AVTECH ELECTROSYSTEMS LTD.
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# INSTRUCTIONS

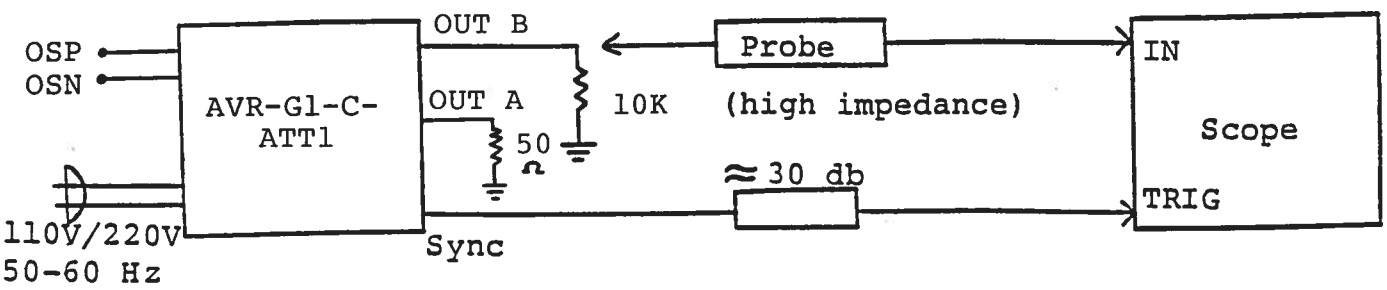
## MODEL AVR-G1-C-P-ATT1 PULSE GENERATOR

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 dissembled, 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 5 GHz for OUT A and 100 MHz for OUT B.

2) RANGE B was specifically designed to drive high impedance loads ($R_L \geqslant 10K$). The unit may fail if operated into low impedance loads (eg. 50 ohm) at very wide pulse width (eg. $\geqslant$ 100 us). RANGE A must see a load impedance of 50 Ohms to function properly.

3) 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 LEAD-LAG switch is in the LEAD position. The TRIG output lags the main output when the switch is in the LAG position.

4) When the RANGE A-B switch is in the A position, the pulse width for OUT A is controlled by the one turn PW A control.

5) When the RANGE A-B switch is in the B position, the pulse width for OUT B is determined by the 3-position range switch and the one turn PW control. CAUTION: The output duty cycle must not exceed 50%.

6) The output pulse amplitudes for the A and B outputs are controlled by means of the front panel AMP A and AMP B controls.

7) To obtain a stable output display the PRF control on the front panel should be set mid range. The front panel TRIG toggle 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.

8) CAUTION: The PRF for RANGE A must not exceed 20 kHz and the duty cycle for RANGE B must not exceed 50%.

9) 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 0.2 us (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 SYNC output.

10) 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 100 ns to 5 ms. The TRIG output precedes the main output when the LEAD-LAG switch is in the LEAD position and lags when the switch is in the LAG position.

11) AVR 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:

