PerkinElmer instruments.
ORTEC Products

660
Dual 5-kV Detector Bias Supply

- Two independent bias supplies in a single module for germanium and silicon detectors
- 0–5 kV or 0–500 V at 0–100 µA
- Remote shutdown feature compatible with ORTEC and TTL outputs from warmup sensors on germanium detectors
- Reset safety feature on remote shutdown minimizes risk of preamplifier FET damage
- Selected output polarity indicated before bias voltage is turned on
- Automatic overload protection and overload indicator

The ORTEC Model 660 Dual 5-kV Detector Bias Supply contains two independently adjustable power supplies for furnishing the bias voltage to germanium detectors, silicon detectors, or ionization chambers. It can be used with any detector that draws less than 100 µA of current, and whose gain is insensitive to the applied voltage. The output voltages are continuously adjustable from zero to full scale with calibrated and locking 5-turn dials. Each supply provides two outputs controlled by the same dial: a 0 to 5 kV output, and a 0 to 500 V output. Two 10-segment bar-graph indicators verify that the selected voltages are being supplied at the outputs.

Security against accidentally changing the output polarity to the wrong state is ensured by two features. The selected output polarity for each supply is indicated by front-panel LEDs whenever the NIM bin power is turned on. Thus, the correct polarity can be verified before the HV ON/OFF switch is used to turn on the bias voltage to the detector. In addition, the side panel must be removed in order to alter the output polarity. This discourages unintentional changes.

The Model 660 includes a remote shutdown feature to protect the preamplifier FET against damage when a cooled germanium or Si(Li) detector warms up. Each supply includes a BIAS SHUTDOWN input that is compatible with the standard warmup sensor output on ORTEC preamplifiers. When the preamplifier signals a warmup condition, the Model 660 shuts off the bias voltage to that detector, and turns on a SHUTDOWN indicator light. The bias voltage remains off, independent of the signal from the preamplifier warmup sensor, until the shutdown mode is manually cancelled by pressing the RESET push button. This protects the preamplifier FET if the detector is cooling down with the HV ON/OFF switch accidentally left on. For further protection against operator error in the ORTEC shutdown mode, the bias shut-down input interprets a disconnected cable or a shorted cable as a warm detector, and responds by turning off the bias voltage. Some detector manufacturers provide a TTL logic level output from their detector warmup sensor. A board-mounted jumper in the Model 660 can be moved to the TTL position to make the bias shutdown input compatible with detectors supplying a TTL output. It is also possible to disable the bias shutdown feature by moving the board jumper to the BYPASS position. The Model 660 is shipped from the factory with both supplies set to the ORTEC mode.

The high voltage outputs are protected against overload. When the bias supply senses an excessive output current demand, it turns on the overload light and reduces the output voltage until the output current is within tolerable limits. Recovery from overload is automatic when the excessive current demand is eliminated.

Channels A and B are independent supplies. The specifications apply to either channel.

PERFORMANCE

BIAS VOLTAGE RANGES 0–5 kV, or 0–500 V, on separate outputs, with each output controlled by a common, 5-turn, direct-reading, precision potentiometer located on the front panel.

BIAS VOLTAGE POLARITY Positive or negative. Internally selectable. Polarity indicated by front-panel LEDs whenever bin power is on.

RATED OUTPUT CURRENT 0–100 µA.

OUTPUT LINEARITY Within ±3% of dial setting from 10% to 100% of full range.

TEMPERATURE SENSITIVITY OF OUTPUT VOLTAGE <±0.08%/°C through the 10 to 50°C operating range.

VOLTAGE STABILITY <±0.1%/h variation in output voltage with constant temperature, constant load, and constant input voltages from the bin supply.

NOISE AND RIPPLE <10 mV peak-to-peak from 5 Hz to 50 MHz.

OUTPUT VOLTAGE RISE TIME Nominally 500 ms.

INPUTS

BIAS SHUTDOWN INPUT Rear-panel BNC connector accepts signals from warmup sensors in cooled germanium detectors. When a warmup is signalled, this input turns off the detector bias voltage in order to protect the preamplifier FET input. The ORTEC/TTL/BYPASS jumper selects the operating mode of the BIAS SHUTDOWN input for compatibility with the warmup sensor in the associated Ge detector.

ORTEC Mode The input is compatible with the warmup sensor output on ORTEC germanium detectors. For added safety, an open or shorted coaxial cable on the BIAS SHUTDOWN input will also cause the supply to shut down.

