

INSTRUCTIONS

MODEL AVR-8A-C-PN 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

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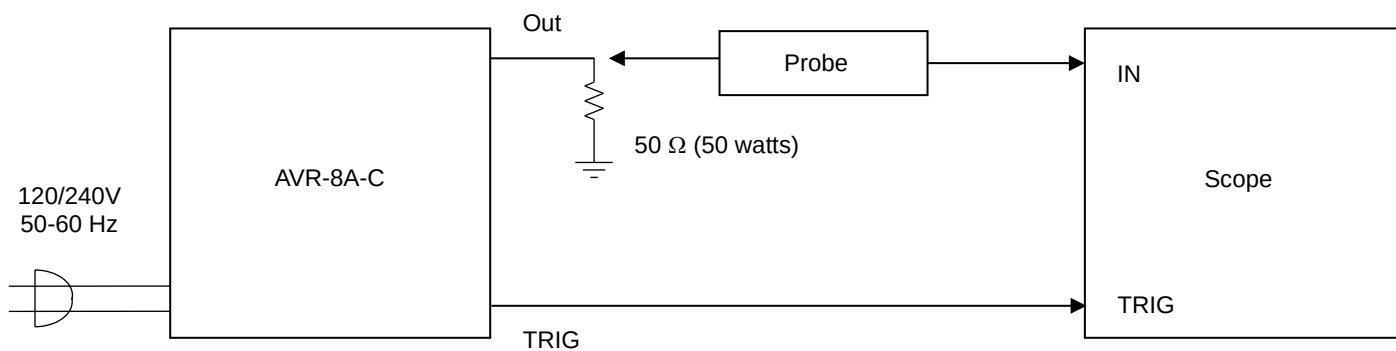
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FIG. 1: PULSE GENERATOR TEST ARRANGEMENT



GENERAL OPERATING INSTRUCTIONS

- 1) **CAUTION:** EXTREME CAUTION SHOULD BE FOLLOWED WHEN USING THIS INSTRUMENT AS IT GENERATES OUTPUT PULSE AMPLITUDES AS HIGH AS 1,000 VOLTS. DC POTENTIALS AS HIGH AS 1,000 VOLTS ARE EMPLOYED IN THE GENERATION OF THE 1,000 VOLT PULSE SO EXTREME CAUTION MUST BE EMPLOYED WHEN REPAIRING THIS INSTRUMENT. IT IS THEREFORE HIGHLY RECOMMENDED THAT THE UNIT BE RETURNED TO AVTECH FOR ALL REPAIRS BEYOND THE REPLACEMENT OF THE 1.0 AMP LINE FUSE OR THE 2.5 AMP SB REAR PANEL FUSE.
- 2) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 100 MHz.
- 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.

The DELAY control controls the relative delay between the reference output pulse provided at the TRIG output and the main output. This delay is variable over the range of 0.2 μ s to 200 μ s.

	MIN	MAX
Range 1	0.2 μ s	2.0 μ s
Range 2	2.0 μ s	20 μ s
Range 3	20 μ s	200 μ s

- 4) The output pulse width is controlled by means of the front panel ten-turn PW control and by the PW RANGE control. Note that the MODE A-B switch must be in the A position. The minimum and maximum PW for each range and the corresponding maximum PRF are as follows. Note that the unit may fail if operated at duty cycles exceeding 0.2%.

	PW min	PW max
Range 1	0.2 μ s 1 KHz	2.0 μ s 1 KHz
Range 2	2.0 μ s	20 μ s

	1 KHz	100 Hz
Range 3	20 μ s	200 μ s
	100 Hz	10 Hz

To voltage control the output pulse width within each range, set the rear panel switch in the EXT position and apply 0 to +10 Volts to connector A ($R_{IN} \geq 10K$). (option).

- 5) To obtain a stable output display the PRF control on the front panel should be set mid range. The front panel MODE toggle switch should be in the INT position. The 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 and PRF FINE controls. CAUTION: Do not exceed the duty cycle of 0.2%.
- 6) The output pulse amplitude is controlled by means of the front panel ten turn AMP control. To voltage control the output amplitude, set the rear panel switch in the EXT position and apply 0 to +10 Volts to connector A ($R_{IN} \geq 10K$). (-EA option).
- 7) The output polarity is controlled by the two-position polarity switch. Note that the polarity will not change if the output voltage exceeds about 100 Volts. Therefore, rotate the AMP control full CCW before attempting to reverse the polarity. Note when the unit is operating at a low duty cycle and an attempt is made to reduce the output amplitude, the amplitude will decay slowly with a time constant of several tens of seconds.
- 8) An external clock may be used to control the output PRF of the AVR unit by setting the front panel MODE switch in the EXT position and applying a 50 ns (or wider) TTL level pulse to the TRIG BNC connector input. With the MODE switch in the EXT A position, the output pulse width will be controlled by the front panel PW controls. If the switch is in the EXT B position, the output pulse width equals the input trigger pulse width.
- 9) For single pulse manual operation, set the front panel MODE switch in the MAN position and push the SINGLE PULSE button.
- 10) The AVR-8A-C features output impedance of the order of several Ohms (rather than 50 Ohms). The following consequences of this feature should be noted:

