
**LUDLUM MODEL 44-3
LOW ENERGY GAMMA SCINTILLATOR**

**August 2010
Serial Number PR134823 and Succeeding
Serial Numbers**



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**

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Introduction

The Model 44-3 sodium iodide (NaI) low energy gamma scintillator is primarily used for detecting low levels of gamma radiation in the range of 10 keV - 60 keV. It consists of a 2.54cm(1 inch) diameter X 1mm thick NaI crystal coupled to a photomultiplier tube and is housed in a 0.062 inch thick aluminum housing with a 18.4 mg/cm² mylar window. The detector is energy dependent, over responding by a factor of ten or greater in the 100 keV range and underresponding by a factor of 0.5 above 1 MeV when normalized to ¹³⁷Cs.

The Model 44-3 will operate with any Ludlum instruments or equivalent instruments that provide 500 - 1200 VDC and an input sensitivity of approximately 10 mV or higher.

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



Model 44-3

Note:

The detector does not contain any consumable materials.

Note:

If the detector is used in a manner not intended by the manufacturer, the detector may not function properly.

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 Model 44-3 serial number is located on the side of the detector.

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. The following items and information should also be included to insure quick turnaround time of your equipment.

- instrument(s) and related cable(s)
- brief description as to the reason for return
- description of service requested
- return shipping address
- customer name and telephone number

Specifications

SCINTILLATOR: 2.5cm(1 inch) diameter X 1 mm thick NaI(Tl) crystal

WINDOW: 18.4 mg/cm² mylar(also available with a 7.8 mg/cm² window for energies as low as 5 keV)

Model 44-3 Low Energy Gamma Scintillator

WINDOW AREA: Active and open - 5 cm²

EFFICIENCY(4pi geometry): ¹²⁵I is 33.5% (based on ¹²⁹I efficiency of 18%)(background of less than 250 cpm)

SENSITIVITY: Approximately 675 cpm/μR/hr (¹²⁵I)

RECOMMENDED ENERGY RANGE: Approximately 10 - 60 keV

ENERGY RESPONSE: Energy dependent

COMPATIBLE INSTRUMENTS: General purpose survey meters, ratemeters, and scalars

TUBE: .8cm(1.5inches)diameter magnetically shielded photomultiplier

OPERATING VOLTAGE: Typically 500-1200 volts

DYNODE STRING RESISTANCE: 100 megohm

CONNECTOR: Series "C" (*others available*)

CONSTRUCTION: Aluminum housing with beige powder coat finish

TEMPERATURE RANGE: 4° to 59°C (-20° to 122°F)

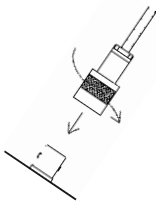
May be certified to operate from -40° to 120°C (-40° to 65°F).

SIZE: 5.1 cm(2 inches) x 17.8 cm (7inches)(D x L)

WEIGHT: 0.5 kg(1 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 $\frac{1}{4}$ 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 HV (high voltage) is at the proper setting for the detector.
2. Connect the detector to the instrument and check for a proper background reading (typically 350 cpm at an ambient background of 8-15 $\mu\text{R/hr}$).
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 which meet these criteria are ready for use. Failure to meet these criteria may indicate a malfunction in the detector.

Safety Considerations

ENVIRONMENTAL CONDITIONS FOR NORMAL USE

1. Indoor or outdoor use (in a dry environment)
2. No maximum altitude
3. Temperature range of -20°C to 50°C (5°F to 122°F);
May be certified to operate from -40° to 120°C (-40 to 65°F).
4. Maximum relative humidity of less than 95% (non-condensing)
5. Pollution Degree 1 (as defined by IEC 664)

CLEANING INSTRUCTIONS AND PRECAUTIONS

The detector may be cleaned externally with a damp cloth, using only water as the wetting agent. Do not immerse the instrument in any liquid. Observe the following precautions when cleaning:

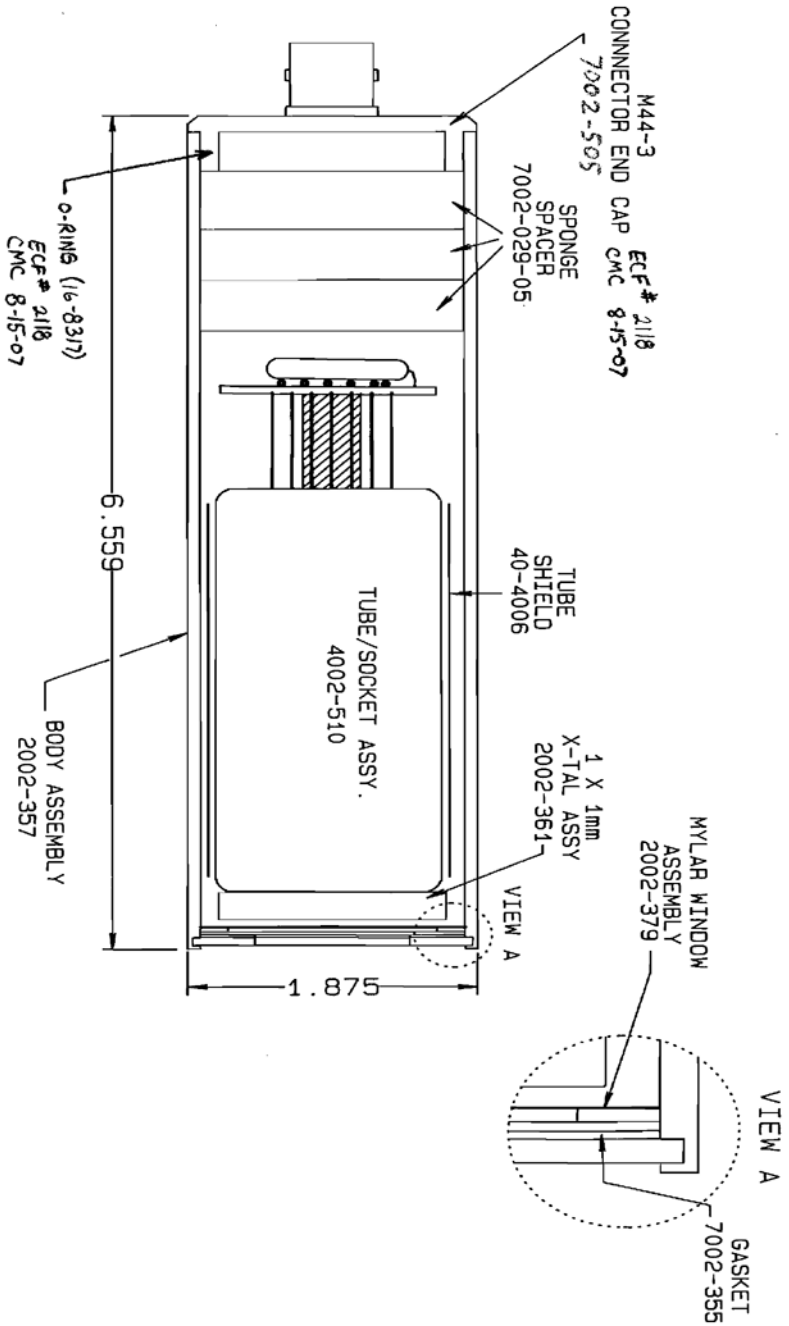
1. Turn the instrument electronics OFF.
2. Allow the instrument to sit for 1 minute.
3. Disconnect the detector cable before cleaning the detector.

