INSTRUCTIONS

MODEL AVO-7E-C-PN PULSE GENERATOR

S.N.:

TECHNICAL SUPPORT

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We

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declare that the AVO-7E-C. pulse generator meets the intent of
Directive 89/336/EEC for Electromagnetic Compatibility.
Compliance pertains to the following specifications as listed in the
official Journal of the European Communities:
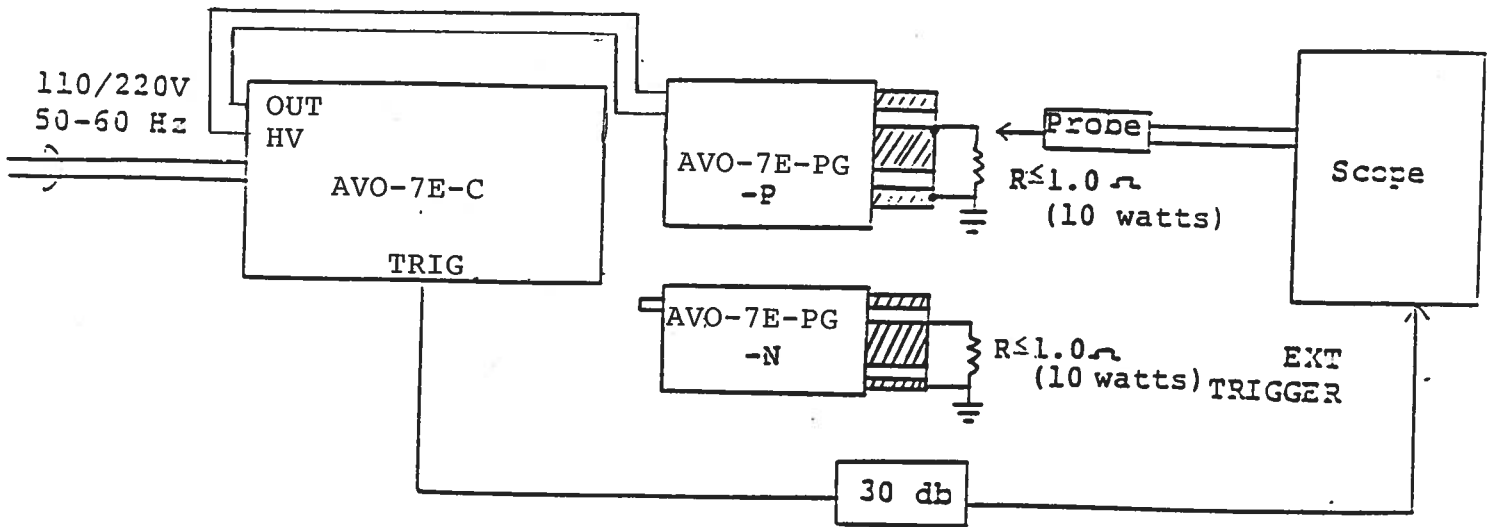
EN 50081-1 Emission

EN 50082-1 Immunity

Fig. 1   PULSE GENERATOR TEST ARRANGEMENT

110/220V
50-60 Hz

OUT
HV

AVO-7E-C

TRIG

AVO-7E-PG
-P

R≤1.0 Ω
(10 watts)

Probe

Scope

AVO-7E-PG
-N

R≤1.0 Ω
(10 watts)

EXT
TRIGGER

30 db

GENERAL OPERATING INSTRUCTIONS

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) The sync 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.

3) The desired output polarity is selected by means of the front panel POLARITY switch and by connecting the desired output module to the mainframe. The tan multi-pin cable must be plugged into the OUT connector on the back panel and the black 50 Ohm RG174 cable connected between the HV SMA connector on the -PG module and the rear panel SMA HV connector on the mainframe.

4) 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.

5) 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 10%.

