LUDLUM MODEL 15
NEUTRON COUNTER

Revised March 1999
Serial No. 146807; 149428
and Succeeding Serial Numbers

LUDLUM MEASUREMENTS, INC.
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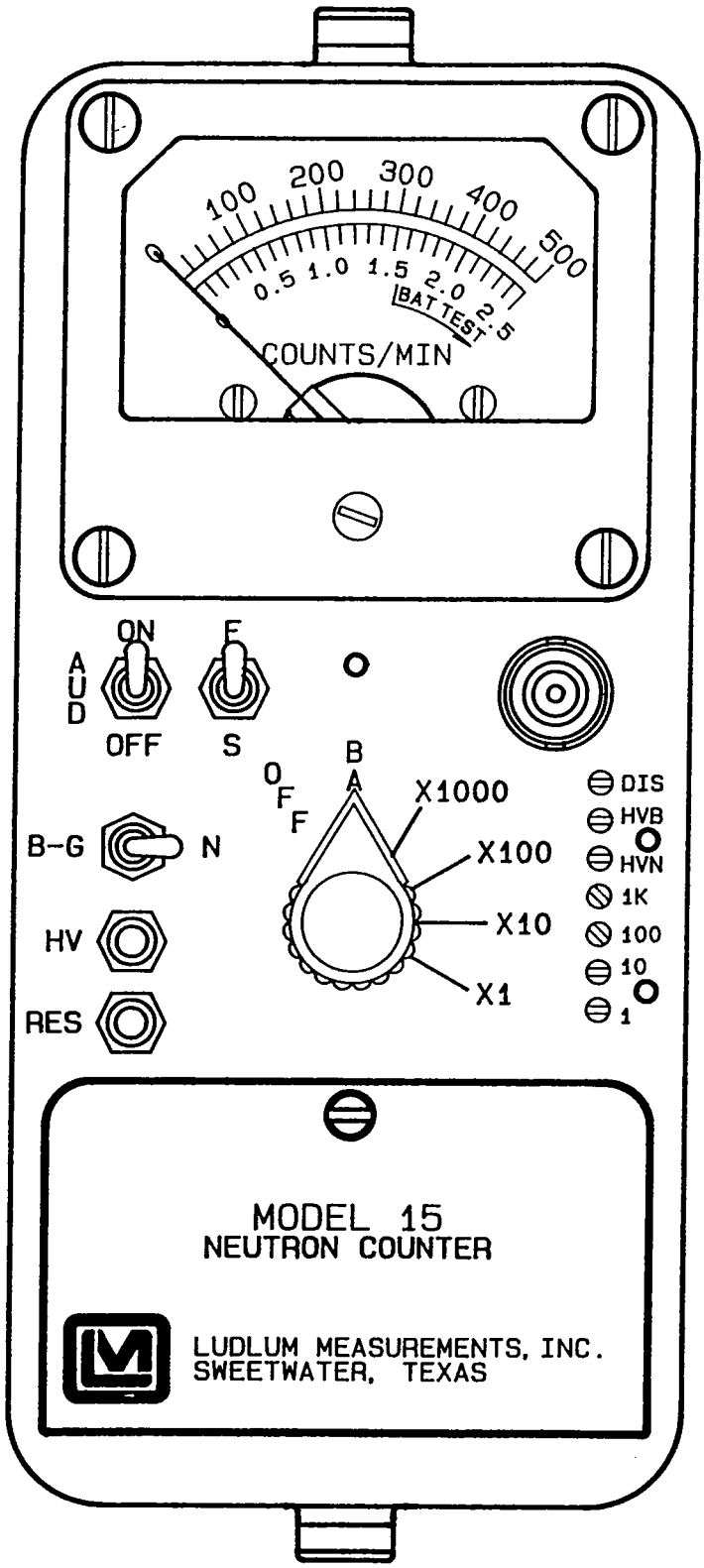

CHG	NO.				DWN	CHK	APP
DWN BK	DATE 12/8/89	CHK	DATE 3-15-99	APP	DATE 3-15-99		
TOL: SHOP STD ☐ OTHER			SCALE: FULL OTHER ☐				
TITLE MODEL 15 NEUTRON COUNTER							
LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556			SERIES 363		SHEET 255		

M15 Neutron Counter
March 1999

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1. GENERAL

The Ludlum Model 15 Neutron Counter provides the required electronic circuitry, detector, and moderator for monitoring "fast" and "slow" neutrons. The instrument also has capabilities for radiation monitoring with a Geiger-Mueller detector.

The Model 15 incorporates a 2-position switch which is associated with the two adjustable controls for HV output. Each control adjustment is independent of the other.

This manual includes general description, control functions, operation, calibration, maintenance instructions. In the event that further information is desired, please contact the factory or one of the field representatives.

