



THE LUDLUM REPORT

DECEMBER 1988

VOLUME III

NUMBER 4

A NEWSLETTER FROM
LUDLUM MEASUREMENTS, INC.
SWEETWATER, TEXAS 79556

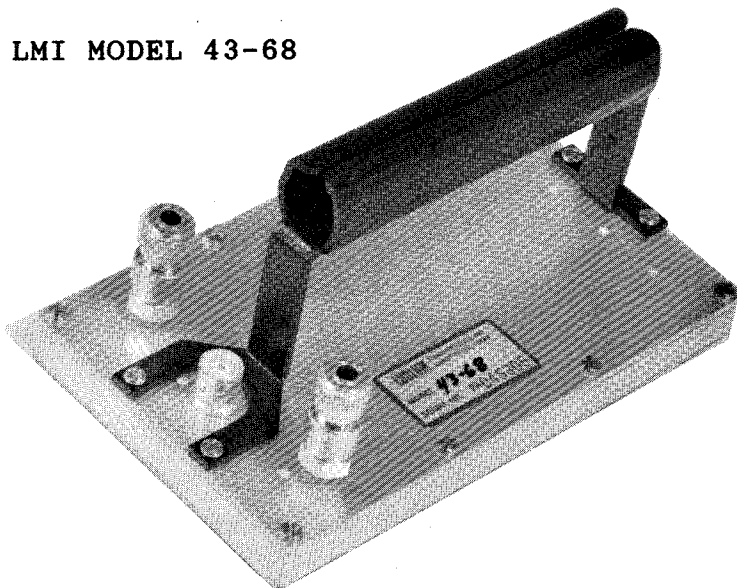
501 OAK STREET
P. O. BOX 810
915/235-5494
FAX: 915/235-4672

EDITORS: KENT BOATRIGHT
CHRIS MAXWELL

HAPPY HOLIDAYS

The folks at Ludlum Measurements would like to wish you and yours a very happy holiday season! We appreciate your patronage and look forward to future relations. LMI will be closed for the Christmas Holidays December 24 - 26th. The New Year Holiday will be observed on Sunday, January 1st and we will be open for business Monday, January 2nd. Have a prosperous new year and enjoy your Murphy's Laws calendar.

LMI MODEL 43-68



December 1988

Our Model 43-68 is a 100 cm² gas proportional detector for Alpha and Beta/Gamma radiation. It features quick release shut-off valves that allow the detector to be used in a static flow mode, with the gas hoses disconnected, a minimum of two hours with 10 % or less degradation. The detector window of 0.4 mylar mg/cm² is 3.465" H X 5.663" L with a 79 % open hex screen producing a 100 cm² open window.

The detector's efficiency is 40 % for Pu-239, 30 % for C-14, 60 % for Tc-99 and 1 % for Gamma. The operating voltage for Alpha is 1000-1200 volts and 1600-1700 volts Beta/Gamma. The background count on the Alpha plateau is 1 cpm and 300 cpm Beta/Gamma. The conversion from cpm to mR/hr is 17,000 to 1.

SURVEY METERS/DETECTORS

December 1988

Operating a survey meter and detector at the incorrect high voltage setting is a common problem many of our customers endure. This problem usually occurs when a different detector is substituted for the detector that the instrument was originally calibrated with. Thus, because some detectors have different operating voltages, most instrument high voltage settings must be determined for that particular detector and survey meter.

The LMI models 44-6, 44-7, and 44-9 G-M (Geiger-Mueller) detectors operate between 900 - 1100 volts with 900 volts being the standard high voltage (HV) setting, LMI scintillation detector high voltages may vary operating below or above this standard setting. The LMI Calibration/Repair Department will normally set the HV at 900 volts on a survey meter that is sent in with a G-M detector attached. If you try to use a scintillation detector with the instrument set at 900 volts, the scintillation detector will most likely not be set at this operating point of the plateau. That is why it is important for us to know what kind of detectors you will use with that instrument. We have many request regarding the operation of both the G-M and scintillation detectors with the same survey meter. Typically, the scintillation detector is modified to accommodate the 900 volts which can be performed at the time of calibration.

