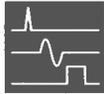


AVTECH



AVTECH ELECTROSYSTEMS LTD.
NANOSECOND WAVEFORM ELECTRONICS

□ 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

INSTRUCTIONS

MODEL AVR-4B-PW-C-AF2 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 or liability assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

A) SPECIFICATIONS



AVTECH ELECTROSYSTEMS LTD.
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May 15, 1992

Randy Schrader
SM-ALC/LHHCBZ
McClellan AFB
Sacramento, CA 95652

Tel: (916) 643-2936
Fax: (916) 643-2140

Dear Randy:

With reference to our recent telephone conversations, I am pleased to offer a price and delivery quotation for a special purpose pulse generator meeting the following specifications:

Model designation:	AVR-4B-PW-C-P-AF2
Train repetition rate:	0.5 to 150 Hz. 3 position range switch and ten turn control.
Train length:	15 usec to 8.0 msec 3 position range switch and ten turn control.
Pulse repetition rate:	20 Hz to 20 kHz. 3 position range switch and ten turn control.
Pulse length:	15 usec to 6.0 msec. 3 position range switch and ten turn control.
Pulse rise time:	≤50 ns
Pulse fall time:	≤50 ns
Amplitude:	0 to +250 volts to 600 ohms. Controlled by one turn control.
Maximum output power:	10 watts
Duty cycle (max):	10%

Monitor output: Provides coincident TTL level replica of main output.

External trigger: a) TTL input determines train repetition rate and train length.
b) TTL input determines pulse repetition rate and pulse length.

Train ON-OFF: ON position enables the train function, OFF position inhibits the train function and allows the pulse rate oscillator to free run.

Operating temperature: +60 to 100⁰F

Connectors: BNC

Chassis size: 4" x 16" x 12" with 19" rack mount kit.

Weight: 10 lbs

Prime power: 120-240V, 50-60 Hz

Fuses: a) 0.5 Amp line fuse

Other: See Model AVR-4B-PW-C-P, Cat. No. 8

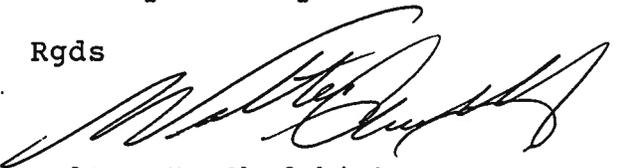
Price: \$5,990.00 US each, FOB destination

Delivery: 30-45 days ARO

Please give me a call if you require any additional information or modifications to the above quotation.

Thank you for your interest in our products.

Rgds

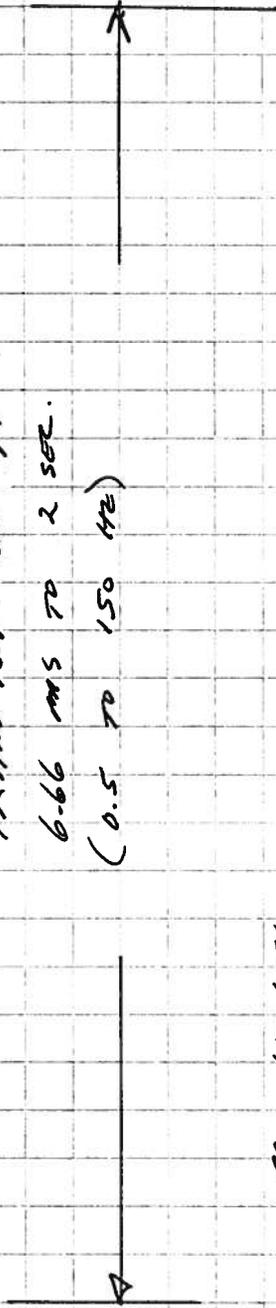


Walter J. Chudobiak
Chief Engineer

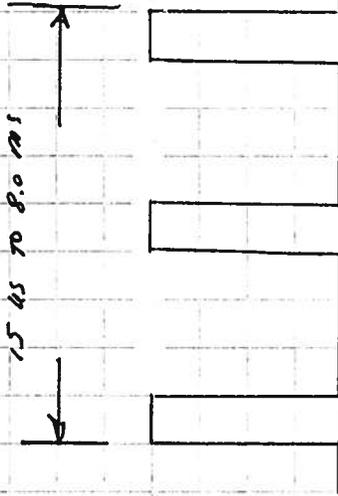
WJC:cm

Encl: Waveform Sketch
Cat No. 8
Cat No. 8S1
Price List

TRAIN REPETITION RATE
6.66 MS TO 2 SEC.
(0.5 TO 150 KHZ)



