

**LUDLUM MODEL 3-98**

**SURVEY METER**

**June 2020**

**Serial No. 346285 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.

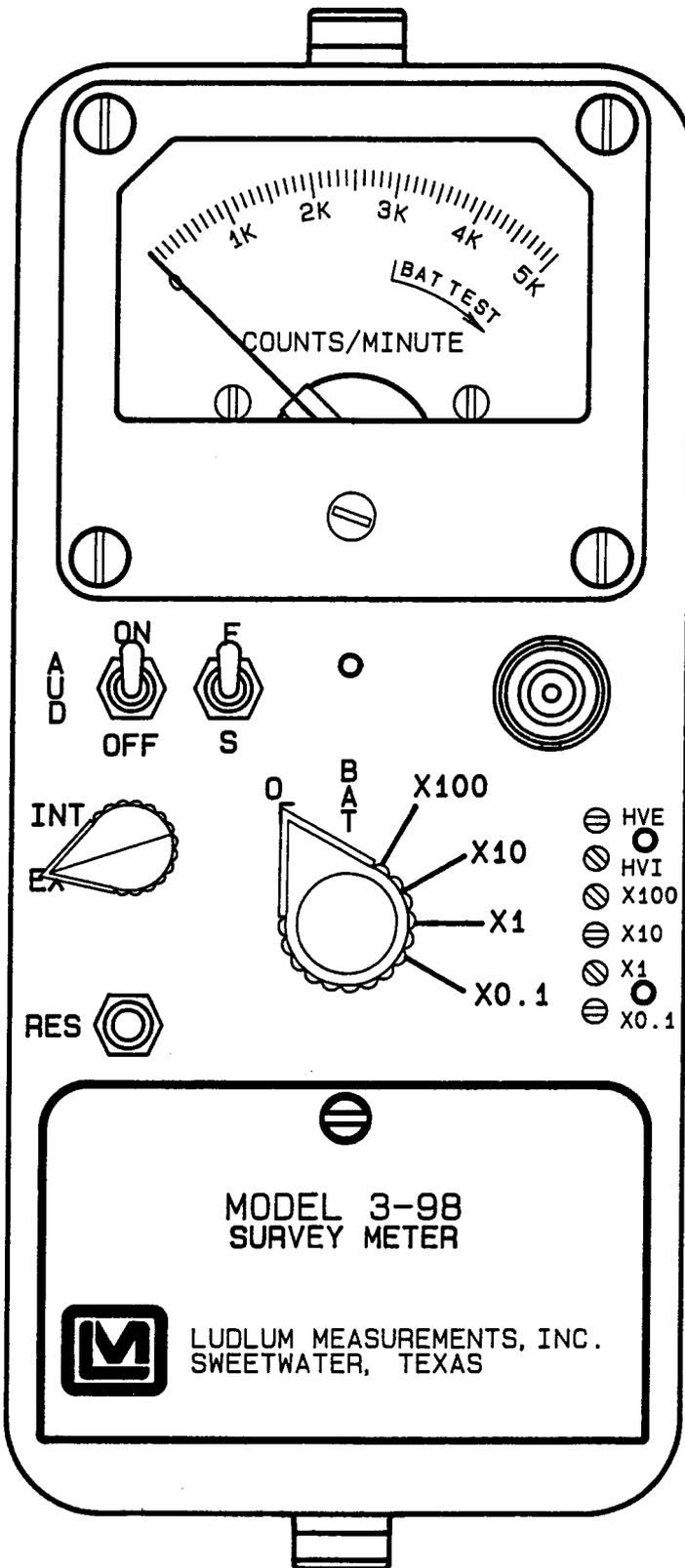
There are no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option 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**



CHK NO.		CHK DATE		APP DATE	
CHK DATE	9-15-92	CHK DATE	APR 01	APP DATE	4-09-01
TOL: SHOP STD	<input type="checkbox"/>	SCALE: FULL	<input type="checkbox"/>	OTHER	<input type="checkbox"/>
TITLE M 3-98 SURVEY METER					
LUDLUM MEASUREMENTS, INC.		SERIES	363	SHEET 591	
901 OAK STREET		SWEETWATER, TEXAS 78066			

# M3-97 Survey Meter

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# Model 3-98 Survey Meter

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### 1. GENERAL

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The Model 3-98 is a portable survey instrument with four linear ranges up to 500,000 cpm. The instrument features an internal pancake tube along with the capability of utilizing an external probe by a switch on the front-panel labeled INT/EXT. Separate high-voltage adjustments for the internal and external probes are provided. The high-voltage power supply is regulated and adjustable from 200 to 1000 V. The unit body is made of cast aluminum, including the meter housing. The can is 0.23 cm (0.090 in.) aluminum. Other operating features of the instrument include a unimorph speaker mounted to the instrument can with an audio ON-OFF capability, fast-slow meter response, meter reset button, and a six-position switch for selecting battery check or scale multiples of X0.1, X1, X10 and X100.

Each range multiplier has its own calibration potentiometer.

Most Ludlum Measurements GM probes will operate on this unit, as will many of the scintillation detectors. The external high voltage is factory set for 900 V. For special requirements, it may be adjusted for operation with any GM or scintillator tube between 400 and 1500 V.

The unit is operated with two "D" cell flashlight batteries for operation from approximately 0 to 65 °C (32 to 150 °F). For temperature operation to -18 °C (0 °F), either very fresh alkaline or rechargeable NiCd batteries may be used. Battery drain averages 17 milliamperes.

