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NANOSECOND WAVEFORM ELECTRONICS
SINCE 1975

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INSTRUCTIONS

MODEL AVMH-5-P-ADRB
+20 TO +100 VOLTS, 1 MHz
IMPULSE GENERATOR MODULE
WITH 2 - 4 ns PULSE WIDTH

SERIAL NUMBER: _____

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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INTRODUCTION

The AVMH-5-P-ADRB is a high performance module capable of generating up to +100V into 50 Ω loads at repetition rates up to 1 MHz.

The output pulse width is variable from 2 to 4 ns. The pulse width is controlled by two 0 to +10 Volt DC control voltages; one for the leading edge and one for the falling edge. The control voltage input impedance is > 1 kilohm.

A TTL-level pulse must be applied to the trigger input, to trigger the output. The trigger pulse width should be > 10 ns in width. The input impedance is 1 k Ω .

The AVMH-5-P-ADRB requires a +24V DC / 500 mA power supply.

The output is designed to drive 50 Ω loads. (A 50 Ω load is required for proper operation.) The output is AC-coupled.

This instrument is intended for use in research and development laboratories.

SPECIFICATIONS

Model ¹ :	AVMH-5-P-ADRB
Amplitude (50Ω load ¹):	+20V to +100V
Pulse width:	2 to 4 ns (FWHM)
PRF:	0 to 1 MHz
Jitter:	± 15 ps (Ext trig in to pulse out)
Trigger required:	TTL (low = 0V, high = +3V to +5V), 10 ns or wider. 1 kΩ input impedance.
Monitor output option:	Provides a -20 dB attenuated coincident replica of main output
Connectors:	Out, Monitor, Trig: SMA
Power requirement:	+24V DC / 500 mA
Dimensions (HxWxD):	2.2 x 3.5 x 5.8 inches
Temperature range:	+5°C to +40°C

1) A 50 Ohm load is required. Other loads may damage the instrument. Consult Avtech (info@avtechpulse.com) if you need to drive other load impedances.

REGULATORY NOTES

FCC PART 18

This device complies with part 18 of the FCC rules for non-consumer industrial, scientific and medical (ISM) equipment.

This instrument is enclosed in a rugged metal chassis and uses a filtered power entry module (where applicable). The main output signal is provided on a shielded connector that is intended to be used with shielded coaxial cabling and a shielded load. Under these conditions, the interference potential of this instrument is low.

If interference is observed, check that appropriate well-shielded cabling is used on the output connectors. Contact Avtech (info@avtechpulse.com) for advice if you are unsure of the most appropriate cabling. Also, check that your load is adequately shielded. It may be necessary to enclose the load in a metal enclosure.

If any of the connectors on the instrument are unused, they should be covered with shielded metal "dust caps" to reduce the interference potential.

This instrument does not normally require regular maintenance to minimize interference potential. However, if loose hardware or connectors are noted, they should be tightened. Contact Avtech (info@avtechpulse.com) if you require assistance.

EC DECLARATION OF CONFORMITY



We Avtech Electrosystems Ltd.
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 Ottawa, Ontario
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declare that this pulse generator meets the intent of Directive 2004/108/EG 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

and that this pulse generator meets the intent of the Low Voltage Directive 2006/95/EC. Compliance pertains to the following specifications as listed in the official Journal of the European Communities:

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use

DIRECTIVE 2011/65/EU (RoHS)

We Avtech Electrosystems Ltd.
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declare that, to the best of our knowledge, all electrical and electronic equipment (EEE) sold by the company are in compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (also known as “RoHS Recast”). In addition, this declaration of conformity is issued under the sole responsibility of Avtech Electrosystems Ltd. Specifically, products manufactured do not contain the substances listed in the table below in concentrations greater than the listed maximum value.