2. SPECIFICATIONS

- **POWER**: Two flashlight batteries, standard "D" cells; Mercury or rechargeable cells directly interchangeable

- **HIGH VOLTAGE**: Adjustable from 200 to 2,500 volts; electronically regulated to 1%; HV support of scintillation loads to 1,500 volts, proportional to 2,500 volts

- **SENSITIVITY**: Adjustable from 2 to 60 millivolts

- **INPUT IMPEDANCE**: 0.1 megohm

- **METER**: 1 mA, 2 1/2-inch scale, pivot-and-jewel suspension

- **RANGE**: 0-500,000 counts/minute (cpm)

- **LINEARITY**: ±5% full scale

- **BATTERY DEPENDANCE**: Instrument calibration change less than 3% within battery check limits on meter

- **CALIBRATION CONTROLS**: Individual potentiometers for each range; accessible from the front cover while in operational status

- **AUDIO**: Built-in unimorph speaker with On-Off switch

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

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

- **SIZE** : 10.67cm (4.2")H x 8.9cm (3.5")W x 21.6cm (8.5")L, exclusive of handle

- **WEIGHT**: 1.3kg (3 lbs.), less detector and batteries

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

- **CABLE** : 39-inch "C" connector

- **END WINDOW G-M SPECIFICATIONS**: Detector - LND723; window - 1.5 to 2 mg/cm^2 mica; window diameter - 1.25 inches; wall - 0.125 inch stainless steel; dimension - 1.375 inches 5.250 inches long

- **NEUTRON DETECTOR**: Nancy Wood G-10-2 Boron Triflouride

- **NEUTRON DETECTOR MODERATOR**: 2 inches of polyethylene surrounding the detector; 0.030 inch thick cadmium thermal neutron shield enclosing the moderator; outer shell and fittings of aluminum; weight-4 lbs.

3. DESCRIPTION OF CONTROLS AND FUNCTIONS

- **Range Selector Switch**: A six-position switch marked OFF, BAT, X1000, X100, X10, X1. Turning the range selector switch from OFF to BAT position provides the operator with a battery check of the instrument. A BAT check scale on the meter provides a visual means of checking the battery-charge status.

Moving the range selector switch to one of the range multiplier positions (X1000, X100,X10, X1) provides the operator with an overall range of 0 to 500,000 cpm. Multiply the scale reading by the multiplier for determining the actual scale reading.

- **AUD ON-OFF Toggle Switch**: In the ON position, operates 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 full scale meter deflection in four seconds. In the slow, "S", position, 90% of full scale meter deflection takes 22 seconds. In "F" position, there is fast response and large meter deviation. "S" position should be used for slow response and damped, meter deviation.

- **RES Pushbutton Switch**: When depressed, this switch provides a rapid means to drive the meter to zero.

- **HV Pushbutton Switch**: When depressed, displays the detector high voltage on the meter.

Test high voltage with detector connected. High voltage will decline with scintillation detectors, due to internal resistance.

- **B-G/N**: Switch allows selection of the desired detector. It is associated with the HV outputs. In the Beta-Gamma position, the HV is adjusted for approximately 900 volts for use with G-M detectors. In the Neutron position, the HV potentiometer is incorporated to be used with the neutron detector.

- **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.

- **Discriminator Adjustment**: Allows the input sensitivity to be adjusted from 2 to 60 millivolts.

4. OPERATING PROCEDURES

✔ NOTE: To open the Battery Lid, twist the lid button counterclockwise 1/4 turn. To close, twist clockwise 1/4 turn.

- Open the 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.

- Connect the G-M detector. Set B-G/N switch to B-G. Turn the instrument range multiplier switch to X1000. Expose the detector to a radiation check source. The speaker should click with the audio switch turned to the ON position.

Press the HV Test. Meter should indicate approximately 900 volts.

- 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" position and slow response in "S" position.

- Depress the RES Button. The meter should zero.

- Connect Neutron detector. Set B-G/N to N. Press HV Test switch. Compare high voltage reading to calibration test sheet reading (approximately 1500 volts). Expose to Neutron test source and record reading.

- Set B-G/N switch to B-G. Press HV Test switch. Compare high voltage reading to calibration test sheet reading (900 volts). Expose the detector to a Gamma test source and record the reading.

5. CALIBRATION

Calibration controls are located on the front of the instrument under the calibration cover. The controls may be adjusted with an 1/8-inch blade screwdriver.

✔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.

- **Calibration of Discriminator**

☐ Set range at X10. Remove cal cover plate. Connect Model 15 to Model 500 Pulser. Set pulser pulse height 10 ± 0.5 millivolts for use without a G-M detector. If a G-M detector is used, set pulse height at 30 ± 0.5 millivolts. Set pulser rate at 400 x 10 counts/minute.

☐ Adjust DIS control until meter reading increases from 0 to a stable reading near 400 counts/minute. Check adjustment by lowering Model 500 Pulser height to 9 millivolts for 10 millivolt setting or 29 millivolts for 30 millivolt settings. Meter reading should drop to 0. Increase Model 500 pulse height to 12 millivolts for a 10 millivolt disc setting or 32 millivolts for a 30 millivolt DIS setting. Meter reading should increase to a stable value near 400 counts/minute.

