



**SOR**

**Quick User's Guide  
for Autonomous Operation**

15-00079 Rev 1

# The SOR Series Electronic Dosimeter

## Welcome!

The SOR/R and its sister products (DMC 2000 X, XB, GN; SOR/RF, T) have been the industry standard in personal radiation protection for over a decade. In keeping with the Mirion Technologies goal of providing systems to protect people from nuclear risks, it is designed to provide superior measurement and alarm capabilities in a compact size.

## Packaged with this unit, you will find:

- A SOR series dosimeter.
- The SOR Quick User's Guide.
- A battery tool for easily removing the clip and battery cover.
- A reset tool for quickly resetting a powered down SOR.

## Important notes before going forward:

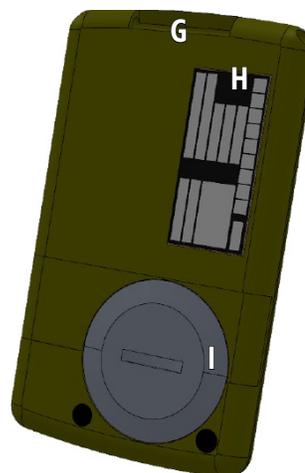
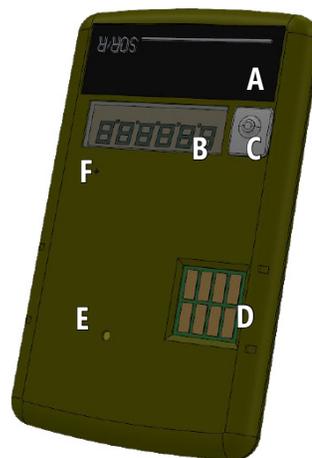
*Do not let the SOR battery completely discharge. The SOR will notify you when the battery needs changing. Letting the battery completely discharge can result in errors requiring additional hardware to reset.*

*Use only approved batteries in the SOR (see page 3). Other batteries may result in damage to the device.*

*Please note that there are no serviceable parts inside the SOR, and that tampering with the case or removing the warranty seal will compromise the waterproof and EMI resistant characteristics, and void the warranty.*

## Your SOR : At a Glance

- A. Product label, approximate location of the antenna for handsfree operation.
- B. 6-Character backlit display.
- C. Pushbutton for manual operation.
- D. ISO Connector for testing battery level and attaching accessories.\*
- E. Speaker.\* \*
- F. Location of detector; marked by a "+."
- G. Attachment point for optional belt clip or neck lanyard.
- H. Serial number and barcode label.
- I. Battery cover.



\* ISO connector not present on the SOR/RF.

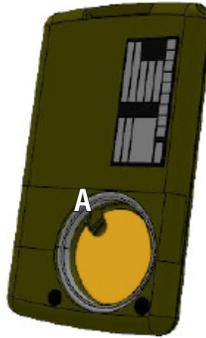
\*\* This is not a reset button. Do not insert foreign objects.

## Changing the battery on the SOR

**Note:** The battery on the SOR S should be changed when the "BA LO" or "DF BAT" warnings are displayed. Waiting until the dosimeter is completely dead can result in errors requiring reader hardware to reset.

1. Remove the clip. Using a small flat head screwdriver or similar tool, gently lift up the tab at the top of the clip and slide the clip assembly off the back of the dosimeter. Only a slight amount of pressure is needed.
2. Remove the battery cover. Using either a provided battery tool or a watch case wrench or similar tool, unscrew the battery cover.
3. Insert a Renata CR2450N or Toshiba 2450 battery in the battery compartment, with the positive plate flush against the speaker. (See *figure 1* for example.) Other brands have incorrect physical profiles and will cause short circuits and/or potential damage to the device.

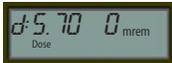
**figure 1:** Note the yellow insulator that should be present. The cutout portion of it should reveal the positive contact as shown at **A**.



4. Replace the battery cover, tightening it to hand-tight plus an additional  $\frac{1}{4}$  turn with the battery tool.
5. Replace the clip, sliding it in the rails on the back of the dosimeter until it clicks and locks into place.

## Pause\* Display Indications on the SOR

### # of button presses

0.	Pause: Dosimeter is effectively 'off,' awaiting further action.	
1.	Change: Start point for putting the SOR in run mode	
2.	Modif: Start point for modifying setpoints and parameters.	
3.	Serial Number of the SOR	
4.	Reset: Indicates whether dose is reset between uses.	
5.	Cumulative Dose received on last use.	
6.	Highest Dose Rate received on last use.	
7.	Amount of time the SOR was last in run mode.	
8.	Dose Alarm threshold. In this example, $5.92 \times 10^0$ , or 5.92, mrem.	
9.	Rate Alarm threshold. In this example, $9.9 \times 10^{-1}$ , or .99, mrem/h.	
10.	Displays what setting the audible chirp rate is set to.**	
11.	Indicates that the SOR is in autonomous mode.	
12.	External detector indication. (Unused placeholder value)	

\* Pause mode in the SOR is effectively "off." The SOR is never meant to be completely powered down.

