

LUDLUM MODEL 43-5
ALPHA SCINTILLATOR
March 2011

LUDLUM MODEL 43-5

ALPHA SCINTILLATOR

March 2011



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**

TABLE OF CONTENTS

1.	GENERAL.....	1
2.	SPECIFICATIONS.....	1
3.	MAINTENANCE.....	1
	3.1 Repair of Probe Face.....	1
	3.2 Replacement of PMT	2
	REPLACEMENT PARTS LIST	3
	1.5-inch Tube Socket, Drawing 2 x 286	3
	DRAWINGS AND DIAGRAMS.....	5
	Assembly View, Drawing 77 x 23	
	1.5-inch Tube Socket, Drawing 2 x 317	
	1.5-inch Tube Socket Component Outlines, Drawing 2 x 318	

Model 43-5 Alpha Scintillator
March 2011

1. GENERAL

The Model 43-5 Alpha Scintillator is a detector (probe) designed for alpha radiation survey when used with general purpose survey meters, ratemeters, and scaler instruments. It utilizes a zinc sulfide scintillation crystal doped with silver [ZnS(Ag)] and a 3.8 cm (1.5 in.) diameter magnetically shielded photomultiplier tube (PMT).

The welded detector body is fabricated from 16-gauge (1/16 inch) aluminum alloy and painted with a beige powder-coat finish. The window protective screen

is made of 0.13 cm (0.05 in.) thick unpainted aluminum alloy, and the window is aluminized Mylar, typically 0.8 mg/cm² thick. When intended for outdoor use, an extra layer of Mylar is recommended (total of 1.2 mg/cm² thickness).

A plastic protective cover is provided for protection of the detector face against puncture of the Mylar when the detector is not in use. Pinholes in the window will cause light leaks and malfunction of the detector.

2. SPECIFICATIONS

WINDOW: typically 0.8 mg/cm² aluminized Mylar (1.2 mg/cm² for outdoor use)

DYNODE STRING RESISTANCE: 100 megohm

WINDOW AREA: 50 cm² open, 76 cm² active

OPERATING VOLTAGE: 500 volts-1200 volts

EFFICIENCY: 13% of 4 π emission with ²³⁹Pu source in contact with probe protective screen

CONNECTOR: Series "C" (others available)

SCINTILLATOR: ZnS (Ag)

SIZE: 7.6 x 6.4 x 34.3 cm (3 x 2.5 x 13.5 in.) (H x W x L)

MULTIPLIER TUBE: 3.8 cm (1.5 in.) diameter

WEIGHT: 0.9 kg (2 lb)

3. MAINTENANCE

Normally, causes of malfunction of the Model 43-5 are due to either light holes in the thin aluminized Mylar or a defective multiplier tube. The malfunction caused by light holes gives an increase in background noise up to complete saturation where the instrument may indicate zero count. If the instrument indicates zero count, reduce the high voltage and cover probe face with an opaque material. By movement of the opaque material, a light leak should be discernible.

3.1 Repair of Probe Face

To repair the face of the probe, perform the following steps: (Refer to Drawing 77 x 23 for assembly view.)

1. Remove protective window frame.
2. Remove window with Mylar assembly from scintillation retainer face.

M43-5 Alpha Scintillator March 2011

3. Remove aluminized Mylar from window screen and clean off old glue from screen.
4. Inspect silicone gasket and replace if damaged.
5. Inspect scintillation retainer face for a complete coating of ZnS. Re-coat, if necessary.
6. Reglue two layers of 0.4 mg/cm² aluminized Mylar to window screen, placing glue only on the outer edge of the screen.

****CAUTION**:**

The thin Mylar is very susceptible to puncture. Extreme care should be exercised while gluing the aluminum Mylar to the window screen and when reinstalling window with Mylar assembly to the face of the probe.

7. Reinstall window with Mylar to face of probe.

Malfunctions caused by the tube such as a zero count, intermittent or a very reduced count, may occur. After thoroughly checking for a light leak, replacement of the tube may be necessary. After removing the tube from the probe body, check the front of the tube face. A tube that has become defective may show clear through the face, instead of the dark amber color.

3.2 Replacement of PMT

To replace the PMT, perform the following steps: (Refer to Drawing 77 x 23 for assembly view.)

NOTE: If the replacement is for an original “based” tube (Part No. 01-5001), refer to

instructions included in the installation kit.

NOTE: When needed, use **thermal** strippers to strip the white Teflon high-voltage signal wire to prevent damaging the wire.

