

GASTON COUNTY, NC

**LUDLUM MODEL 52-1-1
PORTAL MONITOR
GUIDANCE**

**This guidance can be altered and modified when
needed for specific conditions and situation**

**In support of North Carolina Emergency Response Plans
for Catawba and McGuire Nuclear Sites**

**On line edition of guidance is current
for the nuclear plan**

Prepared by:

Gaston County Office of Emergency Management

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LUDLUM MODEL 52-1-1 PORTAL MONITOR OPERATING GUIDANCE

Ludlum Model 52-1-1 Portal Monitor(s) are provided by the North Carolina Division of Emergency Management for use where suspected contamination may have occurred and large numbers of the public or emergency workers may have been affected.

I. RESPONSIBILITIES

- A. The County Emergency Management agency's listed in Attachment 1 are responsible for storage,
- B. Assembly and Operation of the monitor(s) will be the responsibility of the monitoring teams at the Radiological Monitoring and Decontamination locations assigned this equipment.
- C. Personnel assigned to monitoring duties will be responsible for assuring that the Portal Monitor Survey Form is **completed for each evacuee found to be contaminated** prior to their release from the monitoring station.

II. GENERAL

The Ludlum Model 52-1-1 Portal Monitor is used for Beta/Gamma personnel contamination monitoring and meets FEMA standard for Emergency Response Portal Monitoring (FEMA REP-21). It is designed to be disassembled for ease of transportation and storage, and can be assembled in 5 minutes or less without tools. All parameters are stored in non-volatile memory which requires no battery back-up. The parameters are pre-set at the factory to detect a 1.0 μCi Cs 137 Beta source in accordance with the FEMA standard. The Model 52-1-1 can be operated from 85-250 VAC 50/60HZ source without a voltage selector switch or 3 "D" cell batteries (Battery life is approximately 24 hrs).

The portal frame incorporates four large plastic scintillation detectors with a total volume of 672 cubic inches. Audible signals accompany the LEDs for additional indication. Detector counts, background, and all parameters may be viewed on the LCD display.

The instrument has a person counter integrated into the electronics that increments by one every time a count is completed. It also has a RS-232 port that can be used to print out parameter set points, background counts, and counts above background.

The Ludlum Model 52-1-1 incorporates a summing alarm which increases the systems sensitivity to widespread contamination. If two or more channels had a noticeable increase in counts but did not exceed their alarm threshold then the sum of their counts could exceed the summing alarm.

III. ASSEMBLY and CHECKOUT INSTRUCTION

A. Unit Assembly

The Ludlum Model 52-1-1 comes in a container that can be used for transport and storage. The segments and quantities that make up the system are:

- 1- Base
- 1- Bottom Right (Section **R1**)
- 1- Top Right (Section **R3**)
- 1- Bottom Left (Section **L1**)
- 1- Top Left (Section **L3**)
- 1- Top Section
- 1- Electronics Section
- 1- Power Cord

Open the case and visually inspect make sure that you have all the above pieces. (Base section will have to be removed to view all sections.)

The Ludlum Model 52-1-1 can be assembled without tools. All connections are made with latches. To connect a latch, lift up the bottom tab, hook the top cross bar into the hook on the piece that you are attaching and then push the tab back down until it snaps into place. To unlatch, lift up the tab and unhook the top cross bar.

Refer to Figure 1 - Ludlum Model 52-1-1 Assembly Drawing for the following assembly.

NOTE

Left side will have the electronics module attached – insure this side is faced toward the operator location.

1. Set the **BASE** on the ground with rectangular tubes facing up.

CAUTION

Latches can snap closed or spring open violently causing pain or injury.

When assembling sections be careful not to pinch the skin of the hand between parts being assembled.

2. Insert the male end of **RIGHT** side section **R1** into the female side of the Base marked **RIGHT** and attach the latches. The detector screens must be facing toward the middle (inside) of the portal.
3. Insert the male end of **LEFT** side section **L1** into the female side of the Base marked **LEFT** and attach the latches. The detector screens must be facing toward the middle (inside) of the portal.