	PW min	PW max
Range 1	1 us	10 us
	PRF max 1 kHz	PRF max 1 kHz
Range 2	10 us	100 us
	PRF max 1 kHz	PRF max 100 Hz
Range 3	100 us	1 ms
	PRF max 100 Hz	PRF max 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 the "A" BNC connector ($R_{IN} \geq 10$ K). (option).

6) 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 to the "A" BNC connector ($R_{IN} \geq 10$ K). (option).

7) 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 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 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 top 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.

8) For single pulse manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PUSH button.

9) 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 1.0 us to 1 ms. 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	1.0 us	10 us
Range 2	10 us	100 us
Range 3	100 us	1 ms

10) The output terminals of the pulse generator
     module consists of a short length of microstrip
     transmission line protruding from the module
     chassis. The OUT terminal is the center conductor
     which is bounded on both sides by the ground plane
     (see below).
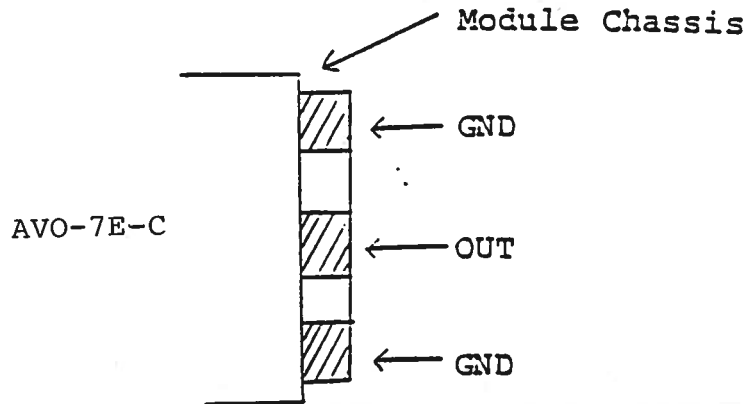
The load should be connected between the OUT and GND
terminals using very short leads (≤ 0.5 cm). The
voltage across the load may be monitored by connecting
a length of 80 mil semi-rigid 50 Ohm cable as shown
below (or by means of a high impedance scope probe):
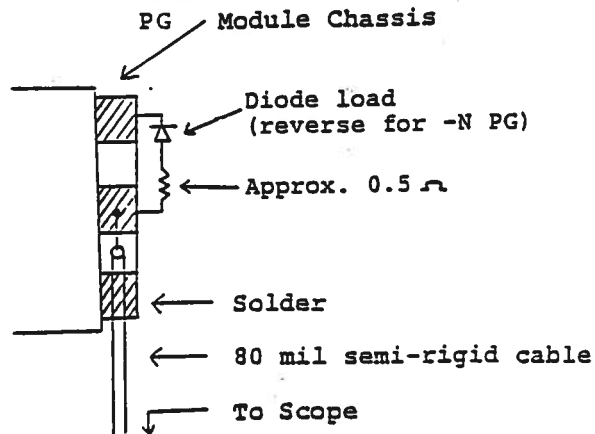
Take care to insure that during soldering the OUT
conductor is not shorted to the chassis. Also, use
minimal heat when soldering.

10A) If the load cannot be placed directly on the output
      terminals of the -PG module, the AV-LZ lines should be
      used between the -PG module and the load (see AV-LZ
      data sheet).

11)   The AVO-7E is designed to supply up to 15 amperes to a
      maximum load voltage of 20 volts. Factory tests are
      conducted with a 1.0 ohm load capable of dissipating at
      least 20 watts. Higher load resistance values may be
      used but the output voltage must be limited to 20 volts
      or less.

12) <u>CAUTION</u>: 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 duty cycle rating is exceeded. 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, ie. operate in the LOW PRF range when possible rather than in the HIGH range.
   b) Keep the output PW to a minimum.
   c) Keep the load resistance as high as possible.

13) AVO-7E 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)

14) <u>MONITOR Option</u>. The M output connector on the mainframe rear panel provides a voltage pulse (to 50 ohm or higher) where amplitude is proportional to the output peak load current. An output current of 15 amperes provides a monitor voltage of 8.0 volts to $R_L >$ 1 K and 40 Volts to 50 Ohms.

