LMI TIPS: Operating Scintillation Detectors at 900 Volts

June 1989

Many of our customers inquire about using scintillation and G-M detectors interchangeably with the same instrument. To make this possible, a few extra steps have to be taken because of the difference in operating voltages of these two type detectors. The scintillation type detector has a lower operating voltage than does that of the G-M detector.

Scintillation detectors contain a 1.5 inch photomultiplier tube that is usually operated between 600 to 1000 volts, while most G-M detectors operate at approximately 900 volts. Therefore, the scintillation must be changed to operate at 900 volts. Usually, the simplest way to change the high voltage plateau on a scintillation detector is to change the existing end cap on the detector to an adjustable gain cap. The adjustable gain cap allows the customer to "shift" or adjust the operating voltage of the scintillator by simply adjusting the recessed control in the end of the cap. This control will affect the voltage operating point over a range of approximately 150 volts.

Another alternative is to remove the original detector end cap and place a resistor between the tube socket and the end cap. The resistor in series with the photomultiplier tube and the connected instrument effectively forms a voltage divider network consisting of the resistor and the total input impedance of the instrument. Increasing the resistance will decrease the pulse amplitude from the photomultiplier tube requiring an increase in operating voltage to obtain the same detector operating point before the resistor was added. Resistor values will vary from each detector and instrument combination. Typical values for a 50 to 150 volt increase is 200k to 1 megohms, respectively. Discretion should be used in placement of the resistor due to the high operating voltage (use heat-shrink over the resistor).

Please note for both of the above procedures that the detector operating voltage can only be increased and never lowered below the initial operating point.

Example: A detector which originally operates at 1000 volts cannot be lowered to an operating point of 900 volts. (Exception: if a resistor has previously be added inside the photomultiplier tube.)

Both procedures will vary the operating point approximately 150 - 200 volts above the initial detector operating voltage. A detector operating at 600 volts may not not conceivably be shifted to a 900 volt operating point. If you have questions, please give Chris Maxwell a call at 915/235-4947.

REPAIR DEPARTMENT TIPS

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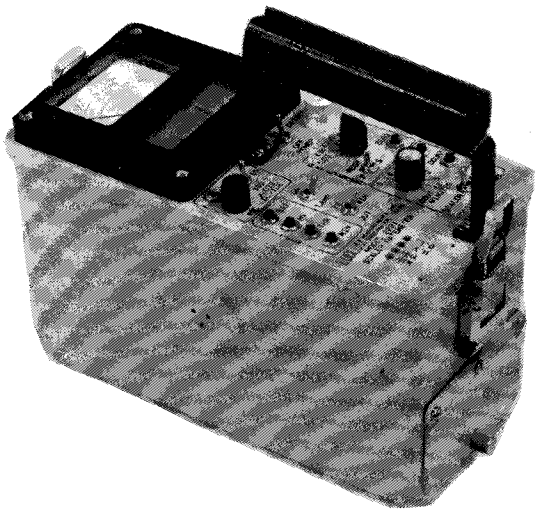
A common problem many of our customers experience is that of excessive background count when monitoring alpha radiation. Frequently, the problem is caused by light leaking into the detector, which the photomultiplier tube changes into electrical pulses that are counted by the monitoring instrument.

Consequently, if the mylar face on the detector is torn or punctured, ambient light may produce an excessive background reading. If the tear or puncture is sizable, a low or even no activity or readout may result which is a result of the instrument's inability to resolve the light pulses. To check the detector for light leaks, simply shade the detector face from the light with an opaque material while monitoring the meter. (Start at one end of the detector and slowly move the shade to the other end while watching the meter face.) When the ambient light is blocked from the detector, a sudden change in the monitoring instrument readout should occur. For small increases in background count, the detector may need to be enclosed in a light-tight bag for a period of time before the cause can be determined. Although torn mylar is usually the cause of light leaks, unwanted light can enter by other means.

Contamination of the detector face itself is another common problem that frequently arises. Even small amounts of alpha contamination may generate an apparent increase in background count. Many people use a thin window G-M detector when checking their detector for alpha contamination. The problem with this method of testing originates because the thin window G-M detector may not detect small amounts of alpha contamination due to the relatively higher gamma background count. The best way to check for alpha contamination is to use another alpha detector or perform wipe tests to pinpoint the contamination. If you have questions, please give our Repair Department a call.

NEW LMI MODEL 2221 PORTABLE SCALER/RATEMETER



The new Model 2221 portable scaler/ratemeter features a single channel analyzer with analog and digital ratemeter outputs. The unit provides a three switch position audio divide by circuit to provide distinguishable clicks per event for high count activity. Potentiometers are easily accessible on the face of the instrument for threshold, window, HV and overload controls. The threshold, window, HV and battery voltage are displayed on the LCD readout by pushing the appropriate test button. The overload feature indicates detector count saturation and is displayed on the LCD readout by flashing dashes and deflecting full scale on the analog meter. The LCD and analog meter can be illuminated for easy readout in low light situations.

The instrument is powered by 4 "D" cell batteries with a life of approximately 250 hours and the battery compartment is externally accessible for battery replacement. This new Model is designed for operating with scintillation, proportional or G-M detector and utilizes a four decade linear and log ratemeter with a six digit LCD readout for the scaler and digital ratemeter.

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MODEL 2221 SPECIFICATIONS

HIGH VOLTAGE: 0 - 2400 volts with digital readout.
CALIBRATION STABILITY: Less than 15% variance to battery end point.
SENSITIVITY: Voltage sensitive and adjustable from 1.5 mV - 100 mV; factory calibrated at 10 mV.
INPUT IMPEDANCE: 22k
READOUT: Liquid crystal display with toggle ON/OFF back lighting.
METER: 2.5" scale, 1 mA, pivot and jewel suspension.
SCALE: Log: four decade from 50 - 500k cpm.
Linear: 0 - 500 cpm with multipliers of X1k, X100, X10, X1.
RANGE: 0 - 500,000 cpm.
LINEARITY: ± 5% of full scale.
RESPONSE: 2 positions, FAST - 4.4 seconds, SLOW - 22 seconds, for 90% of full deflection.
AUDIO: Built in unimorph speaker with click per event and switch selective divide by 1, 10, and 100.
CONNECTORS: Series "C".
SIZE: 11 (4.25")W X 25 (10")L X 15 (6")H (9")H with handle.
WEIGHT: 2.5 (5.5 lbs.) including batteries.
FINISH: Computer beige polyurethane paint with silkscreened nomenclature.

LMI CALENDARS

We are currently updating our mailing list in preparation for our annual calendar mailout. Again at the end of the year, we will send out the Murphy's Laws calendar. Please notify us if the name or address is incorrect on this newsletter and also the name and address of any co-worker who might like to receive our mailings.

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PLEASE FORWARD
ADDRESS CORRECTION REQUESTED