### 2. SPECIFICATIONS

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**RANGES:** four linear range multiples of X0.1, X1, X10, and X100; typically used in combination with the 0-5k cpm meter dial, 0-5000,000 cpm is achieved with the range multiplier

**PROTECTIVE SCREEN:** stainless steel, 79% open

**METER:** 1mA, 6.4 cm (2.5 in.) scale, with pivot-and-jewel suspension

**POWER:** two standard "D" size batteries

**BATTERY LIFE:** exceeds 600 hours with a fresh set of alkaline "D" cell batteries

**METER COMPENSATION:** temperature compensation is provided by thermistors on the main board

**BATTERY DEPENDANCE:** instrument calibration changes less than 3% within battery check limits on meter

**INPUT SENSITIVITY:** 30 mV, ( $\pm 10$  mV)

**AUDIO:** built-in unimorph speaker with an ON-OFF switch

**HIGH VOLTAGE:** adjustable 400-1500 V

**CONNECTOR:** series "C," 706 U/G; BNC or MHV may also be provided

**RESPONSE:** 4 or 22 seconds for 90% of final meter reading

**SIZE:** 22.9 x 8.9 x 21.6 cm (9 x 3.5 x 8.5 in.) (H x W x L), with handle

**LINEARITY:**  $\pm 5\%$  of full scale

**WEIGHT:** 1.4 kg (3 lb), less detector and batteries

**INTERNAL DETECTOR:** pancake style GM detector with  $1.7 \pm 0.3$  mg/cm<sup>2</sup> window

**FINISH:** drawn-and-cast aluminum, with computer-beige polyurethane enamel and silk-screened nomenclature

**WINDOW AREA:** Active: 15.51 cm<sup>2</sup>;  
Open: 12.26 cm<sup>2</sup>

### 3. DESCRIPTION OF CONTROLS AND FUNCTIONS

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**Range Multiplier Selector Switch:** a six-position switch marked OFF, BAT, X100, X10, X1, X0.1. Turning the range selector switch from OFF to BAT position provides the operator a battery check of the instrument. A BAT check scale on the meter provides a visual means of checking the battery status. Moving the range selector switch to one of the range multiplier positions (X0.1, X1, X10, X100) provides the operator with typical overall ranges of 0-500 kcpm (for a typical meter dial it's 0-5 kcpm). Multiply the scale reading by the multiplier for determining the actual reading.

**AUD ON-OFF Toggle Switch:** In the ON position, the switch energizes the unimorph speaker, located on the left side of the instrument. The frequency of the clicks is relative to the rate of the incoming pulses. The higher the rate, the higher the audio frequency. The audio should be turned OFF when not required to reduce battery drain.

**F-S Toggle Switch:** Provides meter response. Selecting the fast, "F" position, of the toggle switch provides 90% of the final meter reading in four seconds. In slow, "S" position, 90% of the final meter reading takes 22

seconds. In the "F" position, there is a fast response and large meter deviation. In the "S" position, there is a slow response and damped meter deviation.

**RESET Pushbutton:** When depressed, provides a rapid means to drive the meter to zero.

**INT/EXT Switch:** a two-position switch used to alternate between the internal pancake tube and the external probe. In the INT position, the internal tube is utilized. In the EXT position, the external probe is utilized.

**H.V. Adjustment:** provides a means to vary the high voltage from 400 to 1500 volts. The high voltage setting may be checked at the probe connector with an appropriate voltmeter.

**Range Calibration Adjustments:** recessed potentiometers located under the calibration cover, on the right side of the front panel. These adjustment controls allow individual calibration for each range multiplier.

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**4. OPERATING PROCEDURES**

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**Caution:** Verify instrument voltage input rating before connecting to a power converter. If the wrong power converter is used, the instrument and/or power converter could be damaged.

**Note:** To open the Battery Lid, twist the lid button counterclockwise a quarter-turn. To close, twist clockwise a quarter-turn.

- Open the Battery Lid and install two "D" size batteries. Note (+) (-) marks on the inside of the lid. Match the battery polarity to these marks.

**Note:** The center post of flashlight battery is positive. Close the battery box lid.

- Switch the range switch to BAT. The meter should deflect to the battery check portion of the meter scale. If the meter does not respond, recheck that the batteries have proper polarity.
- Turn the INT/EXT switch to EXT.
- Connect a detector to the Model 3-98.

- Turn the instrument range switch to X100. Expose the detector to a check source. The speaker should click with the AUDIO ON-OFF switched to ON.

- Move the range switch to the lower scales until a meter reading is indicated. The toggle switch labeled F-S should have fast response in "F" and slow response in "S".

- Depress the RES switch. The meter should zero.

- Turn the INT/EXT switch to INT and hold the check source to the end of the can until a meter reading is indicated.

**Note:** To assure proper operation of the instrument between calibrations, an instrument operational check should be performed prior to use. A reference reading with a check source should be obtained at the time of initial calibration or as soon as possible afterwards, for confirming correct operation. Confirm the proper reading on each scale.

If the instrument does not read within 20% of the proper reading, it should be sent in to a calibration facility for recalibration.

## 5. CALIBRATION

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### 5.1 Detector Operating Point

**CAUTION:** The detector operating voltage is connected to both detectors at all times, regardless of which position the detector INT/EXT switch is set. The maximum operating voltage for the internal GM detector is 1000 VDC; therefore, the external detector operating voltage must be kept below 1000 VDC.

- Switch the INT/EXT switch to the INT position and adjust the HVE control for 900 volts at the instrument connector.

**NOTE:** Measure high voltage with a Model 500 pulser on a high-impedance voltmeter with a high meg probe. If one of these is not available, use a voltmeter with a minimum of 1000 megohm input resistance.

- For external GM detector applications, the power supply may be adjusted for 450-550 volt and 900 volt GM tubes. Follow the above procedure, only set the supply at the new operating voltage.
- For scintillation counters, connect the scintillator. Expose the unit to a source and develop an operating voltage versus count-rate plot. Set the operating voltage at the flattest portion of this curve.

### 5.2 Calibration CPM Meter Dial

To calibrate the cpm scale, a Ludlum Model 500 pulse generator is required.

- Connect the pulse generator to the instrument and adjust the pulse frequency to provide a 4/5-scale deflection on the X100 range (400,000 cpm). Adjust the X100 range calibration potentiometer as required.
- Adjust the pulse frequency to a 1/5 scale deflection on the X100 range (100,000 cpm) and confirm that the meter indicates  $\pm 10\%$  of incoming pulses. Decrease the pulse frequency by decades and adjust each range calibration potentiometer accordingly.