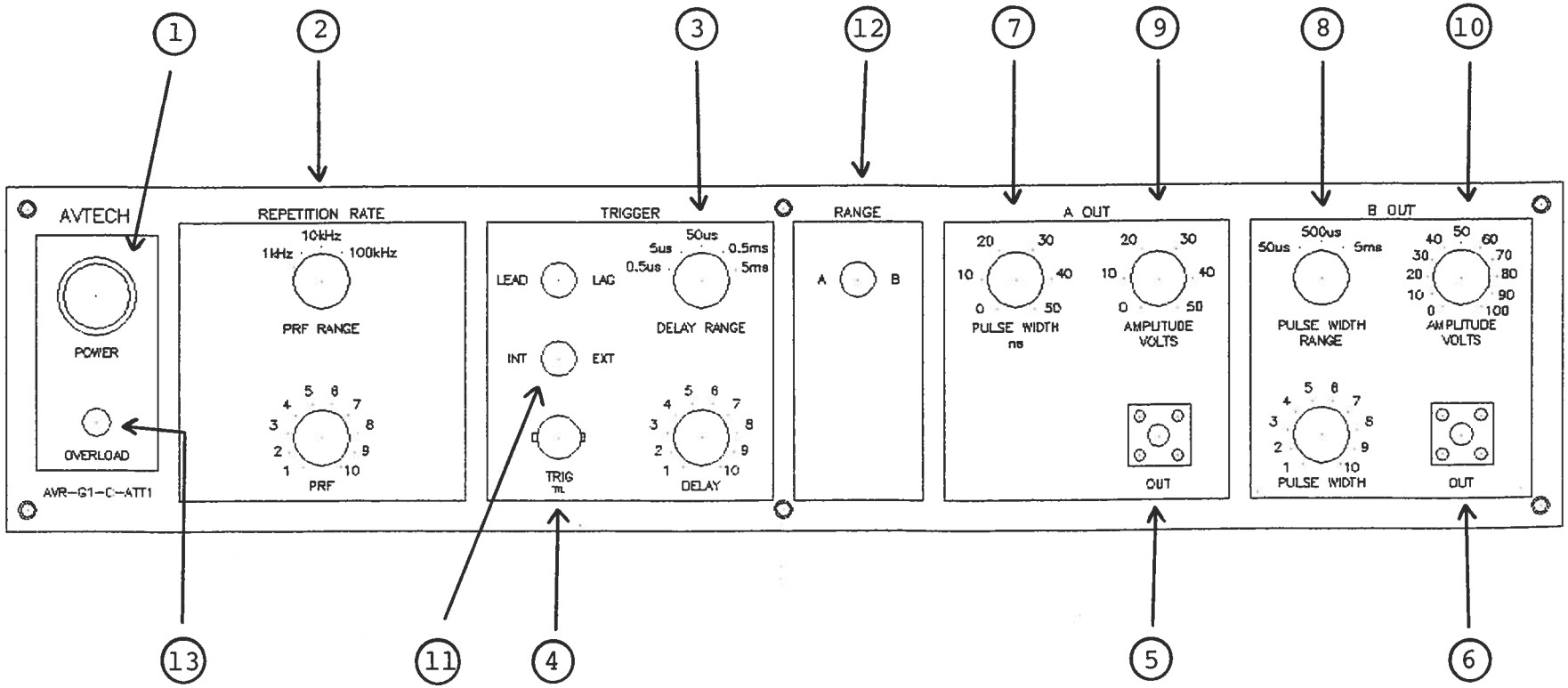
    1) Reducing PRF (i.e. switch to a lower range)
    2) Reducing pulse width (i.e. switch to a lower range)
    3) Removing output load short circuit (if any)

12) 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.

13) For additional assistance:

    Tel: 1-800-265-6681
    Fax: 613-226-2802

Fig. 2 AVR-G1-C-P-ATT1



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

(2) PRF Control. Varies PRF from 100 Hz to 100 kHz as follows:

| | | | |
|---|---|---|---|
| Range 1 | 100 Hz | to | 1 kHz |
| Range 2 | 1 kHz | to | 10 kHz |
| Range 3 | 10 kHz | to | 100 kHz |

CAUTION: PRF from A OUT must not exceed 20 kHz and the duty cycle for B OUT must not exceed 50%.

(3) DELAY Control. Controls the relative delay between the reference output pulse provided at the TRIG output (4) the main output (5) and (6). This delay is variable over the range of 100 ns to about 5.0 ms. Delay LEADS or LAGS depending on the position of the LEAD-LAG switch.

(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) or (6) if the two position LEAD-LAG switch is in the LEAD position. This output follows the output at (5) or (6) if the switch is in the LAG position. The delay range is variable from 100 ns to 5.0 ms. The external trigger signal is applied at this input when the EXT-INT toggle switch is in the EXT position.

(5) OUT A Connector. SMA connector provides output to 50 Ohms.

(6) OUT B Connector. SMA connector provides output to a high impedance load ($\geq$ 10K).

(7) PW A Control. A one turn control varies the A OUT PW from 0 to 50 ns.

(8) PW B Control. A one turn control and 3-position range switch which varies the output pulse width from 5 us to 5.0 ms. CAUTION: The duty cycle must not exceed 50%.

(9) AMP A Control. One turn control which varies the A output pulse amplitude from 0 to +50 V to 50 Ohms.

(10) B AMP Control. One turn control which varies the B output pulse amplitudes from 0 to +100V to a high impedance load ($R_L$ > 10K).

(11) EXT-INT Control. With this toggle switch in the INT position, the PRF of the AVR 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 AVR 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.

