BRACKET:PIN MODULATOR	28480	08695-00001	1
C8695-00002	PANEL:FRONT(8695B)	28480	08695-00002	1
C8695-0100	PANEL:FRONT(8695A)	28480	08695-0100	1
C8695-20007	WAVEGUIDE ASSY	28480	08695-20007	1
C8695-2110	SCALE:12.4-18.0 GHZ(8695B)	28480	08695-2110	1
08695-2115	PANEL:REAR(8695B & OPT 004)	28480	08695-2115	1
C8695-60005	ADAPTER/SMA/WAVEGUIDE(8695B)	28480	08695-60005	1
C8695-6105	ASSY:FREQ SHAPE	28480	08695-6105	1
08731-310	NUT:KNURLED(8695B)	28480	08731-310	1

 # See introduction to this section for ordering information

Table 3-5. Code List of Manufacturers

The following code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) and their latest supplements. The date of revision and the date of the supplements used appear at the bottom of each page. Alphabetical codes have been arbitrarily assigned to suppliers not appearing in the H4 Handbooks.

Code No.	Manufacturer	Address
00000	U.S.A Common	Any supplier of U.S.
00136	McCoy Electronics	Mount Holly Springs, Pa.
00213	Sage Electronics Corp.	Rochester, N.Y.
00287	Cemco, Inc.	Danielson, Conn
00334	Humidial	Colton, Calif.
00348	Mictron, Co., Inc.	Valley Stream, N.Y.
00373	Garlock Inc.	Cherry Hill, N.J.
00656	Aerovox Corp.	New Bedford, Mass.
00779	Amp. Inc.	Harrisburg, Pa.
00781	Aircraft Radio Corp.	Boonton, N.J.
00809	Croven,Ltd.	Whitby, Ontario, Canada
00815	Northern Engineering Laboratories, Inc.	Burlington, Wis.
00853	Sangamo Electric Co., Pickens Div.	Pickens, S.C.
00866	Goe Engineering Co.	City of Industry, Cal.
00891	Carl E. Holmes Corp.	Los Angeles, Cal.
00929	Microlab Inc.	Livingston, N.J.
01002	General Electric Co., Capacitor Dept.	Hudson Falls, N.Y.
01009	Alden Products Co.	Brockton, Mass.
01121	Allen Bradley Co.	Milwaukee, Wis.
01255	Litton Industries, Inc.	Beverly Hills, Cal.
01281	TRW Semiconductors, Inc.	Lawndale, Cal.
01295	Texas Instruments, Inc., Transistor Products Div.	Dallas, Texas
01349	The Alliance Mfg. Co.	Alliance, Ohio
01538	Small Parts Inc.	Los Angeles, Cal.
01589	Pacific Relays, Inc.	Van Nuys, Cal.
01670	Gudebrod Bros. Silk Co.	New York, N.Y.
01930	Amerock Corp.	Rockford, Ill
01960	Pulse Engineering Co.	Santa Clara, Cal.
02114	Ferroxcube Corp. of America	Saugerties, N.Y.
02116	Wheelock Signals, Inc.	Long Branch, N.J.
02286	Cole Rubber and Plastics Inc.	Sunnyvale, Cal.
02660	Amphenol-Borg Electronics Corp.	Broadview, Ill.
02735	Radio Corp. of America, Semiconductor and Materials Division	Somerville, N.J.
02771	Vocaline Co. of America, Inc.	Old Saybrook, Conn.
02777	Hopkins Engineering Co.	San Fernando, Cal.
02875	Hudson Tool & Die	Newark, N.J.
03508	G.E. Semiconductor Prod. Dept.	Syracuse, N.Y.
03705	Apex Machine & Tool Co.	Dayton, Ohio
03797	Eldema Corp.	Compton, Calif.
03818	Parker Seal Co.	Los Angeles, Cal.
03877	Transitron Electric Corp.	Wakefield, Mass.
03888	Pyrofilm Resistor Co., Inc.	Cedar Knolls, N.J.
03954	Singer Co., Diehl Div., Finderne Plant	Sumerville, N.J.
04009	Arrow, Hart and Hegeman Elect. Co.	Hartford, Conn.
04013	Taruus Corp.	Lambertville, N.J.
04062	Arco Electronic Inc.	Great Neck, N.Y.
04217	Essex Wire	Los Angeles, Cal.
04222	Hi-Q Division of Aerovox	Myrtle Beach, S.C.
04354	Precision Paper Tube Co.	Wheeling, Ill.
04404	Dymec Division of Hewlett-Packard Co.	Palo Alto, Cal.
04651	Sylvania Electric Products, Microwave Device Div.	Mountain View, Cal.
04673	Dakota Engr. Inc.	Culver City, Cal.
04713	Motorola Inc, Semiconductor Prod. Div.	Phoenix, Arizona
04732	Filtron Co., Inc. Western Div.	Culver City, Cal.
04773	Automatic Electric Co.	Northlake, Ill.
04796	Sequoia Wire Co.	Redwood City, Cal.
04811	Precision Coil Spring Co.	El Monte, Cal.
04870	P. M. Motor Company	Westchester, Ill.
04919	Component Mfg. Service Co.	W. Bridgewater, Mass.
05006	Twentieth Century Plastics, Inc.	Los Angeles, Cal.
05277	Westinghouse Electric Corp. Semiconductor Dept.	Youngwood, Pa.
05347	Ultronix, Inc.	San Mateo, Cal.
05397	Union Carbine Corp., Elect. Div.	New York, N.Y.
05574	Viking Ind. Inc.	Canoga Park, Cal.
05593	Icore Electro-Plastics Inc.	Sunnyvale, Cal.
05616	Cosmo Plastic (c/o Electrical Spec. Co.)	Cleveland, Ohio
05624	Barber Colman Co.	Rockford, Ill.
05728	Tiffen Optical Co.	Roslyn Heights, Long Island, N.Y.
05729	Metro-Tel Corp.	Westbury, N.Y.
05783	Stewart Engineering Co.	Santa Cruz, Cal.
05820	Wakefield Engineering Inc.	Wakefield, Mass.
06004	Bassick Co., Div. of Stewart Warner Corp.	Bridgeport, Conn.
06090	Raychem Corp.	Redwood City, Cal.
06175	Bausch and Lomb Optical Co.	Rochester, N.Y.
06402	E.T.A. Products Co. of America	Chicago, Ill.
06540	Amatom Electronic Hardware Co., Inc.	New Rochelle, N.Y.
06555	Beede Electrical Instrument Co., Inc.	Penacook, N.H.
06666	General Devices Co., Inc.	Indianapolis, Ind.
06751	Components Inc., Ariz. Div.	Phoenix, Arizona
06812	Torrington Mfg. Co., West Div.	Van Nuys, Cal.
06980	Varian Assoc. Etmac Div.	San Carlos, Cal.
07088	Kelvin Electric Co.	Van Nuys, Cal.
07126	Digitran Co.	Pasadena, Cal.
07137	Transistor Electronics Corp.	Minneapolis, Minn.
07138	Westinghouse Electric Corp., Electronic Tube Div.	Elmira, N.Y.
07149	Filmohm Corp.	New York, N.Y.
07233	Cinch-Graphik Co.	City of Industry, Cal.
07256	Silicon Transistor Corp.	Carle Place, N.Y.
07261	Avnet Corp.	Culver City, Cal.
07263	Fairchild Camera & Inst. Corp., Semiconductor Div.	Mountain View, Cal.
07322	Minnesota Rubber Co.	Minneapolis, Minn.
07387	Birtcher Corp, The	Monterey Park, Cal.
07397	Sylvania Elect. Prod. Inc., Mt. View Operations	Mountain View, Cal.
07700	Technical Wire Products Inc.	Cranford, N.J.
07829	Bodine Elect. Co.	Chicago, Ill.
07910	Continental Device Corp.	Hawthorne, Cal.
07933	Raytheon Mfg. Co., Semiconductor Div.	Mountain View, Cal.
07980	Hewlett-Packard Co., Boonton Radio Div.	Rockaway, N.J.
08145	U.S. Engineering Co.	Los Angeles, Cal.
08289	Blinn, Delbert Co.	Pomona, Cal.
08358	Burgess Battery Co.	Niagara Falls, Ontario, Canada
08524	Deutsch Fastener Corp.	Los Angeles, Cal.
08664	Bristol Co., The	Waterbury, Conn.
08717	Sloan Company	Sun Valley, Cal.
08718	ITT Cannon Electric Inc., Phoenix Div.	Phoenix, Arizona
08727	National Radio Lab. Inc.	Paramus, N.J.
08792	CBS Electronics Semiconductor Operations, Div. of CBS Inc.	Lowell, Mass.
08806	General Electric Co., Miniature Lamp Dept.	Cleveland, Ohio
08984	Mel-Rain	Indianapolis, Ind.
09026	Babcock Relays Div.	Costa Mesa, Cal.
09134	Texas Capacitor Co.	Houston, Texas
09145	Tech. Ind. Inc. Atohm Elect.	Burbank, Cal.
09250	Electro Assemblies, Inc.	Chicago, Ill.
09353	C & K Components Inc.	Newton, Mass.
09569	Mallory Battery Co. of Canada, Ltd.	Toronto, Ontario, Canada
09922	Burndy Corp.	Norwalk, Conn.
10214	General Transistor Western Corp.	Los Angeles, Cal.

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H4-1 Dated AUGUST 1966

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Table 3-5. Code List of Manufacturers (cont'd)