TTL Mode A source supplying >+2 V or an open circuit will allow the Model 660 to produce the full output voltage. A source supplying <+0.8 V and capable of sinking 7 0 0 µA will shut down the high voltage output.

INDICATORS

0 kV–5 kV Front-panel, 10-segment, bar-graph display indicates actual output voltage at the 0–5 kV output. Each segment corresponds to a 0.5-kV increment in output voltage, starting with 0.5 kV to turn on the first segment, and ending with 5 kV to turn on the tenth segment.

POS Front-panel LED is lit when the bin power is on, if the positive output polarity has been selected.

NEG Front-panel LED is lit when the bin power is on, if the negative output polarity has been selected.

ON Front-panel LED indicates when the output bias voltage is turned on. This LED turns off when the HV ON/OFF switch is turned off, the bin power is off, or the shutdown mode has been activated.

OVERLOAD Front-panel LED turns on when the bias supply senses an excessive output current demanded by the external load. Under overload, the output voltage is reduced automatically until the output current is within tolerable limits. Recovery from overload is automatic when the overload is eliminated.

SHUTDOWN Front-panel LED turns on when the shutdown mode has been activated to turn off the output voltage. The shutdown mode is activated by the appropriate signal level on the rear-panel, BIAS SHUTDOWN input, or whenever the bin power is turned off and on.

CONTROLS

0–5 kV Front-panel, 5-turn, direct-reading, locking potentiometer with 500 dial divisions adjusts the output voltages simultaneously for the 0–500 V and the 0–5 kV outputs.

HV ON/OFF Front-panel toggle switch turns the 0–500 V and the 0–5 kV outputs on or off. For added safety, the RESET push button must be pressed after turning the HV ON/OFF switch to the ON position, in order to turn on the output voltage. The output voltage will not turn on if a shutdown condition is present at the BIAS SHUTDOWN input.

BYPASS MODE The BIAS SHUTDOWN input is rendered inactive, and cannot trigger a bias shutdown.

OUTPUTS

0–5 kV Rear-panel SHV connector furnishes the adjusted output voltage in the 0 to 5-kV range through an output impedance of approximately 2 MΩ. A voltage foldback circuit protects the output against demands for excessive output current. Recovery from overload is automatic when the overload is eliminated.

0–500 V Rear-panel SHV connector furnishes the adjusted output voltage in the 0 to 500-V range through an output impedance of approximately 700 kΩ. A voltage foldback circuit protects the output against demands for excessive output current. Recovery from overload is automatic when the overload is eliminated.

ORDERING INFORMATION

To order, specify:

Model	Description
660	5-kV Detector Bias Supply
C-24-12	RG-62A/U 93-W Cable with two BNC male plugs; 12-ft length
C-36-12	RG-59A/U 75-W Cable with two SHV female plugs; 12-ft length

RESET Pressing this front-panel push-button switch enables the high voltage to turn on after the bin power has been turned on, the HV ON/OFF switch has been turned on, or the supply has been disabled by the BIAS SHUTDOWN input. If a shutdown condition is still present at the BIAS SHUTDOWN input, the RESET button will be ineffective.

ORTEC/TTL/BYPASS Internal printed wiring board jumper selects the operating mode of the BIAS SHUTDOWN input for compatibility with the warmup sensor in the associated Ge detector. The ORTEC position is used for ORTEC detectors. The TTL position is for detectors employing TTL levels. The BYPASS position disables the BIAS SHUTDOWN input, but does not alter the function of the RESET button. The Model 660 is shipped with this jumper in the ORTEC mode.

OUTPUT VOLTAGE POLARITY The output polarity is changed between positive and negative by changing the position of a daughter board in the module.

ELECTRICAL AND MECHANICAL

POWER REQUIREMENTS The Model 660 derives its power from a NIM bin power supply. Required dc voltages and currents are: +24 V at 135 mA, +12 V at 150 mA, –12 V at 100 mA, –24 V at 75 mA.

WEIGHT
Net 0.90 kg (2.0 lb).
Shipping 1.4 kg (3.0 lb).

DIMENSIONS Standard single-width NIM module, 3.43 X 22.13 cm (1.35 X 8.714 in.) front panel per DOE/ER-0457T.

Model 660
5-kV Detector Bias Supply
Operating and Service Manual

WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. As temporarily permitted by regulation it has not been tested for compliance with limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to make whatever measures may be required to correct the interference.

