

**LUDLUM MODEL 243 and 243-2
SHIELDED WELL SCINTILLATOR**

February 2021

**LUDLUM MODEL 243 and 243-2
SHIELDED WELL SCINTILLATOR**

February 2021



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**

Model 243 and 243-2 Shielded Well Scintillator
February 2021

Model 243 and 243-2 Shielded Well Scintillator
February 2021

Table of Contents

1. GENERAL.....	1
2. UNPACKING AND REPACKING	1
3. ASSEMBLY AND DISASSEMBLY.....	2
4. SPECIFICATIONS.....	4
5. MODEL 243 PARTS LIST	4
6. MODEL 243-2 PARTS LIST	5
7. DRAWINGS AND DIAGRAMS.....	5

Model 243 and 243-2 Shielded Well Scintillator

February 2021

1. GENERAL

The Model 243 and the Model 243-2, along with a pulse height analyzer system, is used for gamma ray assay and wipe test analysis. The Model 243 is shielded with a 1.3 cm (0.5 in) of lead to improve sensitivity by reducing background and other external radiation.

The Model 243 detector is an integrated 4.4 cm (1.75 in) diameter by 5.1 cm (2 in) thick NaI (TI) crystal scintillator optically coupled to a 5.1 cm (2 in.) diameter, 10-stage photo-multiplier tube. The Model 243-2 detector is an integrated 5.1 x 5.1 cm (2 x 2 in) thick NaI (TI) crystal scintillator optically coupled to a 5.1 cm (2 in) diameter, 10-stage photomultiplier tube.

Note:

The size of the crystal and the efficiency noted in the specifications being the only difference between the Model 243 and the Model 243-2, this manual will refer to the two instruments as the “Model 243.”

The Model 243 uses a series “C” connector for both signal and high-voltage lines. Pulse height analyzer systems having separate signal and HV connectors will require a signal splitter box (Model 297 or equivalent).

2. UNPACKING AND REPACKING

Warning:

The well detector contains a fragile crystal and may be damaged by a shock or direct impact.

Warning:

If the instrument has to be returned, it must be disassembled and packaged sufficiently to prevent damage.

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 on the packing list are in the carton. If multiple detectors are included, refer to the calibration certificates for the 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.

Model 243 and 243-2 Shielded Well Scintillator February 2021

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.

3. ASSEMBLY AND DISASSEMBLY

Note:

This instrument is shipped disassembled to prevent damage.

Tools Required:

- Large flat blade screwdriver

When the Model 243 is unpacked, there will be three pieces (as shown in the picture below):

1. The well detector with a foam ring around it
2. The main cap
3. The lead shield assembly



1↑

2↑

3↑

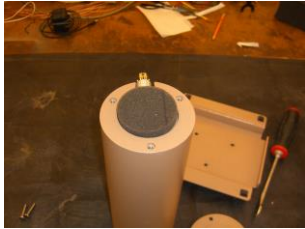
Model 243 and 243-2 Shielded Well Scintillator
February 2021

ASSEMBLY:

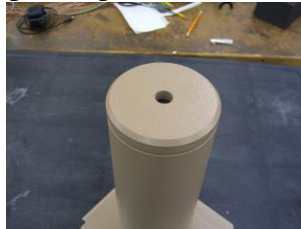
1. Turn the Model 243 lead shield assembly upside down.
2. Remove three each 10-32 x 1 inch screws from the base.
3. Remove the base and the bottom foam pad.
4. Carefully place the well detector inside the lead shield.



5. Place the bottom foam pad on top of the well detector and replace the rear cap and base, as well as the three screws.



6. Turn the instrument right side up and place the foam ring around the well detector, and then place the main cap on top.



DISASSEMBLY:

1. Turn the Model 243 probe and shield assembly upside down
2. Remove three each 10-32 x 1 inch screws from the base.
3. Remove the Model 243 base and bottom foam pad.
4. Carefully remove the well detector from the lead shield assembly. (Be aware that some well detectors may be wrapped with foam padding and may not come out easily.)

