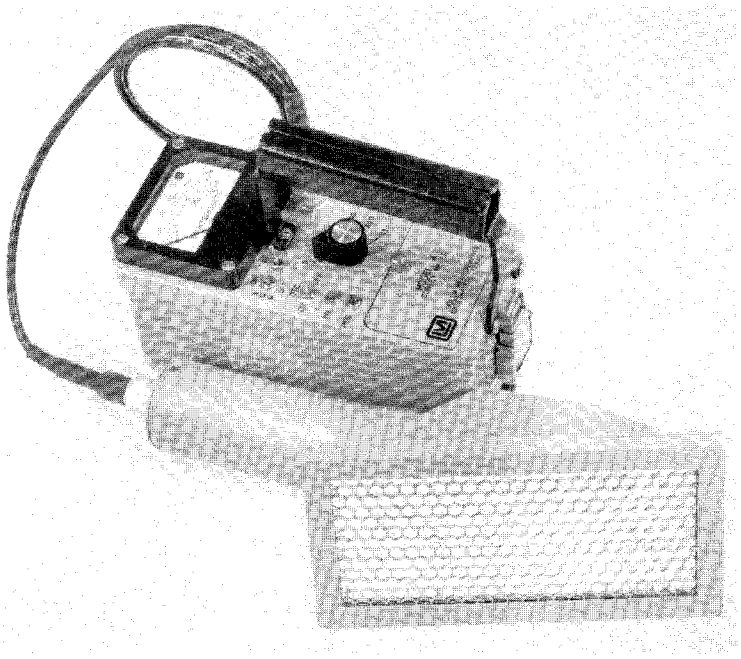
A GREAT COMBINATION !!

June 1993



The Ludlum Model 4 Survey Meter and the Model 43-90 Alpha Scintillator are a great combination for alpha surveying. The Model 4 provides the necessary voltage (adjustable 200 - 2500 volts) for the Model 43-90. An overrange function on the Model 4 monitors the high voltage current to the detector. If the voltage to the detector changes due to the detector being damaged or window having a light leak, a LED on the meter will illuminate and meter will deflect full scale. Dead time correction on the Model 4 makes all ranges linear and the unit can be calibrated with a linear pulser. The Model 4 also includes a pulse width discriminator which will enhance gamma rejection when used with the Model 43-90 alpha scintillator.

The Ludlum Model 43-90 is a rectangular alpha scintillator with an open area of 100 cm^2 and active area of 125 cm^2. This large area detector is light weight (approx 1.5 lbs) and has approximately 38 % efficiency for Pu-239 (2pi geometry). The mylar window can easily be changed in the field and cost $8.50 each.

Ludlum Model 4 Special Features

The Overrange control monitors detector current for abnormal levels. This feature is useful to avoid overrange paralysis of the detector and to respond to light leaks. When the overrange feature is activated, the meter will go full scale and an overrange LED will illuminate.

Dead Time Correction feature on the Model 4 will allow linear meter scales thus permitting automatic correction for dead time loss. This function also includes a front panel-mounted On/Off switch which capacitates the instrument to be accurately calibrated with a linear pulser.

The Pulse Width Discrimination is another feature that is useful for discrimination of gamma counts when the instrument is used with an alpha scintillator. This function can be deactivated when used with proportional detectors and makes no difference when used with a G-M.

LMI Model 4 Survey Meter Specifications

Audio: Built in unimorph speaker with On/Off switch.
Response: Toggle switch for FAST (4 seconds), or SLOW (22 seconds) for 90 % of final reading.
Multiplier Ranges: X1; X10; X100; X1000
Meter: 0-500 cpm; HV readout and Bat test.
Linearity: $\pm$ 5 % full scale.
Detectors: G-M, Scintillation or Proportional.
High Voltage: Adjustable from 200 - 2500 volts; electronically regulated to 1 %; HV support of scintillation loads to 1500 volts, proportional to 2500 volts. High voltage test indicated on meter.
Sensitivity: Adjustable from 2 - 40 millivolts. Control located under calibration cover.
Calibration Stability: Less than 5 % variance to battery endpoint.
Power: 2 each Standard "D" cell batteries, 600 hours typical life. Mercury or rechargeable cells directly interchangeable.
Size: 10.67(4.2")H x 8.9(3.5")W x 21.6(8.5")L
Weight: 1.36 (3lbs), less batteries and detector.

Price: $550.00 ea.

LMI Model 43-90 Rectangular Alpha Scintillator Specifications

Detector: ZnS (Ag).
Window: 1.2 mg/cm^2 aluminized mylar.
Window Area: Open area is approximately 100 cm^2; active area is 125 cm^2.
Efficiency: 38 % for Pu-239. (2pi geometry)
Operating Voltages: 600 - 1100. (1200 V. max)
Non-Uniformity: Less than 5 %.
Photomultiplier Tube: 3.8 (1.5") diameter.
Protective Screen: 0.25" stainless steel hex, 79 % open.
Size: 33 (12.5") x 10 (4")H x 10 (4") L.
Weight: 0.68 (1.5 lbs)
Finish: Computer beige polyurethane paint.