Printed in U.S.A. ORTEC® Part No. 753780 1202
Manual Revision H

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.

CONTENTS

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.

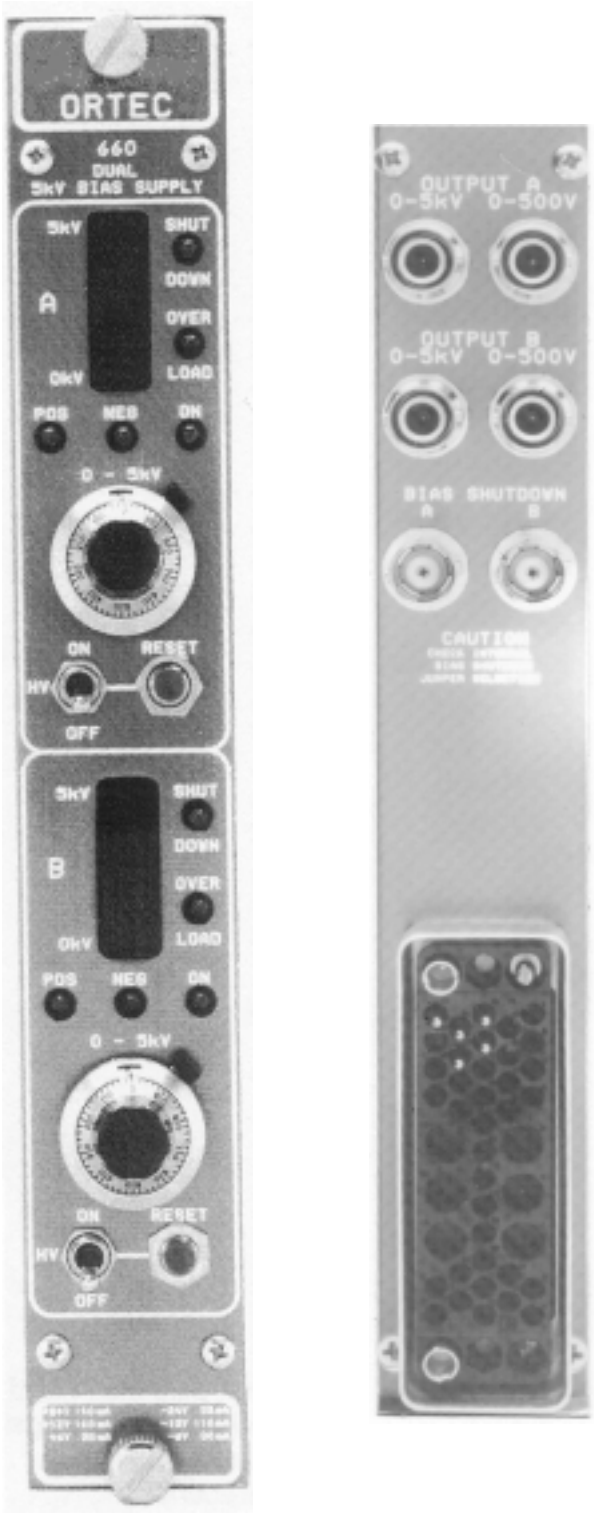
Cleaning Instructions

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.


ORTEC
660
DUAL
5kV BIAS SUPPLY
5kV
SHUT
DOWN
A
OVER
LOAD
0kV
POS
NEG
ON
0 - 5kV
ON
RESET
HV
OFF
5kV
SHUT
DOWN
B
OVER
LOAD
0kV
POS
NEG
ON
0 - 5kV
ON
RESET
HV
OFF
OUTPUT A
0-5kV 0-500V
OUTPUT B
0-5kV 0-500V
BIAS SHUTDOWN
A
B
CAUTION

ORTEC MODEL 660
Dual 5-kV DETECTOR BIAS SUPPLY

1. DESCRIPTION

The ORTEC Model 660 Dual 5-kV Detector Bias Supply contains two independently adjustable power supplies for furnishing the bias voltage to germanium detectors, silicon detectors, or ionization chambers. It can be used with any detector that draws less than 100 µA of current, and whose gain is insensitive to the applied voltage. The output voltage is continuously adjustable from zero to full scale with a calibrated and locking 5-turn dials. Each supply provides two outputs controlled by the same dial: a 0 - 5 kV output, and a 0 - 500 V output. Two 10-segment bar-graph indicator verify that the selected voltage is being supplied at the outputs.