- a) When used to switch some semiconductor devices (eg. bipolar and VMOS power transistors), the AVR unit will yield much faster switching times than those provided by 50 Ohm pulse generators.
 - b) The AVR unit will safely operate in to load impedances in the range of 50 Ohms to an open circuit. However, the fall time may degrade for load impedances higher than fifty Ohms.
 - c) The AVR unit may be effectively converted to a fifty-Ohm output impedance generator by placing a fifty-Ohm carbon composition resistor in series with the output of the unit and the load. The maximum available load voltage will then decrease to 500 Volts (from 1,000 Volts).
 - d) The output switching elements may fail if the unit is inadvertently operated into a short circuit. The switching elements are easily replaced in the field following the procedure outlined in the REPAIR Section.
- 11) CAUTION: The output stage is protected against overload condition by a 2.5 A slow blow fuse on the main frame back panel. However, the output switching elements may fail if the unit is triggered at a PRF exceeding 1 kHz or at duty cycles resulting in an average output power in excess of 50 Watts. Heating and subsequent likely failure of the output stage is reduced if the following action is taken where possible:
- a) PRF is kept to a minimum, i.e. operate in a low PRF range when possible rather than in a high PRF range.
 - b) Keep the output PW to a minimum.
- 12) OVERLOAD INDICATOR. AVR-8-C units with a serial number higher than 5600 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), 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 unit will safely withstand a short-circuited load condition.

- 13) 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.

14) For further assistance:

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FIG. 2: FRONT PANEL CONTROLS

FRONT PANEL CONTROLS

- 1) ON-OFF Switch. Applies basic prime power to all stages.
- 2) PRF Control. Varies PRF from 0.1 Hz to 1 kHz as follows:

Range 1	0.1 Hz	1.0 Hz
Range 2	1 Hz	10 Hz
Range 3	10 Hz	100 Hz
Range 4	100 Hz	1 kHz

- 3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) the main output (5). This delay is variable over the range of 0.2 to about 200 μ s. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.

	MIN	MAX
Range 1	0.2 μ s	2.0 μ s
Range 2	2 μ s	20 μ s
Range 3	20 μ s	200 μ s

- 4) TRIG Output. This output is used to trigger the scope time base. The output is a TTL level 100 ns (approx.) pulse capable of driving a fifty-Ohm load. This output precedes the output at (5) if the two-position ADVANCE-DELAY switch is in the ADVANCE position. This output follows the output at (5) if the switch is in the DELAY position. The delay range is variable from 0.2 μ s to 200 μ s. The external trigger signal is applied at this input when the MODE switch is in the EXT position.
- 5) OUT Connector. SHV connector provides output to a 50-Ohm (or higher) load.
- 6) PW Control. A ten-turn control and 3-position range switch, which varies the positive output pulse width from 0.2 μ s to 200 μ s (when the MODE A-B switch is in the A position). The minimum and maximum PW for each range and the corresponding maximum PRF are as follows. Note that the unit may fail if operated at duty cycles exceeding 0.2%.

	PW min	PW max
Range 1	0.2 μ s	2 μ s
	PRF max 1 KHz	PRF max 1 KHz
Range 2	2 μ s	20 μ s
	PRF max 1 KHz	PRF max 100 Hz