Another problem our customers sometime experience is obtaining the proper readout when a different detector is used instead of the original detector and survey instrument. For example, you are using a detector and a survey meter that were calibrated together and you wanted to use another (second) detector; the original detector was calibrated on the mR/hr scale. The other (second) detector's cpm/mR/hr will not have the same relationship as the original detector. Therefore, the meter scale and the other detector will not be compatible.

When an LMI Model 3 survey meter is ordered with a Model 44-9 pancake G-M detector and the customer requests a dual scale mR/hr and cpm meter face, we would send a 202-330 meter face. However, if the customer ordered a Model 44-6, sidewall G-M detector we would send a 202-241. Below are a list of meter scales and the detector that should be used with that meter scale. If you have questions regarding a specific meter scale that is not listed, please give us a call.

INSTRUMENT	METER SCALE	DETECTOR
LMI MODEL 2	202-2	any detector
	202-325	44-7
LMI MODEL 3	202-2	any detector
	202-84	44-6, 44-38
	202-85	44-7
	202-118	44-9
	202-241	44-6, 44-38
	202-330	44-7, 44-9
LMI MODELS 12, 16 & 18	202-129	any detector
	202-356	any detector
LMI MODEL 14-C	202-84	44-6, 44-38
	202-85	44-7
	202-118	44-9
	202-241	44-6, 44-38
	202-330	44-7, 44-9

Dec 1988

The majority of problems we encounter with returned instruments in the Ludlum Repair Department require simple solutions. Dirty or corroded contacts (especially battery contacts), damaged cables, loose connections and other types of mechanical problems are the leading cause of instrument failure. Although electronic component failure is a possibility, it is infrequent in comparison.

The next time you have a problem with your instrument, check the battery compartment for evidence of corrosion or a leaking battery. Even though the battery check field on the instrument may indicate sufficient voltage, a leaky battery may be the problem. Never store the instrument over thirty days without removing the batteries. For minor corrosion problems, an eraser can be used to "buff" the contacts clean. Also, an engraving tool will work sufficiently to "rough up" the contacts. When the corrosion problem is more severe and the battery compartment is contaminated with acid from a leaking battery, the acid may be neutralized by using a baking soda paste. Apply the paste to the entire battery compartment and let this mixture dry (usually takes a few hours). A brush can be used to remove the mixture residue. In some cases, the battery contacts may have to be replaced.

Faulty instrument cables is another common problem we experience in our repair department. Cables can be visually inspected for "breaks" in the insulation or for damaged connectors. An easy way to check for a break is to "jiggle" the cable while observing the meter face and audio; there should be no change in the readout of the meter scale or the audio output if the cable is adequate. We recommend that you invest in a spare cable to alleviate down-time.

Hopefully, by conducting a few of these simple tests on your instruments, you can save both time and money on costly repairs. If you are unsure of some of these procedures or you are having other problems with your LMI equipment, please give our LMI Repair Department a call at 915/235-5494. Also, if you send your instrument back for repair or calibration, please include your name, company name, address, telephone number, required calibration interval and a brief description of the problem you are experiencing with the product.

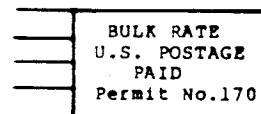
CONDENSING HUMIDITY

Occasionally a customer may experience a problem with condensing humidity causing dew or frost inside the instrument. Presume that your instrument is in your office which has a temperature of 72° Fahrenheit and a relative humidity of 40 % and you take the instrument outdoors where the temperature is 40° F. When the instrument "cools down" to 45° F., dew will form inside the instrument and possibly cause the instrument to malfunction. In the same indoor temperature as above with an outdoor temperature of 20° F., the dew will turn to frost when the instrument "cool down" temp is 32° F.

