

INSTRUCTIONS

MODEL AV-155C-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

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## CAUTION

To avoid possible damage to the laser diode, the following start up and shut down sequences should be followed:

### START UP SEQUENCE

- 1) POWER switch is OFF (i.e. button out).
- 2) Set amplitude controls fully CCW.
- 3) Set OPERATE-STANDBY switch to STANDBY position.
- 4) Solder connect the laser diode to the output terminals.
- 5) Apply prime power by setting the POWER switch in the ON position (i.e. push button in).
- 6) Set OPERATE-STANDBY switch to OPERATE position.
- 7) Set amplitude to desired level. Do not change the position of the OPERATE-STANDBY switch from OPERATE to STANDBY without first setting the amplitude controls to fully CCW.

### SHUT DOWN SEQUENCE

- 1) Set amplitude controls fully CCW.
- 2) Set OPERATE-STANDBY switch to the STANDBY position.
- 3) Turn off the prime power by pushing the POWER switch button.
- 4) Remove the laser diode from the output terminals.

FIG. 1: MODEL AV-155C-C PULSE GENERATOR TEST ARRANGEMENT  
(RESISTIVE LOAD, NO DIODE)

## GENERAL OPERATING INSTRUCTIONS

- 1) The bandwidth capability of components and instruments used to display the pulse generator output signal (probes, cables, connectors, etc.) should exceed 100 MHz.
- 2) A low-inductance resistor should be used as the load. Note that an inductance of 50 nH will yield an inductance spike of about one Volt. With a low-inductance one Ohm load, the overshoot may be as high as 10%. The overshoot will significantly decrease as the load resistance is increased to 2 or 3 Ohms. The load should be solder connected to the small PCB board at the end of the AV-LZ1 line. If the unit is equipped with the S5 socket option, the resistor may be inserted into the socket pins.
- 3) To control the unit via the internal clock, set the INT-EXTA-EXTB switch in the INT position. Set the PRF range switch in either the 10K or 100K position.
- 4) The output pulse width is controlled by means of the front panel one turn PW control and the X1-X10 range switch. The control should initially be set mid range and the pulse width adjusted using an oscilloscope.
- 5) The output pulse amplitude is controlled by means of the front panel ten turn AMP control and the rear panel 0.2-2.0 Amp range switch. Note that the load voltage range (i.e. compliance voltage) of the unit is 4 Volts so the load resistance must be sufficiently low (ideally one Ohm) so that the load voltage does not exceed 4 Volts.
- 6) The output DC bias is controlled by the front panel DC bias control. The polarity of the bias is always the same as the output pulse polarity.
- 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 0.1 us to 10 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	0.1 us	1.0 us
Range 2	1.0 us	10 us

- 8) The unit may also be triggered externally by setting the INT-EXTA-EXTB switch in either the EXTA or EXTB position and applying a trigger pulse to the TRIG BNC.
- 9) When the switch is in the A position the unit operates as a voltage to current converter as follows:

$$I_{OUT} = 0.5 V_{IN}$$

Note that in this mode, the input amplitude should not exceed +4 Volts and also note that the PRF pulse width, amplitude and DC bias controls on the front panel are inactive.

- 10) When the switch is in the B position, the unit requires a TTL input trigger pulse (PW > 50 ns) and the output pulse width, amplitude and DC bias are controlled by the front panel controls. The input trigger rate should not exceed 1.0 MHz as this may result in damage to the unit.
- 11) The diode load should be solder connected (as shown below) to the end of the AV-LZ1 flexible line which protrudes from the front panel.

For units with the S5 option, the diode plugs directly into the socket provided.

- 10) The diode impedance should equal the characteristic impedance of the output line (1 Ohm). If the diode impedance is higher than one Ohm, the output rise time will be higher than 50 ns. This problem may be solved by replacing the AV-LZ1 line with a higher impedance version. The flexible output transmission line (AVTECH Model AV-LZ1) may be changed by desoldering the line from the 1/16" glass epoxy circuit board which protrudes from the -PG module. The -PG module is accessed by removing the four Phillips screws on the back panel of the instrument. The top cover will then slide back (and off), thereby exposing the -PG module.
- 11) If the diode impedance is less than one Ohm, the output waveform may exhibit severe overshoot. The addition of a small series resistor will serve to reduce the overshoot. Also if the diode has significant inductance ( $>10$  nH) overshoot will be observed and for this reason the diode lead lengths must be extremely short ( $\leq 0.1$  inches).
- 12) The unit can be converted from 100 to 220V 50-60 Hz operation by adjusting the voltage selector card in the rear panel fused voltage selector-cable connector assembly.
- 13) For additional assistance:

Tel: (613) 226-5772  
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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 100 Hz to 1 MHz as follows:

100 Hz to 1 kHz  
1 kHz to 10 kHz  
10 kHz to 100 kHz  
100 kHz to 1 MHz

- (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 100 us. Delay LEADS or LAGS depending on the position of the ADVANCE-DELAY switch.

