

PRODUCT SUMMARY

The CG 5001 is the computerized solution to large-scale scope calibration needs. The CG 5001 can be used as part of a computer-based system to calibrate and verify all major oscilloscope parameters, and is specifically designed for use where many oscilloscopes are maintained. Its programmability, combined with state-of-the-art performance, helps to minimize calibration lab labor while maximizing accuracy of verification checks.

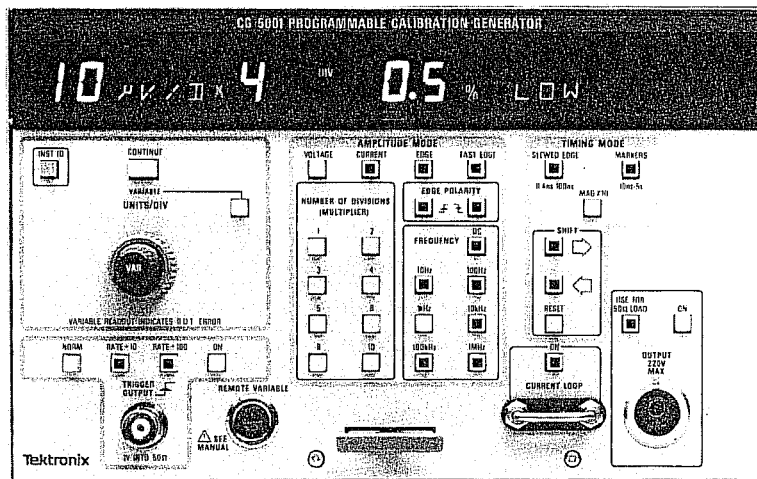
In addition to the CG 5001, TM 500 offers a complete set of calibration instruments that can be configured into a portable test set for in-field oscilloscope service and calibration. These TM 500 oscilloscope calibration instruments offer the widest range of standard amplitude squarewaves, fastest risetimes, lowest aberrations, fastest time marks and widest frequency range of leveled sinewaves available today.

The TG 501 Time Mark Generator provides crystal-controlled time marks from 5 s to 1 ns, plus a variable mode of operation which allows you to read the oscilloscope's timing error directly in percent from the digital display.

The PG 506 Calibration Generator provides clean, fast-rise squarewaves for checking oscilloscope transient response and calibrated-amplitude squarewaves for checking and setting the vertical amplifier gain of the oscilloscope. Like the TG 501, the PG 506 has a variable mode of operation which allows you to read the oscilloscope's calibration error directly in percent from its digital display.

The SG 503 and SG 504 generators provide leveled sinewaves for bandwidth checks (-3 dB points) and triggering performance checks. The SG 503 is a general-purpose leveled sinewave oscillator providing variable output from 250 kHz to 250 MHz. The SG 504 provides a leveled sinewave output that is variable from 245 MHz to 1050 MHz in two bands. The SG 502 Oscillator benefits calibration applications where verification of low frequency rolloff in ac modes and performance measurement of low-frequency-reject triggering modes is required.

CG 5001



Programmable Oscilloscope Calibration Generator

OSCILLOSCOPE CALIBRATION
SELECTION GUIDE

| | Primary Functions | Secondary Functions |
|--|--|---|
| CG 5001 Programmable Calibration Generator | Amplitude Calibration 40 μ V to 200 V Time Base Calibration 0.4 ns to 5 s | Testing risetime and transient response, attenuator compensation, oscilloscope nonlinearity |
| PG 506 Calibration Generator | Amplitude Calibration 200 μ V to 100 V | Testing risetime and transient response, attenuator compensation |
| TG 501 Time Mark Generator | Time Base Calibration 1 ns to 5 s | Testing oscilloscope nonlinearity |
| SG 503 Signal Generator | Bandwidth Calibration 250 kHz to 250 MHz | General leveled RF signal source |
| SG 504 Signal Generator | Bandwidth Calibration 245 MHz to 1050 MHz | General leveled RF signal source with frequency modulation capability |

CG 5001



The CG 5001 is designed to support other products which comply with IEEE Standard 488-1978.

The Tektronix CG 5001 Programmable Oscilloscope Calibration Generator is a micro-processor-based generator that can be used as part of a computerized system for the calibration and verification of major oscilloscope parameters, including:

- Vertical Gain
- Horizontal Timing and Gain
- Vertical Bandwidth/Pulse Characteristics
- Probe Accuracy and Compensation
- Current Probe Accuracy
- Calibrator Output Accuracy

The CG 5001's front panel features a wide range of functions, many of which represent a new state-of-the-art in calibration performance. All these functions are programmable by a controller via the GPIB (General Purpose Interface Bus). A "Learn" mode allows any manually-set function or range to be acquired by a controller. Subsequent use of the resulting program requires a minimum of operator skill and makes data logging an automatic operation.

This computer-assisted test and calibration system can provide step-by-step instructions to the operator, thus significantly reducing the skill level required.

Many of the calibration and test steps previously performed by the operator can now be transferred to a computer which executes them in a consistent and error-free manner. To calibrate a particular oscilloscope, the computer's program can send control-setting information to the CG 5001, which then sends the appropriate calibration signals to the oscilloscope. At the same time, a series of operator instructions can be placed on a terminal to automatically coordinate the operator with the calibration signals being sent from the CG 5001. The operator follows these instructions to make the necessary settings of the oscilloscope controls as the calibration or test procedure progresses. The CG 5001 returns error or deviation information to the controller, where it can be compared with preprogrammed reference values for the oscilloscope. A permanent record of the entire maintenance procedure can be stored by the controller and can be printed via peripherals such as a hard copy unit or line printer. Throughout the process, all calibration settings are determined by the computer's program. All front panel settings on the oscilloscope are specified in detail for the operator. Calculations of error percentages are performed automatically.

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 μ V 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% \pm 1 μ V.

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 — \pm 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 — \pm 0.25% \pm 2 μ A.

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

Drop — \leq 1%.

Variable Range — \pm 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) — \leq 1.3 ns.

Aberrations — \pm 2%.

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

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

Variable Amplitude Range — $>$ \pm 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 \geq 1 M Ω load (1-2-5 steps with multipliers).

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

Risetime — $<$ 100 ns.

Aberrations — \pm 2% of squarewave amplitude.

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

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

Variable Amplitude Range — $>$ \pm 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 μ s to 5 s range).

Accuracy — \pm 0.01% (optional TCXO \pm 0.0003%).

Amplitude — 1 V minimum into 50 Ω .

Variable Range — \pm 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 — \pm 0.01% (Optional TCXO \pm 0.0003%).

Edge Position Uncertainty — \pm 40 ps.

Amplitude — $>$ 1 V into 50 Ω .

Variable Range — \pm 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 — \pm 0.001%.

Input Amplitude — 1 V to 10 V RMS.

Input Resistance — 10 k Ω (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, 1/2 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**

| 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 |

** 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 — \leq 200 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 Ω .

Variable Range — \pm 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**