



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
U.S.A. & CANADA

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

INSTRUCTIONS

MODEL AVO-6C1-C-US1 PULSE GENERATOR

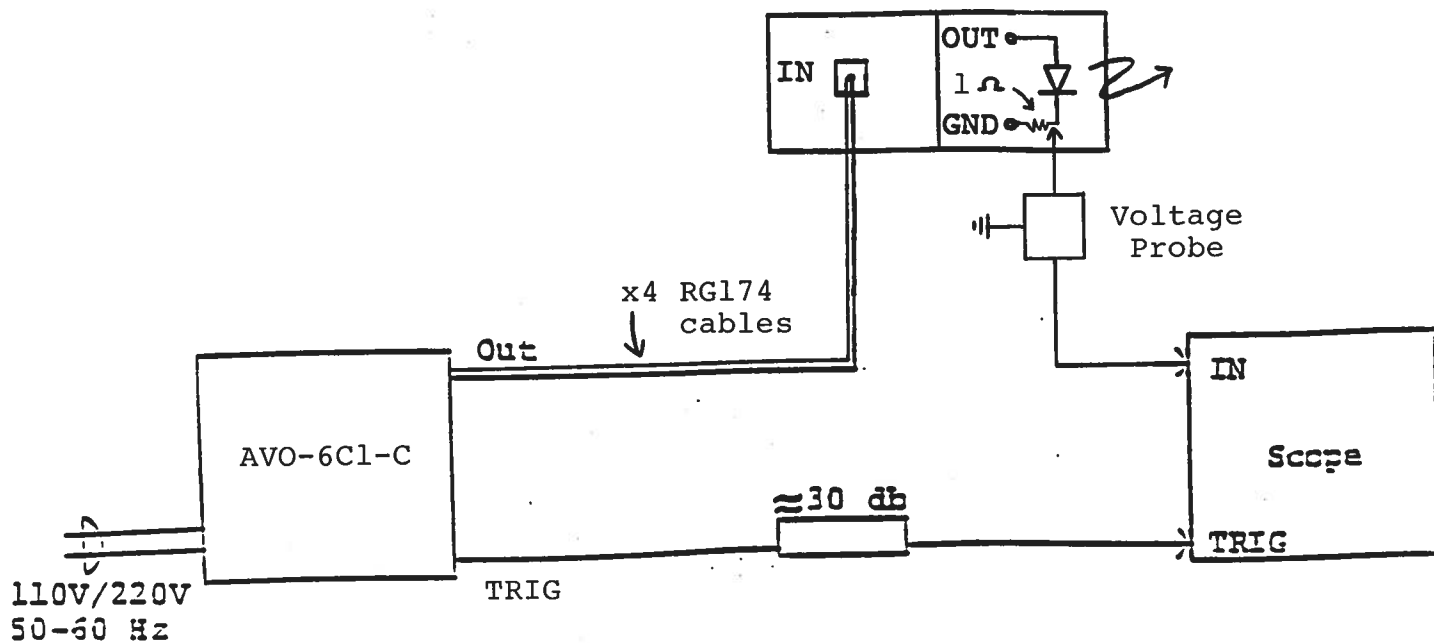
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WARRANTY

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 or liability assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

Fig. 1

PULSE GENERATOR TEST ARRANGEMENT



Notes:

- 1) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 100 MHz.
- 2) A general description of the AVO-6C1-T module is given in Fig. 3.
- 3) The AVO-6C1-T module should be connected to the AVO-6C1 mainframe via the supplied 24" RG174 cables (4).
- 4) The laser diode is solder-connected between the OUT and GND terminals on the side of the AVO-6C1-T module.
- 5) The mainframe provides a voltage pulse of up to 36 Volts to the AVO-6C1-T module (to provide a maximum current of 3 Amperes).
- 6) The diode current may be monitored using either a current transformer or by placing a low-value resistor (eg. 1.0 Ohm) between the laser cathode and ground. The potential across the resistor may then be monitored using a voltage probe.
- 7) The TRIG output channel provides TTL level signals. To avoid overdriving the TRIG input channel of some scopes, a 30 db attenuator should be placed at the input to the scope trigger channel. 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.
- 8) The output pulse width is controlled by means of the front panel one turn PW control (ten turn with -PWT option) 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 the above.