4. Insert the male end of **RIGHT** side section **R3** into female end of section **R1** and attach the latches. The detector screens must be facing toward the middle (inside) of the portal.
5. Insert the male end of **LEFT** side section **L3** into female end of section **L1** and attach the latches. The detector screens must be facing toward the middle (inside) of the portal.
6. Insert the **TOP** into the tops of the side sections and attach the latches. The top can be installed in either direction. It does not matter which end goes to the right.
7. If you have 120 line voltage available, plug the **POWER CORD** into the connector on the bottom of the Electronics marked INPUT. If no 120 line voltage available, install 3 “D” Cell Batteries into the battery compartment. The Power Cord and Batteries may both be installed at the same time, but the Ludlum Model 52-1-1 **does not** charge the batteries.
8. Plug the **ELECTRONICS** section onto the back of section **L1** with the blank end facing up.

WARNING

DO NOT FORCE THE ELECTRONIC UNIT ONTO THE LEG SECTION – THIS WILL DAMAGE THE ELECTRONIC CONNECTIONS AND PUT THE UNIT OUT OF SERVICE.

- a. Make sure to engage the black connector pins **FIRST**.
 - b. Make sure that the pin in the back of L1 goes into the hole on the Electronics section.
 - c. Then close the latches.
9. **Place protective paper or plastic** (.5mm thickness) covering over the base-plate of the monitor to protect the metal frame from contamination. This covering should be replaced as needed due to wear or contamination.
 10. **Measure six (6) feet from the edge of base plate** and mark a line with tape or other means. Keep all persons to be monitored behind this line while someone is being scanned by the portal monitor. This distance will help keep any background effect from contaminated individuals to an acceptable level.
 11. Proceed with Operations Checkout. (Operations checkout is required prior to any personnel monitoring activity.)

B. OPERATIONS CHECKOUT

To ensure the unit is functioning correctly, an operational check must be performed before starting monitoring activity. This check verifies that the unit is turned on, the settings are appropriate and the system will alarm when the detectors are exposed to radiation above background level.

1. Turn ON the POWER switch located on the bottom of the Electronics and allow the instrument to update the location background count. This mandatory update takes approximately one minute during which the yellow UPDATING status LED will flash and the alarm will sound.
2. The new background data is compared to the low and high background setpoints programmed into the unit. If the setpoints are exceeded, the red INSTRUMENT FAILURE status LED will illuminate and an alarm will sound. The unit will continue to attempt to update the background data until the alarm condition is corrected, either by the background count going down (below programmed parameters) or repair/replacement of the failed detector is accomplished.

NOTE

High levels of external radiation can cause the INSTRUMENT FAILURE alarm.

3. The green ENTER/CHECKING status LED will illuminate when the background update is successfully completed. When this LED illuminates **each of the detectors must be tested with an approved check source included in the unit case.**
4. **Holding the check source in proximity to the detector,** step into the center of the portal. When the **IR beam is broken,** the green ENTER/CHECKING status LED will flash and the alarm will beep once. When the count time is complete, the red RADIATION ALARM status LED will flash and the alarm will sound. The LCD readout will provide the numerical indication of radiation on the appropriate sensor (LT / RT / LB / RB).
5. **The alarm check must be accomplished for all four (4) sections to confirm the unit is functioning.**
6. **Once the alarm check is accomplished for each of the sections, the check source must be passed through the CENTER of the portal at the following heights (approximate) and verify that the alarm is triggered each time.**

1.5 feet (Knee Level)

3 feet (Waist Level)

4.5 feet (Chest Level)

7. If the portal monitor fails any of the tests, contact the local Emergency Management agency for further instructions.
8. If the above operational tests are successfully passed then the portal monitor is considered operational for personnel scanning activity.

C. **INDIVIDUAL SCANNING OPERATIONS**

This section provides information on use of the portal monitor to scan individuals for radiation contamination. Refer to Figure(s) 3 4, and 5 for views of the Front Panel and Top and Bottom of the Electronics Section.

Note

Background Subtract has been activated on the portal monitor. If a background addition is required and directed by North Carolina Radiation Protection, the North Carolina Division of Emergency Management will provide specific instructions to the operator to modify the instrument parameters.