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

AVTECH

POWER

OVERLOAD

AVO-7E-C-PN
15 AMP, 1 TO 1000 us
LASER DIODE DRIVER

PRF RANGE(Hz)
10 . 100 . 1k
PRF

DELAY RANGE(us)
10 . 100 . 1000
DELAY

ADVANCE

SINGLE PULSE

DELAY
INT . EXT . MAN

TRIG
TTL

PULSE WIDTH

PULSE WIDTH
RANGE(us)
10 . 100 . 1000

AMPLITUDE
(15 AMPS MAX)

POS . NEG
POLARITY
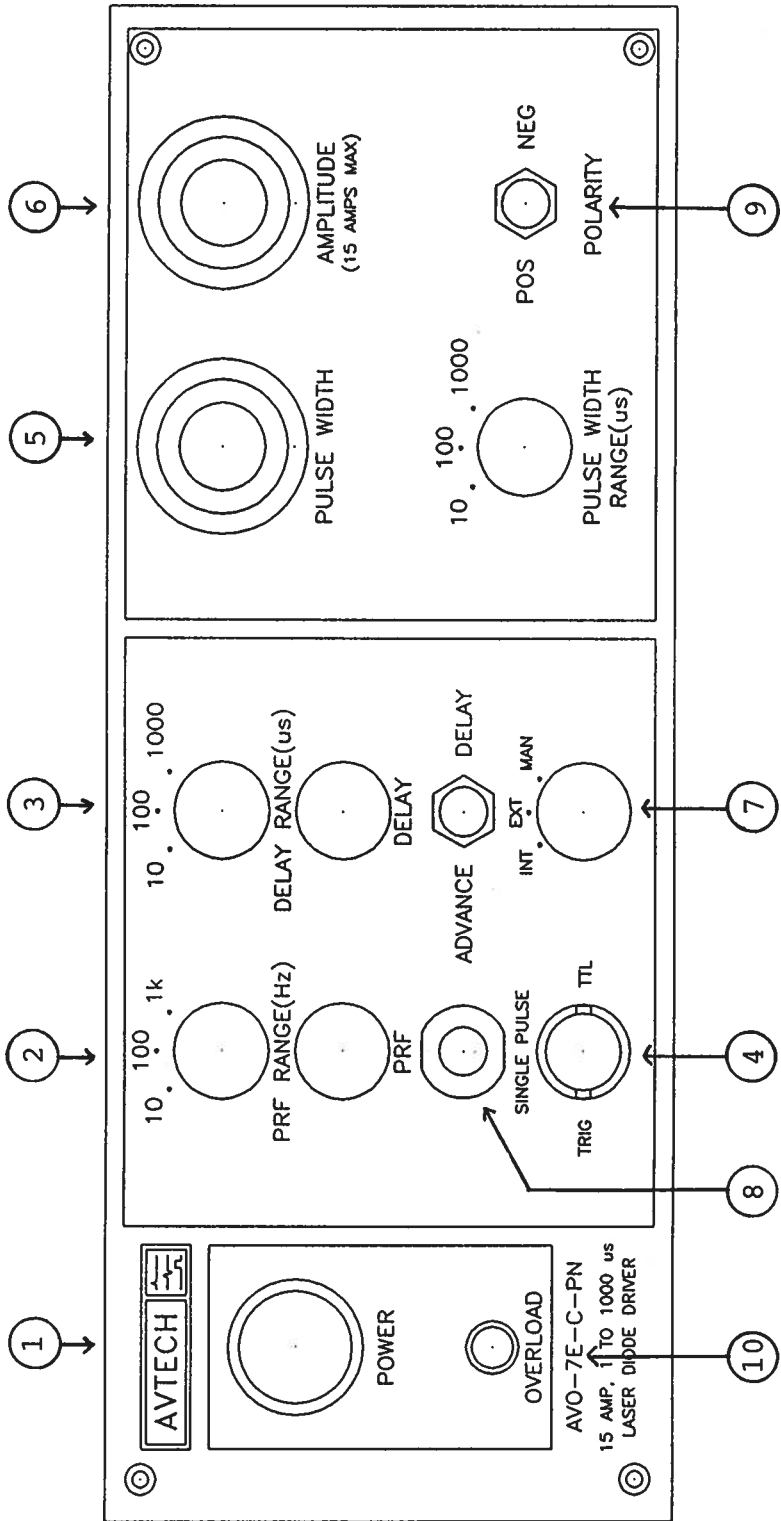
FIG 2: FRONT PANEL CONTROLS

