

SIGNAL GENERATOR/COUNTER

SG-4162AD

Operation

Manual

INTRODUCTION

The SG-4162AD is a combined radio frequency signal generator and frequency counter. The 6 character LED display allows direct reading either generated internally or from an external source. The frequency generator has a range of 100kHz - 150MHz with either sine or square waveforms and adjustable output level. The frequency counter has a range of 10Hz to 150MHz.

1. PREPARATION

- (1) Set the POWER switch at OFF.
- (2) Connect the AC plug to the AC supply.
- (3) Connect the RF output leads to OUTPUT terminals.
- (4) Set the FREQ RANGE switch at the operating band and rotate the frequency dial knob to the desired frequency.
- (5) The output connecting leads should be as short as possible to prevent pickup of unwanted noise. A long shielded cable will degrade the output response at high frequencies, especially when square waves are in use.

2. CONNECTIONS

The RF leads are connected to the input of the circuit under test. The red terminal is at high potential, or "hot", and black is at earth potential for chassis connection.

For the RF signal at the receiver antenna input, connect a 50 to 200 Ω resistor, 1/4W, in series. When checking sets with a rod antenna, connect leads to a coil with a few turns of wire and couple the coil to the antenna.

In checking RF and IF amplifier circuits, connection should be made through a small capacitor, 1-5pF, in order to prevent detuning effects.

NOTE: When connecting directly to the input circuit, make certain there is no high DC voltage present. Otherwise, connect a blocking capacitor, 0.05 μ F — 100pF, depending on the frequency.

SPECIFICATION

A) RF SIGNAL GENERATOR

FREQUENCY RANGE.....	A 100KHz – 300KHz B 300KHz – 1000KHz C 1MHz – 3.2MHz D 3.0MHz – 10MHz E 10MHz – 35MHz F 32MHz – 150MHz (UP TO 450MHz ON THIRD-HARMONICS)
FREQUENCY ACCURACY.....	\pm COUNT ACCURACY \pm 1 DIGIT.
RF OUTPUT.....	100mV, RMS. APPROX (UP TO 35MHz)
OUTPUT CONTROL.....	0dB/20dB AND FINE ADJUSTER
MODULATION.....	INTERNAL 1KHz EXTERNAL 50Hz – 20KHz, AT LESS THAN 1V RMS.

AUDIO OUTPUT..... 1KHz, MIN. 1V. VRMS (FIXED)
 CRYSTAL OSCILLATOR HC-6/u HOLDER.....FOR 1 – 15MHZ USE CRYSTALL IN TYPE
 HC-6u HOLDER (NOT INCLUDED)
 POWER**240Vac 50Hz**

B) FREQUENCY COUNTER

FREQUENCY RANGE..... HF 10Hz TO 10MHz
 VHF 10MHz TO 150MHz
 INPUT VOLTAGE.....**LESS THAN 50mV**
 MAXIMAL INPUT VOLTAGE.....**LESS ABOUT 3V EFFECTIVE**
 GATE TIMES.....**3V**
 DEFINITION.....HF 1Hz/VHF 10Hz
 INPUT IMPEDANCE.....HF 1 M Ω
 VHF 50 Ω
 OPERATION TEMPERATURE.....0 TO 40°C.

PANEL CONTROLS AND TERMINALS FUNCTION

(1) POWER SWITCH:

(2) MONITOR DISPLAY: **LED to display up to 6-digits mantissa of count value for the frequency Hz of output of RF Signal Generator and input of frequency counter. The number of displayed digits is determined by Gate Time.**

The flashing dot on the display indicates MHz or kHz range and indicates gate time. IF THE OVERRANGE INDICATOR LIGHTS, INDICATING THAT ONE OR MORE OF THE MOST SIGNIFICANT FIGURES IS NOT DISPLAYED, CHANGE THE GATE TIME TO 0.1s (FINE KNOB).

