<u>INSTRUCTIONS</u>

MODEL AVL-2-B

0 TO 350 VOLTS, 2 ns RISE TIME

HIGH PERFORMANCE PULSE GENERATOR
WITH IEEE 488.2 AND RS-232 CONTROL

SERIAL NUMBER: _____

<u>WARRANTY</u>

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<u>TECHNICAL SUPPORT</u>

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Manual Reference: /fileserver1/officefiles/instructword/avl/obs/AVL-2-B,edition2.doc, created November 16, 2001

INTRODUCTION

The AVL-2-B is a high performance, GPIB and RS232-equipped instrument capable of generating 350V into 50Ω loads at repetition rates up to 5 kHz. The output pulse width is variable from 5 to 100 ns, and the sync delay is variable up to ±200 ns. The rise time is fixed at less than 2 ns.

Instruments with the "-P" model suffix can generate 0 to +350V, whereas instruments with the "-N" model suffix can generate 0 to -350V. Instruments with the "-PN" suffix can generate both polarities.

The AVL-2-B is a highly flexible instrument. Aside from the internal trigger source, it can also be triggered or gated by external TTL-level signals. A front-panel pushbutton or a computer command can also be used to trigger the instrument.

The AVL-2-B features front panel keyboard and adjust knob control of the output pulse parameters along with a four line by 40 character back-lit LCD display of the output amplitude, pulse width, pulse repetition frequency, and delay. The instrument includes memory to store up to four complete instrument setups. The operator may use the front panel or the computer interface to store a complete "snapshot" of all key instrument settings, and recall this setup at a later time.

AVAILABLE OPTIONS

The AVL-2-B is available with several options:

"-OS" Option: an externally generated DC offset can be added to the output.

"-EA" Option: the amplitude can be controlled by an externally generated 0 to +10V analog control voltage.

"-M" Option: a monitor output is provided.

SPECIFICATIONS

Model:	AVL-2-B
GPIB and RS-232 control:	included
Amplitude: (50 Ohm load)	AVL-2-B-P: 0 to +350 Volts AVL-2-B-N: 0 to -350 Volts AVL-2-B-PN: 0 to ±350 Volts
External DC Offset:	Optional feature. Present on instruments with "-OS" model number suffix. 0 to ±50 Volts, 250 mA maximum
Rise time:	< 2 ns
Fall time:	< 4 ns
Pulse width:	5 to 100 ns
PRF:	0 to 5 kHz
Polarity:	Positive
Propagation delay:	< 350 ns (Ext trig in to pulse out)
Jitter: (Ext trig in to pulse out)	± 100 ps ± 0.03% of sync delay
Trigger required: (ext trig mode)	+ 5 Volts, 50 to 500 ns (TTL)
Sync delay:	Variable 0 to 200 ns, sync out to pulse out
Sync output:	+ 5 Volt, 200 ns, will drive 50 Ohm loads
Gate input:	Synchronous or asynchronous, active high or low, switchable. Suppresses triggering when active.
Connectors: OUT TRIG SYNC GATE	BNC BNC BNC BNC
Power requirements:	120/240 Volts (switchable) 50-60 Hz
Dimensions:	100 mm x 430 mm x 375 mm (3.9" x 17" x 14.8")
Chassis material:	cast aluminum frame & handles, blue vinyl on aluminum cover plates
Mounting:	Any
Temperature range:	+ 15° to + 40° C

INSTALLATION

VISUAL CHECK

After unpacking the instrument, examine to ensure that it has not been damaged in shipment. Visually inspect all connectors, knobs, liquid crystal displays (LCDs), and the handles. Confirm that a power cord, a GPIB cable, and two instrumentation manuals (this manual and the "OP1B Interface Programming Manual") are with the instrument. If the instrument has been damaged, 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 visible. Confirm that the power selector card is in the correct orientation.

For AC line voltages of 110-120V, the power selector card should be installed so that the "120" marking is visible from the rear of the instrument.

For AC line voltages of 220-240V, the power selector card should be installed so that the "240" marking is visible from the rear of the instrument.

If it is not set for the proper voltage, remove the fuse and 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 1.0A slow blow fuse is required. In the 240V setting, a 0.5A slow blow fuse is required.

LABVIEW DRIVERS

A LabVIEW driver for this instrument is available for download on the Avtech web site, at http://www.avtechpulse.com/labview. A copy is also available in National Instruments' Instrument Driver Library at http://www.natinst.com/.