Model 243 and 243-2 Shielded Well Scintillator
February 2021

4. SPECIFICATIONS

DETECTOR: Model 243-Integral line 4.4 x 5.1 cm (1.8 x 2 in.) (Dia x thickness) NaI (TI) scintillator

Model 243-2-Integral line 5.1 x 5.1 cm (2 x 2 in.) (Dia x thickness) NaI (TI) scintillator

WELL SIZE: 1.7 x 3.9 cm (0.66 x 1.6 in.) (Dia x D)

SCINTILLATOR CONSTRUCTION: 0.025 cm (0.010 in.) thick aluminum well

LEAD SHIELDING: 1.3 cm (0.5 in.) thick lead with removable cap

EFFICIENCY (4 π):

Model 243: 65% for ¹²⁹I; 80% for ¹²⁵I; 33% for ¹³⁷Cs; 43% for ⁶⁰Co, 90% for ^{99m}Tc

Model 243-2: 41% for ⁵⁷Co

DETECTOR OPERATING VOLTAGE: 500-1200 Vdc

SIZE:

Base: 20.3 x 20.3 cm (8 x 8 in.) (L x W)

Body: 8.9 x 27.9 cm (3.5 x 11 in.) (Dia x H)

BACKGROUND: 1000 cpm or less in a 10mR/hr field (optional one-half inch sleeve for background reduction, part no. 7379-044)

WEIGHT: 18.1 kg (40 lb); shipping weight is 20.4 kg (45 lb)

5. MODEL 243 PARTS LIST

<u>Ref. No.</u>	<u>Description</u>	<u>Part No.</u>
Unit	Completely Assembled Model 243 Shielded Well Scintillator	47-1621
*	M 243 HV SIGNAL SPLITTER ASSY (Optional-For use w/Analyzers w/separate signal & HV connectors)	4379-038
*	4.4 x 5.1 cm (1.75 x 2 in.) Integral Line Detector	01-5130
*	5.1 cm (2 in.) Tube Socket Board	5002-934
*	Model 243 Shield Assembly	2379-008
*	Model 243 Main Cap	7002-046-03
*	Model 243 Foam Ring	7090-015
*	Model 243 Rear Cap	7379-009

**Model 243 and 243-2 Shielded Well Scintillator
February 2021**

*	Model 243 Base	7379-010
*	Bottom Foam Pad	7260-001-05
*	“C” Connector UG706/U	4478-011
*	Bumper-Rubber Keystone	21-9276

6. MODEL 243-2 PARTS LIST

<u>Ref. No.</u>	<u>Description</u>	<u>Part No.</u>
Unit	Completely Assembled Model 243-2 Shielded Scintillator	47-3276
*	M 243 HV SIGNAL SPLITTER ASSY (Optional-For use w/Analyzers w/separate signal & HV connectors)	4379-038
*	5.1 x 5.1 cm (2 x 2 in.) Integral Line Detector	01-5136
*	5.1 cm (2 in.) Tube Socket Board	5002-934
*	Model 243 Shield Assembly	2379-008
*	Model 243 Main Cap	7002-046-03
*	Model 243 Conn. Holder	7379-003
*	Model 243 Cover	7379-004
*	Model 243 Rear Cap	7379-009
*	Model 243 Base	7379-010
*	Bottom Foam Pad	7260-001-05
*	“C” Connector UG706/U	4478-011
*	Black Bumper	21-9376