- **Calibration of Ratemeter**

☐ Set Range switch at X1000. Set Model 500 pulse at 400 x 1K counts/minute. Set Model 500 pulse height at 20 millivolts for a disc setting of 10 millivolts or 60 millivolts for a DIS setting of 30 millivolts.

☐ Now adjust X1000 control until Model 15 reads 400 x 1000 counts/minute. Reduce Model 500 setting to 100 x 1K counts/minute. Confirm that meter reading is 100 ±10.

☐ Set Model 500 to 400 x 100 counts/minute. Set Model 15 Range switch to X100. Adjust X100 cal control until Model 15 reads 400 x 100 counts/minute. Reduce counts on Model 500 to 100 x 100 counts/minute and check Model 15 reads 100 ±10. Repeat procedure for X10 and X1 ranges.

- **Calibration of High Voltage Readout**

☐ Open instrument and locate HV calibration control on accessory circuit board. Connect Model 15 to Model 500. Set B-G/N switch to N. Press HV Test switch and record HV reading on both Model 500 and Model 15.

☐ Adjust HVN potentiometer for 1500 volts on Model 500. Press HV Test and adjust internal Model 15 control until meter reads 1500 volts. Reduce HVN control for 1000 volts on Model 500. HV Test should read 1000 ±10%. Increase HVN control to 2000 volts on Model 500. HV Test should read 2000 ±10% volts.

- **Calibration of High Voltage**

(For Beta-Gamma Set B-G/N to B-G.) Press HV Test Switch and adjust HVB for a voltage reading of 900 volts.

- **Calibration of High Voltage For Neutrons**

☐ Switch B-G/N switch to N. Connect Neutron probe. Press HV Test switch. Adjust HVN for a voltage source. Note meter reading. Repeat procedure in 100 volt increments up to 1900 volts.

☐ Expose Neutron detector to a 1 R/hr Gamma field. Reduce high voltage setting until count rate is less than 10 counts/minute.

☐ Plot data from the previous two steps. Pick an operating point just above the knee of the count plateau, but at a voltage less than the Gamma cutoff found in previous step. Record this voltage and adjust HVN control for operation at this voltage.

- **Efficiency Calibration**

☐ With instrument fully calibrated, set B-G/N switch to N. Connect Neutron detector within moderator. Expose the detector to a known Neutron field and determine counts/minute per Neutron/Cm^2/second for that energy source. Note that the Model 15 is energy dependant.

☐ Repeat above procedure with B-G/N set on B-G, Gamma detector connected and exposed to a known Gamma field. Determine counts/minute per mR/hr.

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. 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 100° FAHRENHEIT.

7. THEORY OF OPERATION

7.1 INPUT

Detector pulses are coupled from the detector through C57 to emitter follower Q96. R83, 89 provide bias. R137 protects Q96 from input shorts. R27 couples the detector to the high voltage supply.

7.2 AMPLIFIER

A self-biased amplifier provides gain in proportion to R63 divided by R70. Transistor (pin 6 of U1) provides amplification. Pin 12,15 of U1 are coupled as current mirror to provide a load for pin 6 of U1. The output self-biases to 2 Vbe (approximately 1.4 volts) at pin 7 of U1. This provides just enough bias current through pin 6 of U1 to conduct all of the current from the current mirror.

Positive pulses from pin 7 of U1 are coupled to the discriminator.

7.3 DISCRIMINATOR

Comparator U2 provides discrimination. The discriminator is set by the DIS (Discriminator) control located on the front panel, coupled to pin 3 of U2. These pulses are coupled to pin 5 of U3 for meter drive and pin 12 of U3 for audio.

7.4 AUDIO

Discriminator pulses are coupled to univibrator pin 12 of U3. Front panel audio ON-OFF selector controls the reset at pin 13 of U4. When ON, pulses from pin 10 of U3 turns on oscillator U5, which drives the can mounted unimorph through Q149 and T136. Speaker tone is set by R84, C112; duration by R86.

7.5 DIGITAL ANALOG CONVERTOR

Pin 12, 15 of U4 are coupled as a current mirror. For each pulse of current through R72, and equal current is delivered to C105. This charge is drained off by R74. The voltage across C105 is proportional to the incoming count rate.

7.6 SCALE RANGING

Detector pulses from the discriminator are coupled to univibrator pin 5 of U3. For each scale, the pulse width of pin 6 of U3 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 C105 by one count on the X1 range as 1,000 counts on X1K range.

7.7 METER DRIVE

The meter is driven by the emitter to Q6, coupled as a voltage follower in conjunction with pin 1 of U6. For ratemeter drive, the meter is coupled to C105 at P1-15.

For high voltage, the meter is coupled to R132 at P1-11.

For Battery Test, the voltage follower is bypassed and the meter movement is directly coupled to the battery through R150.

