

LEADER TEST INSTRUMENTS

MODEL LSG-11

SIGNAL GENERATOR



LEADER ELECTRONICS CORP.

LEADER SIGNAL GENERATOR MODEL LSG-11

The **LSG-11** is a versatile and handy wide-band signal generator designed for the radio experimenter, hobbyist, service technicians and for instructional purposes. It covers a very wide band of frequencies, 120 Kc to 130 Mc on fundamentals and up to 390 Mc on harmonics. Among the many features incorporated are the large easy-to-read dial, marked spot frequencies at 455 Kc, 4.5 Mc and 10.7 Mc, two audio frequencies, provision for crystal oscillator operation and coaxial cable output. The generator is robustly constructed for all around use.

SPECIFICATIONS

Frequency Range	120 Kc to 390 Mc
Band A	120 Kc to 320 Kc
B	320 Kc to 1,000 Kc
C	1.0 Mc to 3.2 Mc
D	3.2 Mc to 11 Mc
E	11 Mc to 38 Mc
F	38 Mc to 130 Mc
Calibrated Harmonics	120 Mc to 390 Mc
RF Output	over 100,000 μ V, 120 Kc to 38 Mc
RF Controls	HIGH-LOW switch, and FINE
Modulation Frequencies	400 and 1,000 cps
Crystal Oscillator	1-15 Mc (FT243 type, X'tal not supplied)
AF Output	3 to 4 volts
AF Input	4 volts, approx.
Tube Complement	12BH7 RF Oscillator-buffer 6AR5 AF Osc or Amp and Xtal Osc
Rectifier	$\frac{1}{2}$ wave selenium
Accessory	75 Ω coaxial cable
Power Source	100, 117 or 230 volts as specified, AC 50/60 cps; 13 VA approx.
Size, H \times W \times D	190 \times 275 \times 115 mm ($7\frac{1}{2} \times 10\frac{3}{4} \times 4\frac{1}{2}$ in)
Wight, net	2.7 kg (6 lb)

1. DESCRIPTION

A. Controls

Frequency Range One of the six positions is used to set the range.

Frequency Dial

The desired frequency is set one on of the seven scales. An auxiliary 0-180 scale can be used for precise calibration.

RF HIGH-LOW

RF output voltage can be set to the high or low levels.

RF FINE

Fine output voltage adjustments are made.

SIG SELECT

The mode of the output signal is selected as follows :

EXT : RF output is the unmodulated carrier unless an external AF source is used.

400 : RF carrier modulated with 400 cps tone.

1,000 : RF carrier modulated with 1,000 cps tone.

XTAL : Crystal oscillator output, unmodulated.

AF IN-OUT

Adjusts internal AF oscillator output to an external load, or modulation depth when external AF source is used. Operating AC power switch attached.

B. Connections

RF OUT : Connector for output coaxial cable.

XTAL : Socket for FT-243 type crystal holder.

AF-GND : AF terminals for connections to load, or external source.

C. Circuits

1. A simplified block diagram of the instrument is shown in Fig. 1.

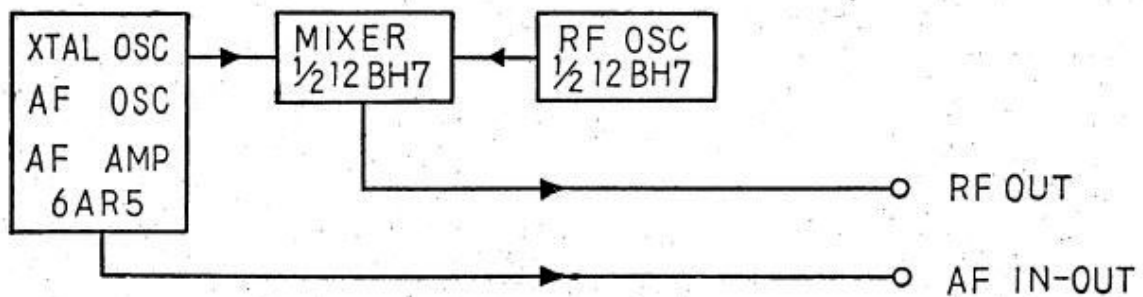


Fig. 1 Block Diagram

The diagram shows the RF, Mixer and combination AF oscillator or amplifier and crystal oscillator.

