

By: Beth Hall and Rollie Cantu

TROUBLESHOOTING TIPS

Occasionally, you may encounter problems with your LMI instrument or detector that may be repaired or resolved in the field, saving turnaround time and expense in returning the instrument to us for repair. Toward that end, LMI electronics technicians offer the following tips for troubleshooting the most common problems. Where several steps are given, perform them in order until the problem is corrected. You should keep in mind that the three most common problems are: 1. detector cables; 2. sticky meters; 3. battery contacts.

Note that the first troubleshooting tip is to determine whether the problem is with the electronics or with the detector. A Ludlum Model 500 Pulser can be invaluable at this point, because you can simultaneously check high voltage, input sensitivity or threshold, and check the electronics for counting.

Electronics Utilizing a G-M Detector, Scintillator, or Proportional Detector

SYMPTOM

POSSIBLE SOLUTION

No power (or meter does not reach
BAT TEST or BAT OK mark)

1. Check batteries and replace if weak.
2. Check polarity (See marks on battery lid). Are the batteries installed backwards?
3. Check battery contacts. Clean them with rough sandpaper or use an engraver to clean the tips.
4. Check for loose or broken wires, especially between the main board and calibration board.

Nonlinear Readings

1. Check the high voltage (HV). Use the HV check or test function if the instrument is equipped with this feature or use a multimeter with high impedance.
CAUTION: Do NOT use a standard multimeter, as you will get a low reading and/or possibly cause damage to the multimeter.
2. Check for noise in the detector cable by disconnecting the detector and placing the instrument on the lowest range setting. Wiggle the cable and observe the reading for significant changes.
3. Check for a "sticky" meter movement. Does the reading change when you tap the meter? Does the meter needle "stick" at any spot?
4. Check the "meter zero." Turn the power OFF. The meter should come to a rest on "0".

Meter goes full-scale or "Pegs Out"

1. Replace the detector cable to see if it has failed' causing excess noise.
2. Check the HV and, if possible, the input threshold for proper settings.
3. Check for loose wires, especially between the main board and the calibration board.

FROM THE TRENCHES

Meter goes full scale or "Pegs Out" (continued)

4. Ensure that the instrument can is attached properly. When attached properly, the speaker will be on the left side of the instrument. If the can is on backwards, the interference between the audio and input preamplifier can cause noise.

Following are the most common detector problems, by detector category.

1. If the tube has a thin mica window, check for window breakage. If damage is evident, the tube must be replaced.
 2. Check the HV. For most G-M tubes, the voltage is normally 900 Vdc, or 460-550 Vdc for "peanut" tubes (Ludlum Model 133 series).
 3. Input sensitivity is normally 35 mV. If the input sensitivity is too low, the user could see some double-pulsing.
 4. Wires to the tube may be broken or the crimped connector could have a loose wire.
-
1. Alpha or Alpha/Beta scintillators are prone to light leaks. They can be tested for this problem in a dark room or with a bright light. If a light leak is determined, changing the mylar window assembly will usually fix the problem. Note: When replacing the window make sure to use a window made with the same thickness mylar and the same number of layers as the original window.
 2. Verify that the HV and input sensitivity are correct. Beta scintillators will typically operate at 35 mV input sensitivity (or 2 - 4 mV for the beta channel of an alpha/beta scintillator), while alpha and gamma scintillators operate from 10 - 35 mV. High voltage varies with the photomultiplier tube (PMT) from as low as 600 Vdc to 1400 Vdc.
 3. On a gamma scintillator, visually inspect the crystal for breakage or humidity leakage. Water inside the crystal will turn it yellow and gradually degrade performance.
 4. Check the PMT to see if the photocathode still exists. If the end of the PMT is clear (not brownish), this indicates a loss of vacuum which will render the PMT useless.
-
1. Check the HV and input sensitivity settings. In gross counting of alpha particles, gas proportional detectors normally operate at 1250 Vdc and 4 mV threshold. In gross counting of beta or alpha and beta particles, gas proportional detectors normally operate at 1650 Vdc and 4 mV threshold. In simultaneous counting of alpha and beta particles, the HV is normally about 1600 Vdc, the alpha threshold is normally 120 mV, and the beta threshold and window are normally 3.5 mV and 30 mV. Neutron ^3He detectors typically require a 2 mV threshold and about 1700 Vdc. Neutron BF_3 detectors typically operate at 1750 Vdc and 30 mV.
 2. Gas proportional detectors need P-10 gas, so check the window for tears or leaks and ensure an adequate supply of gas.
 3. If the window is torn, frequently the anode wires are also broken and shorting against the detector. Replace broken wires, clean with lacquer thinner, then bake at 200°F.
- Humidity can be a problem for air proportional detectors. Dry and/or check the desiccants.

We hope these tips will prove to be helpful. As always, please call if you encounter difficulty in resolving a problem or if you have questions.

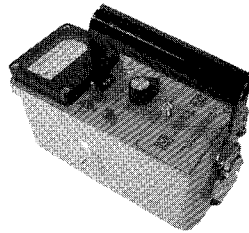
June 1999

The LUDLUM Report

https://www.avis.com/AvisWeb/reservation/ReservationConfirmationPrint

NEW PRODUCTS

MODEL 3 SURVEY METER



At Ludlum Measurements, Inc., one of our most important goals is to maintain a quality product at a competitive price. In keeping with this, we are pleased to introduce the new Model 3 Survey Meter. From the outside, it basically looks the same as the old Model 3, and it functions exactly the same as it has for years. However advances in technology have allowed us to redesign the instrument and keep the same low price without sacrificing quality or reliability. The features that have changed are highlighted in red below.

- INDICATED USE:** General purpose survey
- COMPATIBLE DETECTORS:** G-M, and scintillation type detectors
- CONNECTOR:** Series "C" (others available)
- METER DIAL:** 0 - 2 mR/hr; 0 - 5k cpm, BAT OK (others available)
- MULTIPLIERS:** X0.1, X1, X10, X100
- LINEARITY:** Reading within $\pm 10\%$ of true value
- AUDIO:** Built-in unimorph speaker with ON/OFF switch
- CALIBRATION CONTROLS:** Accessible from front of instrument (protective cover provided)
- RESPONSE:** Toggle switch for FAST (4 seconds) or SLOW (22 seconds) from 10% to 90% of final reading
- POWER:** 2 each D cell batteries
- BATTERY LIFE:** Typically greater than 1700 hours with alkaline battery (battery condition can be checked on meter)
- METER:** 2.5" (6.4 cm) arc, 1 mA analog type
- CONSTRUCTION:** Aluminum housing with beige polyurethane enamel paint, and sub-surface printed membrane nomenclature on front panel.
- TEMPERATURE RANGE:** -4°F(-20°C) to 122°F(50°C)
May be certified for operation from 40°F(-40°C) to 150°F(65°C)
- SIZE:** 6.5" (16.5 cm)H X 3.5" (8.9 cm)W X 8.5" (21.6 cm)L
- WEIGHT:** 3 lbs (1.4 kg) including batteries

PRICE: \$ 395.00

Send address corrections and subscription requests to below address.
Please include your current mailing label with your address correction.

7/9/2004

Bulk Rate
U.S. Postage
PAID
Abilene, TX
Permit No. 1060

LUDLUM MEASUREMENTS, INC.
P.O. Box 810 / 501 Oak St.
Sweetwater, TX 79556-0810