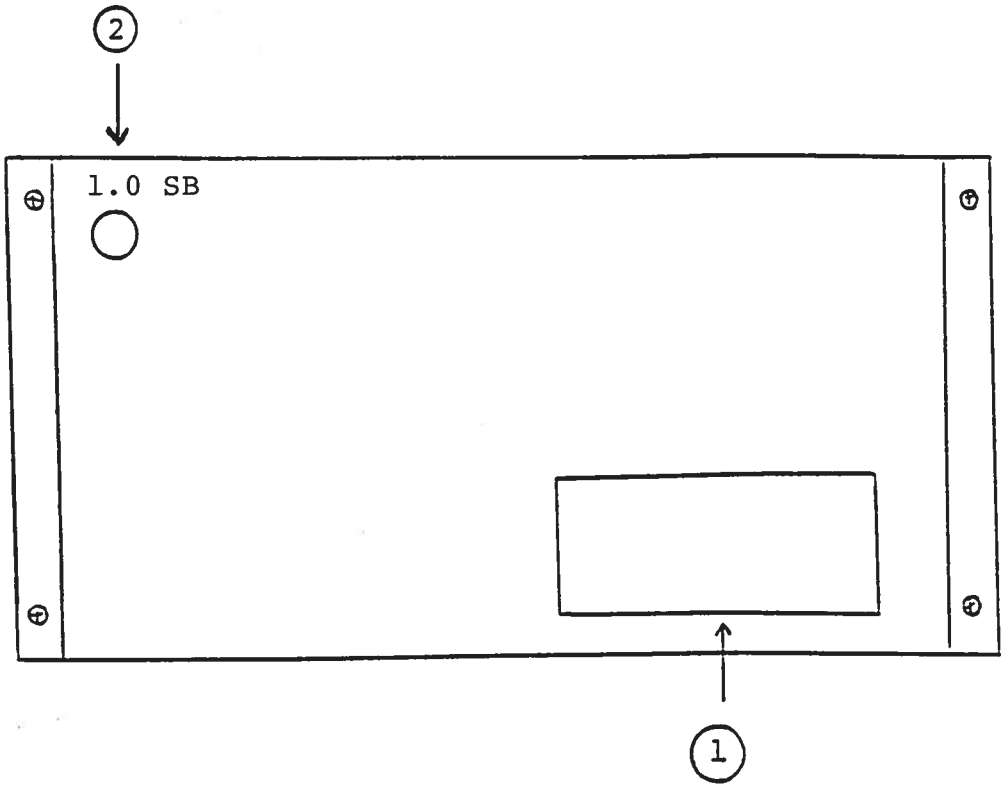
(12) RANGE A-B. The A OUT port is active when the switch is in the A position and the B OUT port is active when the switch is in the B position.

(13) AVR 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



(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 Amp SB).

(2) 1.0 SB. Fuse which protects the output stage if the output duty cycle rating is exceeded.

