

INSTRUCTIONS

MODEL AVR-E1-W-C PULSE GENERATOR

S.N.:

## WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been disassembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

## TECHNICAL SUPPORT

Phone: 613-226-5772 or 1-800-265-6681

Fax: 613-226-2802 or 1-800-561-1970

E-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)

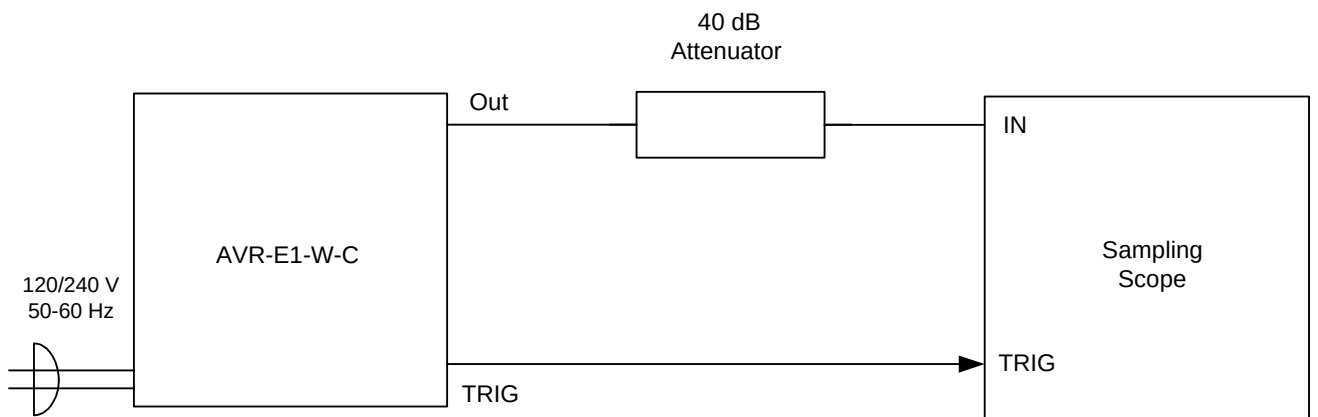
World Wide Web: <http://www.avtechpulse.com>



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FIG. 1: PULSE GENERATOR TEST ARRANGEMENT



## GENERAL OPERATING INSTRUCTIONS

- 1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed five gigahertz.
- 2) The use of 40-dB attenuator at the sampling scope vertical input channel will insure a peak input signal to the sampling scope of less than one Volt.
- 3) The TRIG output channel provides TTL level signals. The TRIG output precedes the main output when the front panel ADVANCE-DELAY switch is in the ADVANCE position. The TRIG output lags the main output when the switch is in the DELAY position.
- 4) To obtain a stable output display the PRF controls on the front panel should be set mid-range while the PRF switch may be in either range. The front panel PRF range switch should be mid range. The front panel DELAY controls and the scope triggering controls are then adjusted to obtain a stable output. The scope may then be used to set the desired PRF by rotating the PRF controls.
- 5) The output pulse width is controlled by means of the front panel one-turn PW control and the two position range switch as follows:
  - 50 – 500 ns
  - 0.5 – 5.0 us
- 6) The output pulse amplitude is controlled by means of the front panel one-turn AMP control.
- 7) Some properties of the output pulse may change as a function of the amplitude pot setting. For some demanding applications, it may be desirable to use a combination of external attenuators and the amplitude pot to achieve the desired output amplitude.
- 8) To DC offset the output pulse connect a DC power supply set to required DC offset value to the back panel terminals marked O.S. The maximum attainable DC offset voltage is  $\pm 50$  Volts,  $\pm 200$  mA (option).

- 9) An external clock may be used to control the output PRF of the AVR unit by setting the front panel PRF range switch in the EXT position and applying a 50 ns (or wider) TTL level pulse to the TRIG BNC connector input. For operation in this mode, the scope time base must also be triggered by the external clock. The propagation delay time in the externally triggered mode is about 300 ns.
- 10) AVR units are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a short circuit), the protective circuit will turn the output of the instrument OFF and turn the indicator light ON. The light will stay ON (i.e. output OFF) for about 5 seconds after which the instrument will attempt to turn ON (i.e. light OFF) for about 1 second. If the overload condition persists, the instrument will turn OFF again (i.e. light ON) for another 5 seconds. If the overload condition has been removed, the instrument will turn on and resume normal operation. Overload conditions may be removed by:
- 1 Reducing PRF (i.e. switch to a lower range)
  - 2 Reducing pulse width (i.e. switch to a lower range)
  - 3 Removing output load short circuit (if any)

Note that the overload light may illuminate when the prime power is applied. The light will extinguish after a few seconds and the unit will then function normally.