7.8 METER COMPENSATION

When the unit is provided with a high torque meter movement, with 1.2 volt drive, a temperature compensation package may be located at the meter, internal or external.

7.9 FAST/SLOW TIME CONSTANT

For slow time constant, C104 is switched from the output of the meter drive to parallel C105.

7.10 LOW VOLTAGE SUPPLY

Battery voltage is coupled to U7 and associated components (a switching regulator) to provide 5 volts at pin 5 to power all logic circuits. Unregulated battery voltage is used to power the meter drive (Q6) and the high voltage blocking oscillator Q145.

7.11 LOW VOLTAGE REFERENCE

U101 provides a 1.22 volt precision reference for HV supply. This unit also biases Q96.

7.12 HIGH VOLTAGE SUPPLY

High voltage is developed by blocking oscillator Q145-T165 and rectified by voltage multiplier CR166, 167, 169 and 175. Output voltage increases as current through Q44 increases, with maximum output voltage with Q44 saturated.

High voltage is coupled back through R47, R90 to opamp pin 6 of U6. R147 completes the high voltage circuit to ground. High voltage output is set by front panel control HV, which sets bias of pin 5 of U6. During stable operation, the voltage at pin 6 of U6 will equal the voltage at pin 5 of U6. Pin 7 of U6 will cause conduction of Q44 to increase or decrease until the high voltage seeks a level for stability.

PARTS LIST

Model 15 Neutron Counter

Ref. No.	Description	Part No.
UNIT	Completely Assembled Model 15 Neutron Counter	48-1357

Circuit Board, Drawing 363 x 532

BOARD	Assembled Circuit	5363-676
• **CAPACITORS**		
C38	0.0047µF, 3kV, C	04-5547
C40-C41	0.0047µF, 3kV, C	04-5547
C42	0.0056µF, 3kV, C	04-5522
C50	100pF, 3kV, C	04-5532
C56	100µF, 10V, DT	04-5576
C57	100pF, 3kV, C	04-5532
C102	100µF, 10V, DT	04-5576
C103	10µF, 20V, DT	04-5592
C104	100µF, 10V, DT	04-5576
C105	22µF, 35V, DT	04-5594
C106	0.001µF, 100V, C	04-5519
C109	0.01µF, 100V, C	04-5523
C111	0.01µF, 100V, C	04-5523
C112	470pF, 100V,C	04-5555
C113	0.01µF, 100V, C	04-5523
C115	0.01µF, 100V, C	04-5523
C117	47pF, 100V, C	04-5533
C119	0.001µF, 100V, C	04-5519
C121	330pF, 100V, C	04-5531
C122	0.0047µF, 3kV, C	04-5547
C126	10µF, 20V, DT	04-5592
C134	100µF, 10V, DT	04-5576
C163	0.01µF, 100V, C	04-5523
C170	0.1µF, 100V, C	04-5521
C171	1µF, 35V, DT	04-5575
C176	0.0047µF, 3kV, C	04-5547
C178	0.1µF, 100V, C	04-5521
C179	0.01µF, 100V, C	04-5523
• **TRANSISTORS**		
Q6	2N3904	05-5755
Q15	MPS6534	05-5763
Q44	2N3904	05-5755
Q96	2N3904	05-5755
Q145	MPSU51	05-5765
• **INTEGRATED CIRCUITS**		
U1	CA3096	06-6023
U3	CD4098	06-6066
U4	CA3096	06-6023
U2	TLC372	06-6265
U5	ICM7555	06-6136
U6	TLC27M7IP	06-6248
U7	MAX631	06-6249
U101	LM385Z-1.2	05-5808
• **DIODES**		
CR94	1N4148	07-6272
CR166-CR167	MR250-2	07-6266
CR169	MR250-2	07-6266
CR175	MR250-2	07-6266
• **THERMISTORS**		
R1-R2	150	07-6332
• **RESISTORS**		
R3	634 OHM	12-7808
R18	1k	10-7009
R27	1 MEG	10-7028
R28	4.7 MEG	10-7030
R36	1 MEG	10-7028
R46	10k	10-7016
R47-R48	1 G	12-7686
R63	82k	10-7022
R64	1k	10-7009
R65	10k	10-7016
R66	1k	10-7009
R68	8.2k	10-7015
R70	4.7k	10-7014
R72	10K	10-7016
R74	82k	10-7022
R75	33k	10-7019
R76	100 OHM	10-7004
R77	2.2k	10-7012
R78	22k	10-7070
R79	100k	10-7023
R81	10k	10-7016
R83	100k	10-7023
R84	470k	10-7026
R86	2.7 MEG	10-7029
R87	10k	10-7016
R89-R90	100k	10-7023
R91	4.7k	10-7014
R128	100k	10-7023
R132	1 MEG TRIMMER	09-6814
R137	10k	10-7016
R138	1 MEG	10-7028
R147	SAT (TYP. 432k)	12-7689

