



DOSE-GARD[®]

OPERATION MANUAL



04401101-1TM Rev A July 29, 2008

**General Atomics Electronic Systems
4949 Greencraig Lane
San Diego, CA 92123**

©Copyright General Atomics Electronic Systems Inc. 2004 – All Rights Reserved

TABLE OF CONTENTS

| | |
|---|-----------|
| CHAPTER 1 INTRODUCTION..... | 4 |
| 1.1 CHAPTER OVERVIEW | 4 |
| CHAPTER 2 DOSE-GARD® OPERATION..... | 5 |
| 2.1 DOSE-GARD® BUTTONS | 5 |
| 2.2 DOSE-GARD® ON AND OFF | 5 |
| 2.3 DOSE-GARD® NORMAL MODE | 6 |
| 2.4 DOSE-GARD® DATA MODE | 6 |
| 2.5 DOSE-GARD® ALARM ACKNOWLEDGE MODE | 8 |
| 2.6 DOSE-GARD® ALARM SET POINT MODE..... | 9 |
| 2.7 DOSE-GARD® RESET MODE | 10 |
| 2.8 DOSE-GARD® TEST MODE..... | 10 |
| 2.9 DOSE-GARD® SERIAL NUMBER MODE..... | 11 |
| 2.10 DOSE-GARD® OFF MODE | 11 |
| 2.11 FLOW CHART REPRESENTATION OF MENU | 12 |
| CHAPTER 3 DOSE-GARD® ALERTS & DISPLAYS | 13 |
| 3.1 NORMAL DISPLAY & DOSE EFFECTS: | 13 |
| 3.2 ALARM ALERT: | 13 |
| 3.3 BATTERY LOW ALERT:..... | 13 |
| 3.4 CHAMBER CHARGE ALERT: | 14 |
| 3.5 ERROR ALERTS: | 14 |
| 3.6 FLOW CHART REPRESENTATION OF ALERTS:..... | 15 |

List of Figures

| | |
|--|----|
| Fig 2.1 Button Positions..... | 5 |
| Fig 2.3 Normal Mode Display | 6 |
| Fig 2.4 Data Mode Display | 7 |
| Fig 2.5 Alarm Acknowledge Mode Display | 8 |
| Fig 2.6 Alarm Set Point Mode Display | 9 |
| Fig 2.7 Reset Mode Display | 10 |
| Fig 2.8 Test Mode Display | 10 |
| Fig 2.9 Serial Number Mode Display..... | 11 |
| Fig 2.10 Off Mode Display | 11 |
| Fig 2.11 Menu Flow Chart | 12 |
| Fig 3.6 Alert Flow Chart..... | 15 |

CHAPTER 1

INTRODUCTION

This manual provides information on the DOSE-GARD[®] dosimeter. The DOSE-GARD[®] device is a microelectronic dosimeter that is used for personnel radiation monitoring. The DOSE-GARD[®] will provide an alarm if the accumulated dose is higher than the Dose Alarm Set Point stored in the DOSE-GARD[®].

1.1 CHAPTER OVERVIEW

This manual begins with the DOSE-GARD[®] device operation describing the basic attributes and operation.

Chapter 2 DOSE-GARD[®] Dosimeter Operation

This chapter provides user information for operating the DOSE-GARD[®] dosimeter. The focus is on the display menu and the use of the buttons on the front panel. The chapter also provides a handy menu flow chart to help understanding the menu, buttons, and alerts.

Chapter 3 DOSE-GARD[®] Alerts and displays

This chapter explains the beeping and display sequence when an alert occurs.

CHAPTER 2

DOSE-GARD® OPERATION

2.1 DOSE-GARD® BUTTONS

The two buttons, marked "M" and "S", below the dosimeter display (Figure 2.1) are used to operate the DOSE-GARD®. The button on the left is the MODE button "M" and the button on the right is the SET button "S".

The "M" button will toggle through the following modes: Normal Mode, Data Mode ("dAt"), Alarm Acknowledge ("AL-") Mode, Alarm Set Point Mode ("SPt"), Reset Mode ("rSt"), Test Mode ("tES"), Serial Number Mode ("SEr"), and Off Mode ("oFF").

The "S" button is used to enter the mode and execute its command.

See the section on each mode for detailed use of the two buttons.



Fig 2.1 Button Positions

2.2 DOSE-GARD® ON AND OFF

To turn the unit ON, hold the "M" button in until the display finishes counting down (5, 4, 3, 2, 1). While the DOSE-GARD® is in the off state, all data is saved within the dosimeter, but the alarm, display, and dose measurement are not functional.

2.3 DOSE-GARD[®] NORMAL MODE

Normal Mode is the main display (Figure 2.3) that will be displayed after exiting all other modes. The mode returns to Normal Mode after five seconds if neither button is pressed. The display shows the total accumulated dose in floating point Rem (Roentgen Equivalent Man) units. The range in Rem is 0.00 to 999, or in cSv (10^{-2} Sievert) 0.00 to 999 cSv.

For maximum accuracy it is recommended that the DOSE-GARD is reset to read 0.00 before use even if the display shows 0.00. This will assure that the internal accumulated dose is cleared.



Fig 2.3 Normal Mode Display

2.4 DOSE-GARD[®] DATA MODE

The DOSE-GARD[®] Reader Software or the DOSE-GARD[®] Calibration Software, and the IrDA interface are required to communicate with the dosimeter using the Data Mode . Refer to the appropriate DOSE-GARD[®] Software manual for installation and operation.