TRAIN LENGTH
15 US TO 8.0 MS



0 TO +250VOLTS

PULSE LENGTH
15 US
TO 6.0MS

PULSE REPETITION RATE
50 US TO 5 MS
(20 KHZ TO 20 KHZ)



MODEL PW-4B-1W-C-P-AF2 OUT PUT WAVEFORM

MAY 15-11

B) INSTALLATION

VISUAL CHECK

After unpacking the instrument, examine to ensure that it has not been damaged in shipment. Visually inspect all connectors, knobs and the handles. Confirm that a power cord and instruction manual are with the instrument. (If the instrument has been damaged in shipment, file a claim immediately with the company that transported the instrument).

PLUGGING IN THE INSTRUMENT

Examine the rear of the instrument. There will be a male power receptacle, a fuse holder and the edge of the power selector card will be visible. Confirm that the power selector is in the correct orientation - it should be marked either 120 or 240, indicating whether it expects 120V AC or 240V AC. If it is not set for the proper voltage, remove the fuse then grasp the card with a pair of pliers and remove it. Rotate horizontally through 180 degrees. Reinstall the card and the correct fuse. In the 120V setting, a 1/2A slow blow fuse is required. In the 240V setting, a 1/4A slow blow fuse is required.

OPERATIONAL CHECK

This check is to confirm that the instrument is fully functional. Set the controls to the following values:

FRONT PANEL

TRAIN INT/EXT Switch: INT position

PULSE INT/EXT Switch: INT position

TRAIN ON/OFF Switch: OFF

TRAIN RATE RANGE Switch: 150 Hz

TRAIN RATE FINE: MAX CW

TRAIN LENGTH RANGE Switch: 800 us

TRAIN LENGTH FINE: MID range

PULSE RATE RANGE Switch: 20 kHz

PULSE RATE FINE: MAX CW

PULSE LENGTH RANGE Switch: 60 us

PULSE LENGTH FINE: MAX CCW

AMPLITUDE Control: Set at 2.0

Connect a cable from the MONITOR OUT connector to the TRIG input of an oscilloscope. Connect a 10W (or higher) 600 Ohm load to the OUT connector and place the scope probe across this load.

Set the oscilloscope to trigger externally (on the rising edge of a TTL pulse) with the vertical setting at 20 Volts/div and the horizontal setting at 20 us/div. Then follow the instructions below and compare what is seen on the oscilloscope to what is described. Only approximate values are needed to confirm operation.

<u>STEP</u>	<u>CONTROL</u>	<u>OPERATION</u>	<u>RESULTS</u>
1)	POWER	Push in (ON)	+50V pulses at the main output, with a period of 50 us, pulse width of 15 us, < 50 ns rise & fall times.
2)	TRAIN ON/OFF SWITCH	Switch to ON	A synchronous burst of about ten 15 us wide pulses separated by about 50 us. 50 Volts.
3)	SCOPE TIME BASE	Change to 2 ms/div	Four bursts about 0.5 ms wide separated by 6 ms.
4)	TRAIN RATE	Set to 15 Hz range and FINE to max	
5)	TRAIN LENGTH	Set to 8 ms range and FINE to max	
6)	PULSE RATE	Set to 2 kHz range and FINE to max	
7)	PULSE LENGTH	Set to 60 us range and FINE to max	A synchronous burst of about eight 50 Volt 60 us pulses separated by about 0.5 ms.
8)	SCOPE TIME BASE	Set to 20 ms/div	Four synchronous bursts about 4 ms wide separated by 60 ms.

<u>STEP</u>	<u>CONTROL</u>	<u>OPERATION</u>	<u>RESULTS</u>
9)	AMPLITUDE CONTROL	Rotate clockwise to 10 and then back to 2.0	Output amplitude increases to 250 Volts and then decreases to 50 V.
10)	TRAIN INT/EXT SWITCH	Set to EXT	No output.
11)	PULSE INT/EXT SWITCH	Set to EXT	No output.
12)	PULSE INT/EXT BNC	Apply 2 kHz 60 us TTL pulse train	
13)	TRAIN INT/EXT BNC	Apply 15 Hz 8 ms TTL pulse train	Three asynchronous 50 Volt bursts about 8 ms wide separated by 60 ms.