Ref. No.	Description	Part No.
R150	2.37k	12-7648
R159	10k	10-7016
R172	47k	10-7020
R177	200 OHM	10-7006
•	**INDUCTORS**	
L13	470UHY	21-9600
•	**TRANSFORMERS**	
T165	L8050	40-0902
•	**MISCELLANEOUS**	
P1	CONN-1-640456-6 MTA100	13-8134
P2	CONN-640456-2 MTA100	13-8073
8EA.	CLOVERLEAF RECEPTACLE	18-8771

Calibration Board, Drawing 363 x 585

BOARD	Assembled Calibration	5363-735
•	**CAPACITORS**	
C1	0.047μF, 100V, C	04-5565
C2	0.0047μF, 100V, C	04-5570
•	**RESISTORS**	
R1-R3	1 MEG TRIMMER	09-6814
R4-R7	100k TRIMMER	09-6813
R8	47k	10-7020
R9	1k	12-7750
•	**RESISTOR NETWORK**	
RN1	10k SIP 8P	12-7720
•	**MISCELLANEOUS**	
P3	CONN-640456-6 MTA100	13-8095
P4	CONN-640456-4 MTA100	13-8088

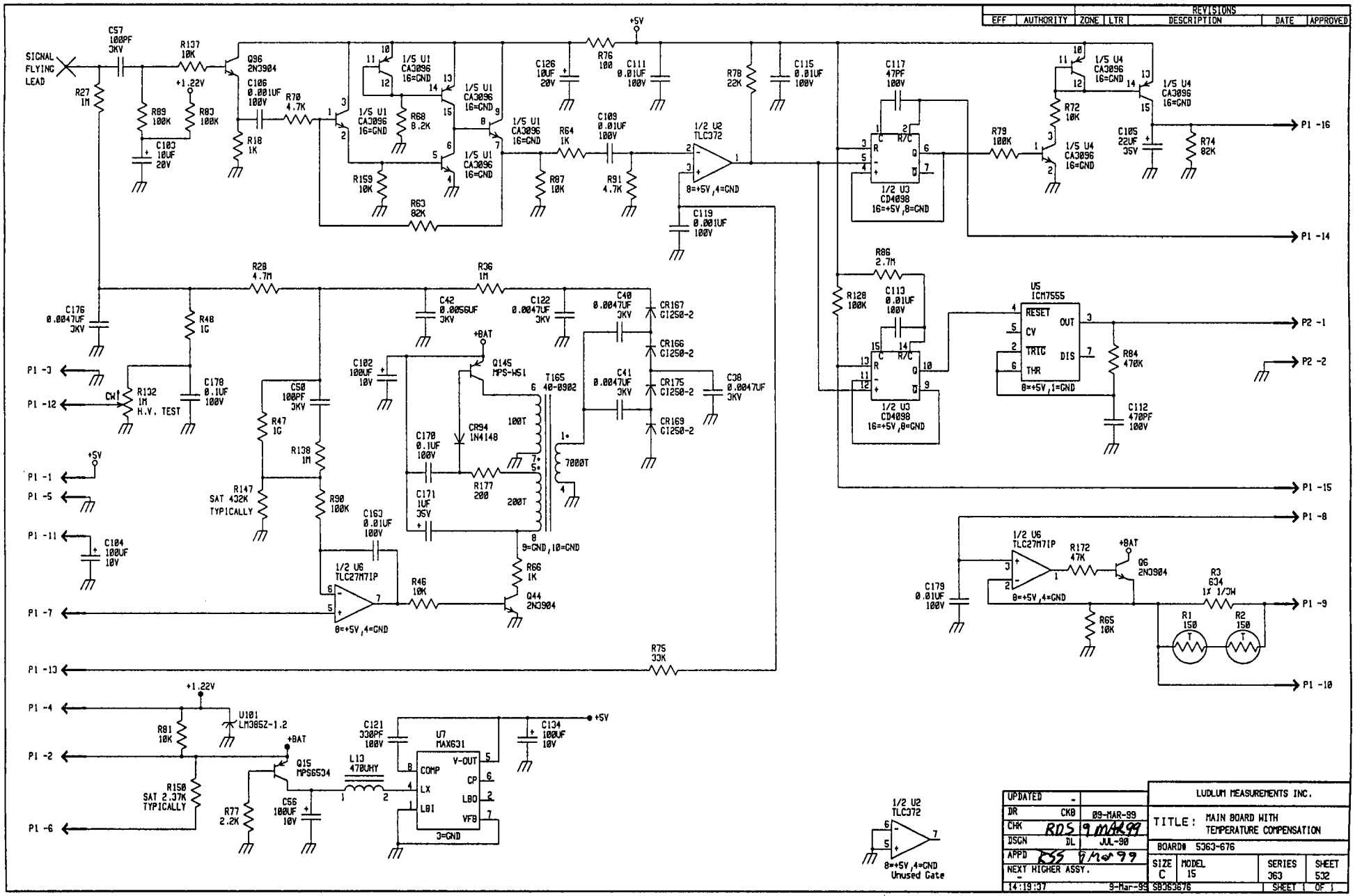
Ref. No.	Description	Part No.