Code No.	Manufacturer	Address
10411	Ti-Tal, Inc.	Berkeley, Cal.
10646	Carborundum Co.	Niagara Falls, N.Y.
11236	CTS of Berne, Inc.	Berne, Ind.
11237	Chicago Telephone of California, Inc.	So. Pasadena, Cal.
11242	Bay State Electronics Corp.	Waltham, Mass.
11312	Teledyne Inc., Microwave Div.	Palo Alto, Cal.
11314	National Seal	Downey, Cal.
11453	Precision Connector Corp.	Jamaica, N.Y.
11534	Duncan Electronics Inc.	Costa Mesa, Cal.
11711	General Instrument Corp., Semiconductor Division, Products Group	Newark, N.J.
11717	Imperial Electronic, Inc.	Buena Park, Cal.
11870	Melabs, Inc.	Palo Alto, Cal.
12136	Philadelphia Handle Co.	Camden, N.J.
12361	Grove Mfg. Co., Inc.	Shady Grove, Pa.
12574	Gulton Ind. Inc., Data System Div.	Albuquerque, N.M.
12697	Clarostat Mfg. Co.	Dover, N.H.
12728	Elmar Filter Corp.	W. Haven, Conn.
12859	Nippon Electric Co., Ltd.	Tokyo, Japan
12881	Metex Electronics Corp.	Clark, N.J.
12930	Delta Semiconductor Inc.	Newport Beach, Cal.
12954	Dickson Electronics Corp.	Scottsdale, Arizona
13019	Airco Supply Co., Inc.	Witchita, Kansas
13103	Thermolloy	Dallas, Texas
13396	Telefunken (GmbH)	Hanover, Germany
13835	Midland-Wright Div. of Pacific Industries, Inc.	Kansas City, Kansas
14099	Sem-Tech	Newbury Park, Cal.
14193	Calif. Resistor Corp.	Santa Monica, Cal.
14298	American Components, Inc.	Conshohocken, Pa.
14433	ITT Semiconductor, A Div. of Int. Telephone & Telegraph Corporation	West Palm Beach, Fla.
14493	Hewlett-Packard Company	Loveland, Colo.
14655	Cornell Dublier Electric Corp.	Newark, N.J.
14674	Corning Glass Works	Corning, N.Y.
14752	Electro Cube Inc.	San Gabriel, Cal.
14960	Williams Mfg. Co.	San Jose, Cal.
15106	The Sphere Co., Inc.	Little Falls, N.J.
15203	Webster Electronics Co.	New York, N.Y.
15287	Scionics Corp.	Northridge, Cal.
15291	Adjustable Bushing Co.	N. Hollywood, Cal.
15558	Micron Electronics	Garden City, Long Island, N.Y.
15566	Amprobe Inst. Corp.	Lynbrook, N.Y.
15631	Cabletronics	Costa Mesa, Cal.
15772	Twentieth Century Coil Spring Co.	Santa Clara, Cal.
15801	Fenwal Elect. Inc.	Framingham, Mass.
15818	Amelco Inc.	Mountain View, Cal.
16037	Spruce Pine Mica Co.	Spruce Pine, N.C.
16179	Omni-Spectra Inc.	Detroit, Ill.
16352	Computer Diode Corp.	Lodi, N.J.
16585	Boots Aircraft Nut Corp.	Pasadena, Cal.
16688	Ideal Prec. Meter Co., Inc., De Jur Meter Div.	Brooklyn, N.Y.
16758	Delco Radio Div. of G.M. Corp.	Kokoma, Ind.
17109	Thermonetics Inc.	Canoga Park, Cal.
17474	Tranex Company	Mountain View, Cal.
17675	Hamlin Metal Products Corp.	Akron, Ohio
17745	Angstrohm Prec. Inc.	No. Hollywood, Cal.
17856	Siliconix Inc.	Sunnyvale, Cal.
17870	McGraw-Edison Co.	Manchester, N.H.
18042	Power Design Pacific Inc.	Palo Alto, Cal.
18083	Clevite Corp., Semiconductor Div.	Palo Alto, Cal.
18324	Signetics Corp.	Sunnyvale, Cal.
18476	Ty-Car Mfg. Co., Inc.	Holliston, Mass.
18486	TRW Elect. Comp. Div.	Des Plaines, Ill.
18583	Curtis Instrument, Inc.	Mt. Kisco, N.Y.
18612	Vishay Instruments Inc.	Malvern, Pa.
18873	E.I. DuPont and Co., Inc.	Wilmington, Del.
18911	Durant Mfg. Co.	Milwaukee, Wis.
19315	The Bendix Corp., Navigation & Control Div.	Teterboro, N.J.
19500	Thomas A. Edison Industries, Div. of McGraw-Edison Co.	West Orange, N.J.
19589	Concoa	Baldwin Park, Cal.
19644	LRC Electronics	Horseheads, N.Y.
19701	Electra Mfg. Co.	Independence, Kansas
20183	General Atronics Corp.	Philadelphia, Pa.
21226	Executone, Inc.	Long Island City, N.Y.
21355	Fafnir Bearing Co., The	New Britian, Conn.
21520	Fansteel Metallurgical Corp.	N. Chicago, Ill.
23042	Texscan Corp.	Indianapolis, Ind.
23783	British Radio Electronics Ltd.	Washington, D.C.
24455	G.E. Lamp Division	Nela Park, Cleveland, Ohio
24655	General Radio Co.	West Concord, Mass.
24681	Memcor Inc., Comp. Div.	Huntington, Ind.
26365	Gries Reproducer Corp.	New Rochelle, N.Y.
26462	Grobert File Co. of America, Inc.	Carlstadt, N.J.
26851	Compac/Hollister Co.	Hollister, Cal.
26992	Hamilton Watch Co.	Lancaster, Pa.
28480	Hewlett-Packard Co.	Palo Alto, Cal.
28520	Heyman Mfg. Co.	Kenilworth, N.J.
30817	Instrument Specialties Co., Inc.	Little Falls, N.J.
33173	G.E. Receiving Tube Dept.	Owensboro, Ky.
35434	Lectrohm Inc.	Chicago, Ill.
36196	Stanwyck Coil Products, Ltd.	Hawkesbury, Ontario, Canada
36287	Cunningham, W.H. & Hill, Ltd.	Toronto, Ontario, Canada
37942	P.R. Mallory & Co., Inc.	Indianapolis, Ind.
39543	Mechanical Industries Prod. Co.	Akron, Ohio
40920	Miniature Precision Bearings, Inc.	Keene, N.H.
42190	Muter Co.	Chicago, Ill.
43990	C.A. Norgren Co.	Englewood, Colo.
44655	Ohmite Mfg. Co.	Skokie, Ill.
46384	Penn Eng. & Mfg. Corp.	Doylestown, Pa.
47904	Polaroid Corp.	Cambridge, Mass.
48620	Precision Thermometer & Inst. Co.	Southampton, Pa.
49956	Microwave & Power Tube Div.	Waltham, Mass.
52090	Rowan Controller Co.	Westminster, Md.
52983	Sanborn Company	Waltham, Mass.
54294	Shallcross Mfg. Co.	Selma, N.C.
55026	Simpson Electric Co.	Chicago, Ill.
55933	Sonotone Corp.	Elmsford, N.Y.
55938	Raytheon Co. Commercial Apparatus & System Div.	So. Norwalk, Conn.
56137	Spaulding Fibre Co., Inc.	Tonawanda, N.Y.
56289	Sprague Electric Co.	North Adams, Mass.
59446	Telex Corp.	Tulsa, Okla.
59730	Thomas & Betts Co.	Elizabeth, N.J.
60741	Triplett Electrical Inst. Co.	Bluffton, Ohio
61775	Union Switch and Signal, Div. of Westinghouse Air Brake Co.	Pittsburgh, Pa.
62119	Universal Electric Co.	Owosso, Mich.
63743	Ward-Leonard Electric Co.	Mt. Vernon, N.Y.
64959	Western Electric Co., Inc.	New York, N.Y.
65092	Weston Inst. Inc. Weston-Newark	Newark, N.J.
66295	Wittek Mfg. Co.	Chicago, Ill.
66346	Minnesota Mining & Mfg. Co. Revere Mincom Div.	St. Paul, Minn.
70276	Allen Mfg. Co.	Hartford, Conn.
70309	Allied Control	New York, N.Y.
70318	Allmetal Screw Product Co., Inc.	Garden City, N.Y.
70417	Amplex, Div. of Chrysler Corp.	Detroit, Mich.
70485	Atlantic India Rubber Works, Inc.	Chicago, Ill.
70563	Amperite Co., Inc.	Union City, N.J.
70674	ADC Products Inc.	Minneapolis, Minn.
70903	Belden Mfg. Co.	Chicago, Ill.
70998	Bird Electric Corp.	Cleveland, Ohio
71002	Birnbach Radio Co.	New York, N.Y.
71034	Bliley Electric Co., Inc.	Erie, Pa.
71041	Boston Gear Works Div. of Murray Co. of Texas	Quincey, Mass.
71218	Bud Radio, Inc.	Willoughby, Ohio
71279	Cambridge Thermionics Corp.	Cambridge, Mass.
71286	Camloc Fastener Corp.	Paramus, N.J.
71313	Cardwell Condenser Corp.	Lindenhurst, L.I., N.Y.
71400	Bussmann Mfg. Div. of McGraw-Edison Co.	St.Louis, Mo.

Table 3-5. Code List of Manufacturers (cont'd)

Code No.	Manufacturer	Address
71436	Chicago Condenser Corp.	Chicago, Ill.
71447	Calif. Spring Co., Inc.	Pico-Rivera, Cal.
71450	CTS Corp.	Elkhart, Ind.
71468	ITT Cannon Electric Inc.	Los Angeles, Cal.
71471	Cinema, Div. Aerovox Corp.	Burbank, Cal.
71482	C.P. Clare & Co.	Chicago, Ill.
71590	Centralab Div. of Globe Union Inc.	Milwaukee, Wis.
71616	Commercial Plastics Co.	Chicago, Ill.
71700	Cornish Wire Co., The	New York, N.Y.
71707	Coto Coil Co., Inc.	Providence, R.I.
71744	Chicago Miniature Lamp Works	Chicago, Ill.
71785	Cinch Mfg. Co., Howard B. Jones Div.	Chicago, Ill.
71984	Dow Corning Corp.	Midland, Mich.
72136	Electro Motive Mfg. Co., Inc.	Willimantic, Conn.
72619	Dialight Corp.	Brooklyn, N.Y.
72656	Indiana General Corp., Electronics Div.	Keasby, N.J.
72699	General Instrument Corp., Cap. Div.	Newark, N.J.
72765	Drake Mfg. Co.	Harwood Heights, Ill.
72825	Hugh H. Eby Inc.	Philadelphia, Pa.
72928	Gudeman Co.	Chicago, Ill.
72962	Elastic Stop Nut Corp.	Union, N.J.
72964	Robert M. Hadley Co.	Los Angeles, Cal.
72982	Erie Technological Products, Inc.	Erie, Pa.
73061	Hansen Mfg. Co., Inc.	Princeton, Ind.
73076	H.M. Harper Co.	Chicago, Ill.
73138	Helipot Div. of Beckman Inst. Inc.	Fullerton, Cal.
73293	Hughes Products Division of Hughes Aircraft Co.	Newport Beach, Cal.
73445	Amperex Elect. Co.	Hicksville, L.I., N.Y.
73506	Bradley Semiconductor Corp.	New Haven, Conn.
73559	Carling Electric, Inc.	Hartford, Conn.
73586	Circle F Mfg. Co.	Trenton, N.J.
73682	George K. Garrett Co., Div. MSL Industries Inc.	Philadelphia, Pa.
73734	Federal Screw Products Inc.	Chicago, Ill.
73743	Fischer Special Mfg. Co.	Cincinnati, Ohio
73793	General Industries Co., The	Elyria, Ohio
73846	Goshen Stamping & Tool Co.	Goshen, Ind.
73899	JFD Electronics Corp.	Brooklyn, N.Y.
73905	Jennings Radio Mfg. Corp.	San Jose, Cal.
73957	Groove-Pin Corp.	Ridgefield, N.J.
74276	Signalite Inc.	Neptune, N.J.
74455	J.H. Winns, and Sons	Winchester, Mass.
74861	Industrial Condenser Corp.	Chicago, Ill.
74868	R.F. Products Division of Amphenol-Borg Electronics Corp.	Danbury, Conn.
74970	E.F. Johnson Co.	Waseca, Minn.
75042	International Resistance Co.	Philadelphia, Pa.
75263	Keystone Carbon Co., Inc.	St. Marys, Pa.
75378	CTS Knights Inc.	Sandwich, Ill.
75382	Kulka Electric Corporation	Mt. Vernon, N.Y.
75818	Lenz Electric Mfg. Co.	Chicago, Ill.
75915	Littlefuse, Inc.	Des Plaines, Ill.
76005	Lord Mfg. Co.	Erie, Pa.
76210	C.W. Marwedel	San Francisco, Cal.
76433	General Instrument Corp., Micamold Division	Newark, N.J.
76487	James Millen Mfg. Co., Inc.	Malden, Mass.
76493	J.W. Miller Co.	Los Angeles, Cal.
76530	Cinch-Monadnock, Div. of United Carr Fastener Corp.	San Leandro, Cal.
76545	Mueller Electric Co.	Cleveland, Ohio
76703	National Union	Newark, N.J.
76854	Oak Manufacturing Co.	Crystal Lake, Ill.
77068	The Bendix Corp., Electrodynamics Div.	N. Hollywood, Cal.
77075	Pacific Metals Co.	San Francisco, Cal.
77221	Phanostran Instrument and Electronic Co.	So. Pasadena, Cal.
77252	Philadelphia Steel and Wire Corp.	Philadelphia, Pa.
77342	American Machine & Foundry Co. Potter & Brumfield Div.	Princeton, Ind.
77630	TRW Electronic Components Div.	Camden, N.J.
77638	General Instrument Corp., Rectifier Div.	Brooklyn, N.Y.
77764	Resistance Products Co.	Harrisburg, Pa.
77969	Rubbercraft Corp. of Calif.	Torrance, Cal.
78189	Shakeproof Division of Illinois Tool Works	Elgin, Ill.
78277	Sigma	So. Braintree, Mass.
78283	Signal Indicator Corp.	New York, N.Y.
78290	Struthers-Dunn Inc.	Pitman, N.J.
78452	Thompson-Bremer & Co.	Chicago, Ill.
78471	Tilley Mfg. Co.	San Francisco, Cal.
78488	Stackpole Carbon Co.	St. Marys, Pa.
78493	Standard Thomson Corp.	Waltham, Mass.
78553	Tinnerman Products, Inc.	Cleveland, Ohio
78790	Transformer Engineers	San Gabriel, Cal.
78947	Ucinite Co.	Newtonville, Mass.
79136	Waldes Kohinoor Inc.	Long Island City, N.Y.
79142	Veeder Root, Inc.	Hartford, Conn.
79251	Wenco Mfg. Co.	Chicago, Ill.
79727	Continental-Wirt Electronics Corp.	Philadelphia, Pa.
79963	Zierick Mfg. Corp.	New Rochelle, N.Y.
80031	Mepco Division of Sessions Clock Co.	Morristown, N.J.
80033	Prestole Corp.	Toledo, Ohio
80120	Schnitzer Alloy Products Co.	Elizabeth, N.J.
80131	Electronic Industries Association. Any Brand Tube meeting EIA Standards-Washington, D.C.	
80207	Unimax Switch, Div. Maxon Electronics Corp.	Wallingford, Conn.
80223	United Transformer Corp.	New York, N.Y.
80248	Oxford Electric Corp.	Chicago, Ill.
80294	Bourns Inc.	Riverside, Cal.
80411	Arco Div. of Robertshaw Controls Co.	Columbus, Ohio
80486	All Star Products Inc.	Defiance, Ohio
80509	Avery Label Co.	Monrovia, Cal.
80583	Hammarlund Co., Inc.	Mars Hill, N.C.
80640	Stevens, Arnold, Co., Inc.	Boston, Mass.
80813	Dimco Gray Co.	Dayton, Ohio
81030	International Instruments Inc.	Orange, Conn.
81073	Grayhill Co.	LaGrange, Ill.
81095	Triad Transformer Corp.	Venice, Cal.
81312	Winchester Elec. Div. Litton Ind., Inc.	Oakville, Conn.
81349	Military Specification	
81483	International Rectifier Corp.	El Sugundo, Cal.
81541	Airpax Electronics, Inc.	Cambridge, Maryland
81860	Barry Controls, Div. Barry Wright Corp.	Watertown, Mass.
82042	Carter Precision Electric Co.	Skokie, Ill.
82047	Sperti Faraday Inc., Copper Hewitt Electric Div.	Hoboken, N.J.
82116	Electric Regulator Corp.	Norwalk, Conn.
82142	Jeffers Electronics Division of Speer Carbon Co.	Du Bois, Pa.
82170	Fairchild Camera & Inst. Corp., Space & Defense Systems Div.	Paramus, N.J.
82209	Maguire Industries, Inc.	Greenwich, Conn.
82219	Sylvania Electric Prod. Inc., Electronic Tube Division	Emporium, Pa.
82376	Astron Corp.	East Newark, Harrison, N.J.
82389	Switchcraft, Inc.	Chicago, Ill.
82647	Metals & Controls Inc., Spencer Products	Attleboro, Mass.
82768	Phillips-Advance Control Co.	Joliet, Ill.
82866	Research Products Corp.	Madison, Wis.
82877	Roltron Mfg. Co., Inc.	Woodstock, N.Y.
82893	Vector Electronic Co.	Glendale, Cal.
83058	Carr Fastener Co.	Cambridge, Mass.
83086	New Hampshire Ball Bearing, Inc.	Peterborough, N.H.
83125	General Instrument Corp., Capacitor Div.	Darlington, S.C.
83148	ITT Wire and Cable Div.	Los Angeles, Cal.
83186	Victory Eng. Corp.	Springfield, N.J.
83298	Bendix Corp., Red Bank Div.	Red Bank, N.J.
83315	Hubbell Corp.	Mundelein, Ill.
83324	Rosan Inc.	Newport Beach, Cal.
83330	Smith, Herman H., Inc.	Brooklyn, N.Y.
83332	Tech Labs	Palisades Park, N.J.
83385	Central Screw Co.	Chicago, Ill