7. DRAWING AND DIAGRAMS

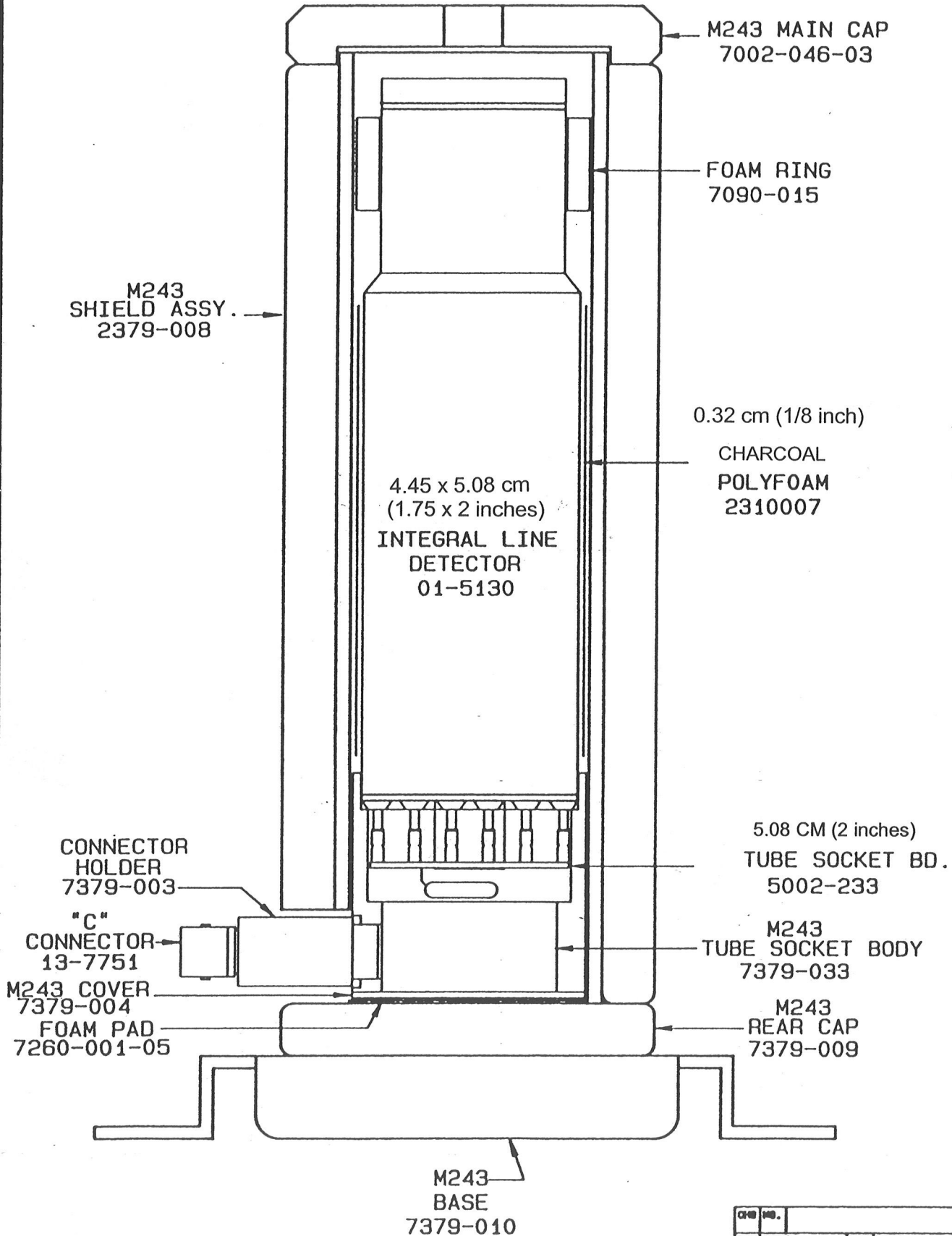
Assembly View Model 243, Drawing 379 x 16

Detector Assembly Model 243, Drawing 379 x 19

5.1 cm (2 in.) Voltage Divider 5002-934, Drawing 2 x 934

5.1 cm (2 in.) Voltage Divider 5002-934 Component Layout, Drawing 2 x 935A (2 sheets)

