



# AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS  
SINCE 1975

P.O. BOX 265  
OGDENSBURG, NY  
U.S.A. 13669-0265  
TEL: (315) 472-5270  
FAX: (613) 226-2802

TEL: 1-800-265-6681  
FAX: 1-800-561-1970

e-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)  
<http://www.avtechpulse.com>

P.O. BOX 5120 STN. F  
OTTAWA, ONTARIO  
CANADA K2C 3H4  
TEL: (613) 226-5772  
FAX: (613) 226-2802

## INSTRUCTIONS

MODEL AVR-3-PW-C-P-TEK2 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

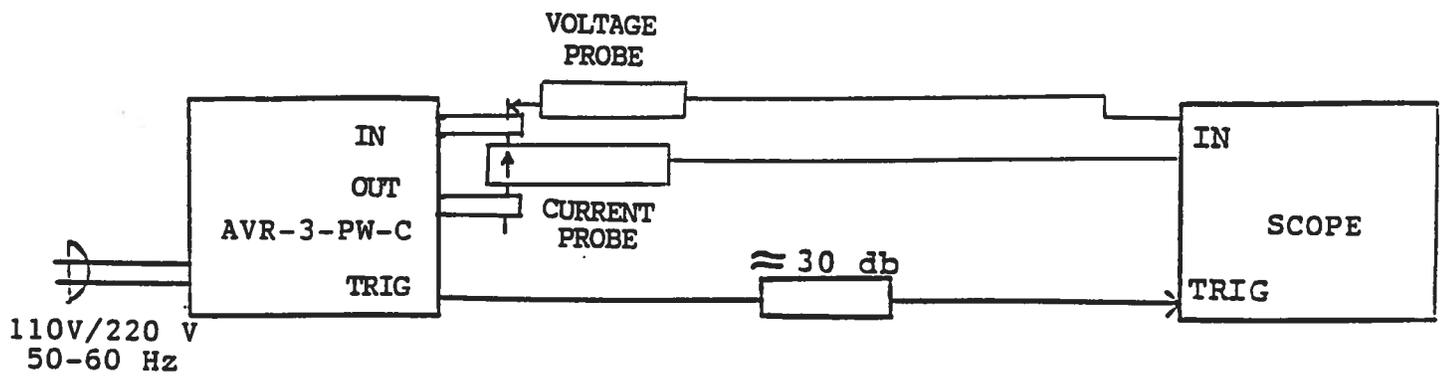
E-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)

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

## TABLE OF CONTENTS

WARRANTY .....	2
TABLE OF CONTENTS .....	3
Fig. 1: PULSE GENERATOR TEST ARRANGEMENT .....	4
THEORY OF OPERATION .....	5
Fig. 2: SHORTING BAR, ADAPTER ARRANGEMENT FOR CURRENT PROBE .....	5
JULY 1994 MODIFICATION: .....	6
Fig. 3: FRONT PANEL CONTROLS .....	10
FRONT PANEL CONTROLS .....	11
PERFORMANCE CHECK SHEET .....	14

Fig. 1: PULSE GENERATOR TEST ARRANGEMENT



## THEORY OF OPERATION

- 1) The AVR-3-PW-C-TEK2 generates a voltage pulse (0 to +200 Volts, 0.25 to 250 us) which is accessible at the front panel OUT terminal. A shorting bar (typically #18 bus bar wire) is connected between the OUT and IN terminals and the current probe is placed over the shorting bar. The IN terminal connects to ground via a 40 Ohm termination. A variable current of up to 5.0 Amperes is defined by the 200 Volt pulse and the 40 Ohm termination.