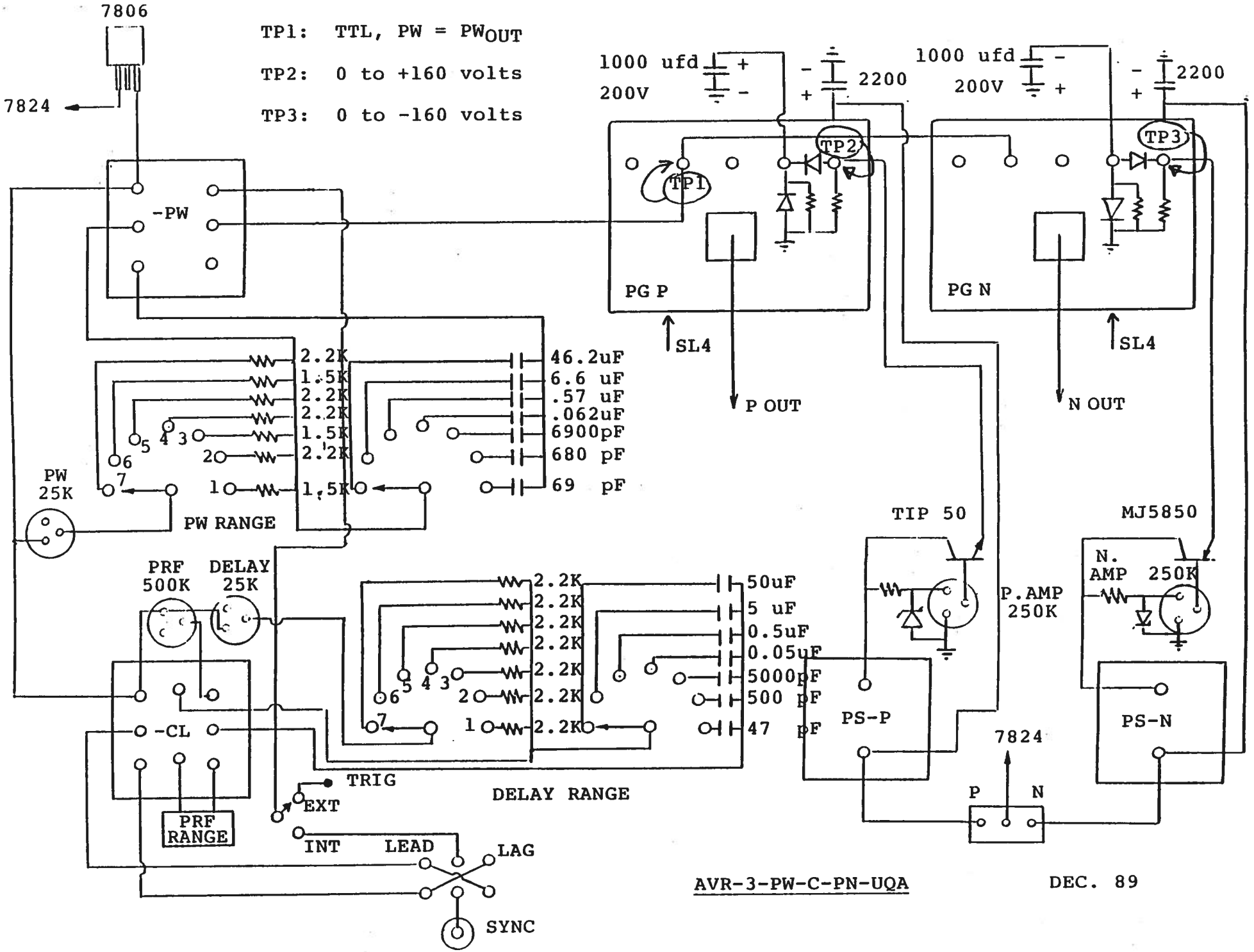

7806
7824
TP1: TTL, PW = PWOUT
TP2: 0 to +160 volts
TP3: 0 to -160 volts
1000 ufd 200V
2200
1000 ufd 200V
2200
TP1
TP2
TP3
PG P
PG N
SL4
SL4
P OUT
N OUT
-PW
2.2K
1.5K
2.2K
2.2K
1.5K
2.2K
1.5K
46.2uF
6.6 uF
.57 uF
.062uF
6900pF
680 pF
69 pF
PW 25K
PW RANGE
TIP 50
MJ5850
N. AMP 250K
P.AMP 250K
PRF 500K
DELAY 25K
2.2K
2.2K
2.2K
2.2K
2.2K
2.2K
2.2K
50uF
5 uF
0.5uF
0.05uF
5000pF
500 pF
47 pF
-CL
TRIG
EXT
PRF RANGE
DELAY RANGE
PS-P
PS-N
7824
P
N
INT
LEAD
LAG
SYNC
AVR-3-PW-C-PN-UQA
DEC. 89

