

**LUDLUM MODEL 44-2
GAMMA SCINTILLATOR**

**August 2012
Serial Number PR134789 and Succeeding
Serial Numbers**

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Table of Contents

<i>Introduction</i>	1
<i>Unpacking and Repacking</i>	2
<i>Specifications</i>	3
<i>Operating Procedures</i>	4
<i>Safety Considerations</i>	5
<i>Parts List, Drawings and Diagrams</i>	6
<i>Energy Response Curve</i>	10

Introduction

The Model 44-2 sodium iodide (NaI) gamma scintillator is primarily used for detecting low levels of gamma radiation in the range of 60 keV–1.25 MeV. It consists of a 2.54 x 2.54 cm (1 x 1 in.) (Dia. X thickness) NaI crystal coupled to a photomultiplier tube and is housed in a 0.157 cm (0.062 in.) thick aluminum housing. The front entrance window has a total thickness of 2.3 mm (0.09 in.) of aluminum. The detector is energy dependent, over-responding by a factor of 10 or greater in the 100keV range and under-responding by a factor of 0.5 above 1 MeV when normalized to ¹³⁷Cs.

The Model 44-2 will operate with any Ludlum instruments or equivalent instruments that provide 500–1200 volts. The recommended instrument input sensitivity is approximately 10 mV or higher.

Some common applications for this detector include background radiation monitoring, low-level radiation detection, and spectrum analysis when used in conjunction with a single- or multi-channel analyzer.



Model 44-2

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.

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 ensure 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

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

Sensitivity: typically 175 cpm per $\mu\text{R/hr}$ (^{137}Cs gamma)

Energy Response: energy dependent

Background: 1800 cpm

Operating Voltage: 500–1200 volts

Dynode String Resistance: 100 megohm

Connector: series "C" (others available)

Scintillator: 2.5 x 2.5 cm (1 x 1 in.) Dia. x thickness

Tube: 2.9 cm (1.1 in.) diameter magnetically shielded photomultiplier

Construction: aluminum housing with beige powder-coat finish

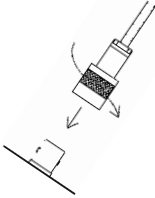
Temperature Range: -15 to 50 °C (5 to 122 °F); may be certified for -40 to 65 °C (-40 to 150 °F)

Size: 5.1 x 18.5 cm (2 x 7.3 in.) (Dia. 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 one 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. Ensure 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 1.4-2.6 kcpm or 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 that 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 to 50 °C (5 to 122 °F); May be certified for operation from -40 to 65 °C (-40 to 150 °F).
4. Maximum relative humidity of less than 95% (non-condensing)
5. Pollution Degree 3 (as defined by IEC 664)

(Occurs when conductive pollution or dry nonconductive pollution becomes conductive due to condensation. This is typical of industrial or construction sites.)

