



Function Generator (TG102)
Stock No. 610-635

Instruction Manual

SPECIFICATION

OPERATING RANGE

Frequency range: <0.2Hz to 2MHz in 6 overlapping decade ranges with fine adjustment by a calibrated vernier.

Internal Mode

Vernier range: >1000:1 on each range, except 10Hz range: >100:1

Vernier accuracy: Better than $\pm 5\%$ of full scale 100Hz to 1MHz ranges; better than $\pm 8\%$ on 10Hz range.

External (Sweep) Mode

Sweep range: >1000:1 within each range, except 10Hz range: >100:1

Input impedance: 10k Ω

Input sensitivity:

Input for 10:1 sweep $\approx 4.5V$ peak-to-peak

Input for 100:1 sweep $\approx 4.95V$ peak-to-peak

Input for 1000:1 sweep $\approx 5V$ peak-to-peak

Maximum allowable

input voltage: $\pm 10V$

Sweep linearity: Better than 1%

Maximum slew rate of

sweep voltage: 0.1V/ μs

OPERATING MODES

(Specifications apply for vernier between 0.2 and 2.0 and output 10V peak-to-peak into 50 Ω termination).

Sine

Distortion: Less than 0.5% on 100, 1k and 10k ranges; less than 1% on 10 and 100k ranges; all harmonics >25dB below fundamental on 1M range.

Amplitude flatness: $\pm 0.2dB$ to 200kHz; $\pm 1dB$ to 2MHz

Triangle

Linearity: Better than 99% to 200kHz

Square Wave

Rise and fall times: <80ns

Mark : Space ratio: 1:1 $\pm 1\%$ to 100kHz

DC

Range: $\pm 10V$ from 50 Ω

OUTPUTS

50 Ω : Two switch-selectable ranges with >30dB vernier control within each range.

0dB: 0.6V to 20V peak-to-peak from 50 Ω (0.3V to 10V into 50 Ω).

-20dB: 60mV to 2V peak-to-peak from 50 Ω (30mV to 1V into 50 Ω).

DC offset control range: $\pm 10V$ from 50 Ω . DC offset plus signal peak limited to $\pm 10V$ ($\pm 5V$ into 50 Ω). DC offset plus waveform attenuated proportionally in -20dB position.

TTL

Capable of driving 20 standard TTL loads.

GENERAL

Power Requirements

Input voltage: 110/120 volts AC nominal 50/60Hz or 220/240 volts AC nominal 50/60Hz adjustable internally. The TG102 will operate safely and meet specification within normal AC supply variations viz. 100-130 volts AC and 200-260 volts AC respectively.

Power consumption: Typically 15VA.

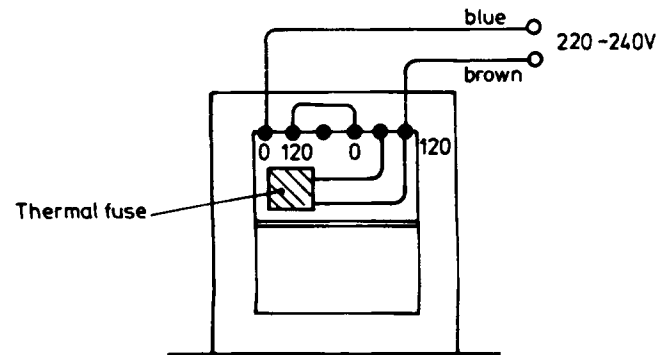
Environmental Operating Range	+5°C to +40°C RH <80%
Storage Temperature Range	-40°C to +70°C
Size	255 × 150 × 50mm
Weight	1200gms (including mains lead).

INSTALLATION

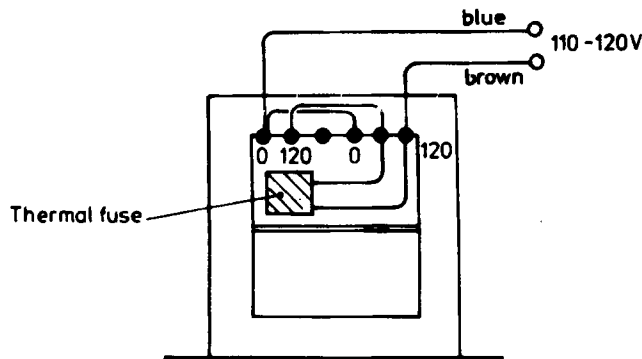
Check that the operating voltage range of the instrument shown on the rear panel is suitable for the local supply. Should it be necessary to change the operating voltage range from 220/240V AC to 110/120V AC or vice-versa proceed as follows:

1. Invert the instrument and remove the 4 rubber feet.
2. Remove the 4 short and 1 long screws.
3. Holding the case upper and lower together turn the instrument the right way up and lift off the top.
4. Change the transformer connections following the diagrams below.
5. Reassemble in the reverse order.