You can avoid this problem by storing the instrument in a dry box. Reducing the humidity to 25 % will drop the dew point below freezing. Conversely, when the instrument is moved from outdoors to indoors the same problem may arise when the instrument "warms up" after both the instrument and outdoor temperature are below freezing. When the instrument warms to 32° F., frost will form on the circuit board. If this happens, turn the instrument off and remove the cover and place the instrument in an oven at 170° F. or in front of a fan to return service. If you are experiencing any of these problems and need additional help, please give us a call. The following chart shows the dew point in various combinations.

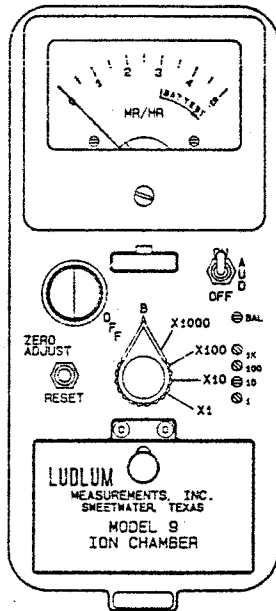
TEMPERATURE	RELATIVE HUMIDITY	DEW POINT
80° F.	30 %	45° F.
78° F.	40 %	51° F.
72° F.	40 %	45° F.
68° F.	30 %	35° F.
65° F.	30 %	31° F.
55° F.	30 %	24° F.

LUDLUM MEASUREMENTS, INC.
501 OAK STREET
P.O. BOX 810
SWEETWATER, TX 79556



PLEASE FORWARD
ADDRESS CORRECTION REQUESTED

LMI MODEL 9



The LMI Model 9 Ionization Chamber is a self-contained, portable instrument used in the detection of beta-gamma radiation. Recently, some of the features have been improved as follows: (1) the calibrations controls are now located on the front panel which allow for easy calibration; (2) the internal desiccant holder has been enlarged; (3) the unimorph speaker emits clicks that increase in proportion to the meter reading; (4) the ion chamber has been redesigned to simplify maintenance; and (5) the internal insulators have been changed from Teflon to sapphire, thus increasing stability.

These improvements should assist the end user in their day-to-day operation of this instrument. Listed below are other specification of the Model 9. If you have questions, please give our Sales Department a call at 915/235-5494.

MODEL 9 SPECIFICATIONS

POWER: 2-3 volts at 25 mA, provided by 2 "D" cell batteries.

RANGE: 4 ranges to 5,000 mR/hr, meter presentation of 0-5 mR/hr with multipliers of X1, X10, X100, X1000.

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

RESPONSE: Approximately 5 seconds for 90 % of full scale deflection on X1 scale. Faster on other scales.

BATTERY LIFE: > 200 hours typical.

WARM-UP TIME: 5 minutes settling time, fastest warm-up on X1000 scale.

CHAMBER WALL: Acrylic with carbon coating.

CHAMBER VOLUME: 220 cm³ with 40 cm² window.

WINDOW: With protective screen, window is 74 % open.

BETA FACTOR: Reading when exposed to depleted uranium slab of 234 mrad/hr: WITH PROTECTIVE SCREEN:

50 mR/hr with slide open

7 mR/hr with slide closed

Beta factor = $234 \div 50 - 7 = 5.4$

WITHOUT PROTECTIVE SCREEN:

70 mR/hr with slide open

7.5 mR/hr with slide closed

Beta factor = $234 \div 70 - 7.5 = 3.7$

Note: Shipped with screen unless otherwise specified.