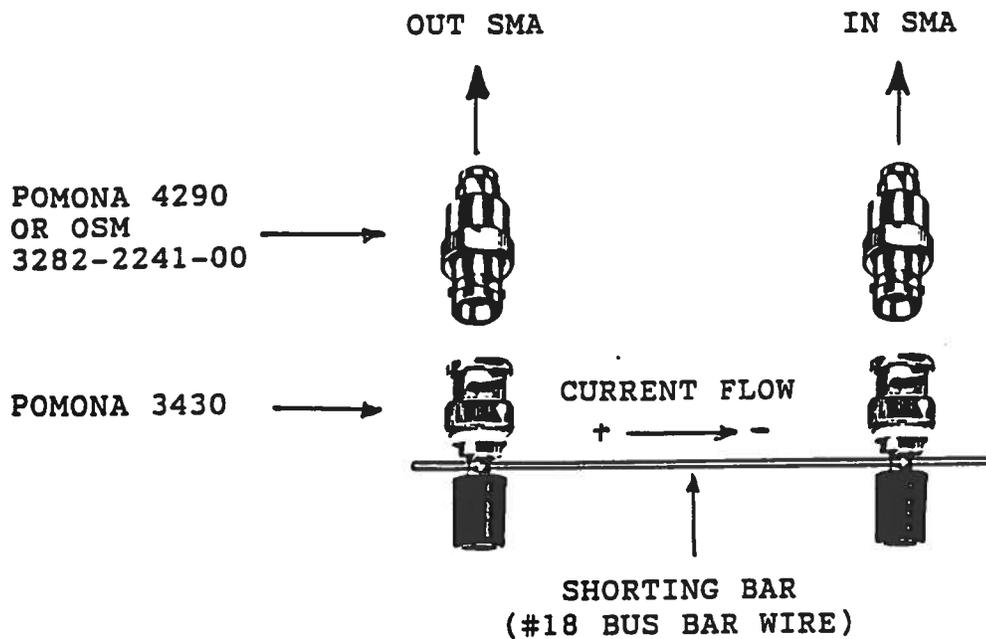
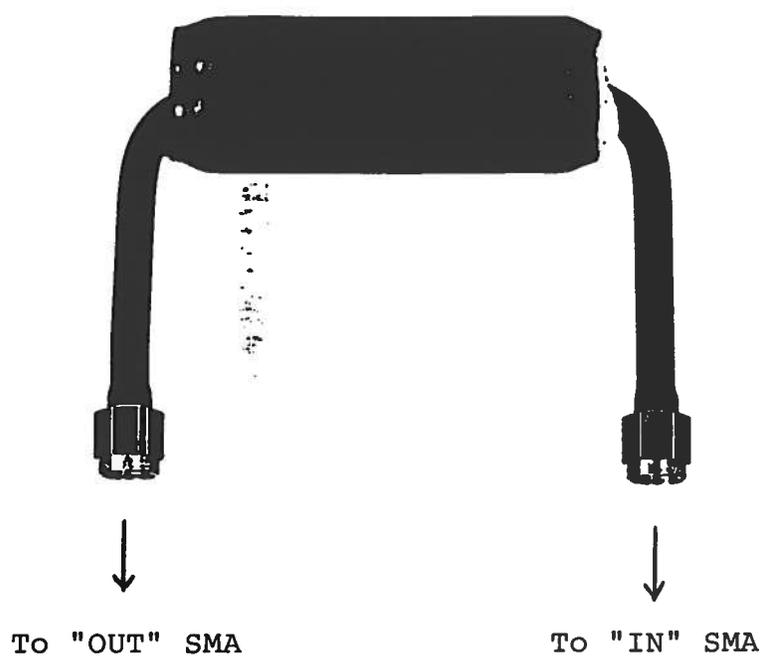


Fig. 2: SHORTING BAR, ADAPTER ARRANGEMENT FOR CURRENT PROBE

JULY 1994 MODIFICATION:

Fig. 3.: ASSEMBLY REPLACED BY ONE PIECE SMA ASSEMBLY SHOWN BELOW:



## GENERAL INSTRUCTIONS

- 1) The TRIG output channel provides TTL level signal. 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.
- 2) To obtain a stable output display the PRF control on the front panel should be set mid range. The front panel TRIG 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.
- 3) The output pulse width is controlled by means of the front panel one turn PW control and by the PW RANGE control. 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 0.25%.

