

**LUDLUM MODEL 44-172
YSO GAMMA SCINTILLATOR**

March 2019

**Serial Number 240057 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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Section**1****Introduction**

The Ludlum Model 44-172 YSO (Yttrium Oxyorthosilicate) detector is used primarily for the detection of low-energy gamma radiation from approximately 5 keV to 145 keV. The Model 44-172 will also detect beta particles from ^{14}C (49 keV average energy).

The detector consists of a 2.5 cm (1 in.) diameter by 1 mm (0.04 in.) thick YSO scintillator. The window area is approximately 5 cm^2 and is covered by 1.2 mg/cm^2 metallized polyester for light tightness.

Compatible instruments for use by this detector provide detector high voltage of 500-1200 Vdc and input sensitivity of approximately -35 mV.



Model 44-172 YSO Detector

Section**2****Packing and Unpacking**

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. 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.

Section
3**Specifications**

Voltage Requirements: 500 volts to 1200 volts maximum.

Scintillator: 2.5 cm (1 in.) diameter by 1 mm (0.04 in.) thick YSO crystal (non-hygroscopic)

Photomultiplier Tube: 2.86 cm (1.125 inch) diameter; head-on type; magnetically shielded

Connector: Standard Series "C" (other types available upon request)

Window Area: 5 cm²

Window Density: 1.2 mg/cm²

Background: 250 cpm or less in a 10 μR/hr field

Efficiency (4π): 40% for ¹²⁵I; 25% for ¹²⁹I, 2.5% for ¹³⁷Cs, 7% for ⁵⁵Fe, 11.2% for ²⁴¹Am, 8% for ¹⁴C; and 7.4% for ⁵⁷Co

Input Sensitivity: typically -35 mV

Recommended Energy Range Operation: 5 keV to 145 keV gamma

Construction: cast-and-drawn aluminum with beige powder-coat finish

Size: 5.1 x 17.8 cm (2 x 7 in.) (Dia x L)

Weight: 0.5 kg (1 lb) including batteries.

Temperature: -4 to 50 °C (24 to 122 °F); may be certified for operation from -40° to 65°C (-40° to 150°F).

Pollution: Pollution Degree 3 (as defined by IEC 664) (Conductive pollution or dry nonconductive pollution that becomes conductive due to condensation occurs. To be found in industrial environment or construction sites (harsh environments).

Section 4

Parts List

	<u>Reference</u>	<u>Description</u>	<u>Part Number</u>
Model 44-172 YSO Gamma Scintillator	UNIT	Completely Assembled Model 44-172 YSO Gamma Scintillator	47-3543
Assembly View, Drawing 2 x 236	*	FOIL-NETIC	01-5019
	*	FOIL-CO-NETIC	01-5026
	*	Photomultiplier Tube 1.125 inch	01-5238
	*	YSO Scintillator	01-5782
	*	CAPLUG 1 7/8 SC MOD M44-1	03-5475
	*	O-Ring-2-029	16-8317
4 ea		SCREW 4-40 x3/16	17-8811
	*	LUG-1497	18-8766
	*	Housing	2002-357
	*	Window Assembly	2002-358
	*	Tube Shield	40-4006
	*	Receptacle UG706/U "C"	4478-011
	*	1.125 inch Voltage Divider	5435-182
7 ea.		Sponge	7002-029-05
	*	Light Pipe	7002-353
	*	Gasket	7002-355
1.125 inch Tube Socket Board, Drawing 435 x 1700	BOARD	Completely Assembled 1.125 inch Voltage Divider Board	5435-533
CAPACITORS	C1-C3	0.01 μ F, 200V	04-5725
	C4	0.0047 μ F, 3KV	04-5958
RESISTORS	R1	10M, 1/8W, 1%	12-7996
	R2	7.5M, 1/8W, 5%	12-7971
	R3-R10	10M, 1/8W, 1%	12-7996
	R11	2.21M, 1/8W, 1%	12-7002
	R12-R13	6.04M, 1/8W, 1%	12-7071
MISCELLANEOUS	*	Socket 1.125 inch PCB MOUNT	4435-103

A gray square graphic containing the word "Section" in a bold, black, sans-serif font at the top, and a large, white, bold number "5" in the center.