## 6. MAINTENANCE

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Instrument maintenance consists of keeping the instrument clean and periodically checking the batteries and the calibration.

An instrument operational check should be performed prior to each use by exposing both the internal and external detectors to a known source and confirming the proper reading on each scale.

Recalibration should be accomplished after any maintenance or adjustment of any kind has been performed on the instrument. Battery replacements are not considered to be maintenance and do not normally require the instrument to be recalibrated.

Ludlum Measurements recommends recalibration at intervals no greater than one year. Check the appropriate regulations to determine required recalibration intervals.

The batteries should be removed and the battery contacts cleaned of any corrosion at least every three months. If the instrument has been exposed to a very dusty or corrosive atmosphere, more frequent battery servicing should be used.

Use a spanner wrench to unscrew the battery contact insulators, exposing the internal contacts and battery springs. Removing the handle will facilitate access to these contacts.

**Note:** Never store the instrument over 30 days without removing batteries. Although this instrument will operate at very high ambient temperatures, battery seal failure can occur at temperatures as low as 38 °C (100 °F).

## 7. THEORY OF OPERATION

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### 7.1 Input

The external detector pulses are coupled from the detector through C3 to emitter follower Q5. R10 and R20 provide bias. R32 protects Q5 from input shorts. R38 couples the detector to the high-voltage supply.

The internal detector (V1) pulses are coupled from the detector through C27 to emitter follower Q7. R45 limits the current to V1. R21 and R41 provide bias to Q7. R40 protects Q7 from input shorts. R39 couples V1 to the high-voltage supply.

The internal detector is used only when the INT/EXT switch is in the INT position. In the EXT position, the external detector is used. When in the EXT position, P1-13 is grounded, turning off Q6, allowing the pulses from Q5 to pass on to the amplifier. P1-14 is opened, allowing R46 to bias Q9, pulling the pulses from the base of Q7 to ground and blocking them from the amplifier. In the INT position, P1-14 is grounded, turning on Q9, allowing the pulses from Q7 to pass onto the amplifier. P1-13 is opened allowing R47 to bias Q6, pulling the pulses from the base of Q5 to ground and blocking them from the amplifier.

### 7.2 Amplifier

A self-biased amplifier provides gain in proportion to R33, divided by R6 for the external detector and R33, divided by R44 for the internal detector. Transistor U9A provides amplification. U1 is coupled as current mirror to provide a load for Pin 3 of U4. The output self biases to  $2 V_{be}$  (approximately 1.4 volts) at Pin 1 of U4. This provides just enough bias current through Pin 3 of U4 to conduct all of the current from the current mirror.

Positive pulses from Pin 7 of U4 are coupled to the discriminator.

### 7.3 Discriminator

Comparator U5 provides discrimination. The discriminator is set by the voltage divider, R8 and R5, coupled to Pin 3 of U5. These pulses are coupled to Pin 5 of U6 for meter drive and Pin 12 of U6 for audio.

### 7.4 Audio

Discriminator pulses are coupled to univibrator Pin 12 of U6. Front-panel audio ON-OFF selector controls the reset at Pin 13 of U6. When ON, pulses from Pin 10 of U6 turn on oscillator U2, which drives the can-mounted unimorph. The speaker tone is set by R13 and C12; duration by R36 and C23.

### 7.5 Digital Analog Convertor

Pins 10-15 of U1 are coupled as a current mirror. For each pulse of current through R9, an equal current is delivered to C22. This charge is drained off by R42. The voltage across C22 is proportional to the incoming count rate.

### 7.6 Scale Ranging

Detector pulses from the discriminator are coupled to univibrator Pin 5 of U6. For each scale, the pulse width of Pin 6 of U6 is increased by a factor of 10, with the actual pulse width being controlled by the front-panel calibration controls and their related capacitors. This arrangement allows the same current to be delivered to C22 by one-tenth of a count on the X.1 range as 100 counts on X1K range.

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### 7.7 Meter Drive

The meter is driven by the emitter to Q3, coupled as a voltage follower in conjunction with Pin 1 of U3. For the battery test, the voltage follower is bypassed, and the meter movement is directly coupled to the battery through R26.

### 7.8 Meter Compensation

When the unit is provided with a high-torque meter movement, with 1.2 V drive, a temperature compensation circuit is provided on the main circuit board by way of components R15, R17, and R23.

### 7.9 Fast/Slow Time Constant

For the slow time constant, C29 is switched from the output of the meter drive to parallel C22.

### 7.10 Low Voltage Supply

Battery voltage is coupled to U8 and associated components (a switching regulator) to provide 5 V at Pin 5 to power all logic circuits. Unregulated battery voltage is used to power the meter drive (Q3) and the high-voltage blocking oscillator (Q2).

### 7.11 Low Voltage Reference

U7 provides a 1.22 V precision reference for HV supply.

### 7.12 High Voltage Supply

High voltage is developed by blocking oscillator Q2-T1 and rectified by voltage multiplier CR1, CR2, CR3, and CR4. Output voltage increases as current through Q1 increases, with maximum output voltage with Q1 saturated.

High voltage is coupled back through R12 to Pin 6 of opamp U3. R2 completes the high-voltage circuit-to-ground. High-voltage output is set by R4 (HV Set), which sets bias of Pin 5 of U3. During stable operation, the voltage at Pin 6 of U3 will equal the voltage at Pin 5 of U3. Pin 7 of U3 will cause conduction of Q1 to increase or decrease until the high voltage seeks a level of stability.

