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SINCE 1975

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## INSTRUCTIONS

### MODEL AVRH-3-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

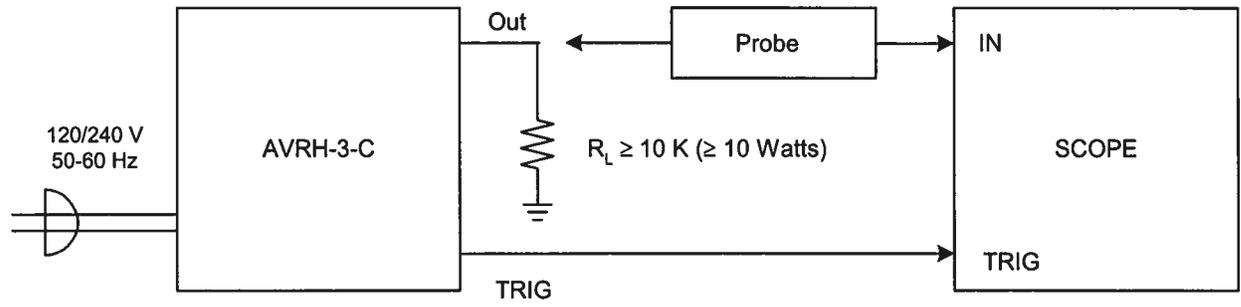
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FIG. 1: PULSE GENERATOR TEST ARRANGEMENT



## GENERAL OPERATING INSTRUCTIONS

- 1) **CAUTION:** EXTREME CAUTION SHOULD BE FOLLOWED WHEN USING THIS INSTRUMENT AS IT GENERATES OUTPUT PULSE AMPLITUDES AS HIGH AS 3,000 VOLTS.
- 2) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 50 MHz. The load impedance should not be less than 1000 Ohms as this will result in possible damage to the output stages. Also, the coaxial cable between the SHV output connector and the load should not exceed about 0.5 meters (or the rise time will be degraded).
- 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 0.1 us to 2.5 us.

- 4) To obtain a stable output display the PRF control on the front panel should be set mid range. The front panel Mode 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 controls.
- 5) The output pulse width is controlled by means of the front panel ten-turn pulse width control. To voltage control the output pulse width, set the rear panel switch in the EXT position and apply 0 to +10V to the "A" BNC connector ( $R_{IN} \geq 10K$ ). (Option)
- 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 +10V to the "A" BNC connector ( $R_{IN} \geq 10K$ ). (option).

**CAUTION:** To avoid stressing the output stage it is recommended that the output amplitude control be set fully counter clockwise before applying prime power to the instrument.

- 7) 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. For operation in this mode, the scope time base must also be triggered by the external clock rather than from the TRIG output.

When the Mode switch is in the EXT A position, the output pulse width is controlled by means of the front panel one turn PW control.