(1)   ON-OFF Switch. Applies basic prime power to all
       stages.

(2)   PRF Control. Varies PRF from 1 Hz to 1.0 kHz as
       follows:

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

	MIN	MAX
Range 1	1.0 us	10 us
Range 2	10 us	100 us
Range 3	100 us	1 ms

(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 external trigger
       signal is applied at this input when the EXT-INT toggle
   switch is in the EXT position.

(5)   PW Control. A one turn control (ten turn for -PWT
       option) and 3-position range switch which varies the
       output positive output pulse width from 1.0 us to 1 ms.
       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	1.0 us	10 us
	PRF max 1 kHz	PRF max 1.0 kHz
Range 2	10 us	100 us
	PRF max 1.0 kHz	PRF max 100 Hz
Range 3	100 us	1 ms
	PRF max 100 Hz	PRF max 10 Hz

(6) <u>AMP Control</u>. A one turn control (ten turn for -AT option) which varies the output pulse amplitude from 0 to 15 Amps (to $R_L \leq 1$ Ohm).

(7) <u>INT-EXT-INT Control</u>.   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 controls. With the toggle switch in the EXT position, the AVO 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. The MODE A-B switch is accessed by removing the top cover (by removing the four Phillips screws on the top 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.

(8) <u>SINGLE PULSE</u>. For single pule manual operation, set the front panel INT-EXT-MAN switch in the MAN position and push the SINGLE PULSE button.

(9) <u>POLARITY</u>. The desired output polarity is selected by means of the front panel POLARITY switch and by connecting the required output module to the rear panel OUT connector.