Wiring Diagram, Drawing 363 x 587

•	**AUDIO**	
DS1	UNIMORPH-6030	21-9251
•	**CONNECTORS**	
J1	CONN-1-640442-6	13-8187
J2	CONN-640442-2 MTA100	13-8178
J3	CONN-640442-6 MTA100	13-8171
J4	CONN-640442-4 MTA100	13-8170
J5	RECPT-UG706/U SCREW IN "C"	13-7751
•	**SWITCHES**	
S1	PA-600-210	08-6501
S2	#923 SWTCHCRFT	08-6518
S3	30-1-PB	08-6517
S4-S6	7101-SYZ-QE	08-6511
•	**BATTERY**	
B1-B2	DURACELL "D"	21-9313
•	**MISCELLANEOUS**	
M1	PORT BEZEL FRONT ASSY	4363-188
*	METER MOVEMENT (1mA)	15-8030
*	PORT LATCH KIT W/O BATT. LID	4363-349
*	PORT HANDLE (ROLLED) W/SCREWS	7363-139
*	PORT HANDLE FOR CLIP W/SCREWS	7363-203
*	REPLACEMENT CABLE (STD 39")	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

DRAWINGS AND DIAGRAMS

Main Circuit Board, Drawing No. 363 x 532
Main Circuit Board Component Layout, Drawing No. 363 X 533
Calibration Board, Drawing No. 363 x 585
Calibration Board Component Layout, Drawing No. 363 x 588
Wiring Diagram, Drawing No. 363 x 587


REVISIONS
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SIGNAL FLYING LEAD
C57 100PF 3KV
R137 10K
Q96 2N3904
C106 0.001UF 100V
R70 4.7K
R27 1M
R89 100K
R80 100K
C103 10UF 20V
+1.22V
R18 1K
1/5 U1 CA3096 16=GND
R68 8.2K
R159 10K
R63 82K
C126 10UF 20V
R76 100
C111 0.01UF 100V
R64 1K
C109 0.01UF 100V
R87 10K
R91 4.7K
1/2 U2 TLC372
8=+5V,4=GND
C119 0.001UF 100V
R78 22K
C115 0.01UF 100V
C117 47PF 100V
1/2 U3 CD4098 16=+5V,8=GND
R79 100K
1/5 U4 CA3096 16=GND
R72 10K
C105 22UF 35V
R74 82K
P1 -16
P1 -14
R28 4.7M
R36 1M
C176 0.0047UF 3KV
R48 1G
C42 0.0056UF 3KV
C122 0.0047UF 3KV
C40 0.0047UF 3KV
C41 0.0047UF 3KV
CR167 GI250-2
CR166 GI250-2
CR175 GI250-2
CR169 GI250-2
C38 0.0047UF 3KV
+BAT
C102 100UF 10V
Q145 MPS-W51
T165 40-0902
100T
200T
7000T
CR94 1N4148
C170 0.1UF 100V
R177 200
C171 1UF 35V
C50 100PF 3KV
R47 1G
R138 1M
R147 SAT 432K TYPICALLY
R90 100K
C163 0.01UF 100V
9=GND,10=GND
R66 1K
Q44 2N3904
R46 10K
1/2 U6 TLC27M71P
8=+5V,4=GND
P1 -3
P1 -12
CW
R132 1M H.V. TEST
C178 0.1UF 100V
P1 -1
P1 -5
P1 -11
C104 100UF 10V
P1 -7
R86 2.7M
R128 100K
C113 0.01UF 100V
U5 ICM7555
RESET
CV
TRIG
THR
OUT
DIS
8=+5V,1=GND
R84 470K
C112 470PF 100V
P2 -1
P2 -2
P1 -15
P1 -8
1/2 U6 TLC27M71P
R172 47K
+8AT
Q6 2N3904
C179 0.01UF 100V
8=+5V,4=GND
R65 10K
R3 634 1% 1/3W
R1 150
R2 150
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P1 -10
R75 33K
P1 -13
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P1 -2
P1 -6
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DSGN DL JUL-98
APPD RDS 9 MAR 99
NEXT HIGHER ASSY. -
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BOARD# 5363-676
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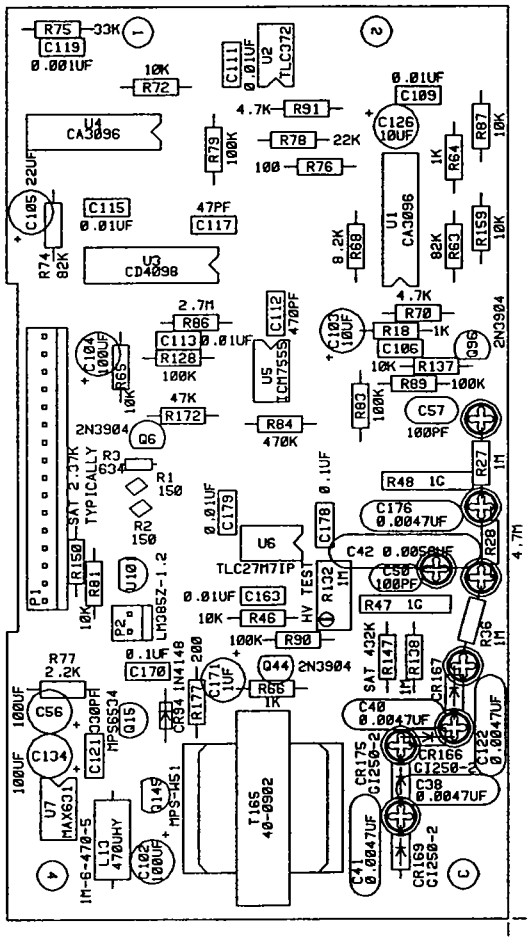