Price: $650.00 ea.

LMI TIPS: CABLE LENGTHS June 1993

Note: This is part 1 of a two part series covering detector cable length variations. This part addresses Scintillation and Proportional detectors and part 2 will encompass G-M detectors and special applications.

Changing coaxial cable lengths between the detector and counting instrument can change the overall response of the detector. It is important to realize what the effects of increasing or decreasing detector cable lengths areand how to compensate for these changes to ensure the counting system reliability.

Coaxial cables have capacitance through the dielectric material between the current or signal carrying conductors. This capacitance is usually rated in picofarrads/ft. or pf/m. A typical Belden RG-58U Low Noise coaxial cable has a nominal capacitance of 38 pf/ft. or 124.7 pf/m.

The cable connecting the detector to the counting instrument is typically configured to use the center conductor of the coax to carry the detector operating voltage (HV) and signal components of the detector. The coax shield or braided conductor is used as the detector ground which is referenced to the counting instrument chassis ground. Therefore, the signal which is a series of AC pulses corresponding to each detected radiation event, is attenuated between the center conductor through the dielectric to ground. The counting instruments have a threshold in which the detector pulse must cross to be counted. A typical threshold level, commonly referred to as input sensitivity, is 30 millivolts for a portable survey meter such as a Model 3; therefore, at least a 30 millivolt pulse amplitude is required from the detector before it will be recognized by counting circuit.

Scintillator or Proportional detectors are the most affected by cable length changes. Considering that the detector pulse output varies in amplitude with radiation energy levels, any changes in pulse amplitude would be extremely critical. Using a Model 3 and 44-2 (1" x 1" NaI) scintillation detector for an example:

The M3/44-2 are plateaued with ^{241}Am source using a 39" cable. The operating point is set approx. 50 volts above the knee of the plateau @ 614 volts and input sensitivity is 30 mV. If the connecting cable is changed from a 39" to a 6ft., very little difference would be noticed in the meter reading but if the operating voltage is decreased 20 volts, the count rate will start to fall off. If the ^{214}Am plateau is re-plotted, the operating voltage would need to be increased to 650 volts (34 volts increase) to be at the same operating point as the 39" cable connection. If a 20' cable was substituted the operating voltage would have to be increased to 752 volts and a 50' cable would require an 823 volt operating voltage.

The above scenario illustrates that the detector operating voltage (HV) can be used to compensate for gain losses or increases due to the change in cable length. Due to the wider operating voltage range of most scintillation detectors, adjusting the HV is the most efficient way to compensate for cable length changes. But in the situation of the Proportional detector, the detector breakdown or saturation point remains constant which limits the operating voltage range of the detector.

Continued on next page

In addition to increasing the operating voltage for an increase in cable length, the threshold (input sensitivity) can be lowered to achieve the cable length compensation. Since the Proportional detector saturation point does not change with cable length variations, the cable lengths are usually limited to less than 25 ft.

The parameters affecting detector operating voltage and sensitivity changes due to cable length variations are: cable capacitance, input impedance of the counting instrument, detector impedance, and detector gain. With this many variables, there cannot be direct ratio between cable length and instrument voltage/threshold compensation. Count rate versus detector operating voltage plateaus is the tool for changing the cable lengths on Scintillation and Proportional detectors.

USED AND OUTDATED EQUIPMENT REQUESTED

Note: The folllowing story ran in our last newsletter with an incorrect phone number.

Our friends at TSTC-Waco have asked us to relay their plea for any outdated or used radiation detection equipment which you have no need for. Texas State Technical College's Nuclear Technology Department teaches an eighteen month entry-level health physics program. Because of the increase in enrollment at the Waco campus, the department is in need of equipment to be used in their classes.

Graduates of this course have an Associates Degree of Applied Science in Nuclear Technology and are referred to as "entry-level health physics technicians". If you can help in any way or have questions, please contact either Linda Morris, Georgia Martini, or Gary Nordwig at (817)867-4877.

LEASING AGREEMENT AVAILABLE

Are you needing more equipment for your business but just don't have the cash flow for a large capital outlay? Equipment leasing may be the answer to this and other problems you might encounter when it comes to equipment acquisitions. Recently LMI has joined with LeasePartners to make equipment leasing available to most everyone.

Leasing is easy. LMI equipment can be 100% financed at fixed, competitive rates for periods of 12 to 60 months. Preserve you bank credit lines, think about leasing. For more information, contact LeasePartner's Scott Heikkila at 800/533-0060 extension 458.

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