CLEANING INSTRUCTIONS AND PRECAUTIONS

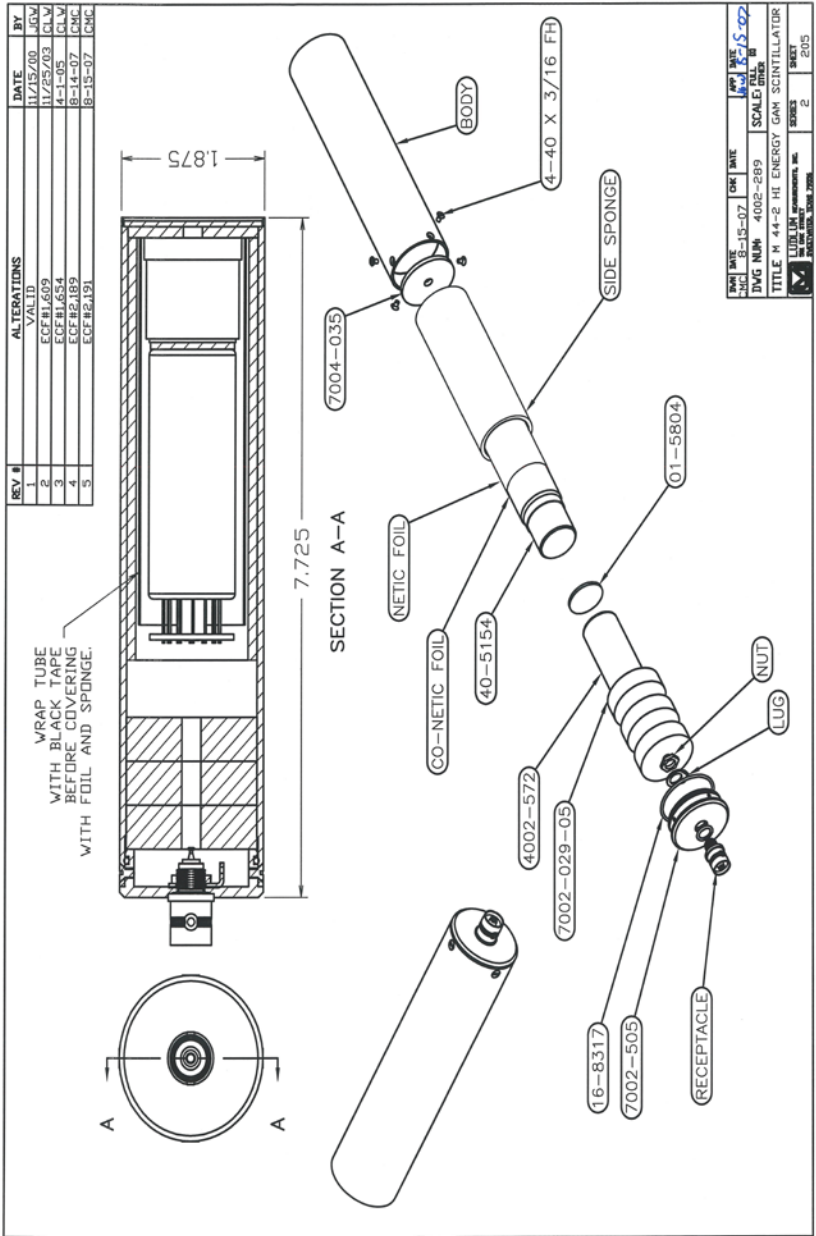
The detector may be cleaned externally with a damp cloth, using only water as the wetting agent. Do not immerse the instrument in any liquid. Observe the following precautions when cleaning:

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

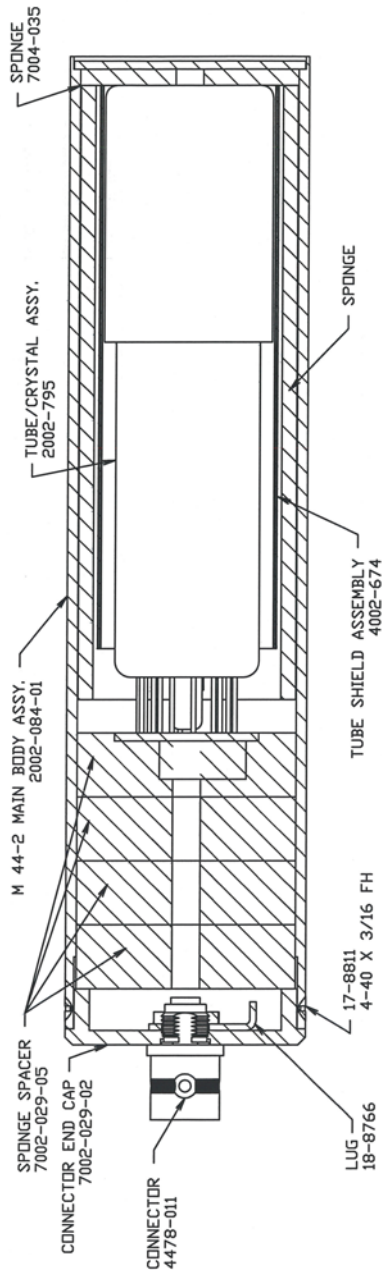
Parts List, Drawings and Diagrams

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
UNIT	Completely Assembled Model 44-2 Alpha-Beta-Gamma Detector	47-1532
1 EA	DETECTOR BODY	2002-084-01
1 EA	END CAP	7002-505
1 EA	2.5 x 2.5 cm (1 x 1 in.) NaI CRYSTAL	40-5154
1 EA	2.9 cm (1.1 in.) TUBE SOCKET ASSY	4002-572
1 EA	TUBE SHIELD	40-4006
1 EA	CONNECTOR, UG 706/U	4478-011
1 EA	EJ560-1.10 × .080 OPT PAD	01-5804
1 EA	O-RING	16-8317
1 EA	LUG	18-8766
4 EA	SCREWS	17-8811
6 EA	SPONGE	7002-505
2 EA	XTAL SIDE SPONGE	7002-276
10 cm (4 in.)	TEFLON WIRE	21-9362
10 cm (4 in.)	# 26 WIRE WIRE	21-9558

