

INSTRUCTION MANUAL

**MODULAR MICROWAVE
SIGNAL GENERATORS
MODELS 1607E AND 1608E**

polarad electronics inc.

5 DELAWARE DRIVE LAKE SUCCESS, NEW YORK, 11040 516-328-1100

MARCH 1979



Instrumentation

Warranty

polarad electronics inc

We warrant each new instrument to be free of defects in materials and workmanship.

We will service, repair and adjust as required any instrument which proves defective within one year after date of delivery and which is returned to our factory (or other authorized depot) for that purpose.

For warranty information or other assistance, please contact Polarad Customer Service Department in Lake Success, New York, or an authorized regional service depot.

No other warranty is expressed or implied. No liability is assumed for consequential damages.

*5 Delaware Drive
Lake Success, New York 11040
516-328-1100
TWX 510-223-0414*



INSTRUCTION MANUAL CHANGE BULLETIN

THIS BULLETIN APPLIES TO:

MODEL(S): All Polarad Instruments

SERIAL NO.:

ISSUE DATE: April 1979

PACKAGING INSTRUCTIONS

Polarad instruments are shipped in well insulated cartons with carefully designed insulated packing materials to avoid instrument damage during handling in transit.

We recommend that the original shipping container and packing materials be retained for any reshipment.

CAUTION

The instrument should not be reshipped unless protected by the original carton and packing material or one of equal insulating capability.

Shipping containers can be ordered from Polarad. Please specify model and serial number on your orders or requests for quotation, so that the proper shipping materials will be furnished.

Please contact Polarad Customer Service Department for any additional information.

This bulletin should be carefully examined since it contains information vital for updating this manual and for incorporating changes made after publication date. Bulletins are issued to insure that the manual contains current information and reflects the characteristics of the instrument for which it is intended.

For additional information, please contact Polarad's instrument application specialists for maintenance assistance, or our Customer Service Department.

polarad electronics inc.

5 Delaware Drive / Lake Success, New York 11040 / 516-328-1100 TWX 510-223-0414

INSTRUCTION MANUAL CHANGE BULLETIN

THIS BULLETIN APPLIES TO:

MODEL(S): Kit No. B160871

SERIAL NO.:

ISSUE DATE: 1 January 1977

50 TO 400 Hz POWER SOURCE MODIFICATION KIT P/N 160871

(F MODIFICATION)

This procedure describes the installation of Modification Kit P/N 160871 which enables Polarad Modular Microwave Signal Generators and Signal Sources to operate with AC Power, 50 to 400 Hz.

1. Disconnect all wires from the existing fan and remove the fan from the rear panel of the instrument. Save all hardware.
2. Disconnect all wires from the GROUND terminal.
3. Remove the GROUND terminal from the rear panel of the instrument. (See figure 1). Do not discard the GROUND terminal or its mounting hardware; they are used to mount capacitor C94.

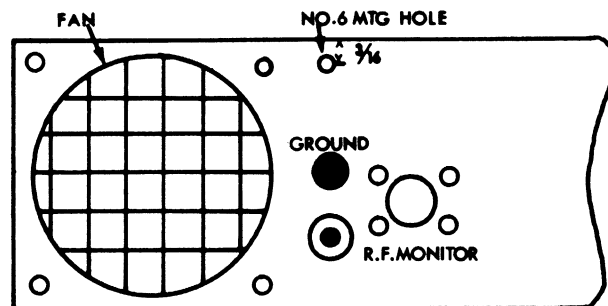


Figure 1

4. Drill a No. 6 (No. 26 drill) clearance hole in the rear panel 3/16 in. from the inside bend of the top of the rear panel (see figure 1) and 2-1/8 in. center-to-center from the mounting hole of the GROUND terminal. (See figure 2.)

This bulletin should be carefully examined since it contains information vital for updating this manual and for incorporating changes made after publication date. Bulletins are issued to insure that the manual contains current information and reflects the characteristics of the instrument for which it is intended.

For additional information, please contact Polarad's instrument application specialists for maintenance assistance, or our Customer Service Department.

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nelson • ross electronics division polarad electronic instruments division

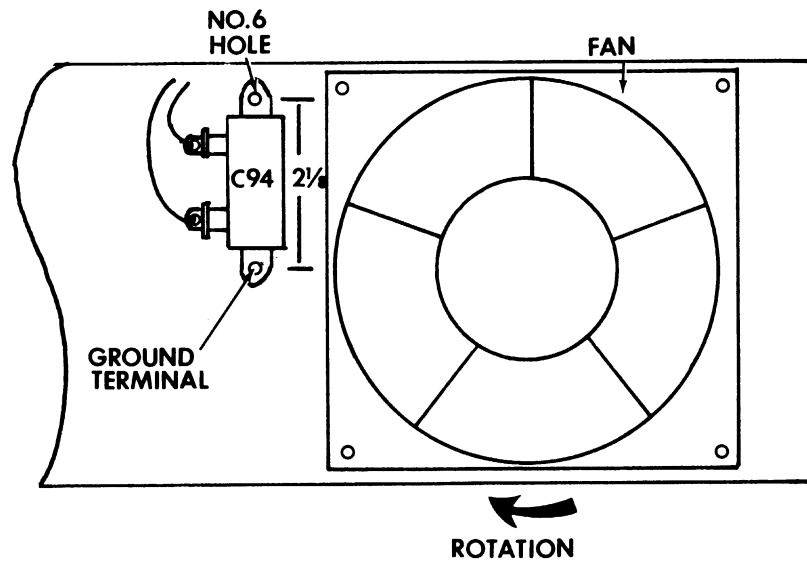


Figure 2

5. Mount the new fan on the rear panel using the hardware saved in Step 1. The fan should be mounted with the fan terminal block toward the top and center of the fan. The Air-flow arrow should be pointing toward the rear panel.
6. Mount one end of capacitor C94 with the GROUND terminal and its mounting hardware obtained in Step 3 into the existing GROUND terminal mounting hole. Mount the other end of the capacitor into the mounting hole drilled in Step 4 using the screw, washer, and nut supplied with the kit. Capacitor C94 should be mounted with its terminals facing away from the fan. See figure 2.
7. Reconnect the wires disconnected in Step 2 to the GROUND terminal.
8. Simultaneously connect the AC line wires and the connecting wires of capacitor C94 to the fan terminal block as shown in figure 3. Capacitor C94 is supplied with the connecting wires attached to the capacitor.

NOTE

Observe the orientation of the yellow dot.

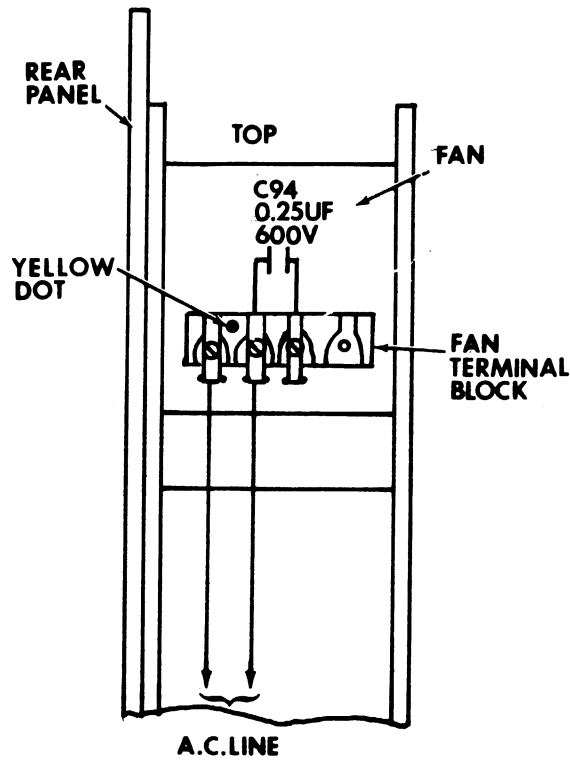


Figure 3

ITEMS SUPPLIED WITH KIT NO. 160871

Ref. Symbol	Description	Mfr's Part No.	Mfr's Code	Qty
B1	FAN, AXIAL	B711291	82199	1
C94	CAPACITOR, PAPER, 0.25 UF, 10 PCT, 600 WVDC	CP54B1 EF254K	81349	1
H1	SCREW, MACHINE, PAN HEAD, CROSS-RECESSED, NO. 6-32 x 3/8 IN. LG	MS51957-28	96906	1
H2	WASHER, LOCK, INTERNAL TOOTH, NO. 6	MS35333-36	96906	1
H3	NUT, PLAIN, HEXAGON, NO. 6-32	MS35649-262	96906	1

In the Instruction Manuals for the Signal Generators and Signal Sources, replace the blower circuitry of the schematics with the circuitry shown in figure 4.

