



THURLBY THANDAR INSTRUMENTS

TG200 Series



2MHz Function & Sweep/Function Generators

TG210, TG215, TG230 function generators

the highest waveform quality

The function generator is one of the most versatile pieces of test & measurement instrumentation available.

It can generate a variety of precision waveshapes over a range of frequencies from mHz to MHz. It can provide a wide range of controlled amplitudes from a low-impedance source, and maintain constant amplitude as the frequency is varied. Voltage control of frequency enables a source of swept frequency to be generated for frequency response testing. AM and FM modulation facilities can also be utilised.

The TG200 series from TTI represents the state of the art in 2MHz function generators.

Exceptional waveform quality

The TG200 series provides very high waveform quality under all conditions. That means low sinewave distortion, low aberration triangle waves and fast-edged square waves with low overshoot.

Unlike many competitive products good waveform quality is maintained throughout the frequency range, and at low output levels.

Variable symmetry for pulse and ramp waveforms

The TG200 series provides bi-directional variable symmetry at constant frequency from 1:9 to 9:1.

Wide range level control

The TG200 series provides a main output with a maximum emf of 20V pk-pk from a 50 Ω or 600 Ω source.

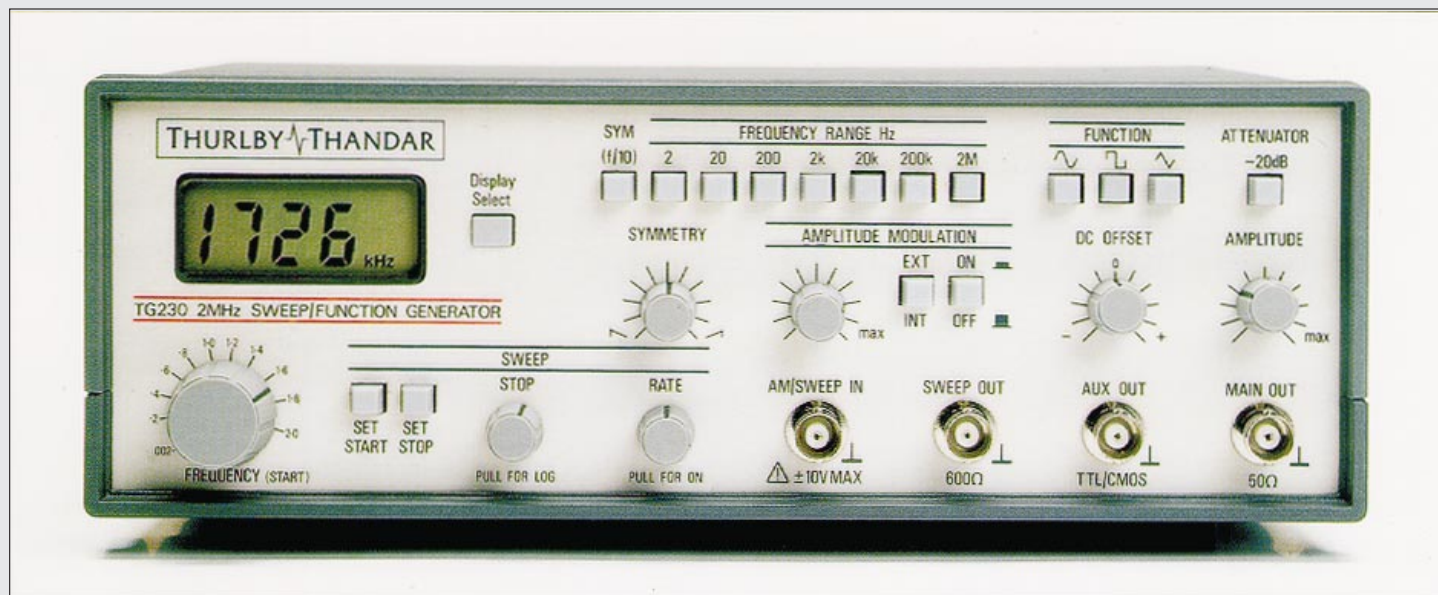
An amplitude vernier with a range of 40dB is combined with a -20dB switched attenuator to provide levels down to 20mV pk-pk.

Variable DC offset of +/-10V is available via a centre detent control.

An auxiliary output provides a fixed 0V to +5V level suitable for driving both TTL and CMOS loads.

Wide sweep range

Each range can be swept by at least 1000:1 either manually or via the sweep control.



- 0.002Hz to 2MHz frequency range
- Very high waveform quality at all frequencies & levels
- 20V pk-pk from 50 Ω or 600 Ω , plus TTL/CMOS output
- 1000:1 frequency change by vernier or external voltage
- Variable symmetry with constant frequency
- Variable DC offset with zero detent
- Precision internal lin/log sweep (TG230 only)
- Internal/external AM up to 100% (TG230 only)
- Digital display of frequency (not TG210)
- Digital display of amplitude and offset (not TG210)

Stylish and robust

All three models are housed in the latest Thurlby-Thandar mid-size instrument case.

