

LUDLUM MODEL 44-17
LOW ENERGY GAMMA SCINTILLATOR

October 2016

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LUDLUM MEASUREMENTS, INC.
501 OAK STREET, P.O. BOX 810
SWEETWATER, TEXAS 79556
325-235-5494, FAX: 325-235-4672

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**

Model 44-17 Low Energy Gamma Scintillator

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General

The Ludlum Model 44-17 iodide (NaI) low-energy gamma scintillator is primarily used for detecting low levels of gamma radiation in the range of 10 keV to 200 keV. It consists of a 5.1 cm x 2 mm (2 x 0.079 in.) thick NaI(Tl) crystal coupled to a photomultiplier tube that is housed in a 0.016 cm (0.062 in.) thick aluminum housing with a 43 mg/cm² Mylar window. The detector is energy dependent, over-responding by a factor of 10 or greater in the 100 keV range and under-responding by a factor of 0.5 above 1 MeV when normalized to ¹³⁷Cs.

The Model 44-17 will operate with any of the Ludlum instruments or equivalent instruments that can provide 500-1200 Vdc and an input sensitivity of approximately -10 mV.

The common application for this detector is low-level radiation.



Unpacking and Repacking

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. The serial number is located on the detectors' bottom plate.

To return an instrument or detector for repair or calibration, provide sufficient packing material to prevent damage during shipment (see “Caution!” in Introduction section) 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

Scintillator: 5.1 cm x 2 mm (2 x 0.079 in.) thick

Window Assembly: total 43 mg/cm²

3 layers metalized polyester 1.2 mg/cm²

1 layer drafting metalized polyester 7 mg/cm²

Crystal can 34.8 mg/cm²

Window Area: active and open are both 17.8 cm²

Efficiency (4 π geometry): typically 41% for ¹²⁵I

Background: less than 1500 cpm

Recommended Energy Range Operation: approximately 10-200 keV

Energy Response: energy dependent

Compatible Instruments: general-purpose survey meters, ratemeters, and scalers

Tube: 5.1 cm (2 in.) diameter magnetically shielded photomultiplier

Operating Voltage: typically 500-1200 volts

Dynode String Resistance: 60 megohm

Connector: series "C" (others available)

Construction: aluminum housing with beige powder coat

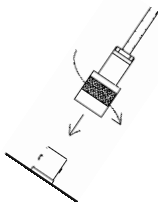
Temperature Range: -15 to 50 °C (5 to 122 °F); may be certified to operate from -40 to 65 °C (-40 to 150 °F)

Size: 6.7 x 22.9 cm (2.6 x 9 in.) (Dia x L)

Weight: 0.7 kg (1.5 lb)

Operating Procedures

CONNECTING TO AN INSTRUMENT



Connect one end of the cable provided to the detector by firmly pushing the connector together while twisting clockwise a quarter of a turn until latched. Repeat the process in the same manner with the other end of the cable and the instrument.

TESTING THE DETECTOR

1. Insure that the instrument high voltage (HV) is at the proper setting for the detector.
2. Connect the detector to the instrument and check for a proper background reading (typically 1000-1300 cpm).
3. Expose the detector to a check source and verify that the instrument indicates within 20% of the check source reading from the last calibration. Alternatively, expose the detector to a source of known value and verify that the detector detects greater than or equal to the efficiency listed in the specification section of this manual.
4. Instruments and detectors that meet these criteria are ready for use. Failure to meet these criteria may indicate a malfunction in the detector.

Parts List

Model 44-17 Gamma Scintillator, Drawing 260 x 30

| Reference | Description | Part Number |
|-----------|--|--------------|
| UNIT | Completely Assembled Model 44-17 Gamma Scintillator | 47-1547 |
| 1 EA | MODEL 44-17 BODY W/CAP | 2260-002-04 |
| 1 EA | CONNECTOR CAP (Model 44-10/44-7) | 7260-002-01 |
| 1 EA | CASE BODY | 7260-002-04 |
| 1 EA | CAP LOWER BODY | 7260-002-07 |
| 1 EA | 2-INCH X 2 mm NaI CRYSTAL | 01-5166 |
| 1 EA | PHOTO TUBE ASSEMBLY | 01-5919 |
| 1 EA | CONNECTOR, UG 706/U | 4478-011 |
| 1 EA | O-RING | 16-8289 |
| 3 EA | FOAM PAD | 7260-001-05 |
| 1 EA | MYLAR WINDOW ASSEMBLY | 4260-055 |
| ** | MAGNETIC FOIL (TUBE SHIELD) | 01-5019/5026 |
| 1 EA | END CAP | 7260-153 |