- 9) MONITOR OUT M. Provides an attenuated (x10) coincident replica of the main positive output pulse to 50-Ohms. (option).
- 10) The unit can be converted from 120 to 240V 50-60 Hz operation by adjusting the voltage selector card in the rear panel fused voltage selector-cable connector assembly.
- 11) For additional assistance:
- Tel: (613) 226-5772  
Fax: (613) 226-2802  
Email: [info@avtechpulse.com](mailto:info@avtechpulse.com)

FIG. 2: FRONT PANEL CONTROLS



## FRONT PANEL CONTROLS

- (1) **ON-OFF Switch.** Applies basic prime power to all stages.
- (2) **PRF Control.** With this range switch in the 20, 200, 2K or 20K positions, the pulse repetition frequency (PRF) of the instrument is controlled by the internal clock oscillator, which in turn is controlled by the PRF range switch and fine control.

With the range switch in the EXT position, the instrument requires a 50 ns (or wider) TTL level pulse applied at the TRIG input in order to trigger the output stages.

- (3) **DELAY Control.** These controls vary the relative delay between reference output pulse provided at the TRIG output (4) and the main output (6). This delay is variable over the range of 0 to about 500 ns. Coarse and fine controls are provided. If the Advance/Delay switch (5) is set to "ADVANCE", the reference output on the TRIG output (4) precedes the main output (6). If the Advance/Delay switch (5) is set to "DELAY", the reference output on the TRIG output (4) lags the main output (6).

The delay is not adjustable when triggering externally.

- (4) **TRIG Output.** This connector has two functions. When triggered internally, this output provides a reference signal that can be used to trigger an oscilloscope scope time base. The output is a 2V, 200 ns (approx.) pulse capable of driving a 50-Ohm load. Set the scope to trigger on the positive edge.

When triggered externally, (i.e., the PRF range switch is in the EXT position), the external TTL-level trigger signal is applied at this point.

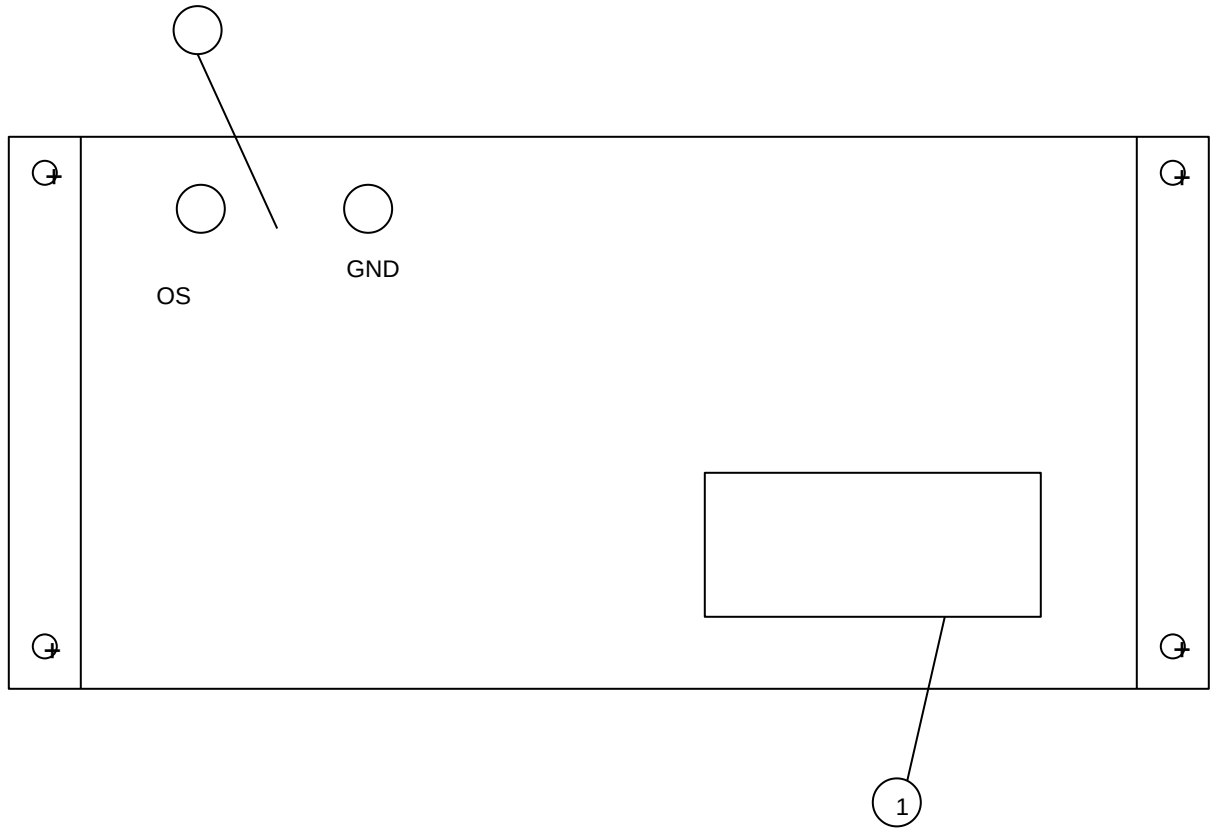
- (5) **ADVANCE/DELAY SWITCH.** This switch determines whether the reference output pulse on the TRIG connector (4) occurs in before the main output pulse (ADVANCE mode), or whether the reference pulse occurs after the main output pulse (DELAY mode). This switch is only useful when triggering internally.
- (6) **OUT.** This connector provides the main output pulse. The output is designed to drive 50-Ohm loads.
- (7) **PULSE WIDTH.** A one-turn control and two position range switch vary the output pulse width as follows:

50 – 500 ns  
0.5 – 5.0 us

- (8) AMPLITUDE. A one-turn control which varies the output pulse amplitude.
- (9) AVR units are protected by an automatic overload protective circuit which controls the front panel overload light. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a short circuit), the protective circuit will turn the output of the instrument OFF and turn the indicator light ON. The light will stay ON (i.e. output OFF) for about 5 seconds after which the instrument will attempt to turn ON (i.e. light OFF) for about 1 second. If the overload condition persists, the instrument will turn OFF again (i.e. light ON) for another 5 seconds. If the overload condition has been removed, the instrument will turn on and resume normal operation. Overload conditions may be removed by:
- 1 Reducing PRF (i.e. switch to a lower range)
  - 2 Reducing pulse width (i.e. switch to a lower range)
  - 3 Removing output load short circuit (if any)

Note that the overload light may illuminate when the prime power is applied. The light will extinguish after a few seconds and the unit will then function normally.

FIG. 3: BACK PANEL CONTROLS



## BACK PANEL CONTROLS

- (1) **FUSED CONNECTOR, VOLTAGE SELECTOR.** The detachable power cord is connected at this point. In addition, the removable cord is adjusted to select the desired input operating voltage. The unit also contains the main power fuse.

For AC line voltages of 110-120V, the power selector card should be installed so that the "120" marking is visible from the rear of the instrument.

For AC line voltages of 220-240V, the power selector card should be installed so that the "240" marking is visible from the rear of the instrument.

If it is not set for the proper voltage, remove the fuse and then grasp the card with a pair of pliers and remove it. Rotate horizontally through 180 degrees. Reinstall the card and the correct fuse.