1. Unfasten connector end cap (removing four screws).
2. Slowly remove connector end cap and pull out as far as wires will allow.
3. Remove (desolder) ground and high-voltage wires from connector end cap.
4. Remove sponges.
5. Remove photomultiplier tube assembly (including circuit board).
6. Unplug ground and high-voltage wires from tube circuit board.
7. Remove metallic shield.
8. Slide the metallic shield over the new tube and tape to tube.
9. Plug in ground and high-voltage wires to appropriate connectors.
10. Place tube assembly into handle.
11. Install sponges.
12. Reconnect (solder) the high-voltage and ground wires to connector end cap.
13. Install connector end cap to complete final assembly.

**Model 43-5 Alpha Scintillator
March 2011**

REPLACEMENT PARTS LIST

Ref. No.	Description	Part No.
UNIT	Completely Assembled Model 43-5 Probe	47-1521

Part No.	Description	Qty.
4002-510	PM TUBE-ADIT	1 EA.
40-4006	TUBE SHIELD	1 EA.
40-4111	WINDOW W/MYLAR	1 EA.
03-5412	DOUBLE-SIDED TAPE	
14-5431	ZINC SULFIDE (SOLD BY OZ.)	
13-7751	"C" CONNECTOR UG706/U	1 EA.
03-5432	COUPLING SILICONE GREASE	
17-8811	4-40 X 3/16 FH SCREW	4 EA.
17-8511	4-40 X 5/16 BH SCREW	4 EA.
21-9362	WHITE TEFLON WIRE	3-inch
21-9432	#26 BLACK WIRE	3-inch
22-9631	SILICONE CORD- 0.139 GASKET	
2077-023	COMPLETE BODY ASSY. W/WINDOW FRAME	1 EA.
7002-505	CONNECTOR END CAP	1 EA.
*40-4049	ADJUSTABLE GAIN END CAP	(OPTIONAL)
16-8317	O-RING-2-029	1 EA.
7002-029-04	PLEXIGLASS SPACER	1 EA.
7002-029-05	SPONGE	4 EA.
7085-064	CONNECTOR WRENCH (FOR "C" CONN.)	
7077-027	TUBE RETAINER	1 EA.
7077-030	ACRYLIC RETAINER	1 EA..

1.5 Inch Tube Socket, Drawing 2 x 317

Ref. No.	Description	Part No.
BOARD	Completely Assembled 1.5 inch Tube Socket	5002-502

CAPACITORS

C1	0.01 μ F, 2kV, C	04-5525
----	----------------------	---------

RESISTORS

R1	10 MEG	10-7106
R2	1 MEG	12-7964

M43-5 Alpha Scintillator
March 2011

Ref. No.	Description	Part No.
R3-R6	10 MEG	10-7106
R11	10 MEG	10-7106
R101-R104	10 MEG	10-7106
R111	10 MEG	10-7106

MISCELLANEOUS

12 ea.	Contact-003-1381-003	01-5245
--------	----------------------	---------

***OPTIONAL**

Ref. No.	Description	Part No.
BOARD*	Completely Assembled Gain Control	5209-019

CAPACITORS

C1	0.0047 μ F, 3kV, C	04-5547
----	------------------------	---------

RESISTORS

R1	100k TRIMMER POT	09-6813
----	------------------	---------

MISCELLANEOUS

	Cloverleaf-011-6809-000-599	18-8771
--	-----------------------------	---------

***Note: For units with Gain Control only.**

DRAWINGS AND DIAGRAMS

Assembly View, Drawing 77 x 23

1.5 Inch Tube Socket Board, Drawing 2 x 317

1.5 Inch Tube Socket Component Outlines, Drawing 2 x 318

CONNECT. END
CAP

7002-505

O-RING 2-029
16-8317

SPONGE
7002-029-05
4 EA.