The successful completion of the above 13 steps should provide the operator with a basic familiarity of the operating characteristics of the instrument. If additional assistance is required, see Section C and if still necessary, then:

Tel: 1-800-265-6681
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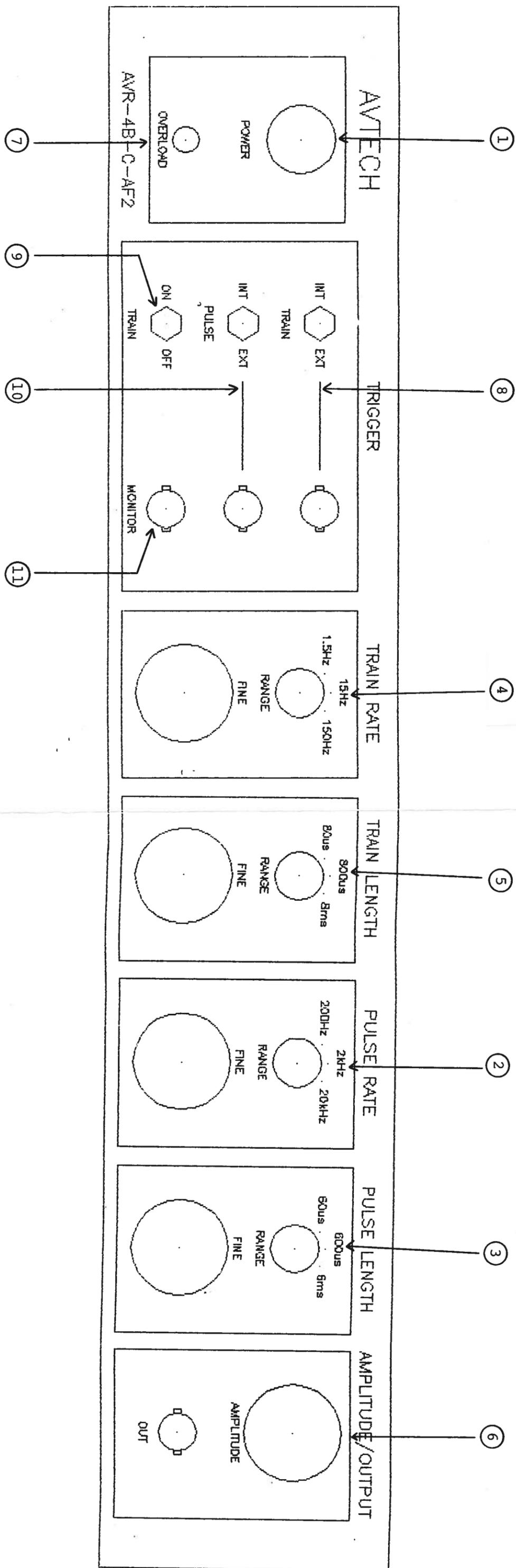


Fig. 1 FRONT PANEL CONTROLS

C) FRONT PANEL CONTROLS

(1) POWER Switch. The POWER push button switch applies AC prime power to the primaries of the transformer, turning the instrument on. The push button lamp (#382 type) is connected to the +15V DC supply.

(2) PULSE RATE. 3-position range switch and ten turn fine potentiometer controls internal Pulse Rate as follows:

50 Hz	200 Hz
200 Hz	2 kHz
2 kHz	20 kHz

Pulse INT-EXT switch (10) must be in INT position for (2) to be active.

(3) PULSE LENGTH. 3-position range switch and a ten turn fine potentiometer controls internal pulse length as follows:

15 us to 60 us
60 us to 600 us
600 us to 6 ms

(4) TRAIN RATE. 3-position range switch and a ten turn fine potentiometer controls internal train rate as follows:

0.5 Hz to 1.5 Hz
1.5 Hz to 15 Hz
15 Hz to 150 Hz

TRAIN INT-EXT switch (8) must be in the INT position and the TRAIN ON-OFF switch (9) must be in the ON position for (4) to be active.

