The CG 5001 is designed to greatly reduce your maintenance costs. Built-in self test routines and hardware check the operation of all major circuits each time the power is turned on.

Modular construction means that all circuit boards unplug (except the Main Interconnect) for easy exchange if service is required. A signature analysis mode is included to facilitate troubleshooting of the digital portion of the instrument.

CHARACTERISTICS

VOLTAGE (AMPLITUDE MODE)

The standard voltage is used to calibrate vertical display accuracy.

Range — 40 μV to 200 V (1-2-5 steps with multiplier).

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

Polarity — Positive from ground.

Accuracy — +0.25% ±1 μV.

Frequency — 40 mV to 80 mV: 10 Hz to 100 kHz. 100 mV to 10 V: dc or 10 Hz to 100 kHz. 12 V to 200 V: dc or 10 Hz to 10 kHz.

Variable Range — ±9.9%.

CURRENT (AMPLITUDE MODE)

The standard current is used to calibrate current probes.

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

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

Accuracy — ±0.25% ±2 μA.

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

Droop — ⩽1%.

Variable Range — ±9.9%.

LOW EDGE (AMPLITUDE MODE)

The Low Distortion Pulse obtained in this mode is used to test oscilloscope input amplifier and attenuator compensation.

Range — 20 mV to 1 V p-p (50 Ω load only) (1-2-5 steps with multipliers).

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

Polarity — Positive or negative transitions to ground.

Risetime (Falltime) — ⩽1.3 ns.

Abberrations — ±2%.

Long Term Flatness — ±0.5% after first 10 ns.

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

Variable Amplitude Range — > ±9.9% from nominal.

HIGH EDGE (AMPLITUDE MODE)

The Low Distortion Pulse obtained in this mode is used to test oscilloscope input amplifier and attenuator compensation.

Range — 1.2 V to 100 V ⩾1 MΩ load (1-2-5 steps with multipliers).

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

Risetime — <100 ns.

Aberrations — ±2% of squarewave amplitude.

Long Term Flatness — ±0.5% after first 500 ns.

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

Variable Amplitude Range — > ±9.9% from nominal.

MARKERS (TIMING MODE)

The markers obtained in this mode are used to calibrate oscilloscope time bases.

Range — 10 ns to 5 s (1-2-5 steps).

X10 Magnifier — Increase marker rate by a factor of ten (0.1 μs to 5 s range).

Accuracy — ±0.01% (optional TCXO ±0.0003%).

Amplitude — 1 V minimum into 50 Ω.

Variable Range — ±9.9%.

SLEWED EDGE (TIMING MODE)

Slewed Edges are used to calibrate the very fastest ranges found on oscilloscope time bases.

Range — 0.4 ns to 100 ns (1-2-5 steps plus 0.4 ns).

X10 Magnifier — Increases Slewed Edge rate by a factor of ten (5 ns to 100 ns range).

Accuracy — ±0.01% (Optional TCXO ±0.0003%).

Edge Position Uncertainty — ±40 ps.

Amplitude — >1 V into 50 Ω.

Variable Range — ±9.9%.

TRIGGER OUTPUT

The oscilloscope under test is normally triggered externally from this source.

Output Amplitude — 1 V minimum into 50 Ω.

Trigger Rate (Marker Mode) — Normal: Slaved to marker rate from 100 ns to 5 s; 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.

Slewed Edge Mode — One trigger per slewed edge.

All Other Modes — Normal: Slaved to output frequency. Divided by 10: One-tenth output frequency. Divided by 100: One-hundredth output frequency.

TIMING REFERENCE OUTPUT
EXTERNAL TIMING REFERENCE

Input Frequency — Any integral multiple of 1 MHz up to 5 MHz.

Required Accuracy — ±0.001%.

Input Amplitude — 1 V to 10 V RMS.

Input Resistance — 10 kΩ (nominal).

ENVIRONMENTAL

Meets or exceeds MIL-T-28800B, Class 5 requirements.

Ambient Temperature — Operating: 0°C to +50°C. Nonoperating: −55°C to +75°C.

Altitude — Operating: 4500 m (15,000 ft). Nonoperating: 15 000 m (50,000 ft).

Vibration — Operating: Displacement (p-p), 0.015 inch. Vibration Frequency: 10 Hz to 55 Hz. Total time: 75 minutes.

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

Shock — Nonoperating: 30 g's, ½ sine, 11 ms duration, three shocks in each direction along three major axes; total shocks, 18.

