The LUDLUM Report March 2001

Example of Peaking Procedure for Various Isotopes

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This is Part 2 of "Example Peaking Procedures used at Ludlum Measurements, Inc." Please refer to the previous "From the Trenches" column published in the December 2000 issue of the LMI newsletter for Part 1.

In Part 1, we discussed the peaking procedure used in-house at LMI for peaking LMI Models 44-10, 44-11, 44-20, 203, and 243 detectors on the 662-kev Cs-137 photopeak with a Model 2200 Scaler/Ratemeter. Other scintillation detectors are peaked in the same manner, but have different values for resolution. In Part 2, we will cover using the LMI Model 2200 in peaking for other isotopes. The specific detector model is not germane to this discussion, as resolution of the detector will not be addressed.

As mentioned in Part 1, actual field conditions may necessitate the use of different parameters (such as a wider window). Following are examples of such conditions that affect the choice of window width:
(1) If isotopes other than the target isotope are known to be present, use of a narrow window may be appropriate in order to isolate the target isotope's photopeak. This is especially the case for isotopes that have a photopeak energy close to that of the target isotope's photopeak energy. Note, however, that the use of a narrow window will decrease the number of counts registered, which may cause the user to miss detection of small quantities of the target isotope.
(2) If the target isotope is isolated from other isotopes, a wider window may be used. This is also the case when other isotopes are present but are known to have sufficiently different photopeak energies from the target isotope. Please bear in mind that these and other suggestions written herein are offered as guidelines only. Your particular situation may warrant a different procedure.

To avoid repeating the specific operating procedure for peaking, we will assume that the reader is familiar with these steps. What may prove to be valuable, however, are the settings used at LMI for the Model 2200 with the THRESHOLD dial calibrated to different keV/turn ratios. Below are examples of THRESHOLD and WINDOW settings for common isotopes of interest:

(1) 100 keV/turn:
For **Cs-137** (normal factory setting), the **THRESHOLD** dial is calibrated to 100 keV/turn and set at **6.42**. The WINDOW dial is set at 0.40. (Photopeak energy at 662 keV*.)

For **Tc-99m**, the **THRESHOLD** dial should be calibrated to 100 keV/turn and set at **1.20**. The WINDOW dial is set at 0.40. (Photopeak energy at 140 keV*.)

For **I-131**, the **THRESHOLD** dial should be calibrated to 100 keV/turn and set at **3.44**. The WINDOW dial is set at 0.40. (Photopeak energy at 364 keV*.)

(2) 10 keV/turn:
For **Am-241**, the **THRESHOLD** dial is calibrated to 10 keV/turn and set at **5.00**. The WINDOW dial is set at 2.00.

For **I-125**, the **THRESHOLD** dial should be calibrated to 10 keV/turn and set at **1.70**. The WINDOW dial is set at 2.00. (Photopeak energy at 27 keV.* Note that this window setting may not include the full contribution from the 31 and 35 keV photopeaks.)

(3) 200 keV/turn:
For **Co-60**, the **THRESHOLD** dial is calibrated to 200 keV/turn and set at **6.55**. The WINDOW dial is set at 0.20. (Photopeak energy at 1.33 MeV.)*

For **Co-60**, the **THRESHOLD** dial is calibrated to 200 keV/turn and set at **5.75**. The WINDOW dial is set at 0.20. (Photopeak energy at 1.17 MeV.)*

NOTE: *A peak check is recommended when switching from one isotope to another. Minor voltage adjustments may be necessary.*

*REFERENCE: *Shareware Radiation Decay – Emission Tables and Spectra by Charles Hacker, Version 2: March 1997. Initial program written by Grove Engineering, based upon RSIC data.*

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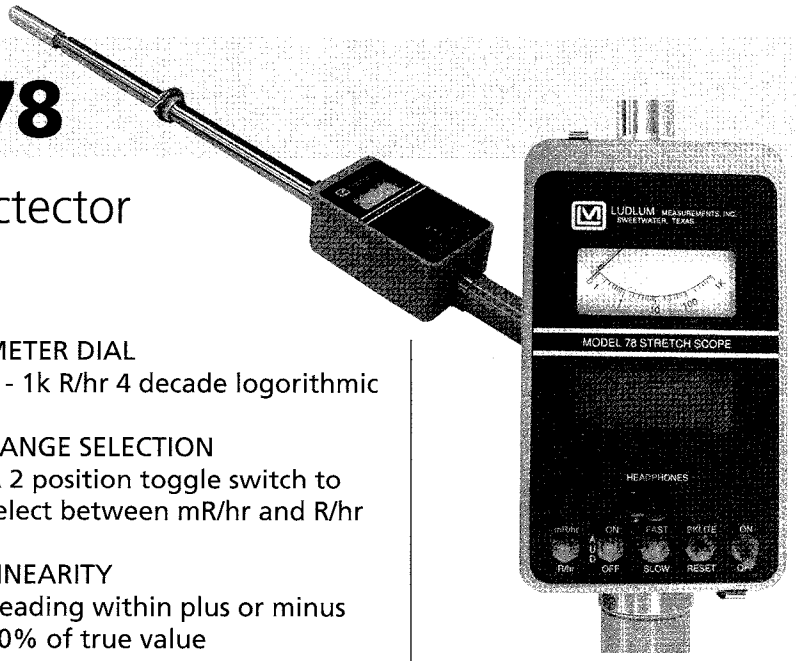
Model 78

Telescoping Dectector



INDICATED USE
High activity gamma survey with telescoping detector

WORKING ENVIRONMENT
Splash proof shields for outdoor use

DETECTORS
Two energy compensated G-M tubes

ENERGY RESPONSE
Within plus or minus 15% of true value from 60 keV - 3 MeV

DISPLAY
4 digit LED display with 0.5"(1.3cm) digits and separate range indicators, and low battery

DISPLAY RANGE
000.0 - 9999 with indicators of mR/hr and R/hr

BACKLIGHT/RESET
Temporary action 2 position toggle switch to turn backlight on for predetermined time frame or zero meter and display

METER DIAL
0 - 1k R/hr 4 decade logorithmic

RANGE SELECTION
A 2 position toggle switch to select between mR/hr and R/hr

LINEARITY
Reading within plus or minus 10% of true value

AUDIO
Built in click-per-event audio with ON/OFF switch

RESPONSE
Dependant on number of counts present. Typical times FAST 4 - 25 seconds, or SLOW 4 - 60 seconds from 10% to 90% of final reading

POWER
2 each "D" cell batteries (housed in sealed handle)

BATTERY LIFE
Typically 250 hours with alkaline batteries (battery failure indicated on display)

METER
3" (7.6cm) arc, 1 mA analog type

CONSTRUCTION
Aluminum housing with beige polyurethane enamel paint, and polished stainless steel telescope assembly

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
7"(18 cm)H X 4"(10.1 cm)W X 45"(114 cm)L retracted; 156" (396.2 cm)L fully extended

WEIGHT
6.4 lbs(2.9 kg) including batteries