Security against accidentally changing the output polarity to the wrong state is ensured by two features. The selected output polarity is indicated by front-panel LEDs whenever the NIM bin power is turned on. Thus, the correct polarity can be verified before the HV ON/OFF switch is used to turn on the bias voltage to the detector. In addition, the side panel must be removed in order to alter the output polarity. This discourages unintentional changes.

The Model 660 includes a remote shutdown feature to protect the preamplifier FET against damage when a cooled germanium or Si(Li) detector warms up. Each supply includes a BIAS SHUTDOWN input which is compatible with the standard warmup sensor output on ORTEC preamplifiers. When the preamplifier signals a warmup condition, the Model 660 shuts off the bias voltage and turns on a SHUTDOWN indicator light. The bias voltage remains off, independent of the signal from the preamplifier warmup sensor, until the shutdown mode is manually canceled by pressing the RESET push-button. This protects the preamplifier FET if the detector is cooling down with the HV ON/OFF switch accidentally left on. For further protection against operator error in the ORTEC shutdown mode, the bias shutdown input interprets a disconnected cable or a shorted cable as a warm detector, and responds by turning off the bias voltage. Some detector manufacturers provide a TTL logic level output from their detector warmup sensor. A board-mounted jumper in the Model 660 can be moved to the TTL position to make the bias shutdown input compatible with detectors supplying a TTL output. It is also possible to disable the bias shutdown feature by moving the board jumper to the BYPASS position. The Model 660 is shipped from the factory with both supplies set to the ORTEC mode.

The high voltage outputs are protected against overload. When the bias supply senses an excessive output current demand, it turns on the overload light and reduces the output voltage until the output current is within tolerable limits. Recovery from overload is automatic when the excessive current demand is eliminated.

2. SPECIFICATIONS[1]

Channels A and B are independent supplies. The specifications listed below apply to either channel.

2.1. PERFORMANCE

BIAS VOLTAGE RANGES 0-5 kV, or 0-500 V, on separate outputs, with each output controlled by a common, 5-turn, direct-reading, precision potentiometer located on the front panel.

BIAS VOLTAGE POLARITY Positive or negative. Internally selectable. Polarity indicated by front-panel LEDs whenever bin power is on.

RATED OUTPUT CURRENT 0-100 µA.

[1]Subject to change without notice

OUTPUT LINEARITY Within ±3% of dial setting from 10% to 100% of full range.

TEMPERATURE SENSITIVITY OF OUTPUT VOLTAGE <±0.08%/°C through 10° to 50°C operating range.

VOLTAGE STABILITY <±0.1%/h variation in output voltage with constant temperature, constant load, and constant input voltages from the bin supply.

NOISE AND RIPPLE <10 mV peak-to-peak from 5 Hz to 50 MHz.

OUTPUT VOLTAGE RISE TIME Nominally 500 ms.

2.2. INDICATORS

0 kV - 5 kV Front-panel, 10-segment, bar-graph display indicates actual output voltage at the 0-5 kV output. Each segment corresponds to a 0.5-kV increment in output voltage, starting with 0.5 kV to turn on the first segment, and ending with 5 kV to turn on the tenth segment.

POS Front-panel LED is lit when the bin power is on, if the positive output polarity has been selected.

NEG Front-panel LED is lit when the bin power is on, if the negative output polarity has been selected.

ON Front-panel LED indicates when the output bias voltage is turned on. This LED turns off when the HV ON/OFF switch is turned off, the bin power is off, or the shutdown mode has been activated.

OVERLOAD Front-panel LED turns on when the bias supply senses an excessive output current demanded by the external load. Under overload, the output voltage is reduced automatically until the output current is within tolerable limit. Recovery from overload is automatic when the overload is eliminated.

SHUTDOWN Front-panel LED turns on when the shutdown mode has been activated to turn off the output voltage. The shutdown mode is activated by the appropriate signal level on the rear-panel, BIAS SHUTDOWN input, or whenever the bin power is turned off and on.

2.3. CONTROLS

0-5 kV Front-panel, 5-turn, direct-reading, locking potentiometer with 500 dial divisions adjusts the output voltages simultaneously for the 0-500 V and the 0-5 kV outputs.

