

**Model 9326
Fast Preamplifier
Operating and Service Manual**

Advanced Measurement Technology, Inc.

a/k/a/ ORTEC[®], a subsidiary of AMETEK[®], Inc.

WARRANTY

ORTEC* warrants that the items will be delivered free from defects in material or workmanship. ORTEC makes no other warranties, express or implied, and specifically NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

ORTEC's exclusive liability is limited to repairing or replacing at ORTEC's option, items found by ORTEC to be defective in workmanship or materials within one year from the date of delivery. ORTEC's liability on any claim of any kind, including negligence, loss, or damages arising out of, connected with, or from the performance or breach thereof, or from the manufacture, sale, delivery, resale, repair, or use of any item or services covered by this agreement or purchase order, shall in no case exceed the price allocable to the item or service furnished or any part thereof that gives rise to the claim. In the event ORTEC fails to manufacture or deliver items called for in this agreement or purchase order, ORTEC's exclusive liability and buyer's exclusive remedy shall be release of the buyer from the obligation to pay the purchase price. In no event shall ORTEC be liable for special or consequential damages.

Quality Control

Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

Repair Service

If it becomes necessary to return this instrument for repair, it is essential that Customer Services be contacted in advance of its return so that a Return Authorization Number can be assigned to the unit. Also, ORTEC must be informed, either in writing, by telephone [(865) 482-4411] or by facsimile transmission [(865) 483-2133], of the nature of the fault of the instrument being returned and of the model, serial, and revision ("Rev" on rear panel) numbers. Failure to do so may cause unnecessary delays in getting the unit repaired. The ORTEC standard procedure requires that instruments returned for repair pass the same quality control tests that are used for new-production instruments. Instruments that are returned should be packed so that they will withstand normal transit handling and must be shipped PREPAID via Air Parcel Post or United Parcel Service to the designated ORTEC repair center. The address label and the package should include the Return Authorization Number assigned. Instruments being returned that are damaged in transit due to inadequate packing will be repaired at the sender's expense, and it will be the sender's responsibility to make claim with the shipper. Instruments not in warranty should follow the same procedure and ORTEC will provide a quotation.

Damage in Transit

Shipments should be examined immediately upon receipt for evidence of external or concealed damage. The carrier making delivery should be notified immediately of any such damage, since the carrier is normally liable for damage in shipment. Packing materials, waybills, and other such documentation should be preserved in order to establish claims. After such notification to the carrier, please notify ORTEC of the circumstances so that assistance can be provided in making damage claims and in providing replacement equipment, if necessary.

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SAFETY INSTRUCTIONS AND SYMBOLS

This manual contains up to three levels of safety instructions that must be observed in order to avoid personal injury and/or damage to equipment or other property. These are:

DANGER Indicates a hazard that could result in death or serious bodily harm if the safety instruction is not observed.

WARNING Indicates a hazard that could result in bodily harm if the safety instruction is not observed.

CAUTION Indicates a hazard that could result in property damage if the safety instruction is not observed.

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

In addition, the following symbol may appear on the product:



ATTENTION – Refer to Manual



DANGER – High Voltage

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

SAFETY WARNINGS AND CLEANING INSTRUCTIONS

DANGER Opening the cover of this instrument is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.

WARNING Using this instrument in a manner not specified by the manufacturer may impair the protection provided by the instrument.

Cleaning Instructions

To clean the instrument exterior:

- Unplug the instrument from the ac power supply.
- Remove loose dust on the outside of the instrument with a lint-free cloth.
- Remove remaining dirt with a lint-free cloth dampened in a general-purpose detergent and water solution. Do not use abrasive cleaners.

CAUTION To prevent moisture inside of the instrument during external cleaning, use only enough liquid to dampen the cloth or applicator.

- Allow the instrument to dry completely before reconnecting it to the power source.



Front Panel



Rear Panel

ORTEC MODEL 9326 FAST PREAMPLIFIER

1. DESCRIPTION

The Model 9326 Fast Preamplifier is optimized for amplifying the pulses from microchannel plate detectors, electron multipliers, photomultiplier tubes, fast photodiodes, and silicon charged-particle detectors. The fast rise times of these detectors are preserved by the <1-ns rise time of the Model 9326 output, which can supply 0- to -1-V pulse amplitudes into a 50- Ω load. The compact size permits placement close to the detector to avoid ground loop and environmental noise interference with the small signals produced by the detector. Gains of 5, 10, or 20 volts/volt (non-inverting) can be selected via a board jumper.

A low-frequency roll-off less than 10 kHz is unusual for a preamplifier intended for processing fast detector pulses. This low-frequency response was incorporated to virtually eliminate pulse undershoot when used with the FASTFLIGHT™ Digital Signal Averager in the electrospray time-of-flight mass spectrometry application.

