

1 Introduction

The low frequency generator SG66 is one of a series of Advance Signal Generators and provides both sine and square waves from 5c/s to 125kc/s, with low hum and noise content at all signal levels.

Frequency selection is provided by a range switch, selecting one of five ranges, and a calibrated dial that is easy to read. The output level is indicated by the reading on a calibrated meter and the setting of a 50dB decade attenuator.

When using the sine wave output, alternative impedances of 600 Ω floating and 5 Ω unbalanced are available with output levels that are continuously variable from 0 to 30V r.m.s. and from 0 to 1W, respectively. A square wave output is also available at separate terminals and is adjustable from 0 to 30V peak to peak. The maximum rise and fall time of the square wave is 0.75 μ s over the whole frequency range.



2 Specification

Frequency Range 5c/s to 125kc/s in five ranges:

5c/s to 50c/s
50c/s to 500c/s
500c/s to 5,000c/s
5kc/s to 50kc/s
50kc/s to 125kc/s

Frequency Accuracy $\pm 1\%$ or $\pm 1\text{c/s}$ whichever is the greater.

Hum and Noise Level Less than 0.25% of maximum output.

Sine Wave Output impedance 600 Ω approximately, floating unbalanced, 5 Ω unbalanced.

Output Levels 0 to 30V r.m.s. into 600 Ω . Level indicated by calibrated meter and setting of 50dB decade attenuator. Meter calibrated -10dB to +2dB relative to 1mW into 600 Ω . 0 to 1W into 5 Ω .

Output Voltage Accuracy Decade attenuator $\pm 2\%$. Meter $\pm 5\%$ F.S.D.

Distortion Less than 1% at 1W.

Square Wave Output impedance varies up to 5k Ω with level setting. Output level 0 to 30V pk.pk. Rise and fall times 0.75 μs maximum. (Sine wave output available at same time with some distortion.)

Power Supply 100, 110, 120, 130V $\pm 7\%$
200, 220, 240, 260V $\pm 7\%$ a.c. supply 40 to 60c/s.

Power Consumption Approximately 100W.

Accessories Supplied One red 4mm plug, Part No. 12178. One black 4mm plug, Part No. 12179. One Instruction Manual, Part No. 2894.

Dimensions

Width	Height	Depth
16 $\frac{1}{2}$ in.	10 $\frac{1}{2}$ in.	8 $\frac{3}{4}$ in.
(42cm)	(27cm)	(22cm)

Weight 32 $\frac{1}{2}$ lb (14.6kg).

Finish Dark blue metal case with light grey front panel and medium grey surround. All colours to B.S.2660; case tint No. 7-086, front panel tint No. 9-093, front panel surround tint No. 9-095.

4 Circuit Description

4.1 General

The basic circuit of the instrument is illustrated in the functional diagram (fig.1) and the full circuit diagram in fig.2. It is seen that a Wien Bridge Oscillator forms the

4.3 Sine Wave Output

The oscillator output is passed via C14 to the sine wave level control RV7 (ADJUST VOLTS) which is located in the grid circuit of the triode V4B. This triode forms a straight-