HV ON/OFF Front-panel toggle switch turns the 0-500 V and the 0-5 kV outputs on or off. For added safety, the RESET push-button must be pressed after turning the HV ON/OFF switch to the ON position, in order to turn on the output voltage. The output voltage will not turn on if a shutdown condition is present at the BIAS SHUTDOWN input.

RESET Pressing this front-panel push-button switch enables the high voltage to turn on after the bin power has been turned on, the HV ON/OFF switch has been turned on, or the supply has been disabled by the BIAS SHUTDOWN input. If a shutdown condition is still present at the BIAS SHUTDOWN input, the RESET button will be ineffective.

ORTEC/TTL/BYPASS Internal printed wiring board jumper selects the operating mode of the BIAS SHUTDOWN input for compatibility with the warmup sensor in the associated Ge detector. The ORTEC position is used for ORTEC detectors. The TTL position is for detectors employing TTL levels. The BYPASS position disables the BIAS SHUTDOWN input, but does not alter the function of the RESET button. The Model 660 is shipped with this jumper in the ORTEC mode.

OUTPUT VOLTAGE POLARITY The output polarity is changed between positive and negative by changing the position of a daughter board in the module.

2.4. INPUTS

BIAS SHUTDOWN INPUT Rear-panel BNC connector accepts signals from warmup sensors in cooled germanium detectors. When a warmup is signaled, this input turns off the detector bias voltage in order to protect the preamplifier FET input. The ORTEC/TTL/ BYPASS jumper selects the operating mode of the BIAS SHUTDOWN input for compatibility with the warmup sensor in the associated Ge detector.

ORTEC Mode The input is compatible with the warmup sensor output on ORTEC germanium detectors. For added safety, an open or shorted coaxial cable on the BIAS SHUTDOWN input will also cause the supply to shut down.

TTL Mode A source supplying >+2 V or an open circuit will allow the Model 659 to produce the full output voltage. A source supplying <+0.8 V and capable of sinking 700 µA will shut down the high voltage output.

BYPASS Mode The BIAS SHUTDOWN input is rendered inactive, and cannot trigger a bias shutdown.

2.5. OUTPUTS

0-5 kV Rear-panel SHV connector furnishes the adjusted output voltage in the 0 to 5 kV range through an output impedance of approximately 2 MΩ. A voltage foldback circuit protects the output against demands for excessive output current. Recovery from overload is automatic when the overload is eliminated.

0-500 V Rear-panel SHV connector furnishes the adjusted output voltage in the 0 to 500 V range through an output impedance of approximately 700 kΩ. A voltage foldback circuit protects the output against demands for excessive output current. Recovery from overload is automatic when the overload is eliminated.

2.6. ELECTRICAL AND MECHANICAL

POWER REQUIREMENTS The Model 660 derives its power from a NIM bin power supply. Required dc voltages and currents are: +24 V at 135 mA, +12 V at 150 mA, -12 V at 100 mA, -24 V at 75 mA.

WEIGHT

Net 0.90 kg (2.0 lb).
Shipping 1.4 kg (3.0 lb).

DIMENSIONS NIM-standard single-width module 3.43 x 22.13 cm (1.35 x 8.714 in.) front panel per DOE/ER-0457T.

3. INSTALLATION

3.1. GENERAL

The ORTEC Model 660 Dual 5-kV Detector Bias Supply contains two totally independent 0-5 kV detector bias supplies in a single-wide NIM package. For simplicity, the following information describes only one of the two power supply sections. The specifications, controls, inputs, outputs, and operation are duplicated in the second power supply section.

The Detector Bias Supply is normally used in conjunction with other modular electronics and is installed in a Model 4001A/4002A NIM Bin/Power Supply. The Bin and Power Supply is intended for rack mounting. Therefore, any other equipment that may be installed in the same rack must be sufficiently cooled by circulating air to prevent any localized heating of the circuits in the Model 660. The temperature of equipment operating in racks can easily exceed the recommended maximum of 50°C (120°F) unless these precautions are taken.

3.2. CAUTION

Removal of the module side panel exposes components that operate at voltages up to 5 kV. Always turn power Off before removing the side panel, and connect a grounded wire to each output.