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

PHYSICAL CHARACTERISTICS*1

Dimensions	mm	in
Width	203	8.0
Height	124	4.9
Depth	305	12.0
Weights	**kg**	**lb**
Standard	3.9	8.5
Option 01	4.0	8.7

*1 *Maximum Overall Dimensions (triple compartment plug-in).*

PULSE HEAD (STANDARD ACCESSORY) FAST EDGE (AMPLITUDE MODE)

The Pulse Head is used to generate fast rise, low distortion pulses for testing higher bandwidth vertical amplifiers.

Polarity — Positive or negative transitions from ground.

Risetime — ⩽200 ps.

Aberrations — ±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 ±5% into 50 Ω.

Variable Range — ±10%.

ORDERING INFORMATION

CG 5001 Programmable Calibration Generator **$14,995**

Includes: Output cable assembly (012-0884-00); pulse head (015-0311-01); instrument interface guide (070-4616-00); program CAL GEN (070-4768-00); instruction manual (070-4767-00).

CG 551AP Programmable Calibration Generator **$14,995**

OPTIONS

Option 01 — Adds High Accuracy Time Base (TCXO) CG 5001/CG 551AP. **+$650**

Option 02 — Deletes Pulse Head CG 5001/CG 551AP. **−$1,100**

Utility Software
For TM 5000/4041. Order 062-6958-01 **$150**
See page 297 for description and ordering information.

CONVERSION KIT

CG 551AP — Field Modification Kit to convert to CG 5001. Order 040-1041-02 **$140**

MAINFRAMES

CG 5001 requires either a TM 5003 or TM 5006. The CG 551AP is a TM 500 version of the CG 5001 and requires a TM 506 Mod JB, TM 515 Mod UB or RTM 506 Mod JB. The CG 5001 is not compatible with TM 500 power module mainframes.

OPTIONAL ACCESSORIES

Comparator Head — Used to calibrate built-in oscilloscope calibrators against the signals available from the CG 5001. Both the oscilloscope calibrator and CG 5001 standard amplitude signals are applied to the Comparator Head and simultaneously displayed on the oscilloscope CRT. The CG 5001 signals are then varied to obtain congruent displays. Errors are then displayed on the CG 5001 readout. Order 015-0310-01 **$500**

Remote Variable — Permits remote operation of the following front panel controls: Units/Div, Variable-Fixed Button, Continue Push-button and the VAR. Order 015-0309-01 **$375**

Pulse Head — (When purchased separately.) Order 015-0311-01 **$1,400**

Rigid Circuit Board Extender — Order 067-0975-00 **$100**

Flexible Circuit Board Extender — Order 067-0974-00 **$115**

PG 506

Three Squarewave Output Modes

10 Hz to 1 MHz

Direct Readout of Oscilloscope Deflection Error

The PG 506 Calibration Generator provides three modes of squarewave output, selectable dc outputs, and a variable-amplitude output with front-panel digital indication of oscilloscope deflection error. Simultaneous plus and minus low-level, fast-rise (1.0 ns) squarewaves or high amplitude (60 V), extremely clean squarewaves are available at frequencies from 10 Hz through 1 MHz for checking oscilloscope transient response. A 5 mA calibration current loop is useful for current probe calibration. A 1 kHz squarewave can be generated in the amplitude calibration mode. Its amplitude may be varied around the calibrated level until the squarewave aligns with the oscilloscope vertical graticule divisions. Scope deflection error then can be read directly off the PG 506 digital display in percentage high or low, permitting rapid verification of oscilloscope performance.

CHARACTERISTICS

AMPLITUDE CALIBRATOR MODE

Period — Fixed at ≈1 ms or dc.

Amplitude — From 200 μV p-p to 100 V p-p in 1-2-5 sequence, accurate within ±0.25% into 1 MΩ. 100 μV p-p to 5 V p-p into 50 Ω.

Error Readout — Range: ±7.5%. Resolution: 0.1%.

PULSE MODES

Period — 1 μs to 10 ms (within 5%) in decade steps with the variable control in Cal position. Variable extends period to at least 100 ms.

Symmetry — ≈50% duty cycle.

HIGH AMPLITUDE OUTPUT

Risetime — Unterminated: 100 ns or less. Terminated into 50 Ω: 10 ns or less.

Amplitude Range — Unterminated: 6 V or less to at least 60 V. Terminated into 50 Ω: 0.5 V or less to at least 5 V.

Leading Edge Aberrations — Within 2% or 50 mV p-p, whichever is greater, when terminated into 50 Ω.

Polarity — Positive going from a negative potential to ground.

Output Resistance Source — 600 Ω within 5%.