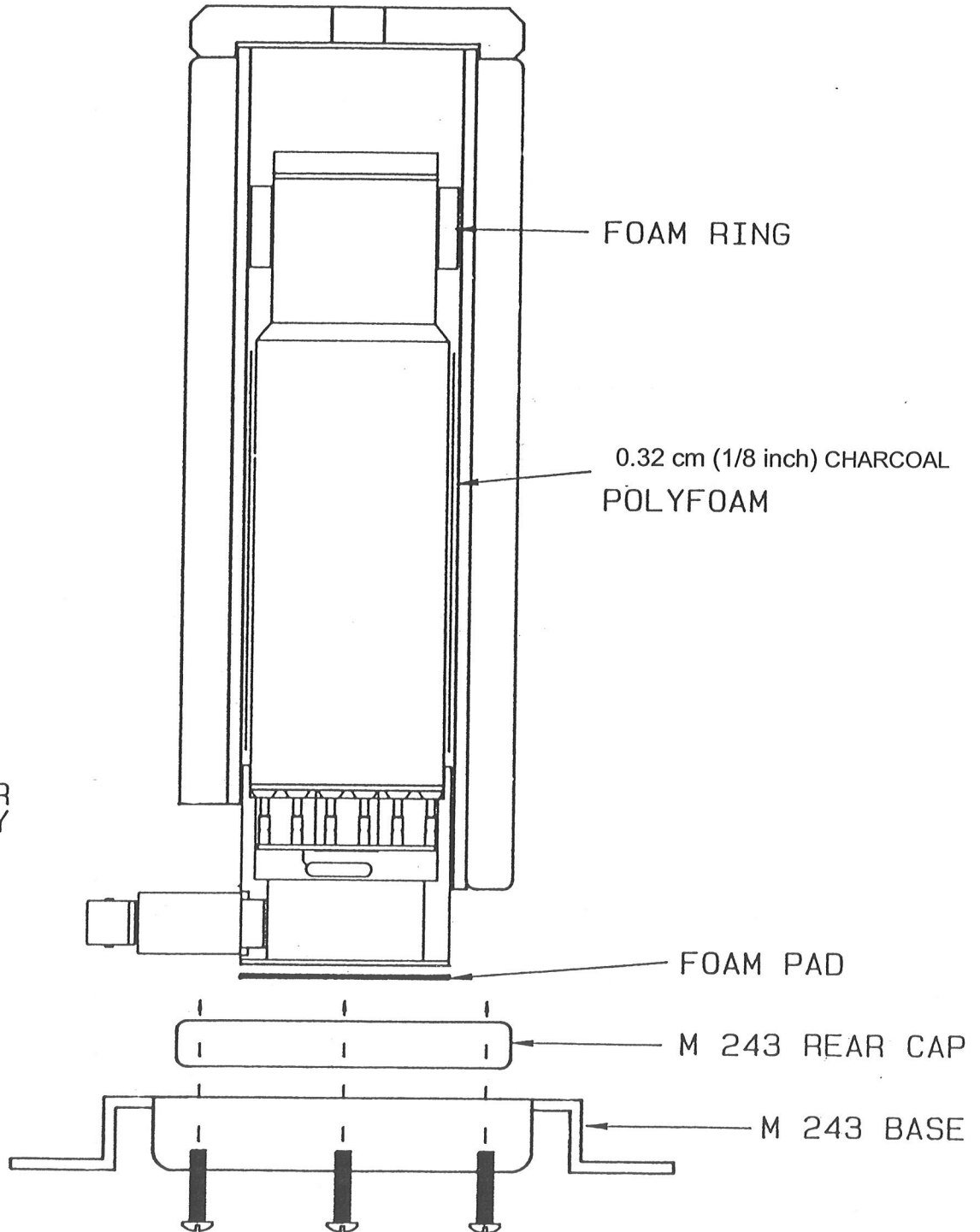
MODEL 243 SHIELDED WELL SCINTILLATOR



CHK NO.		CHK	CHK	APP
DATE	6-28-70	DATE		DATE
TOL:	SHOP STD <input type="checkbox"/>	SCALE:	FULL LJ	OTHER
TITLE M243 SHIELDED WELL SCINT.				
LUOLUM RESEARCH & DEVELOPMENT, INC.		SHEET	SHEET	
2101 W. 11TH STREET DALLAS, TEXAS 75008		379	16	

