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 Option 004. Rear panel RF Output	50 ohms/Type N

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 Option 004, Rear panel RF Output	50 ohms/Type N	50 ohms/Type N

*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)

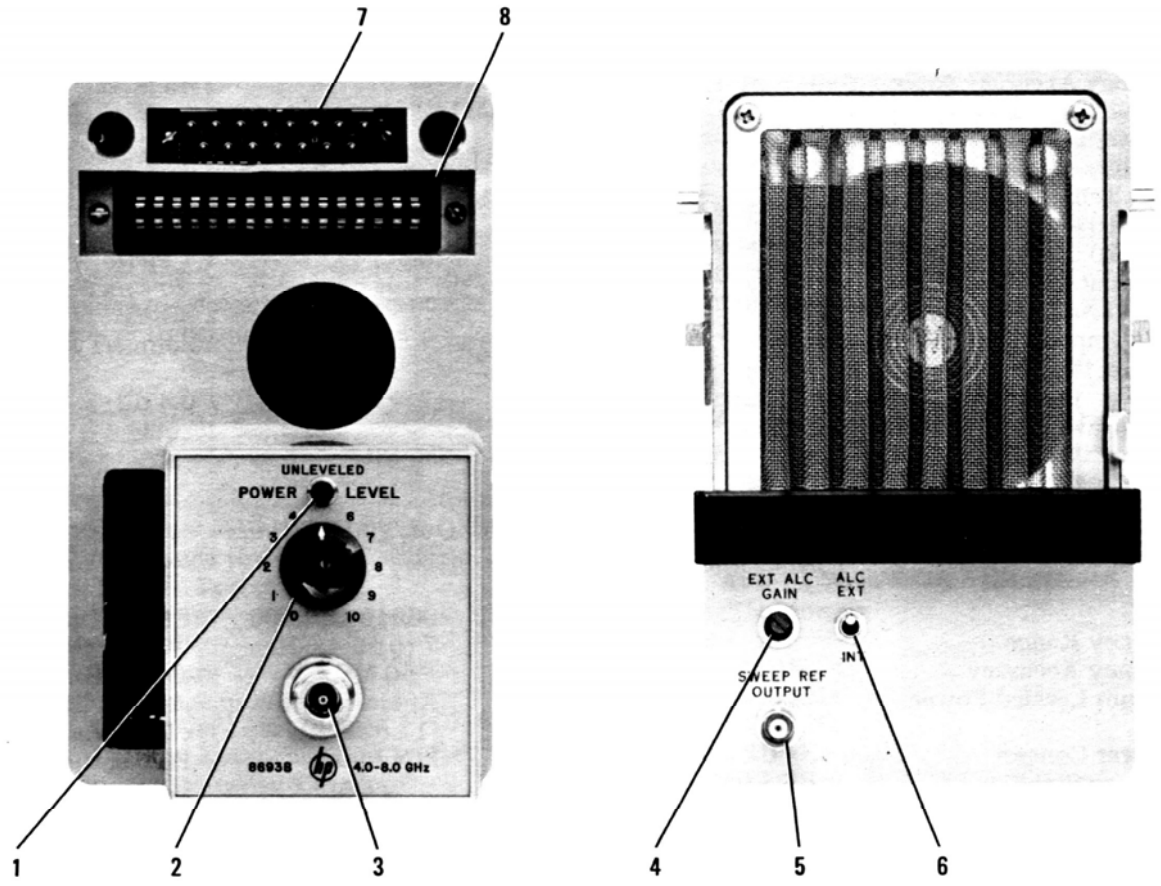
	8694B	8694B,Opt.100	8694B,Opt.200
Frequency Range	8 to 12.4 GHz	7 to 12.4 GHz	7 to 11 GHz
Frequency Accuracy	± 40 MHz	± 50 MHz	± 40 MHz
Maximum Leveled Power	At least 30 mW (14.8 dBm)	At least 15 mW (11.8 dBm)	At least 15 mW (11.8 dBm)
RF Power Control	PIN Line	PIN Line	PIN Line
Frequency Stability			
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.

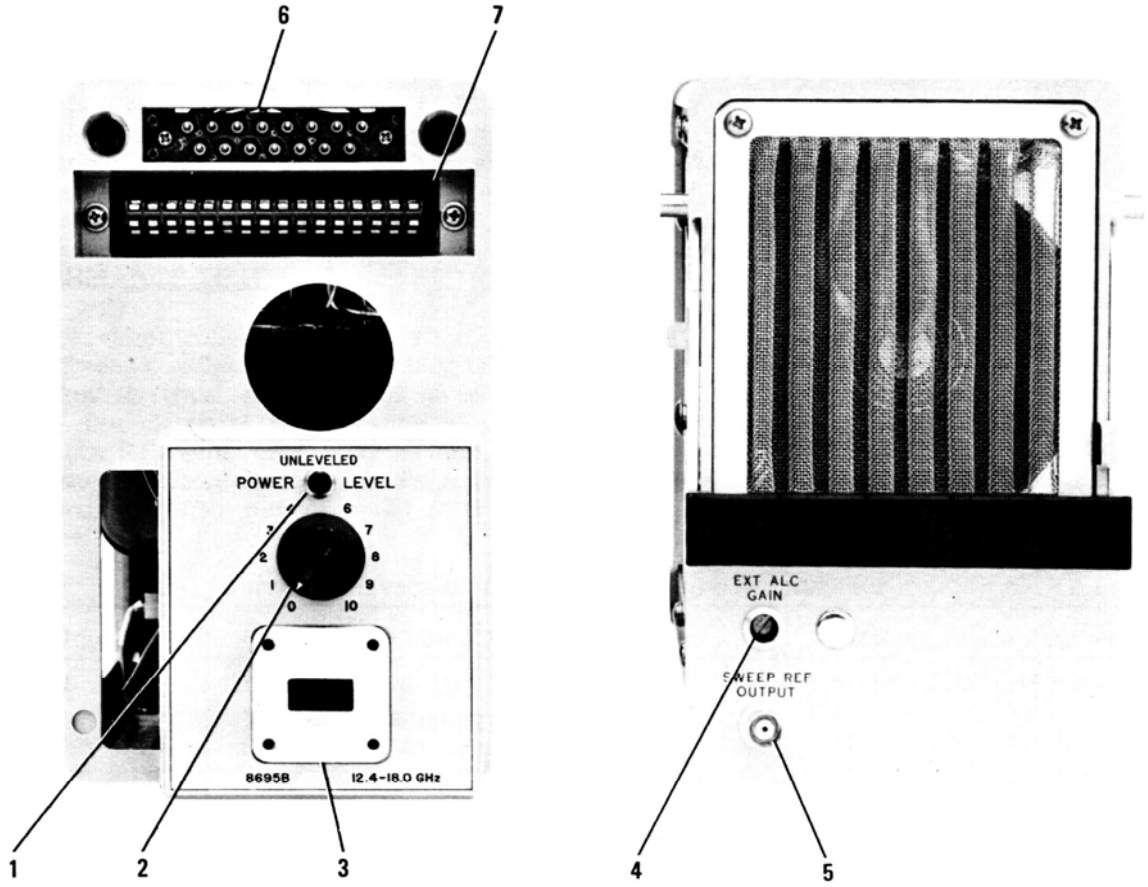
6. ALC EXT-INT. Switch installed on Option 001 RF Units. Selects or disables an internal leveling loop.

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