This heavy duty ABS case features an integral multi-position handle which acts as an adjustable tilt stand.

the widest range of facilities

Digital display for precision and convenience

The TG215 and TG230 have the convenience of a digital display.

Unlike competitive products the display provides a readout not just of frequency, but of amplitude and offset as well.



For the four higher frequency ranges the auto-ranging meter displays frequency to an accuracy of +/- 1 digit.

For the three lower frequency ranges the meter changes mode to maintain fast update despite the low frequencies being measured. When compared to the normal fixed gate time meters used in other products this provides several important advantages:

- High resolution is provided at all points on the dial within a given range.
- Fast display update rate is maintained at all times.
- Good accuracy is achieved for frequencies as low as 0.1Hz.

This system is unique in combining accuracy, resolution and high update rate at all times.

Three models meeting a variety of needs

TG210

The TG210 offers all of the basic generator functions including sine, square & triangle waveforms, variable DC offset, variable symmetry and external sweep input.

TG215

The TG215 adds a digital display of frequency, amplitude and offset for greater precision and convenience.

TG230

The TG230 has all the features of the TG215 plus an internal sweep generator with linear or log sweep, variable sweep rate and a sweep output socket.

It also offers internal or external amplitude modulation.

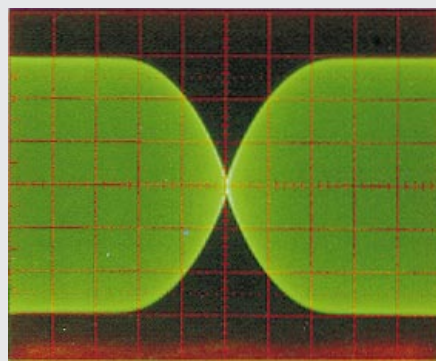
Advanced internal sweep

The TG230 incorporates a versatile internal sweep generator capable of providing linear or logarithmic frequency sweeps.

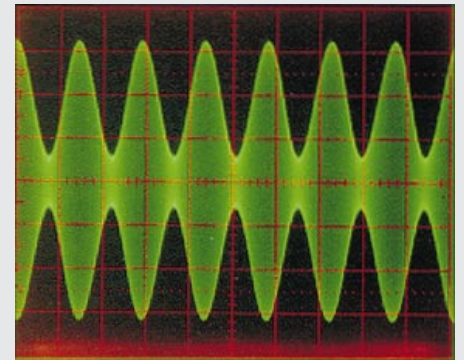
Start and stop frequencies can be set with precision using the digital display. Sweep ranges of over 1000:1 are possible.

The sweep rate is adjustable over a wide range with excellent setability. The sweep period limits are typically 20ms and 20s.

A sweep output socket is provided for use with an oscilloscope or an X-Y recorder. Unlike many other sweep generators, the sweep ramp is triangular which gives a superior display when using an oscilloscope to display swept frequencies.



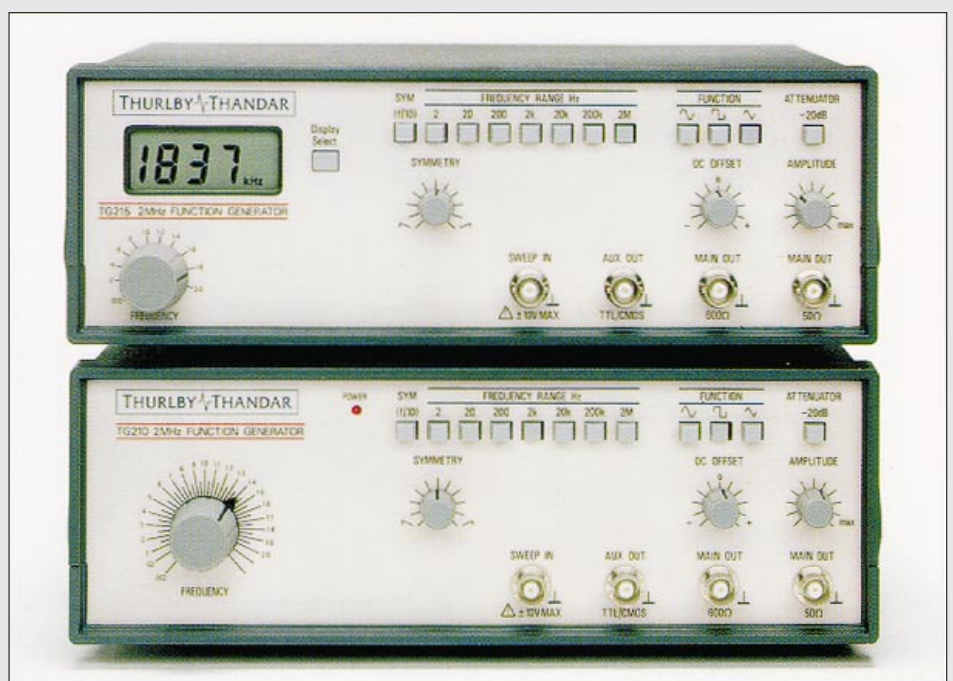
The display of a filter response using an oscilloscope in XY mode and a TG230 in swept frequency mode.