Model 44-2 Gamma Scintillator



Model 44-2 Gamma Scintillator

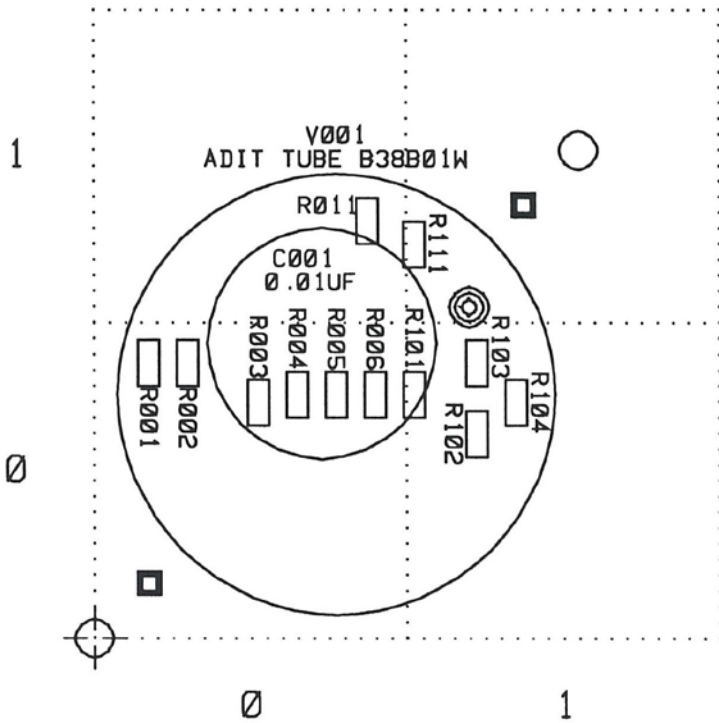


Model 44-2 Gamma Scintillator

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
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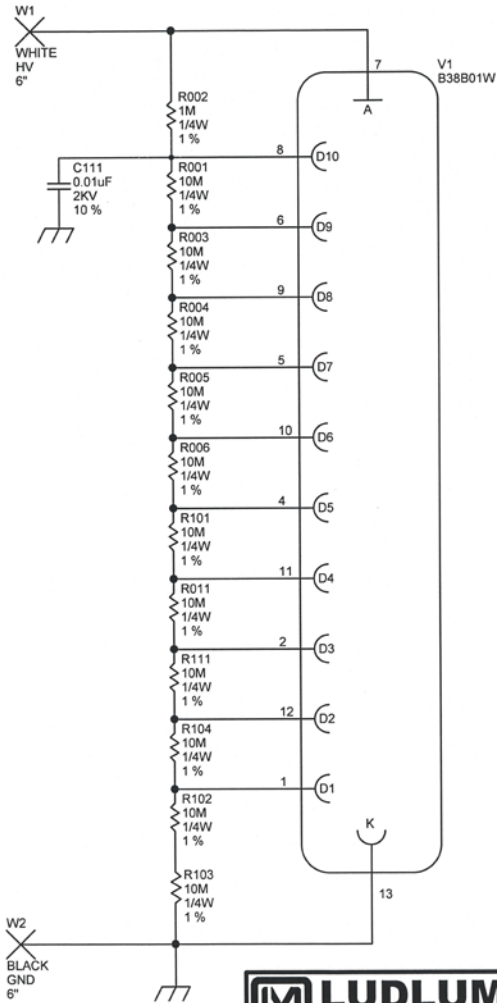
3.8 cm (1.5 in.) Tube Socket Board

1 EA	CIRCUIT BOARD	5002-502
1 EA	CAP 0.01 μ F 2kv	04-5525
11 EA	RES 10 M, 1/4 W, 2%	10-7106
1 EA	RES 1 M, 1/4 W, 1% SMT	12-7964
1 EA	JACK-TEST 1128-09-0319	40-4006



Model 44-2 Gamma Scintillator

3.8 cm (1.5 in.) Tube Socket Board - Schematic



		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828	
		Drawn: CKB 25-JAN-07	Title: 1.5" VOLTAGE DIVIDER
Design: DL 14-FEB-96	Model: VARIOUS		
Check:	Board#: 5002-502		
Approve: <i>[Signature]</i> 19:01:11	14-Feb-2011	Sheet: 1 of 1	Series: 2
Rev: 2.0		Sheet: 317	
002502R2P1.ash			

Energy Response for Ludlum Model 44-2