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Table 3-5. Code List of Manufacturers (cont'd)

Code No.	Manufacturer	Address
83501	Gavitt Wire and Cable Co., Div. of Amerace Corp.	Brookfield, Mass.
83594	Burroughs Corp Electronic Tube Div.	Plainfield, N.J.
83740	Union Carbide Corp. Consumer Prod. Div.	New York, N.Y.
83777	Model Eng. and Mfg., Inc.	Huntington, Ind.
83821	Loyd Scruggs Co.	Festus, Mo.
83942	Aeronautical Inst. & Radio Co.	Lodi, N.J.
84171	Arco Electronics Inc.	Great Neck, N.Y.
84396	A.J. Glesener Co., Inc.	San Francisco, Cal.
84411	TRW Capacitor Div.	Ogallala, Neb.
84970	Sarkes Tarzian, Inc.	Bloomington, Ind.
85454	Boonton Molding Company	Boonton, N.J.
85471	A.B. Boyd Co.	San Francisco, Cal.
85474	R.M. Bracamonte & Co.	San Francisco, Cal.
85660	Koiled Kords, Inc.	Hamden, Conn.
85911	Seamless Rubber Co.	Chicago, Ill.
86174	Fafnir Bearing Co.	Los Angeles, Calif.
86197	Clifton Precision Products Co., Inc.	Clifton Heights, Pa.
86579	Precision Rubber Products Corp.	Dayton, Ohio
86684	Radio Corp. of America, Electronic Comp. & Devices Div.	Harrison, N.J.
86928	Seastrom Mfg. Co.	Glendale, Cal.
87034	Marco Industries	Anaheim, Cal.
87216	Philco Corporation (Lansdale Division)	Lansdale, Pa.
87473	Western Fibrous Glass Products Co.	San Francisco, Cal.
87664	Van Waters & Rogers Inc.	San Francisco, Cal.
87930	Tower Mfg. Corp.	Providence, R.I.
88140	Cutler-Hammer, Inc.	Lincoln, Ill.
88220	Gould-National Batteries, Inc.	St. Paul, Minn.
88698	General Mills, Inc.	Buffalo, N.Y.
89231	Graybar Electric Co.	Oakland, Cal.
89473	G.E. Distributing Corp.	Schenectady, N.Y.
89665	United Transformer Co.	Chicago, Ill.
90030	United Shoe Machinery Corp.	Beverly, Mass.
90179	U S Rubber Co., Consumer Ind. & Plastics Prod. Div.	Passaic, N.J.
90763	United Carr Fastener Corp	Chicago, Ill.
90970	Bearing Engineering Co.	San Francisco, Cal.
91146	ITT Cannon Elect. Inc., Salem Div.	Salem, Mass.
91260	Connor Spring Mfg. Co.	San Francisco, Cal.
91345	Miller Dial & Nameplate Co.	El Monte, Cal.
91418	Radio Materials Co.	Chicago, Ill.
91506	Augat Inc.	Attleboro, Mass.
91637	Dale Electronics, Inc.	Columbus, Nebr.
91662	Elco Corp.	Willow Grove, Pa.
91737	Gremar Mfg. Co., Inc.	Wakefield, Mass.
91827	K F Development Co.	Redwood City, Cal.
91886	Malco Mfg. Co., Inc.	Chicago, Ill.
91929	Honeywell Inc., Micro Switch Div.	Freeport, Ill.
91961	Nahm-Bros, Spring Co.	Oakland, Cal.
92180	Tru-Connector Corp.	Peabody, Mass.
92367	Elgeet Optical Co., Inc.	Rochester, N.Y.
92607	Tensolite Insulated Wire Co., Inc.	Tarrytown, N.Y.
92702	IMC Magnetics Corp.	Westbury, Long Island, N.Y.
92966	Hudson Lamp Co.	Kearney, N.J.
93332	Slyvania Electric Prod. Inc., Semiconductor Div.	Woburn, Mass.
93369	Robbins & Myers Inc.	Pallisades Park, N.J.
93410	Stemco Controls, Div. of Essex Wire Corp.	Mansfield, Ohio
93632	Waters Mfg. Co.	Culver City, Cal.
93929	G.V. Controls	Livingston, N.J.
94137	General Cable Corp.	Bayonne, N.J.
94144	Raytheon Co., Comp. Div., Ind. Comp. Operations	Quincy, Mass.
94148	Scientific Electronics Products, Inc.	Loveland, Colo.
94154	Wagner Elect. Corp., Tung-Sol Div.	Newark, N.J.
94197	Curtiss-Wright Corp. Electronics Div.	East Patterson, N.J.
94222	South Chester Corp.	Chester, Pa.
94330	Wire Cloth Products, Inc.	Bellwood, Ill.
94375	Automatic Metal Products Co.	Brooklyn, N.Y.
94682	Worcester Pressed Aluminum Corp.	Worcester, Mass.
94696	Magnecraft Electric Co.	Chicago, Ill.
95023	George A. Philbrick Researchers, Inc.	Boston, Mass.
95236	Allies Products Corp.	Diania, Fla.
95238	Continental Connector Corp.	Woodside, N.Y.
95263	Leecraft Mfg. Co., Inc.	Long Island, N.Y.
95265	National Coil Co.	Sheridan, Wyo.
95275	Vitramon, Inc.	Bridgeport, Conn.
95348	Gordos Corp.	Bloomfield, N.J.
95354	Methode Mfg. Co.	Rolling Meadows, Ill.
95566	Arnold Engineering Co.	Marengo, Ill.
95712	Dage Electric Co., Inc.	Franklin, Ind.
95984	Siemon Mfg. Co.	Wayne, Ill.
95987	Weckesser Co.	Chicago, Ill.
96067	Microwave Assoc., West Inc.	Sunnyvale, Cal.
96095	Hi-Q Div. of Aerovox Corp.	Olean, N.Y.
96256	Thordarson-Meissner Inc.	Mt. Carmel, Ill.
96296	Solar Manufacturing Co.	Los Angeles, Cal.
96396	Microswitch, Div. of Minn.-Honeywell	Freeport, Ill.
96330	Carlton Screw Co.	Chicago, Ill
96341	Microwave Associates, Inc.	Burlington, Mass.
96501	Excel Transformer Co.	Oakland, Cal.
96508	Xcelite Inc.	Orchard Park, N.Y.
96733	San Fernando Elect. Mfg. Co.	San Fernando, Cal.
96881	Thomson Ind. Inc.	Long Island, N.Y.
97464	Industrial Retaining Ring Co.	Irvington, N.J.
97539	Automatic & Precision Mfg.	Englewood, N.J.
97979	Reon Resistor Corp.	Yonkers, N.Y.
97983	Litton System Inc., Adler-Westrex Commun. Div.	New Rochelle, N.Y.
98141	R-Tronics, Inc.	Jamaica, N.Y.
98159	Rubber Teck, Inc.	Gardena, Cal.
98220	Hewlett-Packard Co., Moseley Div.	Pasadena, Cal.
98278	Microdot, Inc.	So. Pasadena, Cal.
98291	Sealectro Corp.	Mamaronech, N.Y.
98376	Zero Mfg. Co.	Burbank, Cal.
98410	Etc Inc.	Cleveland, Ohio
98731	General Mills Inc., Electronics Div.	Minneapolis, Minn.
98734	Paeco Div. of Hewlett-Packard Co.	Palo Alto, Cal.
98821	North Hills Electronics, Inc.	Glen Cove, N.Y.
98978	International Electronic Research Corp.	Burbank, Cal.
99109	Columbia Technical Corp.	New York, N.Y.
99313	Varian Associates	Palo Alto, Cal
99378	Atlee Corp.	Winchester, Mass.
99515	Marshall Ind., Capacitor Div.	Monrovia, Cal.
99707	Control Switch Division, Controls Co. of America	El Segundo, Cal.
99800	Delevan Electronics Corp.	East Aurora, N.Y.
99848	Wilco Corporation	Indianapolis, Ind.
99928	Branson Corp.	Whippany, N.J.
99934	Rembrandt, Inc.	Boston, Mass.
99942	Hoffman Electronics Corp., Semiconductor Div.	El Monte, Cal.
99957	Technology Instrument Corp. of Calif.	Newbury Park, Cal.