Fig. 4a

POWER SUPPLY

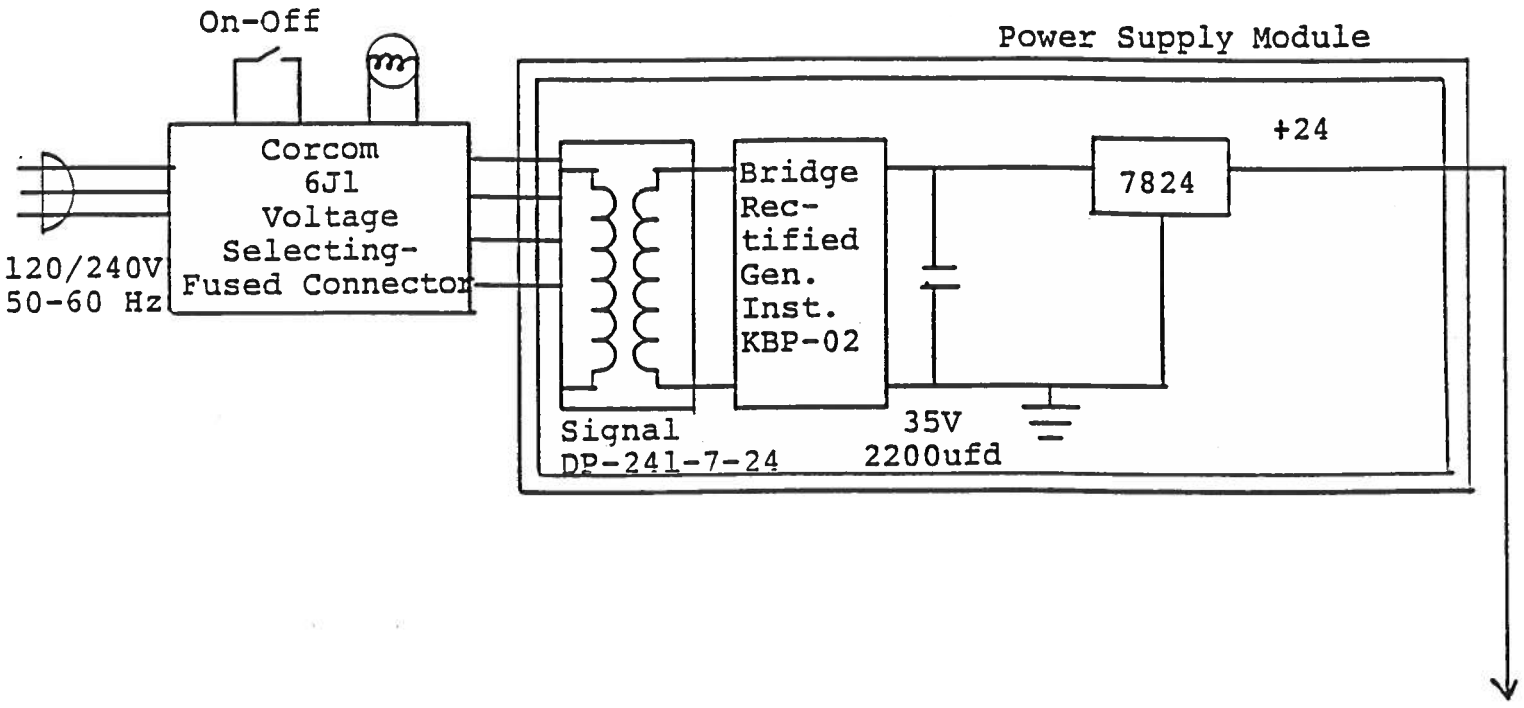



Fig. 4b

# SYSTEM DESCRIPTION AND REPAIR PROCEDURE

The AVR-G1-C consists of the following basic modules:

1) AVR-G1-PG pulse generator module (A and B)
2) AVR-G1-CL2 clock module
3) +24V power supply board
4) AVR-G1-PSB power supply module
5) AVR-G1-PW2 pulse width module
6) AVR-OL overload module

The modules are interconnected as shown in Fig. 4. 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. The PW module controls the output pulse width for B OUT. 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 (SL5T) may have failed due to an output short circuit condition or to a high duty cycle condition (B OUT). 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. CAUTION: Briefly ground the SL5T tabs to discharge the 100 volts power supply potential. The elements may be removed from their sockets by means of a needle nosed pliers. The SL5T is a selected VMOS power transistor in a TO 220 package and may be checked on a curve tracer. If defective, replacement units should be ordered directly from Avtech. When replacing the SL5T switching elements, take care to insure that the short lead (of the three leads) is adjacent to the back of 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 the operation of the clock and power supply modules 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 100 Hz to 100 kHz using the PRF controls.
c) The relative delay between the pin 2 and 3 outputs can be varied by at least 1 us by the DELAY control.

The sealed clock module must be returned to Avtech for repair or replacement if the above conditions are not observed.

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January 27, 1993.

Mr. Dodabalapur
Room 1B411
AT&T Bell Laboratories
600 Mountain Avenue
Murray Hill, NJ 07974

Dear Mr. Dodabalapur:

Following my quote of January 26 and our subsequent telephone conversation, I am pleased to provide a revised price and delivery quotation for a special purpose pulse generator meeting the following specifications:

Model designation: AVR-G1-P-C-ATT1.

| | RANGE A | RANGE B |
|---|---|---|
| Output amplitude: | 0 to +50 Volts (to 50 Ohms, one turn control). | 0 to +100 Volts (to $R_L \geq$ 10K, one turn control). |
| Pulse width: | 1 to 50 ns (one turn control). | 5 us to 5 ms. Controlled by a 3-position range switch and one turn control. Maximum duty cycle is 50%. |
| Rise time: | $\leq$ 350 ps. | $<$ 10 ns. |
| Fall time: | $\leq$ 1 ns. | $<$ 10 ns. |

.../2

| | | |
|---|---|---|
| PRF: | 100 Hz to 20 kHz. | 100 Hz to 100 kHz. Controlled by 3-position range switch and one turn control. Maximum duty cycle is 50%. |
| Delay: (SYNC to OUT) | 0 to ±5 ms. | 0 to ±5 ms. |
| Other: | See AVR-G1-C, pages 54 and 55, Cat. No. 8. | |
| Price: | $3,498.00 US each, FOB destination. | |
| Delivery: | 3 weeks ARO. | |

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

Yours truly,

Dr. Walter Chudobiak
Chief Engineer

WC:pr

03.11.93