	MIN	MAX
Range 1	0.1 us	1.0 us
Range 2	1.0 us	10 us

- (4) **TRIG.** When the INT-EXTA-EXTB switch is in the INT position 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 100 us. The external trigger signal is applied at this input when the toggle switch is in the EXTA or EXTB position. When the switch is in the A position the unit operates as a voltage to current converter as follows:

$$I_{OUT} = 0.5 V_{IN}$$

Note that in this mode, the input amplitude should not exceed +4 Volts and also note that the PRF, pulse width, amplitude and DC bias controls on the front panel are inactive.

When the switch is in the B position, the unit requires a TTL input trigger pulse (PW > 50 ns) and the output pulse width, amplitude and DC bias are controlled by the front panel controls. The input trigger rate should not exceed 1.0 MHz as this may result in damage to the unit.

- 5) OUT. 1 meter long AV-LZ1 flexible output line protrudes from the front panel. Diode load and series matching resistor to be solder connected to end of line. For units with -S5 option, diode plugs into the socket provided.
- 6) PULSE WIDTH. Varies output pulse width as follows (INT and EXT B MODE only):
  - 100 ns to 1.0 us
  - 1.0 us to 10 us
- 7) PULSE AMPLITUDE. Ten turn amplitude control varies output pulse amplitude from 0 to 2.0 Amp (INT and EXT B mode only). Note that rear panel amplitude range switch sets maximum output current at 2.0 Amps or 0.2 Amps.
- 8) DC BIAS AMPLITUDE. One turn offset control varies DC offset from 0 to 500 mA (INT and EXT B mode only). (Ten turn control for -OT option units).
- 9) STANDBY-OPERATE. When this switch is in the STANDBY position, a set of relay controls shorts out the laser diode whether the prime power is ON or OFF. When the switch is in the OPERATE position, the relay contacts open, provided the prime power is on. See the START UP and SHUT DOWN SEQUENCE notes preceding Fig. 1 for a full discussion of the operation of this switch.

FIG. 3: BACK PANEL CONTROLS

## BACK PANEL CONTROLS

- 1) Power Entry Module. Detachable line cord connects to this point. Also contains voltage selector card and line fuse (0.50 A SB).
- 2) A SB Fuses. Limits current supplied to the output stages (POS and NEG).
- 3) Monitor Option. BNC connector provides a coincident replica of the output pulse. For  $R_L \geq 1K$ .

$$I_{LOAD} = 2 V_M \text{ (Volts, Amp)}$$

For  $R_L = 50 \text{ Ohm}$

$$I_{LOAD} = 4 V_M \text{ (Volts, Amp)}$$

$V_M$  is the monitor output Volt, amplitude is determined using a scope.

- 4) AMP RANGE. Two position switch set full scale output at either 2.0 Amps or 200 mA.
- 5) Cover Screws. To remove the top cover, remove the 4 Phillips screws and the top cover may then be slid back and off.

FIG. 4: POWER SUPPLY

FIG. 5: AV-155-PS-DUP2 BLOCK DIAGRAM

## SYSTEM DESCRIPTION AND REPAIR

Model AV-155C-C consists of a clock module (-CL2), a pulse generator module (AV-155C-PG) and a power supply which supplies -10V, -5.8V, +12V and +5.8 Volts to the modules. The power supply and block diagram are shown in Figs. 4 and 5.

If the instrument does not provide an output, check the line fuse and the 2.5 A SB fuses. If the fuses are not at fault, remove the top cover and check the -10V, -5.8V, +12V and +5.8 voltage levels. If the voltage levels are correct then the -PG module is defective. The sealed -PG module must then be returned to AVTECH for repair and replacement.



PERFORMANCE CHECK SHEET