(5) TRAIN LENGTH. 3-position range switch and a ten turn fine potentiometer controls internal train length as follows:

15 us to 80 us
80 us to 800 us
800 us to 8 ms

TRAIN INT-EXT switch (8) must be in the INT position and the TRAIN ON-OFF switch (9) must be in the ON position for (4) to be active.

- (6) AMPLITUDE/OUTPUT. Ten turn control varies output amplitude at BNC connector from 0 to +250 Volts to a load resistance of 600 Ohms or higher. CAUTION: Model AVR-4B-PW-C-AF2 will provide up to 10 Watts average power to a 600 Ohm load. If operating at or near maximum duty cycle (10%) with maximum output amplitude, ensure that the load is capable of dissipating the 10 Watts. An average output power of 10 Watts results when the duty cycle is 10% and the output amplitude is 250 Volts to a load resistance of 600 Ohms. If an attempt is made to operate with an average output power significantly in excess of 10 Watts, the automatic overload function (7) will function and protect the output stage against failure.
- (7) OVERLOAD. An automatic overload protective circuit 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 pulse rate (i.e. switch to a lower range)
 - 2) Reducing pulse length (i.e. switch to a lower range)
 - 3) Reducing TRAIN RATE and/or TRAIN LENGTH (i.e. switch to a lower range)
 - 4) Reducing the output amplitude
 - 5) Removing output load short circuit (if any)
- (8) TRAIN EXT/INT. With this 2-position switch in the INT position (and (9) in the ON position) the train rate and length are controlled by (4) and (5). When this two-position switch is in the EXT position (and (9) is in the ON position and (10) is in the INT position) an output at (6) is obtained only if a TTL pulse (having the desired TRAIN RATE and TRAIN LENGTH) is applied at the TRAIN BNC connector (8). In this mode, the output at (6) is synchronous.
- (9) TRAIN ON/OFF. When this two-position switch is in the ON position (and (8) and (10) are in the INT position) the output train rate and length are controlled by (4) and (5). When this switch is in the OFF position, (4) and (5) are inactive and the pulse rate oscillator free runs. CAUTION: BE SURE THAT THE DUTY CYCLE RATING OF 10% IS NOT EXCEEDED.

- (10) PULSE INT/EXT. With this two-position switch in the INT position, the pulse rate and length are controlled by (2) and (3). With this switch in the EXT position (2) and (3) are inactive and the output at (6) is controlled by a TTL level pulse train applied to the BNC connector at (10). To obtain output bursts at (6), the TRAIN INT-EXT switch must be in the EXT position and TTL level pulses applied to the BNC connector at (10). In this mode, the output at (6) is asynchronous.
- (11) MONITOR. A +5 Volt pulse train which is a coincident replica of the output at (6) is available at this BNC connector. The monitor output amplitude is fixed at +5 Volts for a load termination of $R_L > 50$ Ohms and this output will withstand a short circuit condition. This output may be used to trigger the time base of an oscilloscope.

D) REAR PANEL CONTROLS

- (1) AC POWER INPUT. A three-pronged recessed male connector is provided on the back panel for AC power connection to the instrument. Also contained in this assembly is a 1/2A slow blow fuse and a removable card that can be removed and repositioned to switch between 120V AC in and 240V AC in.
- (2) 2.0A SB. This fuse protects the output stage if the output duty cycle rating is exceeded (a back-up function for the automatic overload feature).