To minimize damage caused by large transients from the detector, the input incorporates overload protection. The output is also short-circuit protected. Any 9-pin-D preamplifier power connector meeting the ORTEC standard pin assignments can be used to supply the +12-V power via a standard power cable.

2. SPECIFICATIONS

2.1. PERFORMANCE

INPUT NOISE <100 μ V rms.

OUTPUT RISE TIME <1 ns.

LOW FREQUENCY ROLL-OFF <10 kHz.

GAIN Selectable by board jumpers for 5, 10, or 20 V/V. The overall gain is non-inverting.

OPERABLE TEMPERATURE RANGE 0–50°C.

2.2. CONTROLS

COARSE GAIN Board jumper selection of low (5 V/V), medium (10 V/V), or high (20 V/V) gain.

2.3. INPUTS

ANALOG INPUT Front-panel BNC connector accepts negative-polarity analog signals in the range of 0 to -200 mV. Input impedance: 50 Ω ac, <1000 Ω dc to ground. Diode clamps provide protection against overload to \pm 2 V dc, or \pm 10 V for a 50-ns wide pulse at a duty cycle <1%.

2.4. OUTPUTS

ANALOG OUTPUT Rear-panel BNC connector provides a negative-polarity output pulse. Linear range is nominally +0.25 V to -1 V on a 50- Ω load. AC-coupled and short-circuit protected.

2.5. ELECTRICAL AND MECHANICAL

POWER Requires +12 V at 100 mA dc power, which is supplied through a 3-m (9.8-ft) power cord included with the Model 9326. The mating connectors on the ends of the power cord are ORTEC-standard, 9-pin-D, preamplifier power connectors. Pin assignments for the male connector on the preamplifier case are +12 V on pin 4, and ground on pins 1 and 2.

WEIGHT Net 0.39 kg (0.85 lb); shipping 1.3 kg (2.9 lb).

DIMENSIONS Compact preamplifier box: 8.6 cm W \times 13.3 cm D \times 3.0 cm H (3.4 in. W \times 5.3 in. D \times 1.2 in. H).

3. INSTALLATION AND STARTUP

NOTE The correct coaxial cable impedance is critical for the connections between the detector and the Model 9326 Fast Preamplifier input, and between the preamplifier output and the load. Only RG-58A/U cable can be used to match the 50- Ω termination impedances at the input to the preamplifier and the load. Cables not having a 50- Ω characteristic impedance, as does RG-58/U (53.5- Ω), will cause reflections of the input pulses at the ends of the cable. Always use high-quality RG-58A/U 50- Ω coaxial cable.

3.1. SETUP

CAUTION To avoid damaging the preamplifier, disconnect it from all voltage sources before removing the cover.

CAUTION Set the Model 9326 coarse-gain jumper before connecting the unit to any other equipment.

CAUTION The Model 9326 should not be subjected to temperatures in excess of 50°C.

3.1.1. Preamplifier Input

3.1.1.1. Setting the Coarse Gain

The Model 9326 Preamplifier Input has three coarse-gain settings (5 V/V, 10 V/V, and 20 V/V). To change the gain:

1. Remove the two outboard screws on the rear panel of the preamplifier. Do not remove the screw between the Output and Power connectors.
2. Slide the printed wiring board (PWB) out of the case by pulling on the rear panel output connector.
3. Figure 1 shows the location of the gain jumper on the board. (Note that the values of the three jumper settings are printed on the board beside their respective settings.) Change the board jumper to the desired gain setting.
4. Carefully slide the board back into the same suspension slots on the preamplifier case.
5. Insert the two outboard screws to reattach the rear panel to the case.