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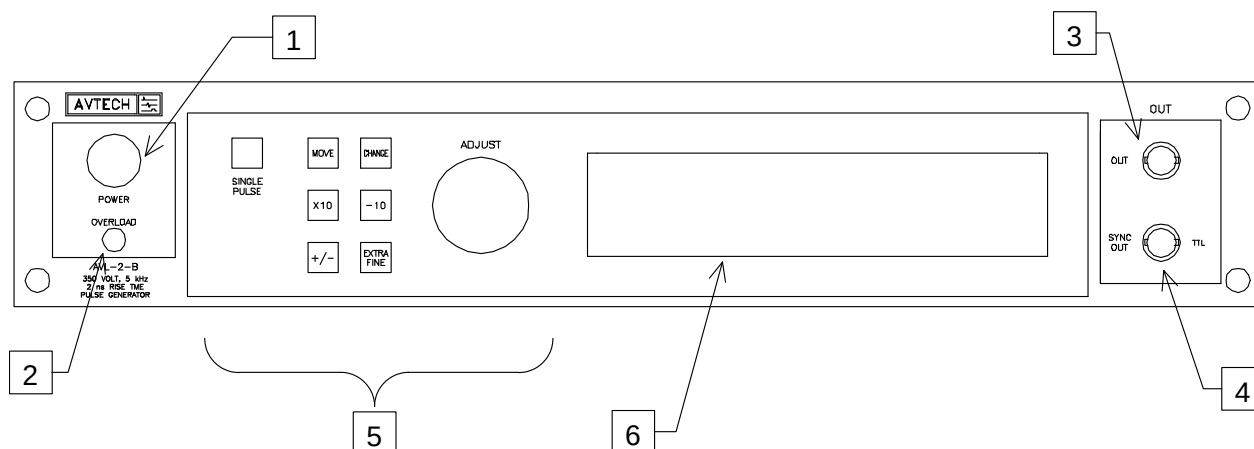
1. <u>POWER Switch</u>. The POWER push button switch applies AC prime power to the primaries of the transformer, turning the instrument on. The push button lamp (#382 type) is connected to the internal +15V DC supply.

2. <u>OVERLOAD</u>. The AVL-2-B is protected in its internal software against conflicting or dangerous settings. As an additional protective measure, an automatic overload circuit exists, 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 very low impedance), 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.

   This overload indicator may come on briefly at startup. This is not a cause for concern.

   Note that the output circuit can withstand an infinite VSWR on the output port but is intended for operation with 50Ω loads.

3. <u>OUT CONNECTOR</u>. This BNC connector provides the main output signal, into load impedances of 50Ω.

4. <u>SYNC OUT</u>. This connector supplies a SYNC output that can be used to trigger other equipment, particularly oscilloscopes. This signal leads (or lags) the main output by a duration set by the "DELAY" controls and has an approximate amplitude of +3 Volts to R_L > 1kΩ with a pulse width of approximately 50 ns.

5. <u>LIQUID CRYSTAL DISPLAY (LCD)</u>. This LCD is used in conjunction with the keypad to change the instrument settings. Normally, the main menu is displayed, which lists the key adjustable parameters and their current values. The "OP1B Interface Programming Manual" describes the menus and submenus in detail.

6. <u>KEYPAD</u>.

Control Name	Function
MOVE	This moves the arrow pointer on the display.
CHANGE	This is used to enter the submenu, or to select the operating mode, pointed to by the arrow pointer.
×10	If one of the adjustable numeric parameters is displayed, this increases the setting by a factor of ten.
÷10	If one of the adjustable numeric parameters is displayed, this decreases the setting by a factor of ten.
+/-	If one of the adjustable numeric parameters is displayed, and this parameter can be both positive or negative, this changes the sign of the parameter.
EXTRA FINE	This changes the step size of the ADJUST knob. In the extra-fine mode, the step size is twenty times finer than in the normal mode. This button switches between the two step sizes.
ADJUST	This large knob adjusts the value of any displayed numeric adjustable values, such as frequency, pulse width, etc. The adjust step size is set by the "EXTRA FINE" button. When the main menu is displayed, this knob can be used to move the arrow pointer.

REAR PANEL CONTROLS
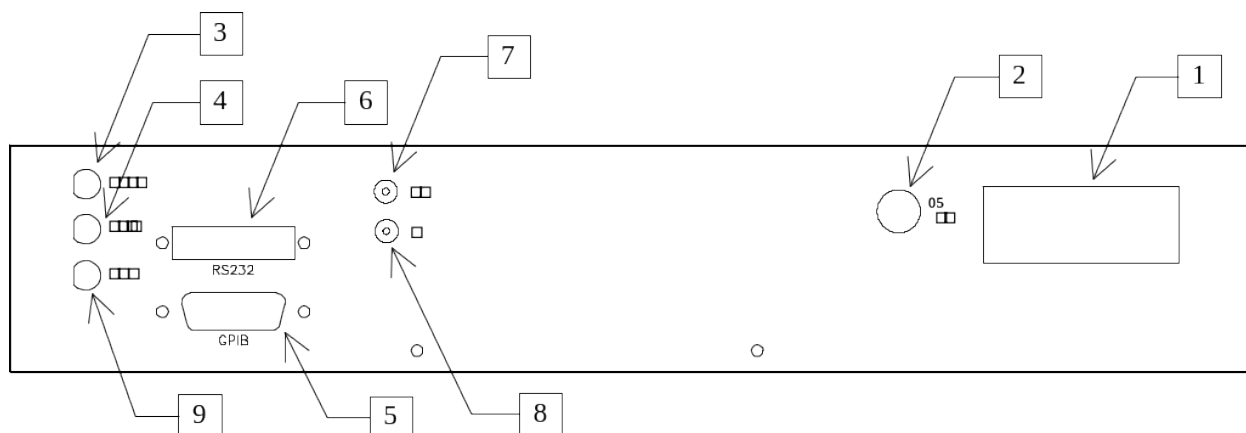
1. <u>AC POWER INPUT</u>. A three-pronged recessed male connector is provided on the back panel for AC power connection to the instrument. Also contained in this assembly is a slow-blow fuse and a removable card that can be removed and repositioned to switch between 120V AC in and 240V AC in.