	PW min	PW max
Range 1	0.25 us PRF max 10 kHz	2.5 us PRF max 2.5 kHz
Range 2	2.5 us PRF max 2.5 kHz	25 us PRF max 250 Hz
Range 3	25 us PRF max 250 Hz	250 us PRF max 25 Hz

- 4) 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 between terminal A and ground ( $R_{IN} \geq 10K$ ).

- 5) An external clock may be used to control the output PRF of the AVR unit by setting the front panel TRIG toggle switch in the EXT position and applying a 50 ns (or wider) (approx.) 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 triggered externally, the output pulse width is controlled by the front panel PW controls provided the MODE A-B switch is in the A position. When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width.
- 6) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.
- 7) 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 0.25 us to 250 us. The TRIG output precedes the main output when the ADVANCE-DELAY switch is in the ADVANCE position and lags when the switch is in the DELAY position.

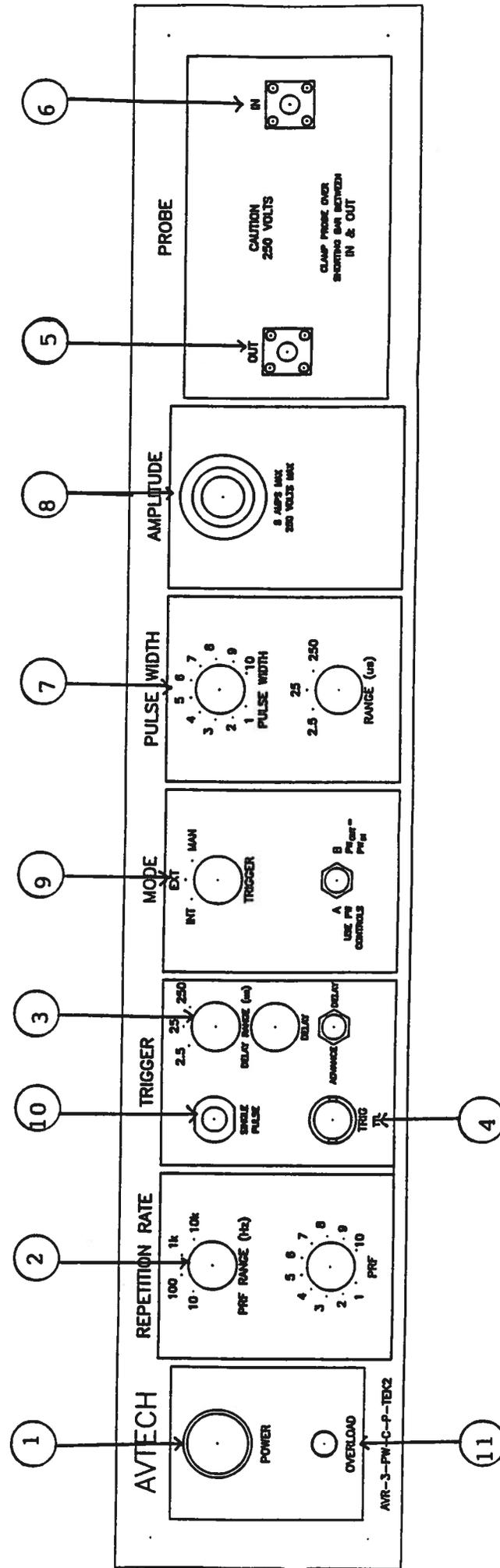
	MIN	MAX
Range 1	0.25 us	2.5 us
Range 2	2.5 us	25 us
Range 3	25 us	250 us

- 8) AVR-3-PW-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 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)