3.3. SELECTION OF OUTPUT POLARITY

The polarity of the output voltage of the Model 660 is determined by the location of a printed wiring board that plugs onto the main printed wiring board. Access to the board is obtained by removing the

right side panel of the module (viewed from the front). When the polarity PWB is moved to the forward position, positive polarity is selected. When the polarity PWB is moved to the rear position, negative polarity is selected (Fig. 1). The selected output is indicated by two front-panel-mounted LEDs. POS indicates positive high voltage and NEG indicates negative high voltage. The capacitors on this board can retain substantial voltages even after power is turned off. Observe the precautions in Section 3.2 to avoid injury.

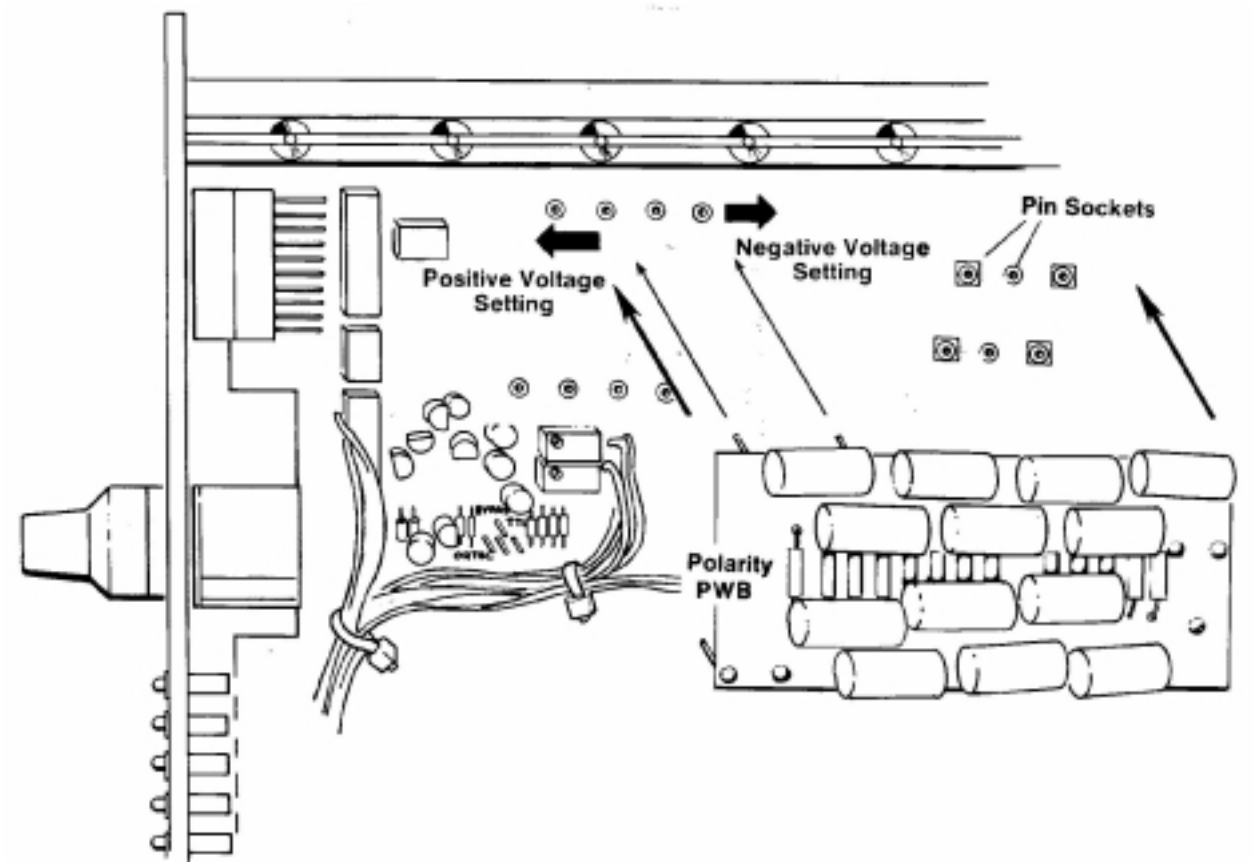


Fig. 1. Changing the High Voltage Output Polarity: (A) For Positive HV, plug the Printed Wiring Board (PWB) into the leftmost (toward the front of the module) set of pin sockets; (B) For Negative HV, plug the PWB into the rightmost (toward the rear of the module) set of pin sockets.

3.4. SELECTION OF BIAS SHUTDOWN MODE

The selection of the Bias Shutdown mode is accomplished via a printed wiring board (PWB) jumper located on the main PWB (Fig. 2). Access to the jumper is obtained by removing the right side panel (viewed from the front). Its three alternate locations ORTEC, TTL, and BYPASS are marked on the PWB. Follow the precautions prescribed in Section 3.2.