TUBE RETAINER
7077-027

TUBE/SOCKET ASSY.
4002-510

"C"
CONNECTOR
4478-011

COMPLETE BODY ASSY.
2077-023

SCINTILLATION RETAINER
7077-030

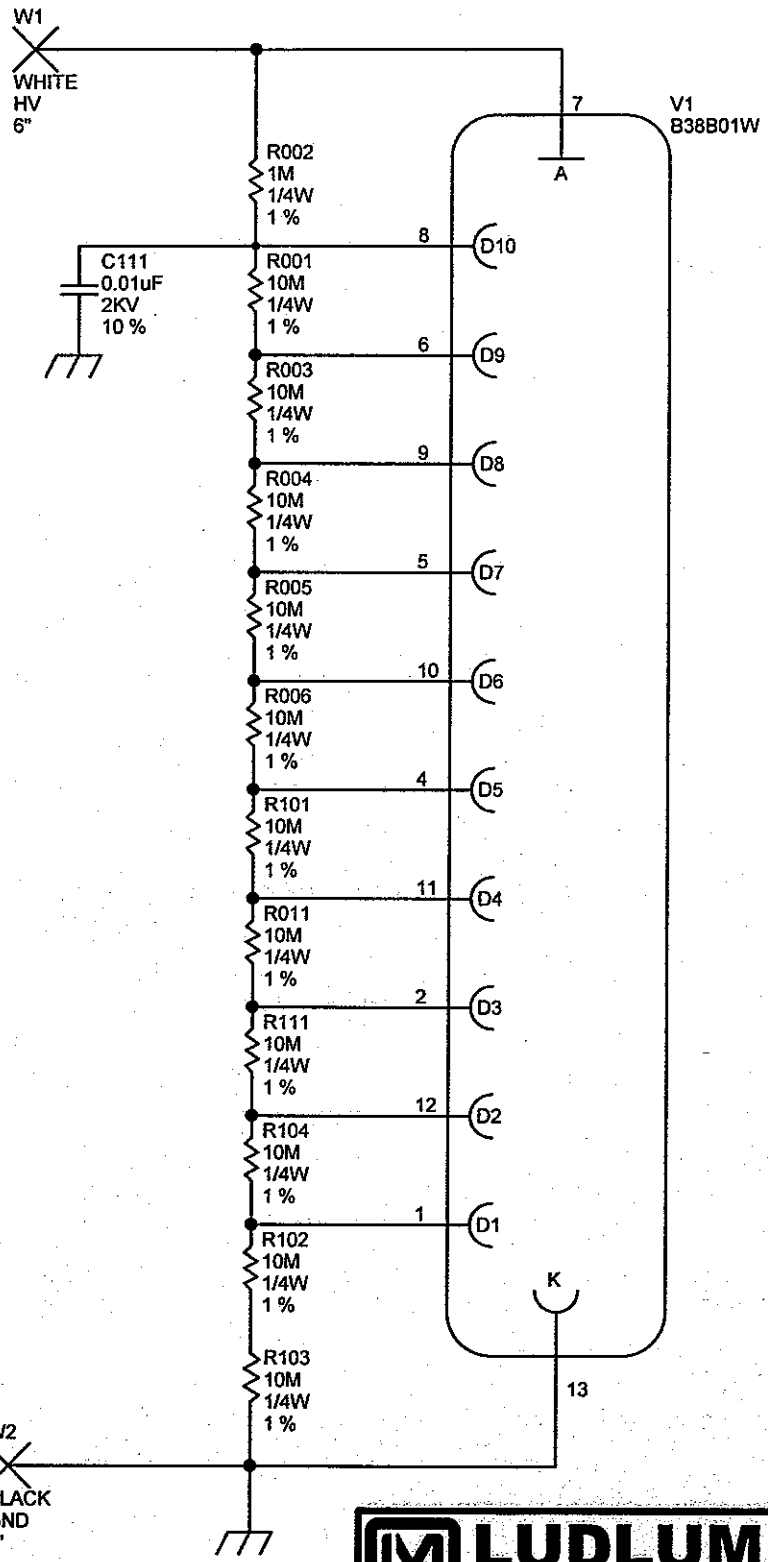
DOUBLE-SIDED TAPE (03-5412)
W/ZINC SULFIDE (14-5431)

SILICONE GASKET CORD
22-9631

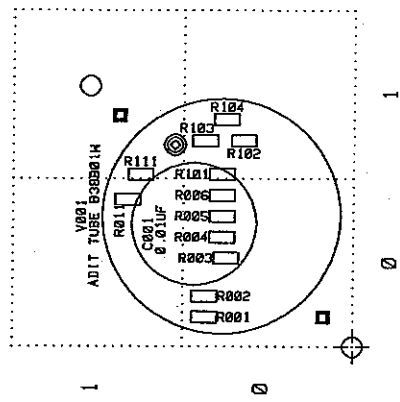
WINDOW W/MYLAR
40-4111

WINDOW FRAME
7077-028

REV	NO.	DATE	BY	CHK	APP
1		8/13/96	KO		
TITLE		8/13/96	10-8-96	APP	DATE
M		10-8-96	10-8-96	10-8-96	10-8-96
TOL:		SHOP STD	SCALE:	FULL	OTHER
TITLE		M 43-5 ALPHA SCINT. PROBE			PROBE
LUDLUM INSTRUMENTS, INC.		SERIES			SHEET
1000 W. 10TH ST.		77			23
MILWAUKEE, WIS. 53219					



		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	Sheet: 1 of 1	Series:
Approve: <i>[Signature]</i> 19:01:11	14-Feb-2011	Rev: 2.0	Sheet 317
<small>002502R2P1.sch</small>			



LUDLUM MEASUREMENTS INC. SWEETWATER, TX.	
DR	CKB
BOARD	5002-502
TITLE	VOLTAGE DIVIDER BOARD
DESN. DL.	02/14/96
MODEL	1 1/2"
APP. JWS	10-24-07
FILENAME	B5002502
DATE	11-59-05
REVISED	14-Jan-04
REVISION	SERIES
1	0
OUTLINE	OUTLINE
1	0
2	318