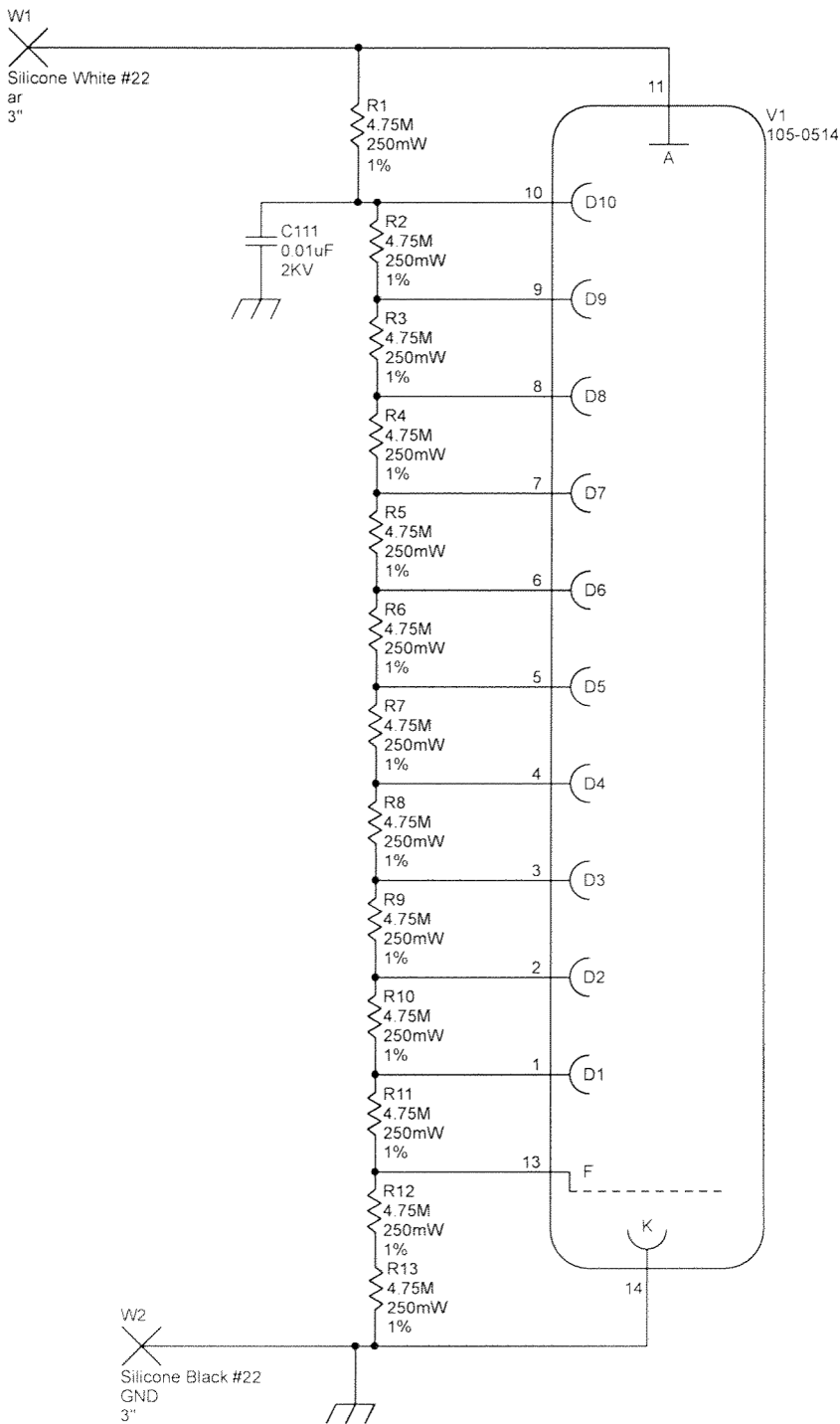
MODEL 243 ASSEMBLY DRAWING

DETECTOR
ASSEMBLY



3 EA. 10-32 X 1 INCH SCREWS

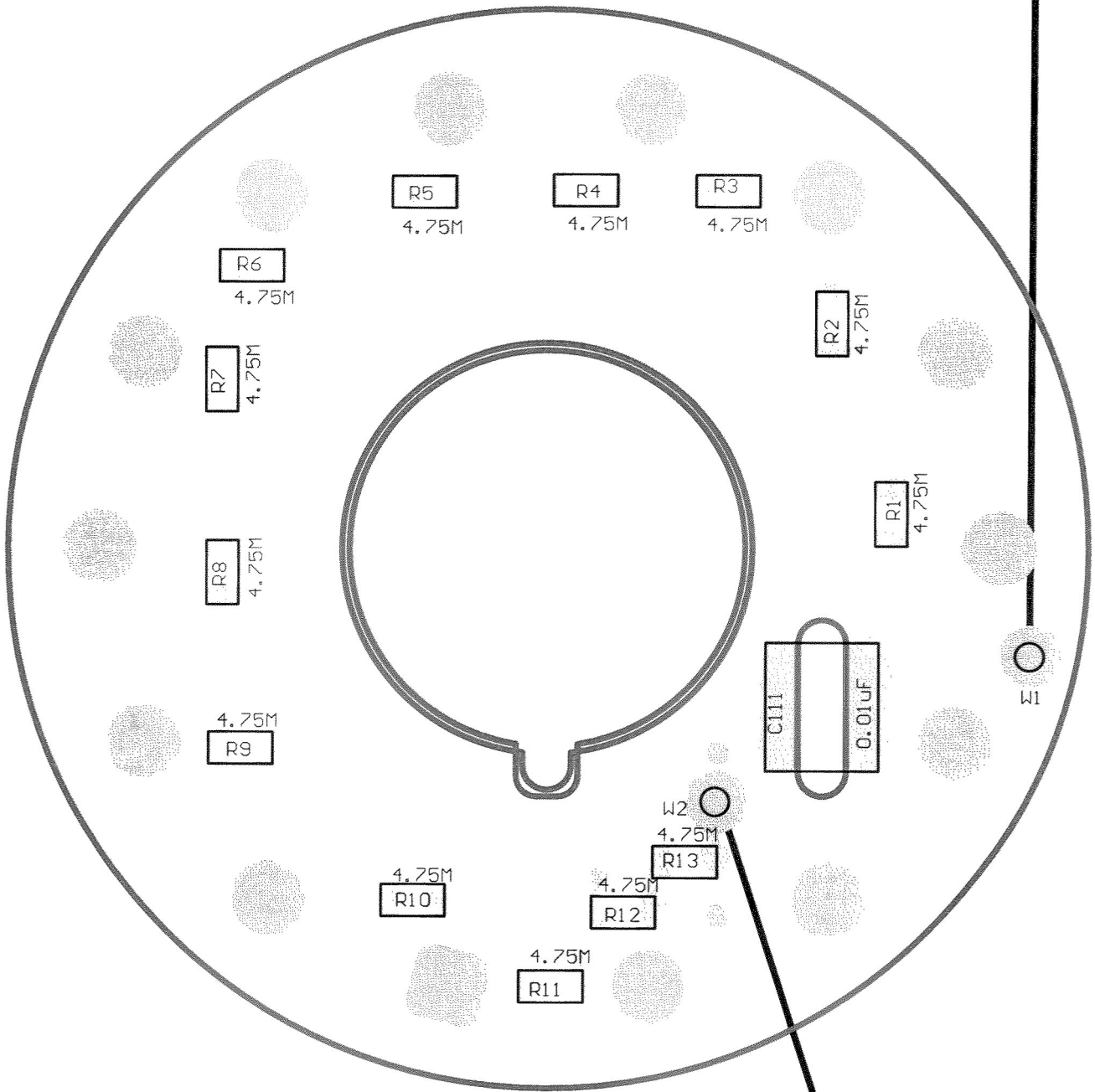
CHG. NO.		DRM	CHK	APP
DATE	6-28-10	CHK	DATE	DATE
TOL:	SHOP STD <input type="checkbox"/>	SCALE:	FULL	OTHER
TITLE M 243 ASSEMBLY DRAWING				
LUDLUM MEASUREMENTS, INC.		SERIES	SHEET	
801 OAK STREET DALLAS, TEXAS 75008		379	19	



		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828	
		Drawn: PAB Design: RC Approver: <i>[Signature]</i> Print Date: 7/30/2018 10:54:05 AM	Title: 2" VOLTAGE DIVIDER Model: N/A Board#: 5002-934 Sheet: 1 of 1 Rev: 4

