

**LUDLUM MODEL 44-10
GAMMA SCINTILLATOR**

**September 2015
Serial Number PR107232 and Succeeding
Serial Numbers**

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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**

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Introduction

The Model 44-10 sodium iodide (NaI) gamma scintillator is primarily used for detecting high-energy gamma radiation in the range of 60 keV to 2 MeV. It consists of a 5.1 x 5.1 cm (2 x 2 in.) diameter by thickness NaI crystal coupled to a photomultiplier tube and is housed in a 0.16 cm (0.062 in.) thick aluminum housing. The detector is energy dependent, over-responding by a factor of 5 in the 100 keV range and under-responding by a factor of 0.5 above 1 MeV when normalized to ¹³⁷Cs.

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

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



Model 44-10

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 and accessories (cable, etc.) and ensure that all of the items listed on the packing list are in the carton. If more than one detector is in the carton, refer to the calibration certificate(s) for serial number (S/N) match. The Model 44-10 S/N is located on the side of the detector near the connector.

To return the instrument or detector for repair or calibration, provide sufficient packing material to prevent damage during shipment and appropriate warning labels to ensure 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 x 5.1 cm (2 x 2 in.) (Dia x thickness), NaI (Tl) crystal

SENSITIVITY: typically 900 cpm/ μ R/hr (^{137}Cs gamma)

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: 500-1200 V

DYNODE STRING RESISTANCE: 60 megohm

EFFICIENCY (4 π): ^{125}I is 4%; ^{57}Co is 20%, ^{137}Cs is 9%; and ^{60}Co is 15%.

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

CONSTRUCTION: aluminum housing with beige polyurethane enamel paint

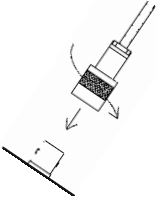
TEMPERATURE RANGE: -20 to 50 °C (-4 to 122 °F); may be certified to operate from -40 to 65 °C (-40 to 150 °F)

SIZE: 6.6 x 27.9 cm (2.6 x 11 in.) (Dia x L)

WEIGHT: 1.04 kg (2.3 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. Ensure that the instrument high voltage (HV) is at the proper setting for the detector (900 volts).
2. Connect the detector to the instrument and check for a proper background reading (typically 4,000-10,000 cpm at 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 (-4 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:

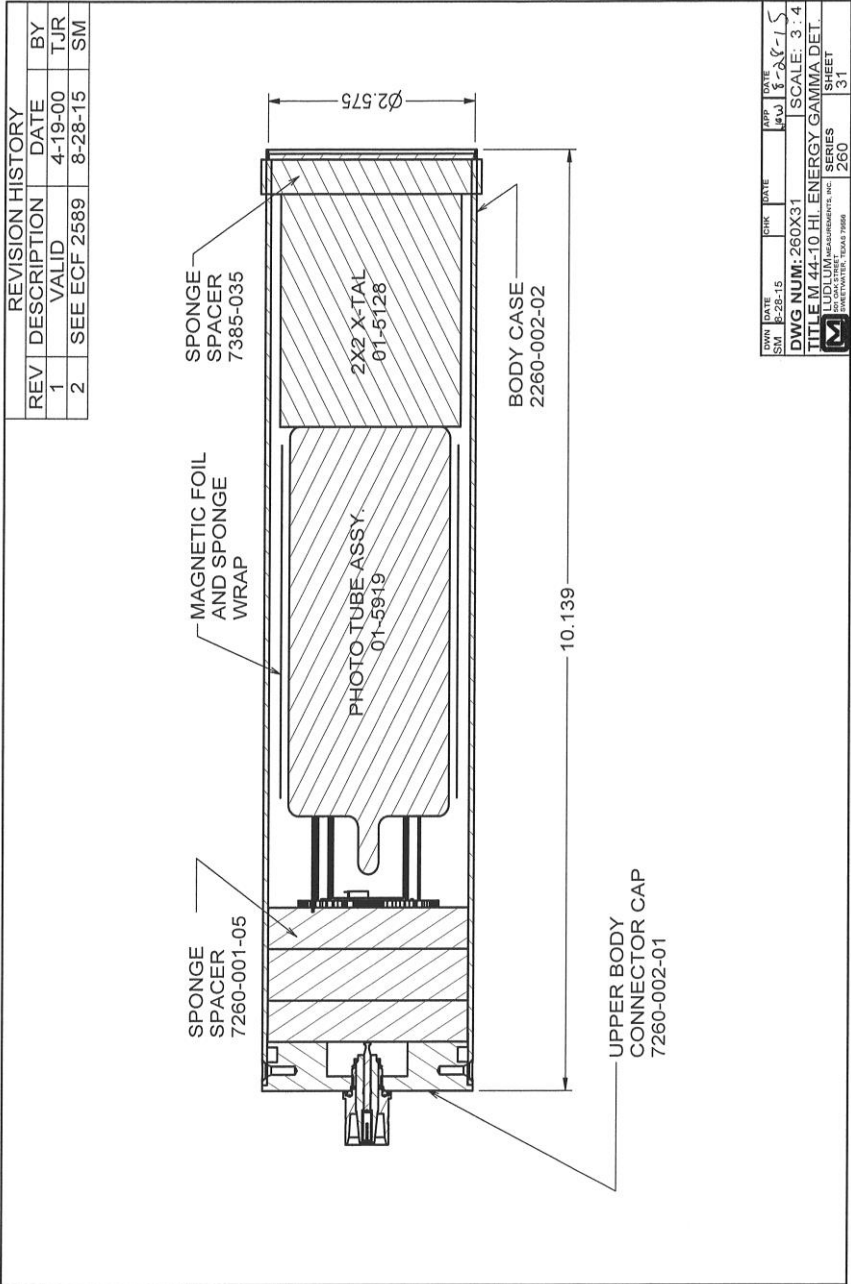
1. Turn the instrument electronics OFF.
2. Allow the instrument to sit for one minute.
3. Disconnect the detector cable before cleaning the detector.