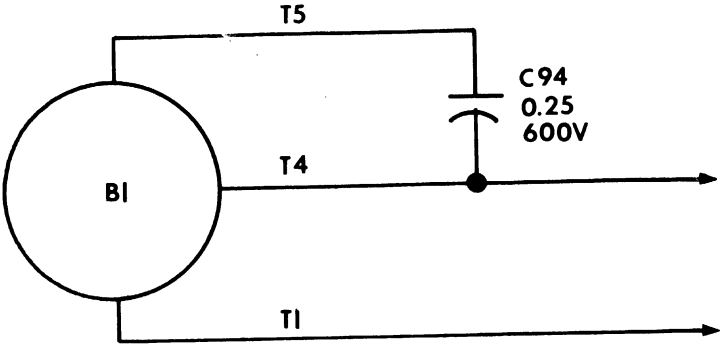


Figure 4

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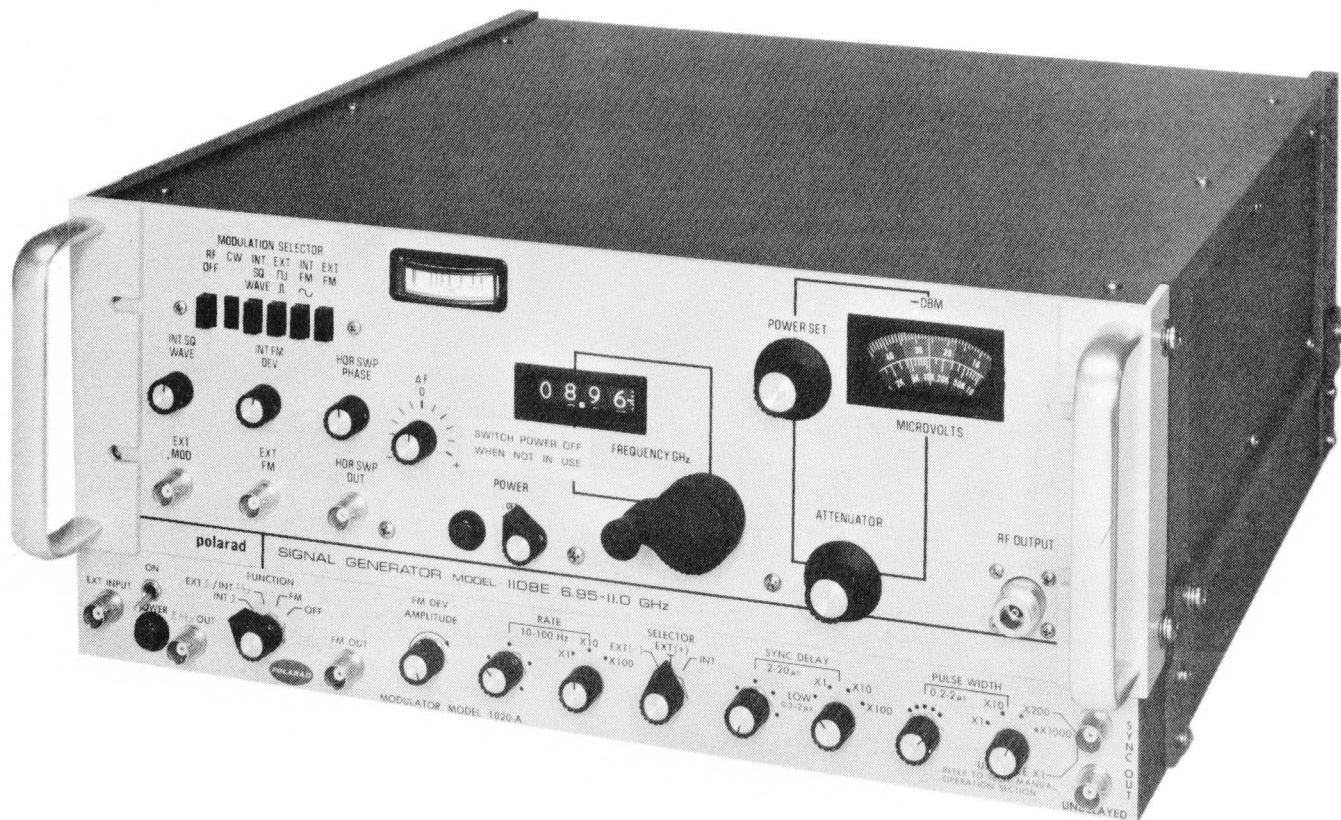


Figure 1-1. Model 1608E Modular Microwave Signal Generator

SECTION I

INTRODUCTION

1-1. SCOPE OF MANUAL

1-2. This manual contains instructions for the use and maintenance of the Modular Microwave Signal Generators, Models 1607E and 1608E (figure 1-1), manufactured by Polarad Electronics Inc., Lake Success, New York. The manual includes a general description of the instruments, installation procedure, theory of operation, operating instructions and maintenance.

1-3. Models 1607E and 1608E each consists of modulators and a modular signal generator. Model 1607E consists of Models 1020A and 1107E; Model 1608E consists of Models 1020A and 1108E. They can either be placed on a test bench, or they can be mounted in a standard 19" rack by simply reversing the handles at either end of the instruments.

1-4. The operating instructions, theory of operation, maintenance data, and parts lists for the individual instruments comprising Models 1607E and 1608E, as well as individual general descriptions of the component instruments, are contained in the following Polarad instruction manuals which are part of the Model 1607E/1608E manual.

1. Modular Microwave Modulator Model 1020A
2. Modular Microwave Signal Generators Models 1107E and 1108E

1-5. The manuals for the individual instruments are either supplied separately or bound into this manual depending on the ordering instructions received.

1-6. PURPOSE AND USE OF THE INSTRUMENTS.

1-7. Models 1607E and 1608E are general purpose broad band signal generators. The frequency ranges of the instruments are:

Model 1607E	3.7 to 8.4 GHz
Model 1608E	6.95 to 11.00 GHz

They provide spectrally pure CW signals and include modulation facilities for FM, square wave and widely adjustable pulsed outputs. The CW output signals of Models 1607E and 1608E are directly calibrated from -127 dBm up to +3 dBm. Greater output signal levels are provided by use of the uncalibrated segments of the attenuator scales. The available uncalibrated output levels are adjustable to the following levels:

Model 1607E:	≥25 mw from 3.7 to 4.3 GHz
	≥10 mw from 4.3 to 5.0 GHz
	≥15 mw from 5.0 to 8.0 GHz
	≥10 mw from 8.0 to 8.2 GHz
	≥8 mw from 8.2 to 8.4 GHz

Model 1608E:	≥20 mw from 6.95 to 8.0 GHz
	≥10 mw from 8.0 to 11.0 GHz

1-8. Typical uses of Models 1607E and 1608E are as reference signal generators to test broad- and/or narrow-band microwave systems and components such as antennas, attenuators, beacons, crystal mounts, hybrid structures, preselectors, radars, receivers, and traveling wavetube amplifiers. They can be used to make specific measurements such as bandwidth, insertion loss, frequency calibration, image rejection ratio, sensitivity, signal to noise ratio, VSWR, FM, square wave, and pulsed modulation tests, etc.

1-9. The signal generators of Models 1607E and 1608E incorporate phase lock provisions to increase frequency stability when the instruments are used with an external frequency stabilizer. The signal generators also incorporate provisions for external motor drive for tuning. An extension of the tuning shaft protrudes through the rear panel of the signal generators for this purpose.

1-10. The modulator outputs of Models 1607E and 1608E can be used to modulate other instruments simultaneously with their use in Models 1607E and 1608E. The modulator provides amplitude and frequency modulation for signal generators, signal sources, and oscillators. It provides pulse, square wave, and sawtooth outputs, and delayed or undelayed sync pulses for synchronization.

1-11. GENERAL DESCRIPTION.

1-12. The compact modular Microwave Signal Generators, Models 1607E and 1608E, are identically-sized. They are suitable for bench or rack use. The modulator and signal generator instruments used in Models 1607E and 1608E are AC line-powered. The instruments that comprise Models 1607E and 1608E are identically sized and consist of front and rear panels, a chassis or frame, and dust covers. The panels serve as a mounting for the operating controls and input/output connectors. The handles at either end of the signal generator front panels are reversible for bench or rack use. The dust covers, which are side, top, and bottom panels, enclose and protect the internal components of the instruments.

1-13. EQUIPMENT SUPPLIED.