<i>Material/Substance</i>	<i>Threshold level</i>
Lead (Pb)	< 1000 ppm (0.1% by mass)
Mercury (Hg)	< 1000 ppm (0.1% by mass)
Hexavalent Chromium (Cr6+)	< 1000 ppm (0.1% by mass)
Polybrominated Biphenyls (PBB)	< 1000 ppm (0.1% by mass)
Polybrominated Diphenyl ethers (PBDE)	< 1000 ppm (0.1% by mass)
Cadmium (Cd)	< 100 ppm (0.01% by mass)

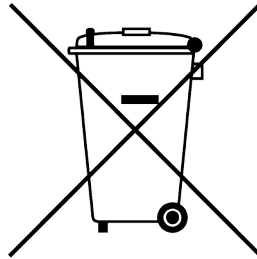
DIRECTIVE 2002/96/EC (WEEE)

European customers who have purchased this equipment directly from Avtech will have completed a “WEEE Responsibility Agreement” form, accepting responsibility for WEEE compliance (as mandated in Directive 2002/96/EC of the European Union and local laws) on behalf of the customer, as provided for under Article 9 of Directive 2002/96/EC.

Customers who have purchased Avtech equipment through local representatives should consult with the representative to determine who has responsibility for WEEE

compliance. Normally, such responsibilities will lie with the representative, unless other arrangements (under Article 9) have been made.

Requirements for WEEE compliance may include registration of products with local governments, reporting of recycling activities to local governments, and financing of recycling activities.




INSTALLATION

VISUAL CHECK

After unpacking the instrument mainframe and the transformer module, examine to ensure that they have not been damaged in shipment. Visually inspect all connectors, knobs, and handles. Confirm that a power cord and an instrumentation manual (this manual), are with the instrument. If the instrument has been damaged, file a claim immediately with the company that transported the instrument.

PROTECTION FROM ELECTRIC SHOCK

 Operators of this instrument must be protected from electric shock at all times. The owner must ensure that operators are prevented access and/or are insulated from every connection point. In some cases, connections must be exposed to potential human contact. Operators must be trained to protect themselves from the risk of electric shock. This instrument is intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possibly injury. In particular, operators should:

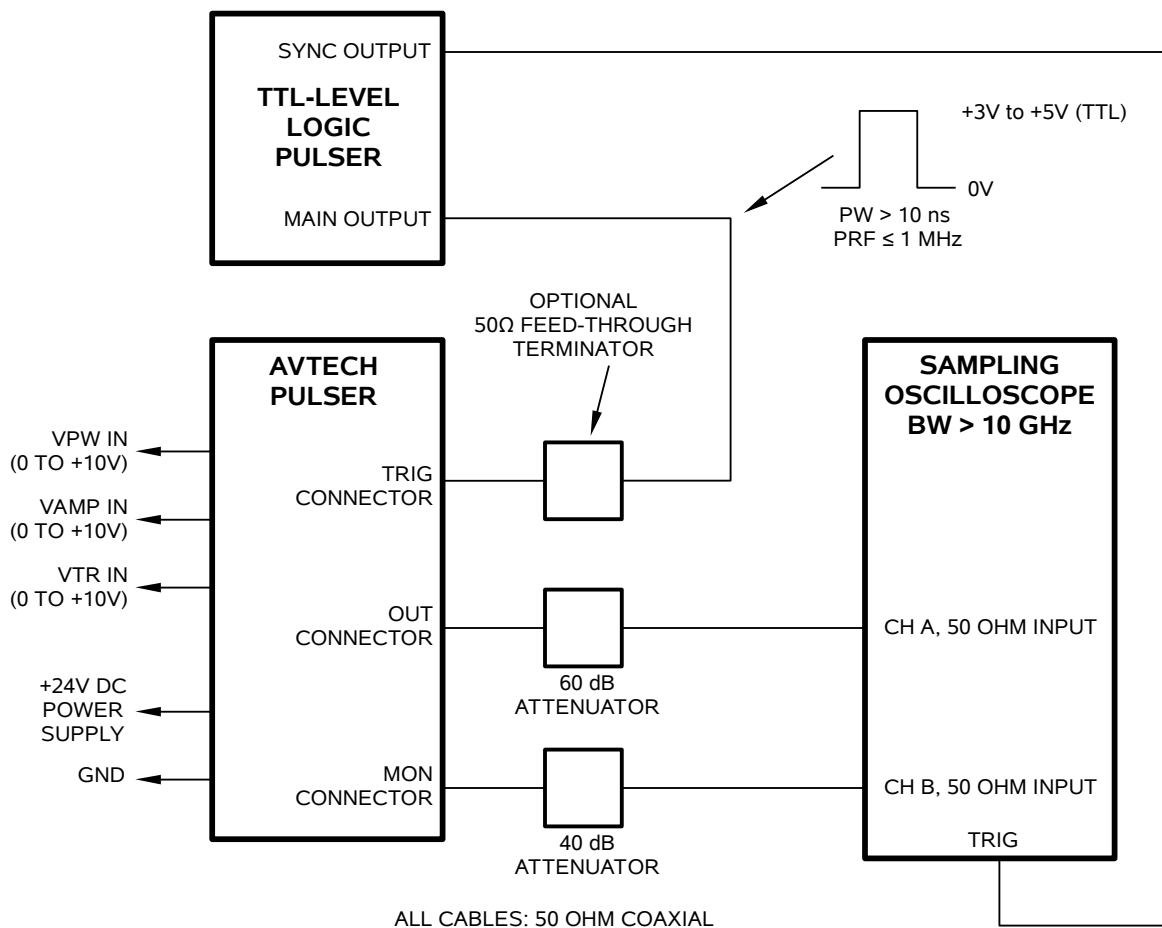
1. Keep exposed high-voltage wiring to an absolute minimum.
2. Wherever possible, use shielded connectors and cabling.
3. Connect and disconnect loads and cables only when the instrument is turned off.
4. Keep in mind that all cables, connectors, oscilloscope probes, and loads must have an appropriate voltage rating.
5. Do not attempt any repairs on the instrument, beyond the fuse replacement procedures described in this manual. Contact Avtech technical support (see page 2 for contact information) if the instrument requires servicing. Service is to be performed solely by qualified service personnel.