Parts List, Drawings and Diagrams

Model 44-10 Gamma Scintillator

<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
UNIT	Completely Assembled Model 44-10 Gamma Scintillator	47-1540
1 EA	BODY CASE W/ CAP	2260-002-02
1 EA	CONNECTOR CAP	7260-002-01
1 EA	2 x 2 inch NaI CRYSTAL	01-5128
1 EA	2 inch PHOTO TUBE ASSY	01-5919
1 EA	CONNECTOR, UG706/U	4478-011
1 EA	O-RING	16-8289
8 EA	SPONGE SPACER	7260-001-05
1 EA	END SPONGE SPACER	7385-035
*	MAGNETIC FOIL	01-5019/5026
1 EA	SPONGE WRAP	21-9267

Model 44-10 Gamma Scintillator

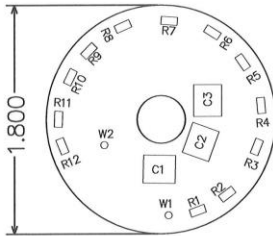


Model 44-10 Gamma Scintillator

Reference Description Part Number

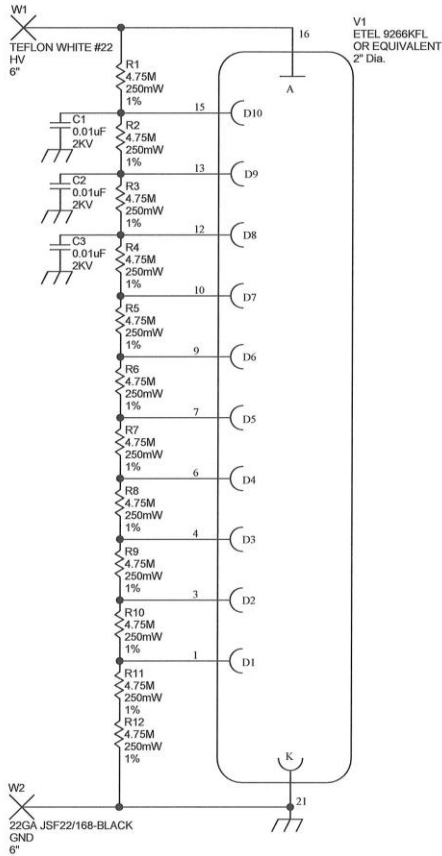
2 inch Voltage Divider Board

1EA	VOLTAGE DIVIDER	5435-401
1EA	CAP 0.01 μ F 2kv	04-5722
11 EA	RES 4.75 meg 1/8 W, 1%	12-7995



		PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0821	
		MEASUREMENTS, INC.	
Title: VOLTAGE DIVIDER			
Drawn: AC	05/07/2012	Model: VARIOUS	
Design: RSS	05/07/2012	Board#: 5435-401	
Approve: <i>[Signature]</i>	10-22-12	Rev: 2	
Print Date: 10/10/2012 9:37:52 AM		SCALE: 1.00	Series: 435
		Top Overlay	Sheet: 965
<small>W:\Projects\LMIVoltageDividers\5435-401\Rev2\435401R2_Manual.PcbDoc</small>			

2 inch Voltage Divider Board - Schematic



		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0628	
		Draws: AC 05/07/2012	Title: VOLTAGE DIVIDER
Design: RSS 05/07/2012	Model: VARIOUS	Board#: 5435-401	
Approve: 10-20-12	Sheet: 1 of 1	Series: 435	Sheet: 964
Print Date: 10/10/2012 9:37:50 AM		Rev: 2	
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Energy Response for Ludlum Model 44-10