1-14. Table 1-1 lists the equipment supplied for the Models 1607E and 1608E instruments.

1-15. EQUIPMENT SPECIFICATIONS.

1-16. Table 1-2 lists the equipment specifications for the Models 1607E and 1608E instruments.

1-17. OPERATION, THEORY OF OPERATION, MAINTENANCE, AND PARTS LIST.

1-18. For operation, theory of operation, maintenance, and parts list of the individual modules comprising Models 1607E and 1608E, refer to the handbooks listed in paragraph 1-4.

TABLE 1-1. EQUIPMENT SUPPLIED

Qty	Item	Polarad Model or Part Number	
1	Modular Microwave Signal Generator, consisting of:	1607E	1608E
(1)	Modular Microwave Modulator	1020A	1020A
(1)	Modular Microwave Signal Generator	1107E	1108E
1	Power Cable	B160833	
1	Power Jumper Cord	B160826	
1	RF Cable Assembly	B12551	
1	Test Connector	A713772	
1	Video Cable Assembly	B12553	
2	Video Cable Assembly	C147363	
1	Wrench Kit	A25109	
1	Operating and Maintenance Instructions	—	
1	1/4 Amp Fuse (115 VAC)		
1	1/8 Amp Fuse (230 VAC)		

TABLE 1-2. EQUIPMENT SPECIFICATIONS

Characteristic	Specification
Frequency Range	
Model 1607E	3.7 to 8.4 GHz
Model 1608E	6.95 to 11.0 GHz
ΔF Control Range	1.5 MHz, minimum
Frequency Accuracy	$\pm 0.5\%$ (Digital readout)
Frequency Stability	0.0008% per volt change in line voltage, 0.005% per degree C ambient
Calibrated Power Output	+6 dBm to -130 dBm
Power Monitor Range	-3 dBm to +3 dBm
Attenuator Dial Range	+3 dBm (0.310 volts) to -127 dBm (0.1 microvolts)
Output Power Absolute Accuracy	1607E: ± 2 db (+3 dBm to -127 dBm) 3.7 to 8.2 GHz 1608E: ± 2 db (+3 dBm to -127 dBm) 6.95 to 11.0 GHz
Uncalibrated Power Output	1607E: ≥ 25 mw from 3.7 to 4.3 GHz ≥ 10 mw from 4.3 to 5.0 GHz ≥ 15 mw from 5.0 to 8.0 GHz ≥ 10 mw from 8.0 to 8.2 GHz ≥ 8 mw from 8.2 to 8.4 GHz 1608E: ≥ 20 mw from 6.95 to 8.0 GHz ≥ 10 mw from 8.0 to 11.0 GHz
“P” Option includes an auxiliary panel mounted power meter with calibration from +5 to +13 dBm, accuracy ± 1 dB, used for measurement of signal generator power at the end of the RF cable and external signals.	
Output	
Impedance	50 ohms nominal
VSWR	2:1 maximum
Connector	Type N
RF Monitor Output	-10 dBm minimum
Types of Output Available	CW, square wave, pulse and FM
Modulation – Generated with Model 1020A	
Internal Modulation, Internally or Externally Synchronized	
Square Wave Frequency	10 Hz-10 KHz continuously adjustable
Pulse Repetition Rate	10 Hz-10 KHz continuously adjustable
Width	0.2 to 2000 μ sec continuously adjustable

TABLE 1-2. EQUIPMENT SPECIFICATIONS (Continued)

Characteristics	Specifications
Rise and Decay Times	1607E: $\leq 0.15 \mu\text{sec}$ 1608E: $\leq 0.1 \mu\text{sec}$
FM Type Frequency Sweep Width	Sawtooth 10 Hz - 10 kHz continuously adjustable Continuously adjustable to 7.5 MHz, typical
External Pulse Modulation Repetition Rate Pulse Width Polarity Input Amplitude	Single pulse to 1 MHz rate 0.5 to 2500 μsec Positive or negative 15 to 70 volts peak
Synchronization Sync Outputs, Delayed and Undelayed (Separate Outputs) Repetition Rate Amplitude Delay	10 to 10,000 pps $\geq +25\text{V}$ peak into 1K ohms load. 0.3 to 2,000 μsec , continuously adjustable
External Sinewave Input Sync Frequency Amplitude	10 Hz - 10 kHz 5 to 50 vrms
External Pulse Sync Input Repetition Rate Amplitude Polarity Pulse Width Rise Time	Single pulse to 10,000 pps 5 to 50V peak Positive or negative 0.5 to 5 μsec 0.1 to 1 μsec
Modulation – Generated with Models 1107E and 1108E	
Internal Square Wave Rate On-Off Ratio Synchronization	950 to 1050 Hz (minimum) 100% Internal
Internal FM Rate Sweep Width	Line rate Continuously adjustable to 7.5 MHz, typical

TABLE 1-2. EQUIPMENT SPECIFICATIONS (Continued)

Characteristic	Specification
<p>External Pulse Modulation Input Modulating Pulse</p> <p>Amplitude Width Rise Time</p>	<p>15 to 50 volts peak, positive Width set to obtain desired output pulse width Model 1607E: $\leq 0.15 \mu\text{sec}$ Model 1608E: $\leq 0.10 \mu\text{sec}$</p>
<p>Output Modulated Pulse</p> <p>Width Rise and Delay Time (when input pulses have significantly faster rise times) Rate</p>	<p>0.2 to 2000 μsec Model 1607E: $\leq 0.15 \mu\text{sec}$ Model 1608E: $\leq 0.10 \mu\text{sec}$ Single pulse to 1 MHz</p>
<p>External FM Modulation</p> <p>Type and Rate</p> <p>Sweep Width</p>	<p>Any waveshape having frequency components between 10 Hz and 0.5 MHz</p> <p>Adjustable to 7.5 MHz, typical</p>
<p>EXT FM Input Coupling</p>	<p>Capacitive coupled to klystron repeller</p>
<p>Power Requirements</p>	<p>115 or 230 volts $\pm 10\%$, 50-60 Hz, 150 watts (50-400 Hz optional, add suffix "F" to model number)</p>
<p>Dimensions</p>	<p>7" H x 16-3/4" W x 17" D</p>
<p>Weight</p>	<p>50 pounds</p>
<p>Accessories Supplied</p>	<p>RF Cable Assembly, Wrench Kit, Video Cables</p>

SECTION II

OPERATION

2-1. GENERAL.

2-2. Models 1607E and 1608E are shipped complete and ready to operate; no special or permanent installation procedures are required. The instrument shall be unpacked upon receipt, observing the usual precautions customary when unpacking an electronic instrument.

2-3. INSTALLATION.

2-4. After unpacking the instrument, plan its installation. If the unit will be used on a bench or cart, the required dimensions are shown in figure 2-1. If the unit is to be used in a rack, the handles at either end of the front panel should be reversed for rack mounting as shown in figure 2-1. The instrument requires 115/230 volts, single phase, 50/60 Hz ac power.

Note

Models 1607E and 1608E are shipped ready for 115 vac operation. If the instrument is to be operated from a 230-volt source, set the 115/230 volt switch, located on the rear panels of the Models 1107E/1108E and 1020A to the 230 volt position. Replace the fuse in the Model 1107E/1108E with the 0.75 amp fuse and the fuse in Model 1020A with the 1/8 amp fuse, both of which are supplied in the accessory kit.

2-5. OPERATING CONTROLS, INDICATORS, AND CONNECTORS.


2-6. The operating controls, indicators, and connectors of the Model 1607E/1608E are listed in Table 2-1 and shown in Figure 2-2.

2-7. MODEL 1607E/1608E OPERATION

2-8. To operate Model 1607E/1608E, proceed as follows:

a. Connect power cable B160826 between the AC OUTPUT connector of the Model 1020A Modulator and the AC INPUT connector of the Signal Generator.

b. Set the POWER switches of the Modulator and the Signal Generator to their off positions.

c. Connect video cable C147363 between the  OUT connector on the Modulator and the EXT MOD connector on the Signal Generator.

d. Connect the other video cable C147363 between the FM OUT connector on the Modulator and the EXT FM connector on the Signal Generator.

e. Connect power cable B160833 between the AC INPUT connector of the Modulator and the external ac power source.

f. Turn the POWER switches on the Modulator and the Signal Generator to ON and allow the instruments to warm up for 20 minutes. Power indicator lamp on the Signal Generator and the POWER ON indicator lamp on the Modulator should illuminate indicating power is being provided to the instruments.

2-9. CW OPERATION. For CW operation, proceed as follows:

a. Set the FREQUENCY GHz control of the Signal Generator to the desired frequency.

b. Set the FUNCTION switch of the Modulator to OFF.