(10) <u>OVERLOAD INDICATOR</u>. AVO-7E-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)
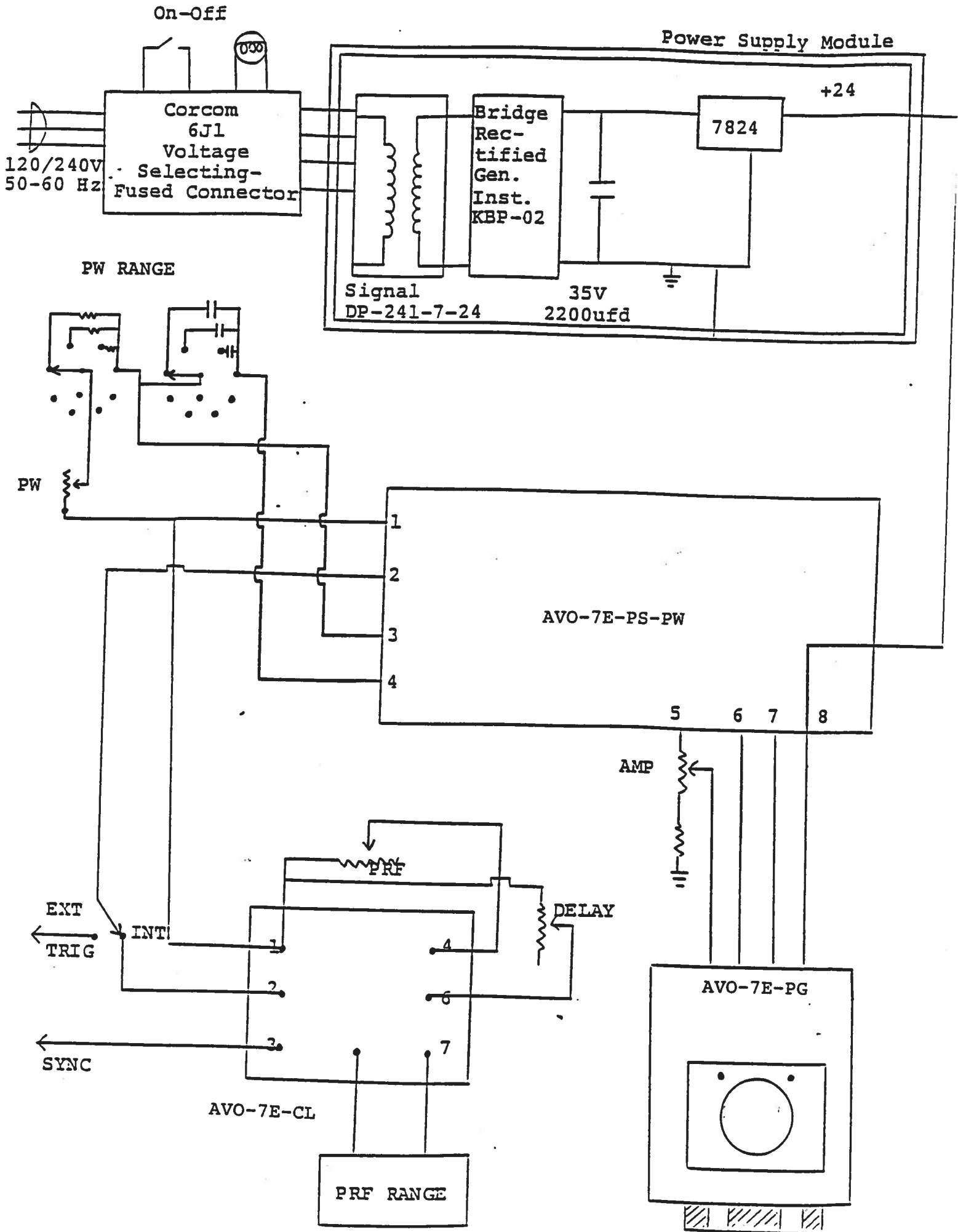3) Removing output load short circuit (if any)