220/240 V Operation: primaries in series



110/120 V Operation: primaries in parallel



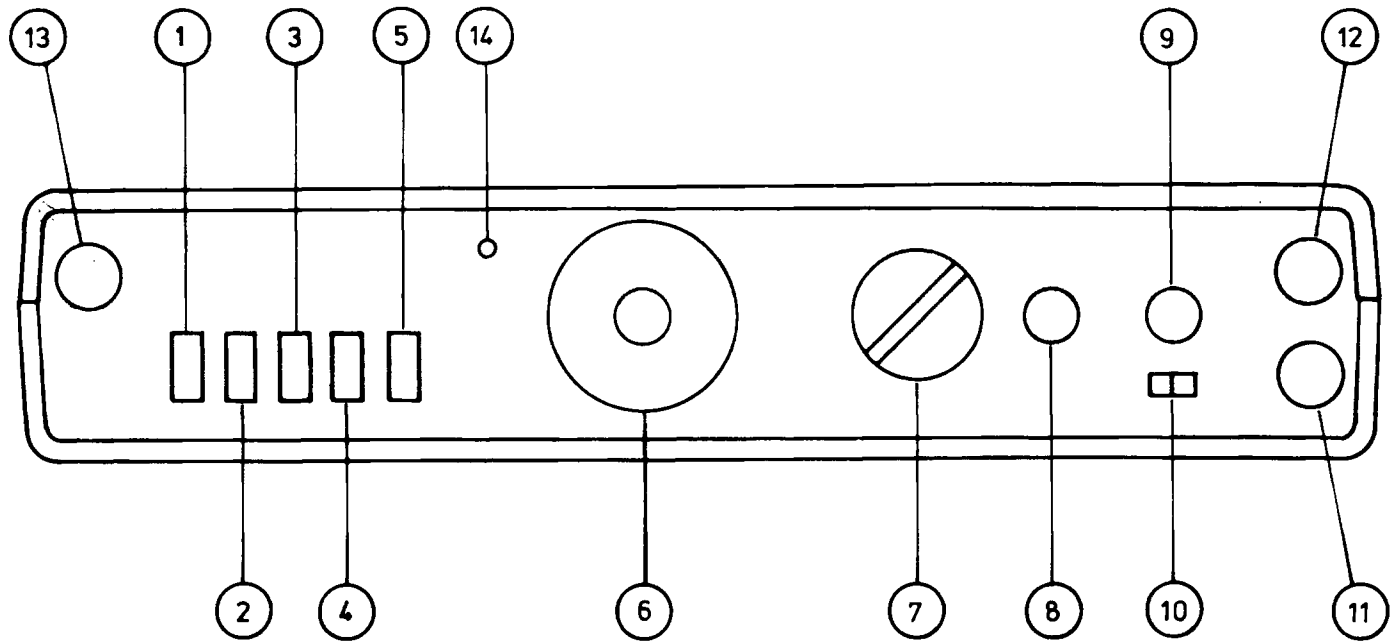
When a three core mains lead with bare ends is provided this should be connected as follows:—

BROWN	— MAINS LIVE
BLUE	— MAINS NEUTRAL
GREEN/YELLOW	— EARTH

WARNING! THIS APPARATUS MUST BE EARTHED

Any interruption of the protective conductor inside or outside the apparatus or disconnection of the protective earth terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited.

Note: A thermal fuse is fitted in the primary circuit of the transformer. This will become 'open circuit' in the event of a fault occurring in the instrument which would cause excessive temperature rise of the transformer. Should such a fault occur it will be necessary to return the instrument for Service.



OPERATION

Power

To turn the instrument on, depress the ON/OFF switch (1). Depress again to release and turn the instrument off. The L.E.D. (14) indicates when the instrument is on.

Output Waveform

Sine, square or triangle waveform at the 50Ω output (11) are selected by interlocked switches 2, 3, or 4 respectively; selection of any one automatically cancels the others. With all three switches out (accomplished by half-depressing any one) the output will be a DC level only; this is useful as it permits input threshold testing of a circuit with the TG102 instead of having to connect up an external DC supply.