1. The Green **ENTER/CHECKING** status LED must be lit in order to use the instrument. If the yellow **UPDATING** status LED is on, the system should not be used and all people to be checked should remain at least 6 feet away until the Green **ENTER/CHECKING** status LED comes back on.
2. Have the person to be monitored step into the center of the monitor insuring they break the infrared beam. The Green **ENTER/CHECKING** status LED will start blinking to indicate the portal is now surveying. A soft, low-pitched beep will also occur.
3. The Yellow **INCOMPLETE** light will come on and a soft, low-pitched beep will occur if the person being monitored steps out of the monitor before the survey is complete. Should this occur have the subject reenter the portal monitor as described in Step 2 and remain until monitoring is complete.
4. When the count is complete, the Green **ENTER/CHECKING** status LED or the Red **RADIATION ALARM** status LED will flash and soft, low-pitched beep will occur.
 - A. Green **ENTER/CHECKING** status LED illuminated
 - 1) Have the individual proceed to the Registration Desk.
 - B. Red **RADIATION ALARM** status LED illuminated
 - 1) Record the numerical radiation indications for each sensor (LT / RT / LB / RB) on the Portal Monitor Survey Form
 - 2) Have the individual proceed to the Decontamination Area for decontamination and re-monitoring.

IV. RETURNING THE PORTAL MONITOR TO SERVICE

- A. When monitoring functions have been completed turn the instrument **OFF** and **DISCONNECT** the power cord. The portal monitor should then be wiped down with a damp cloth (using **WATER ONLY** as the wetting agent) prior to repacking. Instrument should be disassembled in reverse of the assembly instructions (Para III A. and Figure 1) and packed in the storage/transfer case according to Figure 2. The monitor should be returned to the county emergency management office with notation of any problems that may have occurred with the equipment.

- B. If any problems were noted the county emergency management office should immediately notify the N. C. Division of Emergency Management REP Program Manager.

REP Program Counties

Eastern Branch

Brunswick County
New Hanover County

Central Branch

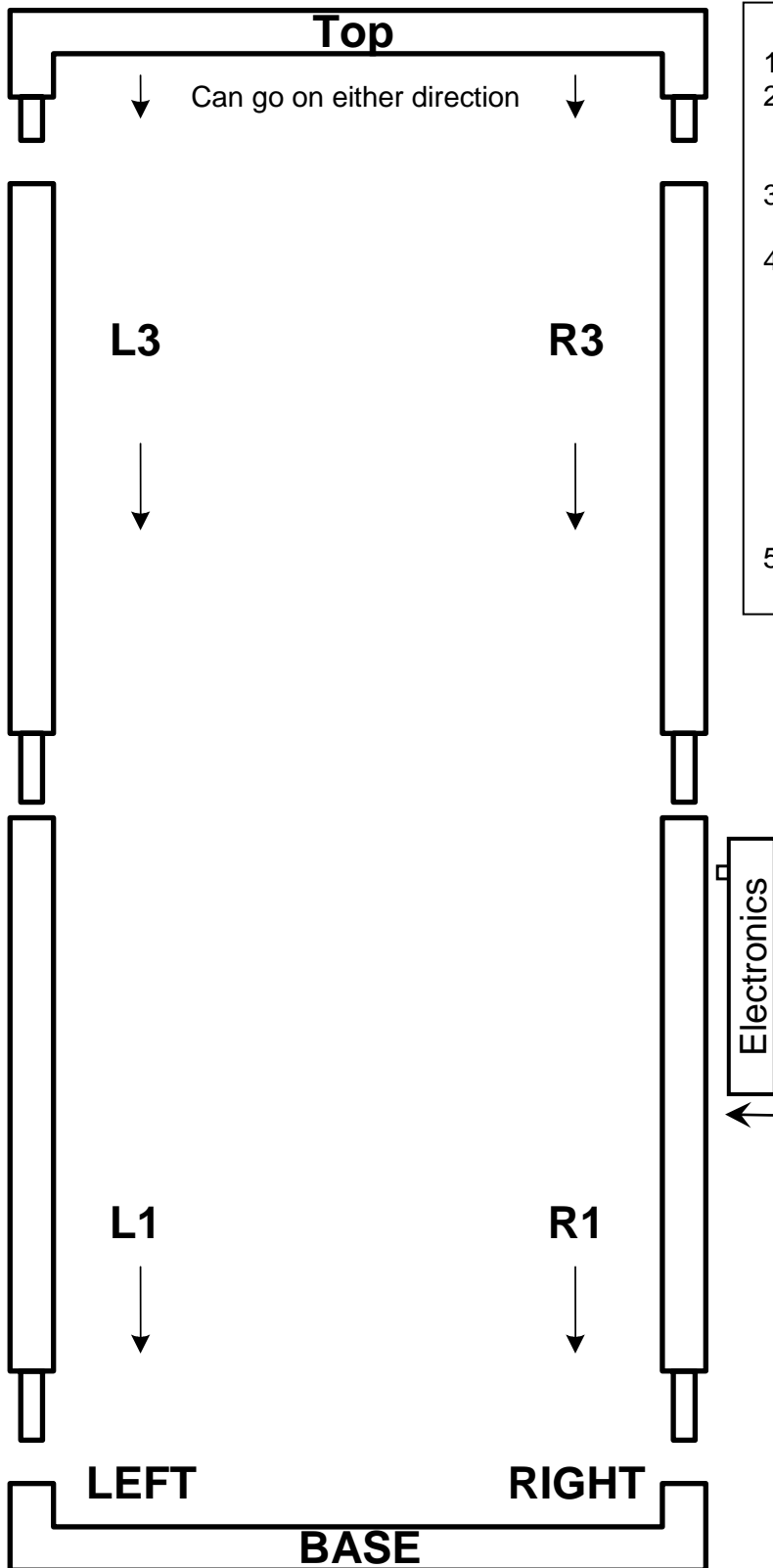
Wake County
Chatham County
Harnett County
Lee County