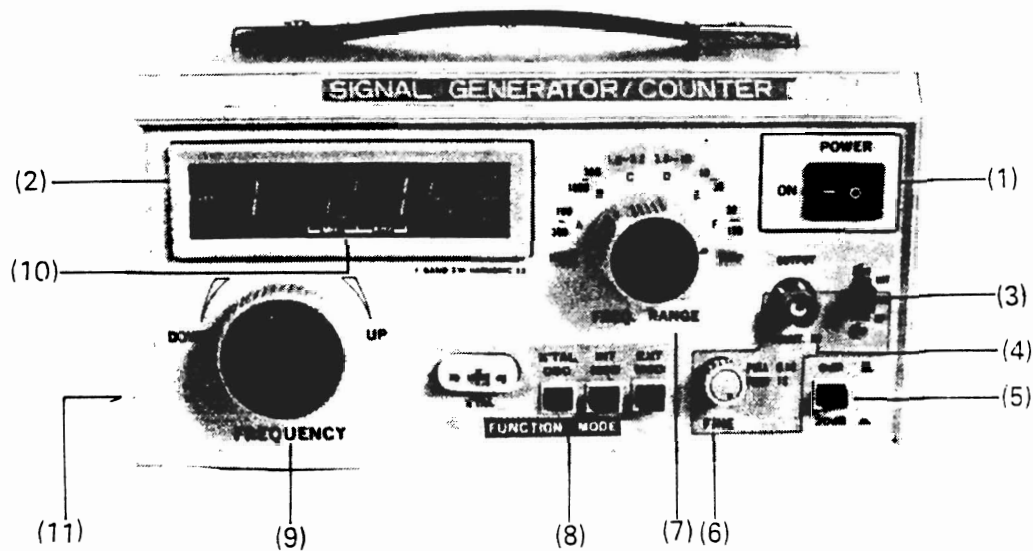
(3) "INT/VHF/HF" SWITCH: **Select "INT" position for use as a RF Signal Generator.**

Select "VHF" position for use as a frequency counter with a frequency range from 10MHz to 150MHz.

To select on "HF" position this unit is used as frequency counter for measuring frequency range from 10Hz to 10MHz.

- (4) "OUTPUT/COUNT IN" TERMINAL: **With the "INT/VHF/HF" switch in the "INT" position, this terminal is used for the output of the RF Signal Generator. With the switch in the "VHF" or "HF" position, this terminal is used as the input terminal of frequency counter.**
- (5) ATTENUATOR SWITCH: **-20dB attenuation of output from signal generator.**
- (6) "FINE" KNOB: **This control has a dual use. Turned left or right it is used for fine adjustments of the output voltage level of the signal generator. Pulled out or pushed in it alters the gate time of the frequency counter.**
- (7) FREQUENCY RANGE BAND: A 100K – 300KHz
B 300 – 1000KHz
C 1M – 3.2MHz
D 3M – 10MHz
E 10M – 35MHz
F 32M – 150MHz
(UP TO 450MHz ON THIRD HARMONICS)
- (8) FUNCTION MODE:
1. EXT MOD: For modulation of carrier with an external source
2. INT. MOD: Used of internal 1KHz for modulation of external circuit testing.
3. X'TAL OSC.: Crystal oscillator output frequency depends on crystal
4. X'TAL: Crystal socket, for insertion of quartz crystal 1 – 15MHz in type HC-6/u holder.
- (9) FREQUENCY DIAL: Set the RF output frequency in the range selected by the freq. range band.

- (10) FREQUENCY DISPLAY: For digital display of the output frequency
- (11) MOD. IN/OUT JACK: On the rear of the unit, for external modulation input or output from internal 1KHz oscillator.



OPERATION OF RF SIGNAL GENERATOR AND FREQUENCY COUNTER

A) RF SIGNAL GENERATOR

PREPARATION: a. Set the power switch at off.

b. Connect the AC plug to the AC supply.

c. Connect the RF output leads to output terminals.

d. Set the fine control at center and push down (5) ATTENUATOR SWITCH.

1. Power switch at "ON" position.

2. INT/VHF/HF switch at "INT" position.

3. CONNECTIONS: The RF leads are connected to the input of the circuit under test and "OUTPUT" terminal of the unit. For the RF Signal at the receiver antenna input, connect a 50 to 200 ohm resistor, 1/4W in series. When checking sets with a rod antenna, connect leads to a coil with a few turns of wire and couple the coil to the antenna. In checking RF and IF amplifier circuits, connection should be made through a small capacitor, 1-5pF, in order to prevent detuning effect.

NOTE: WHEN CONNECTING DIRECTLY TO THE INPUT CIRCUIT, MAKE CERTAIN THE THERE IS NO HIGH DC VOLTAGE PRESENT. OTHERWISE, CONNECT A BLOCKING CAPACITOR, $0.05\mu\text{F}$ – $100\mu\text{F}$, DEPENDING ON THE FREQUENCY.