Frequency

Frequency range is selected by a six position multiplier switch (7) with fine adjustment by calibrated vernier (6).

50Ω Output

The amplitude of the 50Ω output is controlled by the 2-position attenuator switch (10) and the Output Level vernier (9). The output has a 50Ω source impedance and an output level of 0.6V to 20V peak to peak or 60mV to 2V peak to peak with the attenuator in the -20dB position. If the output is terminated with 50Ω the output levels are halved to 0.3V to 10V and 30mV to 1V. Greater attenuation can be achieved by using standard 50Ω BNC attenuators. The 50Ω output is short circuit proof for a period of 10 minutes at maximum output and will withstand a short circuit for greater periods at lower output levels.

DC Offset

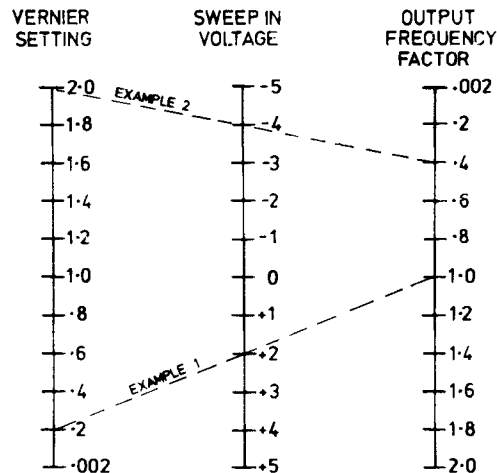
Depressing the DC offset button (5) enables the DC offset control (8) which has a range of ±10 volts from 50Ω in all output modes. DC offset plus signal peak is limited to ±10V (±5V into 50Ω). DC offset plus waveform is attenuated proportionally in the -20dB position.

TTL Output

The TTL output (12) provides a fixed TTL pulse output of approximately 50% duty cycle in phase with the 50Ω output and capable of driving 20 standard TTL loads; it should not be connected to a resistive load of less than 600Ω. The TTL output leads the 50Ω output by approximately 40ns making it ideal as a sync pulse.

Sweep Input

The generator frequency can be swept, d.c. programmed or modulated by a suitable control voltage applied to the sweep input socket (13). The TG102 sums the sweep input voltage with the internal control voltage derived from the vernier (6) to determine the operating frequency. The resultant frequency can be calculated from the vernier setting and sweep voltage using the nomograph; if a straight line between the vernier setting and the sweep in voltage is extrapolated to the output frequency factor axis the point of intersection (times the range multiplier) gives the generator frequency.



A positive voltage increases the frequency; for frequency control with positive-going d.c. inputs the vernier should therefore be set to the lower frequency limit of the range to be swept. Example 1 on the nomograph shows that with the dial set at 0.2 and a +2V input the input frequency is $1.0 \times$ range multiplier; a 0 to +2V sweep therefore sweeps the frequency from 0.2 to 1.0 (times the range multiplier in each case).

Similarly, a negative voltage decreases the frequency and for negative-going d.c. inputs the vernier should be set to the upper frequency limit of the range to be swept. Example 2 shows that with the dial at 2.0 and a -4V input the output frequency is $0.4 \times$ range multiplier; a 0 to -4V sweep therefore sweeps the frequency from 2.0 to 0.4 (times the range multiplier in each case).

To use a sweep signal which is symmetrical about ground the vernier should be set at approximately the centre frequency of the band to be swept. For example, to sweep from .002 to 2.0 the vernier should be set at 1.0 and a $\pm 2.5V$ sweep input used; refer to the nomograph.

Note: Non-linear operation may result when the sweep input voltage is excessive; that is, when the attempted generator frequency exceeds the range limits. The upper limit is 2.0 times the multiplier setting and the lower limit is .002 times the multiplier setting; it will be apparent from the nomograph when these limits are being exceeded.

WARNING!

The opening of covers or removal of parts is likely to expose live parts. The apparatus shall be disconnected from all voltage sources before any adjustment, replacement or maintenance and repair during which the apparatus shall be opened.

If afterwards, any adjustment, maintenance or repair of the opened apparatus under voltage is inevitable, it shall be carried out only by a skilled person who is aware of the hazard involved.

GUARANTEE

For guarantee details please see separate insert contained in packaging.