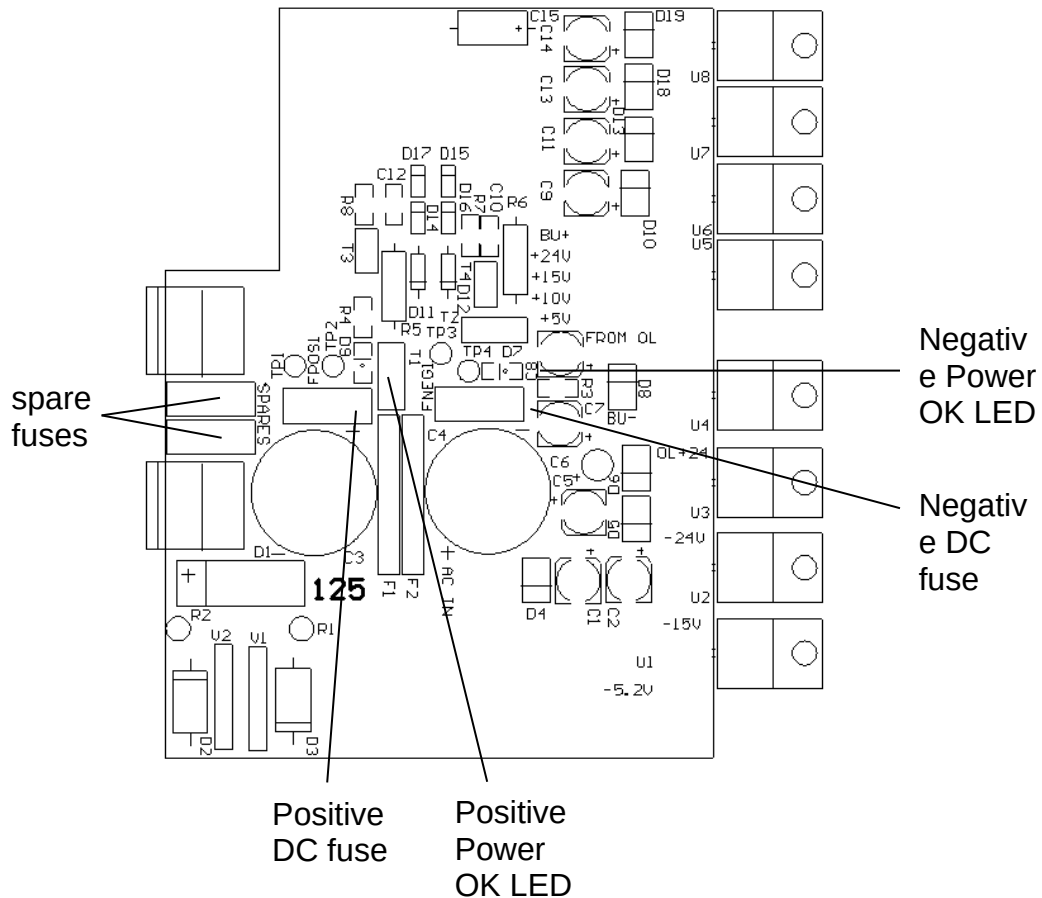
In the 120V setting, a 0.5A slow blow fuse is required. In the 240V setting, a 0.25A slow blow fuse is required.

- (2) **DC OFFSET Input.** To DC offset the output pulse, connect a DC power supply set to the desired offset value to these terminals. The maximum allowable DC offset voltage is  $\pm 50$  Volts,  $\pm 200$  mA (-OS option).

## POWER SUPPLY AND FUSE REPLACEMENT

This instrument has three main fuses, plus two spares. One, which protects the AC input, is located in the rear-panel power entry module, as described in the “Rear Panel Controls” section of this manual. If the power appears to have failed, check the AC fuse first.

The other two fuses (plus two spares) are located on the internal DC power supply, as shown below:



The positive fuse and one of the spare fuses on this circuit board are 1A slow-blow fuses, Littlefuse part number R452001. (This fuse can be ordered from Digikey, [www.digikey.com](http://www.digikey.com). The Digikey part number is F1343CT-ND). The negative fuse and the second spare fuse are 0.5A slow-blow fuses (Littlefuse R452.500, Digikey part number F1341CT-ND).

If you suspect that the DC fuses are blown, follow this procedure:

- 1 Remove the top cover, by removing the four Phillips screws on the top cover and then sliding the cover back and off.
- 2 Locate the two "Power OK" LEDs on the power supply circuit board, as illustrated above.
- 3 Turn on the instrument.
- 4 Observe the "Power OK" LEDs. If the fuses are not blown, the two LEDs will be lit (bright red). If one of the LEDs is not lit, the fuse next to it has blown.
- 5 Turn off the instrument.
- 6 If a fuse is blown, use needle-nose pliers to remove the blown fuse from its surface-mount holder.
- 7 Replace the fuse. (Spare 1 Amp and 0.5 Amp fuses are provided on the circuit board. They may be transferred to the active fuse locations using needle-nose pliers.)

PERFORMANCE CHECK SHEET