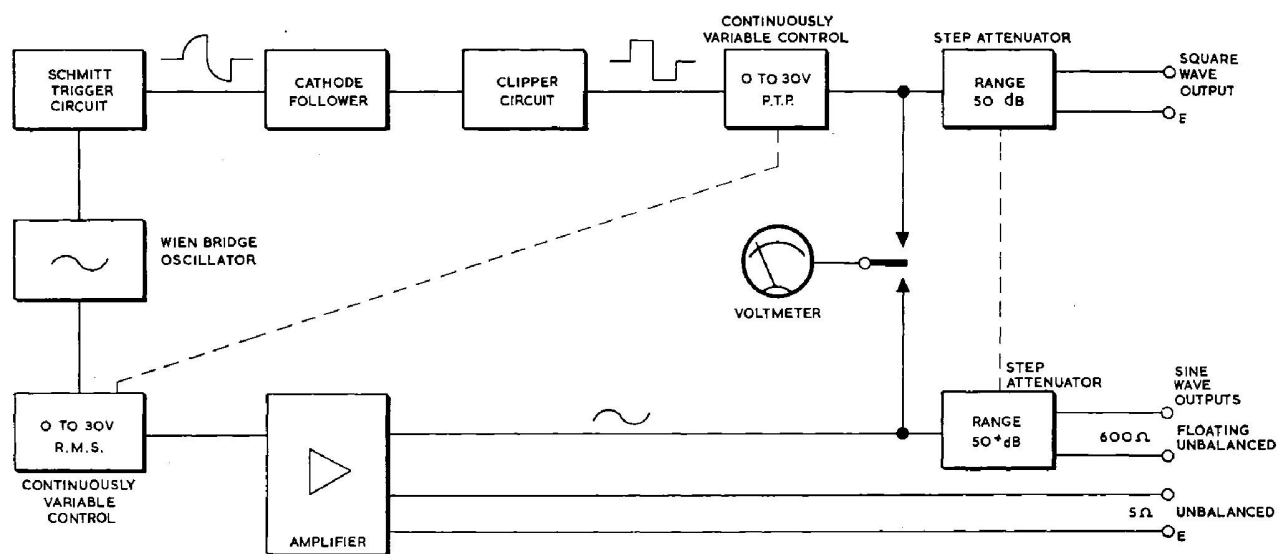


Fig.1. Functional Diagram SG66

source of both sine and square wave signals. The square wave output is obtained using a Schmitt trigger circuit and clipper circuits, as described in later paragraphs.

4.2 Wien Bridge Oscillator

The valves V2A and V2B form the basis of the oscillator circuit and, together with the associated cathode followers V1A and V1B, are connected to that part of the h.t. supply which is stabilised by the neons NS1, NS2.

The high impedance grid circuit of the cathode follower V1A is connected to the mid-point of the potential divider formed by R1/R3, R2/R4 etc. which is connected in parallel with C25 and forms one arm of the bridge. The other bridge arm is formed by the series elements R8/RV1, R9/RV2 etc. connected in series with C26 and the fixed trimmer C27, and preset trimmers C1 to C5.

The drive to the bridge is derived from the low impedance circuit of the cathode follower V1B. C7 forms a negative feedback path between V2B cathode and V1A grid circuits. Other forms of negative feedback are derived from the negligible decoupling in the cathode circuit of V2A (C9 is only effective on the highest frequency range) and by the absence of decoupling across R24 in the cathode circuit of V2B.

forward driver stage for the single ended push-pull circuit formed by the series coupled valves V5 and V6. Negative feedback is provided via the loop C19, R41 and by the lack of decoupling in the cathode circuit of V4B.

The sine wave signals are fed to one of two output transformers via capacitor C31. Transformer T1 is used on the two lower frequency ranges from 5c/s to 500c/s, and T2 on the three higher frequency ranges from 500c/s to 125kc/s.

One output is floating with an impedance of 600Ω and is monitored by the output level meter VM1. The level meter monitors the input to the decade attenuator, and the attenuator output is connected direct to the 600Ω output terminals. The alternative 5Ω sine wave output is taken from a separate winding on transformer T1 or T2 and is unbalanced to earth.

4.4 Square Wave Output

The input to the Schmitt trigger circuit V3 is earthed when the output selector switch is in the SINE position. Moving this switch to the alternative SINE/SQUARE position removes this earth connection, and passes part of the sinusoidal signal across R28 to the grid of the trigger valve V3.

When the input signal is positive, and with the earth connection removed from the grid, V3A will conduct. The

input signal going negative at V3A grid will cause reduction in current through the valve, resulting in an increased positive potential at the anode which is passed to the grid of V3B via R51. Thus V3A will tend to cut-off and V3B will now conduct. Therefore, the application of the sinusoidal signal to the grid of V3A will result in a waveform from the anode of V3B that is approximately square in shape (*fig.1*).

The cathode follower V4A acts as a buffer stage between the high impedance output of the trigger circuit and the relatively low impedance of the following clipper circuit. In this way the pulse shape of the trigger output is preserved.

From V4A the signal is passed to the clipper circuit formed by zener diodes MR1 and MR2, where the output of the trigger circuit is shaped into an improved square wave. The square wave output level is controlled by the potentiometer RV10 (ADJUST VOLTS) and the decade attenuator formed by R57 to R62. The output level meter VM1 indicates the signal level immediately preceding the attenuator except in

the +30dB position of the attenuator, when the meter indicates the level at the output terminals. In positions +20dB to -20dB the output of the attenuator is connected to the square wave output terminals.

4.5 Power Supply Circuit

The d.c. supply for the signal generator is derived from a.c. supplies (100 to 130V or 195 to 265V) via transformer T3 and a conventional voltage doubler circuit consisting of C24, MR4, MR3 and C23. The components R45 and C22 form a simple smoothing circuit. The h.t. supply to oscillator valves V2A and V2B is stabilised by neons NS1 and NS2.

The valve heaters are supplied from a separate winding on T3. A centre-tap earth connection is provided by the slider of RV8 which may be adjusted to produce minimum hum in the output signal.

The supply indicator lamp ILP1 is connected directly across one 115V winding of T3.