Drawings

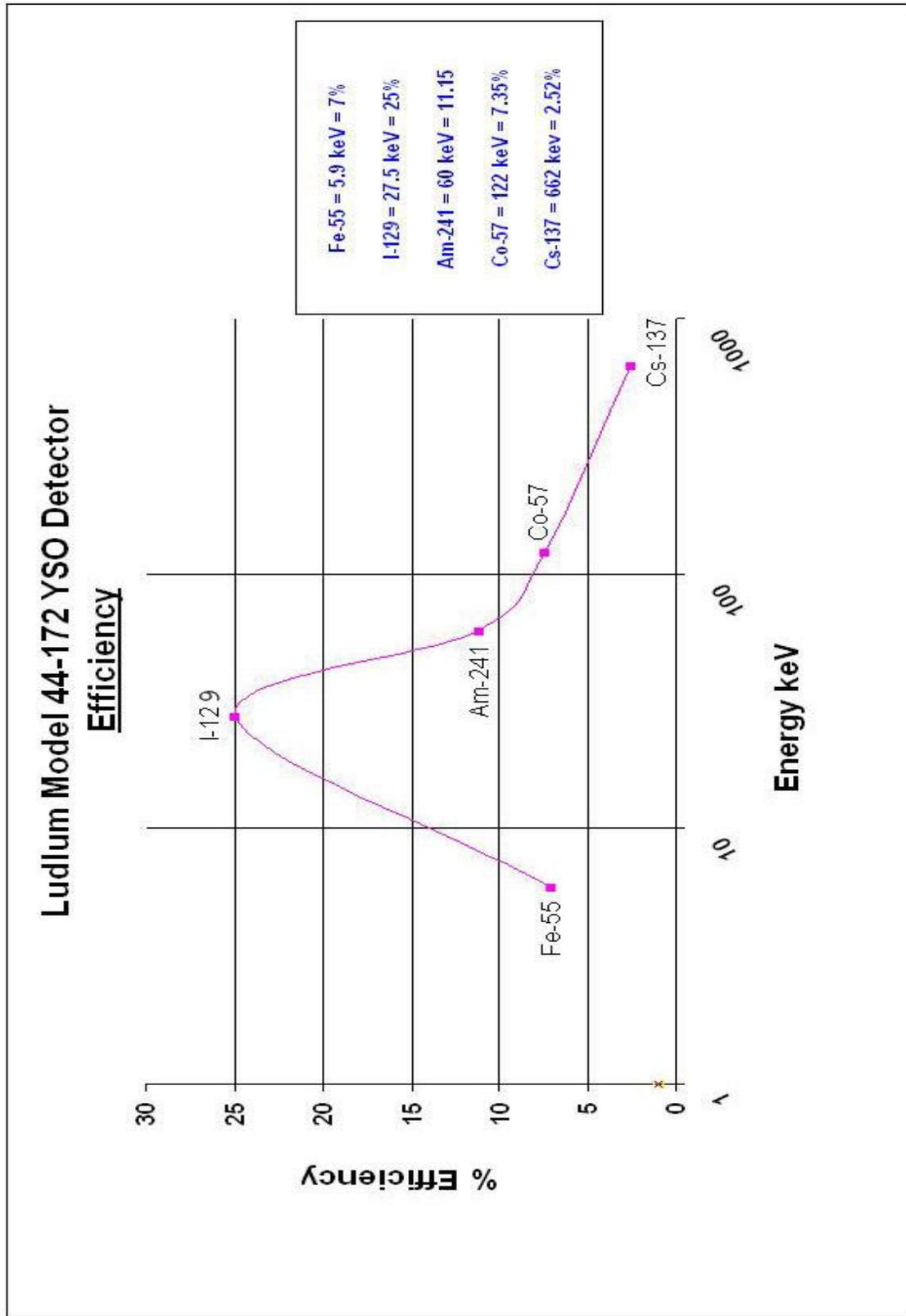
4 π Efficiency Curve

Assembly View, Drawing 2 \times 236

1 1/8 Inch Voltage Divider Board, Drawing 435 \times 1700

1 1/8 Inch Voltage Divider Board Component Layout, Drawing 435 \times 1701 (2 sheets)