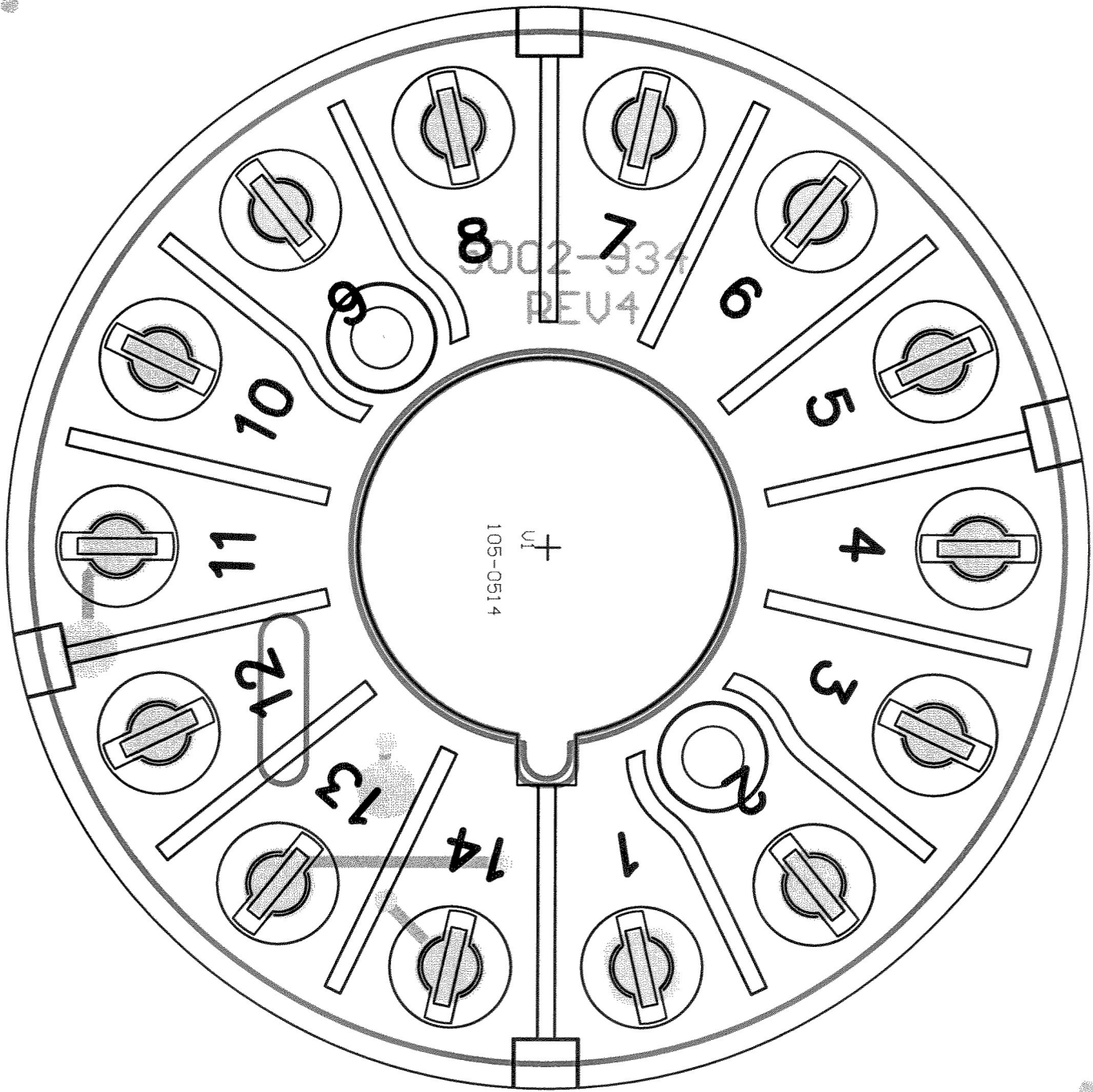
W:\Projects\LMIVoltageDividers\5002-934\Rev4\002934R4P1_SchDoc

WHITE SILICONE



BLACK SILICONE

LUDLUM		PO Box 810	
MEASUREMENTS, INC.		501 Oak Street	
		Sweetwater, TX 79556	
		U.S.A. 1-800-622-0828	
Title: 2" VOLTAGE DIVIDER			
Drawn: CKB	7/30/2018	Model: N/A	
Design: RC	7/30/2018	Board#: 5002-934	
Approve: <i>RCB</i>	<i>7/30/18</i>	Rev: 4	
PCBA Drawing		SCALE: 1.00	Series
Print Date: 7/30/2018	10:54:12 AM	Top Overlay	Sheet
		2	935A



LUDLUM MEASUREMENTS, INC. PO Box 810
501 Oak Street
Sweetwater, TX 79556
U.S.A. 1-800-622-0828

Title: 2" VOLTAGE DIVIDER			
Drawn: CKB	7/30/2018	Model: N/A	
Design: RC	7/30/2018	Board#: 5002-934	
Approve: <i>RIS</i>	<i>30 July 18</i>	Rev: 4	
PCBA Drawing		SCALE: 1.00	Series Sheet
Print Date: 7/30/2018	10:54:17 AM	Bottom Overlay	2 935A

W:\Projects\LM\VoltageDividers\5002-934\Rev4\002934R4 Assy.PcbDoc