There were nine women from five different counties and so many assorted cowboys that they couldn't get in the store and still have room for the band which consisted of George Edwards and his fiddle, occasionally supported by jangling trace chains, a hanging clevis and a hooting jug which changed tone as the level of the contents got steadily lower. John Garrison had a hole burned in his boot and exchanged boots and dancing partners with Rollie Burns after each set. A good time was had by all at the Christmas Ball, March 10, 1882.

Jeff Carroll, LEGENDARY TEXAS

From The Trenches

with David Wyatt

Instrument Trouble Shooting and Helpful Hints

SINGLE CHANNEL ANALYZER CALIBRATION TECHNIQUES

March 1994

Single channel pulse height analyzer (SCA) energy calibrations can sometimes be confusing or even misleading if calibrated incorrectly. Unlike the MCA (Multichannel Analyzer), the SCA's do not usually incorporate a monitor to display the radiation energy spectrum; therefore when calibrating (sometimes referred to as "peaking") a SCA and detector for a specific isotope photo peak, it helps to visualize the anticipated isotope energy spectrum(See figure 1 &2). For discussion we will use a Ludlum Model 2200 Scaler/Ratemeter/SCA and the Model 44-10 2" X 2" NaI Scintillation Detector, but the same principle will also work for a proportional detector. Since ^{137}Cs produces the most familiar energy spectrum, we will use it for the SCA peaking example.

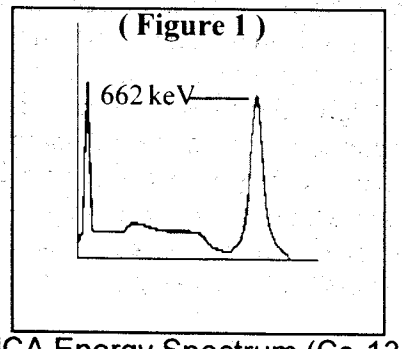
The three adjustable parameters encountered on most SCA's are - the lower pulse height discrimination level referred to as the THRESHOLD (THR) - upper pulse height level referred to as the WINDOW (WIN) - detector operating voltage referred to as HV (High Voltage). The HV varies the pulse(s) amplitude from the detector. The THR and WIN adjustments establish the narrow counting window in which the pulses of interest are to be counted. The object of calibrating the SCA and the detector by varying the high voltage is to position the majority of the pulses of interest (photo peak) within the counting window.

Calibration Procedure:

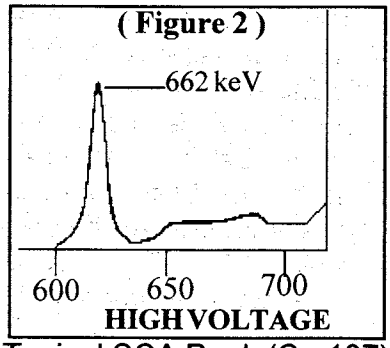
Determine the counting window width for the isotope. The THR and WIN controls on the Model 2200 utilize 10 turn dials which may be used to correlate directly to the energy level of the isotope. For ^{137}Cs we will use a 40 keV counting window - the THR setting should be 642 and the WIN setting should be 040. Select the WIN "OFF" position to disable the upper pulse height level. Select the most sensitive ratemeter range (X1 for the M2200). Adjust the HV to approx. 450 volts. While observing the ratemeter, increase the HV until a sharp increase in count rate is observed with the source positioned near the detector and note the HV dial setting*. The point where the ratemeter starts to increase is the photo peak leading edge region (see Fig. 2). Switch the WIN "IN" and slowly increase the HV until the ratemeter starts to decrease - note HV dial reading. This is the trailing edge of the photo peak illustrated in Fig. 2. Decrease the HV until the "peak" count rate is observed on the ratemeter. The HV dial reading should be near center between the two indications in the above previous steps.

*In studying the illustration in Fig. 2, it should noted that if the HV is increased just a few increments beyond the point where the ratemeter just starts to respond, the photo peak can easily be passed up and the counting window could be centered on one of the backscatter peaks or possibly the 32 keV x-ray peak. Once the count rate starts, it may be more convenient to decrease the HV dial a few increments before switching the window "IN" to ensure that the photo peak is not passed up.

Some of the parameters that will affect the instrument response to the energy calibration are - window width, detector resolution, activity of the radiation source, and detector's efficiency to source activity.

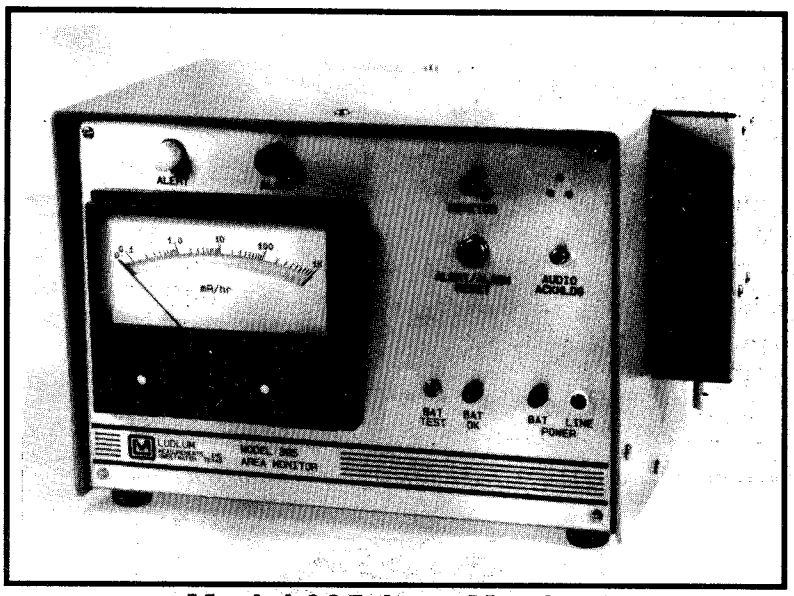


MCA Energy Spectrum (Cs-137)