   For AC line voltages of 110-120V, the power selector card should be installed so that the "120" marking is visible from the rear of the instrument.

   For AC line voltages of 220-240V, the power selector card should be installed so that the "240" marking is visible from the rear of the instrument.

   If it is not set for the proper voltage, remove the fuse and 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 1.0A slow blow fuse is required. In the 240V setting, a 0.5A slow blow fuse is required.

2. <u>0.5A SB</u>. This fuse protects the DC power supply to the output stage.

3. <u>GATE</u>. This TTL-level (0 and +5V) logic input can be used to gate the triggering of the instrument. This input can be either active high or active low, depending on the front panel settings or programming commands. (The instrument triggers normally when this input is unconnected).

4. <u>TRIG</u>. This TTL-level (0 and +5V) logic input can be used to trigger the instrument, if the instrument is set to triggering externally. The instrument triggers on the rising edge of this input. The instrument can also be set such that the output pulse width tracks the pulse width on this input, or the output pulse width can be set independently.

5. <u>GPIB Connector</u>. A standard GPIB cable can be attached to this connector to allow the instrument to be computer-controlled. See the "OP1B Interface Programming Manual" for more details on GPIB control.

6. <u>RS-232 Connector</u>. A standard serial cable with a 25-pin male connector can be attached to this connector to allow the instrument to be computer-controlled. See the "OP1B Interface Programming Manual" for more details on RS-232 control.

7. <u>OS Connector</u>. (Optional feature. Present on "-OS" units only.) The desired DC offset is applied to this connector. Internally, it is connected to the output centre conductor via a high quality RF inductor. Do not exceed $\pm$50V, 250 mA.

8. <u>M Connector</u>. (Optional feature. Present on "-M" units only.) The monitor output provides an attenuated replica (20 dB down) of the voltage on the main output. The monitor output is designed to operate into a 50 Ohm load.

9. <u>AMP Connector</u>. (Optional feature. Present on "-EA" units only.) The output amplitude can be set to track the voltage on this input. Zero Volts in corresponds to zero amplitude output, and +10V in corresponds to maximum amplitude out. This mode is activated by selecting "Ext Control" on the front-panel amplitude menu, or with the "source:voltage external" command.

GENERAL INFORMATION

BASIC PULSE CONTROL

This instrument can be triggered by its own internal clock or by an external TTL trigger signal. In either case, two output channels respond to the trigger: OUT and SYNC.

- OUT. This is the main output. The maximum output voltage is ±350V.

- SYNC. The SYNC pulse is a fixed-width TTL-level reference pulse used to trigger oscilloscopes or other measurement systems. When the delay is set to a positive value the SYNC pulse precedes the OUT pulse. When the delay is set to a negative value the SYNC pulse follows the OUT pulse.

These pulses are illustrated below, assuming internal triggering and a positive delay:

SYNC OUT
(generated by
internal clock)

200ns

3V, FIXED

DELAY   PW

AMPLITUDE,   0 to +350V for "-P" models
0 to -350V for "-N" models
0 to ±350V for "-PN" models

OUT
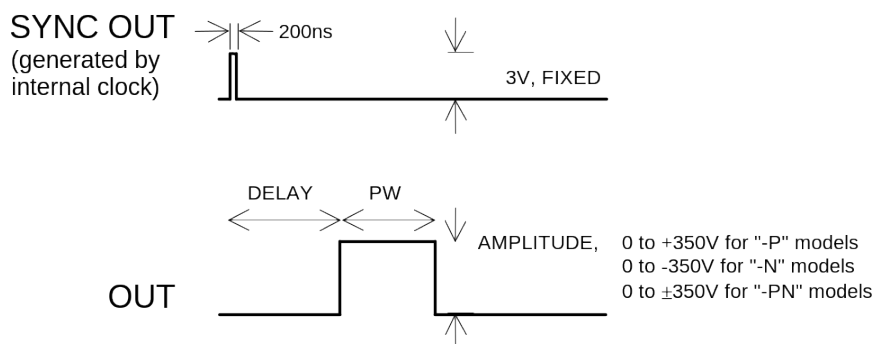
Figure A

If the delay is negative, the order of the SYNC and OUT pulses is reversed:

SYNC OUT
(generated by
internal clock)