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**PARTS LIST**

Ref. No.	Description	Part No.	Ref. No.	Description	Part No.
<b>Model 3-98 Survey Meter</b>			U5	TLC372IP	06-6265
			U6	CD4098BE	06-6066
UNIT	Completely Assembled Model 3-98 Survey Meter	48-1135	U7	LM385Z-1.2	05-5808
			U8	MAX631	06-6249
			U9	CMXT3904TRLF	05-5888
<b>Main Circuit Board, Drawing 363 X 525</b>			U10	CMXT3906TRLF	05-5890
			U11	CMXT3904TRLF	05-5888
BOARD	Assembled Circuit Board	5464-633	<b>DIODES</b>		
<b>CAPACITORS</b>			CR1-CR4	1N4007	07-6274
C1	0.0015μF, 3kV, C	04-5518	CR5	1N4148	07-6272
C2	0.01μF, 100V, C	04-5523	<b>RESISTORS</b>		
C3	100pF, 3kV	04-5532	R1-R2	1M, 250mW, 5%	10-7028
C4	0.0027μF, 3kV, C	04-5520	R3	10k, 250mW, 5%	10-7016
C5	220pF, 100V, C	04-5530	R4	22k, 250mW, 5%	10-7070
C6-C7	0.0015μF, 3kV, C	04-5518	R5	10k, 250mW, 5%	10-7016
C8	0.001μF, 100V, C	04-5519	R6-R7	4.7k, 250mW, 5%	10-7014
C9	100μF, 10V, DT	04-5576	R8	43k, 250mW, 5%	10-7057
C10	100pF, 3kV	04-5532	R9	33k, 250mW, 5%	10-7019
C11	0.0015μF, 3kV, C	04-5518	R10	100k, 250mW, 5%	10-7023
C12	470pF, 100V, C	04-5555	R11	10k, 250mW, 5%	10-7016
C13	0.01μF, 100V, C	04-5523	R12	1 G, FHV-1, 2%	12-7686
C14	1μF, 35V, DT	04-5575	R13	470k, 250mW, 5%	10-7026
C15	0.1μF, 100V, C	04-5521	R14	10k, 250mW, 5%	10-7016
C16-C17	100μF, 10V, DT	04-5576	R16	1k, 250mW, 5%	10-7009
C18	330pF, 100V	04-5531	R17	301 OHM, 400mW, 1%	12-7855
C19	10μF, 20V, DT	04-5592	R18	47k, 250mW, 5%	10-7020
C20	220pF, 100V, C	04-5530	R19	1k, 250mW, 5%	10-7009
C21	100pF, 100V, C	04-5527	R20-R21	100k, 250mW, 5%	10-7023
C22	10μF, 20V, DT	04-5592	R22	10k, 250mW, 5%	10-7016
C23	0.01μF, 100V, C	04-5523	R24	200 OHM, 250mW, 5%	10-7006
C24	100μF, 10V, DT	04-5576	R25	2.2k, 250mW, 5%	10-7012
C25	0.1μF, 35V, DT	04-5574	R26	2.37k, 1/8W, 1%	12-7648
C27	100pF, 3kV, C	04-5532	R27	22k, 125mW, 5%	10-7070
C29	47μF, 16V, DT	04-5550	R28	100 OHM, 250mW, 5%	10-7004
C30	0.1μF, 35V, DT	04-5574	R29	8.2k, 250mW, 5%	10-7015
<b>TRANSISTORS</b>			R30	100k, 250mW, 5%	10-7023
Q1	2N3904G	05-5755	R31	1k, 1/4W, 5%	10-7009
Q2	2N4402BU	05-5763	R32	10k, 250mW, 5%	10-7016
Q3	2N3904G	05-5755	R33	82k, 250mW, 5%	10-7022
Q4	2N4402BU	05-5763	R34	10k, 1/4W, 5%	10-7016
Q5-Q7	2N3904G	05-5755	R35	100k, 250mW, 5%	10-7023
Q8	2N7000	05-5820	R36	2.7M, 250mW, 5%	10-7029
<b>INTEGRATED CIRCUITS</b>			R37	1k, 250mW, 5%	10-7009
U1	CMXT3906TRLF	05-5890	R38	1M, 333mW, 1%	12-7609
U2	ICM7555	06-6136	R39	33k, 250mW, 5%	10-7019
U3	TLC27M7IP	06-6248	R40	10k, 250mW, 5%	10-7016
U4	CMXT3904TRLF	05-5888	R41	100k, 250mW, 5%	10-7023
			R42	180k, 250mW, 5%	10-7068
			R44	4.7k, 250mW, 5%	10-7014

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<b>Ref. No.</b>	<b>Description</b>	<b>Part No.</b>		<b>Ref. No.</b>	<b>Description</b>	<b>Part No.</b>
					MTA100	13-8057
			P4		CONN-640456-4	
R47	100k, 250mW, 5%	10-7023			MTA100	13-8088
R48	10M, 250mW, 5%	10-7031				
<b>THERMISTORS</b>			<b><u>Chassis Wiring Diagram, Drawing 363 X 582</u></b>			
RT15	150 Ohm, 333mW, 2%	07-6332	<b>AUDIO</b>			
RT23	150 Ohm, 333mW, 2%	07-6332				
<b>INDUCTORS</b>			DS1	UNIMORPH 60690	21-9251	
L1	470UHY	21-9600	<b>CONNECTOR</b>			
<b>TRANSFORMERS</b>			J1	CONN-1-640442-6		
T1	L8050	40-0902		MTA100	13-8187	
<b>MISCELLANEOUS</b>			J2	CONN-640442-2		
W2-W9.	RECEPTACLE Cloverleaf			MTA100	13-8178	
	011-6809	18-8771	J3	CONN-640442-5		
P1	CONN-1-640456-6			MTA100	13-8140	
	MTA100X16	13-8134	J4	CONN-640442-4		
P2	CONN-640456-2 MTA100X2			MTA100	13-8170	
		13-8073	J5	RECPT-UG706/U "C"	13-7751	
J1	CONTACT#1414	18-9124	<b>SWITCHES</b>			
J2	JACK-TEST 1128-09-0319		S1	Centerlab PA600-210	08-6501	
		18-8806	S2	55D36-01-2-AJN	08-6514	
			S3-S4	7101-SYZ-QE	08-6511	
			S6	30-1 P/B	08-6517	
<b><u>Calibration Board, Drawing 363 X 528</u></b>			<b>BATTERY</b>			
BOARD	Completely Assembled		B1-B2	"D" Duracell Battery	21-9313	
	Calibration Board	5363-674	<b>DETECTOR</b>			
<b>CAPACITORS</b>			V1	GM TUBE-LND7311	01-5008	
C1	0.047 $\Phi$ F 100V C X7R	04-5565	<b>MISCELLANEOUS</b>			
C2	0.0047 $\Phi$ F 100V C X7R	04-5570	*	BATTERY LID W/CE	9363-986	
<b>RESISTORS</b>			*	PORTABLE BATTERY LID WITH		
R1-R2	1 Meg Trimmer	09-6814		STAINLESS CONTACT	2009-036	
R3	100k Trimmer	09-6813	*	PORTABLE BATTERY NEGATIVE		
R4	1 Meg Trimmer	09-6814		CONTACT ASSY	2001-065	
R5	100k Trimmer	09-6813	*	PORTABLE BATTERY POSITIVE		
R7	100k Trimmer	09-6813		CONTACT ASSY	2001-066	
<b>RESISTOR NETWORK</b>			M1	PORT BEZEL		
RN1	NETWORK-10k SIP			FRONT PANEL ASSY	4363-188	
	8PIN	12-7720	*	PORT DEEP CAN		
<b>MISCELLANEOUS</b>				ASSEMBLY	4363-615	
P3	CONN-640456-5		*	MODEL 3-98 CAN ASSY	4363-737	
			*	Model 3-98 CASTING	9363-739	
			*	Model 3-97/3-98 MAIN		
				HARNESS	8363-700	
			*	PORTABLE KNOB	08-6613	

