

**LUDLUM MODEL 43-1 AND 43-1-1
SCINTILLATORS**

**January 2010
Serial No. PR185463
and Succeeding Numbers**



**LUDLUM MEASUREMENTS, INC.
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M43-1 and 43-1-1 Scintillators
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1. GENERAL

The Model 43-1 and Model 43-1-1 scintillators are large area detectors with 75 cm² active areas. The Model 43-1 is an alpha

detector and the Model 43-1-1 is an alpha-beta detector. The large area detectors are useful for radiation surveys and wipe test analysis.

2. SPECIFICATIONS

- **WINDOW:** 1.2 mg/cm² metallized mylar
- **WINDOW AREA:** 75 cm² active area
- **EFFICIENCY:**
ALPHA: 33% of 4 π emission for ²³⁹Pu
ALPHA-BETA: 4% of 4 π emission for ¹⁴C
- **DETECTOR OPERATING VOLTAGE:** 500-1200 volts
- **BACKGROUND:** 3 cpm or less
- **CROSS TALK (for the 43-1-1 only):**
ALPHA TO BETA: less than 10%
BETA TO ALPHA: less than 1%
- **SCINTILLATION MATERIAL:**
Model 43-1: ZnS(Ag)
Model 43-1-1: EJ 212 with ZnS
- **SIZE:** 12.2 x 24.9 cm (4.8 x 9.8 in.) (Dia x L)
- **WEIGHT:** 0.9 kg (2 lb)
- **CONNECTOR:** series "C"; other connectors available upon request

3. MAINTENANCE

Malfunctions are normally due to either light leaks, a defective photomultiplier tube, contamination, or high voltage not set properly. Malfunctions caused by light holes give an increase in the background count. This increase may cause enough counts to saturate the detector, where the instrument may indicate zero counts.

It is important to make sure that the voltage to the detector is set properly by running a plateau and setting the operating point in the first third of the plateau, above the knee of the curve.

To check for a light leak, cover the window with an opaque material. If the instrument indicates a change in count after a few minutes, the source of the light can sometimes be determined by visual inspection of the window or by uncovering small areas of the window and looking for a change in count.

The photomultiplier tube rarely fails, but a tube malfunction can be isolated by insuring the instrument is not saturated due to light leaks and does not indicate any counts in a known radiation field.

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4. REPAIR/REPLACEMENT OF MYLAR WINDOW

(Refer to drawing 2 x 172A)

1. Remove the four screws from the front face of the detector.
2. Remove the front face from the body of the detector.
3. Remove mylar window from the detector face.
4. Ensure the O-ring on probe body is positioned properly.
5. Refer to drawing 2 x 172A for direction of phenolic ring.
6. Replace the detector front face and secure with the four screws. Check that the o'ring is properly positioned before tightening.
7. Wait at least 20 minutes before checking the detector response. If the instrument reads zero counts when exposed to a source, refer to the previous steps on maintenance.
8. The detector should not be calibrated for at least 24 hours after window replacement to allow for light decay from the ZnS(Ag) scintillator.

5. REPLACEMENT OF PHOTOMULTIPLIER TUBE

1. Unfasten end connector cap (four screws).
2. Slowly remove end connector cap and pull out as far as wires will allow.
3. Remove ground and high voltage wires from end connector cap.
4. Remove foam sponge and plastic spacers.
5. To remove PMT, twist and firmly pull on tube board.
6. Remove tube from tube board.
7. Remove metallic shield.
8. Install new tube to tube board.
9. Clean coupling grease from Plexiglas light pipe.
10. Slide the meter shield over the tube and tape to tube socket.
11. Apply optical coupling grease to the face of the tube. Use only that amount, which when pressed firmly against the Plexiglas, will spread and cover the face of the tube (approximately one-half teaspoon).
12. Place the tube with socket into the probe body. Press unit firmly against the Plexiglas with a little back-and-forth twisting movement. Do not pull out on the tube after pressing tube to Plexiglas. This will cause air bubbles to form between the tube and Plexiglas of the probe.
13. Install the plastic spacers, foam, and reconnect the HV and ground wires to the end cap.
14. Install end cap to complete final assembly.