ENVIRONMENTAL CONDITIONS

This instrument is intended for use under the following conditions:

1. indoor use;
2. altitude up to 2 000 m;
3. temperature 5 °C to 40 °C;
4. maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
5. Mains supply voltage fluctuations up to ± 10 % of the nominal voltage;
6. no pollution or only dry, non-conductive pollution.

BASIC TEST ARRANGEMENT




The input impedance of the TRIG connector is 1 k Ω . This may lead to an impedance mismatch, transmission line reflections, and false triggering. The input impedance can be converted to 50 Ω simply by adding a feed-through SMA terminator onto the TRIG connector. The Pasternack PE6026 is a suitable terminator (see <http://www.pasternack.com>).

CONTROLS - FRONT

The location of the TRIG, MON, and OUT connectors, and the amplitude and pulse width controls are shown in the photo below.



 Caution: Voltages as high as $\pm 100\text{V}$ may be present on the center conductor of this output connector. Avoid touching this conductor. Connect to this connector using standard coaxial cable, to ensure that the center conductor is not exposed.

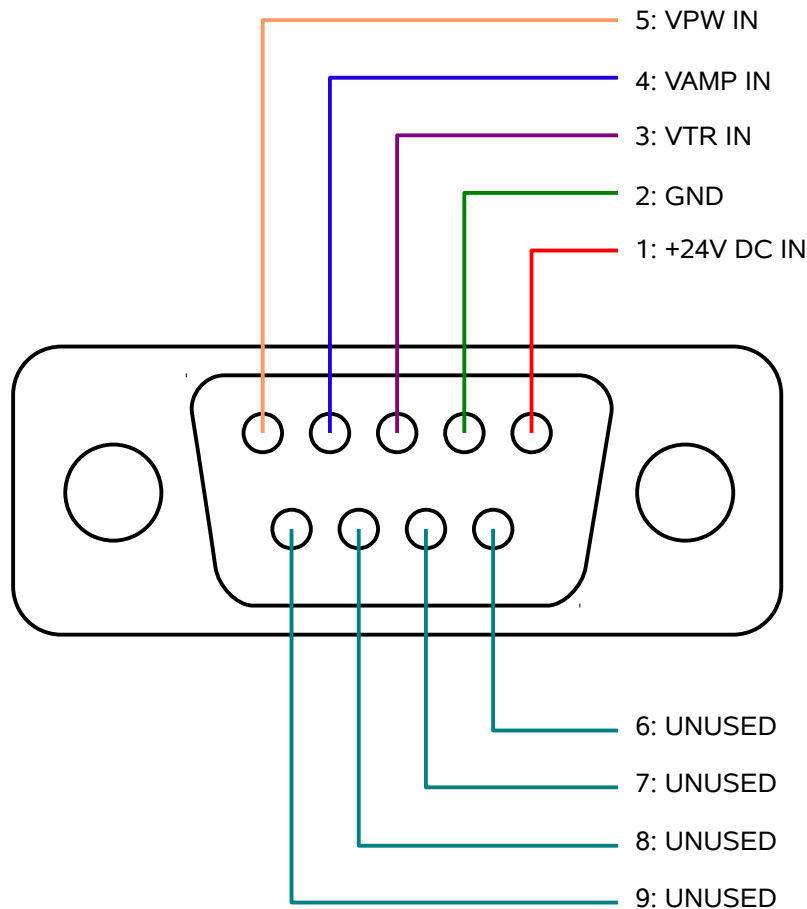
When used, the MON output must be terminated with 50Ω . If it is not used, it may be left unconnected.

CONTROLS - REAR

The power supply and the control signals (other than the TRIG input) are applied to the pins of the DB-9 connector on the rear of the module, shown below:



The pin connections are shown schematically below:



The user-supplied +24V DC power supply must be connected between pins 1 (+24V DC) and 2 (GND).

The output amplitude is controlled by a 0 to +10V DC control voltage applied to pin 4 (VAMP IN). The input impedance is 1 k Ω .

The output pulse width is controlled by two 0 to +10V DC control voltages applied to pins 3 (VTR IN) and pin 5 (VPW IN). The input impedance is 1 k Ω . The VTR IN signal controls the position of the rising edge, and the VPW IN signal controls the position of the trailing edge. They should be adjusted iteratively to obtain the best waveshape.

AMPLITUDE INTERACTION

