

**LUDLUM MODEL 6
GEIGER COUNTER**

**February 2011
Serial No. 170123 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.

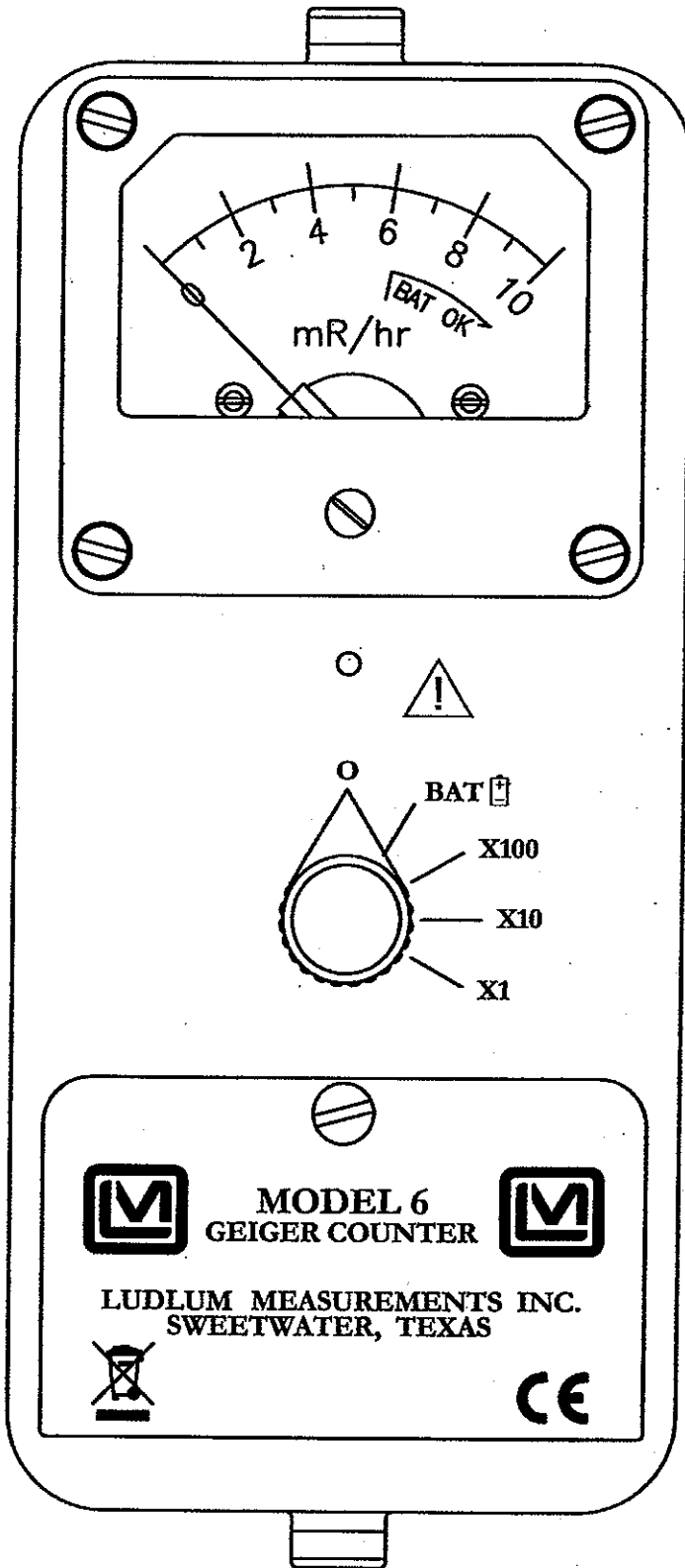
**LUDLUM MEASUREMENTS, INC.
ATTN: REPAIR DEPARTMENT
501 OAK STREET
SWEETWATER, TX 79556**

**800-622-0828 325-235-5494
FAX 325-235-4672**

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REV #	ALTERATIONS	DATE	BY
1	VALID	11/27/89	BK
2	UPDATED FRONT PANEL	4/22/06	CMC