Western Branch

Catawba County
Iredell County
Lincoln County
Gaston County
Mecklenburg County
Cabarrus County (H)
Cleveland County (H)
Union County (H)

(H) = Host County

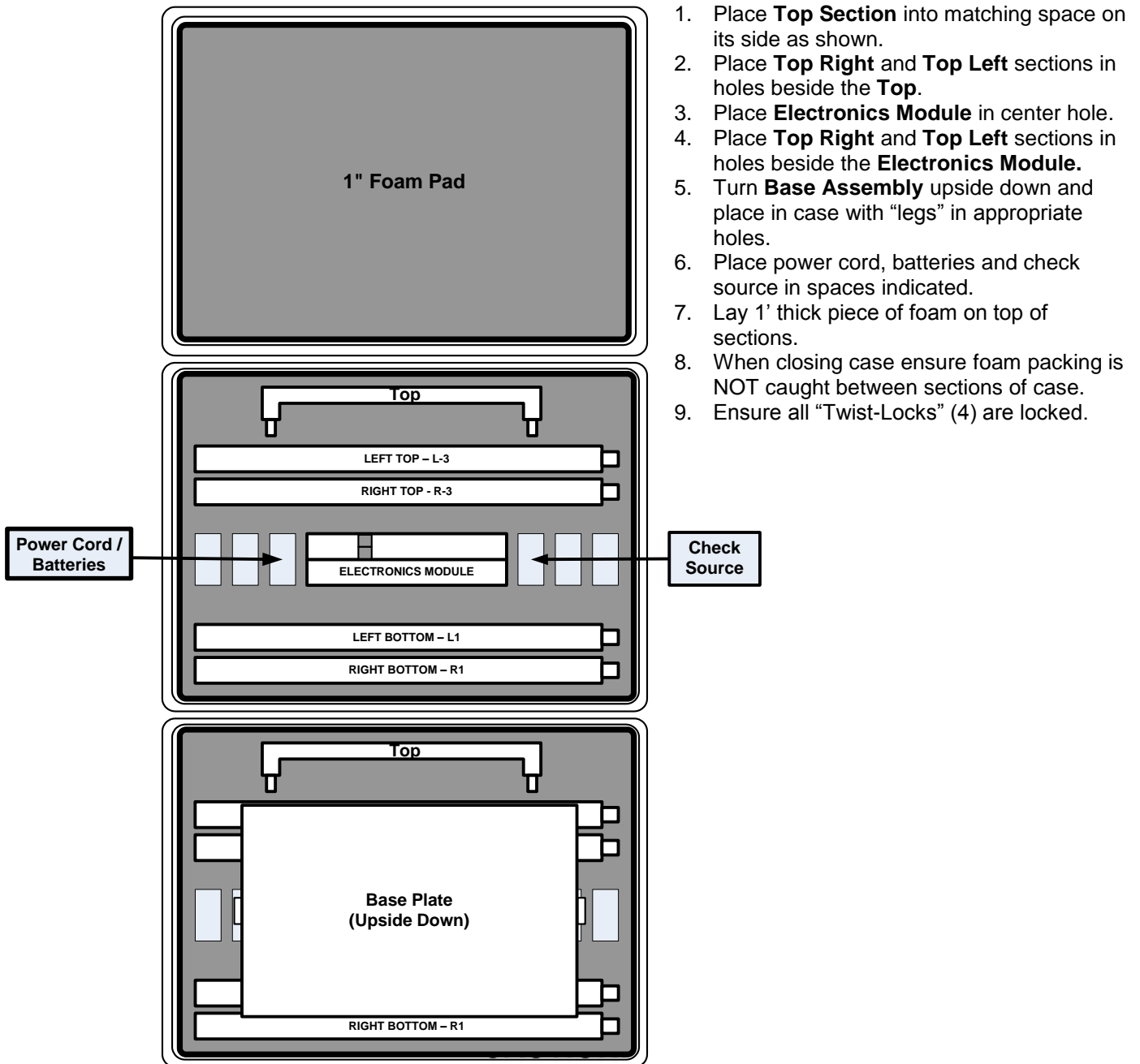
Ludlum Model 52-1-1 Portable Portal Monitor