200ns

3V, FIXED

DELAY

PW

OUT
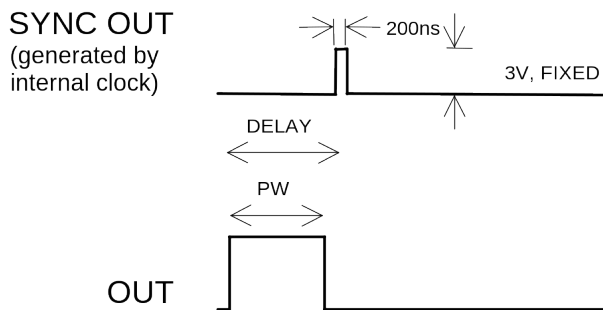
Figure B

The next figure illustrates the relationship between the signal when an external TTL-level trigger is used:
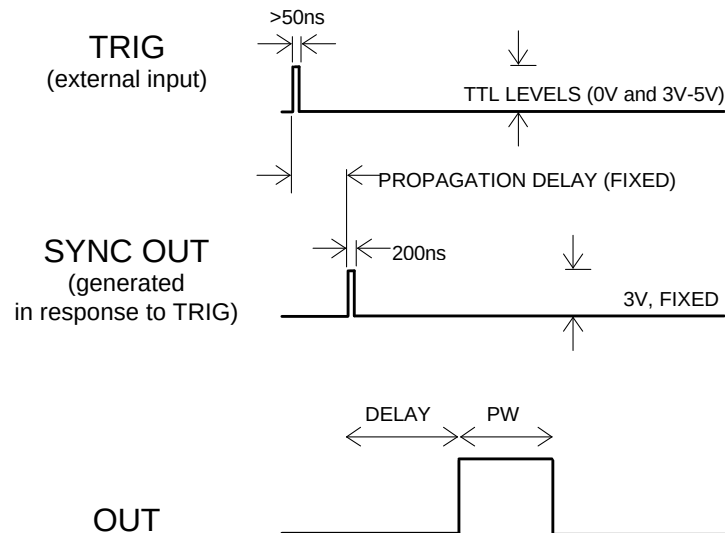
Figure C

As before, if the delay is negative, the order of the SYNC and OUT pulses is reversed.

In general, the delay, pulse width, and frequency (when in the internal mode), of the OUT pulse can be varied with front panel controls or via the GPIB or RS-232 computer interfaces.

TRIGGER MODES

This instrument has four trigger modes:

- Internal Trigger: the instrument controls the trigger frequency, and generates the clock internally.

- External Trigger: the instrument is triggered by an external TTL-level clock on the back-panel TRIG connector.

- Manual Trigger: the instrument is triggered by the front-panel "SINGLE PULSE" pushbutton.

- Hold Trigger: the instrument is set to not trigger at all.

These modes can be selected using the front panel trigger menu, or by using the appropriate programming commands. (See the "OP1B Interface Programming Manual" for more details.)

WARNING: The output stage may be damaged if triggered by an external signal at a pulse repetition frequency greater than 5 kHz.

GATING MODES

Triggering can be suppressed by a TTL-level signal on the rear-panel GATE connector. The instrument can be set to stop triggering when this input high or low, using the front-panel gate menu or the appropriate programming commands. When gated, the output will complete the full pulse width if the output is high, and then stop triggering. Pulses are not truncated.

TOP COVER REMOVAL

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).

ELECTROMAGNETIC INTERFERENCE

To prevent electromagnetic interference with other equipment, all used outputs should be connected to shielded 50Ω loads using shielded 50Ω coaxial cables. Unused outputs should be terminated with shielded 50Ω BNC terminators or with shielded BNC dust caps, to prevent unintentional electromagnetic radiation. All cords and cables should be less than 3m in length.

OPTIONAL FEATURES

RACK MOUNTING, "-R5" OPTION

A rack mounting kit is available. The "-R5" rack mount kit may be installed after first removing the one Phillips screw on the side panel adjacent to the front handle.

DC OFFSET, "-OS" OPTION

A DC offset can be added to the output signal by applying a DC voltage to the rear-panel OS connector. Internally, it is connected to the output centre conductor via a high quality RF inductor. Do not exceed ±50V, 250 mA.

MONITOR OUTPUT, "-M" OPTION

The monitor output provides an attenuated replica (20 dB down) of the voltage on the main output. The monitor output is designed to operate into a 50 Ohm load.

ELECTRONIC AMPLITUDE CONTROL, "-EA" OPTION

The output amplitude can be set to track the voltage on this input. Zero Volts in corresponds to zero amplitude output, and +10V in corresponds to maximum amplitude out. This mode is activated by selecting "Ext Control" on the front-panel amplitude menu, or with the "source:voltage external" command.

<u>PROTECTING YOUR INSTRUMENT</u>

<u>TURN OFF INSTRUMENT WHEN NOT IN USE</u>

The lifetime of the switching elements in the pulse generator module is proportional to the running time of the instrument. For this reason the prime power to the instrument should be turned off when the instrument is not in use. In the case of failure, the switching elements are easily replaced following the procedure described in a following section.

<u>DO NOT EXCEED 5 kHz</u>

The output stage may be damaged if triggered by an external signal at a pulse repetition frequency greater than 5 kHz.

<u>USE A 50Ω LOAD</u>

The output stage may be damaged if the output is not terminated into a 50Ω load.

OPERATIONAL CHECK

This section describes a sequence to confirm the basic operation of the instrument. It should be performed after receiving the instrument. It is a useful learning exercise as well.