The following HP Vendors have no number assigned in the latest supplement to the Federal Supply Code for Manufacturers Handbook.

0000F	Malco Tool and Die	Los Angeles, Calif.
0000Z	Willow Leather Products Corp.	Newark, N.J.
000AB	ETA	England
000BB	Precision Instrument Components Co.	Van Nuys, Cal.
000CS	Hewlett-Packard Co., Colorado Springs	Colorado Springs, Colorado
000MM	Rubber Eng. & Development	Hayward, Cal.
000NN	A "N" D Mfg. Co.	San Jose, Cal.
000QQ	Cooltron	Oakland, Cal.
000WW	California Eastern Lab	Burlington, Cal.
000YY	S.K. Smith Co.	Los Angeles, Cal.

SECTION IV
SCHEMATIC DIAGRAMS

4-1. INTRODUCTION

4-2. Schematic presentations in this manual show electrical circuit operation and are not intended to serve as wiring diagrams. Figure 4-1 lists notes which apply to the schematic diagrams.

4-3. Some switch and circuit board assemblies are shown in part on different pages. To find a specific instrument component, refer to the REFERENCE DESIGNATIONS box which appears on each 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 included in Section III. Refer to page 3-1 for information on how to order parts.

SCHEMATIC DIAGRAM NOTES

Refer to MIL Std 15B for Symbols Not Shown

Resistance is in ohms and capacitance is in microfarads 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.


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


Numbers in circles 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 stripe. E.g., (947) denotes white base, yellow wide stripe, violet narrow stripe.


Voltage regulator (breakdown diode).


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


Denotes FET with P-type base.

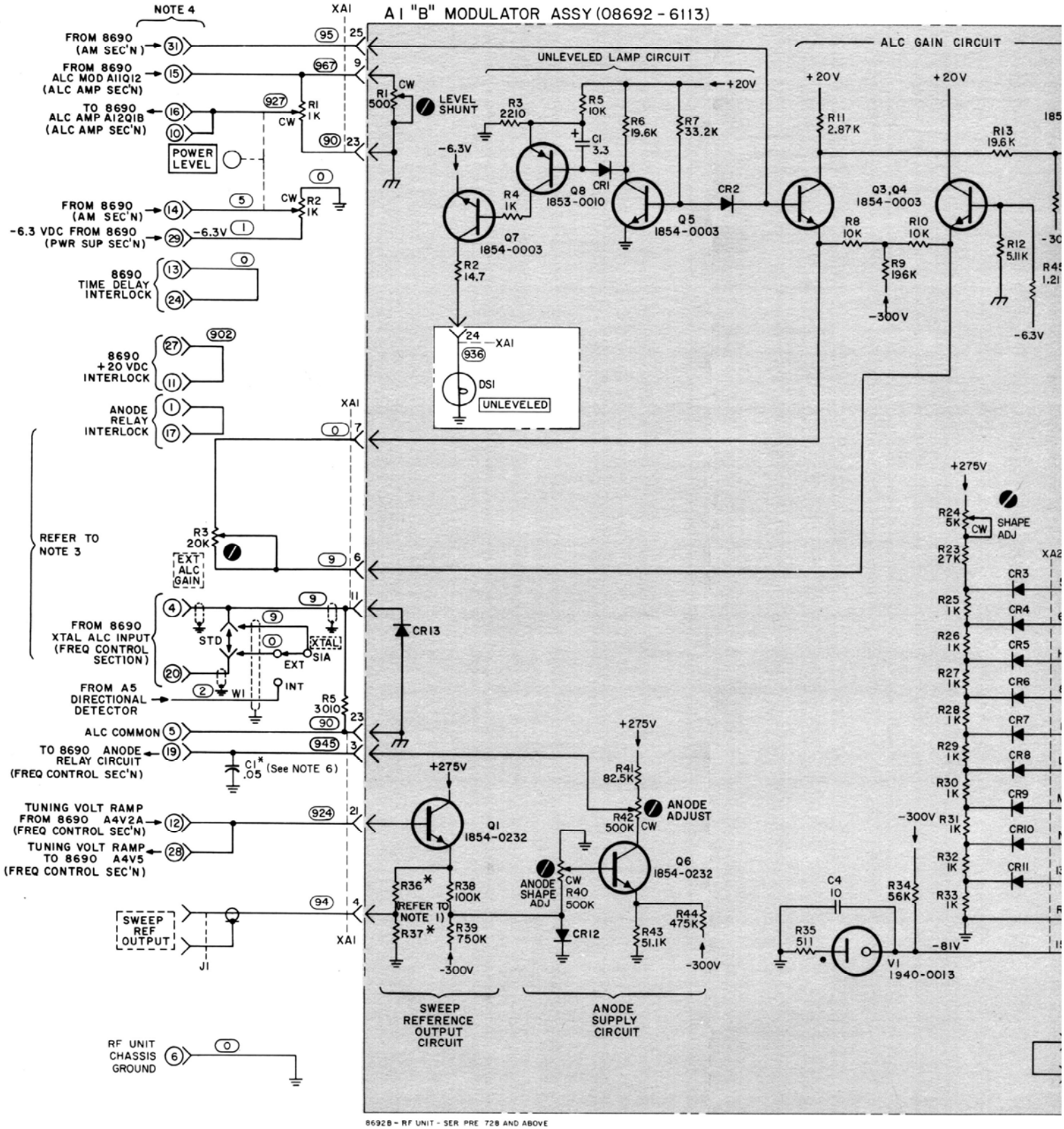

Denotes Capacitive diode (Varicap, varactor).

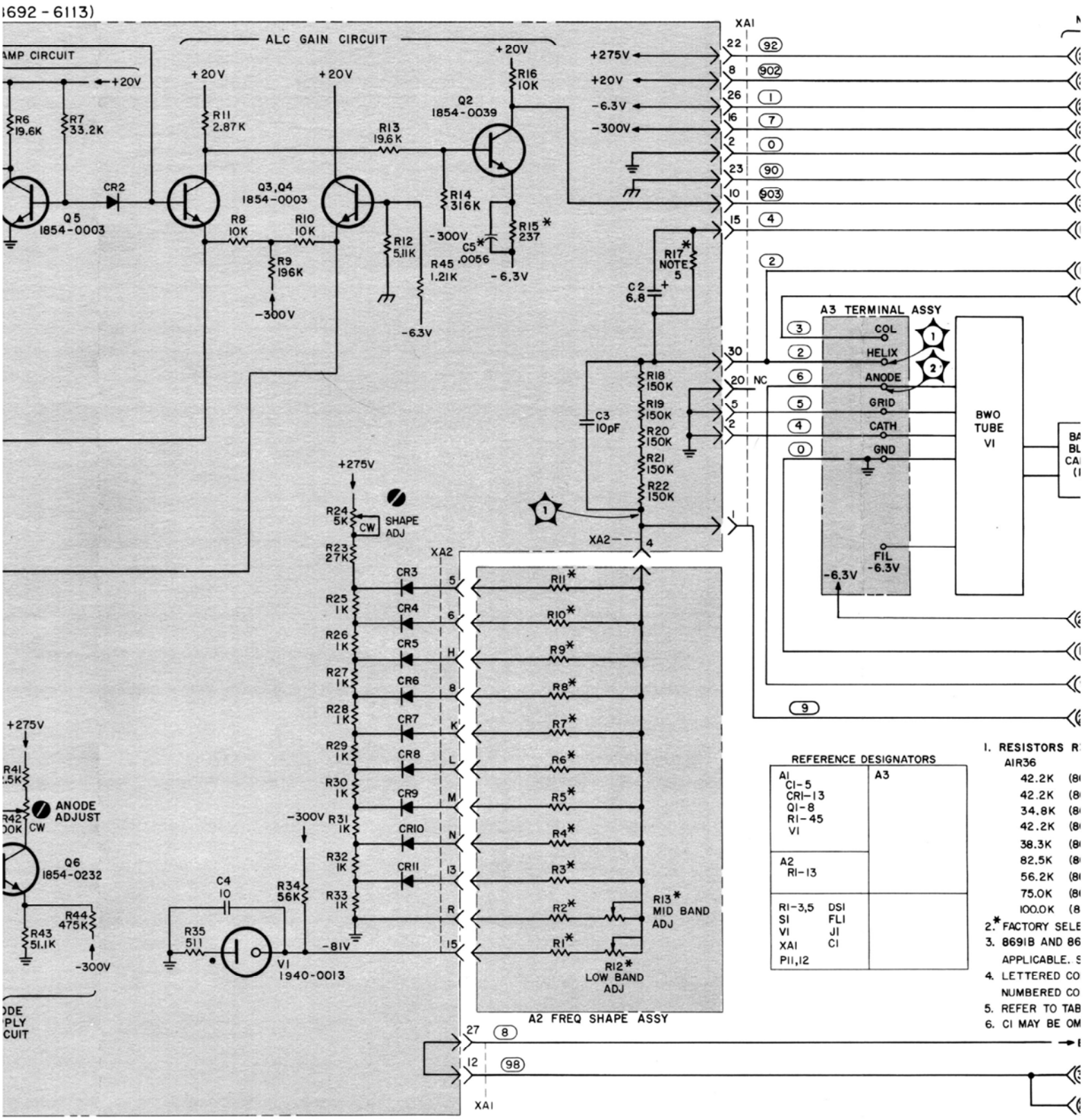

Denotes Silicon Controlled Rectifier.

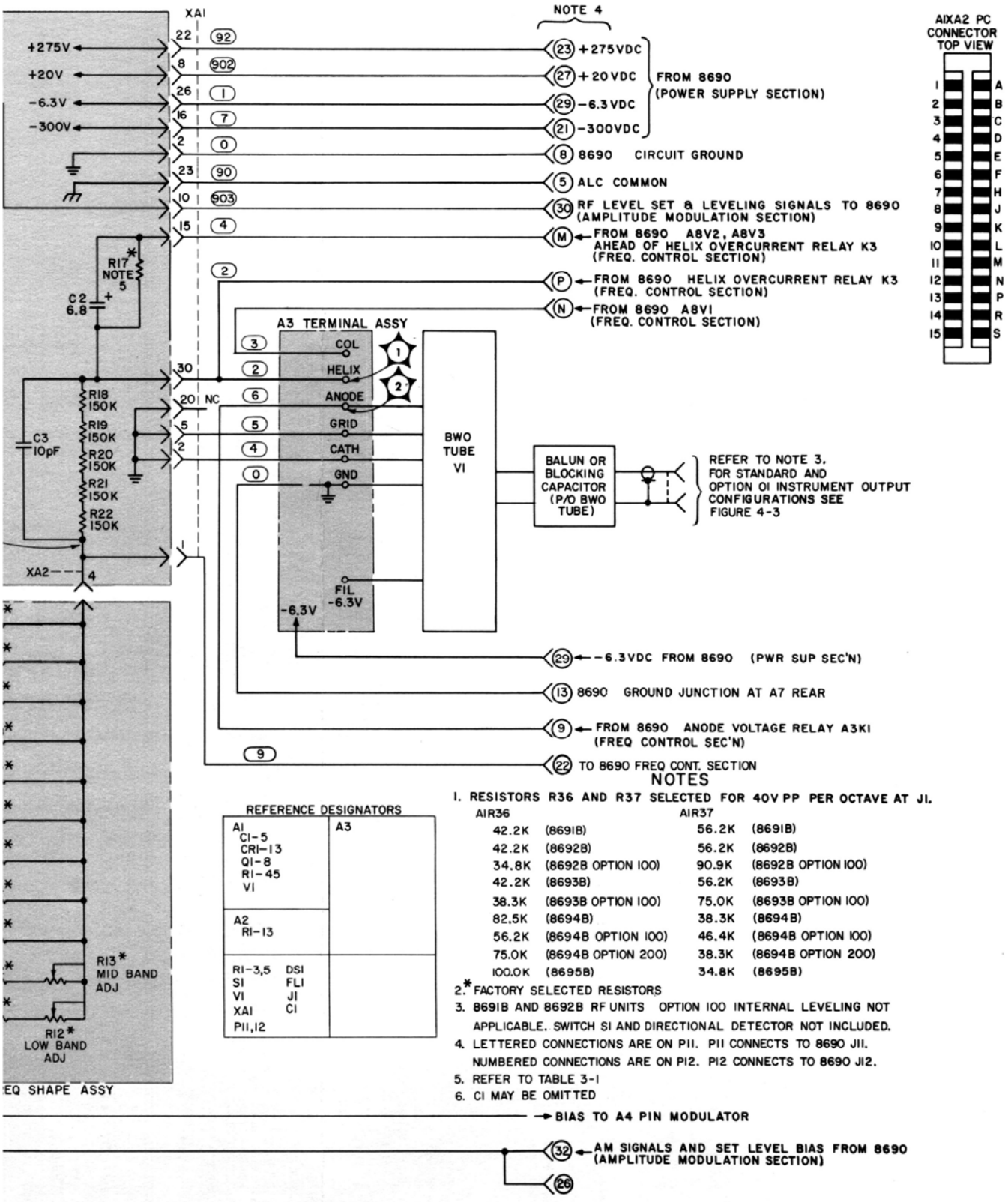

P-Type Metal Oxide Substrate FET (MOSFET)