- Assembly Instructions**
1. Install Batteries in Electronics Module.
 2. Attach power cord to Electronics Module. **Ensure module is turned OFF.**
 3. Attach Monitor Segments as shown. (Bottom to Top)
 4. Plug the **ELECTRONICS** module onto the back of section **L1** with the blank end facing up.
 - a. Make sure to engage the black connector pins **FIRST.**
 - b. Make sure that the pin in the back of L1 goes into the hole on the Electronics section. Then attach the latches.
 5. Turn on power switch - (located on bottom right of electronics module)

Figure 1 - Model 52-1-1 Assembly Instructions

Ludlum Model 52-1-1 Portable Portal Monitor



Due to weight of unit (100 lbs) lifting requires two (2) individuals

Figure 2 - Model 52-1-1 Packing Instructions

Ludlum Model 52-1-1 Portable Portal Monitor

FRONT

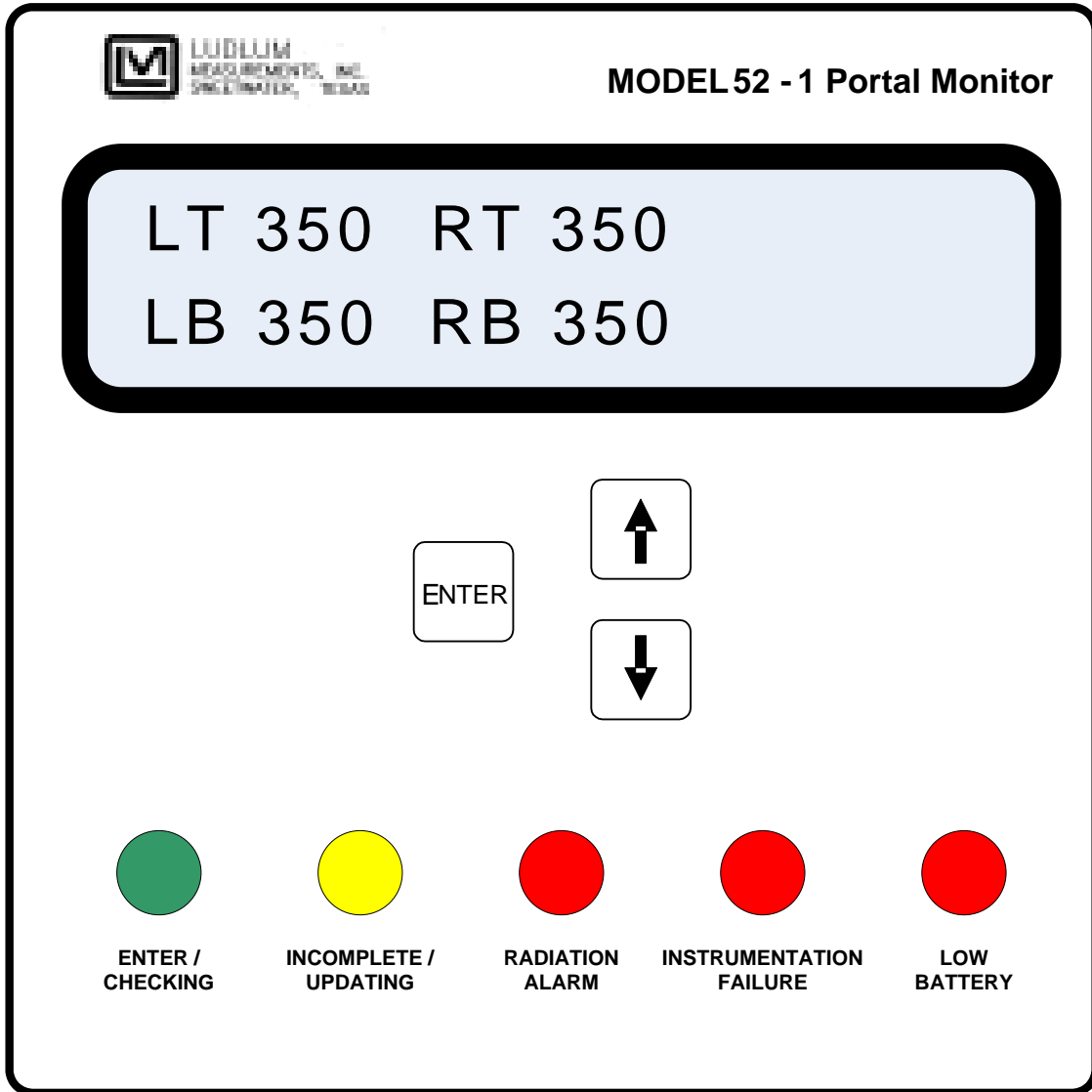
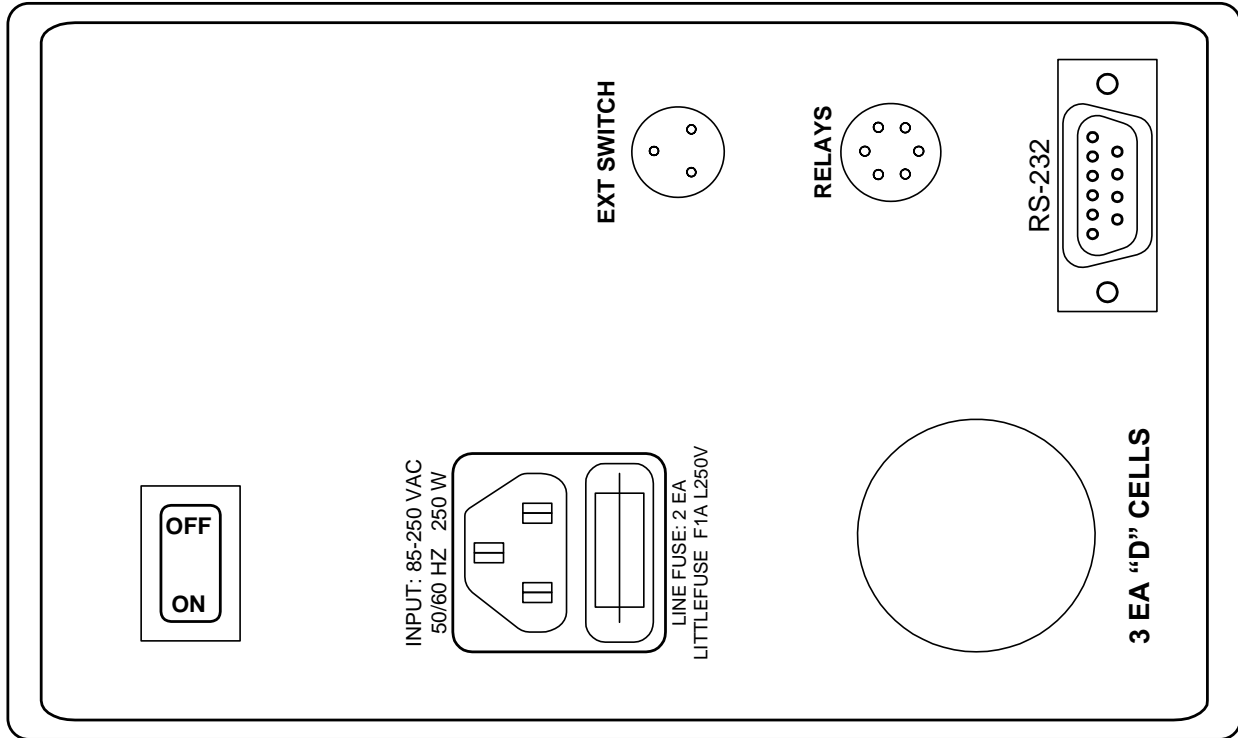


Figure 3 - Model-52-1-1 - Electronics Module Front Panel

Ludlum Model 52-1-1 Portable Portal Monitor

BOTTOM



BACK

(Connected to Segment L1)