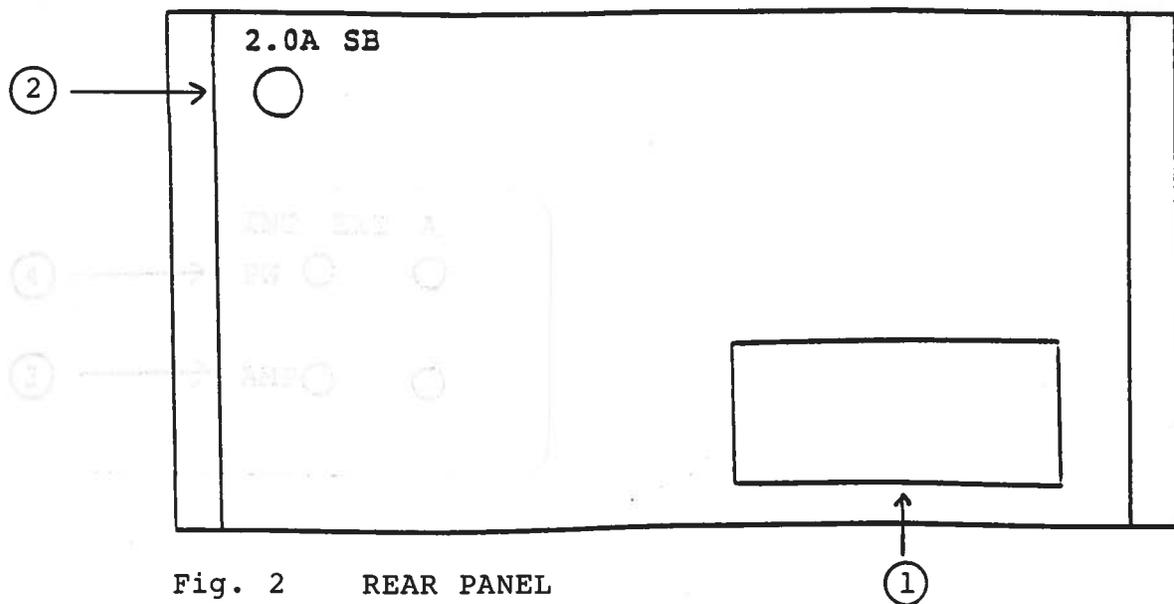


Fig. 2 REAR PANEL

E) TOP COVER REMOVAL AND RACK MOUNTING

- 1) The interior of the instrument may be accessed by removing the four Phillips screws on the top panel. With the four screws removed, the top cover may be slid back (and off).
- 2) The -R5 rack mount kit may be installed after first removing the one Phillips screw on the side panel adjacent to the front handle.

F) BLOCK DIAGRAM DESCRIPTION AND REPAIR PROCEDURE

Model AVR-4B-PW-C-AF2 consists of the following six basic modules (see Fig. 3):

- 1) -AF2-PG output pulse module
- 2) -AF2-PS 0 to +260 Volt DC power supply module
- 3) -AF2-T timing module
- 4) -AF2-INV inverter module
- 5) -AF2-OL overload module
- 6) +24 V DC power supply board