	PW min	PW max
Range 1	50 ns	200 ns
	PRF max 10 kHz	PRF max 10 kHz
Range 2	200 ns	2 us
	PRF max 10 kHz	PRF max 10 kHz
Range 3	2 us	20 us
	PRF max 10 kHz	PRF max 2.5 kHz
Range 4	20 us	200 us
	PRF max 2.5 kHz	PRF max 250 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 between terminal A and ground ($R_{IN} > 10K$). (option).

- 9) 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 and PRF FINE controls.
- 10) The output pulse amplitude is controlled by means of the front panel one turn AMP control (10 turn for -AT option). 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 ($R_{IN} \geq 10K$). (option).
- 11) An external clock may be used to control the output PRF of the AVO unit by setting the front panel TRIG toggle switch in the EXT position and applying a 0.2 usec (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. The MODE A-B switch is accessed by removing the top cover (by removing the four Phillips screws on the back panel and sliding the top cover back and off). When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width. The unit is shipped with the switch in the A position.
- 12) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.
- 13) 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 usec to 100 usec. 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	0.1 us	1.0 us
Range 2	1.0 us	10 us
Range 3	10 us	100 us

14) AVO-6C-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)

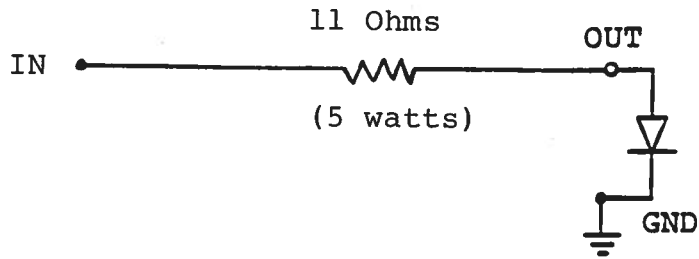
15) The unit can be converted from 110 to 220V 50-60 Hz operation by adjusting the voltage selector card in the rear panel fused voltage selector-cable connector assembly.

16) For additional assistance:

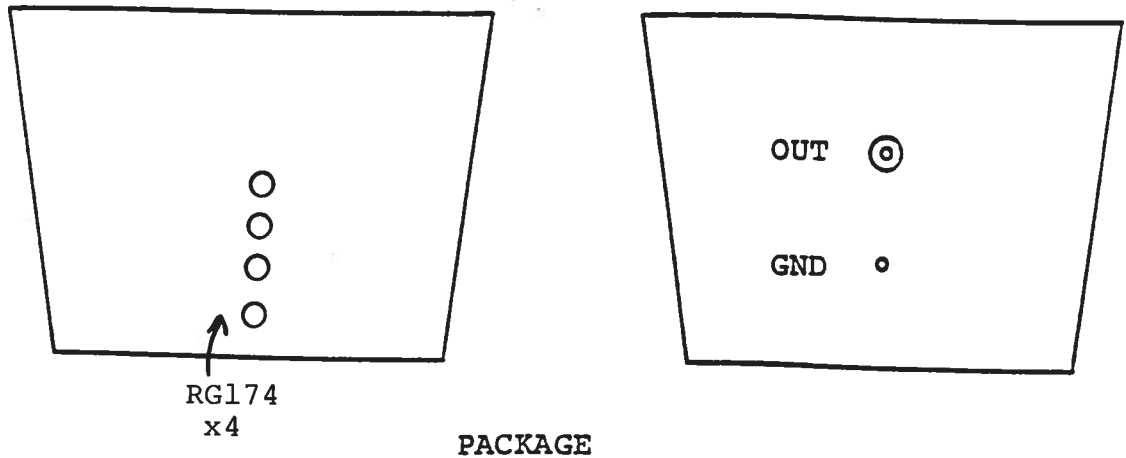
Tel: (613) 226-5772
Fax: (613) 226-2802

Fig. 2

AVO-6C1-US1-T



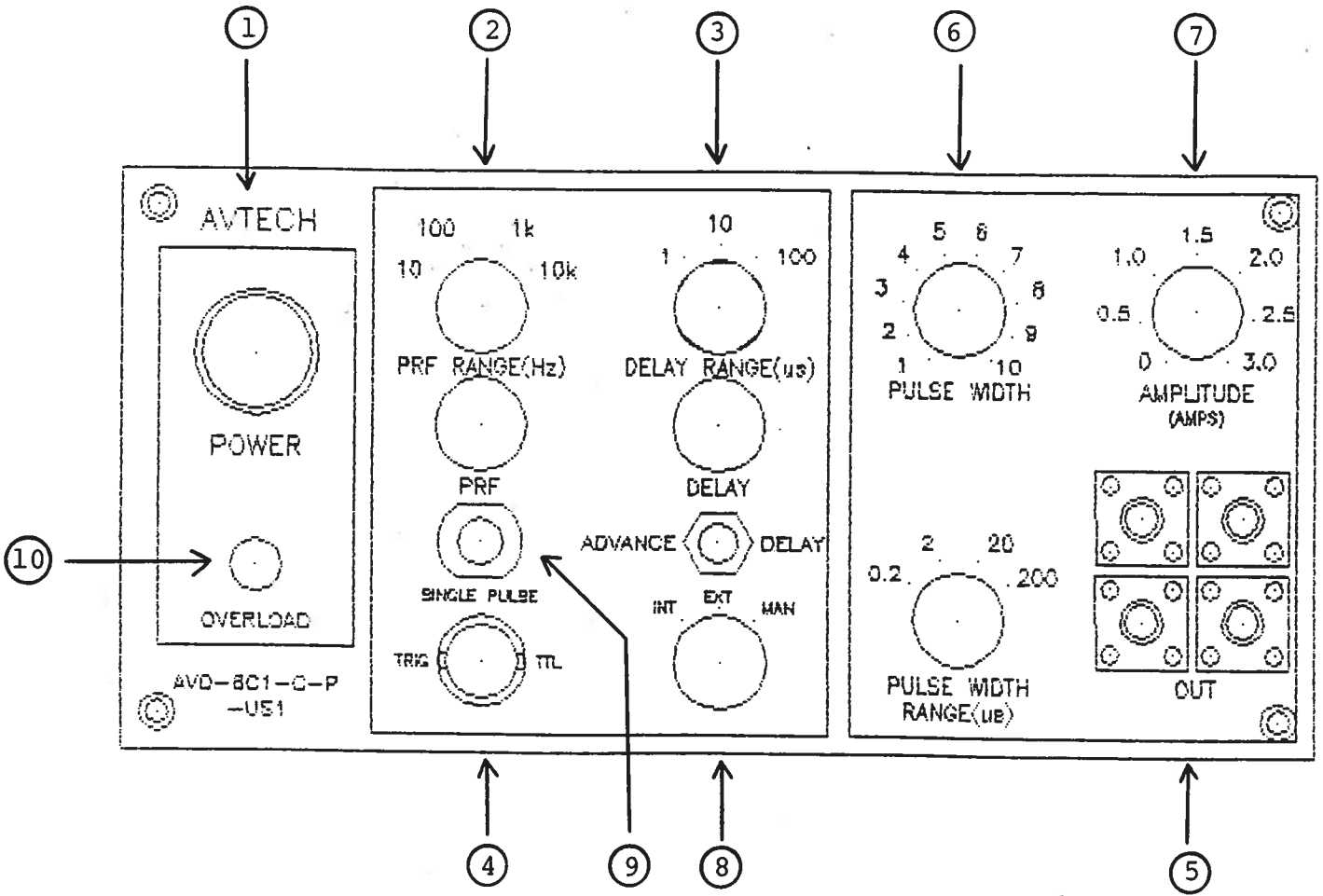
FUNCTIONAL EQUIVALENT CIRCUIT



PACKAGE

Fig. 3

FRONT PANEL CONTROLS



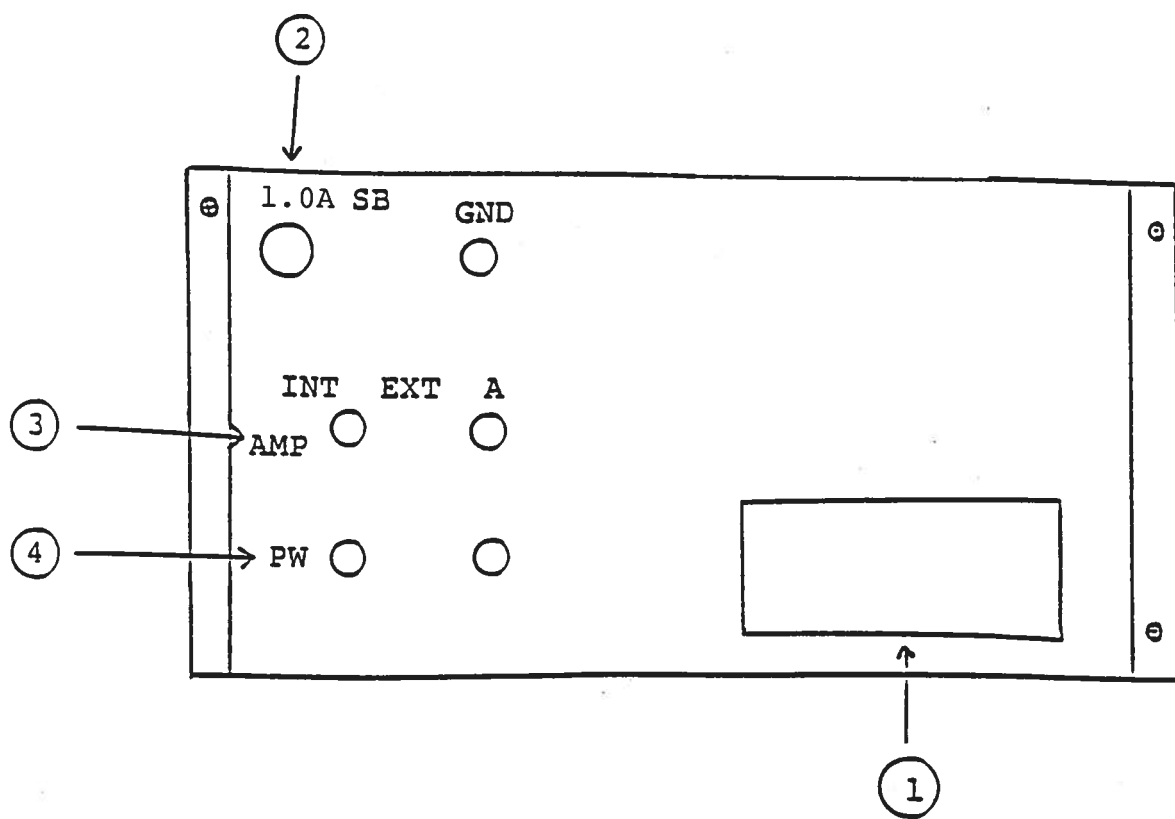
- (1) ON-OFF Switch. Applies basic prime power to all stages.
- (2) PRF Control. Varies PRF from 1 Hz to 10 kHz as follows:
- | | | |
|--------|----|--------|
| 1 Hz | to | 10 Hz |
| 10 Hz | to | 100 Hz |
| 100 Hz | to | 1 kHz |
| 1 kHz | to | 10 kHz |
- (3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) the main output (5). This delay is variable over the range of 0.1 to about 100 usec. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.
- | | MIN | MAX |
|---------|----------|----------|
| Range 1 | 0.1 usec | 1.0 usec |
| Range 2 | 1.0 usec | 10 usec |
| Range 3 | 10 usec | 100 usec |
- (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 usec to 100 usec. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.
- (5) OUT Connector. 4 SMA connectors provide output to the AVO-6C1-US1-T module.
- (6) PW Control. A one turn control (ten turn for -PWT option) and 4 position range switch which varies the positive output pulse width from 50 ns to 200 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 the above.

	PW min	PW max
Range 1	50 ns	200 ns
	PRF max 10 kHz	PRF max 10 kHz
Range 2	200 ns	2 us
	PRF max 10 kHz	PRF max 10 kHz
Range 3	2 us	20 us
	PRF max 10 kHz	PRF max 2.5 kHz
Range 4	20 us	200 us
	PRF max 2.5 kHz	PRF max 250 Hz

- (7) AMP Control. A one turn control (ten turn for -AT option) which varies the output pulse amplitude.
- (8) INT-EXT-MAN Control. With this toggle switch in the INT position, the PRF of the AVO unit is controlled via an internal clock which in turn is controlled by the PRF control. With the toggle switch in the EXT position, the AVO unit requires a 0.2 us 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. The MODE A-B switch is accessed by removing the top cover (by removing the four Phillips screws on the back panel and sliding the top cover back and off). When the MODE A-B switch is in the B position, the output pulse width equals the input trigger pulse width. The unit is shipped with the switch in the A 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. AVO-6C1-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)

Fig. 4

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 (0.25 A SB).
- (2) 1.0A 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 between terminal A and ground ($R_{IN} \geq 10K$). (option).
- (4) EW. To voltage control the output pulse width, set the switch in the EXT position and apply 0 to +10 volts between terminal A and ground ($R_{IN} \geq 10K$). (option).