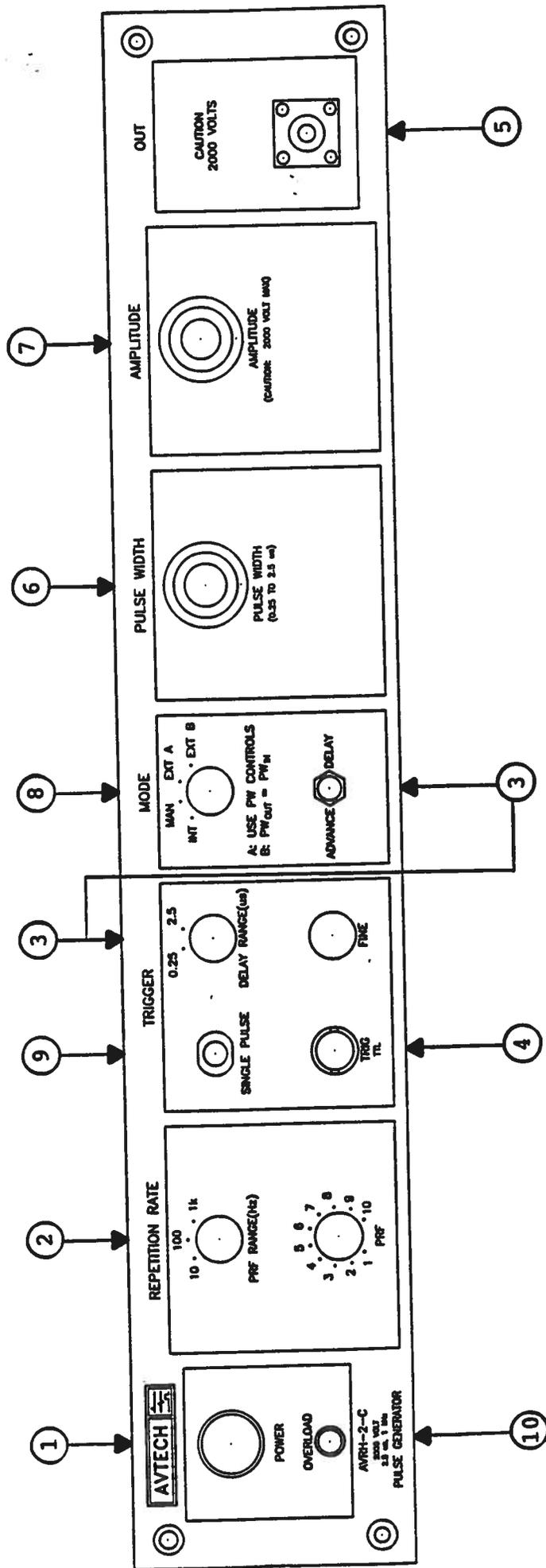
When the Mode switch is in the EXT B position, the output pulse width is controlled by the pulse width of a TTL pulse applied to the TRIG BNC.

CAUTION: The applied pulse width must not exceed 2.5  $\mu$ s.

- 8) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.
- 9) **CAUTION:** The output stage is protected against overload condition by a 1.0 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 25 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.
- 10) **OVERLOAD INDICATOR.** AVRH 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 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)

- 11) Note that when the amplitude or PRF or PW are increased, the output stage of the unit will emit an audible hum. This noise is normal and is due to the step up transformer in the output stage.
- 12) **CAUTION:** DC potentials as high as 800 Volts and pulse potentials as high as 3,000 Volts exist in the interior of the instrument. For this reason it is recommended that the top cover of the unit should not be removed and that the unit should be returned to the factory for servicing (when necessary).
- 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:

Tel: 613-226-5772  
Fax: 613-226-2802  
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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 1 Hz to 1 kHz as follows:

Range 1	1 Hz	10 Hz
Range 2	10 Hz	100 Hz
Range 3	100 Hz	1 kHz

(3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) and the main output (5). This delay is variable over the range of 0.1 to about 2.5 us. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.