The **ORTEC** mode provides compatibility with all ORTEC detectors having a Bias Shutdown output. In this mode, the high voltage output is reduced to zero volts, and a front-panel SHUTDOWN LED indicates a shutdown condition exists if the coaxial cable connecting the ORTEC detector to the Bias Shutdown input becomes open or shorted, or the detector shutdown circuitry indicates a warm detector. The Model 660 is shipped from the factory in the ORTEC mode.

The **TTL** mode is provided to interface with Bias Shutdown circuits compatible with TTL logic levels. In this mode, the high voltage output is reduced to zero volts, and a front-panel SHUTDOWN LED indicates a shutdown condition exists it a logic "0" is applied to the center pin of the Bias Shutdown input. A logic “1" (or open collector) applied to the center pin allows normal operation of the high voltage.

The **BYPASS** mode allows normal operation of the high voltage output without Bias Shutdown protection.

3.5. CONNECTION TO POWER

This instrument obtains its dc operating power from the standard Bin and Power Supply in which it is installed. **Always turn bin power Off and the Model 660 HV ON/OFF switch OFF before inserting or removing the module.** After insertion, turn on the bin power, but leave the Model 660 HV ON/OFF switch in the OFF position. This ensures that the polarity selection of the Model 660 will be indicated by an LED on the front panel before high voltage is actually furnished to its output connectors. The adjusted high voltage is available through the output connectors as soon as the Model 660 HV ON/OFF switch is turned ON and the RESET push button is pressed.

3.6. OUTPUT CONNECTION

The Model 660 Dual 5-kV Bias Supply is compatible with all ORTEC preamplifiers that include provision to accept the high voltage for the detector. The output controls are located on the front panel, and the output connectors are located on the rear panel. The output cables require a type SHV connector at the power supply end, which is the type furnished with each ORTEC preamplifier for that purpose.