N-Type Metal Oxide Substrate FET (MOSFET)

Figure 4-1. Schematic Diagram Notes


A1 "B" MODULATOR ASSY (08692 - 6113)
NOTE 4
XA1
FROM 8690 (AM SEC'N)
FROM 8690 ALC MOD A11Q12 (ALC AMP SEC'N)
TO 8690 ALC AMP A12Q1B (ALC AMP SEC'N)
POWER LEVEL
R1 1K
R1 500
LEVEL SHUNT
FROM 8690 (AM SEC'N)
-6.3 VDC FROM 8690 (PWR SUP SEC'N)
R2 1K
8690 TIME DELAY INTERLOCK
8690 +20 VDC INTERLOCK
ANODE RELAY INTERLOCK
REFER TO NOTE 3
R3 20K
EXT ALC GAIN
FROM 8690 XTAL ALC INPUT (FREQ CONTROL SECTION)
STD
XTAL
EXT
SIA
INT
FROM A5 DIRECTIONAL DETECTOR
W1
R5 3010
ALC COMMON
TO 8690 ANODE RELAY CIRCUIT (FREQ CONTROL SEC'N)
C1 .05 (See NOTE 6)
TUNING VOLT RAMP FROM 8690 A4V2A (FREQ CONTROL SEC'N)
TUNING VOLT RAMP TO 8690 A4V5 (FREQ CONTROL SEC'N)
SWEEP REF OUTPUT
J1
RF UNIT CHASSIS GROUND
UNLEVELED LAMP CIRCUIT
R3 2210
R5 10K
R6 19.6K
R7 33.2K
C1 3.3
-6.3V
R4 1K
Q8 1853-0010
CR1
Q7 1854-0003
Q5 1854-0003
CR2
R2 14.7
DS1
UNLEVELED
ALC GAIN CIRCUIT
+20V
R11 2.87K
R13 19.6K
Q3,Q4 1854-0003
R8 10K
R10 10K
R9 196K
R12 5.11K
-300V
-6.3V
CR13
+275V
R24 5K
SHAPE ADJ
R23 27K
CR3
R25 1K
CR4
R26 1K
CR5
R27 1K
CR6
R28 1K
CR7
R29 1K
CR8
R30 1K
CR9
R31 1K
CR10
R32 1K
CR11
R33 1K
R34 56K
C4 10
R35 511
V1 1940-0013
-81V
R41 82.5K
R42 500K
ANODE ADJUST
Q1 1854-0232
Q6 1854-0232
ANODE SHAPE ADJ
R40 500K
R36 *
R37 *
R38 100K
R39 750K
REFER TO NOTE 1)
R43 51.1K
R44 475K
CR12
SWEEP REFERENCE OUTPUT CIRCUIT
ANODE SUPPLY CIRCUIT
86928 - RF UNIT - SER PRE 728 AND ABOVE


ALC GAIN CIRCUIT
AMP CIRCUIT
+20V
+275V
-6.3V
-300V
-81V
R6 19.6K
R7 33.2K
R11 2.87K
R13 19.6K
R16 10K
Q2 1854-0039
Q3,Q4 1854-0003
Q5 1854-0003
CR2
R8 10K
R10 10K
R9 196K
R12 5.11K
R45 1.21K
R14 316K
R15* 237
C5* .0056
R17* NOTE 5
C2 6.8
R18 150K
R19 150K
R20 150K
R21 150K
R22 150K
C3 10pF
XA1
XA2
A3 TERMINAL ASSY
COL
HELIX
ANODE
GRID
CATH
GND
FIL -6.3V
BWO TUBE V1
NC
R24 5K CW
SHAPE ADJ
R23 27K
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
R25 1K
R26 1K
R27 1K
R28 1K
R29 1K
R30 1K
R31 1K
R32 1K
R33 1K
R34 56K
C4 10
R35 511
V1 1940-0013
R11* R10* R9* R8* R7* R6* R5* R4* R3* R2* R1*
R13* MID BAND ADJ
R12* LOW BAND ADJ
A2 FREQ SHAPE ASSY
R41 1.5K
R42 100K CW
ANODE ADJUST
Q6 1854-0232
R43 51.1K
R44 475K
REFERENCE DESIGNATORS
A1 C1-5 CR1-13 Q1-8 R1-45 V1
A2 R1-13
A3
R1-3,5 S1 V1 XA1 P11,12
DS1 FL1 J1 C1
1. RESISTORS R
A1R36
42.2K
42.2K
34.8K
42.2K
38.3K
82.5K
56.2K
75.0K
100.0K
2.* FACTORY SELE
3. 8691B AND 86
APPLICABLE. S
4. LETTERED CO
NUMBERED CO
5. REFER TO TAB
6. C1 MAY BE OM



REFERENCE DESIGNATORS

A1 C1-5 CR1-13 Q1-8 R1-45 V1	A3
A2 R1-13	
R1-3,5 DS1 S1 FL1 V1 J1 XA1 C1 P11,12	

NOTES

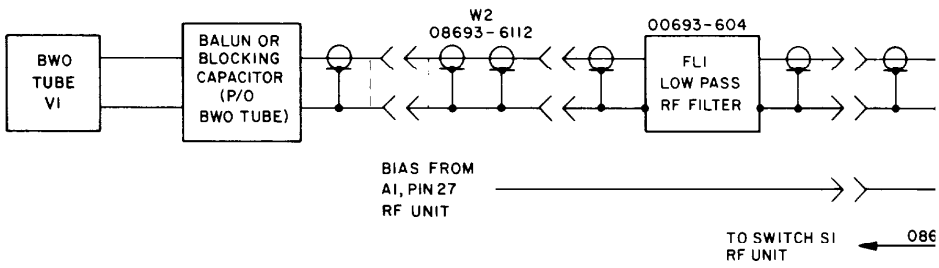
1. RESISTORS R36 AND R37 SELECTED FOR 40V PP PER OCTAVE AT J1.

AIR36		AIR37	
42.2K	(8691B)	56.2K	(8691B)
42.2K	(8692B)	56.2K	(8692B)
34.8K	(8692B OPTION 100)	90.9K	(8692B OPTION 100)
42.2K	(8693B)	56.2K	(8693B)
38.3K	(8693B OPTION 100)	75.0K	(8693B OPTION 100)
82.5K	(8694B)	38.3K	(8694B)
56.2K	(8694B OPTION 100)	46.4K	(8694B OPTION 100)
75.0K	(8694B OPTION 200)	38.3K	(8694B OPTION 200)
100.0K	(8695B)	34.8K	(8695B)

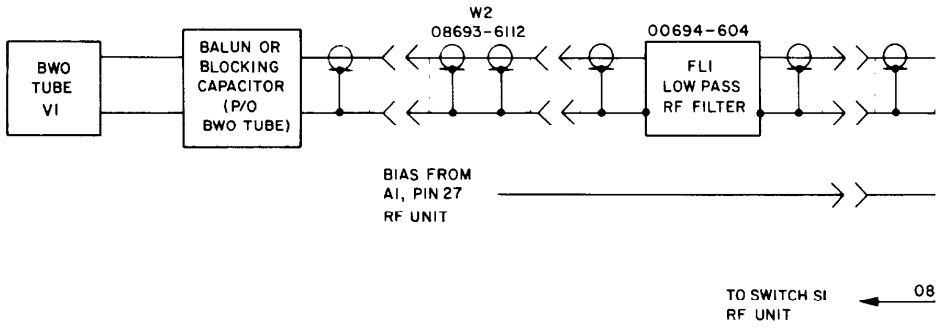
2. * FACTORY SELECTED RESISTORS
3. 8691B AND 8692B RF UNITS OPTION 100 INTERNAL LEVELING NOT APPLICABLE. SWITCH S1 AND DIRECTIONAL DETECTOR NOT INCLUDED.
4. LETTERED CONNECTIONS ARE ON P11. P11 CONNECTS TO 8690 J11. NUMBERED CONNECTIONS ARE ON P12. P12 CONNECTS TO 8690 J12.
5. REFER TO TABLE 3-1
6. C1 MAY BE OMITTED