	MIN	MAX
Range 1	0.1 us	0.25 us
Range 2	0.25 us	2.5 us

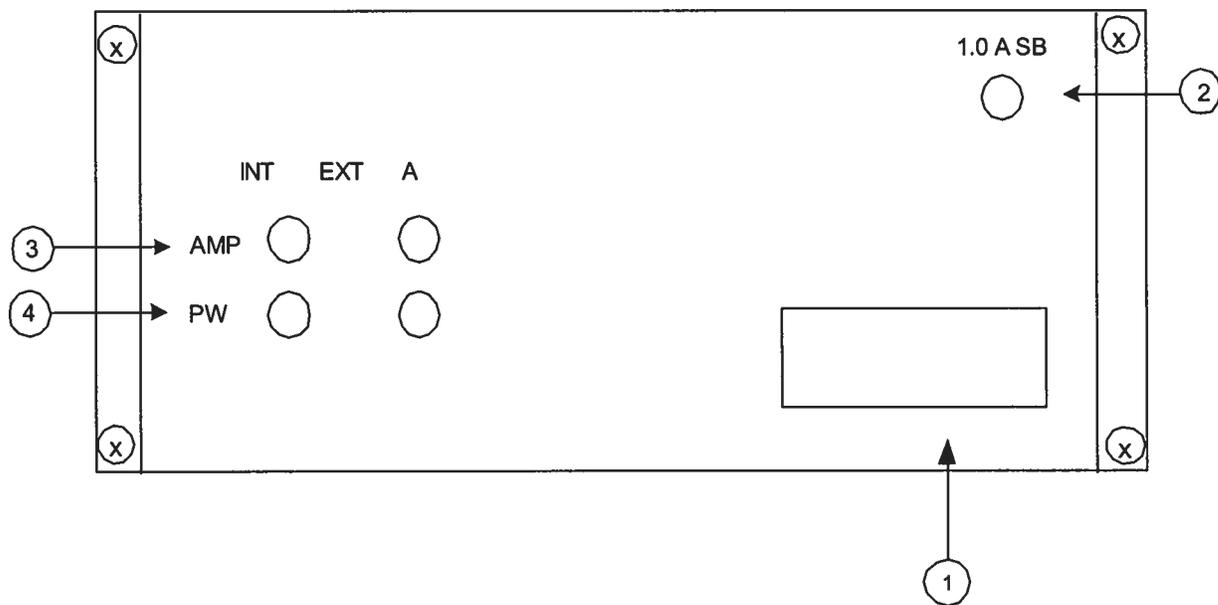
(4) TRIG Output. This output is used to trigger the scope time base. The output is a TTL level 100 ns (approx.) pulse capable of driving a fifty-Ohm load. This output precedes the output at (5) if the two-position ADVANCE- DELAY switch is in the ADVANCE position. This output follows the output at (5) if the switch is in the DELAY position. The delay range is variable from 0.1 us to 2.5 us. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.

(5) OUT Connector. SHV connector provides output to a high impedance load ( $R_L > 10K$  Ohms). Panel connector will mate to King Model 1705-2 connector (for RG58A cable).

(6) PW Control. A ten-turn control, which varies the positive output pulse width from 0.25 us to 2.5 us (when Mode AB switch is in the A position).

(7) AMP Control. A ten-turn control, which varies the output pulse amplitude from 0 to 3,000 Volts (to  $R_L \geq 10$  K). To avoid stressing the output stage, it is recommended that the AMP control be set fully counter clockwise before applying the prime power to the instrument.

- (8) EXT-INT-MAN Control. With this MODE switch in the INT position, the PRF of the AVRH unit is controlled via an internal clock, which in turn is controlled by the PRF control. With the MODE switch in the EXT position, the AVRH 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 applied to the TRIG BNC (4). For single pulse operation, set the INT-EXT-MAN switch in the MAN position.
- (9) SINGLE PULSE. For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.
- (10) OVERLOAD INDICATOR. AVRH 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 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)

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

- (2) 1.0A SB. Fuse which protects the output stage if the output duty cycle rating is exceeded.
- (3) AMP. To voltage control the output amplitude, set this switch in the EXT position and apply 0 to +10V to the "A" BNC connector ( $R_{IN} > 10K$ ). (option).
- (4) PW. To voltage control the output pulse width, set this switch in the EXT position and apply 0 to +10V to the "A" BNC connector ( $R_{IN} > 10K$ ). (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.

## SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVRH-3-C generates a 3,000 Volt pulse by first generating a 750 Volt pulse (of the desired width). This 750 Volt pulse is then supplied to a x4 transformer which increases the output amplitude to 3,000 Volts (to  $R_L > 10K$  Ohms). DC potentials as high as 800 Volts are employed in the generation of the 750 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 1.0 Amp SB rear panel fuse.

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