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<b>Ref. No.</b>	<b>Description</b>	<b>Part No.</b>
*	PROBE KNOB- MS 91528	08-6606
*	PORT BEZEL GLASS W/O SCREWS	4363-352
*	METER MOVEMENT (1mA)	15-8030
*	PORTABLE METER FACE	7363-136
*	HARNESS-PORT CAN WIRES	8363-462
*	PORTABLE BATTERY LID WITH STAINLESS CONTACT	2009-036
*	PORT. LATCH KIT W/O BATT. LID	4363-349
*	PORT. CALIB. COVER W/SCREWS	9363-200
*	PORT. HANDLE (ROLLED) W/SCREWS	7363-139
*	PORT HANDLE FOR CLIP W/SCREWS	7363-203
*	REPLACEMENT CABLE (STD 39 inch)	40-1004
*	CLIP (44-3 TYPE) W/SCREWS	7002-026-01
*	CLIP (44-7 TYPE) W/SCREWS	7010-007-01
*	CLIP (44-6 TYPE) W/SCREWS	7010-008-01

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**DRAWINGS AND DIAGRAMS**

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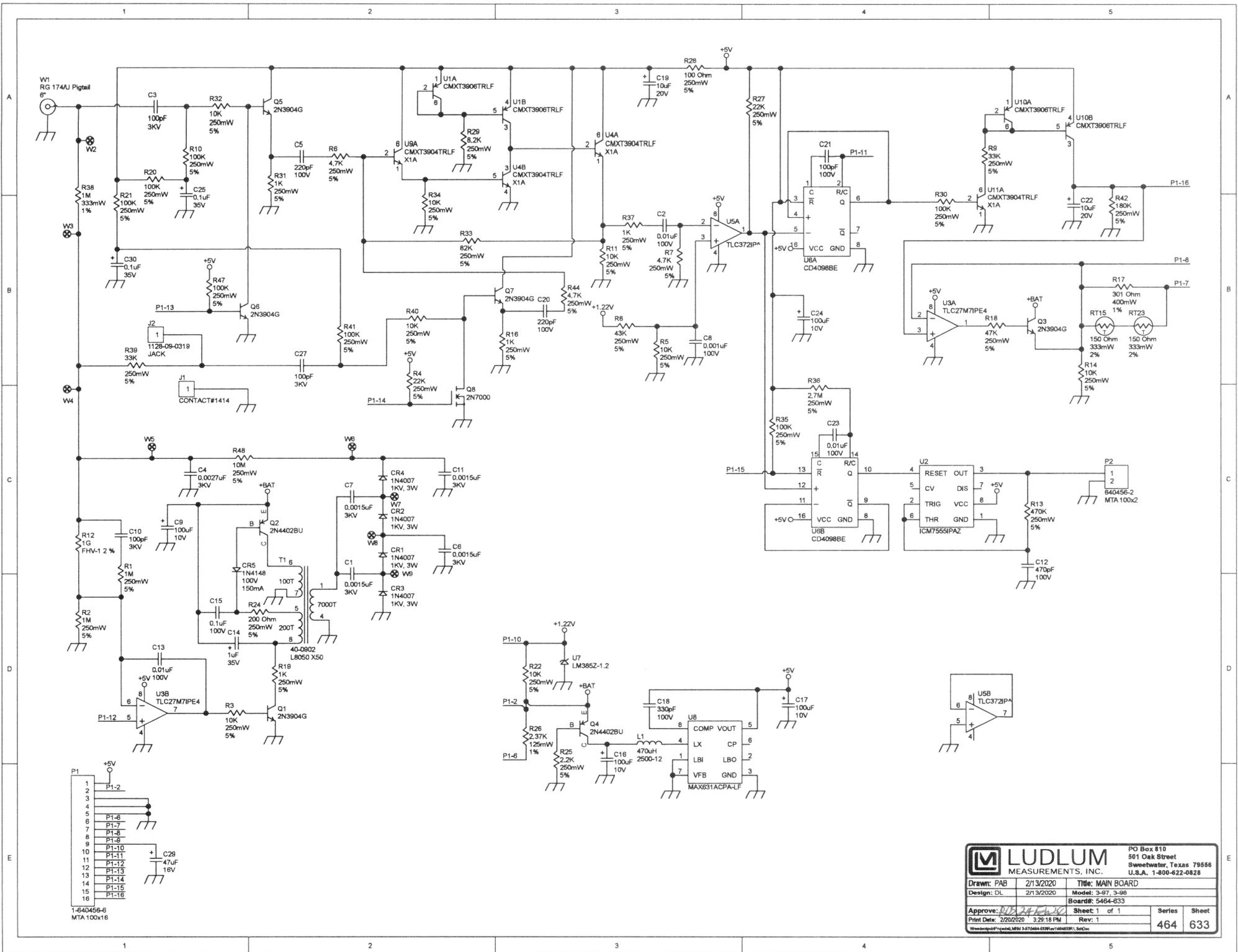
Main Circuit Board, Drawing 464 x 633