DMN DATE	CMC	4-22-06	CHK DATE	APP DATE	BY
PART NUM	4363-262	SCALE	FULL	OTHER	
TITLE M 6 GEIGER COUNTER					
LUDLUM MEASUREMENTS, INC. 501 CHIK STREET SWEETWATER, TEXAS 75086		SERIES	363	SHEET	262

Model 6 Geiger Counter

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1. GENERAL

The Model 6 is a portable battery operated Geiger Counter with an internal GM detector. The instrument features a regulated high-voltage supply, five-position switch for selecting battery check or scale multipliers of X1, X10, X100, and internal calibration controls for the range

multipliers, and high voltage. The meter scale reads 0 to 10 mR/hr, producing a range of 0 to 1 R/hr with the three linear range multipliers. The unit body is made of cast aluminum, including the meter housing. The instrument cover (can) is 0.23 cm (0.090 in.) thick aluminum.

2. SPECIFICATIONS

POWER: two standard "D" size batteries

LINEAR RANGES: 0-1 R/hr; meter presentation of 0-10 mR/hr with range multiples of X1, X10, and X100

DETECTED RADIATION: gamma; X-ray

LINEARITY: $\pm 10\%$ full scale

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

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

OVERLOAD PROTECTION: overload circuitry deflects meter pointer to full scale when the detector is exposed to radiation intensities greater than the upper operating limit (greater than 10 R/hr)

METER: 1 milli-amp, 6.4 cm (2.5 in.) scale with pivot-and-jewel movement

RESPONSE TIME: four seconds measured from 10% to 90% of full scale

DETECTOR: internally-mounted 71412 tube

SIZE: 10.7 x 8.9 x 21.6 cm (4.2 x 3.5 x 8.5 in.) (H x W x L), less handle

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

FINISH: drawn-and-cast aluminum, with beige powder coat

3. DESCRIPTION OF CONTROLS AND FUNCTIONS

Range Multiplier Selector Switch: A five-position switch marked OFF, BAT, X100, X10, and X1. 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 (X1, X10, X100) provides the operator

with an overall range of 0-1R/hr. Multiplying the scale reading by the multiplier determines the actual reading.

Range Calibration Adjustments: Internal potentiometers which allow individual calibration for each range multiplier. Removing the instrument housing will allow access to these controls.

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4. OPERATING PROCEDURES

Note: To open the battery lid, twist the lid button counter-clockwise a quarter of a turn. To close, twist clockwise a quarter of a 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: 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 range switch to X1. Expose the instrument to a radiation check source. The meter should respond.
- Check calibration and proceed to use the instrument.

5. CALIBRATION

- For detector operating point, remove the instrument housing and adjust R33 (Drawing 363 x 452) for 550 volts.

Note: Measure high voltage with a Model 500 Pulser or a high-impedance voltmeter with a high-meg probe. If one of these instruments is not available, use a voltmeter with a minimum of 1000 megohm input resistance.

- Do not use a vacuum tube type voltmeter for this adjustment unless an external high-voltage multiplier probe is used.

- Switch the instrument range multiplier switch to X100 position. Place the detector on calibration range center line with the detector perpendicular to the radiation source. Expose the detector to a calibrated gamma radiation field, which corresponds to approximately 80% of full meter scale. Adjust the X100 range calibration control for the proper reading. Position the instrument in the field, which corresponds to approximately 20% of meter scale. Confirm meter indicates within 10% of reading. Repeat the calibration procedure for the X10 and X1 range positions.
- Replace the instrument housing.

6. MAINTENANCE

- 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 the

detector 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.

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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 regulatory agencies' 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 37.8 °C (100 °F).