Before proceeding with this procedure, finish reading this instruction manual thoroughly. Then read the "Local Control" section of the "OP1B Interface Programming Manual" thoroughly. The "Local Control" section describes the front panel controls used in this operational check - in particular, the MOVE, CHANGE, and ADJUST controls.
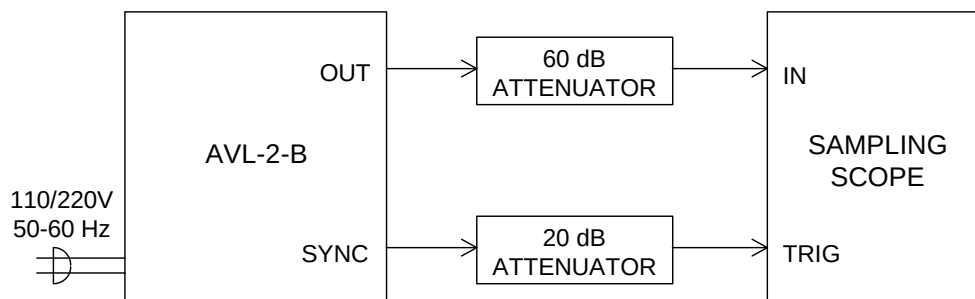
BASIC TEST ARRANGEMENT

1. Connect the pulse generator to a sampling oscilloscope as shown above. Note that:

    a) The use of 60 dB attenuator at the sampling scope vertical input channel will insure a peak input signal to the sampling scope of less than 1 Volt. WARNING: This model may provide a peak output power in excess of 2.8kW. The peak power rating of the attenuator must exceed this limit. Factory tests are conducted using a Midwest Microwave model ATT-0527-20-SMA-07 attenuator.

    b) The TRIG output channel provides TTL level signals (approximately 0 and +3V). To avoid overdriving the TRIG input channel of some scopes, a 20 dB attenuator should be placed at the input to the scope trigger channel.

    c) The bandwidth capability of components and instruments used to display the pulse generator output signal (attenuators, cables, connectors, etc.) should exceed 1 GHz.

    d) Set the oscilloscope to trigger externally with the vertical setting at 100 mV/div and the horizontal setting at 20 ns/div.

2. Turn on the AVL-2-B. The main menu will appear on the LCD.

3. To set the AVL-2-B to trigger from the internal clock at a PRF of 2 kHz:

   a) The arrow pointer should be pointing at the frequency menu item. If it is not, press the MOVE button until it is.

   b) Press the CHANGE button. The frequency submenu will appear. Rotate the ADJUST knob until the frequency is set at 2 kHz.

   c) The arrow pointer should be pointing at the "Internal" choice. If it is not, press MOVE until it is.

   d) Press CHANGE to return to the main menu.

4. To set the delay to 100 ns:

   a) Press the MOVE button until the arrow pointer is pointing at the delay menu item.

   b) Press the CHANGE button. The delay submenu will appear. Rotate the ADJUST knob until the delay is set at 100 ns.

   c) The arrow pointer should be pointing at the "Normal" choice. If it is not, press MOVE until it is.

   d) Press CHANGE to return to the main menu.

5. To set the pulse width to 50 ns:

   a) Press the MOVE button until the arrow pointer is pointing at the pulse width menu item.

   b) Press the CHANGE button. The pulse width submenu will appear. Rotate the ADJUST knob until the pulse width is set at 50 ns.

   c) The arrow pointer should be pointing at the "Normal" choice. If it is not, press MOVE until it is.

   d) Press CHANGE to return to the main menu.

6. At this point, nothing should appear on the oscilloscope.

7. To enable the output:

    a)   Press the MOVE button until the arrow pointer is pointing at the output menu item.

    b)   Press the CHANGE button. The output submenu will appear.

    c)   Press MOVE until the arrow pointer is pointing at the "ON" choice.

    d)   Press CHANGE to return to the main menu.

8.   To change the output amplitude:

    a)   Press the MOVE button until the arrow pointer is pointing at the amplitude menu item.

    b)   Press the CHANGE button. The amplitude submenu will appear. Rotate the ADJUST knob until the amplitude is set at +200V (or -200V for "-N" models).

    c)   Observe the oscilloscope. You should see 50 ns wide, 200V pulses. If you do not, you may need to adjust the delay setting to a value more compatible with your sampling oscilloscope. Repeat step 4 if required. You may also need to adjust the sampling scope controls.

    d)   Rotate the ADJUST knob. The amplitude as seen on the oscilloscope should vary. Return it to 200V.

    e)   ("-PN" units only) Press the +/- button on the front panel. The amplitude as seen on the oscilloscope should flip polarity, to -200V.

    f)   Press CHANGE to return to the main menu.

9.   Try varying the pulse width, by repeating step (5). As you rotate the ADJUST knob, the pulse width on the oscilloscope will change. It should agree with the displayed value.

This completes the operational check.

PROGRAMMING YOUR PULSE GENERATOR

KEY PROGRAMMING COMMANDS

The "OP1B Interface Programming Manual" describes in detail how to connect the pulse generator to your computer, and the programming commands themselves. A large number of commands are available; however, normally you will only need a few of these. Here is a basic sample sequence of commands that might be sent to the instrument after power-up:

```
*rst                      (resets the instrument)
trigger:source internal   (selects internal triggering)
frequency 1000 Hz         (sets the frequency to 1000 Hz)
pulse:width 50 ns         (sets the pulse width to 50 ns)
pulse:delay 20 ns         (sets the delay to 20 ns)
volt:ampl 250             (sets the amplitude to +250 V)
                          ("-N" units should use "volt:ampl -250)
output on                 (turns on the output)
```