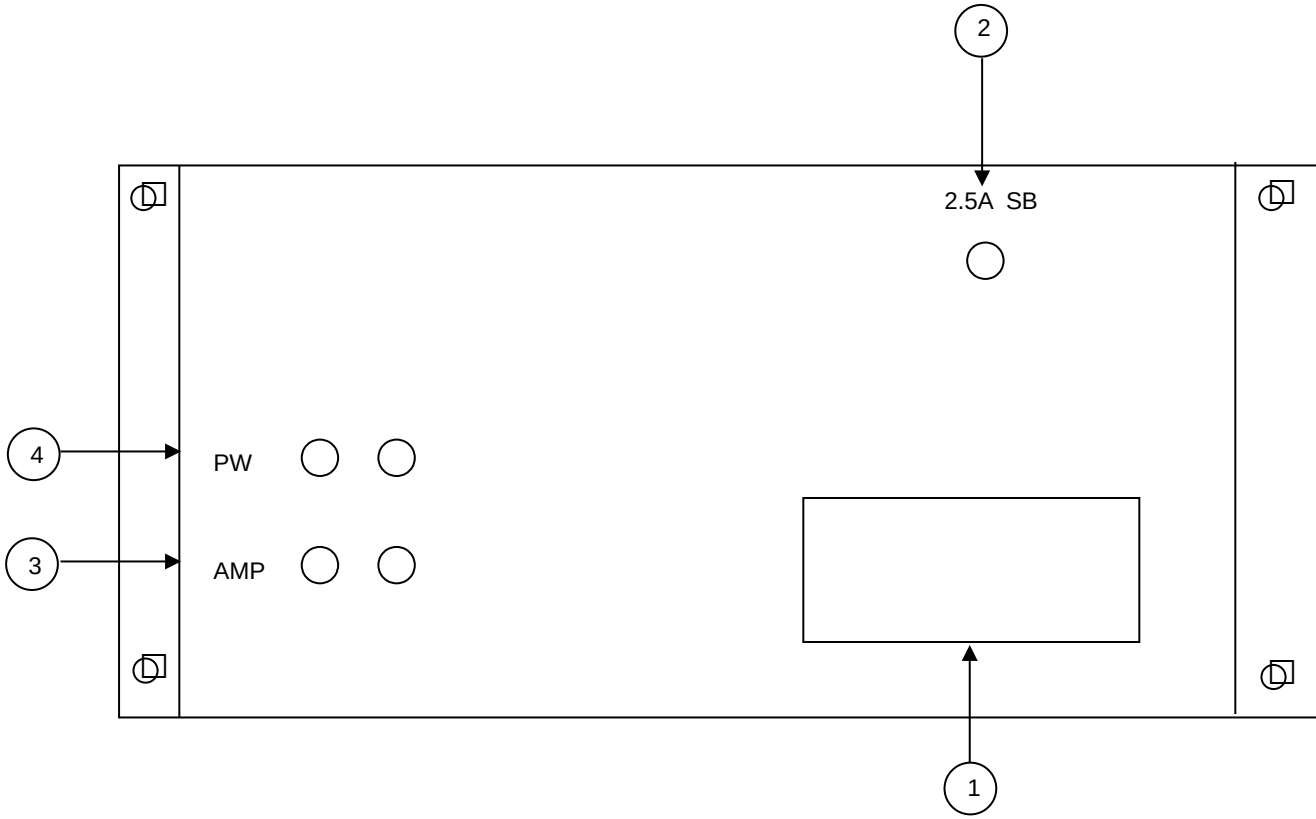
Range 3	20 μ s	200 μ s
	PRF max 100 Hz	PRF max 10 Hz

- 7) AMP Control. A ten turn control, which varies the output pulse amplitude from 0 to 1,000 V.
- 8) MODE Control. With this switch in the INT position, the PRF of the AVR unit is controlled via an internal clock, which in turn is controlled by the PRF control. With the switch in the EXT position, the AVR unit requires a 50 ns (or wider) TTL level pulse applied at the TRIG input in order to trigger the output stages. In addition, in this mode, the scope time base must be triggered by the external trigger source. With the MODE switch in the EXT A position the output pulse width is controlled by the PW controls. With the MODE switch in the EXT B position, the output pulse width equals the input trigger pulse width. For single pulse operation, set the MODE switch in the MAN position.
- 9) SINGLE PULSE. For single pulse manual operation, set the front panel MODE switch in the MAN position and push the SINGLE PULSE button.
- 10) OVERLOAD INDICATOR. AVR-8-C units with a serial number higher than 5600 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), 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 unit will safely withstand an output load short circuit condition.

- 11) POLARITY. The output polarity is controlled by the two-position polarity switch. Note that the polarity will not change if the output voltage exceeds about 100 Volts. Therefore, rotate the AMP control full CCW before attempting to reverse the polarity. Note when the unit is operating at a low duty cycle and an attempt is made to reduce the output amplitude, the amplitude will decay slowly with a time constant of several tens of seconds.

FIG. 3: BACK PPANEL CONTROL



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 1.0A slow blow fuse is required. In the 240V setting, a 0.5A slow blow fuse is required.

- (2) 2.5A SB. Fuse, which protects the output stage if the output duty cycle rating is exceeded.
- (3) EA. To voltage control the output amplitude, set the switch in the EXT position and apply 0 to +10 Volts to BNC connector A ($R_{IN} \geq 10K$). (option).
- (4) EW. To voltage control the output pulse width, set the switch in the EXT position and apply 0 to +10 Volts to BNC connector A ($R_{IN} \geq 10K$). (option).

TOP COVER REMOVAL AND RACK MOUNTING

- 1) The interior of the instrument may be accessed by removing the four Phillips screws on the top panel. With the four screws removed, the top cover may be slid back (and off).
- 2) The -R5 rack mount kit may be installed after first removing the one Phillips screw on the side panel adjacent to the front handle.

PERFORMANCE CHECK SHEET