Some properties of the output pulse may change as a function of the amplitude setting. For some demanding applications, it may be desirable to use a combination of external attenuators and the amplitude pot to achieve the desired output amplitude.

MONITOR OUTPUT

The monitor output connects to the main output internally through a 500 Ohm resistance. If the monitor output is terminated with 50 Ohms, the voltage on the monitor will be 1/11th of the voltage on the main output, approximately.

The monitor output may be left unconnected if it is not needed.

A 50 Ohm termination is required if it is used.

HEATSINKING

This module dissipates approximately 10 Watts of power internally. To avoid excessive thermal drift of the various output parameters, it is recommended that the base of the module be mounted on a heat sink. Four tapped 4-40 threaded holes are provided on the bottom surface for this purpose.

MINIMIZING WAVEFORM DISTORTIONS

USE 50Ω TRANSMISSION LINES AND LOADS

Connect the load to the pulse generator with 50Ω transmission lines (e.g. RG-58 or RG-174 cable).

This instrument requires a 50Ω load for proper operation. It will not properly drive a high-impedance load. The output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

USE LOW-INDUCTANCE LOADS

Lenz's Law predicts that for an inductive voltage spike will be generated when the current through an inductance changes. Specifically, $V_{\text{SPIKE}} = L \times dI_{\text{LOAD}}/dt$, where L is the inductance, I_{LOAD} is the load current change, and t is time. For this reason, it is important to keep any parasitic in the load low. This means keeping wiring short, and using low inductance components. In particular, wire-wound resistors should be avoided.

PREVENTING DAMAGE

The AVMH-5-P-ADRB may fail if triggered at a PRF greater than 1 MHz.

This unit is designed to operate into a load impedance of 50 Ohms and the output stage will be damaged if it is operated into an open circuit (or any other high impedance). Failures due to improper output loading are not covered by the warranty.

MECHANICAL INFORMATION

ELECTROMAGNETIC INTERFERENCE

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

PERFORMANCE CHECK SHEET