Typical SCA Peak (Cs-137)

NEW! NEW! NEW! MODEL 395 AREA MONITOR March 1994



Model 395 Area Monitor

The Ludlum Model 395 is a general purpose log ratemeter for area and source position monitoring. Radiation units are displayed on a four decade logarithmic count ratemeter. Geiger-Mueller (G-M), scintillation, and sealed proportional detectors may be used with the M395. A wide range of external mounted G-M type detectors are available which mount to the M395 cover.

The log ratemeter incorporates dual setpoint alarm pointers which initiate an alarm condition when the meter pointer increases above the preset alarm. The alarm annunciators consist of a yellow lamp for the first level alarm (ALERT) and both visual (red lamp) and audible annunciators for the second level alarm (ALARM). Both alarms can be latching or non-latching. A MONITOR LED is used to indicate system failure such as AC power loss, detector failure or an alarm condition.

Form "C" relay contacts for the Alert, Alarm, and Monitor status are available via the 9 pin RELAY OUT connector on the rear panel for remote applications.

An adjustable regulated high voltage (HV) power supply provides operating voltages from 400-1500 VDC. Detector Overload deflects the meter to full scale in the event that the detector is exposed to a saturated radiation field.

Other features include Audio Acknowledge (AUDIO ACK), battery status LED (BAT OK), and power "ON" indication lamps. A 14-pin MS style connector is located on the rear panel for connection of a remote monitor. A high voltage disable connection is available via the remote connector allowing the use of a door interlock to turn the detector off.

Optional accessories include a Model 295 remote monitor and connecting cables.

Model 395 Specifications

POWER: 115 volts, 50-60 Hz, less than 4 volt-amperes power consumption.
BATTERY: 6 volt Gel-Cell for standby power only. Battery life is approx. 16 hours in alarm condition, 160 hours in non-alarm condition.
BATTERY CHARGER: Built-in charger that operates when the instrument is connected to AC power, and the power switch is in the ON position.
DETECTOR: G-M, sealed proportional and scintillation detectors.
METER: 4-decade logarithmic type.
RANGE: 0 - 1,000 mR/hr (detector dependent).
ALARMS: Yellow lamp for the first level alarm (ALERT), red lamp and audible tone via unimorph speaker for second level (ALARM); audible alarm registers 90 db @ 1 ft. or 84 db @ 1 meter.
OVERLOAD: A detector current sensing circuit to provide alarming condition if the detector is in a high radiation field causing count rate circuit paralysis. Activation of this circuit drives the meter to full scale, activating both alert and alarm conditions.
ACKNOWLEDGE: Push to turn audio alarm OFF without changing status.
BAT TEST: Push button for battery check.
RESET: Resets alarm and alert, but has no affect on meter reading.
PILOT: Two red lamps indicating that power is ON. Line lamp is on with AC power supplied. If AC fails, BAT lamp illuminates.
MONITOR: A green lamp on the front panel which is activated when AC power is on, a minimum count rate is present and both alarm and alert are turned OFF.
CONNECTOR: Series "C" standard. Other types are Available.
HIGH VOLTAGE: Externally adjustable from 400 to 1500 volts
RECORDER OUTPUTS: Adjustable from 0-1 volt, 1mA load maximum, output - pin A and B of the REMOTE connector.

Continued on next page

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REMOTE OUTPUT: 14 pin MS style connector interfacing remote monitor(s); outputs are: Alarm, Alert, Monitor relays; Reset, HV disable, Audio Acknowledge, and Recorder output.
RELAY OUT: Three Form "C" relay contact corresponding to the Alert, Alarm, and Monitor status; contacts rated @ 2 amps - 28 VDC or 120 VAC.
SIZE: 18.8cm (7.4") W x19.6cm (7.7") H x 26.67cm (10.5") L, exclusive of handle.
WEIGHT: 4.8 kg (10 pounds)

MODEL 395 SERIES PRICING INFORMATION

MODEL	LINEAR RANGE	COUNT RATE	Price
395 less Detector	N/A	N/A	$ 745.00
44-38	0.2-200 mR/hr	18 pulses/sec/mR/hr	$ 125.00
	(The following units include detectors)		
395/2	0.01-100 mR/hr	17.5 pulses/sec/mR/hr	$ 840.00
395/4	0.1-1000 mR/hr	2 pulses/sec/mR/hr	$ 840.00
395/6	1-10 R/hr	0.3 pulses/sec/mR/hr	$ 880.00
395/7	0.1-100 R/hr	0.07 pulses/sec/mR/hr	$ 880.00
395/8	0.1-1000 R/hr	0.012 pulses/sec/mR/hr	$ 945.00

LUDLUM MEASUREMENTS, INC.
P.O. Box 810
Sweetwater, Tx 79556

Forwarding & Address
Correction Requested