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PARTS LIST

Ref. No.	Description	Part No.	Ref. No.	Description	Part No.
Model 6 Geiger Counter			RESISTORS		
UNIT	Completely Assembled Model 6 Geiger Counter	48-1676	R1-R2	10k	10-7016
	<u>Circuit Board, Drawing 363 X 452</u>		R3	2.2k	10-7012
BOARD	Assembled Circuit	5363-610	R4	1 MEG	10-7028
	CAPACITORS		R5	10k	10-7016
C1-C4	100 μ F, 10V, DT	04-5576	R6	SAT (2.37k TYP.)	12-7648
C5	1 μ F, 35V, DT	04-5575	R7	1k	10-7009
C6-C8	10 μ F, 20V, DT	04-5592	R8	47k	10-7020
C9	1 μ F, 35V, DT	04-5575	R9	10k	10-7016
C10	330pF, 100V	04-5531	R10	1 MEG	10-7028
C11-C12	0.001 μ F, 100V, C	04-5519	R11	330k	10-7051
C13	470pF, 100V	04-5555	R12	10k	10-7016
C14	0.1 μ F, 100V, C	04-5521	R13	200 OHM	10-7006
C15	0.01 μ F, 100V, C	04-5523	R14	220k	10-7066
C16	0.0027 μ F, 3kV, C	04-5520	R15	18k	10-7018
C17-C18	0.0015 μ F, 3kV, C	04-5518	R16	82k	10-7022
C19-C20	100pF, 3kV, C	04-5532	R17	33k	10-7019
C21	0.0047 μ F, 100V, C	04-5570	R18	10k	10-7016
	TRANSISTORS		R19	1k	10-7009
Q1-Q3	2N3904	05-5755	R20	100k	10-7023
Q4	2N4402BU	05-5763	R21	180k	10-7068
Q5	2N4402	05-5775	R22	100k	10-7023
	INTEGRATED CIRCUITS		R23	10 MEG	10-7031
U1	CA3096	06-6023	R24	4.7k	10-7014
U2	MAX631	06-6249	R25	1.5 MEG	10-7038
U3	ICM7555	06-6136	R26	2.2 MEG	10-7052
U4	TLC27M7IP	06-6248	R27	22k	10-7070
U5	TLC372	06-6265	R28	100 OHM	10-7004
U6	LM385Z-1.2	05-5808	R29-R30	100k	10-7023
	DIODES		R31	1 G	12-7686
CR1	1N4148	07-6272	R32	634R, 1/3W, 1%	12-7808
CR2-CR3	1N4007	07-6274	R33	100k TRIMMER	09-6823
	THERMISTORS		R34- R35	1 MEG TRIMMER	09-6828
R37-R38	RL1006-98	07-6332	R36	100k TRIMMER	09-6823
			INDUCTOR		
			L1	470UHY	21-9600
			TRANSFORMERS		
			T1	L8050	40-0902
			DETECTORS		
			V1	GM TUBE-LND 71412	01-5306