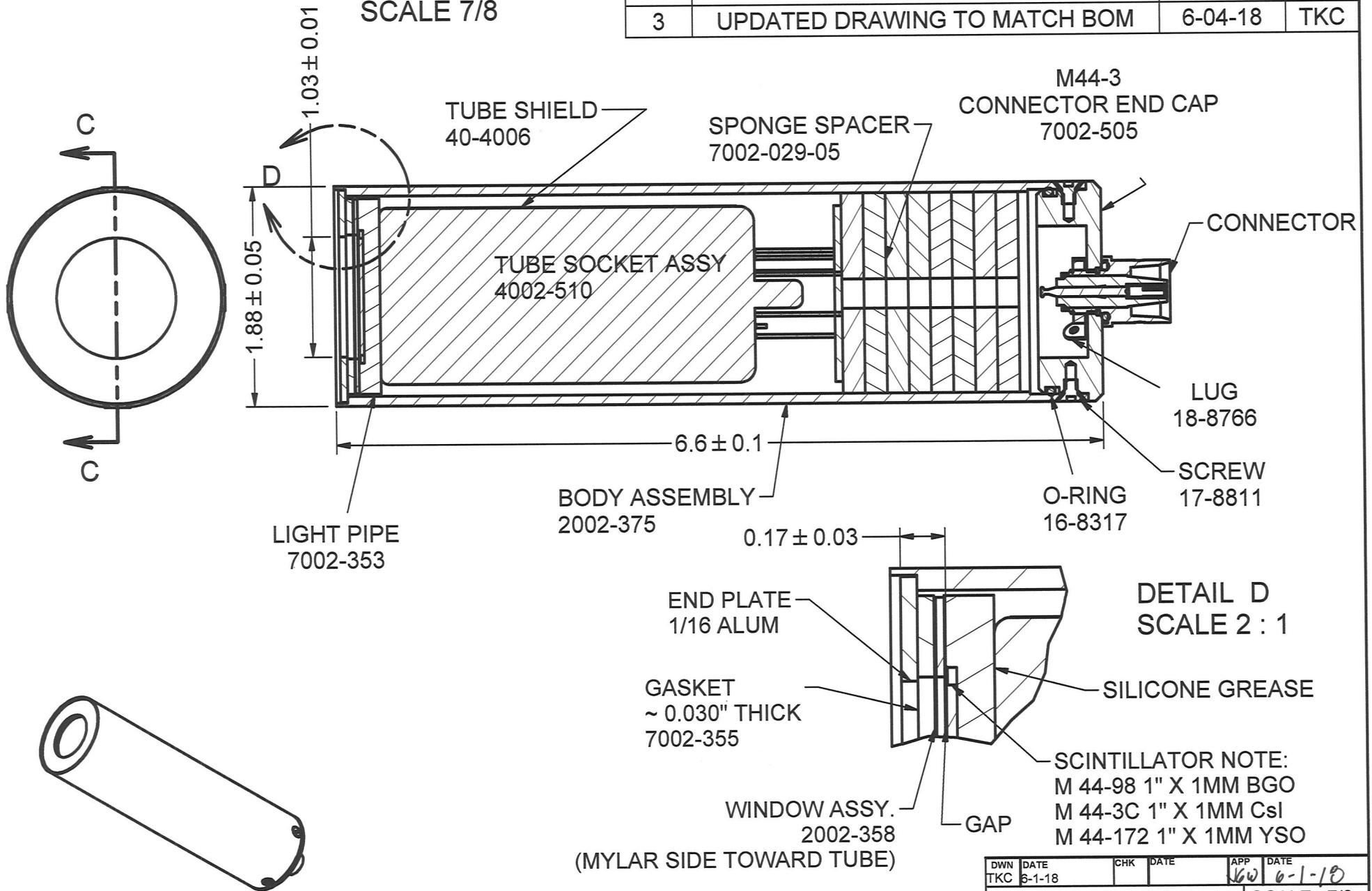
Window Assembly, Drawing 2 x 232A



REVISION HISTORY

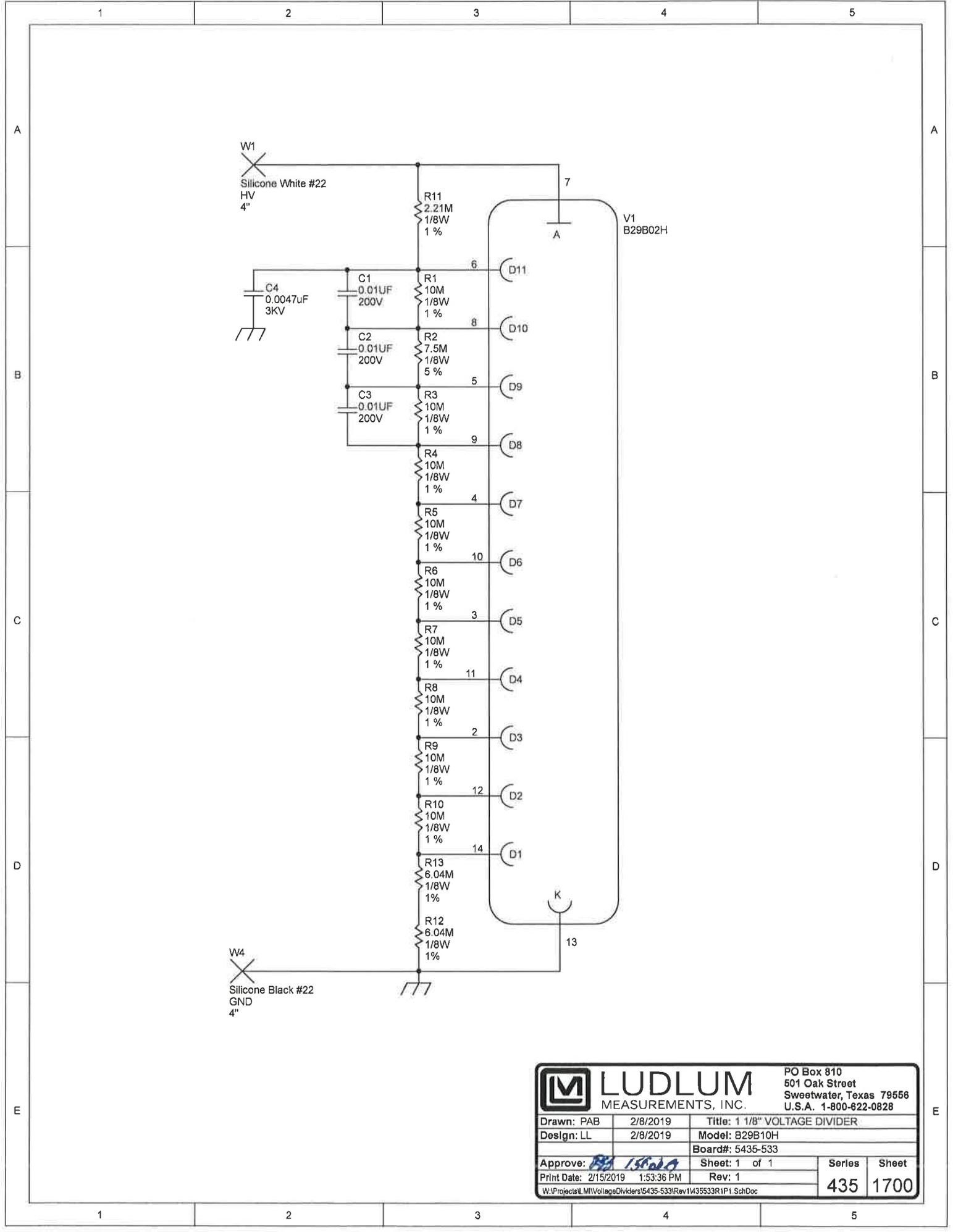
REV	DESCRIPTION	DATE	BY
2	VALID ECF- 2118	8-15-07	CMC
3	UPDATED DRAWING TO MATCH BOM	6-04-18	TKC

SECTION C-C
SCALE 7/8



*(M 44 -3C 2002-358-3)