- 9) A shorting bar (typical #18 bus bar wire) is connected between the OUT and IN SMA connectors. The shorting bar connects to the SMA connector via a POMONA 3430 adapter and a POMONA 4290 adapter (or OSM 3282-2241-00) as shown in Fig. 2. The current probe is clamped over the shorting bar. Note that the current flow is from the out terminal to the IN terminal and note that the shorting bar may be at a pulsed potential as high as +250 Volts. The voltage waveform (across the self-contained 40 Ohm termination) may be observed by connecting a voltage probe between ground and the shorting bar.
- 10) Large energy storage capacitors are employed in the output stage to obtain very low droop ( $\leq 2\%$ ) at very wide pulse (250 us). As a result of the large capacitors, the output voltage amplitude will decrease slowly when the amplitude control is rotated counter-clockwise. This effect is particularly pronounced at narrow pulse widths. The delay time constant may be reduced by a factor of ten by placing the HIGH-LOW capacitor switch in the LOW position. The switch may be accessed by removing the top cover (by removing the four Phillips screws on the top cover and sliding the cover back and off).
- 11) 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.
- 12) For additional information:

Tel: (613) 226-5772  
Fax: (613) 226-2802

Fig. 3: 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 10 kHz as follows:

1 Hz to 10 Hz  
 10 Hz to 100 Hz  
 100 Hz to 1 kHz  
 1 kHz to 10 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 0.25 to about 250 us. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.

	MIN	MAX
Range 1	0.25 us	2.5 us
Range 2	2.5 us	25 us
Range 3	25 us	250 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 0.25 us to 250 us. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.
- 5) OUT Connector. SMA connector provides 0 to +200 Volt output to a 40 Ohm load. (5) and (6) are to be connected as shown in Fig. 2.
- 6) IN Connector. SMA connection to internal 40 Ohm load. (5) and (6) are to be connected as shown in Fig. 2.

- 7) PW Control. A one turn control and 3 position range switch which varies the positive output pulse width from 0.25 us to 250 us. 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 0.25%.

	PW min	PW max
Range 1	0.25 us	2.5 us
	PRF max 10 kHz	PRF max 2.5 kHz
Range 2	2.5 us	25 us
	PRF max 2.5 kHz	PRF max 250 Hz
Range 3	25 us	250 us
	PRF max 250 Hz	PRF max 25 Hz

- 8) AMP Control. A ten turn control which varies the output pulse amplitude from 0 to 200 V (to 40 Ohms).
- 9A) INT-EXT-MAN Control and MODE A-B. With this toggle switch in the INT position, the PRF of the AVR unit is controlled via an internal clock which in turn is
- 9B) controlled by the PRF control. With the toggle 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. When triggered externally, the output pulse width is controlled by the front panel PW controls provided the MODE A-B switch is in the A position. When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width.
- 10) 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.

11) OVERLOAD INDICATOR. AVR-3-PW-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 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)



# AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS  
SINCE 1975

P.O. BOX 265  
OGDENSBURG, NY  
U.S.A. 13669-0265  
TEL: (315) 472-5270  
FAX: (613) 226-2802

TEL: 1-800-265-6681  
FAX: 1-800-561-1970

e-mail: [info@avtechpulse.com](mailto:info@avtechpulse.com)  
<http://www.avtechpulse.com>

P.O. BOX 5120 STN. F  
OTTAWA, ONTARIO  
CANADA K2C 3H4  
TEL: (613) 226-5772  
FAX: (613) 226-2802

Quote No:	9996	Sender's Fax:	613-226-2802
File:	R:\QUOTES\q9996.doc	Receiver's Fax:	219-424-1031
To:	Verizon (formerly GTE) Fort Wayne, IN	Receiver's Phone:	219-428-6504
Attn:	Jeff Gust	Date:	July 31, 2000
Subject:	Price and delivery quotation	Number of pages:	5, including cover

Model AVR-3-PW-C-P-TEK2 is a special order item which was custom designed for Tektronix.  
Price and delivery for this unit are as follows:

Quote no:	9996
Model designation:	AVR-3-PW-C-P-TEK2
Output Amplitude:	0 to +250 Volts to $R_L \geq 50$ Ohms (ie 5 amperes peak current). Ten turn locking dial control.
Output pulse width:	250 ns to 250 us. 3 position range switch and ten turn fine control.
Output connectors:	Two SMA connectors. Output Shorting bar connects between two connectors. (see attached drawing). Tektronix probe clips over this shorting bar.
Rise, fall time:	$\leq 10$ ns
Max duty cycle:	0.25 % (eg PRF max 25 Hz for PW=250 us).
Overshoot at max output:	$\leq 5\%$
Droop (at max pulse width)	$\leq 2\%$
Chassis:	3.9" x 17" x 14.8"
Other:	See standard AVR-3-PW-C, pages 40 and 41 Cat. No. 10

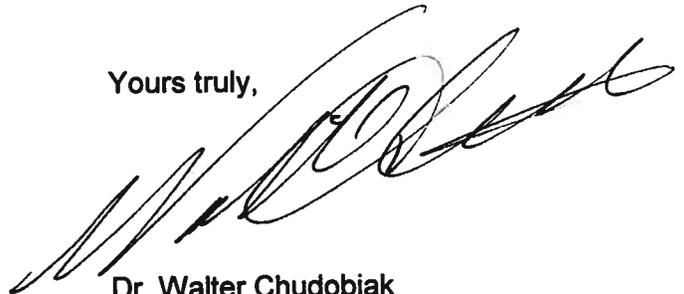
Price: \$3,877.00 US each, FOB destination

Delivery: 60 days, after receipt of order.

A copy of our General Catalog is enclosed. Model AVR-3-PW-C-TEK2 is modelled on our standard product model AVR-3-PW-C (see Cat 10 pages 40 and 41 or <http://www.avtechpulse.com/flight>).

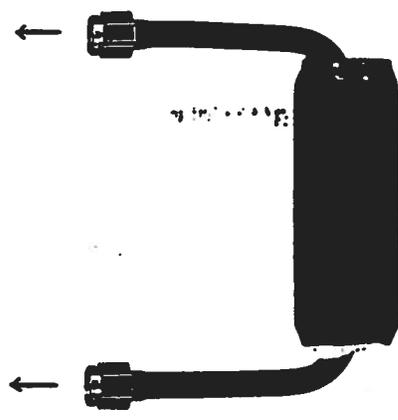
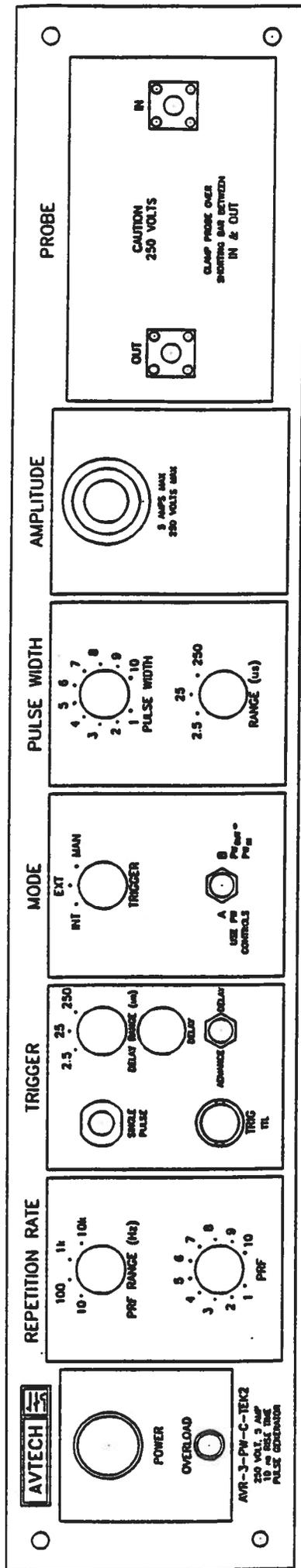
Thank you for your interest in our products. Please contact me again (1-800-265-6681) if you require any additional information.

Yours truly,

A handwritten signature in black ink, appearing to read 'W. Chudobiak', written in a cursive style.

Dr. Walter Chudobiak  
Chief Engineer

WC:mf  
Encl.



OUTPUT SHORTING BAR