OPERATIONS MANUAL FOR CURRENT/VOLTAGE CALIBRATION UNIT

Paul M. Bellamy

Shock Dynamics Laboratory
Department of Physics
Washington State University
Pullman, WA 99164-2814

84-06

for shorted Quartz Gauge

(1) $$K = (1.8623 + 12.54 \times 10^{-3}\,\sigma) \times 10^{-5} \quad \text{coul cm}^{-2}\ \text{Kbar}^{-1}$$

(2) $$i = \frac{K A U_s \cdot \sigma}{\ell} = \frac{A U_s}{\ell}(1.8623 + 12.54 \times 10^{-3}\,\sigma)\,10^{-5} \cdot \sigma$$

A = cm^2 (area of [illegible] electrode which left the guard ring gap area

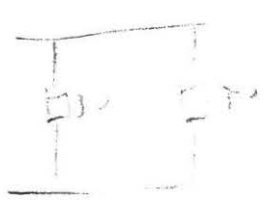
$U_s = 5.72 \times 10^5$ cm/sec

ℓ = cm

i = Amps

σ = Kbars

IV



GENERAL

The current/voltage calibrator puts out variable levels of consistent current or voltage suitable for calibrating oscilloscope faces. Each level (including zero) of calibrating current or voltage is syncronized with a suitable trigger pulse for the oscilloscope's external trigger.

Range

Current - 0 + 0.283 A D.C. in 1-9 steps

Voltage - 0 to 12 in two ranges in 1-9 steps.

Accuracy

0.2% in current or 0.1% in voltage

Modes of Operation

Level setting, continuous scans, single scan, calibrate

Trigger Pulse

6 V positive going pulse (into 50 ohms)

Power Requirements

115 V A.C.

Controls and Connectors

Power Switch and Indicator

oggle switch located in lower left hand corner with pilot light above. Pilot light indicates A.C. power on in unit.

Digital Panel Meter

Digital numbers are milliamps if unit set for current output; volts or millivolts, if unit set for voltage out put.

Step Selector (Thumb Wheel Switch)

Indicates number of steps above zero which will appear on oscilloscope face. Provides a zero reference for setting zero level in current or voltage output.

Zero Set Knob This adjusts the zero of current or voltage. May be set with step selector set to zero (0).

Range Set Knob

This adjusts the greatest range of current or voltage which may be displayed on the oscilloscope face. Step size is covered under "Step Selection".

Out Put Connector

Connector is a standard BNC. Provides calibrated levels of current or voltages.

Current/Voltage Switch

switches from current to voltage output at output connector. Large voltage excursions appear at output connector when this switch is used. Good practice to select current or voltage output before turning on unit.

Voltage Range Switch

Switches between volts or millivolts (0.001 V) scale on panel meter.

Mode Selector Switch

3 position switch. With switch set to level set (up); Panel meter indicates current or voltage of the highest level of output. Current will be flowing in external circuit in this mode. Be sure power limits of external circuit are not exceeded (283 milliamps into 50 ohms is 4 watts).

With switch set to single scan, depressing single calibrate switch, causes the unit to scan all levels of current or voltage set into the unit once only. With switch set to repetitive scan the output is continuiously scanned with the currents or voltages set into the unit. An appropriately syncronize trigger pulse is provided with each level in these two modes.

Single Calibrate

With mode selector set to single scan, depressing single calibrate switch causes the unit to scan all currents or

)ltages set into the unit. These appear sequentially at the output BNC.

Trigger Connector

Connector is a standard BNC. Output from this connector is a 6 volt positive going pulse into 50 ohms. This is syncronized to trigger the oscilloscope when the output from the output connector is at the proper level.

OPERATIONS

1. Select mA current or voltage output before powering up the unit.

insert dummy load into out put slot

2. Turn on power. Ten minutes warm up is recommended.

3. Set Range select to appropriate range (V, mV, or mA).

4. ~~Set Mode select to level set.~~]stet

5. Set step selector to zero (0).

6. Adjust zero set knob for zero on the panel meter.

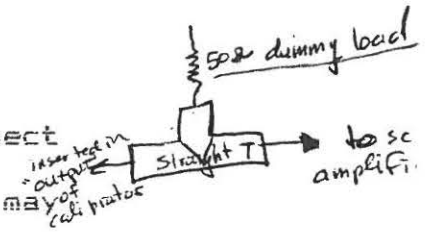
7. Install a dummy load in output and set step selector to one (1). load.

power rating

Put Mode switch to level set and adjust range knob for step size to be calibrated.

9. Adjust step selector for number of calibration steps required.

10. Connect trigger output to oscilloscope time base external trigger input. When several oscilloscopes are to be calibrated at once the last time base on the line should be terminated at 50 ohms. Timebase settings are: external trigger, A.C. coupled, normal sweep, positive slope, adjust for suitable positive level.



11. Set mode selector switch to repetitive scan and connect output to system to be calibrated. A dummy gauge may have to be used at this point since output power in repetitive scan may exceed power ratings of gauges to be calibrated. Adjust oscilloscope verticle gain so the number of calibration lines needed are visible (count the spaces). Set trace intensity and zero position at this point.

12. Set mode selector switch for single scan. Depress single calibrate to clear output (see note 3). Remove dummy load and connect gauge as for an experiment. Adjust cameras and trace rates for configuration used in experiment. Open camera and depress single calibra-

tor switch.

13. Close cameras, develop records, remove calibration unit from system. Do not adjust camera, intensities, or gain, if calibration records are satisfactory. Adjust triggering and complete experiment as soon as possible.

OPERATIONAL NOTES

1. Do not switch from current output to voltage output with an oscilloscope connected to output BNC. The voltage spike produced will burn out a 7A19. Good practice is to only change this switch position when unit is powered down.

2. Be sure power ratings are not exceeded when using unit in repetitive mode. In single scan mode a power rating may be exceeded by a factor of twenty without harm if done only once. Note: a 2 watt 50 ohm terminator can only pass 200 ma or see 10 volts continuously.

3. A voltage will continue to be present at the output connector after the mode selector switch has been in the level set position. Any load connected to the output BNC will see the current or voltage last set in the unit in spite of the setting of the mode selector switch. Normal operation can be restore by depressing the single calibrate switch once with the mode selector

set on single scan.

INTERNAL REPORTS - 1985

1. S.E. Arione and A.G. Ricker, "The Visar and Its Data Reduction", Internal Report 85-01, March, 1985.

2. G.E. Duvall, "Hugoniot of Fused Silica", Internal Report 85-02, May, 1985.

3. Y.M. Gupta, "Determination of a Nonlinear Elastic Relation for Uniaxial Strain Loading", Internal Report 85-03.

4. G. Sutherland, "Measurement of the Pressure-Time Profile of a Multiply Shocked Fluid Using an Electromagnetic Particle Velocity Gauge", Internal Report 85-04, August, 1985.