Section II
Operation

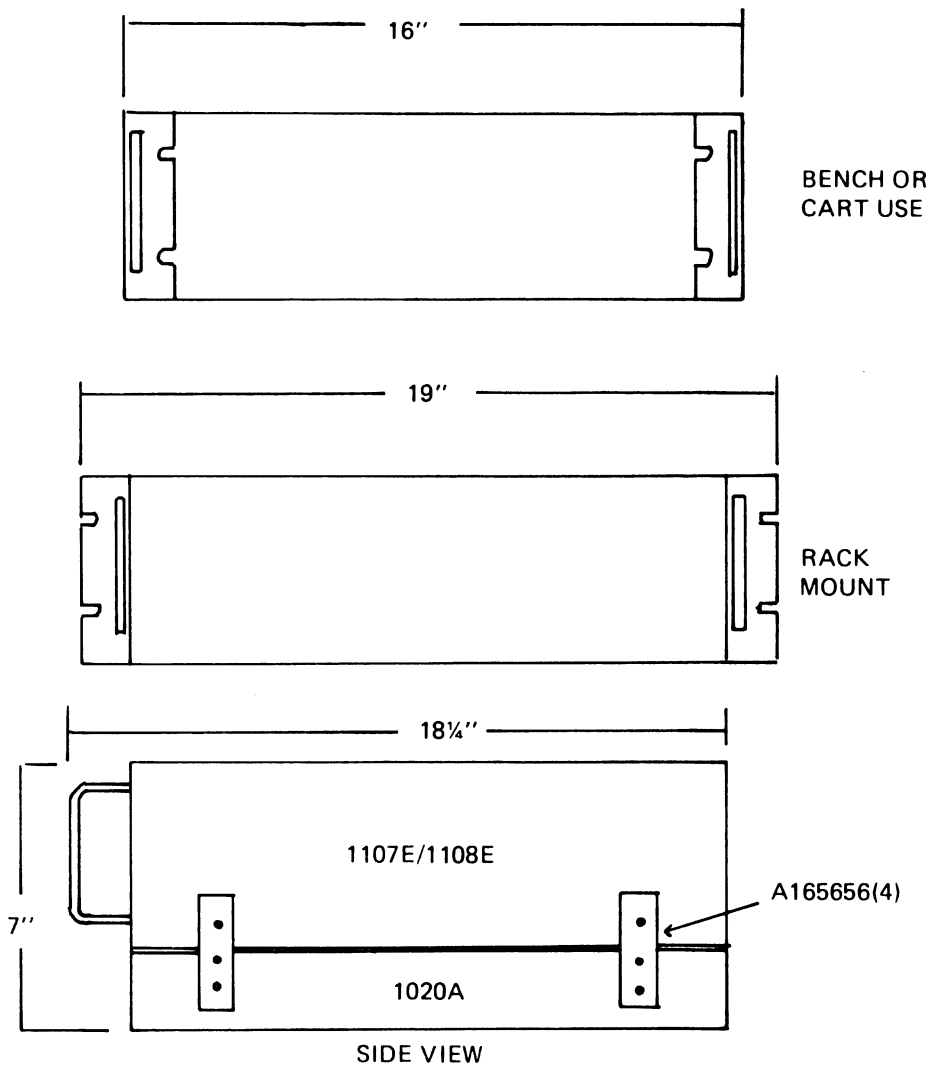


Figure 2-1. Outline Installation Drawing

c. Set the MODULATION SELECTOR switch of the Signal Generator to CW.



CAUTION

It is possible to make the Signal Generator inoperative by driving the attenuator probe too far into the oscillator cavity of the Signal Generator. If this occurs, back off the attenuator by turning the ATTENUATOR control counterclockwise and switch the MODULATION SELECTOR switch to RF OFF and then repeat the operating procedure.

d. Adjust the POWER SET control of the Signal Generator for a reading of CAL on the power monitor meter.

e. Adjust the ATTENUATOR control to read the desired output power level on the attenuator dial.

2-10. INTERNAL SQUARE WAVE MODULATION OPERATION. For internal square wave modulation operation, perform steps a through e of paragraph 2-9 and proceed as follows:

a. Set the FUNCTION switch of the Modulator to EXT  /INT .

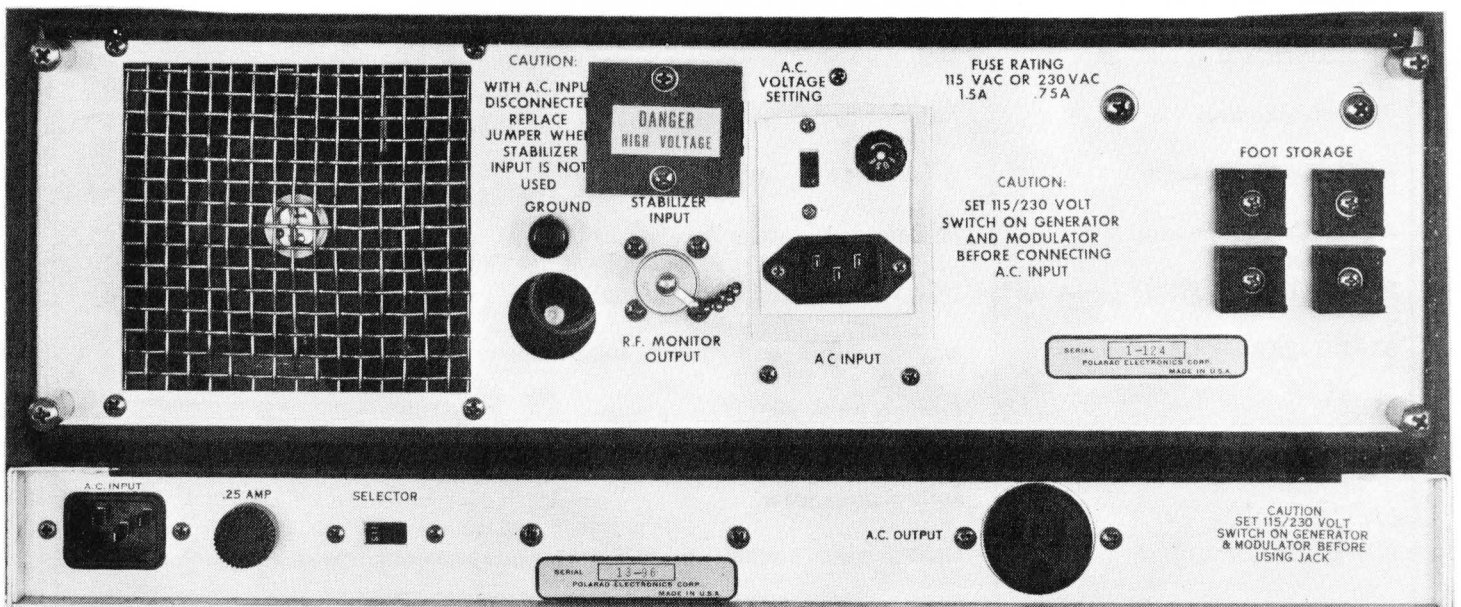
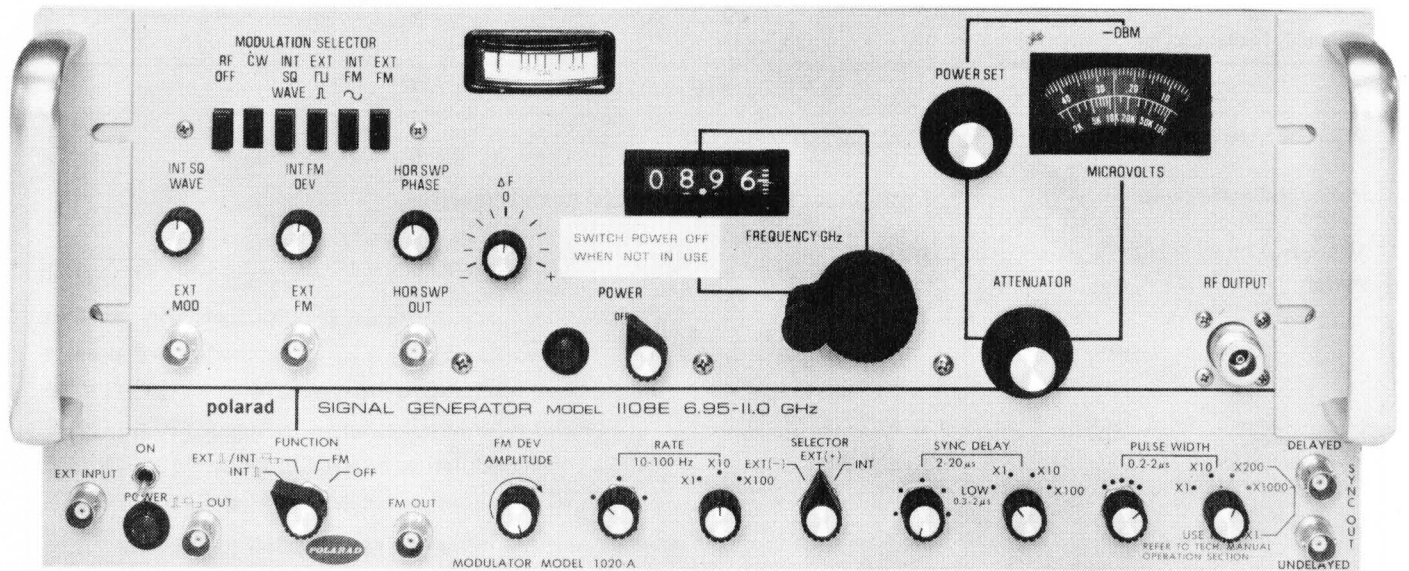
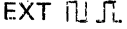