Fig. 3 <u>**BACK PANEL CONTROLS**</u>
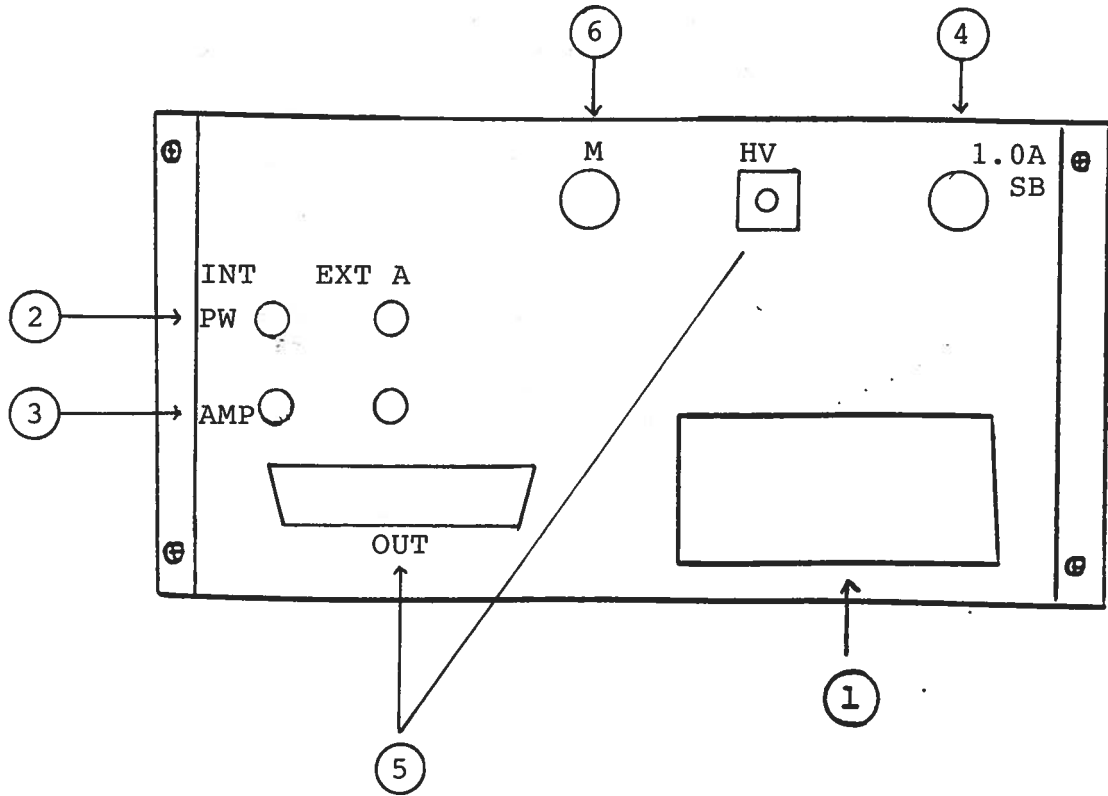
(1)   <u>FUSED CONNECTOR, VOLTAGE SELECTOR</u>. The detachable power cord is connected at this point. In addition, the removable cord is adjusted to select the desired input operating voltage. The unit also contains the main power fuse (0.25A SB).

(2)   <u>EW</u>. To voltage control the output pulse width, set the switch in the EXT position and apply 0 to +10 volts (R_{IN} > 10 K). (option). To the "A" BNC connector.

(3)   <u>EA</u>. To voltage control the output amplitude set the switch in the EXT position and apply 0 to +10 Volts (R_{IN} > 10 K). (option). To the "A" BNC connector.

(4)   <u>1.0 A SB</u>. Fuse which protects the output stage if the output duty cycle raging is exceeded.

(5)   The desired output polarity is selected by means of the front panel POLARITY switch and by connecting the desired output module to the mainframe. The tan multi-pin cable must be plugged into the OUT connector and the black 50 Ohms RG174 cable connected between the HV SMA connector on the -PG module and the SMA HV connector on the mainframe.

(6)   <u>MONITOR Option</u>. The M BNC output connector provides a voltage pulse (to 50 ohm or higher) where amplitude is proportional to the output peak load current. An output current of 15 amperes provides a monitor voltage of 8.0 volts to R_L > 1 K and 40 Volts to 50 Ohms.

On-Off

Power Supply Module

Corcom
6J1
Voltage
Selecting-
Fused Connector

120/240V
50-60 Hz

Bridge
Rec-
tified
Gen.
Inst.
KBP-02

+24

7824

Signal
DP-241-7-24

35V
2200ufd

PW RANGE

PW

AVO-7E-PS-PW

1

2

3

4

5   6 7   8

AMP

EXT

TRIG

INT

SYNC

PRF

DELAY

1

2

3

4

6

7

AVO-7E-CL

PRF RANGE

AVO-7E-PG

SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVO-7E-C unit consists of the following basic modules:

1) AVO-7E-PG pulse generator module
2) AVO-7E-CL clock module
3) AVO-7E-EW pulse width control module
4) +24V power supply board and +50 volt power supply board
5) -15 volt power supply module

The modules are interconnected as shown in Fig. 4.

In the event of an instrument malfunction, it is most
likely that the 2.0A slow blow fuse or the main line fuse
(1.0 Amp) on the rear panel has blown. Replace if
necessary. If the unit still does not function, it is most
likely that some of the output switching elements may
have failed and the unit should be returned to the factory
for repair.

February 23/98

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