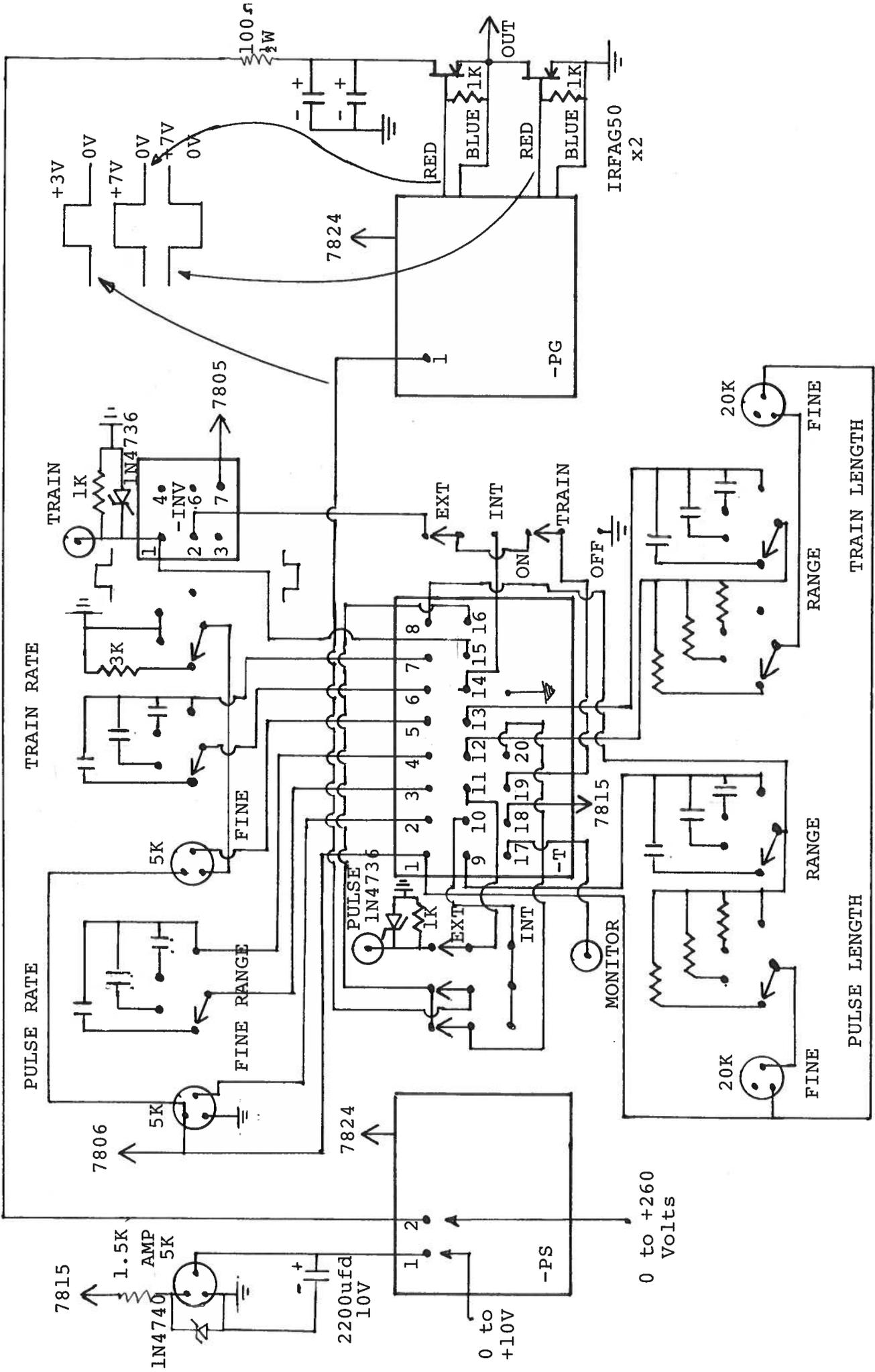
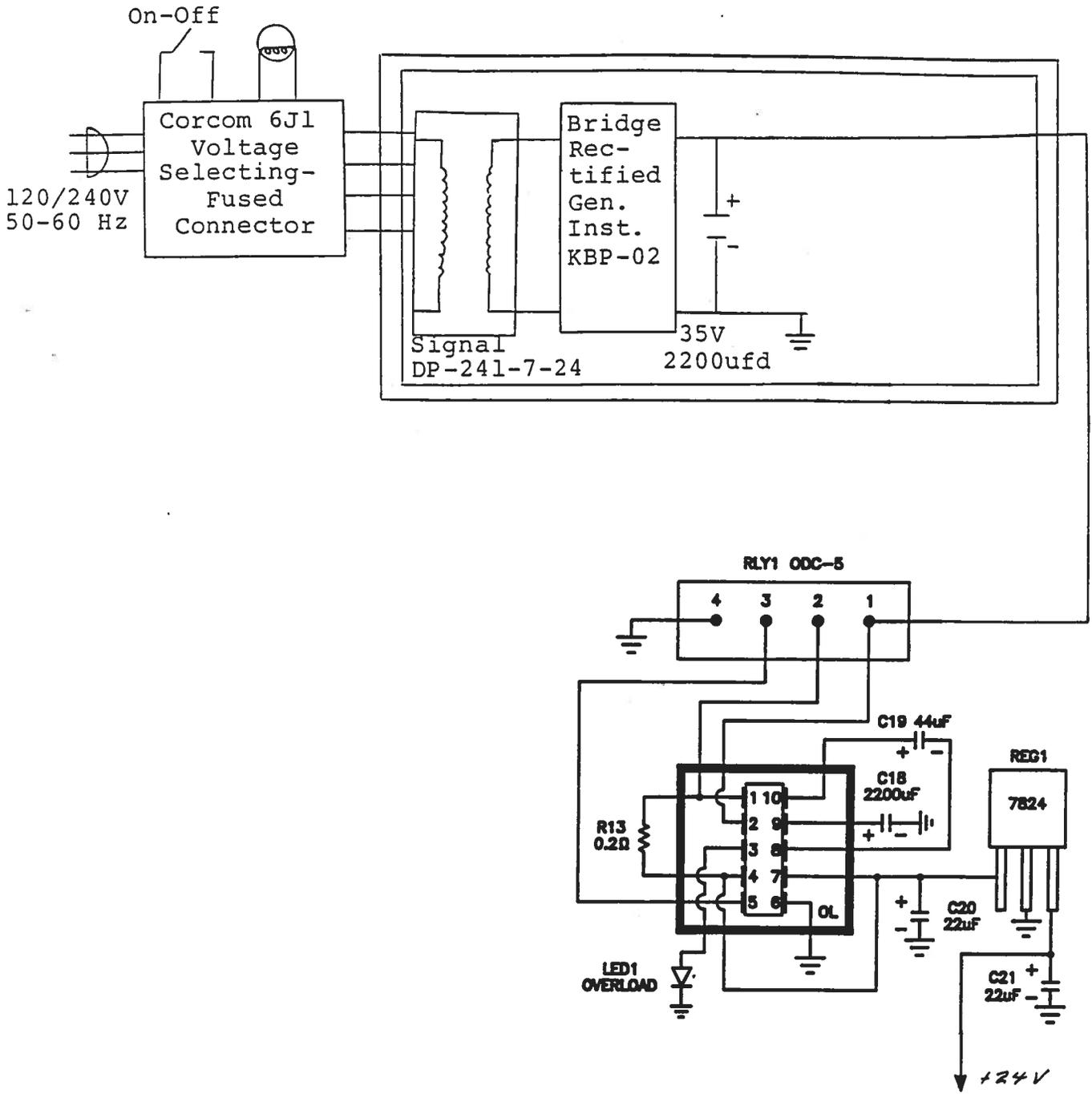