Figure 2-2. Operating Controls, Indicators and Connectors

TABLE 2-1. OPERATING INDICATORS, CONTROLS, AND CONNECTORS

Control, Indicator, or Connector	Function
MODEL 1107E/1108E	
POWER switch	Controls application of ac power
Power indicator lamp	Lights when ac power is applied to instrument
MODULATION SELECTOR switch	Selects type of modulation, as follows: RF OFF Disables rf output, standby position CW No modulation present INT SQ WAVE Square wave modulation internal to Model 1107E/1108E EXT  Pulse modulation external to Model 1107E/1108E INT FM ~ FM modulation internal to Model 1107E/1108E EXT FM FM modulation external to Model 1107E/1108E
INT SQ WAVE control	Adjusts square wave frequency over the minimum range of 950 to 1050 Hz
INT FM DEV control	Adjusts amplitude of fm driving signal internal to Model 1107E/1108E
HOR SWP PHASE control	Controls phase of horizontal sweep signal to oscilloscope
EXT MOD connector	Accepts pulse or square wave modulation signal external to Model 1107E/1108E
EXT FM connector	Accepts frn signal external to the Model 1107E/1108E
HOR SWP OUT connector	Output for horizontal sweep signal to oscilloscope
FREQUENCY GHz dial	Displays digital frequency readout of instrument frequency
Frequency control	Adjusts instrument frequency
RF OUTPUT connector	RF output available for use
ATTENUATOR control	Adjusts output power level of instrument
RF MONITOR OUTPUT connector*	Used for automatic frequency stabilization
STABILIZER INPUT terminals*	Used for automatic frequency stabilization or other auxiliary use.
FUSE*	Protects instrument from damage
Δ F Control	Fine frequency control. May be used to maximize system power output and control pulse jitter.
POWER SET control	Used to adjust oscillator power level for power monitor meter indication of CAL
Power monitor meter	Used to set power level of instrument for attenuator calibration
AC INPUT connector*	Power cord input
AC VOLTAGE SETTING switch*	Selected according to input power ac voltage level either 115 vac or 230 vac

* Located on rear panel.

TABLE 2-1. OPERATING INDICATORS, CONTROLS, AND CONNECTORS (Continued)


Control, Indicator, or Connector	Function								
MODEL 1020A									
POWER switch	Controls application of ac power								
ON indicator lamp	Lights when ac power is applied to instrument								
EXT INPUT connector	Connects the Model 1020A to either externally synchronizing or externally pulse modulating signals								
 OUT connector	Couples output pulse or output square wave to EXT PULSE input jack on Model 1107E/1108E								
FUNCTION switch	Selects internal pulse, internal square wave, internal FM, external pulse modulation, or no modulation								
FM OUT connector	With FUNCTION switch in FM position, couples internally generated sawtooth waveform to EXT FM connector of Model 1107E/1108E								
FM DEV AMPLITUDE control	When FUNCTION switch is in the FM position, adjusts the amplitude of the output sawtooth. (Adjusts deviation of rf outputs when MODULATION SELECTOR switch, on Model 1107E/1108E is set to EXT FM position)								
RATE control and X1-X10-X100 multiplier switch	Adjusts pulse repetition rate from 10 to 10,000 Hz.								
SELECTOR switch	<p>Enables Modulating Output signals to be either internally or externally controlled. For external modulating signals, the controls are set as follows:</p> <ol style="list-style-type: none"> a. Must be set to EXT(+) when a positive synchronizing pulse or a positive modulating pulse is externally applied. b. Must be set to EXT(-) when a negative synchronizing pulse or a negative modulating pulse is externally applied. c. May be set to EXT(+) or EXT(-) when a sine wave synchronizing signal is externally applied. 								
SYNC DELAY control and LOW-X1-X10-X100 multiplier switch	Adjusts delay between both rf output pulse and delayed sync output pulse from 0.3 to 2000 microseconds.								
PULSE WIDTH control and X1-X10-X200-X1000 switch	<p>Adjusts width of rf output pulse from 0.2 to 2000 μsec.</p> <table style="margin-left: 40px;"> <tr> <td>X1</td> <td>0.2 to 2 μsec</td> </tr> <tr> <td>X10</td> <td>2.0 to 20 μsec</td> </tr> <tr> <td>X200</td> <td>40 to 400 μsec</td> </tr> <tr> <td>X1000</td> <td>200 to 2000 μsec</td> </tr> </table>	X1	0.2 to 2 μ sec	X10	2.0 to 20 μ sec	X200	40 to 400 μ sec	X1000	200 to 2000 μ sec
X1	0.2 to 2 μ sec								
X10	2.0 to 20 μ sec								
X200	40 to 400 μ sec								
X1000	200 to 2000 μ sec								
	Pulse width range overlap on the X10 and X200 multiplier position provides pulse width from 20 μ sec to 40 μ sec								

TABLE 2-1. OPERATING INDICATORS, CONTROLS, AND CONNECTORS (Continued)

Control, Indicator, or Connector	Function
MODEL 1020A	
DELAYED SYNC OUT connector	Provides positive video trigger pulse in time coincidence with leading edge of rf output pulse.
UNDELAYED SYNC OUT	Provides positive video trigger pulse which leads both rf output pulse and delayed sync output pulse in time.
115/230 SELECTOR switch*	Selected according to input power ac voltage level
AC INPUT connector*	Connection for ac power cable
AC OUTPUT connector*	Connection for ac power cable between Model 1107E/1108E and Model 1020A

* Located on rear panel.

b. Set the SELECTOR switch of the Modulator to INT.

c. Set the MODULATION SELECTOR switch of the Signal Generator to EXT $\square \sqcup \sqcap$.

d. Adjust the RATE control of the Modulator for the desired rate.

2-11. INTERNAL PULSE MODULATION OPERATION.

For internal pulse modulation operation, perform steps a through e of paragraph 2-9 and proceed as follows:

a. Set the FUNCTION switch of the Modulator to INT \sqcup .

b. Set the SELECTOR switch of the Modulator to INT.

c. Set the MODULATION SELECTOR switch of the Signal Generator to EXT $\square \sqcup \sqcap$.

d. Adjust the RATE and PULSE WIDTH controls of the Modulator for the desired pulse rate and width.

2-12. EXTERNAL PULSE MODULATION OPERATION.

For external pulse modulation operation, perform steps a through e of paragraph 2-9 and proceed as follows:

a. Set the FUNCTION switch of the Modulator to EXT \sqcup /INT \square .

b. Select the SELECTOR switch of the Modulator to EXT(+) or EXT (-) as determined by the externally applied pulse.

c. Set the MODULATION SELECTOR switch of the Signal Generator to EXT $\square \sqcup \sqcap$.

d. Connect the external modulating signal to the EXT INPUT connector of the Modulator.

Note

Undelayed or delayed sync out signals are available at the DELAYED SYNC OUT connector and/or the UNDELAYED SYNC OUT connector of the Modulator.

2-13. INTERNAL FM OPERATION (Internal to 1107E/1108E).

For internal fm operation (1107E/1108E) perform steps a through e of paragraph 2-9 and proceed as follows:

a. Set the MODULATION SELECTOR switch of the Signal Generator to INT FM~.

b. Adjust the INT FM DEV control to obtain the desired sweep width.