2. RF oscillator. One section of a 12BH (V2) duo-triode is used in a Colpitts oscillator to generate frequencies from 120 Kc to 130 Mc on fundamentals. The frequency of operation is set by the FREQ RANGE switch and the tuning dial. The calibration is accurate to $\pm 2\%$ up to 38 Mc, and $\pm 3\%$ to 130 Mc and above. where higher accuracies are required, it is recommended that a heterodyne frequency meter be used, for calibration after the generator has been "Warmed-up" for 2 or 3 hours. The auxiliary

scale (outer arc) can be used for such calibration. For convenience, the 455 Kc, 4.5 Mc and 10.7 Mc points are designated on the scales.

3. - Mixer The other triode section is used as a mixer or modulator, RF buffer and a cathode follower to isolate the load from the RF oscillator. The RF oscillator output is impressed directly on the grid through a small coupling capacitor. The AF modulating voltage is applied to the grid through an R-C network. The FINE and HIGH-LOW output controls are in the cathode circuit. The output cable is connected to the 2-way switch and connector. When the crystal oscillator is in use, the mixer becomes a buffer with the output controls also effective.

4. AF Oscillator or Amplifier and Xtal Oscillator. A 6AR5 (V1) pentode is used for three functions. Two audio frequencies, 400 and 1,000 cps can be generated. The outputs can be used either to modulate the RF carrier, or externally for checking AF amplifiers. About 4 volts from an external source is required for modulation, and this input will be amplified to a sufficient level for the purpose. As a crystal oscillator, quartz plates in the 1 to 15 Mc range can be used.

5. Power Supply. A half wave selenium rectifier with an R-C filter is used for the DC plate supply. Only AC power at 50 or 60 cps may be employed for the instrument.

D. Operation.

1. Preparation Connect the line plug to the AC mains. Attach the output cable to the "RF" OUT connector at the panel lower right. Turn the "AF IN-OUT" knob to switch on the AC power, and the pilot lamp will light. Set the "RF FINE" to "O", and "RF HIGH-LOW" to "LOW". Set the "FREQ RANGE" switch to the operating band and adjust the tuning knob to the desired frequency.

2. Connections. The test clips at the end of the coaxial cable are connected to the circuit or equipment under test. The red clip is at high potential, or "hot", and the black clip is for the ground or chassis connection. The components listed below must be connected between the red clip and the test point.

Component	For connection to
Resistor, $\frac{1}{4}$ W 200-1,000 Ω	Receiver Antenna terminal
Capacitor 50-1000 pf	IF amplifier circuits, etc, where DC voltages are present

For testing the higher frequency IF amplifiers, above 4 Mc, use the smallest possible capacitances to prevent detuning.

3. Modulated Carrier, Internal Source. The test clips are connected ANT and GND (or EARTH) terminals of the receiver. Set the "SIG SELECT" switch to "400" or "1000". Tune the receiver to the generator frequency, or vice versa, and the audio tone will be heard from the speaker. The "400" cycle tone is preferred when testing sets with speakers larger than 4" (10 cm) in diameter. An indicating instrument should be connected across the speaker terminals, when measuring the relative outputs. It is advisable to keep the RF signal input as low as possible by setting the RF switch to "LOW" and "RF FINE" to low values. This is to avoid overloading the tubes; or transistors in the set. Excessive inputs will cause AGC, or AVC, action and/or 2 resonance points will appear and proper alignment or adjustment become impossible. When aligning sharply tuned IF stages, the "400" cycle tone should be used, since with the "1,000", tuning will become difficult due to 2 peaks on the curve.

4. Modulated Carrier, External Source. Set the "SIG SELECT" switch to "EXT". Connect the leads from the external audio source to the "AF" and "GND" terminals. Frequencies from 200 to 20,000 cps can be applied. The modulation depth is adjustable by the "AF IN-OUT" control.

5. Unmodulated Carrier Set the "SIG SELECT" switch to "EXT". There should be no connections to the "AF" and "GND" terminals. The RF signal can be used for testing the receiver with a beat oscillator, frequency calibrating transfer instrument, etc.

6. Crystal Oscillator Operation. Insert the crystal in the socket at the panel lower left. Set the "SIG SELECT" to "XTAL", the "FREQ RANGE" switch to "F" and the tuning to the highest position. The crystal frequency output is available at the cable terminals, and the level can be adjusted by the RF output controls.

7. AF Output Set the "SIG SELECT" switch to "400" or "1,000" and the "FREQ RANGE" switch to "F". The audio signal is taken out from the "AF" and "GND" terminals, and the output level can be adjusted by the "AF" "IN-OUT" control. The load should have high impedance. For low impedances below about 50 K, it is advisable to connect a 100 K or higher, resistor ($\frac{1}{4} \sim \frac{1}{2} W$) between the "AF" and load terminals. In this case, the output voltage will be lowered to some extent.