\*\* 0 = off; 1 = chirp every 10 mrem; 2 = chirp every 1 mrem; 3 = chirp every 0.1 mrem; 4 = chirp every 8 counts (pulses); 5 = chirp every 4 counts; 6 = chirp every count.

**Note:** DMC 2000XB and DMC 2000GN models have additional displays and parameters for secondary channels.

## Setting Alarms for the SOR

Unless otherwise requested, your SOR comes factory set with nominal Dose and Rate alarm settings of 500 mrem and 100 mrem/h, respectively.

Notes on programming mode before altering the factory-set thresholds:

- A flashing **P** signifies Parameter Selection Mode, where you can choose which Parameter (Dose Alarm, Rate Alarm, etc) to change.
- A flashing **d** signifies Digit Selection Mode, where you can choose which digit of the selected parameter you'd like to change.
- A flashing **I** signifies Increment Selection Mode, where you can change the value of the selected digit.

1. Start in *pause\** mode.
2. Press the button twice to change the display to **Modif**.
3. Wait 2-3 seconds for the display to change to **Enter**. Press the button.
4. The SOR will enter programming mode, displaying the serial number.
5. Press the button once more, the display will say **P:RESET** with the **P** blinking.
6. While the **P** is blinking, press the button until you reach the setting to be changed.
7. Hold down the button until the blinking **P** becomes a blinking **d**.
8. Press the button repeatedly until the digit to be changed is blinking.
9. Hold the button down until the blinking **d** becomes a blinking **I**.
10. Press the button repeatedly until the desired value of the digit is reached.
11. Hold the button until the blinking **I** becomes a blinking **P** and return to step 6.
12. Once all settings are correct, wait 45 second for the SOR to return to *pause* mode.

*\*If you have a custom user display, it will take the place of **PAUSE** on the display when the SOR is in pause mode.*



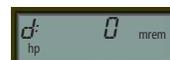
## Turning on the SOR

1. Start in *pause* mode.
2. Press the button once to change the display to **Change**.
3. Wait 2-3 seconds for the display to change to **Enter**.
4. Press the button once. After a beep and LED flash the unit will be in *run* mode.



## Run Display Indications on the SOR

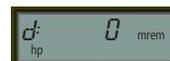
1. Dose display. (Default display)
2. Press the button once: Rate display.
3. Press the button once more: Returns to Dose display



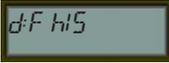
**Note:** Pressing and holding the button for more than 10 seconds while in run mode will show the current alarm settings.

## Turning off the SOR

1. Start in *run* mode.
2. Press and hold the button for 8-10 seconds. The display will change first to **Change** and then **Go Out**.
3. Release the button. The display will change to **Out**.
4. After a beep and LED flash the unit will be in *pause* mode.



## Key to Fault Codes on the SOR

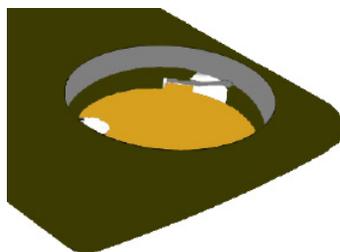
Display	Cause	Solution
	SOR is in <i>run</i> mode and the battery is nearly discharged. The BA LOX display indicates X hours life remaining.	-Change battery before the SOR loses power completely. -Verify the protective insulator is installed under the battery.
	SOR is in <i>pause</i> mode and the battery is near dead. The battery will die within 72 hours if the SOR remains in <i>pause</i> mode.	-Change battery before the SOR loses power completely. -Allowing the battery to completely discharge may result in further errors.
	Dosimeter is completely without power.	-Change battery. -Reset the dosimeter (page 8) -Contact MGPI for verification of device parameters.
	Missing bit/pointer in the histogram. Can occur when the battery is allowed to discharge completely before being changed.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	Loss of calibration factor data stored in the SOR's memory.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	Physical, internal problem related to the SOR's detection circuit; or missing/incorrect parameters related to detection.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	Problem accessing data saved in memory.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	Internal detector calibration data missing or corrupt, usually due to the battery being allowed to discharge completely before being changed.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	External detector calibration data missing or corrupted, usually due to the battery being allowed to discharge completely before being changed.	-Contact MGPI for verification of device parameters. -Requires additional hardware (reader) to clear.
	Fault in the component used for the pulse counting.	-Contact MGPI for verification of device parameters. -May require additional hardware (reader) to clear.
	Microprocessor hung between pause and run, usually resulting from the battery being allowed to discharge before being changed. Also potentially due to non-authorized battery types being installed.	-Remove the battery, inspect battery compartment for damage. -Reset using the battery reset tool. (page 8)

## Using the SOR Reset Tool

If the battery is not changed while in the "Ba LO" mode and a dead battery remains in the dosimeter for a prolonged period of time, the SOR might retain a slight charge and be non-responsive to a new battery. If this is the case, you can use the SOR reset tool provided with your purchase. If you do not have the reset tool handy, leaving the battery out of the SOR for 3-4 days will also sufficiently discharge the dosimeter to accept a new battery.