For triggering a single event, this sequence would be more appropriate:

```
*rst                        (resets the instrument)
trigger:source hold         (turns off all triggering)
pulse:width 50 ns           (sets the pulse width to 50 ns)
output on                   (turns on the output)
volt:ampl 250               (sets the amplitude to +250 V)
                            ("-N" units should use "volt:ampl -250)
trigger:source immediate    (generates a single non-repetitive trigger event)
trigger:source hold         (turns off all triggering)
output off                  (turns off the output)
```

To set the instrument to trigger from an external TTL signal applied to the rear-panel TRIg connector, use:

```
*rst                      (resets the instrument)
trigger:source external   (selects internal triggering)
pulse:width 50 ns         (sets the pulse width to 50 ns)
pulse:delay 1 us          (sets the delay to 1 us)
volt:ampl 250             (sets the amplitude to +250 V)
                          ("-N" units should use "volt:ampl -250)
output on                 (turns on the output)
```

These commands will satisfy 90% of your programming needs.

ALL PROGRAMMING COMMANDS

For more advanced programmers, a complete list of the available commands is given below. These commands are described in detail in the "OP1B Interface Programming Manual". (Note: this manual also includes some commands that are not implemented in this instrument. They can be ignored.)

Keyword	Parameter	Notes
LOCAL		
OUTPut:		
:[STATe]	<boolean value>	
:PROTection		
:TRIPped?		[query only]
REMOTE		
[SOURce]:		
:FREQuency		
[:CW | FIXed]	<numeric value>	
[SOURce]:		
:PULSe		
:PERiod	<numeric value>	
:WIDTh	<numeric value>	
:DCYCle	<numeric value>	
:HOLD	WIDTh | DCYCle	
:DELay	<numeric value>	
:GATE		
:TYPE	ASYNC | SYNC	
:LEVel	HIgh | LOw	
[SOURce]:		
:VOLTage		
[:LEVel]		
[:IMMediate]		
[:AMPLitude]	<numeric value> | EXTernal	
:PROTection		
:TRIPped?		[query only]
STATUS:		
:OPERation		
:[EVENt]?		[query only, always returns "0"]
:CONDition?		[query only, always returns "0"]
:ENABle	<numeric value>	[implemented but not useful]
:QUEStionable		
:[EVENt]?		[query only, always returns "0"]
:CONDition?		[query only, always returns "0"]
:ENABle	<numeric value>	[implemented but not useful]
SYSTem:		
:COMMunicate		
:GPIB		
:ADDRess	<numeric value>	
:SERial		
:CONTrol		
:RTS	ON | IBFull | RFR	
:[RECeive]		

```
            :BAUD           1200 | 2400 | 4800 | 9600
            :BITS           7 | 8
            :ECHO           <boolean value>
            :PARity
                :[TYPE]     EVEN | ODD | NONE
            :SBITS          1 | 2
    :ERRor
        :[NEXT]?                                    [query only]
        :COUNT?                                     [query only]
    :VERSion?                                       [query only]
TRIGger:
    :SOURce             INTernal | EXTernal | MANual | HOLD | IMMediate
*CLS                                        [no query form]
*ESE                    <numeric value>
*ESR?                                       [query only]
*IDN?                                       [query only]
*OPC
*SAV                    0 | 1 | 2 | 3       [no query form]
*RCL                    0 | 1 | 2 | 3       [no query form]
*RST                                        [no query form]
*SRE                    <numeric value>
*STB?                                       [query only]
*TST?                                       [query only]
*WAI                                        [no query form]
```

<u>REPAIR PROCEDURES</u>

<u>WARNING</u>: Before attempting any repairs, note that voltages as high as 400 Volts are employed in the chassis structure.

<u>BASIC CONSTRUCTION</u>

The pulse generator is constructed from the following basic subsystems or modules:

- Metal chassis
- Pulse generator module (AVL-2-PG)
- Delay line module (AVL-2-DL)
- Timing board (AVL-2-T101)
- Low-voltage power supply board (PS)
- Overload module (OL)
- High-voltage power supply module (1/2A24-P20-M-E)
- Amplitude control module (AVL-2-EA-P or AVL-2-EA-N)
- Clock and computer interface board (OP1B)
- Polarity/OS module (AVL-2-PN-(M)-(OS), optional)

These modules are interconnected as shown in the two attached schematic diagrams.

<u>TROUBLESHOOTING A NO-OUTPUT CONDITION</u>

CAUTION: The exposed cases of the SL3 switching elements, which are mounted on the side of the AVL-2-PG module, can have as much as 400V on them. Take care not to touch them, except with proper probes.

If no output pulse is provided by the AVL-2 unit:

- Turn off the prime power supply and remove the top cover panel by removing the four Phillips screws on the top of the instrument.

- Apply a scope probe or voltmeter to pin 3 of the AVL-2-PG unit. With the unit untriggered, turn on the prime power supply. A voltage of about +360 to +380 Volts should be read at pin 3. Alternatively, the voltage may be measured on the cases of the SL3 switching elements.