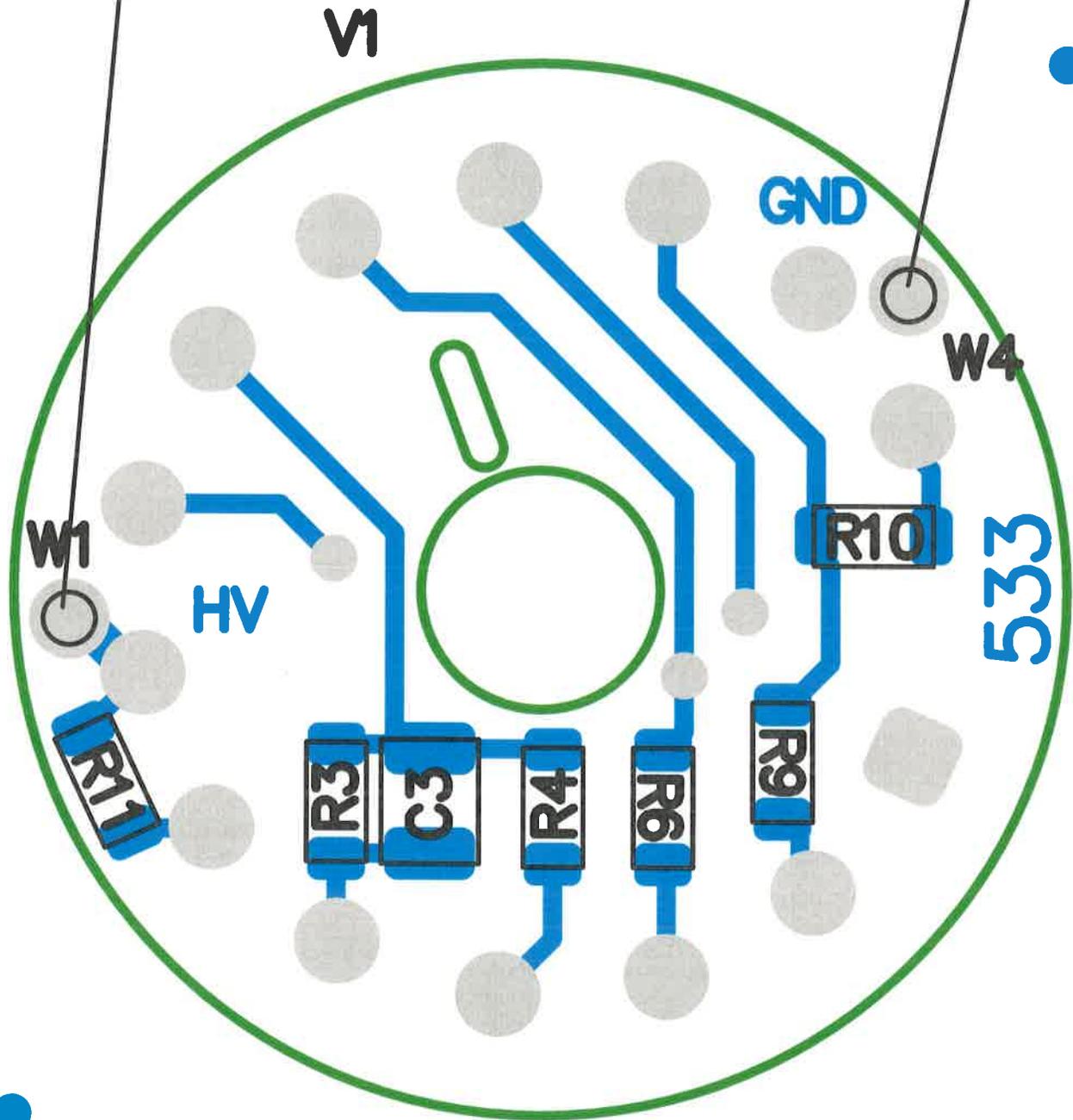
DWN	DATE	CHK	DATE	APP	DATE
TKC	6-1-18			TKC	6-1-18
DWG NUM: 4002-371				SCALE: 7/8	
TITLE M 44-98, 44-3C, 44-172 ASSY					
LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556				SERIES 2	SHEET 236