Main Circuit Board Component Layout, Drawing 464 x 636 (2 sheets)

Calibration Board, Drawing 363 x 528

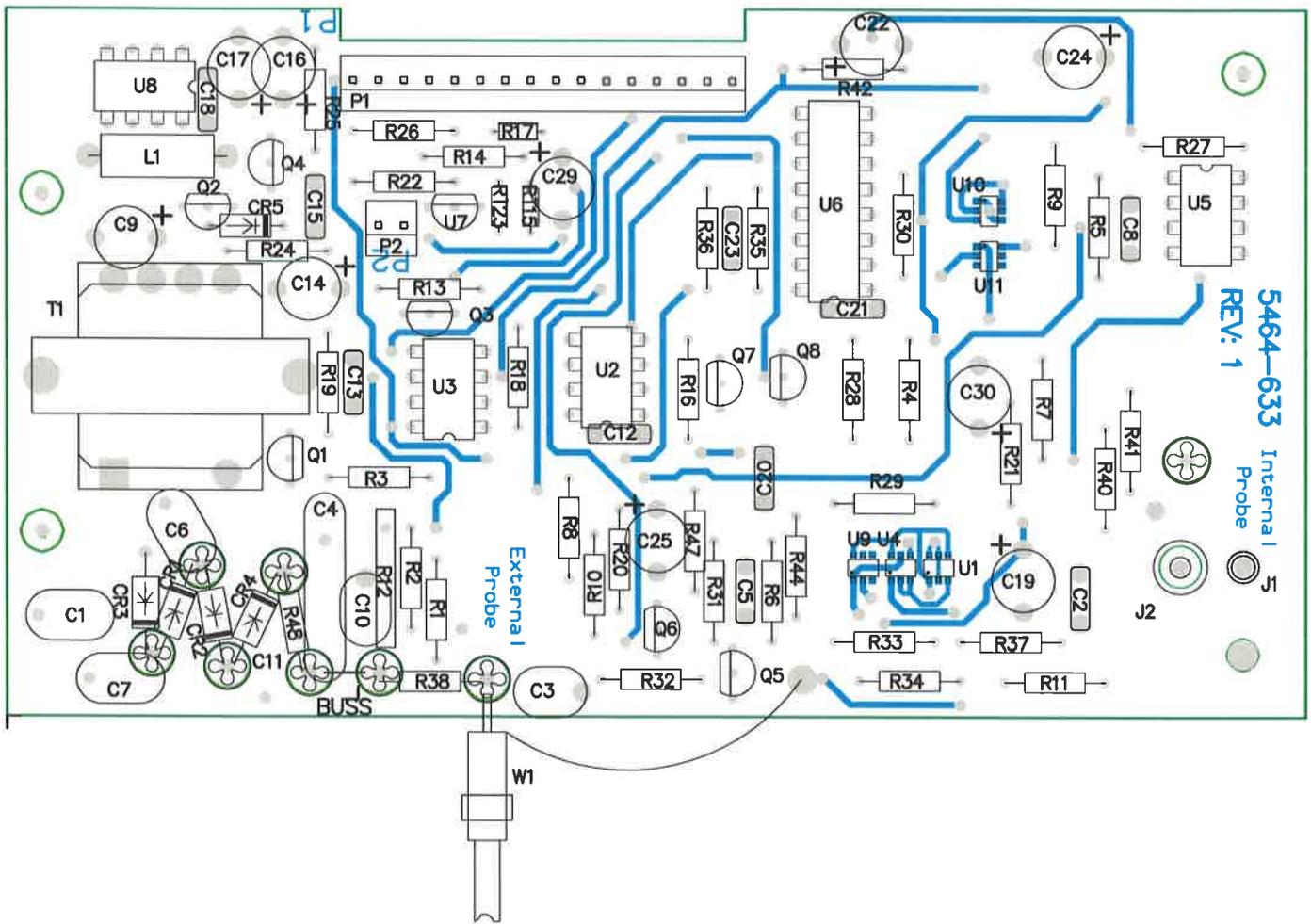
Calibration Board Component Layout, 363 x 529 (2 sheets)

Wiring Diagram, Drawing 363 x 582



1-640456-6  
MTA 100x16

		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828	
		Drawn: PAB Design: DL Approve: <i>[Signature]</i> Print Date: 2/20/2020	2/13/2020 2/13/2020 3:29:18 PM