SYSTEM DESCRIPTION AND REPAIR PROCEDURE

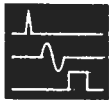
The AVO-6C1-C consists of the following basic modules:

- 1) AVO-6C1-PG pulse generator module
- 2) AVO-CL2 clock module
- 3) +24V power supply board
- 4) AVO-6C1-PS-PW pulse width control-power supply module
- 5) AVO-6C1-T output module

The modules are interconnected as shown in Fig. 5. The clock module controls the output PRF and the relative delay between the main output and the SYNC outputs. The PG pulse generator modules generate the output pulse. In the event of an instrument malfunction, it is most likely that the rear panel 1.0A SB fuse or some of the output switching elements (SL24T) may have failed due to an output short circuit condition or to a high duty cycle condition. The switching elements may be accessed by removing the cover plate on the bottom side of the instrument. NOTE: First turn off the prime power. The elements may be removed from their sockets by means of a needle nosed pliers. The SL24T is a selected VMOS power transistor in a TO 220 packages and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL24T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the black dot on the chassis. If the switching elements are not defective, then the four Phillips screws on the back panel should be removed. The top cover may then be slid off and operation of the clock and power supply modules should be checked. The clock module is functioning properly if:

- a) 0.1 us TTL level outputs are observed at pins 2 and 3.
- b) The PRF of the outputs can be varied over the range of 1 Hz to 10 kHz using the PRF controls.
- c) The relative delay between the pin 2 and 3 outputs can be varied by at least 5 us by the DELAY controls.

The sealed clock module must be returned to Avtech for repair or replacement if the above conditions are not observed. The power supply board generates +24V DC to power the other modules. If the voltage is less than +24V, turn off the prime power and unsolder the lead from the 7824 regulator chip on the power supply board. Solder a 100 ohm 5 watt resistor to the 7824 output to ground and turn on the prime power. A voltage of +24 volts should be read. If the voltage is less then the power supply board is defective and should be repaired or replaced.



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

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

April 27, 1993.

Jacques Beauvais
University of Sherbrooke
Dept. of Electrical Engineering
Sherbrooke, Quebec
J1K 2R1

Fax: 819-821-7937

Dear Jacques:

Following our phone conversation of April 27, I am pleased to provide a price and delivery quotation for a laser diode driver meeting the following specifications:

Model designation: AVO-6C1-C-P-US1

Output amplitude: 0 to +3.0 Amperes

Pulse width: 50 ns to 200 us

Rise, fall time: ≤ 10 ns

PRF: 0 to 10 kHz

Duty cycle max: 5%
(eg. PW=5 us, PRF max=10 kHz
PW=50 us, PRF max=1 kHz
PW=200 us, PRF max=250 Hz)

Output impedance: 12 Ohms

Other: See standard AVO-6C1-C,
pages 62 & 63, Cat. No. 8

Price: \$4,483.00 US each
FOB Destination. Note that
this price includes our
standard 5% academic
discount. GST 7% extra,
PST extra if applicable.

Delivery: 30 days ARO

For the pulse width range of 2 to 50 ns, we would recommend the following standard model (see pages 64, 65, Cat. No. 8):

Model designation: AVO-2A-C-P

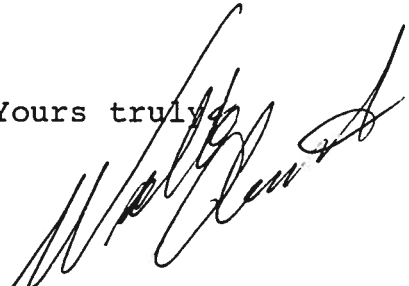
Price: \$2,590.00 US each
FOB Destination. This price includes our standard 5% academic discount. GST 7% extra, PST extra if applicable.

Delivery: 2 weeks ARO

Additional discount: If ordering both the Model AVO-2A-C-P and Model AVO-6C1-C-P-US1, then deduct an additional 5%.

Thank you for your interest in our products. Please call me again if you require any additional information or modifications to the above quotation.

Yours truly,



Dr. Walter Chudobiak
Chief Engineer

WC:pr
Encl. Cat. No. 8
Cat. No. 8S1
Price List

Aug. 6/93

-EW

-EA

-AT