2-14. INTERNAL FM OPERATION (1607E/1608E)

(10 To 10 KHz Sawtooth Rate). For internal FM operation

perform steps a through e of paragraph 2-9 and proceed as follows:

- a. Set the MODULATION SELECTOR switch of Signal Generator 1107E/1108E to EXT FM.
- b. Set the FUNCTION switch to FM and the SELECTOR switch to INT on Modulator 1020A.
- c. Adjust the RATE control and multiplier switch X1, X10, X100 on Modulator 1020A for the desired modulation rate.
- d. Adjust the FM DEV AMPLITUDE control for the required deviation.

2-15. EXTERNAL FM OPERATION. To perform the external FM operation proceed as follows:

- a. Connect the external modulating signal to the EXT FM connector.
- b. Perform steps a through e of paragraph 2-9.
- c. Set MODULATION SELECTOR switch of the Signal Generator to EXT FM.
- d. Set FUNCTION switch of the Modulator to OFF.
- e. Set the external FM source to desired characteristics.

2-16. EXTERNAL SYNCHRONIZATION. For external triggering of the internal pulse or external synchronization of the internal fm signal, proceed as follows:

- a. Connect the external trigger or synchronizing to the EXT INPUT connector of the Modulator.
- b. Set the FUNCTION switch of the Modulator to either EXT(+) for a positive input or EXT(-) for a negative input.

2-17. PACKAGING INSTRUCTIONS.

2-18. PACKAGING FOR SHORT TERM STORAGE. If the instrument is to be stored for a relatively short period, cover it with a suitable protective covering such as a sheet of plastic or paper. Put the accessories and instruction manual in an envelope or bag and fasten it to the instrument to prevent loss. Store the instrument in a clean and dry area where it will not be subjected to extreme temperatures. Save the packing material for future, safe shipping requirements.

2-19. PACKING FOR LONG TERM STORAGE OR SHIPMENT. If the instrument is to be stored for a long time or shipped, proceed as follows:

- a. Save the original wrappings and carton and repackage the instrument in them. The original packing material properly cushions the instrument for shipment.
- b. If the original packing has not been saved, call Polarad Electronics Inc. for proper shipping instructions.

SECTION III
MAINTENANCE

3-1. GENERAL.

3-2. This section contains the minimum performance standards and troubleshooting procedures for the Model 1607E/1608E Signal Generator. For maintenance and alignment procedures for the individual components that comprise the Model 1607E/1608E, refer to the instruction manuals listed in paragraph 1-3.

3-3. TEST EQUIPMENT REQUIRED.

3-4. Table 3-1 lists the test equipment required for the maintenance of Model 1607E/1608E Signal Generator.

3-5. MINIMUM PERFORMANCE TESTS.

3-6. The minimum performance tests, detailed in paragraphs 3-7 through 3-20, will determine whether the instrument is operating within the specifications listed in table 1-2.

3-7. The Signal Generator is shipped, ready for operation, with the 115/230V switches of the Signal Generator and Modulator set for 115 vac. If the Signal Generator is to operate from a 230 volt ac supply, set the 115/230 volt switches of the Signal Generator and Modulator to 230V and insert the proper fuses. Connect power cable B160826 to the AC OUTPUT connector of the Modulator and the AC INPUT connector of the Signal Generator. Connect power cable B160833 to the AC INPUT connector of the Modulator and to the external power source. Set the POWER switches of the Modulator and Signal Generator to ON. Allow a 20-minute warm-up period before attempting any of the minimum performance tests. At the end of each test, disconnect the equipment.

3-8. FREQUENCY RANGE AND TUNING TEST. To perform the frequency range and tuning test, proceed as follows:

a. Set the FREQUENCY GHz control of the Signal Generator to 3.70 GHz (Model 1107E) or 7.00 GHz (Model 1108E).

b. Set the MODULATION SELECTOR switch of the Signal Generator to CW.

c. Adjust the ΔF control of the Signal Generator to the 0 position.

d. Adjust the POWER SET control of the Signal Generator for a reading of CAL on the power monitor meter.

e. Set the ATTENUATOR control of the Signal Generator for a reading of 0 dBm output on the attenuator dial.

f. Connect Systron Donner Model 6316 counter to the RF OUTPUT connector of the Signal Generator. The frequency reading within $\pm 0.5\%$ should be obtained.

g. Perform steps a through f at the following FREQUENCY GHz control settings:

1607E		1608E	
4.00	6.00	7.50	9.50
4.50	7.00	8.00	10.00
5.00	8.00	8.50	10.50
5.50	8.40	9.00	11.00

3-9. OUTPUT POWER AND LEVEL ACCURACY TEST. To perform the output power and level accuracy test, proceed as follows.

a. Set the FREQUENCY GHz control of the Signal Generator to 3.7 GHz (Model 1607E) or 7.0 GHz (Model 1608E).

b. Set the MODULATION SELECTOR switch of the Signal Generator to CW.

c. Set the ΔF control of the Signal Generator to the 0 position.

TABLE 3-1. TEST EQUIPMENT REQUIRED

Item	Manufacturer and Model*	Use
Counter	Systron-Donner 6316	Frequency
Power Meter with Sensor	H-P 435A and H-P 8481A	RF Power Attenuation
Oscilloscope	Tektronix 541A	Modulation
Pre-Amplifier	Tektronix Type CA	Modulation
Pulse Generator	H-P 214A	Pulse/Sync
Pad	3 dB Applied Research HFA 50	Load
AC Power Source	Elgar 501A	EXT. FM
Detector	H-P 423B	Modulation Tests
Spectrum Analyzer	H-P 8555A	FM Deviation Spectral Purity

*NOTE: Equivalent equipment, produced by other manufacturers, may be substituted to obtain satisfactory performance.

d. Adjust the POWER SET control of the Signal Generator for a reading of CAL in the power monitor meter.

e. Set the ATTENUATOR control of the Signal Generator for a reading of 0 dBm output on the attenuator dial.

f. Set the MODULATION SELECTOR switch of the Signal Generator to OFF.

g. Connect H-P Power Meter H-P 435A to the RF OUTPUT connector of the Signal Generator and zero set on +5 dBm range.

h. Set the MODULATION SELECTOR switch of the Signal Generator to CW.

i. Power level should read 0 dBm \pm 2.0 dB adjusting the Power Meter range accordingly.

j. Repeat steps a through i at -10 dBm and -20 dBm.

k. Repeat steps a through i at 6.0 (9.0) and 8.4 (11.0) GHz.

Note

The attenuator is extremely accurate so that if the output accuracy at 0 dBm, -10 dBm, and -20 dBm are all within the specified limits, all other values below -20 dBm will be correct.

3-10. INTERNAL SQUARE WAVE MODULATION TEST. To perform the internal square wave modulation test, proceed as follows:

a. Connect the equipment as shown in figure 3-1.

b. Set FREQUENCY GHz of the Signal Generator to 3.70 GHz (Model 1607E) or 7.0 (Model 1608E).

c. Set the MODULATION SELECTOR switch of the Signal Generator to CW and the Δ F control to 0. Adjust the POWER SET control for an indication of CAL on the power monitor meter.

d. Adjust the ATTENUATOR control of the signal Generator for a reading of 0 dBm on the attenuator dial.

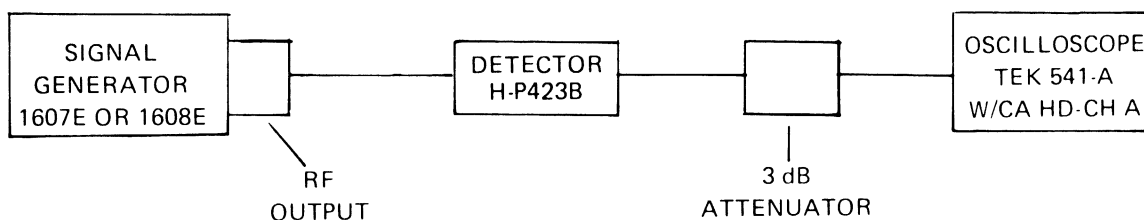






Figure 3-1. Modulation Characteristics Test Set-Up

e. Set the MODULATION SELECTOR switch of the Signal Generator to EXT  .

f. Set the Modulator controls as follows:

Control	Position
FUNCTION	EXT  /INT 
RATE	X1
SELECTOR	INT
RATE Vernier	Fully clockwise

g. Set the oscilloscope for a square wave display.

h. Slowly rotate the RATE control vernier of the Modulator counterclockwise and observe the display on the oscilloscope. The square rate should decrease smoothly to a minimum of typically 10 Hz.


i. Set the RATE multiplier control to X100.

j. Slowly rotate the RATE control vernier of the Modulator clockwise. The display should increase smoothly beyond a rate of 10 KHz.

g. Repeat steps a through j at 6.0 (9.0) and 8.40 (11.0) GHz.