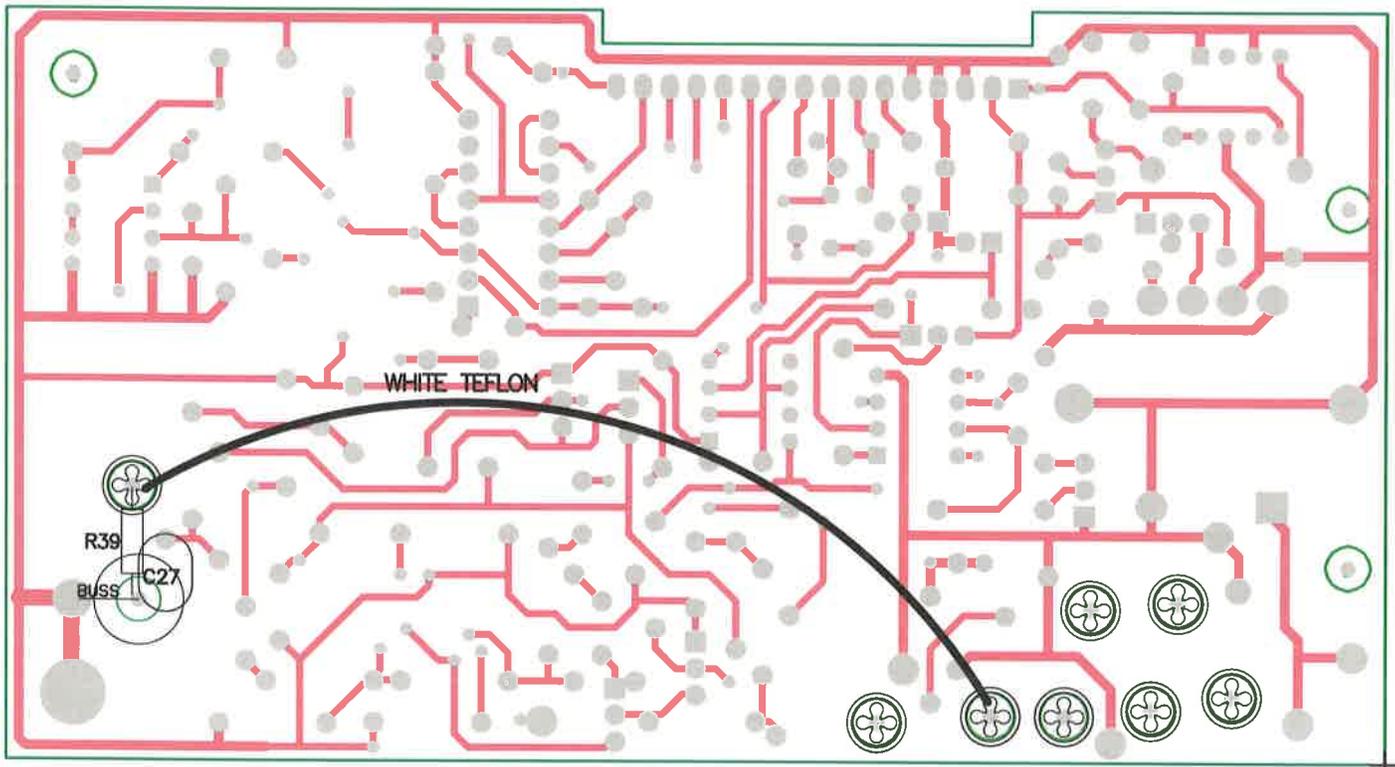
5464-633 Internal  
 REV: 1 Probe

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

Title: MAIN BOARD

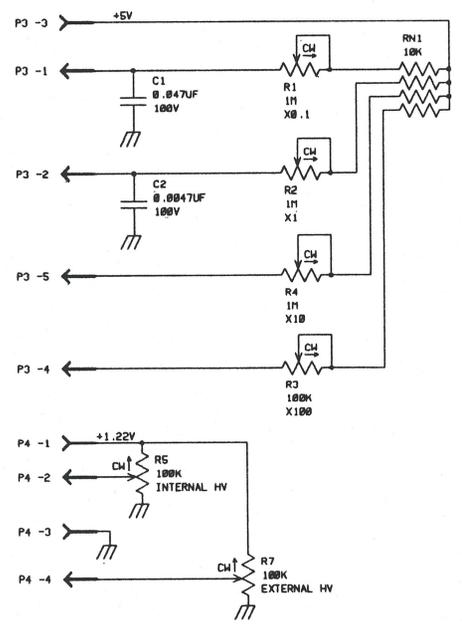
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Design: DL	2/13/2020	Board#: 5464-633
Approve: <i>RDS 24 Feb 20</i>		Rev: 1
PCBA Drawing		SCALE: 1.08
Print Date: 2/20/2020 4:38:26 PM	Top Overlay	Series Sheet 464 636

\\homedom\pcb\Projects\LMM 3-97\5464-633\Rev1\464633R1\_Assy\_PcbDoc

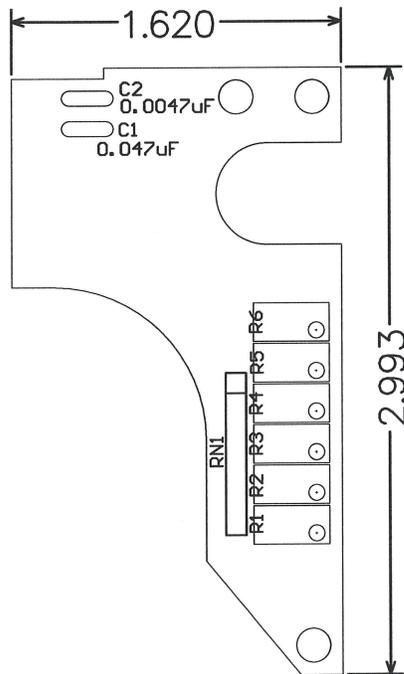


		PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0828	
Title: MAIN BOARD			
Drawn: PAB	2/13/2020	Model: 3-97, 3-98	
Design: DL	2/13/2020	Board#: 5464-633	
Approve: <i>RDS</i>	<i>24 Feb 20</i>	Rev: 1	
PCBA Drawing		SCALE: 1.08	Series Sheet
Print Date: 2/20/2020	3:29:34 PM	Bottom Overlay	464 636
<small>\\wreedom\pcb\Projects\LMM\3-975464-633\Rev1\464633R1_Assy.PcbDoc</small>			

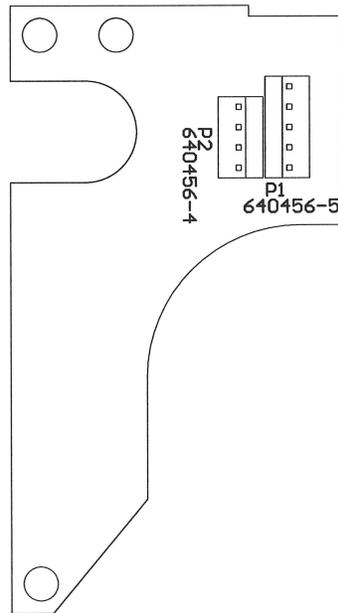
REVISIONS						
EFF	AUTHORITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