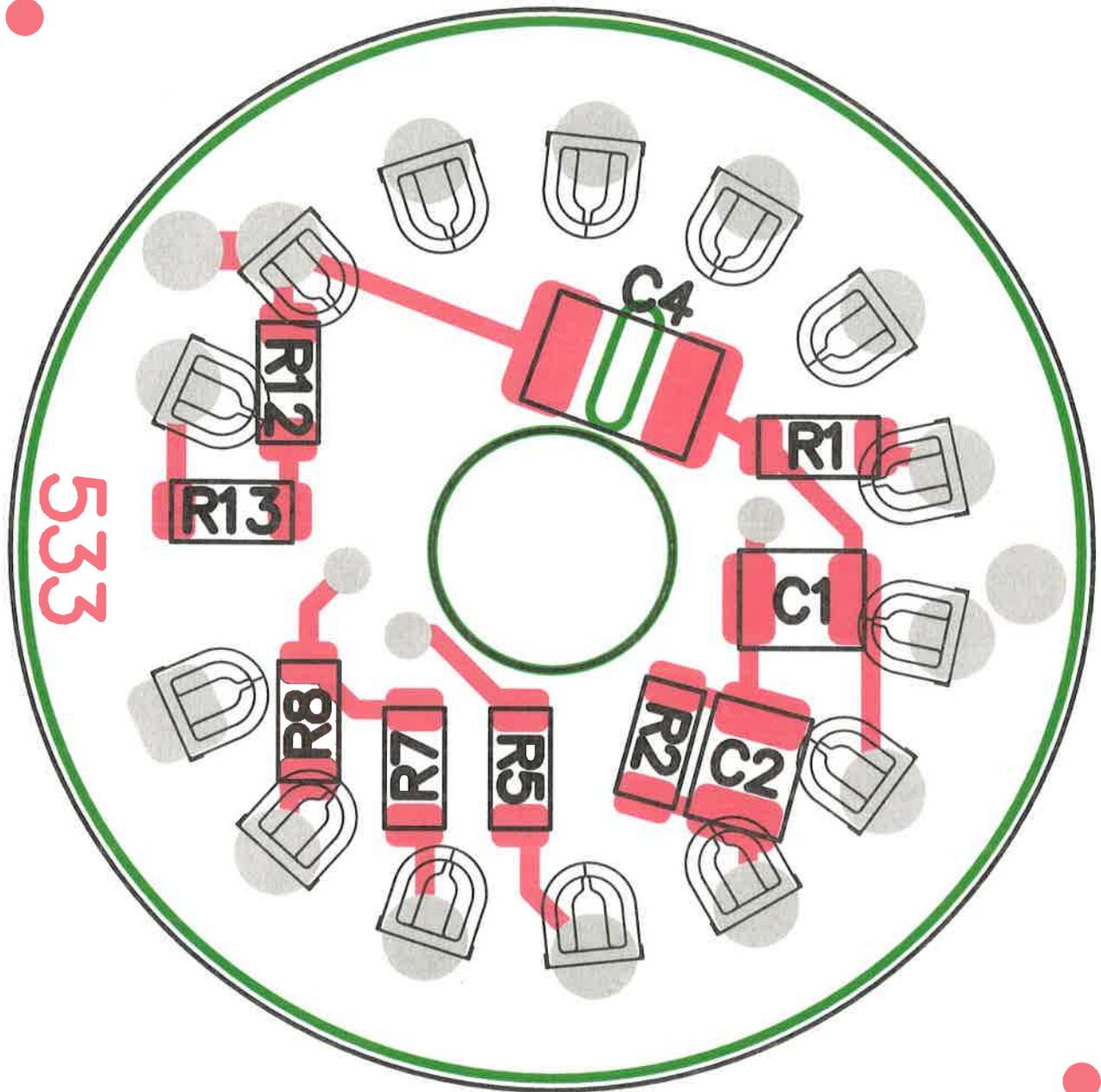
		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828		
		Drawn: PAB Design: LL Approve: <i>[Signature]</i> Print Date: 2/15/2019 1:53:36 PM	2/8/2019 2/8/2019 Sheet: 1 of 1 Rev: 1	Title: 1 1/8" VOLTAGE DIVIDER Model: B29B10H Board#: 5435-533
W:\Projects\LM\VoltageDividers\5435-533\Rev1\435533R1P1 SchDoc				