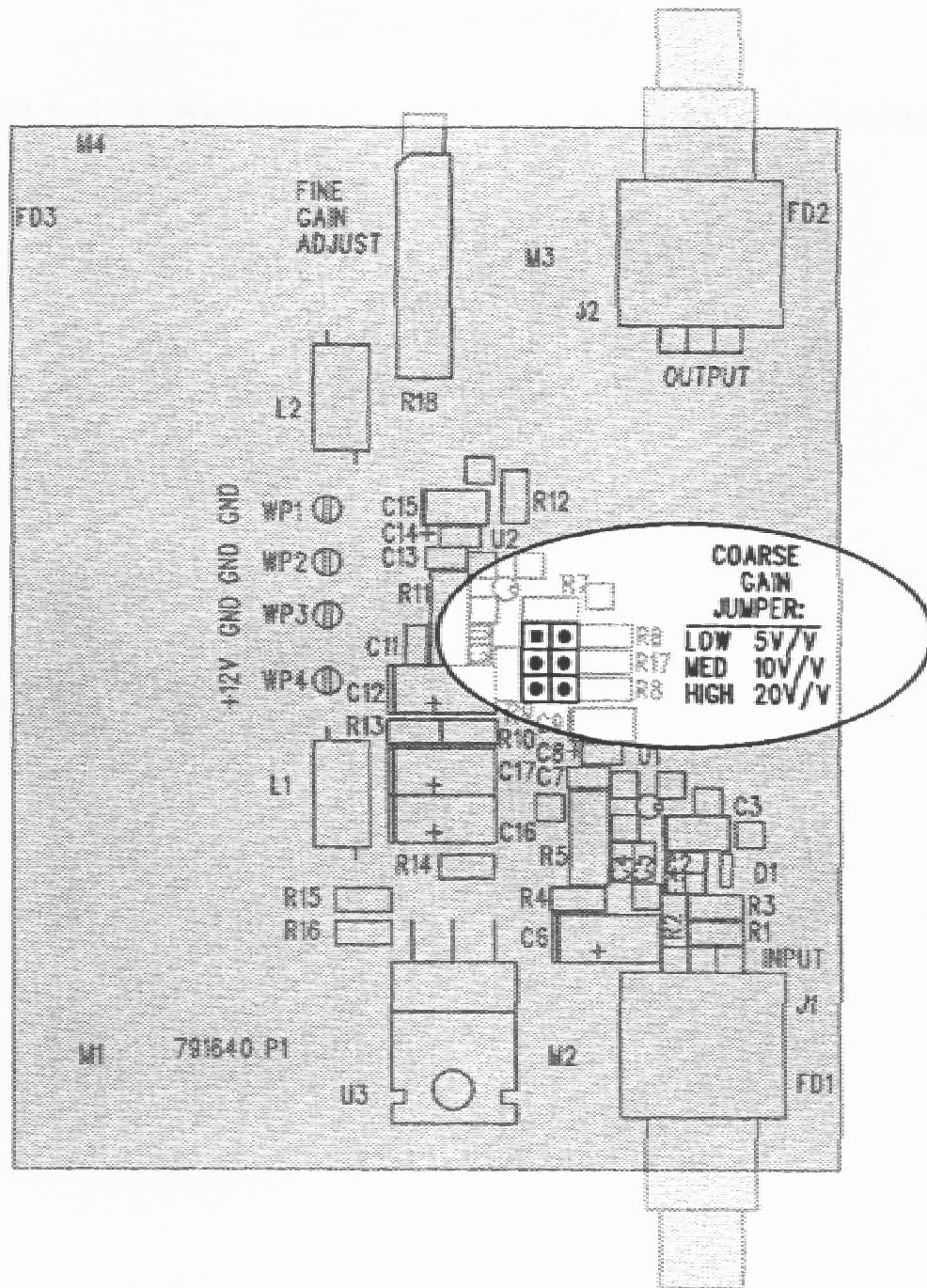


Fig. 1. Setting the Model 9326 Coarse Gain Jumper. (Note that the jumper values are printed on the board.)

3.1.2. Cable Connections

Connect the output of the detector to the INPUT of the Model 9326 with 50- Ω , RG-58A/U coaxial cable having matching BNC connectors. It is best to keep the cable length short (<30 cm) to provide a low-resistance ground path between the detector and preamplifier grounds. This will minimize the interference from ground-loop noise. If the detector has dc high voltage on its output, a high-voltage isolation capacitor will need to be installed in series with the detector output to prevent damage to the preamplifier input. To avoid damaging the preamplifier input, always turn off the detector high voltage and ensure that the voltage on the center pin of the detector connector is zero before connecting to the preamplifier input.

If a connector adapter is required, keep the cable between the detector and preamplifier as short as possible to minimize the effects of cable reflections.

To avoid ground-loop noise, it may be desirable to isolate the detector ground from its mechanical mount with a modest resistance (100–1000 Ω). This ensures that the preamplifier will establish the ground reference for the detector signal, eliminating a ground loop.

3.1.3. Preamplifier Output

Connect the preamplifier OUTPUT to the load using 50- Ω , RG-58A/U coaxial cable with matching BNC connectors. The length of this cable is not critical, but it should not be longer than necessary.

3.1.4. Preamplifier Power

The cable supplied for connecting preamplifier power has a female, 9-pin D connector on one end and a male, 9-pin D connector on the other. Connect the female end to the POWER connector on the rear of the Model 9326. Connect the male end to any standard ORTEC PREAMP POWER connector.

4. MAINTENANCE

The Model 9326 requires very little maintenance other than routine removal of dust and tightening of mechanical connections.