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PARTS LIST

<u>Model 43-1 Alpha Scintillator</u>			Part No.	Descrip.	Part No.
UNIT Completely Assembled				3.8 cm (1.5 in.) Tube Socket Board,	
M43-1 Alpha Scintillator	47-1516			<u>Drawing 2 x 317</u>	
 <u>Model 43-1-1 Alpha-Beta Scintillator</u>				• CAPACITORS	
UNIT Completely Assembled			C001	0.01μF, 2kV	04-5525
M43-1-1 Alpha-Beta Scintillator	47-2336			• RESISTORS	
 <u>Replacement Parts List</u>			R001	10 MEG	12-7996
Part No.	Descrip.	Qty.	R002	1 MEG	12-7844
01-5705	(M43-1-1 ONLY) EJ212- 3.98 X .010 w/ZnS	1 EA.	R003-R006	10 MEG	12-7996
01-5349	PHOTO TUBE	1 EA.	R011	10 MEG	12-7996
40-4006	TUBE SHIELD	1 EA.	R101	10 MEG	12-7996
40-4034	M43-1 Window		R102-R104	10 MEG	12-7996
	w/Mylar	1 EA.	R111	10 MEG	12-7996
4002-653	M43-1-1 Window			• MISCELLANEOUS	
	w/Mylar	1 EA.	V001	3.8 cm (1.5 in.) PM TUBE	01-5001
4478-011	CONNECTOR- UG706/U				
	SERIES "C"	1 EA.			
17-8811	4-40 X 3/16 FH				
	SCREWS	4 EA.			
17-8510	4-40 X 1/4 BH				
	SCREWS	4 EA.			
16-8279	O-RING	1 EA.			
7002-029-05	SPONGE	1 EA.			
7002-029-02	CONNECTOR				
	END CAP	1 EA.			
7002-029-01	PROBE BODY	1 EA.			
7002-127	LIGHT PIPE CASE	1 EA.			
7002-128	PLEXIGLAS				
	LIGHT PIPE	1 EA.			
7002-129	FRONT FACE	1 EA.			
22-9631	CORD	1.20 Ft.			
7002-157	VINYL COVER	1 EA.			

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DRAWINGS AND DIAGRAMS

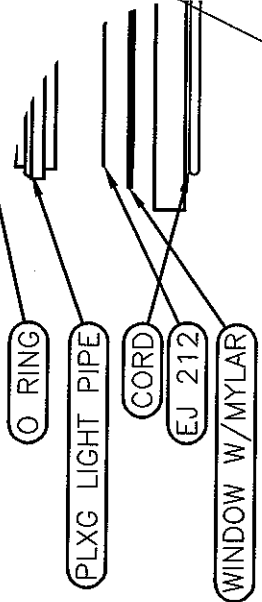
Assembly View, Drawing 2 x 172A

3.8 cm (1.5 in.) Tube Socket Board, Drawing 2 x 317

3.8 cm (1.5 in.) Tube Socket Board Component Layout, Drawing 2 x 318

REV #	ALTERATIONS	DATE	BY
1	VALID	1/30/02	DSW
2	ECF# 2118	8/15/07	DSW

M 43-1-1



COAT EJ 212 W/THIN LAYER OF RTV SILICONE THEN COAT W/ZnS, ALLOW TO DRY THEN ASSEMBLE
MYLAR AWAY FROM LIGHT PIPE

DETAIL A
SCALE 1:2

TUBE ASSY.