Figure 4-2. RF Unit for Serial Prefix 728 and Above

OPTION 001
MODELS: 8693B
8693B OPT. 100

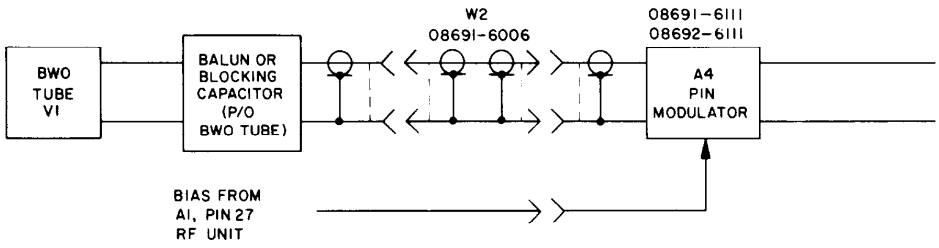


OPTION 001
MODELS: 8694B
8694B OPT. 100
8694B OPT. 200

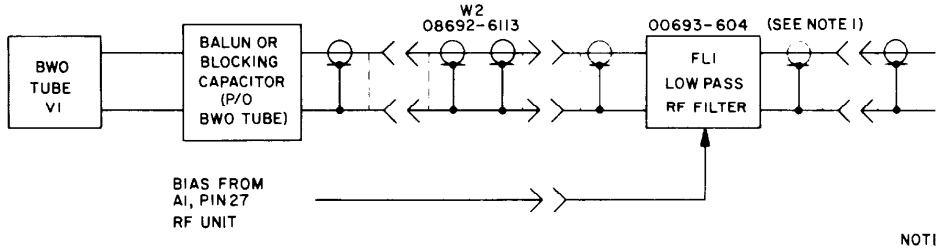


STANDARD
MODELS: 8695B

STANDARD
MODELS: 8691B
8692B
8692B OPT. 100



STANDARD
MODELS: 8693B
8694B
8693B OPT. 100
8694B OPT. 100
8694B OPT. 200



NOTI
1. LC
IS

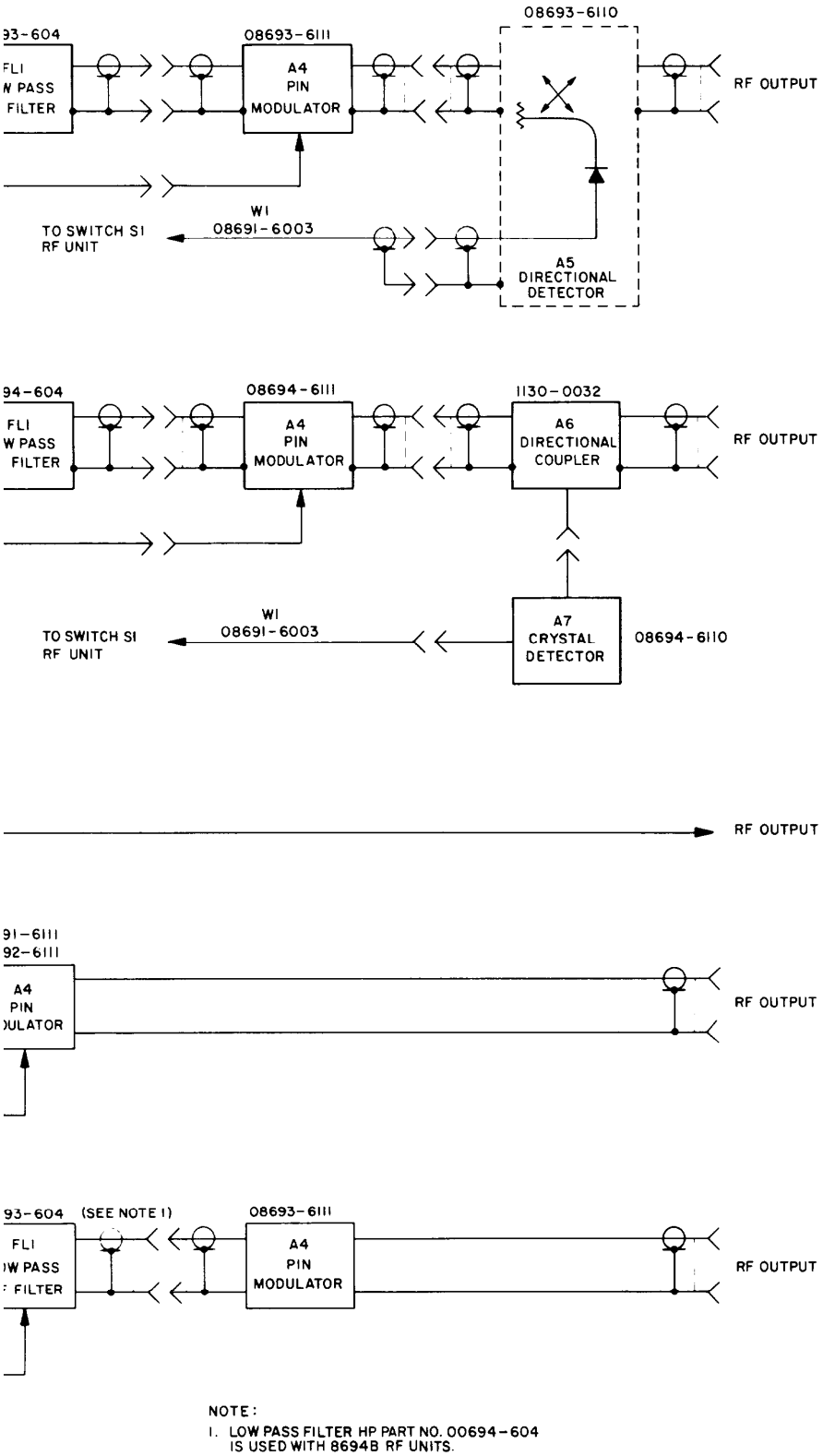


Figure 4-3. Output Configurations

APPENDIX I

MANUAL CHANGES

MODEL 8691B–8695B

RF UNITS

To adapt this manual to instruments with Serial Numbers listed in the table below, make the indicated changes.

Information for adapting this manual to instruments with Serial Numbers not listed in the table below may be included in a yellow MANUAL CHANGES insert supplied with the manual. Information about Serial Numbers not covered in any of these ways can be obtained from the nearest Hewlett-Packard office.

SERIAL PREFIX OR NUMBER	MAKE MANUAL CHANGES
620-	F, E, D, C, B, A
636-	F, E, D, C
715-	F, E, D
720-	F, E
724-	F

SERIAL PREFIX OR NUMBER	MAKE MANUAL CHANGES
728-	K, J, I, H, G
822	K, J, I, H
835	K, J, I
838	K, J
916-	K
967-	L

CHANGE A: A2R12 on Freq Shape Assy A2 is adjusted for proper calibration when RF Unit serials prefixed 620 are used with 8690A serials prefixed 615.

If an RF Unit, serials prefixed 620, is used with an 8690A Sweep Oscillator, 636 or above, approximately -1% calibration error will occur. In this case, perform Adjustments 4, HELIX VOLTAGE SHAPING and 5, FREQUENCY ACCURACY, Table 2-3.

Page 4-3/4-4; Figure 4-2:
Substitute Appendix I schematic for Figure 4-2.

Add: 3.01K resistor (R5) between XA1 Pin 23 and XA1 Pin 11.

CHANGE B: A2R12 on Freq Shape Assy A2 is adjusted for proper calibration when RF unit serials prefixed 636 are used with 8690A serials prefixed 636.

If an RF Unit, serials prefixed 636, is used with an 8690A/B Sweep Oscillator, serials prefixed 615, approximately +1% calibration error will occur. In this case, perform Adjustments 4, HELIX VOLTAGE SHAPING and 5, FREQUENCY ACCURACY, Table 2-3.

CHANGE B: (cont'd)

Page 3-3, Table 3-3:
Change: A1R7 to HP Part No. 0757-0458 R: FXD MET FLM 51.1K OHM 1% 1/8W

Page 3-4, Table 3-3:
Delete: asterisk in Note column of A1R36.
Change: A1Q1 and A1Q6 to HP Part No. 1854-0079.

Page 3-8, Table 3-3:
For RF Units serial prefixed 636-00135 and below:
Change chassis mounted R3 to HP Part No. 2100-0060 (no description change).

Page 3-11, Table 3-4:
Delete HP Part No. 0756-0454.

Add HP Part No. 0757-0458 R: FXD MET FLM 51.1K OHM 1% 1/8W; 28480, TQ 1.

Delete HP Part No. 1854-0232.

Add HP Part No. 1854-0079 TRANSISTOR: SILICON NPN; 28480, TQ 1.

Page 3-12, Table 3-4:
Change HP Part No. 2100-0051 to HP Part No. 2100-0060 (no description change).

Page 4-3/4-4,, Figure 4-2:
Substitute Appendix I schematic for Figure 4-2.

Change: A1R7 to 51.1K ohms.

Change: A1Q1 and A1Q6 HP Part No. to 1854-0079.

Delete: asterisk next to A1R36.

CHANGE C: No change. Affects 8691A through 8697A RF Units only.

Page 4-3/4-4, Figure 4-2:
Substitute Appendix I schematic for Figure 4-2.

CHANGE D: (Affects Option 001 Models only).

Page 4-3/4-4, Figure 4-2:
Substitute Appendix I schematic for Figure 4-2.
Add factory selected resistor R4 (which may be a straight through connection) between the wiper of R3 and INT position of chassis mounted switch S1B (Refer to Appendix I schematic.

CHANGE E: Page 1-2/1-3, Table 1-1:
For the following models, change the "Frequency Accuracy" Specification to read:

8692B	± 10 MHz
8692B Option 100	± 13 MHz
8693B	± 20 MHz
8693B Option 100	± 25 MHz
8694B	± 30 MHz
8694B Option 100	± 40 MHz
8694B Option 200	± 30 MHz

For the following models, change the "Residual FM" Specifications for CW operation in START-STOP, ΔF, and MARKER SWEEP functions to read:

8691B	30 kHz peak
8692B	30 kHz peak
8692B Option 100	30 kHz peak
8693B	50 kHz peak
8693B Option 100	50 kHz peak
8694B	50 kHz peak
8694B Option 100	50 kHz peak
8694B Option 200	50 kHz peak

Page 4-3/4-4, Figure 4-2:
Substitute Appendix I schematic for Figure 4-2.

Delete the following jumper connections:
from P12 pin 16 to P12 pin 10

CHANGE E: (cont'd) Page 4-3/4-4 , Figure 4-2:
Delete the following jumper connections: (cont'd)
from P12 pin 32 to P12 pin 26

Change the chassis ground from P12 pin 6 to P12 pin 8.

NOTE

To use RF Units serial prefixed 724- and above with 8690A Sweep Oscillators serial number 641-00260 and below (including serial prefixes 636- and 615-)it is necessary to disconnect two wires which are connected to pins 26 and 10 of J12 in the 8690A. Removing these wires ensures compatability and does not affect instrument calibration.

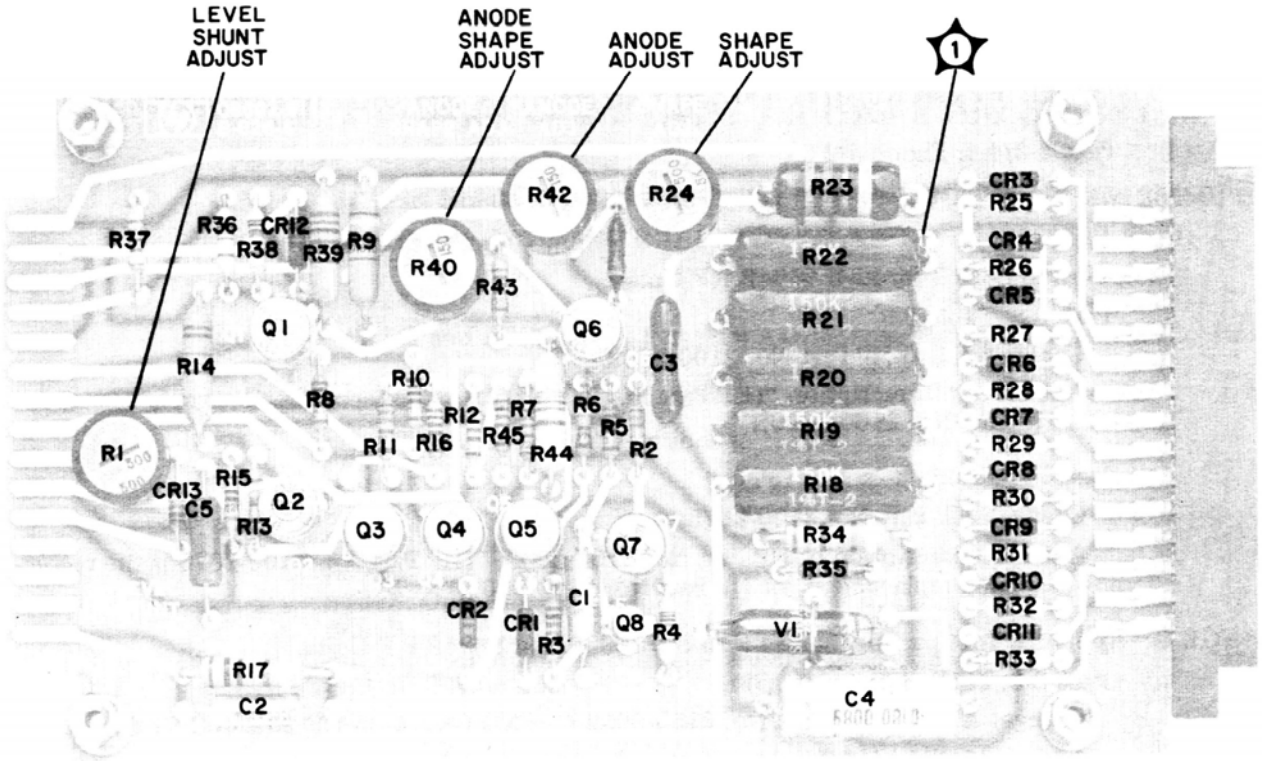
The WHITE-YELLOW-GREEN (color 945) wire going to pin 26 of J12 is connected to a push-on connector on the top side of the Interconnection Assembly A7. This wire connects to pin 20 of XA4 through a conductor on Assy A7. Disconnect this wire (color 945) from Assy A7; then cut it off where it enters the cable harness. Tape the cut end to the harness.

