

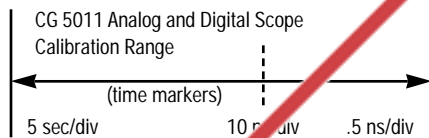
# TM 500 / 5000

MODULAR TEST INSTRUMENTS

- Extended time markers to 0.5 ns
- Next-Cal-Date tracking
- Pulse rise times to 160 picoseconds
- Positive & negative DC capability
- Learn mode
- Flexible configuration
- Easy integration in GPIB (IEEE-488) systems

The CG 5011 is the premier choice to fill all your scope calibration requirements, manual and automated. The CG 5011, with time markers from 5 seconds down to 0.5 ns, is designed to cover both analog and digital oscilloscope verification and calibration.

## Horizontal Timing Calibration Capabilities



The CG 5011 includes a Remote Pulse head as a standard accessory. It provides very fast risetime pulses of less than 10 ps, useful for bandwidth testing on electrical amplifiers as an alternative to a leveled sine wave generator.

The CG 5011 offers a wide range of functions, all programmable either by a controller via the GPIB or from the front panel. A Learn mode allows any manually set function or range to be acquired by a controller.

## CG 5011 Fully Programmable Calibration Generator for Analog and Digital Oscilloscopes

The CG 5011 is even able to keep track of its next due date for calibration, using the Next-Cal-Date tracking feature. Built-in self-test routines and hardware check the operation of all major circuits each time power is turned on.

Options add even more capability. The CG 5011 can be used with the optional Comparator Head to calibrate built-in oscilloscope calibrators. The oscilloscope calibrator and CG 5011 signals are applied to the Comparator Head and displayed simultaneously on the scope CRT. Errors are then automatically displayed on the CG 5011 readout.

The Remote Variable option permits operation of the following from a panel

controls: Units/Div, Variable-Fixed button, Continue button and the VAR.

Configure the CG 5011 for your own calibration station requirements. As three-wide TM 5000 Series modules, each one can stand alone in a TM 5003 mainframe or be used with a companion SC 5030 Programmable Leveled Sine Wave Generator in a six-slot TM 5004A mainframe. Both are ideally suited for environments where multiple scopes are maintained.

Finally, whether it's a single instrument or a complete calibration package, you can count on TEGAM to offer more support of your purchase, including comprehensive manuals, applications assistance, updates and a worldwide service network.



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## CG 5011 Specifications

### Voltage (Amplitude Mode)

(Used to calibrate vertical display accuracy.)

**Range** — 40  $\mu$  V to 200 V, 1 M  $\Omega$  load;  
40  $\mu$  V to 5 V, 50  $\Omega$  load (1-2-5 steps with multiplier).

**Multipliers** — 1,2,3,4, 5, 6, 8 or 10.

**Polarity** — Positive from ground.

**Aberrations** — Less than  $\pm 15\%$  of amplitude ( $\pm 10$  mV).

**Accuracy** —  $\pm(0.25\% + 1 \mu$  V).

### Frequency —

40  $\mu$  V to 80 mV    10 Hz to 10 kHz

100 mV to 10 V    10 Hz to 100 kHz  
+dc or -dc

12 V to 200 V    10 Hz to 10 kHz  
+dc or -dc

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**Variable Range** —  $\pm 9.9\%$ .

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## Current (Amplitude Mode)

(Used to calibrate current probes.)

**Range** — 1 mA to 100 mA (1-2-5 sequence).

**Multipliers** — 1, 2, 3, 4, 5, 6, 8 or 10.

**Aberrations** — Less than 5% of period and less than  $\pm 15\%$  of amplitude ( $\pm 100 \mu$  A).

**Accuracy** —  $\pm(0.25\% + 2 \mu$  A).

**Frequency** — DC or 10 Hz to 1 MHz (decade steps).

**Droop** —  $\leq 1\%$  p-p amplitude.

**Variable Range** —  $\pm 9.9\%$ .

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## Low Edge (Amplitude Mode)

(Used to test input amplifier and attenuator compensation.)

**Range** — 20 mV to 1 V p-p, 50  $\Omega$  load only (1-2-5 steps with multipliers).

**Multipliers** — 1, 2, 3, 4, 5, 6, 8 or 10.

**Aberrations** —  $\pm 2\%$  of square wave amplitude.

**Accuracy** —  $\pm 3\%$ .

**Polarity** — Positive or negative transitions to ground.

**Risetime/Fall time** —  $< 1.3$  ns.

**Long Term Flatness** —  $\pm 0.5\%$  after first 10 ns.

**Frequency** — 10 Hz to 1 MHz (decade steps).

**Variable Amplitude Range** —  $\geq \pm 9.9\%$  from nominal.

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## High Edge (Amplitude Mode)

(Used to test input amplifier and attenuator compensation.)

**Range** — 1.2 V to 100 V p-p, 1 M  $\Omega$  load (1-2-5 steps with multipliers).

**Multipliers** — 1, 2, 3, 4, 5, 6, 8 or 10.

**Aberrations** —  $\pm 2\%$  of square wave amplitude.

**Accuracy** —  $\pm 3\%$ .

**Polarity** — Positive transition only (negative voltage rising to ground).

**Risetime** —  $< 100$  ns.

**Long Term Flatness** —  $\pm 0.5\%$  after first 500 ns.

**Frequency** — 10 Hz to 100 kHz (decade steps).

**Variable Amplitude Range** —  $\geq \pm 9.9\%$  from nominal.

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### Markers (Timing Mode)

(Used to calibrate oscilloscope time bases.)