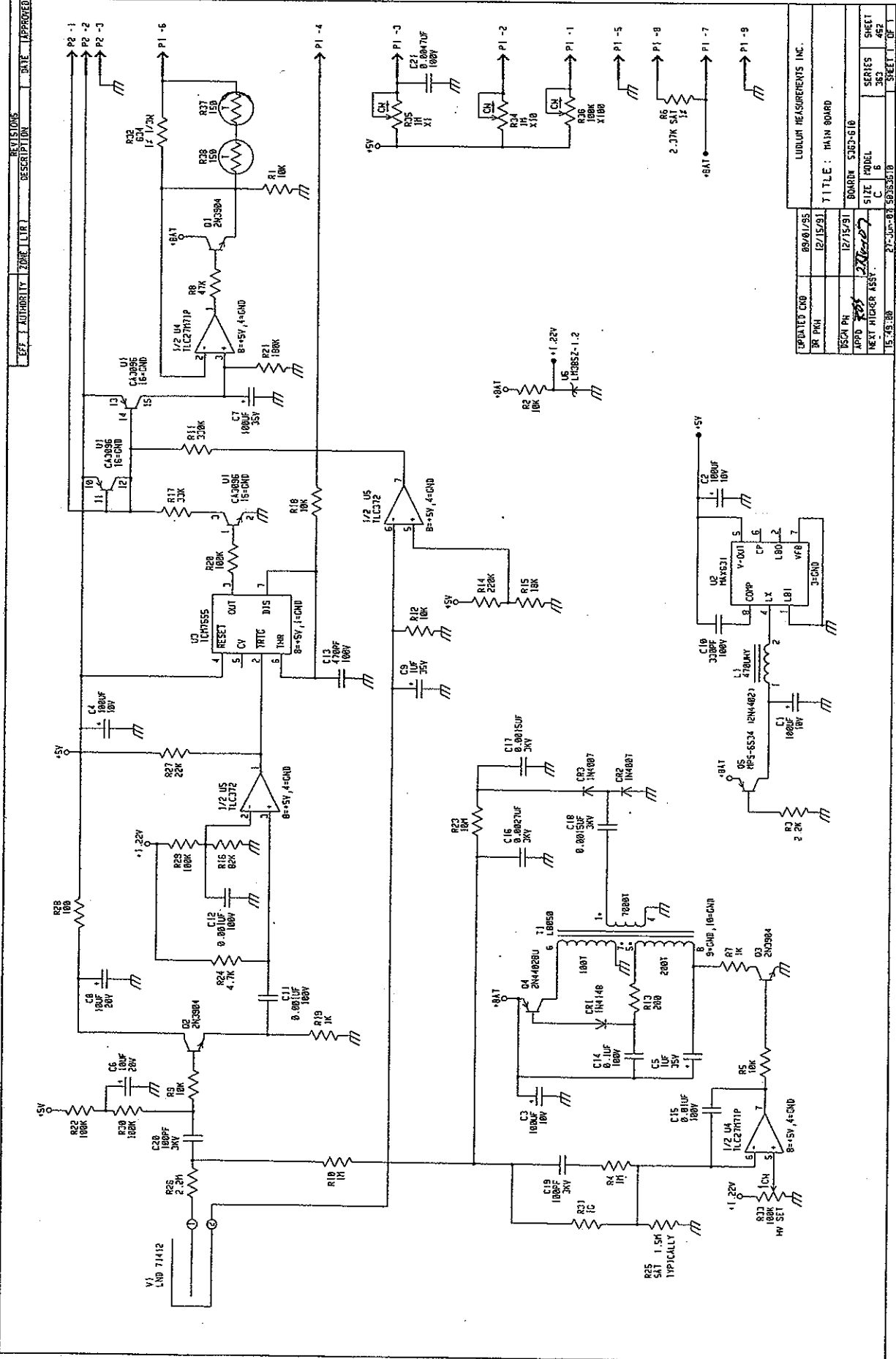
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Ref. No.	Description	Part No.	Ref. No.	Description	Part No.
MISCELLANEOUS			MISCELLANEOUS		
P2	CONN-640456-9 MTA100	13-8094	M1	PORT BEZEL W/MOVEMENT	4363-188
			*	PORT BEZEL W/GLASS	4363-352
7 EA.	CLOVERLEAF 011-6809-000-599	18-8771	*	PORT METERFACE	7363-136
			*	METER MOVEMENT	15-8030
	Wiring Diagram, Drawing 363 x 466		*	PORTABLE KNOB	08-6613
			*	MAIN HARNESS Model 6	8363-622
	CONNECTORS		*	BATTERY CONTACT SET CASTING SCREENED	
J1	CONN-640442-9 MTA100	13-8169	*	Model 6	9363-324
			*	CAN ASSY. Model 6	4363-321
	SWITCHES		*	BATT LID W/LATCHSET Model 6	9363-325
S1	D3G0402N	08-6501	*	PORT HANDLE (ROLLED) W/SCREWS	7363-139
	BATTERY				
B1-B2	DURACELL "D"	21-9313			

