

LUDLUM MODEL 44-17
LOW ENERGY
GAMMA SCINTILLATOR
Revised November 2004



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MODEL 44-17 Low Energy Gamma Scintillator

1. GENERAL

The Model 44-17 sodium iodide (NaI) low energy gamma scintillator is primarily used for detecting low levels of gamma radiation in the range of 10 keV - 200 keV. It consists of a 2" (2.54cm) diameter X 2mm thick NaI crystal coupled to a photomultiplier tube and is housed in a 0.062" thick aluminum housing with a 43 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 44-17 will operate with any Ludlum instruments or equivalent instruments that provide 500 - 1200 Vdc and an input sensitivity of approximately 10mV.

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

2. SPECIFICATIONS

SCINTILLATOR: 2" (5.1cm) diameter X 2 mm thick NaI(Tl) crystal

WINDOW ASSEMBLY: Total 43 mg/cm²

3 layers aluminized mylar 1.2 mg/cm²

1 layer drafting mylar 7 mg/cm²

crystal can 34.8 mg/cm²

WINDOW AREA: Active and open - 17.8 cm²

EFFICIENCY (2pi geometry): Typically 40% - ¹²⁵I

RECOMMENDED ENERGY RANGE: Approximately 10-200 keV

ENERGY RESPONSE: Energy dependent

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

TUBE: 2" (5.1 cm) 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 polyurethane enamel paint

TEMPERATURE RANGE: 5°F (-15°C) to 122°F (50°C)

May be certified to operate from -40°F (-40°C) to 150°F (65°C)

SIZE: 2.6" (6.7 cm) diameter X 9" (22.9 cm) L

WEIGHT: 1.5 lb (0.7 kg)

MODEL 44-17 Low Energy Gamma Scintillator

3. PRELIMINARY INSTRUCTIONS

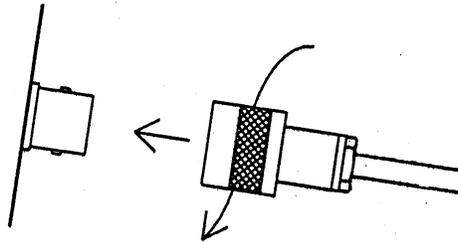
UNPACKING AND REPACKING

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 M44-17 S/N is located on the side of the detector near the connector.

To return the instrument for repair or calibration provide sufficient packing material to prevent damage during shipment and appropriate warning labels to ensure careful handling. The following items and information should also be included to insure a quick turnaround time on your repair/calibration:

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

4. OPERATING PROCEDURES



CONNECTING DETECTOR TO INSTRUMENT

Connect one end of the cable provided to the detector by firmly pushing the connectors together while twisting clockwise 1/4 turn until it latches. Repeat the process in the same manner with the other end of the cable and the instrument.

MODEL 44-17 Low Energy Gamma Scintillator

4. OPERATING PROCEDURES (cont.)

TESTING THE DETECTOR

1. Insure that the instrument 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 $\pm 20\%$ of the check source reading obtained during the last calibration. Alternatively, expose the detector to a check source of a known value and verify that the detector gets greater than or equal to the efficiency listed in the specification section of this manual.
4. Instruments that meet these criteria are ready for use. Failure to meet these criteria may indicate a malfunction in the detector.