Parts List, Drawings and Diagrams

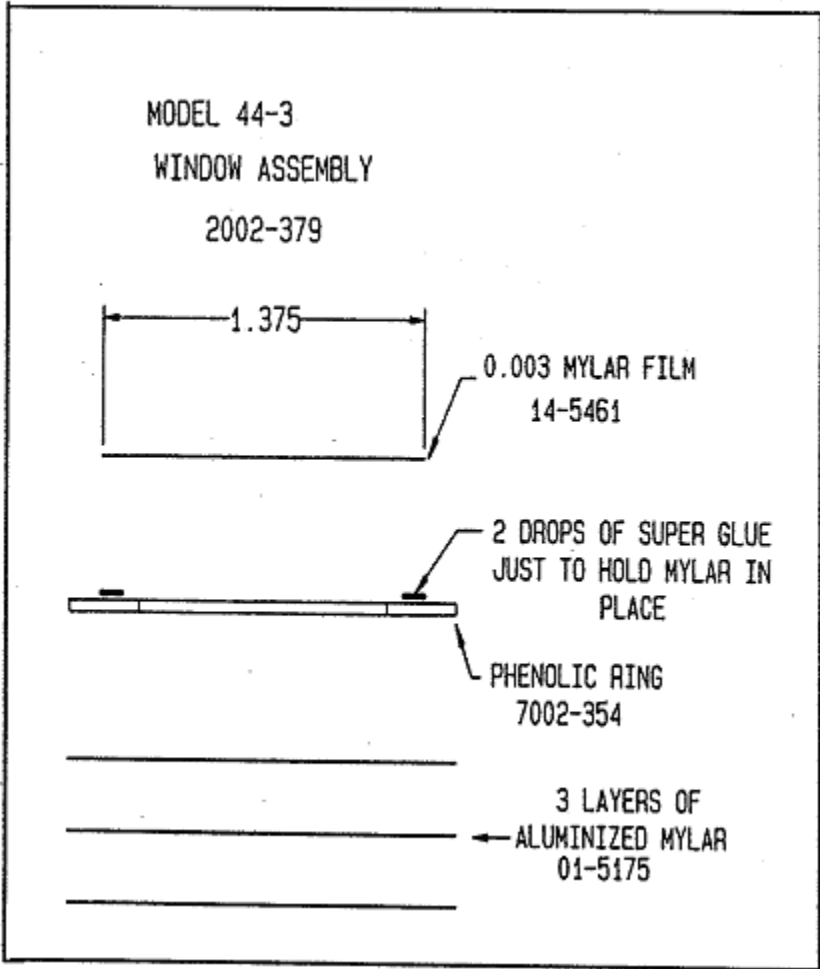
Model 44-3 Gamma Scintillator

| <u>Reference</u> | <u>Description</u> | <u>Part Number</u> |
|------------------|---|--------------------|
| UNIT | Completely Assembled Model 44-3 Gamma Scintillator | 47-1533 |
| 1 EA | DETECTOR BODY | 2002-357 |
| 1 EA | END CAP | 7002-505 |
| 1 EA | 1 x 1 mm NaI CRYSTAL | 2002-361 |
| 1 EA | 1.5 INCH PHOTOMULTIPLIER TUBE | 01-5349 |
| 1 EA | TUBESHIELD | 40-4006 |
| 1 EA | 1.5INCH TUBE SOCKET BOARD | 5002-502 |
| 1 EA | CONNECTOR, UG706/U | 4478-011 |
| 4.5 INCH | TEFLON WIRE | 21-8993 |
| 4.5 INCH | #24 BLACK WIRE | 21-9558 |
| 1 EA | LUG | 18-8766 |
| 4 EA | SCREWS | 17-8811 |
| 7 EA | SPONGE | 7002-029-05 |
| 1 EA | MYLAR WINDOW ASSY | 2002-379 |
| 1 EA | GASKET | 7002-355 |

Model 44-3 Low Energy Gamma Scintillator



Mylar Window Assembly



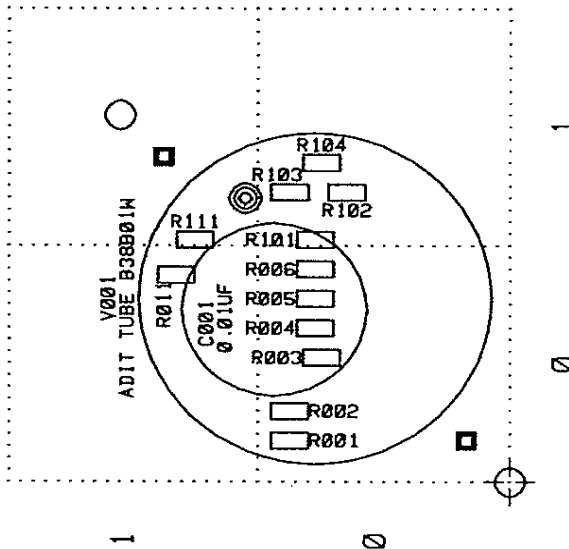
Model 44-3 Low Energy Gamma Scintillator

| <u>Reference</u> | <u>Description</u> | <u>Part Number</u> |
|------------------|--------------------|--------------------|
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1.5 inch Tube Socket Board

1.5 INCH TUBE SOCKET BOARD

| | | |
|-------|-------------------------------|----------|
| 1 EA | CIRCUIT BOARD | 5002-502 |
| 1 EA | CAP 0.01 μ F 2kv | 04-5525 |
| 11 EA | RES 10 M, $\frac{1}{8}$ W, 1% | 12-7996 |
| 1 EA | RES 1M, $\frac{1}{4}$ W, 1% | 12-7844 |



1.5 inch Tube Socket Board (part number 5002-502)

1.5 inch Adit Tube Socket Board - Schematic