4. MODULATED CARRIER, INTERNAL SOURCE:

Push down mode switch at "INT. MOD."

By tuning the receiver to the generator frequency, or vice versa, an audio tone will be heard in the loudspeaker. An audio voltmeter should be connected across the speaker terminals when aligning

the internal circuits. A dummy resistor with suitable power rating can be used in place of the moving coil.

It is advisable to keep the RF Signal level as low as possible in order to prevent overloading the transistors or electron tubes in the circuit. Excessive input voltage will cause age action AND/OR two resonance points to appear and proper alignment or adjustment would be impossible.

5. MODULATED CARRIER, EXTERNAL SOURCE:

Push down switch at "EXT. MOD."

Connect leads from an external audio generator the "EXT/INT MOD."

"MOD. IN/OUT" jack on the rear side of unit. Frequencies up to 15KHz can be used for modulation at RF above 3MHz. The audio input voltage should not exceed 2V. this is to prevent modulation distortion.

6. UNMODULATED CARRIER: Push down mode switch at "EXT". MOD." There should be no connection to the "MOD. IN/OUT" jack on the rear side of unit.

The RF Signal can be used in testing a receiver equipped with a beat oscillator, or circuits that do not require a modulated signal.

The RF signal can be applied to a sweep generator for the marker signal.

7. CRYSTAL OSCILLATOR OUTPUT:

CONTROL SETTING: MODE switch at X'TAL insert a crystal in FT-243 holder in the X'TAL socket.

RF output switch push down 20dB switch to attenuated output level 20dB.

Freq. range switch at "F" and frequency dial at 100KHz.

FINE control at minimum.

The output signal is treated in the same manner as for the unmodulated carrier with exception that the output level cannot be adjusted.

In certain calibration procedures a short lead near the test circuit will provide sufficient coupling.

NOTE: IF and RF Signal is required at the same time, set the output frequency with the freq. range switch and frequency dial as required. Adjust the FINE control.

8. AF OUTPUT, 1KHz

CONTROL SETTING: Function mode switch push down "INT MOD".

Freq. range switch at "F" and frequency dial at 100MHz.

Connect leads from output to the circuit.

Use an external potentiometer, 100K –1M ohm, to lower the voltage.

9. OSCILLATOR FREQUENCY CALIBRATION:

The RF oscillator frequency can be calibrated to a high degree of precision using the harmonics of the internal crystal oscillator and an external all-wave receiver. The latter is utilized as a frequency transfer unit.

1. Function mode switch push down at "X'TAL OSC".
2. Insert the "STANDARD FREQUENCY" crystal, preferably at a multiple of 1MHz. For spot frequency checking, at say 10.7MHz use a 10.7MHz crystal.
3. Push down the attenuator switch down 20dB adjust the FINE control as required.
4. Connect the RF output to the receiver input, direct or through a small coupling capacitor to the rod antenna.
5. In the following example, use of a 1MHz crystal will be given.
6. Tune the receiver to 5MHz, or 5th harmonic of 1MHz. Then by carefully tuning both the oscillator and is adjusted to zero beat and the dial reading is noted. At other frequencies spaced 1MHz apart,

the same procedure is repeated, namely, oscillator setting – tuning the receiver – retuning oscillator and noting the reading on the dial. Practical use of harmonics up to the tenth or higher is possible. However, care must be exercised in selecting the proper harmonic, especially at high RF when a relatively low frequency crystal is used.

NOTE: When a receiver equipped with a beat frequency oscillator is used the measurements can be simplified the “ZEROBEAT” condition is at the point where the steady beat is heard most clearly.

B) FREQUENCY COUNTER

1. Power switch at “ON”
2. “INT/VHF/HF” switch at “VHF” or “HF” position it depends on what input measurement range from 10Hz to 10MHz in “HF” position or from 10MHz to 150MHz in “VHF” position.
3. Connecting the output of measured signal oscillator to the “OUTPUT/COUNT IN” terminal of this unit as frequency counter input terminal.
4. The user can pull up “FINE” switch for Gate Time 0.1sec. and push down “FINE” switch for Gate time 1sec. of the display of frequency counter.

Please make sure that the voltage of your test signal is in the given range. If the voltage is too high or too low, you have to use either a potential divider or a pre-amplifier.

5. The detail operating information, please refer to panel of RF Signal Generator and Frequency Counter (2) (3) (4) (6).