Amplitude modulation for extra versatility

The TG230 provides further versatility by adding AM facilities.

The modulation can be external or internal (via a 400Hz internal generator) with modulation levels fully variable between 0% and 100%.



Technical specifications

FREQUENCY

Frequency Range:	0.002Hz to 2MHz in 7 overlapping decade ranges with fine adjustment by a vernier.
Vernier Range:	1000:1 on each range.
Vernier Accuracy:	Typically +/-5% of full scale for TG210; see Meter Accuracy for TG215 & TG230.

SWEEP MODES

INTERNAL (TG230 only)	
Sweep Range:	1000:1 within each range.
Sweep Rate:	Adjustable, typically 20ms to 20 secs.
Sweep Mode:	Linear or logarithmic. Sweep start and stop frequencies displayed at the press of a button.

EXTERNAL	
Input Impedance:	10k Ω
Input Sensitivity:	0 to 3V for 1000:1 sweep
Maximum Allowable Input Voltage:	+/-10V
Sweep Linearity:	Better than 1%
Maximum Slew Rate of Sweep Voltage:	0.1V/us

AMPLITUDE MODULATION (TG230 only)

Depth:	Variable 0 to 100%
Frequency:	400Hz (internal). DC to 100kHz (external).
External Sensitivity:	Approximately 2V peak-to-peak for 50% modulation.

METER ACCURACY (TG215/230 only)

Frequency:	+/- 1 digit on 2k to 2M ranges; better than 1% of full scale on 2 to 200 ranges.
Amplitude:	Typically 5% of full scale
DC Offset:	Typically 2%
Resolution:	0.05% maximum on all ranges (1 in 2000)
Update Rate:	Varies with range; at least 2 updates per second

OPERATING MODES

Specifications apply for the top decade of each frequency range and output 10V peak-to-peak into 50 Ω termination.

SINE	
Distortion:	Less than 0.5% on 200, 2k and 20k ranges; less than 1% on 2, 20 and 200k ranges; all harmonics >25dB below fundamental on 2M range.
Amplitude Flatness:	+/-0.2dB to 200kHz; +/-1dB to 2MHz.
TRIANGLE	
Linearity:	Better than 99% to 200kHz

SQUARE WAVE

Rise and Fall Times:	<100ns
Mark - Space Ratio:	1 +/- 1% to 100kHz
DC	
Range:	+/-10V from 50 Ω
SYMMETRY	
Symmetry Range:	Variable typically between 1:9 to 9:1 (on top decade of each range), frequency divided by 10.

OUTPUTS

50 Ω	Two switch-selectable ranges with 40dB vernier control within each range.
0dB Range:	0.2V to 20V peak-to-peak (0.1V to 10V into 50 Ω).
-20dB Range:	20mV to 2V peak-to-peak (10mV to 1V into 50 Ω).
DC Offset Control Range:	+/-10V from 50 Ω . DC offset plus signal peak limited to +/-10V (+/-5V into 50 Ω). DC offset plus waveform attenuated proportionally in -20dB position.
600 Ω (not TG230)	Alternative output socket offering the same facilities as the 50 Ω socket.
TTL	Fixed 0 to +5V output capable of driving CMOS and 2 standard TTL loads.
SWEEP OUT	6V ramp from 600 Ω .

GENERAL

CASING	
Moulded ABS case with multi-position stand/handle.	
POWER REQUIREMENTS	
Input Voltage:	110/120 volts AC nominal 50/60Hz or 220/240 volts AC nominal 50/60Hz by rear panel adjustment. The TG230 will operate safely and meet specification within normal AC supply variations viz. 99-132 volts AC and 198-264 volts AC respectively.
Power Consumption:	25VA max.
ENVIRONMENTAL	
Operating Temperature Range: +5oC to +40oC, 20% to 80% RH.	
Storage Temperature Range: -10oC to +65oC	
SIZE	260(W) x 88(H) x 235(D)mm (10.2 x 3.4 x 9.2"), excluding handle and feet.
WEIGHT	1.9kg (4.2lb)

Thurlby Thandar Instruments operates a policy of continuous development and reserves the right to alter specifications without prior notice.

Designed and built in the U.K. by:



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