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REVISIONS						
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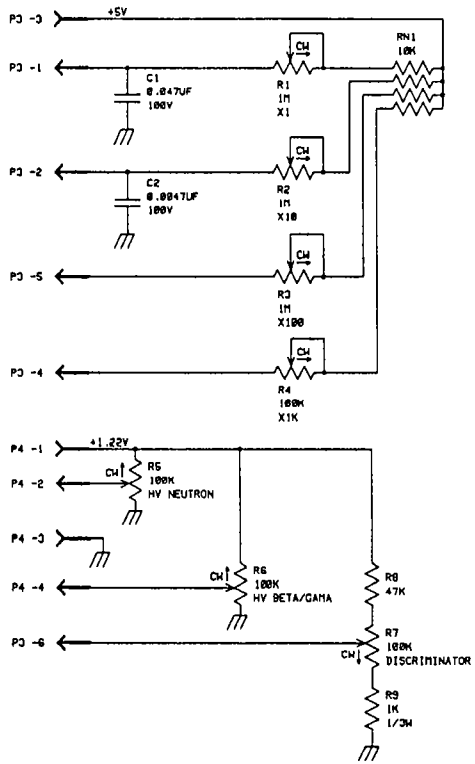
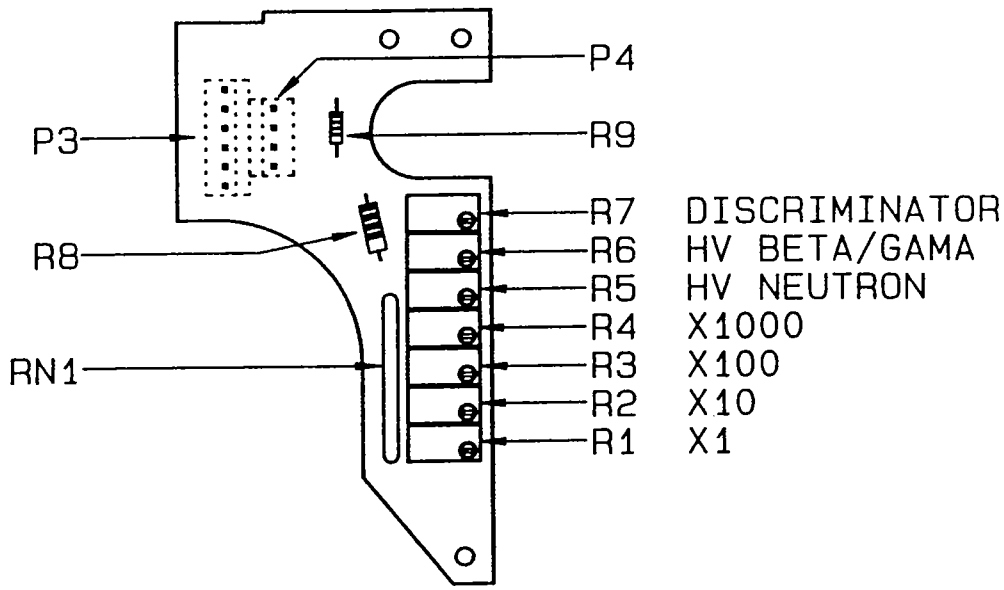


