

Log Survey Meter (LSM) Calibration Worksheet

Location: Radiation Protection Calibration Facility at Site 38

Effective: February-2019 through July-2019

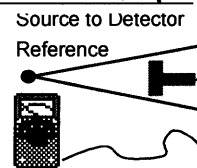
Serial# LSM004 Name JONATHAN GECHT Date 7.11.19
 Temperature AMB °F Humidity AMB % TPS# 7 DVM# 6 Detector# 4
 Last Known Location AD RAD SAFETY OFFICE

1. **Source Wipe:** As per RPIT source wipe procedure, wipe and record source# 90-0.1-109

2. **Battery Change:** Open case and change 9 volt alkaline battery.

3. **As Found Performance Check:**

In the LLCF, expose the detector to the following exposure rates. Record meter readings using the form below. The final readings and adjustments are to be recorded later.



As Found/Calibration					
Source	Distance	Exposure Rate	mR/hr Meter Reading		
			As-Found	Final	Tolerance
137-4.5-1	220.7	2 mR/hr	1.8	SAME	1.8 - 2.2
137-4.5-1	139.5	5 mR/hr	4.9		4.5 - 5.5
137-4.5-1	98.5	10 mR/hr	10		9.0 - 11.0
137-4.5-1	69.9	20 mR/hr	20		18 - 22
137-5.6-3	163.2	50 mR/hr	50		45 - 55
137-5.6-3	115.4	100 mR/hr	100		90 - 110
137-5.6-3	81.7	200 mR/hr	195		180 - 220
137-5.6-3	51.8	500 mR/hr	500		450 - 550
137-5.6-3	36.7	1000 mR/hr	1000		900 - 1100
137-5.6-3	26.1	2000 mR/hr	2000		1800 - 2200

If any of the above As-Found readings are out of tolerance the PCN system must be invoked.

4. **Overload Test:** Expose the instrument to a 4R/hr field with the 137-5.6-3 source at a distance of 18.6 cm. Meter must not drop below full scale. Remove the instrument from the 4R/hr field. Meter must return to background in <2 minutes.

5. **Physical Inspection:** Move instrument to a technician bench and physically inspect the outside and inside of instrument for damage, loose or broken connections, etc. and repair any problems found.

6. **Clean Instrument:** Clean the entire outside of the instrument using a mild cleaner and paper towels "KayDry". Remove all extraneous tape, calibration labels, etc., from the instrument.

7. **Electronic Checks:** Using the form below, record the information as required following the procedures in a - e.

- a. Set the function switch in the OFF position. Mechanically zero the meter (*Meter must read 2*) by opening the case and accessing the rear zero adjustment screw if needed. (*If mechanical zero is adjusted, the final calibration must be completed after the electronic checks*) Record results.
- b. Set the function switch to the BAT. position. Observe and record the meter reading.
- c. Using a DVM measure and record the low voltage power supply at the +5V test point.
- d. Using a DVM measure and record the low voltage power supply at the -5V test point.

		As-Found	Final	Adjust	Observe	Tolerance
a.	Meter Zero	1.9	2	meter	meter	2
b.	BAT OK	7200	SAME	N/A	meter	>200
c.	+5 volts	5.02	↓	N/A.	DVM	4.9 - 5.1
d.	-5 volts	-5.08	↓	N/A.	DVM	-4.9 - -5.1

- e. Set the function switch to ON w/spkr. Hold the probe in the check source alignment frame. Meter must go above 2. Clicking from speaker must be heard. Set the function switch to ON. Clicking must no longer be heard. Remove probe from check source. Meter must drop below 2.

8. Calibration:

- a. Were all tolerances to this point for both radiation and electronic checks within the specifications stated? Select one. Yes. Go to step 8.b. No. Go to step 8.d.
- b. Were any adjustments made? Select one. Yes. Go to step 8.d. No. Go to step 8.c.
- c. To indicate no adjustments were made, write the word *same* under the final column in each table. Go to step 9.
- d. Using the form in step 3, complete the information needed under the column final. Make adjustments as needed. (If after adjustments, meter readings are still unacceptable proceed to step 12 LSM setup)

9. Check Source Measurement:

- a. Place the detector in the check source alignment frame. Record the reading. 6 mR/hr
- b. Subtract 20% from the reading in 9.a and record. 5 mR/hr (If needed, round up measurement for ease of reading)
- c. Add 20% to the reading in 9.a and record. 7 mR/hr (If needed, round down measurement for ease of reading)
- d. Remove old **CHECK SOURCE READS** label and attach a new one to the side of the instrument. Record measurements in 9.b. and 9.c. on the label.

10. Label Change:

Place new calibration label on the instrument. Record the information needed in the spaces provided. This instrument is due for calibration every twelve months.

11. Comments:

Attach any comments to this page.

12. LSM Setup:

Use this section only if the source calibration is out of tolerance.

- a. Set the function switch to the ON position. Set the TPS to 100 seconds and connect the input to the LT test point on the RP312 board. Expose instrument to a 2 mR/hr field. Press the reset button on the TPS. Make 5 100 second runs and record the results. Add the 5 numbers and divide by 500 to calculate the average one-shot counting rate in hertz. Record the total/500 number in the table below.

Run #1	Run #2	Run #3	Run #4	Run #5	Total	Total/500

- b. Mechanically zero the meter (Meter must read 2) by opening the case and accessing the rear zero adjustment screw if needed. Record results.
- c. Apply a pulser signal from a TPS (≤ 50 uSec, F= step 12 a.) to the chassis probe connector, and adjust the REF pot. for a meter reading of 2 mR/hr.
- d. Remove pulser and short CAL TC test points together. Perform *iterative* adjustments at the indicated exposure rates. (High voltage adjustment is located in the probe. Disassemble using step e. If adjustments cannot be brought into tolerance, set HV to 525 and repeat step d, otherwise instrument must be repaired.) Remove short from CAL TC test points.
- e. Remove 4 screws from probe face and open probe. Using a DVM and high voltage probe measure and record the high voltage at the center pin on the GM tube. Reassemble probe.

	Source	Distance	Exposure Rate	As-Found	Final	Adjust	Tolerance	200 mR/hr Note:
a.	137-4.5-1	220.7	2 mR/hr	Hz	Measured w/TPS		N/A	200 mR = 180 Decrease HV until 2K=1.8K Increase Span until 2K=2K Recheck 200mR/hr
b.	Meter Zero	N/A	N/A			meter	2	
c.	2mR/hr Pulse	N/A	N/A			REF	2 mR/hr	
d.	137-4.5-1	220.7	2 mR/hr			REF	1.9 - 2.1	200 mR = 220 Increase HV until 2K=2.2K Decrease Span until 2K=2K Recheck 200mR/hr
	137-5.6-3	26.1	2000 mR/hr			SPAN	1900 - 2100	
	137-5.6-3	81.7	200 mR/hr			H.V.	190 - 210	
e.	High Voltage	N/A	N/A			N/A	N/A	

*when measuring the HV use a 1000 megohm high voltage probe and a DVM with an input impedance of 10^7 ohms.

- f. Return to the step that brought you to step 12.

Reviewed By: 

Date: 7-6-19

Sources and instruments used for this calibration are traceable to National Institute of Standards and Technology

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