4002-601

4-40 X 3/16 FH

4002-601

WINDOW W/MYLAR

O RING

BODY

4-40 X 1/4 BH

M 43-1

DOUBLE-SIDED TAPE ON LIGHT PIPE COAT W/ZnS ALLOW TO DRY THEN ASSEMBLE

O RING

PLXG LIGHT PIPE

CORD

WINDOW W/MYLAR

PLXG LIGHT PIPE

CORD

EJ 212

MYLAR TOWARD LIGHT PIPE

DETAIL B
SCALE 1:2

4002-740

CONNECTOR

END CAP

LUG

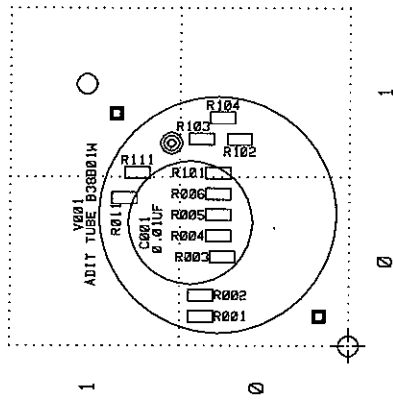
SPONGE

16-8317

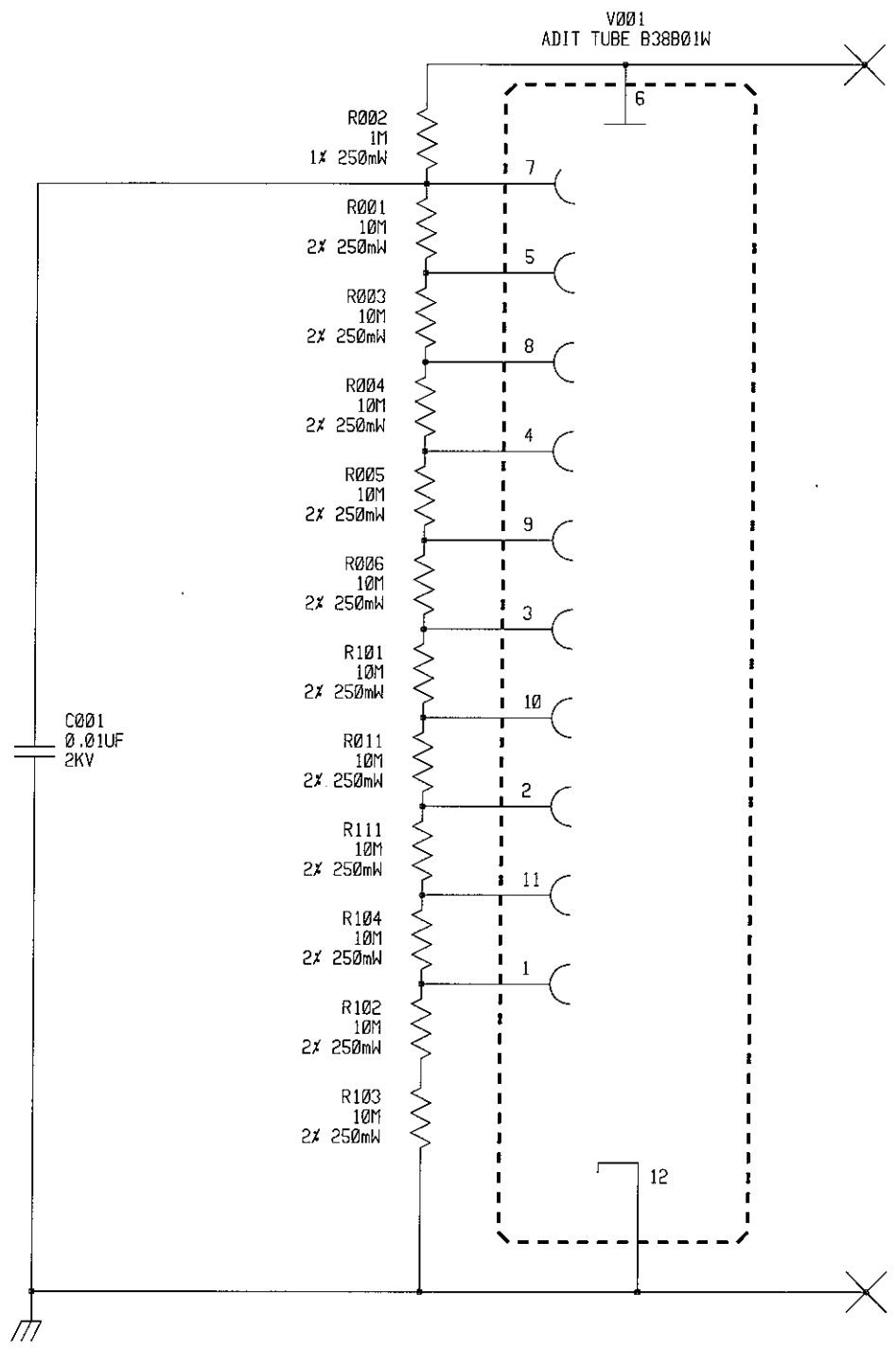
CO-NETIC-FOIL

NETIC FOIL

DRAWN DATE	CHECKED	APPROVED
CMCL 8/15/07		<i>[Signature]</i>
TITLE: M 43-1 & M 43-1-1 ASSEMBLY		
LUDLUM RESEARCH, INC. 5500 WINDYBROOK DRIVE, SUITE 200 FARMERSVILLE, TEXAS 75844		
SHEET	SERIES	2
172A		



LUDLUM MEASUREMENTS INC.		SHEETMATER, TX.	
DR	CMB	02/14/98	TITLE: VOLTAGE DIVIDER BOARD
BOARD: 5002-502		MODEL: 1 1/2"	
DISC#	DL	02/14/98	FILENAME: BS02502
APP JWS	10-24-07	11-59-95	14-Jan-04
COMPONENT	SOLDER	REVISION	SERIES SHEET
OUTLINE	OUTLINE	1 0	2
			319



UPDATED	-
DR CKB	02/14/96
CHK <i>AW.</i>	<i>10-29-99</i>
DSCN DL	02/14/96
APPD <i>RSS</i>	<i>10-27-99</i>
NEXT HIGHER ASSY.	
14:32:55	29-Oct-99

LUDLUM MEASUREMENTS INC.			
TITLE: 1 1/2" VOLTAGE DIVIDER BOARD			
BOARD# 5002-502			
SIZE	MODEL	SERIES	SHEET
C	-	2	317
SB002502		SHEET 1 OF 1	