Open battery compartment (as indicated on page 3) and remove the battery. Then, remove the orange insulator. Insert the reset tool with the 'tongue' pointing into the cavity underneath the top-right quadrant of the threaded battery ring, between the soldered connection and the threaded ring (*figure 1, A*).

Lever the reset tool down. This should cause the tool to make contact with the appropriate part of the internal board, discharging the capacitor and resetting the dosimeter.



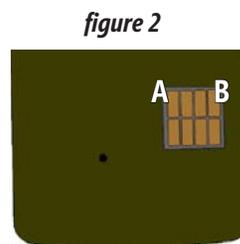
*figure 1: Newer models of the SOR series may have a different appearance. However, the reset tool should still be placed in the same location.*

Replace the insulator as outlined on page 3, *figure 2*. Insert a new battery, and attempt to power up the device. There may be error messages that require additional hardware to clear.

## Checking the Battery on the SOR

Using a voltmeter, you can measure the battery level on the SOR through the ISO connector on the front face. Simply place the leads at **A** and **B** shown in *figure 2*.

If the voltage is between 2.8V DC and 3.0V DC, the battery is still good. The battery should be changed, however, if the level is below 2.8V DC.



## Important Terms about the SOR

**Autonomous Mode** - The SOR is capable of being turned on and off through the use of a push button, also called "standalone mode."

**Battery Tool** - Stainless steel (*figure 1*) tool available from Mirion Technologies for removing the battery cover on the SOR . Mirion part number D20-2005.

*figure 1*



**Chirp Rate** - Setting that causes the SOR to occasionally "chirp" every time it reads a set quantity of radiation. Default turned off, can be adjusted with a reader and software.

**Dose** - The total amount of radiation measured by the SOR with in *run* mode. Displayed in mrem or mSv.

**Dose Alarm Threshold** - The dose set point at which the SOR will begin to alarm. The Dose alarm will continue past this amount until the SOR is reset.

**Dose Rate** - The intensity of the radiation being measured by the SOR in *run* mode. Displayed in mrem/h or mSv/h, configured at purchase or with a reader and software.

**Histogram** - A history file created by the SOR during each use, noting information such as dose received, alarms triggered, and any faults. Saved to the memory. Accessible with a reader and software.

**ISO Connector** - The gold panel on the front of the SOR, used as a connector for peripherals such as a transmitter. Also used for measuring battery voltage.

**Pause Mode** - Effectively "off," as the SOR is not measuring or tracking dose. Unless a custom display is requested, the display will read PAUSE. (*figure 2*)

*figure 2*

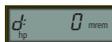


**Rate Alarm Threshold** - The rate set point at which the SOR will begin to alarm. The rate alarm will continue for as long as the measured rate is above this amount, and will cease once it falls back below it.

**Reader** - Refers to any hardware (LDM 220, LDM 210, LDM ) available from Mirion Technologies that is used to communicate with the SOR and alter settings and/or retrieve a histogram.

**Run Mode** - Also "active" mode, the SOR in run is actively measuring and tracking dose and rate. (*figure 3*)

*figure 3*



**Satellite Mode** - The SOR requires software and a reader to be turned on and off, and to access or change parameters.

## Mirion Technologies Contact Information

For problems with your SOR , or for additional information about its use, please contact Mirion Technologies at 770-432-2744.

Before returning any SORs to Mirion Technologies for repair, please contact us to receive a Return Materials Authorization.

For more information about this or any of our other products, contact us at:

### Americas

**Mirion Technologies (MGPI) Inc.**  
*5000 Highlands Parkway Suite 150  
Smyrna GA, 30082, USA  
Tel. 770-432-2744*

### Asia

**Mirion Commercial (Beijing) Co, Ltd.**  
*Shanghai Jiangchang Trading Branch  
Mr Ray Li - Sales Manager  
Tel. +86 137 0128 3132*

### Europe

**Mirion Technologies (MGPI) S.A.**  
*Route d'Eyguières, BP 1  
FR-13113 Lamanon, France  
Tel. +33 (0)4 90 59 59 59*

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