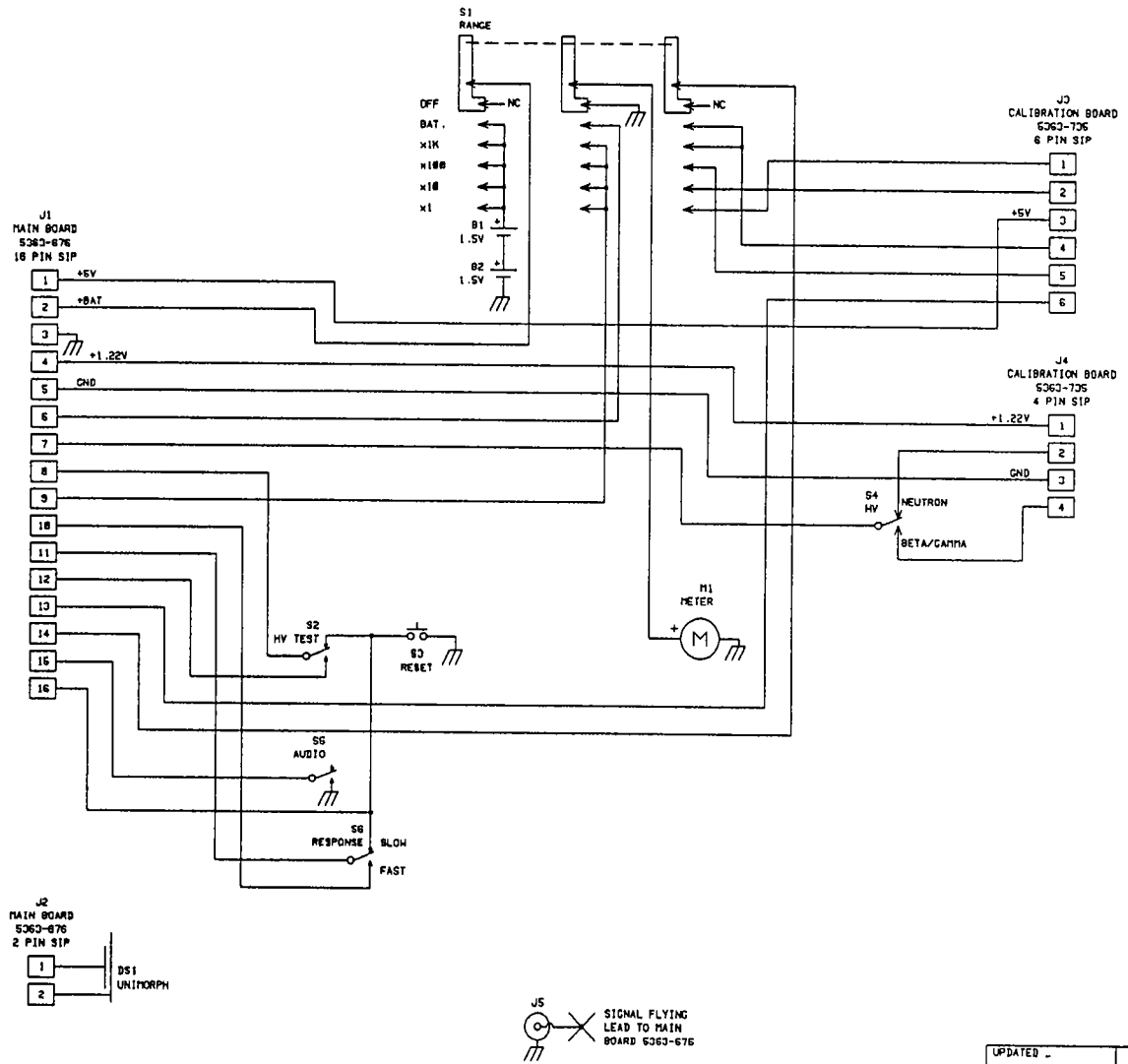
UPDATED -	/ /	LUDLUM MEASUREMENTS INC.
DR CKB	09/22/92	TITLE: CALIBRATION BOARD
CHK AW.	11/6/92	
DSGN -	/ /	BOARD# 5363-735
APPD JGW	11/6/92	SIZE D / MODEL 15 / SERIES 363 / SHEET 586
NEXT HIGHER ASSY. -		
11:24:27	22-Sep-92 5B363735	SHEET 1 OF 1



DESC: CALIBRATION BOARD	
MODEL: 15	
PART #: 5363-735	
DWN: CKB	DATE: 09/23/92
DSGN:	DATE:

DWN CKB	DATE 09/23/92	CHK AM	DATE 11/6/92	APP GM	DATE 11/6/92		
TOL: SHOP STD ☐ OTHER				SCALE: FULL ☒ OTHER			
TITLE MODEL 15 CALIBRATION BOARD							
LUDLUM MEASUREMENTS, INC. 501 OAK STREET SWEETWATER, TEXAS 79556				SERIES 363		SHEET 588	

REVISIONS						
EFF	AUTHORITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



UPDATED -	/ /	LUDLUM MEASUREMENTS INC.	
DR CKB	10/14/92	TITLE: WIRING DIAGRAM	
CHK P.L.	11/6/92		
DSGN DL	07/98	BOARD# 363-706	
APPD JGW	11/6/92	SIZE D / MODEL 16 / SERIES 363 / SHEET 687	
NEXT HIGHER ASSY. -			
13:51:15	6-Nov-92	SB363706	SHEET 1 OF 1