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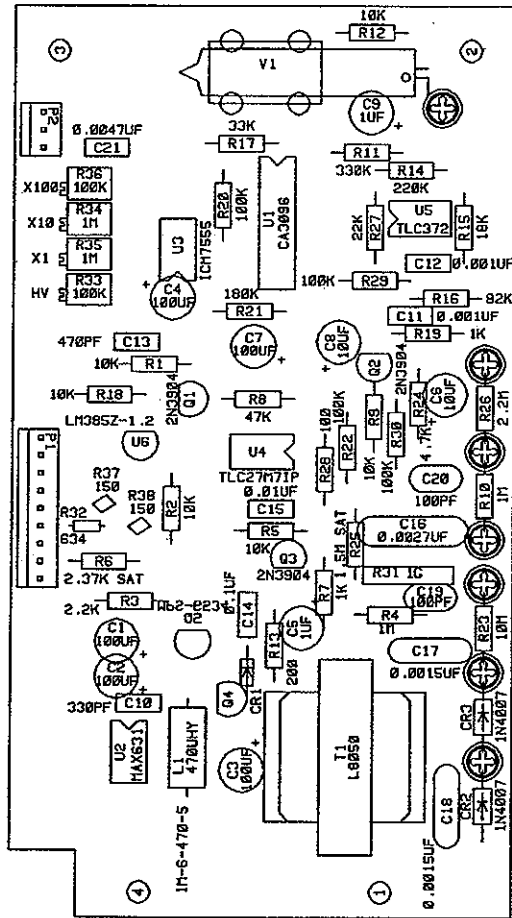
DRAWINGS AND DIAGRAMS

Model 6 Front Panel, Drawing No. 363 x 262 (before page 1)
Main Circuit Board, Drawing No. 363 x 452
Main Circuit Board Layouts, Drawing No. 363 x 464
Wiring Diagram, Drawing No. 363 x 466



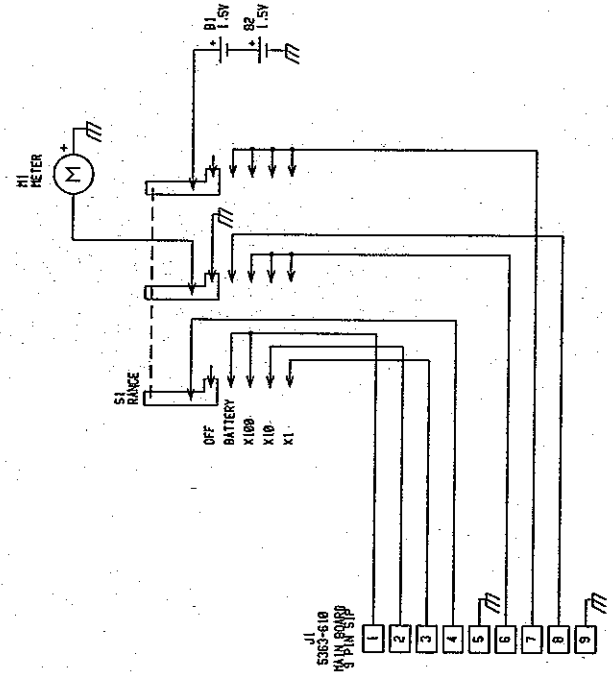
REV	AUTHORITY	ZONE	DATE	APPROVED
1				

REVISED CNO	09/01/95	LUDDUM MEASUREMENTS INC.
DR PWH	12/15/91	TITLE : MAIN BOARD
ISSN PH	12/15/91	BOARDN 5383-610
APPD <i>RDS</i>	<i>2/16/92</i>	SIZE MODEL
NEXT HIGHER ASSY.		C
15-749-380	27-000-03-56353510	SERIES
		363
		462
		SHEET
		OF



DR	CK8	10/08/92	TITLE: MAIN BOARD	SHEET WATER, TX.
CHK	P.W.	11/10/1	BOARD: 5063-610	BSS610
DSGN	PSS	1-1-91	MODEL	SHEET
APP	13-18-120	1-Nov-91	CORP. SIDE	SIDER SIDE
			CORP. PASTE	SLDR PASTE
			SLDR MASK	SLDR TASK

EFF.	AUTHORITY	ZONE	1	LR	REVISIONS	DESCRIPTION	DATE	APPROVED
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UPDATED	01/20/92	LUDLOW MEASUREMENTS INC.	
BR. CD		TITLE: WIRING DIAGRAM	
ISSN		BOARD	353-621
APPO	<i>RS</i>	SIZE	MODEL
	NEXT HIGHER ASSY.	C	B
ES 28-54	17-Feb-13 SS3C-621	SHEET	466
		SHEET	OF 1