SIZE: 9"H X 3.5"W X 8.5"L

WEIGHT: 4.2 pounds (including batteries)

LMI TIPS: DETECTOR OPERATING VOLTAGE

Many of our customers inquire about the procedure we use to check the operating voltage of a scintillation detector. Hopefully, the following will help to answer a few of these questions. Most scintillation detectors which have a 1" photomultiplier tube operate in the range of 600 to 1000 volts. To determine the best operating high voltage (HV) of your detector, the following instruments will be required. They include: a Ludlum Model 500 Pulser (HV tester), a check source, and the instrument and detector to be tested. The check source should be matched for the detector. For example, with a Beta probe M 44-1, use a Beta source and with a Low Energy Gamma detector such as the LMI Model 44-3, use an I-125 or I-129 check source.

To begin, set the HV setting at the point where the detector just begins to recognize the check source. Record a source count and a background count on a graph. Repeat this procedure as you increase the HV at 25 or 50 volt increments until the both counts get erratic or you reach a maximum HV of 1300 V. These recordings will provide you with a counting curve. (See illustration below.) The counting plateau is the region where the curve is the "flattest" or has the most minimal slope. Thus, the operating voltage for that particular detector and instrument should be set at the "knee" of the source count plateau which will provide maximum stability and lengthen the life of the photomultiplier tube. Please give us a call if you have any questions.

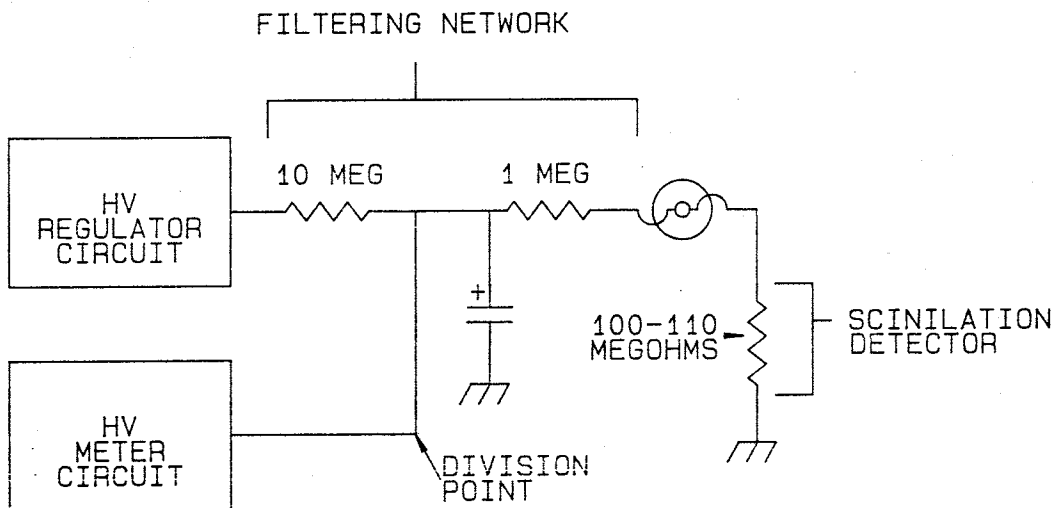
EXAMPLE OF READINGS

High Voltage Reading	Background count	Source Count
600	280	12.0K cpm
650	320	13.5K cpm
700	320	13.5K cpm
750	325	13.5K cpm
800	400	14.0K cpm

HIGH VOLTAGE METER DECREASE

A decrease in operating voltage is observed with some instrument/scintillation detector combinations when the detector is connected to the instrument. This observed decrease in the high voltage (HV) reading is a result of the voltage divisional drop between the HV filtering circuitry in the instrument and the total resistance of the PMT socket (dynode string) as illustrated below.

The observed decrease in voltage is typically 10 % of the operating voltage. Example: HV reading is 900 volts before scintillation detector is connected and 810 volts after the detector is connected. All LMI factory HV settings are calibrated at the instrument (without the detector connected).



LUDLUM MEASUREMENTS, INC.
501 OAK STREET
P.O. BOX 810
SWEETWATER, TX 79556

PLEASE FORWARD
ADDRESS CORRECTION REQUESTED

