LUDLUM MODEL 421 AND 421-3
PMT BASE WITH PREAMPLIFIER/BIAS SUPPLY

October 2014
Serial Number 200000
and Succeeding Serial Numbers
STATEMENT OF WARRANTY

Ludlum Measurements, Inc. warrants the products covered in this manual to be free of defects due to workmanship, material, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M and proportional tubes, and scintillation crystals which are broken due to excessive physical abuse or used for purposes other than intended.

There are no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser’s sole remedy shall be repair or replacement, at the option of Ludlum Measurements. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages, arising from the purchase, use, or inability to use product.

RETURN OF GOODS TO MANUFACTURER

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

LUDLUM MEASUREMENTS, INC.
ATTN: REPAIR DEPARTMENT
501 OAK STREET
SWEETWATER, TX 79556

800-622-0828 325-235-5494
FAX 325-235-4672
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Introduction

The Model 421 and 421-3 Photomultiplier (PMT) Base with Preamplifier and High Voltage (HV) supply is intended for use with 10-stage PMTs fitted with standard 14-pin sockets.

The assembly consists of a resistive divider/preamplifier and bias supply board. A BNC receptacle provides the pre-amplified signal output.

The tail-pulse output is a positive-going pulse (The Model 421-3 is a negative-going pulse.) with approximately 50 µsec tail for connection to a shaping amplifier. The output amplitude may be varied by HV bias adjustment.

The unit operates from a 12 Vdc supply only (NIM type “D” connector).
Getting Started

Remove the calibration certificate or detector functional check certificate and place it in a secure location. Remove the detector(s) and accessories (if applicable) and ensure that all items listed on the packing list are in the carton. If multiple detectors are included, refer to the calibration certificates for serial number (SN) matches.

To return an instrument or detector for repair or calibration, provide sufficient packing material to prevent damage during shipment, and affix appropriate warning labels to promote careful handling.

Every returned instrument must be accompanied by an Instrument Return Form, which can be downloaded from the Ludlum website at www.ludlums.com. Find the form by clicking the “Support” tab and selecting “Repair and Calibration” from the drop-down menu. Then choose the appropriate Repair and Calibration division where you will find a link to the form.
Specifications

**Preamplifier**: gain fixed at approximately -2 V/V. Output of pre-amp is positive with a 500 nsec rise time [NaI (Tl)] and approximately 50 µsec “tail” pulse. Other decay times can be made available.

**Output**: BNC detector, approximately 50 ohms impedance. Maximum output amplitude is 10 V peak.

**Rise Time**: less than 50 nsec

**High Voltage**: adjustable between 0 and 1800 Vdc maximum

**High Voltage Test**: accurate within 5% of actual

**Dynode String Resistance**: 100 megohm

**Dynode Divider Resistance**: Total resistance is approximately 36 meg, intended for low power and moderate to low count rate operation. Other variations can be made available.

**Power Consumption**: Quiescent power is 250 mW at 12 Vdc.

**NIM 9-pin “D”**: Pin 1+2 GND, Pin 3 VHV, Pin 4 +12 Vdc, and Pin 8 GND to shut off HV

**Size**: 5.8 cm (2.3 in.) Diameter; 10.7 cm (4.2 in.) Height

**Weight**: 0.16 kg (0.35 lb), excluding detector and cables
Controls and Functions

**SIGNNAL:** BNC connector providing pre-amplified signal output.

**H Adj:** hole allowing access to the high-voltage bias adjustment screw.

**H Test:** a test point providing access to the PMT bias level (1000 V bias equals 1 V). Touch ground lead to case. Use a standard DC multi-meter to read the bias setting.

**Zero Calibration:** Measure the DC level on the SIGNAL connector using a voltmeter across the BNC connector. Adjust R24 (ZERO) for a reading of 0 mV ± 3 mV.
Ludlum Measurements, Inc. supports the recycling of the electronics products it produces for the purpose of protecting the environment and to comply with all regional, national, and international agencies that promote economically and environmentally sustainable recycling systems. To this end, Ludlum Measurements, Inc. strives to supply the consumer of its goods with information regarding reuse and recycling of the many different types of materials used in its products. With many different agencies – public and private – involved in this pursuit, it becomes evident that a myriad of methods can be used in the process of recycling. Therefore, Ludlum Measurements, Inc. does not suggest one particular method over another, but simply desires to inform its consumers of the range of recyclable materials present in its products, so that the user will have flexibility in following all local and federal laws.

The following types of recyclable materials are present in Ludlum Measurements, Inc. electronics products, and should be recycled separately. The list is not all-inclusive, nor does it suggest that all materials are present in each piece of equipment:

- Batteries
- Glass
- Aluminum and Stainless Steel
- Circuit Boards
- Plastics
- Liquid Crystal Display (LCD)

Ludlum Measurements, Inc. products that have been placed on the market after August 13, 2005, have been labeled with a symbol recognized internationally as the “crossed-out wheelie bin,” which notifies the consumer that the product is not to be mixed with unsorted municipal waste when discarding. Each material must be separated. On the Model 26, the symbol will be placed on the serial number label located on the side of the instrument.

The symbol appears as such:
Section 6

Drawings and Diagrams

HV Power board, Drawing 436 x 231

Pre-Amp and Voltage Divider Board, Drawing 436 x 234