UPDATED	-	/ /	LUDLUM MEASUREMENTS INC.				
DR	CKB	04/07/92	TITLE: CALIBRATION BOARD				
CHK	P.W.	10/1/92	BOARD# 5363-674				
DSCN	-	/ /	SIZE	MODEL	SERIES	SHEET	
APPD	JGW	10/1/92	D	3-97 & 3-98	363	528	
NEXT HIGHER ASSY.	-	-	9-Sep-92			SB063674	SHEET 1 OF 1
14:37:48							

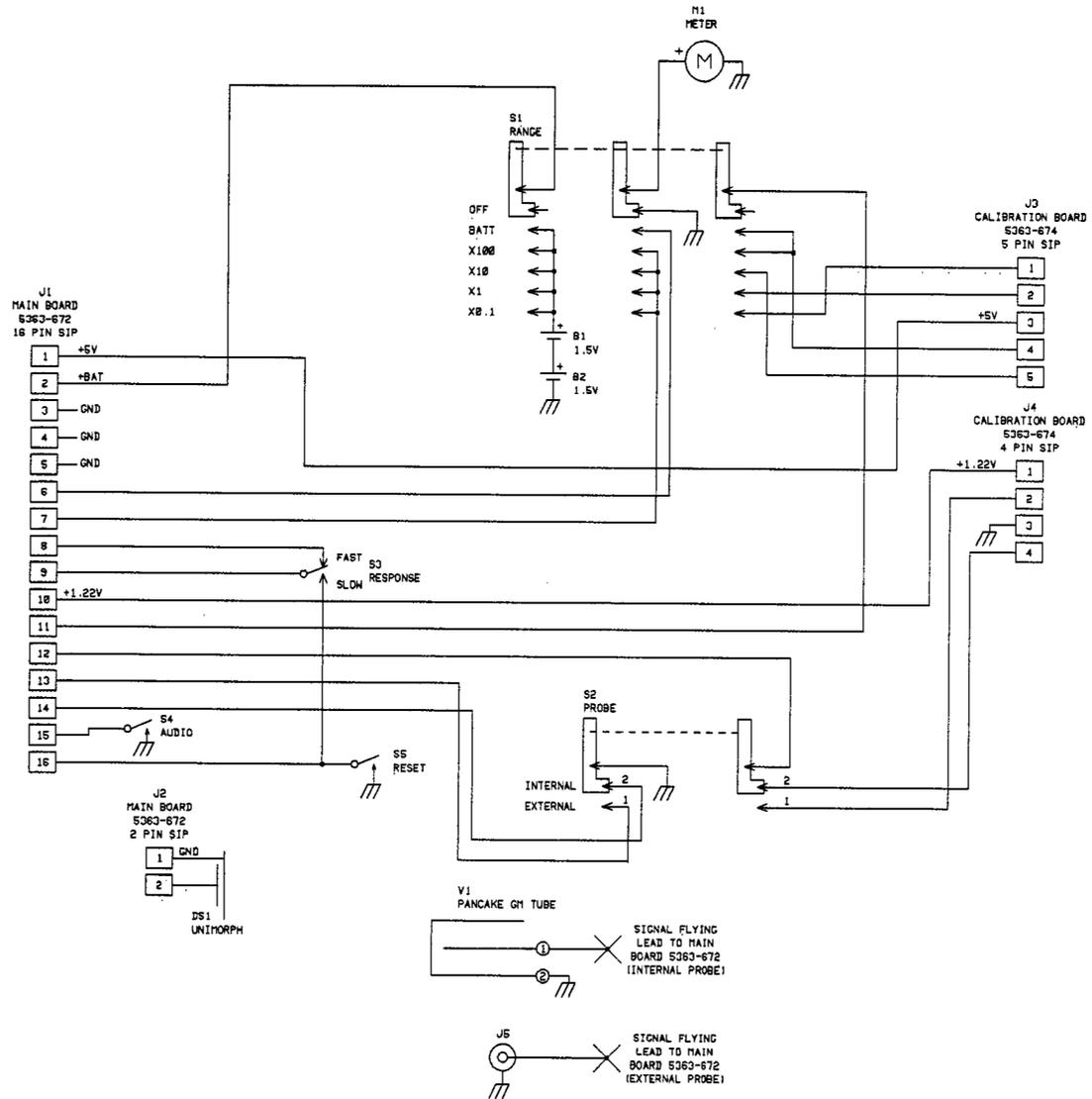


		PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0828		
		<b>Title: CALIBRATION BOARD</b>		
<b>Drawn:</b> CKB	06/18/2001	<b>Model:</b> 3-97/3-98		
<b>Design:</b> DL	06/18/2001	<b>Board#:</b> 5363-674		
<b>Approve:</b> JMC	17 OCT 12	<b>Rev:</b> 1		
<b>Print Date:</b> 10/17/2012 11:17:06 AM		<b>SCALE:</b> 1.00 Top Overlay	<b>Series:</b> 363	<b>Sheet:</b> 529
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		PO Box 810 501 Oak Street Sweetwater, TX 79556 U.S.A. 1-800-622-0828	
<b>Title:</b> CALIBRATION BOARD			
<b>Drawn:</b> CKB	06/18/2001	<b>Model:</b> 3-97/3-98	
<b>Design:</b> DL	06/18/2001	<b>Board#:</b> 5363-674	
<b>Approve:</b> JMC	17 OCT 12	<b>Rev:</b> 1	
<b>Print Date:</b> 10/17/2012 11:17:06 AM		<b>SCALE:</b> 1.00 Bottom Overlay	<b>Series</b> 363 <b>Sheet</b> 529
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				REVISIONS		
EFF	AUTHORITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



UPDATED -	/ /	LUDLUM MEASUREMENTS INC.			
DR CKD	09/11/92	TITLE: WIRING DIAGRAM			
CHK <i>P.W.</i>	<i>10/1/92</i>	BOARD# 363-700			
DISG -	/ /	SIZE	MODEL	SERIES	SHEET
APPD <i>JGW</i>	<i>10/1/92</i>	D	3-98	363	582
NEXT HIGHER ASSY.					
11:38:41	11-Sep-92	58263700			SHEET 1 OF 1