The WHITE-BROWN-YELLOW (color 914) wire going to pin 10 of J12 can best be disconnected by removing the RF Unit and locating the wire in the cable harness just below J12. Pull out this wire (color 914) far enough so that it can be easily reached and cut out about a one inch section between adjacent turns of the cable harness. Tape the cut ends to the harness.

CHANGE F: The first part of Change F applies only to the 8691B and 8692B RF Units. The second part applies to the 8691B through 8694B RF Units.

(8691B and 8692B RF Units Only)

Page 2-10, Figure 2-6:
Substitute the following photograph for Figure 2-6 in Manual.



CHANGE F: (cont'd) Page 3-3, Table 3-3:

Change: A1 Assembly to HP Part No. 08691-6101.

Add: To A1 Assembly description "(HP Part No. 08692-6113 is the recommended replacement for HP Part No. 08691-6101.)"

Delete: A1C5.

Delete: A1CR14.

Change: Following components to read as follows:

A1R9	0757-0860	R: FXD MET FLM 121K OHM 1% 1/2W
A1R11	0757-0442	R: FXD MET FLM 10K OHM 1% 1/8W
A1R12	0757-0280	R: FXD MET FLM 1K OHM 1% 1/8W
A1R13	0757-0430	R: FXD MET FLM 2.21K OHM 1% 1/8W
A1R14	0757-0280	R: FXD MET FLM 1K OHM 1% 1/8W
A1R15	0698-3160	R: FXD MET FLM 46.4 OHM 1% 1/8W
A1R16	0771-0007	R: FXD MET FLM 30K OHM 10% 4W

Page 3-11, Table 3-4:

Delete the following:

HP Part No. 0160-0158
HP Part No. 0180-0089
HP Part No. 0698-3151
HP Part No. 0698-3157
HP Part No. 0698-3442
HP Part No. 0757-0063
HP Part No. 0757-0274
HP Part No. 0757-0428

Change: Total quantity (TQ) of HP Part No. 0757-0280 to 12.

Change: Total quantity (TQ) of HP Part No. 0757-0430 to 2.

Change: Total quantity (TQ) of HP Part No. 1901-0033 to 3.

Add: HP Part No. 0698-3160 R: FXD MET FLM 46.4 OHM 1% 1/8W; 28480, TQ 1.

Add: HP Part No. 0757-0860 R: FXD MET FLM 121K OHM 1% 1/2W; 28480, TQ 1.

Add: HP Part No. 0771-0007 R: FXD MET FLM 30K OHM 10% 4W; 28480, TQ 1.

Page 4-3/4-4, Figure 4-2

Substitute Appendix I schematic for Figure 4-2.

(Applies to 8691B through 8694B RF Units)

Page 3-8, Table 3-3:

Change: R1 to HP Part No. 2100-2009.

Add: To R1 description "(HP Part No. 2100-2675 is the recommended replacement for HP Part No. 2100-2009.)"

Page 3-12, Table 3-4:

Change: HP Part No. 2100-2675 to HP Part No. 2100-2009.

Add: To description of HP Part No. 2100-2009, "(HP Part No. 2100-2675 is the recommended replacement for HP Part No. 2100-2009.)"

CHANGE G: Apply the first part of Change F to the 8693B and 8694B RF Units.

Page 3-3, Table 3-3:

Change: A1C4 to HP Part No. 0150-0052 C: FXD CER 0.05 UF 20% 400 VDCW.

Add: A1CR14 HP Part No. 1901-0033 DIODE: SILICON IN 485B.

CHANGE G: (cont'd)

Page 3-4 , Table 3-3:
Change: A1R35 to HP Part No. 0757-0401 R: FXD MET FLM 100 OHM 1% 1/8W.

Page 3-8 , Table 3-3:
Change A3 Assembly to HP Part No. 08691-6105. No description change.
Delete Chassis mounted component C1.

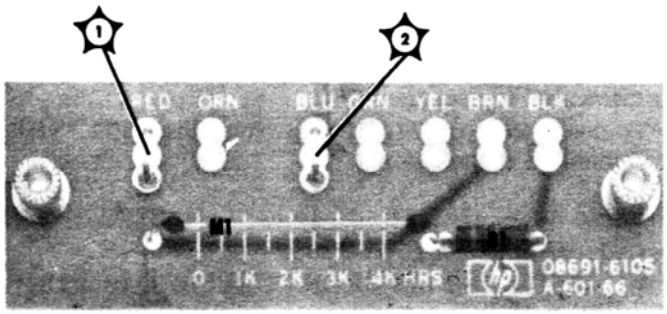
Page 3-11, Table 3-4:
Add: HP Part No. 0757-0401 R: FXD MET FLM 100 OHM 1% 1/8W; 28480, TQ 1.
Change Total quantity (TQ) of HP Part No. 1901-0033 to 4.

Page 3-12, Table 3-4:
Change HP Part No. 08691-6118 to HP Part No. 08691-6105. No description change.

Page 4-3/4-4, Figure 4-2:
Change: Capacitor A1C4 to 0.05 UF.
Change: Resistor A1R35 to 100 ohms.
Add: Diode A1CR14 between XA1 pin 10 and ground (connect anode to pin 10).

CHANGE H:

Page 2-11, Figure 2-8:
Substitute the following photograph for A3 Assembly in Figure 2-8.



Page 3-8, Table 3-3:
Add: A3M1 HP Part No. 1010-0005 INDICATOR: ELAPSED TIME.
Add: A3R1 HP Part No. 0686-2455 R: FXD COMP 2.4 MEGOHM 5% 1/2W.

Page 3-11, Table 3-4:
Add: HP Part No. 0686-2455 R: FXD COMP 2.4 MEGOHM 5% 1/2W; 28480, TQ 1.
Add: HP Part No. 1010-0005 INDICATOR: ELAPSED TIME; 28480, TQ 1.

Page 4-3/4-4, Figure 4-2:
Add: A3 M1 and A3R1 to A3 Terminal Assembly as shown in Appendix I schematic.

CHANGE I:

Pages 1-2/1-3 , Table 1-1:
Change: "Residual FM Specifications to read as follows:

8691B	30 kHz peak
8692B	30 kHz peak
8692B, Option 100	30 kHz peak
8693B	50 kHz peak
8693B, Option 100	50 kHz peak
8694B	60 kHz peak
8694B, Option 100	60 kHz peak
8694B, Option 200	60 kHz peak

CHANGE I: (cont'd) Delete the following below Table 1-1:

Residual FM specifications give peak deviation for modulating components within a 10 kHz bandwidth. Peak deviation may vary ±50% for a corresponding ±10% line voltage change. Specifications apply for both leveled and unleveled operation. Residual FM specifications are twice the above when the RF Unit is used in the 8707A RF Unit Holder. The residual FM specifications are only applicable for RF Units used with 8690B and 8707A instruments having serial prefix 838 or above.

CHANGE J: Entire Manual:

Change all Option 100 references to H01.

Change all Option 200 references to H02.

Change all Option 001 references to Option 01.

Page 1-2/1-3, Table 1-1:

Add: Option 004 available, Rear Panel RF Output (8691B thru 8694B).

Page 3-9, Table 3-3:

Delete: HP Part No. 1951-0072.

Delete: HP Part No. 1951-0084.

Add: To description of V1, HP Part No. 1951-0055, "(HP Part No. 1951-0072 is the recommended replacement)."

Add: To description of V1, HP Part No. 1951-0064, "(HP Part No. 1951-0072 is the recommended replacement)."

Add: To description of V1, HP Part No. 1951-0057, "(HP Part No. 1951-0084 is the recommended replacement)."

Add: To description of V1, HP Part No. 1951-0057, "(HP Part No. 1951-0084 is the recommended replacement.

CHANGE K: Page 3-9, Table 3-3:

Delete: V1, HP Part No. 1951-0085.

Add: V1 1951-0058 ELECTRON TUBE: BWO (8694B, 8694B, Option 100).

Add: To description of V1, HP Part No. 1951-0058 ,"HP Part No. 1951-0085 is the recommended replacement)".

Add: V1 1951-0066 ELECTRON TUBE: BWO (8694B, 8694B, Option 100) (HP Part No. 1951-0085 is the recommended replacement), 28480, TQ: 1.

Page 3-7, Table 3-3:

Delete: A2 Assy, HP Part No. 08694-60001.

Delete: A2 Assy, HP Part No. 08694-60002.

Delete: A2 Assy, HP Part No. 08694-60003.

CHANGE L: Page 3-3, Table 3-3:

Change: A1R12 to HP Part No. 0757-0428 R: FXD MET FLM 5.11K OHM 1% 1/8W.

Page 3-5, Table 3-3:

Change A1R45 to HP Part No. 0757-0274 R: FXD MET FLM 1.21K OHM 1% 1/8W.

Page 3-11, Table 3-4:

Add: HP Part No. 0757-0274 R: FXD MET FLM 1.21K OHM 1% 1/8W, 28480, TQ: 1.

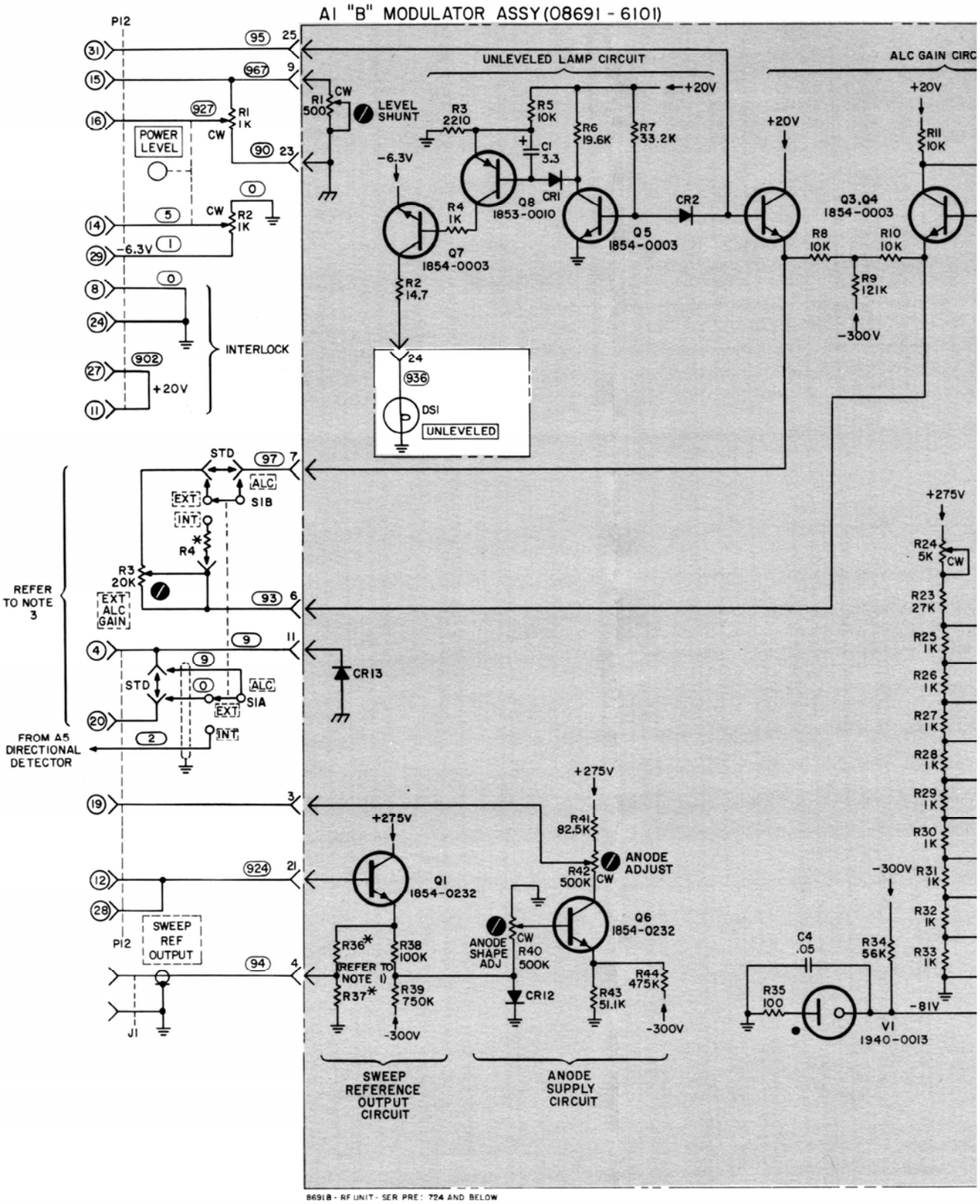
Delete: HP Part No. 0757-0279.