3-11. INTERNAL PULSE MODULATION TEST. To perform internal pulse modulation test, proceed as follows:

- Connect equipment as shown in figure 3-1.
- Perform steps b through e of paragraph 3-10.

c. Set FUNCTION switch of the Modulator to INT  and the SELECTOR switch to INT.

d. Set PULSE WIDTH vernier control of the Modulator fully counterclockwise and set the multiplier control to X1000.

e. Set RATE control of the Modulator fully clockwise and the RATE multiplier to X1.

f. Slowly rotate the PULSE WIDTH vernier control of the Modulator clockwise and observe that the pulse display on the oscilloscope increases in width smoothly until it goes to a maximum of 2000 microseconds.

g. Set PULSE WIDTH multiplier to X1 and RATE multiplier to X100.

h. Slowly rotate the PULSE WIDTH vernier control of the Modulator counterclockwise until the pulse width on the oscilloscope decreases through to a minimum of 0.2 microseconds.

i. Repeat steps a through h at 6.0 (9.0) GHz and 8.4 (11.0) GHz.

3-12. EXTERNAL PULSE MODULATION TEST. To perform the external pulse modulation test, proceed as follows:

- Connect equipment as shown in figure 3-1.
- Connect PULSE OUTPUT of Pulse Generator H-P 214A to the EXT INPUT connector of the Modulator using a BNC-T connector.
- Connect the remaining terminal of the BNC-T connector to Channel B input of the Tektronix CA plug-in unit.

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d. Trigger the oscilloscope externally from the TRIGGER OUTPUT connector of Pulse Generator H-P 214A.

e. Set the FREQUENCY GHz control of the Signal Generator to 6.0 (Model 1607E) or 9.0 GHz (Model 1608E).

f. Set the MODULATION SELECTOR switch of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter of the Signal Generator and ATTENUATOR control for 0 dB setting.

g. Set the MODULATION SELECTOR switch of the Signal Generator to EXT \square \square .

h. Set the FUNCTION control of the Modulator to EXT \square /INT \square and the SELECTOR control to EXT(+) and set the PULSE OUTPUT and TRIGGER OUTPUT polarity of Pulse Generator H-P 214A to (+).

i. Set the oscilloscope for dual-trace display, observing input video and output detected pulse.

j. Set the PULSE WIDTH control of the Pulse Generator 0.5 microseconds and the INT REP RATE control to 10K.

k. Vary the AMPLITUDE control of the Pulse Generator from 15 to 70 volts peak and observe that the output detected pulse is steady.

l. Set the H-P Pulse Generator PULSE WIDTH to 2500 μ sec and INT REP RATE control to minimum.

m. Observe the oscilloscope display for a steady output pulse as the Pulse Generator width is varied from 15 to 70 volts.

3-13. INTERNAL FM-DEVIATION TEST. To perform the internal FM-deviation test, proceed as follows:

a. Set the FREQUENCY GHz control of the Signal Generator to 3.70 GHz (Model 1607E) or 7.0 GHz (Model 1608E).

b. Set the MODULATION SELECTOR switch of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter and ATTENUATOR control for 0 dBm output.

c. Connect an RF coaxial cable between the RF OUTPUT connector of the Signal Generator and the RF INPUT connector of H-P 8555A Spectrum Analyzer.

d. Adjust the controls of the Spectrum Analyzer to display a 3.7 (7.0) GHz signal in the center of the screen.

e. Set the MODULATION SELECTOR switch of the Signal Generator to EXT FM.

f. Set the controls on the Modulator as follows:

Control	Setting
FUNCTION	FM
SELECTOR	INT
RATE	X100
RATE vernier	Approximate middle position

g. Rotate the FM DEV AMPLITUDE control of the Modulator until an FM deviation of 5 MHz peak-to-peak, typical, is indicated on the Spectrum Analyzer.

h. Slowly rotate the RATE vernier control of the Modulator counterclockwise and observe that the 5 MHz FM deviation, typical, is still indicated on the Spectrum Analyzer.

i. Set the RATE control of the Modulator to X1 and set the RATE vernier control to its approximate middle position. Observe that a 5 MHz FM deviation peak-to-peak, typical, is still indicated on the Spectrum Analyzer.

j. Repeat steps a through i at 6.0 (9.0) and 8.40 (11.0) GHz.

3-14. EXTERNAL FM-DEVIATION TEST. To perform the external FM deviation test, proceed as follows:

a. Set the FREQUENCY GHz control of the Signal Generator to 3.70 GHz (1607E) or 7.0 GHz (1608E).

b. Set the MODULATION SELECTOR switch of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter and ATTENUATOR control for 0 dBm output.

c. Connect an RF coaxial cable between the RF OUTPUT connector of the Signal Generator and the RF INPUT connector of H-P 8555A Spectrum Analyzer.

d. Adjust the controls of the Spectrum Analyzer to display a 3.70 (7.0) GHz signal in the center of the screen.

e. Connect a cable between the OUTPUT connector of Elgar Model 501A and the EXT FM connector of the Generator. Set the output level of the Model 501A to minimum.

f. Set the FREQUENCY control of Model 501A to 10 Hz.

g. Set the MODULATION SELECTOR switch of the Signal Generator to EXT FM.

h. Vary the AMPLITUDE control of Model 501A until an FM deviation of 5 MHz peak-to-peak is observed on the Spectrum Analyzer.

i. Change the FREQUENCY control of the Model 501A to 10,000 Hz and repeat step h.

j. Repeat steps a through i at 6.0 (9.0) GHz and 8.4 (11.0) GHz.

3-15. INTERNAL FM TEST. (Internal to Model 1107E/1108E). To perform the internal FM test proceed as follows:

a. Set the FREQUENCY GHz control of the Signal Generator to 3.70 GHz (Model 1607E) or 7.0 GHz (Model 1608E).

b. Set the MODULATION SELECTOR switch of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter and ATTENUATOR control for 0 dBm output.

c. Connect an RF coaxial cable between the RF OUTPUT connect of the Signal Generator and the RF INPUT connector of H-P 8555A Spectrum Analyzer.

d. Adjust the controls of the Spectrum Analyzer to display a 3.7 (7.0) GHz signal in the center of the screen.

e. Set the MODULATION SELECTOR switch to INT FM.

f. Vary the INT FM DEV control until an FM deviation of 5 MHz peak-to-peak is observed on the Spectrum Analyzer.

g. Repeat steps a through f at 6.0 (9.0) GHz and 8.4 (11.0) GHz.

3-16. INTERNAL SYNCHRONIZATION DELAYED SYNC OUT TEST. To perform the internal synchronization delayed sync out test, proceed as follows:

a. Connect the equipment as shown in figure 3-1.

b. Set the FUNCTION switch on the Modulator to INT \square and the SELECTOR switch to INT.

c. Connect the DELAYED SYNC OUT signal of the Modulator to the Vertical Input of the oscilloscope in parallel with a 1000 ohm resistor.

d. The level should be ≥ 25 volts positive and the rise time should be ≤ 1 microsecond simultaneously with the pulse.

3-17. DELAYED SYNC OUT TIMING TEST. To perform the delayed sync out timing test, proceed as follows:

a. Set up equipment as shown in figure 3-1.

b. Set the FREQUENCY GHz control of the Signal Generator to 3.70 GHz (1607E) or 7.0 GHz (1608E).

c. Set the MODULATION SELECTOR switch of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter.

d. Adjust the ATTENUATOR control for a reading of 0 dBm on the attenuator dial.

e. Set the controls on the Modulator as follows:

Control	Setting
FUNCTION	INT \square
RATE	X10
RATE vernier	Fully clockwise
SELECTOR	INT

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Control	Setting
SYNC DELAY	X LOW
SYNC DELAY vernier	Fully counterclockwise
PULSE WIDTH	X1
PULSE WIDTH vernier	Fully clockwise

f. Connect the UNDELAYED SYNC OUT signal of the Modulator to the EXT TRIGGER INPUT of the oscilloscope.

g. Feed the DELAYED SYNC OUT signal of the Modulator to Channel B of the oscilloscope.

h. Connect the H-P 423B Detector output to Channel A of the oscilloscope.

i. Set the oscilloscope to the ALTERNATE mode and adjust the controls of the oscilloscope to obtain a stable display.

j. Observe a simultaneous start of the two pulses on the screen and that the delay is < 0.3 microseconds.

k. Set the SYNC DELAY control of the Modulator to X100 and rotate the SYNC DELAY control vernier clockwise until the delay is ≥ 300 microseconds. Note that the displayed pulses are delayed simultaneously.