Figure 4- M-52-1-1 – Electronics Module

LU DLUM MODEL 52-1-1 Survey Form

Name: _____

DOB: ____ - ____ - ____

Address: _____

Portal Monitor Serial # _____ Type Hand Held Instrument _____ Serial # _____

Hand Held Background Reading _____ mR/hr or CPM

<p>DIRECTIONS:</p> <p>1. The Green ENTER/CHECKING status LED must be lit in order to use the instrument. If the yellow UPDATING status LED is on, the system should not be used and all people to be checked should remain at least 6 feet away until the Green ENTER/CHECKING status LED comes back on.</p> <p>2. Have the person to be monitored step into the center of the monitor insuring they break the infrared beam. The Green ENTER/CHECKING status LED will start blinking to indicate the portal is now surveying. A soft, low-pitched beep will also occur.</p> <p>3. The Yellow INCOMPLETE light will come on and a soft, low-pitched beep will occur if the person being monitored steps out of the monitor before the survey is complete. Should this occur have the subject reenter the portal monitor as described in Step 2 and remain until monitoring is complete.</p> <p>4. When the count is complete, the Green ENTER/CHECKING status LED or the Red RADIATION ALARM status LED will flash and soft, low-pitched beep will occur.</p> <p style="margin-left: 20px;">C. Green ENTER/CHECKING status LED illuminated</p> <p style="margin-left: 40px;">1) Complete the Portal Monitor Survey Form</p> <p style="margin-left: 40px;">2) Have the person proceed to the Registration Desk.</p> <p style="margin-left: 20px;">D. Red RADIATION ALARM status LED illuminated</p> <p style="margin-left: 40px;">1) Record the numerical radiation indications for each sensor (LT / RT / LB / RB) on the Portal Monitor Survey Form</p> <p style="margin-left: 40px;">2) Have the person to proceed to the Decontamination Area for decontamination and re-monitoring.</p>	LT	RT
	LB	RB

If Individual being monitored indicates possible contamination, obtain the following information prior to going to Decontamination Area so their vehicle can also be monitored for contamination.

Color: _____ Type: _____ Make: _____ Model: _____

License Plate: State: _____ Number: _____

If Individual being monitored indicates possible contamination, see reverse of form for additional information

MONITORS NAME: _____ DATE OF SURVEY: ____ - ____ - ____

Decon Area

All contaminated individuals will shower No More Than Three Attempts

Post Decon - Portal Monitor

	Alarms Activated (Circle all that apply)				
1st Decon*	LT	LB	RT	RB	NONE
2nd Decon*	LT	LB	RT	RB	NONE
3rd Decon*	LT	LB	RT	RB	NONE

OR

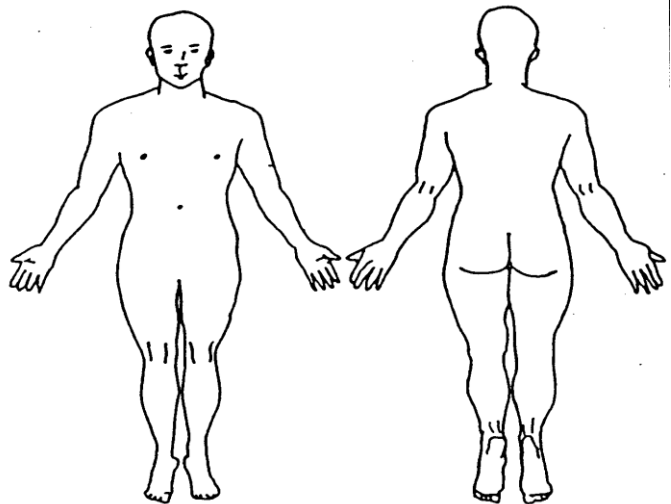
Survey Meter Readings (CPM)

Specific Body Part(L/R)	1 st Post Decon*	2 nd Post Decon*	3 rd Post Decon*
Thyroid			

_____ **Individual Decontaminated and Released to Shelter**

_____ **Individual Sent to Hospital Due To:**
 (✓ items that apply and circle contaminated areas picture)

- _____ **Injury**
- _____ **Thyroid > 300 CPM**
- _____ **Body Contaminated >300 CPM**



COMPLETED FORMS ON ALL PERSONS MUST BE RETAINED AT THE REGISTRATION DESK