FAST-RISE OUTPUTS

Risetime (Terminated Into 50 Ω) — <1.0 ns.

Amplitude Range (Terminated Into 50 Ω) — 100 mV or less to at least 1.0 V.

Leading Edge Aberrations — Within 2% or 10 mV p-p, whichever is greater, during first 10 ns.

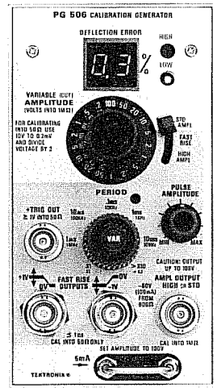
Flatness — Within 0.5% after first 10 ns.

Polarity — Simultaneous positive and negative going. Positive going is from a negative rest potential to ground. Negative going is from a positive rest potential to ground.

Output Resistance Source — 50 Ω within 3% at + and − output connectors.

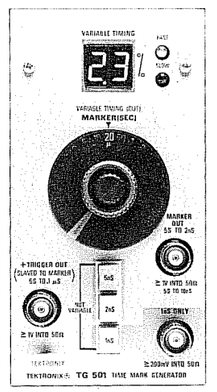
Trigger Output (Terminated into 50 Ω) — Positive-going signal of at least 1 V.

PG 506



Calibration Generator

TG 501



Time Mark Generator

ORDERING INFORMATION

PG 506 Calibration Generator **$2,995**

Includes: Instruction manual (070-3383-00).

Tunnel Diode Pulser

The Tunnel Diode Pulser provides a clean, fast-rise pulse for adjusting the transient response of high-frequency oscilloscopes and other instruments. It can be driven by the PG 506 at repetition rates exceeding 50 Hz. Output amplitude of the pulse is approximately 250 mV into 50 Ω, while risetime is ⩽125 ps; aberrations are <1% in a 1 GHz system.

ORDERING INFORMATION

Tunnel Diode Pulser Order 067-0681-01 **$185**

Precision Voltage Divider

Designed for use with the PG 506 in the Standard Amplitude mode, this 0.4 divider allows your oscilloscope to display a constant four divisions when checking amplitude calibration from 20 μV/div through 1 V/div. It also allows the PG 506 to be more conveniently used with oscilloscopes that cannot display five divisions of amplitude.

CHARACTERISTICS

Input Z — 50 Ω with output load ⩾100 kΩ.

Maximum Input — ⩽5 V RMS.

Output — 0.4 x PG 506 amplitude.

Voltage Accuracy — ±0.4%.

ORDERING INFORMATION

Precision Voltage Divider
Order 015-0265-00 **$140**

Compatible accessories begin on page 448.

TG 501

Marker Outputs, 1 ns to 5 s

Direct Readout of Oscilloscope Timing Error

External Trigger Output

The TG 501 Time Mark Generator provides marker outputs from one nanosecond to five seconds. A unique feature on the TG 501 is a variable timing output with a front-panel two-digit LED display. The display indicates percentage of timing error between the normal time interval and a variable interval set to line up the marker pulse with graticule or division mark on the display. This feature not only provides direct readout in terms of percent error, but also helps eliminate errors associated with visually estimating error from a display.

CHARACTERISTICS

Markers — 1 ns through 5 s in a 1-2-5 sequence.

Marker Amplitude — ⩾1 V peak into 50 Ω on 5 s through 10 ns markers. ⩾750 mV p-p into 50 Ω on 5 ns and 2 ns markers. ⩾200 mV p-p into 50 Ω on 1 ns markers.

Trigger Output Signal — Slaved to marker output from 5 s through 100 ns. Remains at 100 ns for all faster markers.

Internal Time Base	Standard	Option 01
Crystal Frequency	1 MHz	5 MHz
Stability (0°C to 50°C) after ½ hour	within 1 part in 10^5	within 5 parts in 10^7
Long-Term Drift	1 part or less in 10^5 per month	1 part or less in 10^7 per month
Setability	adjustable to within 1 part in 10^7	adjustable to within 5 parts in 10^9

External Reference Input — Available with internal changes. Acceptable frequencies, 1 MHz, 5 MHz, or 10 MHz. Input amplitude must be TTL compatible.

Timing Error Readout Range — To ±7.5%.

Timing Error Measurement Accuracy — Device under test error is indicated to within one least significant digit (to within one displayed count).

ORDERING INFORMATION

TG 501 Time Mark Generator **$2,495**

Includes: Instruction manual (070-1576-02).

Option 01 — 5 MHz Time Base. **+$325**