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## **LUDLUM MODEL 44-2 GAMMA SCINTILLATOR**

**March 2010  
Serial Number PR134789 and Succeeding  
Serial Numbers**



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## Introduction

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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 cm (0.90 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 <sup>137</sup>Cs.

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**

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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

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

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

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### **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**

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### **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.



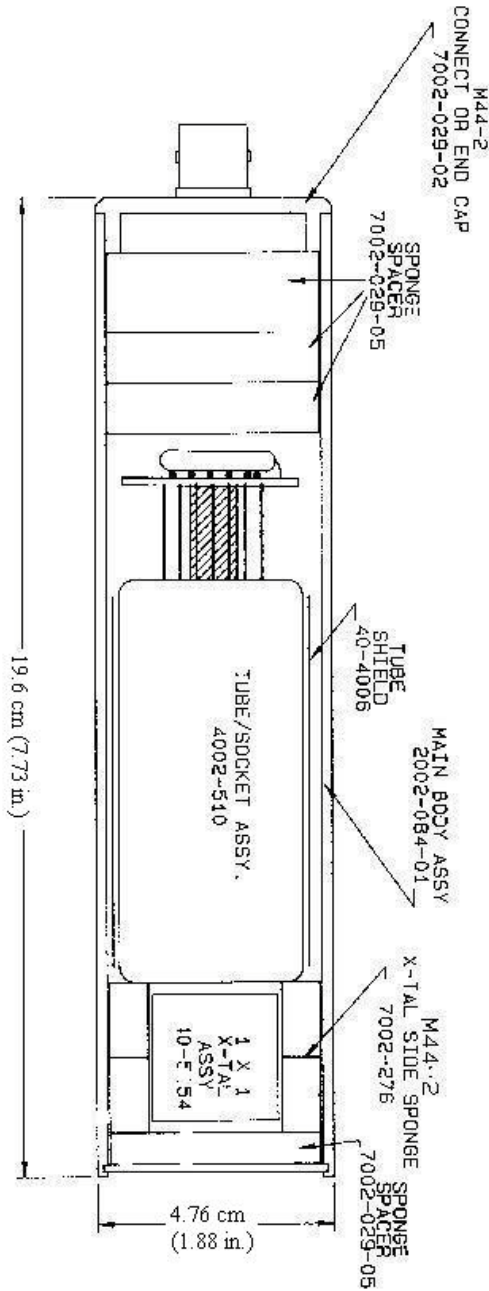
## Parts List, Drawings and Diagrams

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### Model 44-2 Gamma Scintillator

<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

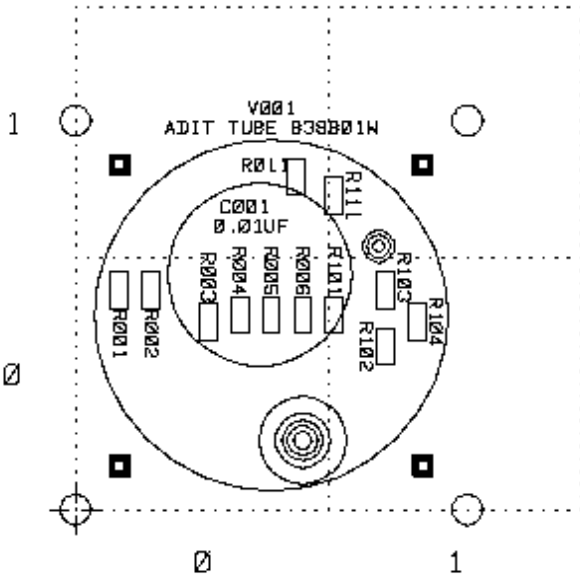


# Model 44-2 Gamma Scintillator

<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 $\mu$ F 2kv	04-5525
11 EA	RES 10 M, $\frac{1}{4}$ W, 2%	10-7106
1 EA	RES 1 M, $\frac{1}{4}$ W, 1% SMT	12-7964
1 EA	JACK-TEST 1128-09-0319	40-4006



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