3-18. EXTERNAL SYNCHRONIZATION SINE WAVE TEST. To perform the external synchronization sine wave test, proceed as follows:

- Set up equipment as shown in figure 3-1.
- Set the FREQUENCY GHz control of the Signal Generator to 3.7 GHz (1607E) or 7.0 GHz (1608E).
- Set the MODULATION SELECTOR switch of the generator to CW. Adjust the POWER SET control of the generator for an indication of CAL on the power monitor meter and ATTENUATOR control for 0 dB output.
- Set the Modulator controls as follows:

Control	Position
FUNCTION	INT \square
SELECTOR	EXT(+) or EXT(-)

e. Set the MODULATION SELECTOR control of the Signal Generator to EXT \square \square .

f. Connect Elgar Model 501A output to the EXT INPUT connector of the Modulator.

g. Feed the Model 501A output signal simultaneously into Channel B and the RF detected pulse into Channel A of the oscilloscope and set the oscilloscope for a stable display.

h. Vary the Model 501A frequency at 5 volts rms between 10 and 10,000 Hz and check for a stable RF pulse.

i. Repeat step h at 50 volts rms.

3-19. EXTERNAL SYNCHRONIZATION PULSE TEST. To perform the external synchronization pulse test, proceed as follows:

- Connect equipment as shown in figure 3-1.
- Set the FREQUENCY GHz control of the Signal Generator to 3.7 GHz (1607E) or 7.0 GHz (1608E).
- Set the MODULATION SELECTOR of the Signal Generator to CW. Adjust the POWER SET control of the Signal Generator for an indication of CAL on the power monitor meter and ATTENUATOR control on 0 dBm output.

d. Connect Pulse Generator H-P 214A to the EXT INPUT connector of the Modulator.

e. Set the Modulator controls as follows:

Control	Position
FUNCTION	INT \square
SELECTOR	EXT(+)

f. Set the MODULATION SELECTOR switch of the Signal Generator to EXT \square \square .

g. Set the H-P 214 Pulse Generator for the following settings as measured on Channel B of the oscilloscope:

Pulse Repetition Rate	10,000 Hz
Pulse Width	0.5 microseconds
Amplitude	5V, positive

h. Set oscilloscope for ALTERNATE mode and adjust oscilloscope for stable display of the two pulses.

i. Reduce the pulse rate on the Pulse Generator from 10,000 Hz to minimum. Observe that, on Channel A of the oscilloscope, the output pulse is stable.

j. Set the amplitude of the Pulse Generator to 50 volts and repeat step i.

k. Set the pulse width of the Pulse Generator to 5 microseconds and repeat step i.

l. Set the amplitude of the Pulse Generator to 5 volts and repeat step i.

m. Repeat step i, except that the positive amplitude of the Pulse Generator is changed to the negative polarity and the SELECTOR switch on the Modulator is set to EXT(-).

3-20. TROUBLESHOOTING*

3-21. The troubleshooting procedure for Model 1607E/1608E is shown in Table 3-2. The procedure locates the fault to one of the components of the Signal Generator. For troubleshooting of the individual component, refer to the instruction manual for that component included in this manual.

WARNING

A REGULATED VOLTAGE OF -1750/-1850 VOLTS WILL BE ENCOUNTERED DURING THE TROUBLESHOOTING PROCEDURE. DO NOT CONNECT OR DISCONNECT TEST EQUIPMENT WHICH CONNECTS INTERNALLY WITH THE INSTRUMENT ENERGIZED.

*Polarad's Customer Service Department, Lake Success, New York and Polarad's service depots worldwide are always pleased to be of assistance.

Customer Service Department






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TABLE 3-2. TROUBLESHOOTING PROCEDURE FOR MODEL 1607E/1608E

Step	Purpose	Procedure	Normal Indication	Abnormal Indication Reference
1	Evaluate power operating conditions	Connect instrument under test to power source.	POWER indicator lights on Model 1107E/1108E and 1020A should illuminate	Check Models 1107E/1108E and 1020A.
2	Power monitor meter not functioning	Allow 20 minutes for the instrument to warm up. Set the MODULATOR SELECTOR switch, of Model 1107E/1108E, to CW. Adjust the POWER SET control, on Model 1107E/1108E for a reading of CAL on the power monitor meter.	Power monitor meter deflects to CAL	Check Model 1107E/1108E only
3	Check of internal FM operation	Set the instrument for a reading of CAL on the power monitor meter of Model 1107E/1108E. Connect an RF cable between the RF OUTPUT connector of Model 1107E/1108E and the RF INPUT connector of H-P 8555A Spectrum Analyzer. Center the signal in the CRT. Set MODULATION SELECTOR switch of Model 1107E/1108E to EXT FM. Set FUNCTION switch of Model 1020A to FM, SELECTOR switch to INT, Rate switch to X100, and the RATE vernier to its approximate middle position. Rotate the FM DEV AMPLITUDE control of Model 1020A.	At least 5 MHz peak-to-peak FM deviation should be obtained.	Check Model 1107E/1108E and/or Model 1020A
4	Check of external FM operation.	Set the instrument for a reading of CAL on the power monitor meter of Model 1107E/1108E. Connect an RF cable between the RF OUTPUT connector of Model 1107E/1108E and the RF INPUT connector of H-P 8555A Spectrum Analyzer. Center the signal in the CRT. Connect a cable between the OUTPUT connector of Elgar Model 501A and the EXT FM connector of Model 1107E/1108E. Set the output level of Model 501A to minimum and set the FREQUENCY control to 10 Hz. Set the MODULATION SELECTOR switch of Model 1107E/1108E to EXT FM. Vary the AMPLITUDE control of Model 501A.	FM deviation of at least 5 MHz peak-to-peak, typical, should be obtained	Check Model 1107E/1108E only

TABLE 3-2. TROUBLESHOOTING PROCEDURE FOR MODEL 1607E/1608E (Continued)

Step	Purpose	Procedure	Normal Indication	Abnormal Indication Reference
5	Check internal pulse operation.	Connect equipment as shown in figure 3-1. Set the instrument for a reading of CAL on the power monitor meter of Model 1107E/1108E. Set the MODULATION SELECTOR switch of Model 1107E/1108E to EXT  . Set the controls of Model 1020A as follows: FUNCTION switch to INT  , SELECTOR switch to INT, PULSE WIDTH vernier control fully ccw and the multiplier control to X1000, RATE control fully clockwise and the RATE multiplier to X1. Slowly rotate the PULSE WIDTH vernier control clockwise.	Corresponding pulse characteristic of pulse, being supplied from Model 1020A should be obtained.	Check Model 1020A and/or Model 1107E/1108E.
6	Check external pulse operation.	Connect the instrument as shown in figure 3-1. Connect the PULSE OUTPUT of H-P 214A to the EXT INPUT connector of Model 1020A using a BNC-T connector. Connect the remaining terminal of the BNC-T connector to the Channel B input of the Tektronix CA plug-in unit. Trigger the oscilloscope externally from the TRIGGER OUTPUT connector of Pulse Generator H-P 214A. Set the instrument for a reading of CAL on the power monitor meter of Model 1107E/1108E and set the MODULATION SELECTOR switch to EXT  . Set the FUNCTION control of Model 1020A to EXT  /INT  and the SELECTOR control to EXT(+). Set the PULSE OUTPUT and TRIGGER OUTPUT polarity of Model H-P 214A to (+). Set the oscilloscope for a dual trace display and observe the input video and detected pulse. Set the PULSE WIDTH control of Model H-P 214A to 0.5 μ sec and the INT REP RATE control to 10K. Vary the AMPLIFIER control of Model H-P 214A from 15 to 70 volts peak.	RF detected pulsed output should be observed	Check Model 1107E/1108E only

SECTION IV

PARTS LIST

4-1. GENERAL.

1607E/1608E Signal Generator. The parts list, of the individual components of the Model 1607E/1608E are found in the individual instruction manuals of the components.

4-2. Table 4-1 provides a listing of the hardware that mechanically connects the two components of the Model

TABLE 4-1. PARTS LIST

Ref Symbol	Description	Manufacturer's Part No.	Mfrs Code	Qty
H1-H4	BRACKET	A165656	82199	4
	SCREW, MACHINE, PAN HEAD, CROSS-RECESSED, NO. 10-32 BY 1/2 IN. LG	MS35207-263	96906	12
	WASHER, FLAT, NO. 10	MS15795-808	96906	12
	WASHER, LOCK, NO. 10	MS35333-73	96906	12