- If the voltage is zero or much less than +360 Volts, then one of the two switching transistors (Part No. SL3) mounted on the AVL-2-PG module has probably failed. With the prime power supply off remove one of the transistors by removing the two

2-56 screws which secure the transistor in its socket. CAUTION: Before touching or removing the transistor, the cases should be briefly shorted to the instrument case to discharge charged capacitors (as high as 400 Volts). Pull the transistor out of the socket. With the unit untriggered turn on the prime power supply and measure the voltage from the case of the remaining transistor to ground. If this voltage is about +360 to +380 Volts then the transistor which was removed is defective and should be replaced. If the voltage which is measured is less than +360 Volts then the transistor still in position is defective and should be replaced. Note that the two transistors are completely interchangeable (order Avtech Part No. SL3). Note that with both transistors removed, the voltage at pin 3 on the AVL-2-PG module should be in the range of +360 to +380 Volts. If the voltage is less then the 1/2A24-P20-M-E module must be replaced.

- If both the 1/2A24-P20-M-E module and the AVL-2-PG module are not found to be defective then the AVL-2-T101 module is suspect. In this case, connect one scope probe to the M pin of the -T101 module and a second probe to S pin of the -T101 module. With the scope triggered externally by the pulse generator providing the trigger input signal to the AVL unit, the waveform at the M and S pins of the -T101 module should resemble:

M ⟶⎍⎎_____ ↕ 3 to 5 V

S _____⎍⎎⟶ ↕ 3 to 5 V

←⟶
Δt
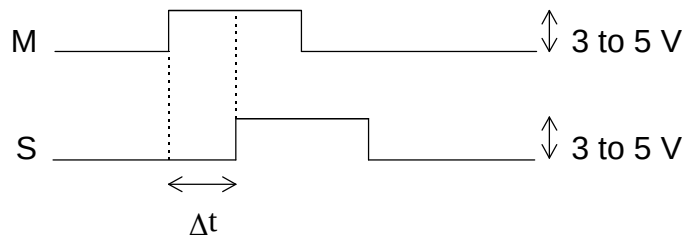
For PW = 5 ns, Δt ≈ -50 ns
For PW = 100 ns, Δt ≈ +50 ns

- As the pulse width is varied over its full range Δt should vary from about -50ns to approximately +50 ns. If the waveforms at the M and S pins do not resemble the above, then the -T101 module is defective and should be replaced. If the waveforms do resemble the above then the -PG module is at fault and should be replaced. Replacement modules should be ordered by part number (eg. AVL-2-PG) from Avtech.

SCHEMATICS - POWER SUPPLY

LINE CORD PLUGS INTO BACK OF

X1 CORCOM

164EL5 SWITCH, WITH SLOAN 510-147
X5

XFMR - 241-8-

DP1B-PS

PS

DP-241-8-

PAD PAD-TOP-

-OLD
X2

X1 OVERLOAD

Tit	AVL-2-B, AVL-2A-B POWER		
Dat	16-Nov-	Revsi	MOD
R:\mjc\circuits\AVL\AVL.ddb - AVL-2-B\Ps-			
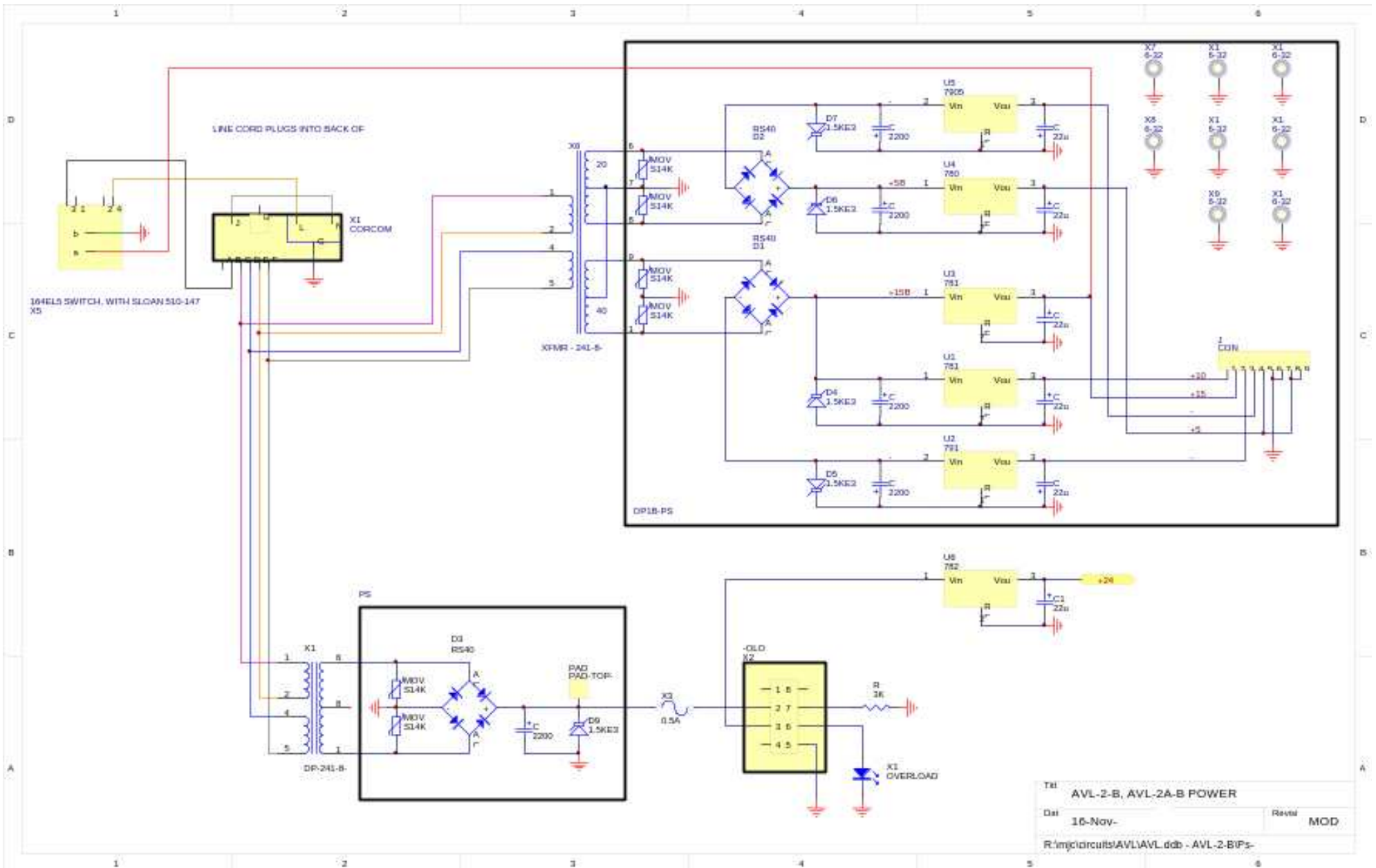
SCHEMATICS - MAIN CIRCUIT