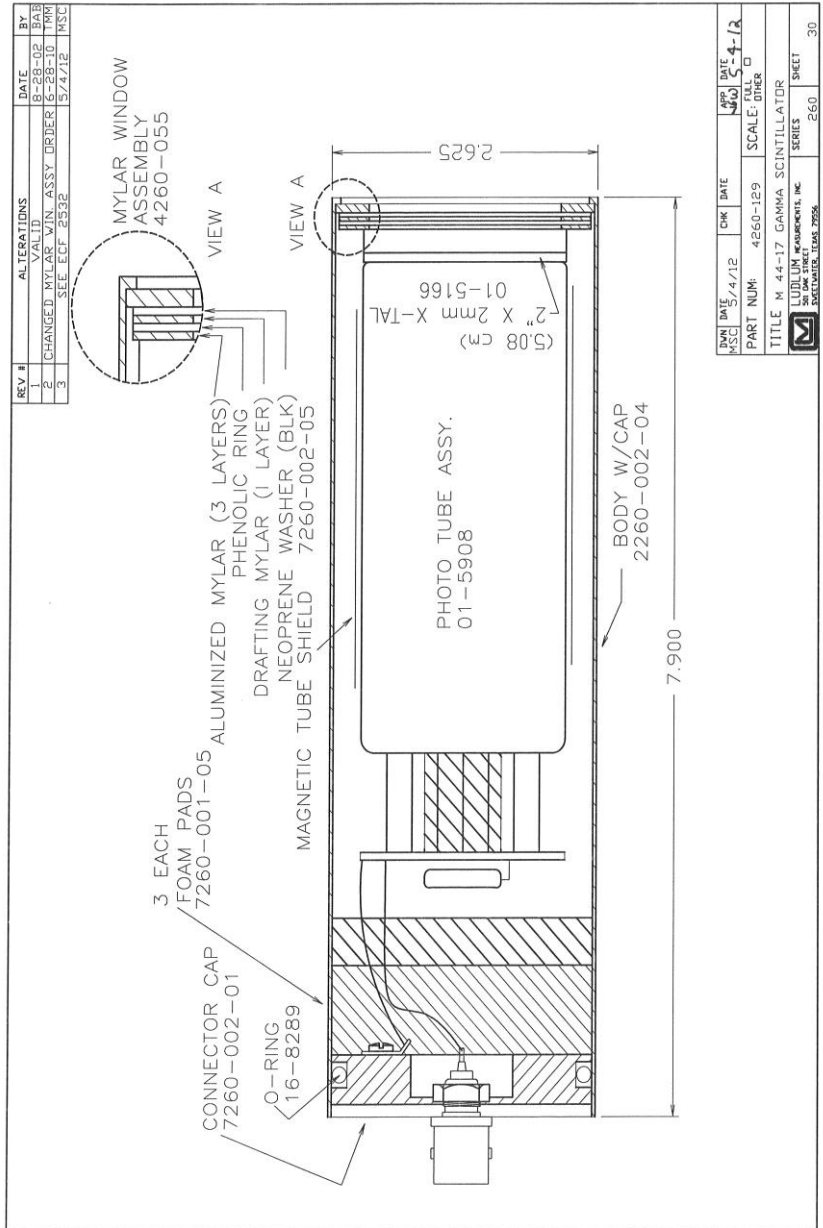
2-inch Voltage Divider Board, Drawing 435 X 964

| | | |
|--------|-----------------------|----------|
| 1 EA | VOLTAGE DIVIDER | 5435-401 |
| C1-C3 | CAP 0.01 μ F 2kV | 04-5722 |
| R1-R12 | RES 4.75 MEG 1/8 W 1% | 12-7995 |

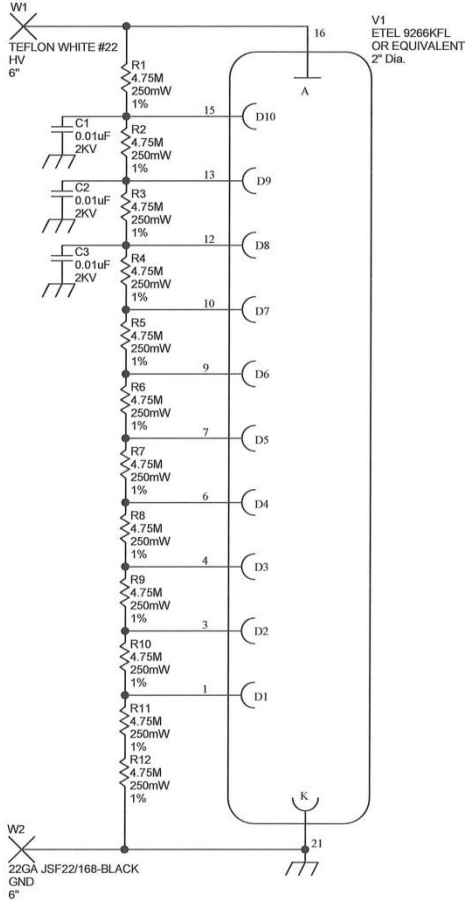
Drawings and Diagrams

Model 44-17 Gamma Scintillator, Drawing 260 x 30
Voltage Divider Schematic, Drawing 435 X 964
Voltage Divider Component Layout, 435 x 965
Model 44-17 Energy Response Curve

Model 44-17 Low Energy Gamma Scintillator

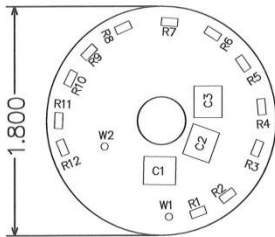


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| | | | |
|--|---|--|-------------------------|
| | | PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828 | |
| | | Design: AC | 05/07/2012 |
| Design: RSS | 05/07/2012 | Model: VARIOUS | Board#: 5435-401 |
| Approve: <i>[Signature]</i> | 10-22-13 | Sheet: 1 of 1 | Series: 435 |
| Print Date: 10/10/2012 9:37:50 AM | W:\Projects\LIVoltageDividers\6435-401\Rev2\435401R2P1.SchDoc | Rev: 2 | Sheet: 964 |

Model 44-17 Low Energy Gamma Scintillator



| | | | |
|--|------------|---|---------------------------------------|
|  LUDLUM MEASUREMENTS, INC. | | PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0821 | |
| | | Title: VOLTAGE DIVIDER | |
| Drawn: AC | 05/07/2012 | Model: VARIOUS | |
| Design: RSS | 05/07/2012 | Board#: 5435-401 | |
| Approves:  | 10-23-12 | Rev: 2 | |
| 10/10/2012 9:37:52 AM | | SCALE: 1.00 Top Overlay | Series 435 Sheet 965 |
| W:\Projects\LM\VoltageDividers\5435-401\Rev2435401R2_Manual_Pcb.Doc | | | |