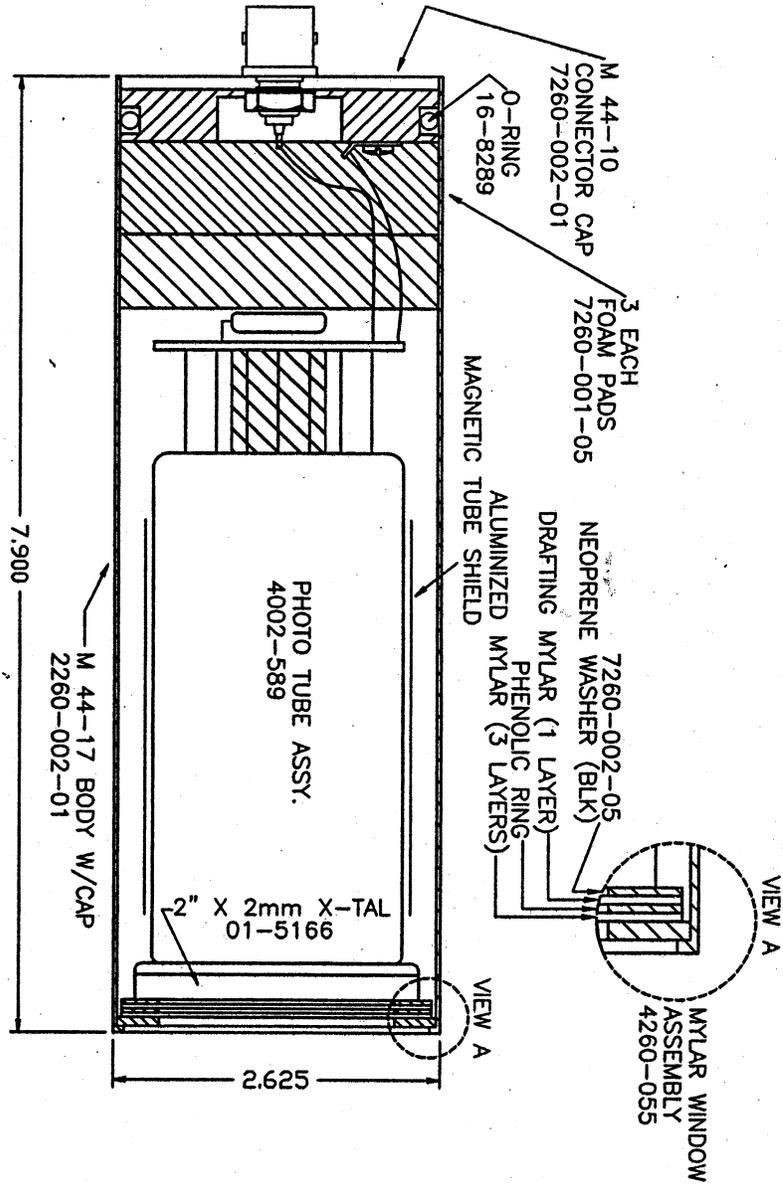
5. PARTS LIST; DRAWINGS; DIAGRAMS

Model 44-17 Gamma Scintillator

Ref. No.	Description	Part No.
UNIT	Completely Assembled Model 44-17 Gamma Scintillator	47-1547
<u>Assembly</u>	<u>View</u>	
1 ea.	M44-17 BODY W/CAP	2260-002-04
1 ea.	CONNECTOR CAP (M44-10/44-7)	7260-002-01
1 ea.	2" x 2mm NaI CRYSTAL	01-5166
1 ea.	PHOTO TUBE ASSEMBLY	4002-589
1 ea.	CONNECTOR, UG 706/U	13-7751
1 ea.	O-RING	16-8289
3 ea.	FOAM PAD	7260-001-05
1 ea.	MYLAR WINDOW ASSY.	4260-055
****	MAGNETIC FOIL (Tube Shield)	01-5019/5026

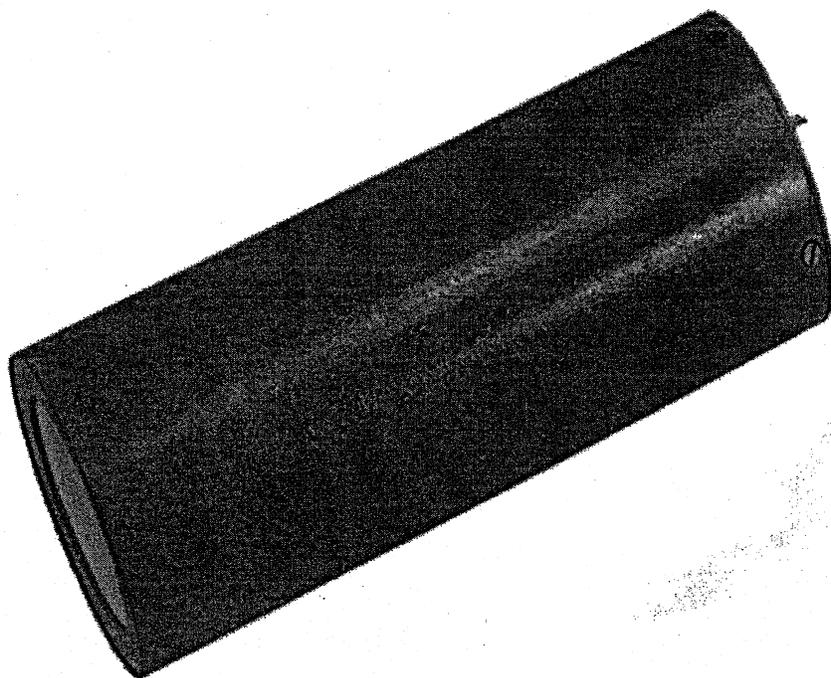
MODEL 44-17 Low Energy Gamma Scintillator
5. PARTS LIST; DRAWINGS; DIAGRAMS