4" WHITE SILICONE WIRE

4" BLACK SILICONE WIRE

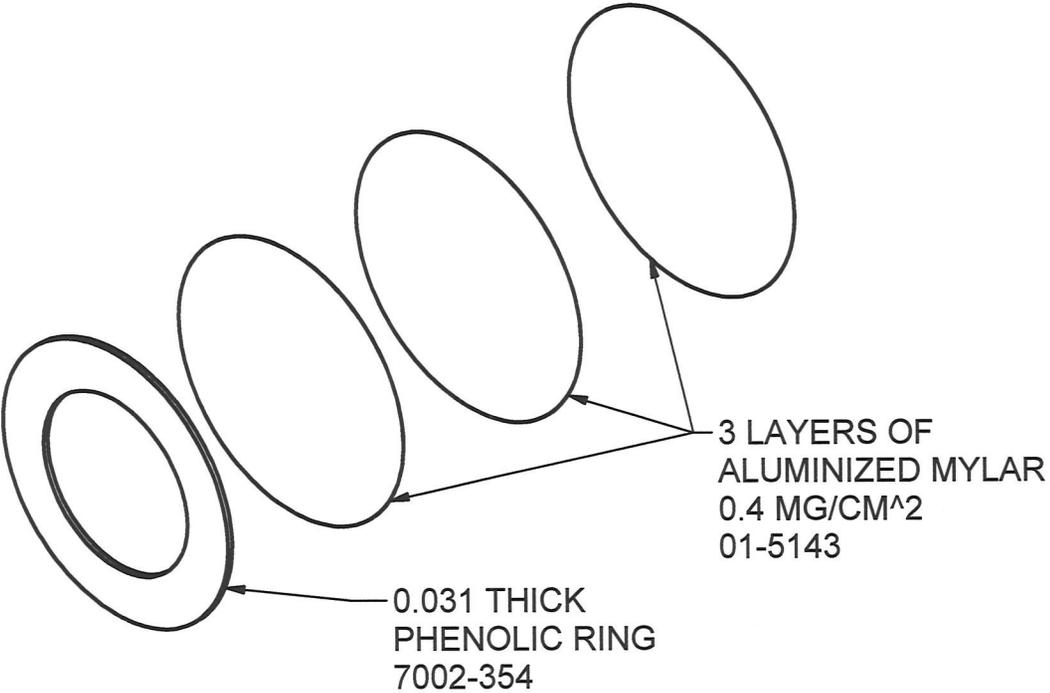


 LUDLUM		PO Box 810	
MEASUREMENTS, INC.		501 Oak Street	
		Sweetwater, TX 79556	
		U.S.A. 1-800-622-0828	
Title: 1 1/8" VOLTAGE DIVIDER			
Drawn: PAB	2/8/2019	Model: B29B10H	
Design: LL	2/8/2019	Board#: 5435-533	
Approve: <i>LL</i>	<i>2/8/19</i>	Rev: 3	
<i>PCBA Drawing</i>		SCALE: 1.08	Series Sheet
Print Date: 2/15/2019 1:55:41 PM		Top Overlay	435 1701
<small>W:\Projects\LMIVoltageDividers\5435-533\Rev1\435533R1_Assy.PcbDoc</small>			



		LUDLUM MEASUREMENTS, INC.		PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0828	
Title: 1 1/8" VOLTAGE DIVIDER					
Drawn: PAB	2/8/2019	Model: B29B10H			
Design: LL	2/8/2019	Board#: 5435-533			
Approve: <i>RL</i>	<i>15 Feb 19</i>	Rev: 3			
PCBA Drawing		SCALE: 1.08	Series	Sheet	
Print Date: 2/15/2019 1:55:46 PM		Bottom Overlay	435	1701	
<small>W:\Projects\LM\VoltageDividers\5435-533\Rev1\435533R1_Assy.PcbDoc</small>					

REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
1	VALID	5-14-99	DDW



DWN	DATE	CHK	DATE	APP	DATE
TKC	5-23-18			<i>Now</i>	<i>6-2-18</i>
DWG NUM: 2002-358				SCALE: 1:1	
TITLE MODEL 44-98, 44-172 WNDW ASSY.					
 LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556			SERIES 2	SHEET 232A	