**Range** — 5 s to 0.5 ns (1-2-5 steps).

**X10 Magnifier** — Increases marker rate by a factor of 10 (5 s to 0.1  $\mu$ s range only).

**Accuracy** —  $\pm 0.0003\%$   
(+15°C to +50°C).

**Amplitude** — 1 V minimum 5 s to 2 ns,  
350 mV minimum: 1 ns, 100 mV minimum:  
0.5 ns into 5  $\Omega$ .

**Variable Range** —  $\pm 9.9\%$ .

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### Trigger Output

**Output Amplitude** — 1 V minimum into 50  $\Omega$ .

**Trigger Rate (Marker Mode)** — Normal:  
slaved to marker rate from 5 s to 100 ns;  
remains at 100 ns for faster markers.

Divided by 10: reduces normal trigger rate  
by a factor of ten.

Divided by 100: reduces normal trigger  
rate by a factor of one hundred.

**All Other Modes** — Normal: slaved to  
output frequency. Divided by 10: one-tenth  
output frequency. Divided by 100: one-  
hundredth output frequency.

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### Reference Frequency

**Output Frequency** — 1 MHz with internal  
time base accuracy.

**Output Amplitude** — TTL compatible.

**Input Frequency** — 1, 2, 3, 4 or 5 MHz.

**Input Amplitude** — 1 V to 10 V RMS  
displayed via EXT REF indicator on front  
panel.

**Required Accuracy** —  $\pm 0.001\%$ .

**Input Resistance** — 10 k $\Omega$  (nominal).

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### Fast Edge (Amplitude Mode)

(Used to generate fast rise, low distortion  
pulses for testing higher bandwidth vertical  
amplifiers.)

**Polarity** — Positive or negative  
transitions from ground.

**Risetime** —  $\leq 160$  ps.

**Aberrations** —  $\pm 3\%$  of pulse amplitude;  
not to exceed 4% p-p for adjacent peaks.

**Frequency** — 100 Hz to 100 kHz  
(decade steps).

**Amplitude** — 1.1 V peak  $\pm 5\%$  into 50  $\Omega$ .

**Variable Range** —  $\pm 10\%$ .

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### Environmental

(Meets or exceeds MIL-T-28800C, Class 5  
requirements with the exception of non-  
operating temperature.)

**Ambient Temperature** — Operating: 0°C  
to +50°C. Non-operating: -20°C to +65°C.

**Altitude** — Operating: 4500 m (15,000 ft.).  
Non-operating: 15,000 m (50,000 ft.).

**Vibration** — Operating: displacement  
(p-p) 0.38 mm (0.015 inch). Vibration  
frequency: 10 Hz - 55 Hz. Total time:  
75 minutes.

**Relative Humidity** — 90% - 95% at  
+50°C for 5 days.

**Shock** — Non-operating: 30 g's, 1/2 sine,  
11 ms duration, three shocks in each  
direction along three major axes; total  
shocks, 18.

**Bench Handling** — Operating: 45° or  
4 inches or point of balance, whichever  
occurs first.

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### Physical Characteristics

Dimensions	mm	in
Width	203	8.0
Height	126	5.0
Depth	305	12.0
Weights	kg	lb
Standard	4.3	9.5
Option 01	4.4	9.6
Option 02	4.0	8.7

A TM 5003 or TM 5006A Mainframe is required to  
operate the CG 5011.

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### Optional Accessories

**Comparator Head** — Used to calibrate  
built-in oscilloscope calibrators against the  
signals available from the CG 5011. Both  
the oscilloscope calibrator and CG 5011  
signals are then varied to obtain congruent  
displays. Errors are then displayed on the  
CG 5011 readout. (015-0310-01)

**Remote Variable** — Permits remote  
operation of the following front panel  
controls: Units/Div, Variable-Fixed Button,  
Continue Push button and the VAR.  
(015-0309-01)



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## Ordering Information

### CG 5011 Programmable Calibration Generator

Includes: Output Cable Assembly (012-0884-01), Pulse Head (015-0611-01), Instruction Manual (070-7745-02), Service Manual (070-7746-00), Instrument Interface Guide (070-7747-00), Programmer's Reference Manual (070-7748-00).

CG 5011/DP	CG 5011 w/Delete Pulse Head
015-0265-00	Precision Voltage Divider
015-0309-01	Remote Variable
015-0310-01	Comparator Head
015-0611-01	Pulse Head
067-0681-01	Tunnel Diode Pulser
067-0974-00	Troubleshooting Aid
TM 5003	3 Wide Power Module Mainframe, GPIB
TM 5003/RI	TM 5003 w/Rear Interface
TM 5006A	6 Wide Power Module Mainframe, GPIB
TM 5006A/R	TM 5006A w/Rack Mount
TM 5006A/RI	TM 5006A w/Rear Interface
TM 5006A/R/RI	TM 5006A w/Rack Mt & Rear Interface
TM 5006A/EMC	TM 5006A w/EMC Shielding

### Mainframe Power Plug Options

Standard	120V North American
UE220	220V Universal Euro & Switzerland
UK240	240V United Kingdom
A240	240V Australian
NA240	240V North American
S220	220V Switzerland

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## Warranty

One year on materials and workmanship.

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## Calibration Documentation

Contact TEGAM for OPTION Z540 NIST Traceable Compliance Certificate and Test Data.

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## Calibration & Technical Services

For warranty and remedial repair, calibration services and spare parts, or for additional information on TEGAM sales and service offices around the world, contact us at 440-466-6100 (ph) or 440-466-6110 (fx).



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