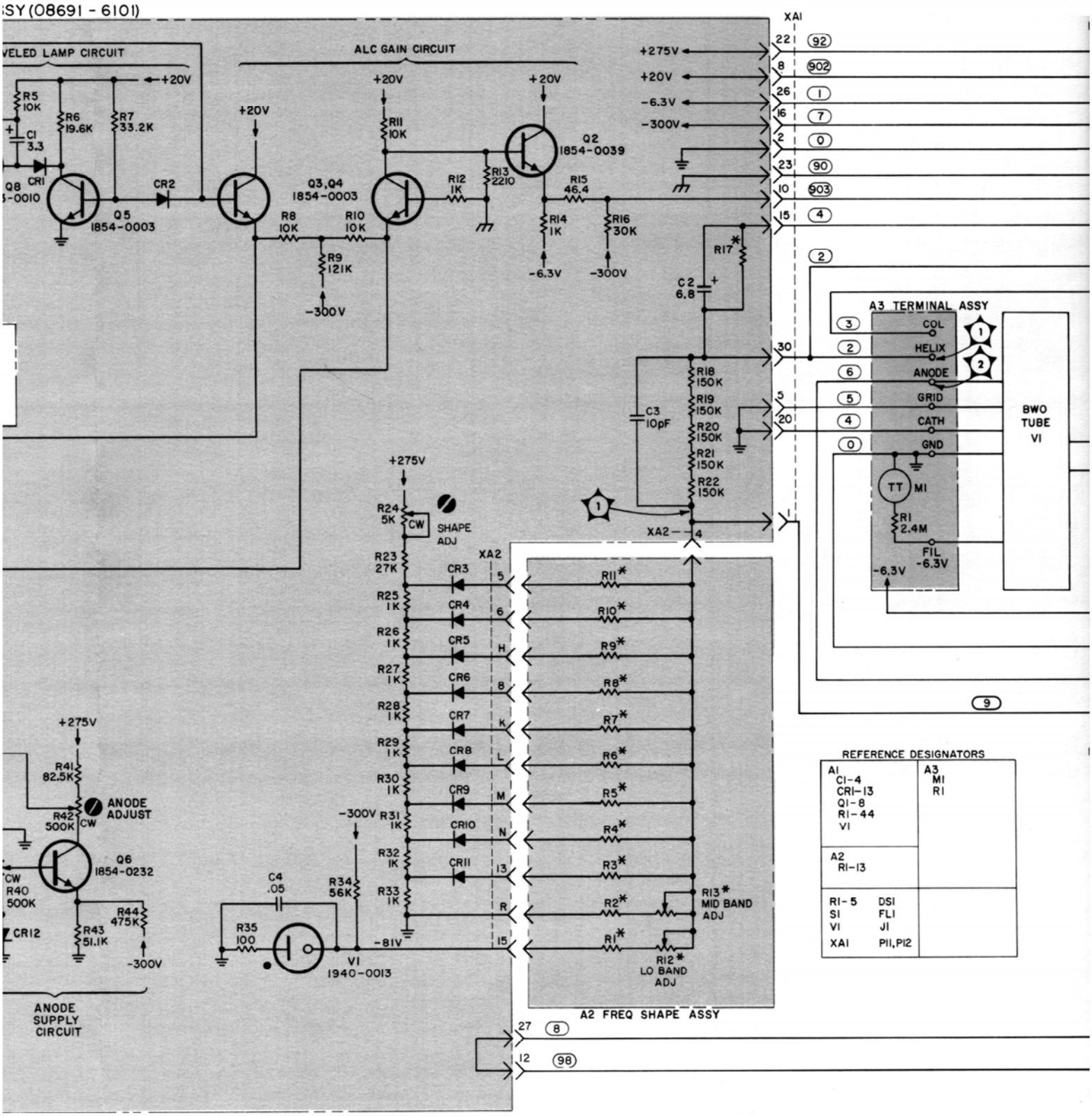
Add: HP Part No. 0757-0428 R: FXD MET FLM 5.11K OHM 1% 1/8W, 28480, TQ: 1.

Page 4-3/4-4, Figure 4-2:

Change A1R12 to 1.21K ohms.

Change A1R45 to 5.11K ohms.


A1 "B" MODULATOR ASSY (08691 - 6101)
P12
UNLEVELED LAMP CIRCUIT
ALC GAIN CIRC
+20V
LEVEL SHUNT
POWER LEVEL
R1 500
R1 1K
R2 1K
R3 2210
R4 1K
R5 10K
R6 19.6K
R7 33.2K
C1 3.3
-6.3V
Q8 1853-0010
Q7 1854-0003
Q5 1854-0003
Q3,Q4 1854-0003
CR1
CR2
R2 14.7
R8 10K
R10 10K
R11 10K
R9 121K
-300V
24
936
DS1
UNLEVELED
INTERLOCK
902
STD
ALC
EXT
INT
S1B
R4
R3 20K
EXT ALC GAIN
REFER TO NOTE 3
CR13
S1A
FROM A5 DIRECTIONAL DETECTOR
+275V
R24 5K
CW
R23 27K
R25 1K
R26 1K
R27 1K
R28 1K
R29 1K
R30 1K
R31 1K
R32 1K
R33 1K
R34 56K
C4 .05
R35 100
V1 1940-0013
-81V
R41 82.5K
R42 500K
ANODE ADJUST
Q1 1854-0232
Q6 1854-0232
ANODE SHAPE ADJ
R40 500K
R43 51.1K
R44 475K
CR12
924
SWEEP REF OUTPUT
R36*
R37*
R38 100K
R39 750K
REFER TO NOTE 1)
J1
SWEEP REFERENCE OUTPUT CIRCUIT
ANODE SUPPLY CIRCUIT
8691B - RF UNIT - SER PRE: 724 AND BELOW


SY (08691 - 6101)
VELED LAMP CIRCUIT
ALC GAIN CIRCUIT
XA1
+275V
+20V
-6.3V
-300V
R5 10K
R6 19.6K
R7 33.2K
C1 3.3
CR1
CR2
Q5 1854-0003
Q3,Q4 1854-0003
R8 10K
R9 12.1K
R10 10K
R11 10K
R12 1K
R13 221Ω
Q2 1854-0039
R14 1K
R15 46.4
R16 30K
R17*
C2 6.8
R18 150K
R19 150K
R20 150K
R21 150K
R22 150K
C3 10pF
A3 TERMINAL ASSY
COL
HELIX
ANODE
GRID
CATH
GND
TT
MI
RI 2.4M
FIL -6.3V
BWO TUBE VI
XA2
R24 5K CW
SHAPE ADJ
R23 27K
R25 1K
R26 1K
R27 1K
R28 1K
R29 1K
R30 1K
R31 1K
R32 1K
R33 1K
R34 56K
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
R11*
R10*
R9*
R8*
R7*
R6*
R5*
R4*
R3*
R2*
R1*
R13* MID BAND ADJ
R12* LO BAND ADJ
A2 FREQ SHAPE ASSY
C4 .05
R35 100
VI 1940-0013
-81V
R41 82.5K
R42 500K CW
ANODE ADJUST
Q6 1854-0232
R40 500K CW
R43 51.1K
R44 475K
CR12
ANODE SUPPLY CIRCUIT
REFERENCE DESIGNATORS
A1
C1-4
CR1-13
Q1-8
R1-44
V1
A2
R1-13
A3
MI
R1
R1-5 DS1
S1 FL1
V1 J1
XA1 P11, P12

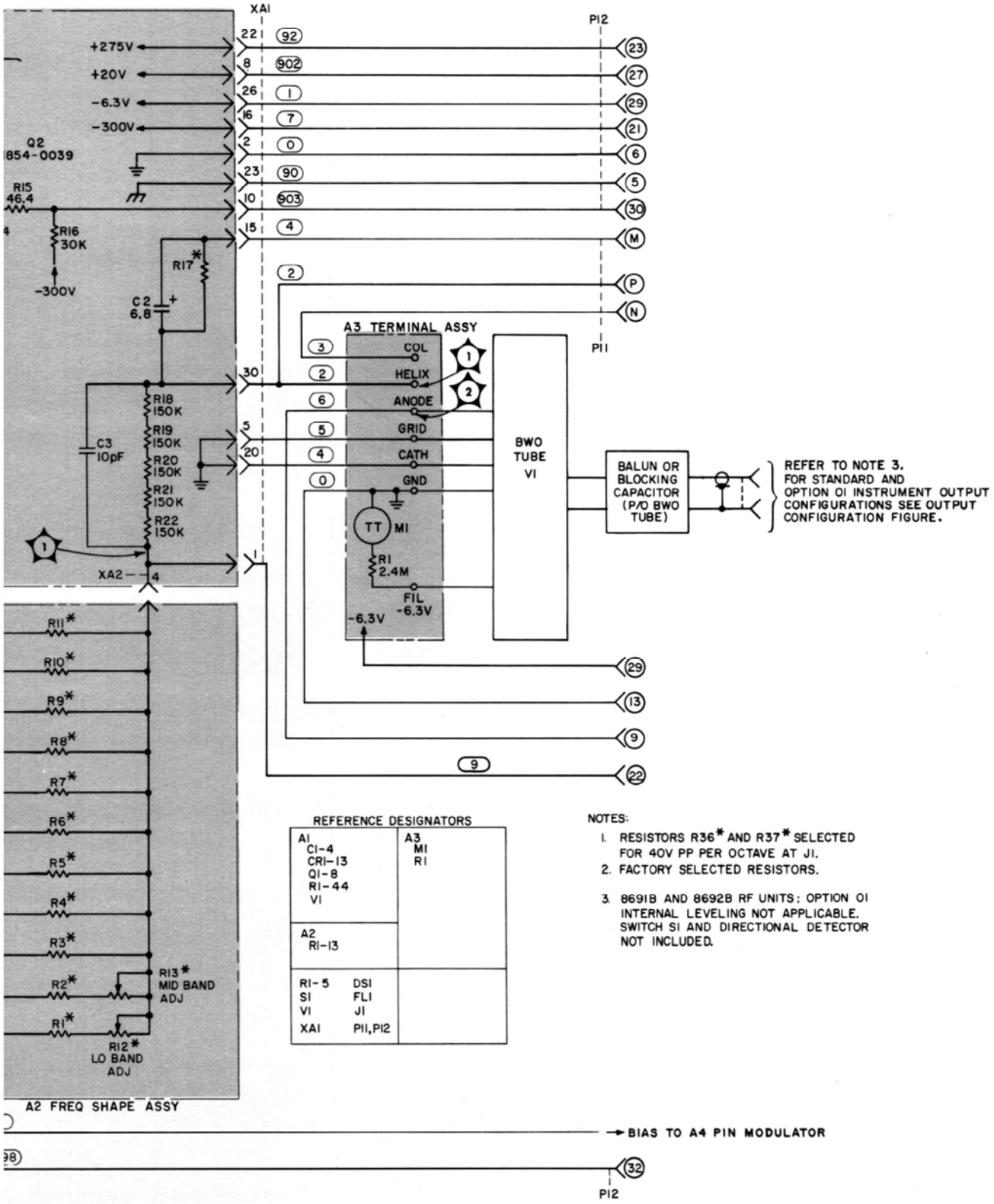


Figure 4-2. RF Unit for Serial Prefix 724 and Below

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San Salvador

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