Model 44-17 Gamma Scintillator



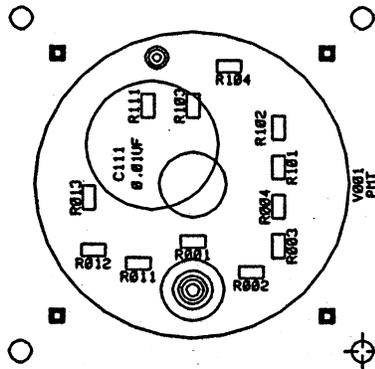
MODEL 44-17 Low Energy Gamma Scintillator
5. PARTS LIST; DRAWINGS; DIAGRAMS

Model 44-17 (Fully Assembled)



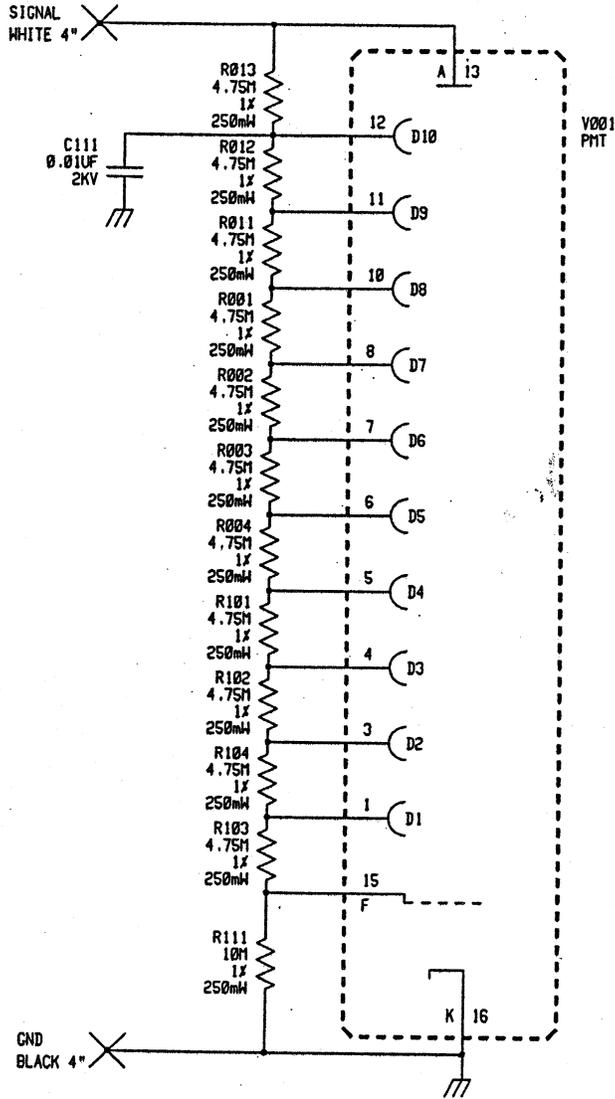
MODEL 44-17 Low Energy Gamma Scintillator
5. PARTS LIST; DRAWINGS; DIAGRAMS

Ref. no,	Description	Part No.
<u>2" Voltage Divider Board</u>		
1 ea.	VOLTAGEDIVIDER	5002-571
C001	CAP 0.01 μ F 2kv	04-5525
R001-R004	RES 4.75 meg 1/8 W 1%	12-7995
R011-R013	RES 4.75 meg 1/8 W 1%	12-7995
R101-R104	RES 4.75 meg 1/8 W 1%	12-7995
R111	RES 10 meg 1/8 W 1%	12-7996
V001	2" PMT	01-5640



MODEL 44-17 Low Energy Gamma Scintillator
5. PARTS LIST; DRAWINGS; DIAGRAMS

2" Voltage Divider Board-Schematic



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