PAD1
ON OP1B PS

CHASSIS GND

X1
0.5A SB

-OLO MODULE
X2

S4 - YEL
S5 - YEL
S7 - WHT
G3 - GRN

R2
12K

U1
7824
Vin REF Vout
1   3

C1
22uF
C2
22uF

D1 D2 D3
1N4937 1N4937 1N4937

R1
100 OHM, 2W

S8 - WHT - UNHARNESSED

HV OUT
HV OUT
HV RETURN
HV RETURN

UV1
1/2A24-P20-M-E

INPUT PWR RETURN
POSITIVE PWR INPUT
IOUT MONITOR
ENABLE/DISABLE
SIGNAL RETURN
REMOTE ADJUST
+5V REF OUT

G4 - GRN
S9 - PUR

X3
101

S
M
TRIG
GND
VCC

AVL-2-T101

S10 - BRN

R3
3K

R4
10K
C3
2.2uF

M1
AVL-2-PG
4 COAX LINES

AVL-2-DL
DELAY LINE

4 COAX LINES

OUT

M
S
HV
GND

S11 - PUR
S14 - BLU
S3 - OR
S9 - PUR
G5 - GRN

DO NOT BUNDLE THESE 4 WIRES TOGETHER

BD1
P5 +15V ON/OFF
P4 +5V ON/OFF

26 MAIN OUT
25 SYNC OUT
24 EXT TRIG
23 PANEL GATE
22 XTRA RLY 1
21 XTRA RLY 2 (DUAL PW)
20 XTRA RLY 3 (V-I)
19 XTRA RLY 4 (EO)
18 XTRA RLY 5
17 AMPL RANGE 0
16 AMPL RANGE 1
15 AMPL RANGE 2
14 AMPL RANGE 3
13 AMPL RANGE 4
12 O.LED
11 O.EA
10 O.SINE
9   O.TRI
8   O.SQU
7   O.LOGIC
6   O.ZOUT
5   O.POL
4   SPARE, 0-10V
3   PW, 0-10V
2   OFFSET, 0-10V
1   AMPLITUDE, 0-10V

OP1B MAIN BOARD, SMALL

X6
SYNC
X7
EXT TRIG
X8
GATE

R5
1K

S13 - BLU (FOR -PN ONLY)

S12 - YEL

G6 - GRN

X4
OUT
COAX

IN, REAR
OUT, REAR

X9
OVERLOAD LED

S9 - PUR
S3 - OR (+5V)
S2 - RED (+15V)
S1 - BLK (-15V)

TO 7805 (+5V)
TO 7815 (+15V)
TO 7915 (-15V)

AMP
+15V
-15V
OUT COAX
GND

X10
AVL-2-EA-P OR AVL-2-EA-N

N/C
POL
IN

M2
AVL-2-PN, FOR -PN UNITS ONLY

SH4B HARNESS

G1 - GRN	28 CM	
G2 - GRN	21	
G3 - GRN	23	
G4 - GRN	11.5	
G5 - GRN	6.5	
G6 - GRN	14.5	
G7 - GRN	12.5	
S1 - BLK	48.5	
S2 - RED	45.2	
S3 - OR	52.3	
S4 - YEL	44	
S5 - YEL	32	
S6 - RED	30.5	
S7 - WHT	44	
S8 - WHT	24 (NOT HARNESSED)	
S9 - PUR	47	
S10 - BRN	18	
S11 - PUR	11.5	
S12 - YEL	14	
S13 - BLU	14 (-PN ONLY)	
S14 - BLU	12	

S6 - RED
G1 - GRN
G2 - GRN
G7 - GRN
SL3 (TWO)
X1VCC

Title	SH4B - AVL-2-B	
Date	16-Nov-2001	Revision 2
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PERFORMANCE CHECKSHEET