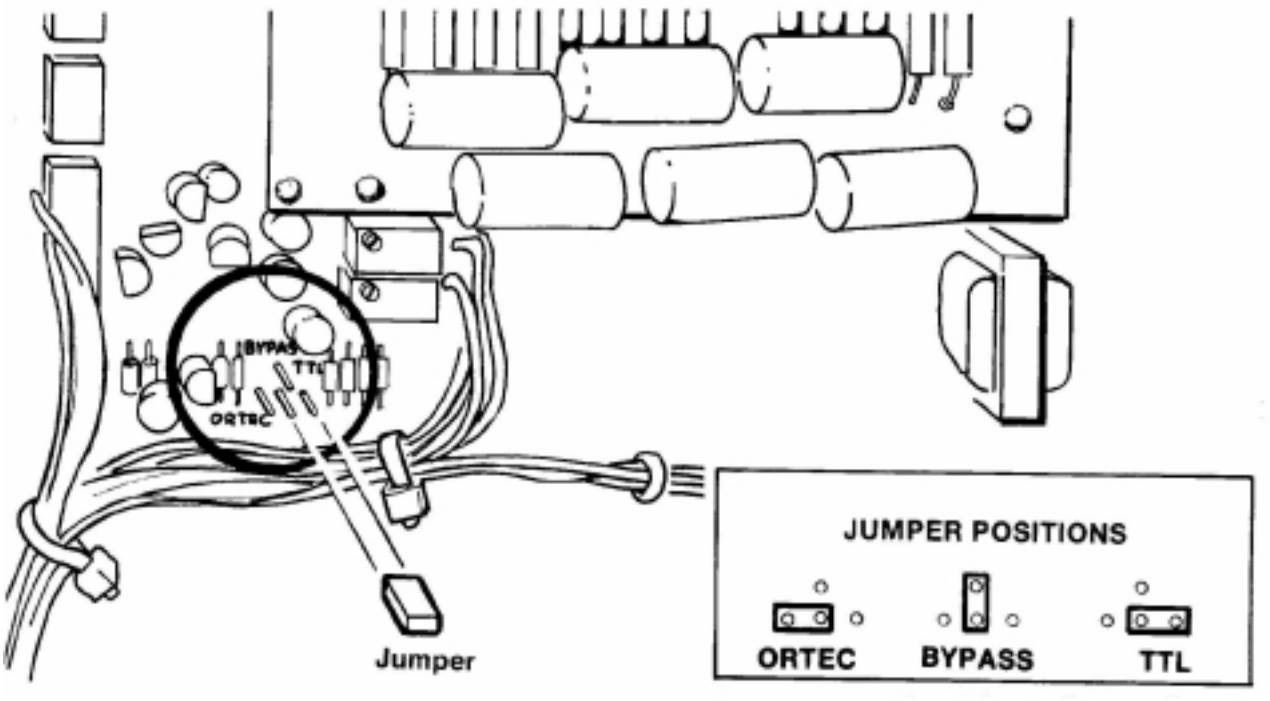


Fig. 2. Jumper Positions for Selecting the Proper Bias Shutdown Configuration.

4. OPERATION

CAUTION

Always have the high voltage turned off before connecting the cable to or disconnecting it from the preamplifier.

Make sure the output high voltage setting of the Model 660 does not exceed the safe limits for the preamplifier or detector to which It is connected.

4.1. SILICON SURFACE-BARRIER DETECTORS

Operating bias voltage for a silicon surface-barrier detector should be obtained from the 0 to 500-V output connector located on the rear panel. The voltage should not be applied as a large step, but should instead be advanced gradually from zero up to the recommended operating potential. With the Model 660, set the front-panel control at zero before switching the power On and pressing RESET. Then gradually advance the setting of the 5-turn potentiometer to the recommended level for the detector. It is a good idea to monitor the noise from the surface-barrier detector as the high voltage is gradually increased. A rapid increase in noise warns of impending breakdown in the detector. The noise should be monitored through the associated preamplifier and amplifier by observation on an oscilloscope.

To remove the detector bias, reduce the setting of the 5-turn control to zero at the Model 660 while the output cable is still connected to the preamplifier.

4.2. OTHER TYPES OF DETECTORS

Operating bias for germanium detectors can be applied as a step from zero to the full operating value. For these applications the 5-turn potentiometer can be adjusted to the required output voltage level while the power switch is turned Off, and then power can be applied by simply turning the Model 660 HV ON/OFF switch to ON and pressing the RESET push-button.

4.3. RECOVERY FROM BIAS SHUTDOWN

When the BIAS SHUTDOWN mode is triggered by the germanium detector's warmup sensor, the HV ON/OFF switch should be turned OFF. After the detector has been cooled down long enough to ensure a safe vacuum in its cryostat, the HV ON/OFF switch should be turned ON. Usually, it is necessary to wait well past the time at which the warmup sensor indicates a cooled detector in order to ensure a safe vacuum, particularly on older detectors. Consult the detector manufacturer's instructions regarding the safe waiting period. Once the HV ON/OFF switch is ON, pressing the RESET button restores the bias voltage to the detector and turns off the SHUTDOWN LED. If the detector is still signaling a warmup condition, the RESET button is not able to cancel the shutdown mode.

5. FACTORY REPAIR SERVICE

This instrument can be returned to the ORTEC factory for service and repair at a nominal cost. Our standard procedure for repair ensures the same quality control and checkout that are used for a new instrument. Always contact ORTEC Customer Service, (865) 482-4411, before sending an instrument for repair to obtain shipping instructions and so that the required Return Authorization Number can be assigned to the unit. Write this number on the address label and on the package to ensure prompt attention when it reaches the ORTEC factory.

Bin/Module Connector Pin Assignments For Standard Nuclear Instrument Modules per DOE/ER-0457T.

Pin	Function	Pin	Function
1	+3 V	23	Reserved
2	- 3 V	24	Reserved
3	Spare bus	25	Reserved
4	Reserved bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 V
7	Coaxial	*29	- 24 V
8	200 V dc	30	Spare bus
9	Spare	31	Spare
10	+6 V	32	Spare
11	- 6 V	*33	117 V ac (hot)
12	Reserved bus	*34	Power return ground
13	Spare	35	Reset (Scaler)
14	Spare	36	Gate
15	Reserved	37	Reset (Auxiliary)
*16	+12 V	38	Coaxial
*17	- 12 V	39	Coaxial
18	Spare bus	40	Coaxial
19	Reserved bus	*41	117 V ac (neutral)
20	Spare	*42	High-quality ground
21	Spare	G	Ground guide pin
22	Reserved		

Pins marked (*) are installed and wired in ORTEC's 4001A and 4001C Modular System Bins.