Fig. 3 AVR-4B-PW-C-AF2 BLOCK DIAGRAM

Fig. 4

SYSTEM BLOCK DIAGRAM (Power Supply Module)



F1) -AF2-PG OUTPUT PULSE MODULE

This module generates the 0 to +250 Volt output pulse and is supplied with a +3 Volt pulse train at PIN (1), a 0 to +260 Volt DC supply on the drain of the top IRFAG50 and +24 V DC to a rear panel solder terminal. The 0 to +260 Volts controls the output pulse amplitude and the +3 Volt pulse at (1) determines the output pulse timing (coincident replicas). In the case of instrument malfunction, first check the rear panel fuses and then check that the 0 to +260 Volt DC amplitude is functioning. If the DC amplitude is not functioning, then the -AF2-PS module is probably defective. If the DC level is functioning then check the waveforms at (1) and at the gates of the two IRFAG50. If the waveform at (1) is not correct, then it is most likely that the -AF2-T module is defective (assuming that the front panel controls are set properly). If the waveform at (1) is correct and the waveforms on the gates are not correct, then turn off the power and detach the two red leads to the gates. Recheck the waveforms. If the waveforms are now pulses having amplitudes of about 13 Volts, then the IRFAG50's are defective and should be replaced (order AVTECH PART NO. -AF2-IRFAG50). If 13 Volt waveforms are not detected then the -AF2-PG module should be returned to AVTECH for repair.

F2) -AF2-PS-DC POWER SUPPLY MODULE

This module accepts a 0 to +10 Volt DC control voltage at (1), a +24V DC supply on a rear panel solder terminal and provides a 0 to +260 Volt DC level at (2) which feeds the drain of the top IRFAG50 in the -AF2-PG module and therefore controls the output pulse amplitude. This sealed module must be replaced if the specified output level is not provided.

F3) -AF2-T TIMING MODULE

This sealed module contains the TRAIN and Pulse clocks and length control functions and provides TTL level outputs to PIN (1) of the -AF2-PG module and to the MONITOR output. This module must be returned to AVTECH for repair (if malfunctioning).

F4) -AF2-INV INVERTER MODULE

This module provides a complement of a train input applied to the EXT TRAIN BNC. The sealed module should be returned to AVTECH if repair is required.

F5) -AF2-OL OVERLOAD MODULE

This sealed module controls the +24 V DC prime power supplied to the entire instrument and in the event of an overloading of the output, interrupts the +24 V supply to produce the operating symptoms described in the FRONT PANEL CONTROL SECTION.

F6) +24 V DC POWER SUPPLY

See Fig. 4.

G) ADDITIONAL ASSISTANCE

For additional assistance:

Tel: 1-800-265-6681

Fax: (613) 226-2802

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The sealed module contains the 25 V DC prime power supplied to the system and for the event of an overvoltage in the output, the 25 V supply to the system is controlled by the output voltage detector in the FRONT PANEL CONTROL SECTION.

For 25 V DC output supply

See Fig. 1.

or additional assistance

For additional assistance

Ref: 1-800-252-6661
Fax: (415) 252-6662