The DOSE-GARD[®] will need to be placed near the IrDA receiver and computer to allow communication. The IrDA window on the DOSE-GARD[®] is located on the back cover plate near the bottom edge. The infrared communication is line-of-sight and this window must be free of any obstruction. The DOSE-GARD should be removed from any holder or boot that blocks this window before using the IrDA.

The following is using the DOSE-GARD[®] Reader Software, but the DOSE-GARD[®] Calibration Software is similar, see respective manual for more information.

In the Data Mode, and with the aid of the DOSE-GARD[®] Reader software, you will be able to:

- ❖ Read data from the DOSE-GARD[®] and record the following data in your computer:
 - Accumulated Dose in Rem
 - Serial Number (assigned at the factory)
 - User-ID (assigned by the user via the Reader software)
 - Dose Alarm Set Point (assigned by the user via the Reader software or manually)
- ❖ Reset the Accumulated Dose
- ❖ Set the Dose Alarm Set Point value
- ❖ Assign the User ID Code (any alpha-numeric identifier)

To transfer data in the Data Mode:

- Toggle the "M" button until the display shows "dAt" as shown in Figure 2.4.
- Hold the "S" button down for three seconds until the display shows "- - -".
- Place the back (non-display side) of the DOSE-GARD[®] facing the front (window side) of the IrDA receiver.

The DOSE-GARD[®] Reader software and DOSE-GARD[®] will automatically start communications. The status light on the Reader Software screen should change from red to green, and the data fields become populated. The DOSE-GARD[®] display should show moving "-" when communicating.

To terminate communications, remove the line-of-sight between the DOSE-GARD[®] and the IrDA interface. After ten seconds, the DOSE-GARD[®] will automatically return to the Normal Mode.

Consult the DOSE-GARD Reader Software Manual for installation/operation of the DOSE-GARD[®] Reader software and hardware/software communication configuration.

Note: This "dAt" mode should NOT be run unnecessarily or left on longer than required since it will shorten the battery life.



Fig 2.4 Data Mode Display

2.5 DOSE-GARD[®] ALARM ACKNOWLEDGE MODE

The audible alarm may be suppressed by acknowledging it in this mode. To enter the Alarm Acknowledge Mode toggle the "M" button until the display shows "AL-" as shown in Figure 2.5. Then press the "S" button for more than three seconds. The audible alarm will silence, and the visible alarm display will continue to toggle between the "AL" display and accumulated dose value.



Fig 2.5 Alarm Acknowledge Mode Display

2.6 DOSE-GARD® ALARM SET POINT MODE

To enter the Dose Alarm Set Point Mode, toggle the "M" button until the display shows "SPt" as shown in Figure 2.6. To set the Dose Alarm Set Point, press the "S" button for more than three seconds until the Dose Alarm Set Point is displayed.

To increase the Dose Alarm Set Point, toggle the "S" button. To decrease the set point, toggle the "M" button. The increments at which the Dose Alarm Set Point will increase or decrease are shown in the following chart.

| DISPLAY RANGE | INCREASE STEPS "S" | DECREASE STEPS "M" |
|---------------|--------------------|--------------------|
| 0.05 to 9.95 | +0.05 rem | -0.05 rem |
| 10.0 to 99.5 | +0.5 rem | -0.5 rem |
| 100 to 995 | +5 rem | -5 rem |

After five seconds of neither button being pressed, the mode will automatically return to Normal Mode.

Note: The DOSE-GARD® dosimeters are set at the factory to a default value of 10.0 REM. It is recommended you set the Alarm Set Point to the appropriate value before use.



Fig 2.6 Alarm Set Point Mode Display

2.7 DOSE-GARD[®] RESET MODE

To enter Reset Mode, toggle the "M" button until the display shows "rES" as shown in figure 2.7. To perform a dose reset, press the "S" button for more than three seconds until the accumulated dose display changes to 0.00. After five seconds of neither button being pressed, the mode will automatically return to Normal Mode.

For maximum accuracy it is recommended that the DOSE-GARD be reset to read 0.00 before any use. This will assure that the internal accumulated dose is cleared.



Fig 2.7 Reset Mode Display

2.8 DOSE-GARD[®] TEST MODE

To enter the display and alarm Test Mode, toggle the "M" button until the display shows "tES" as shown in Figure 2.8. To start the test, press the "S" button for more than three seconds until the alarm sounds. The display will blink showing all segments on as a visible alarm indication. After the alarm sounds the DOSE-GARD[®] will automatically return to Normal Mode.

Note: This test should NOT be run often since it will shorten the battery life.



Fig 2.8 Test Mode Display

2.9 DOSE-GARD[®] SERIAL NUMBER MODE

To enter the Serial Number Mode, toggle the "M" button until the display shows "SEr" as shown below. To display the 10-digit serial number, press the "S" button for more than three seconds until the display sequences through four cycles, showing the entire serial number in four segments. For example, the four displays would show: " 0", "000", "193", & "609" for the serial number 0000193609.



Fig 2.9 Serial Number Mode Display

2.10 DOSE-GARD[®] OFF MODE

To enter the Off Mode, toggle the "M" button until the display shows "off" as shown in Figure 2.10. To turn the DOSE-GARD[®] off, press the "S" button for more than three seconds until the display goes blank.

While the DOSE-GARD[®] is in the off state, all data is saved within the dosimeter memory, but the alarm and dosimeter are not functional. To return to the Normal Mode (ON), press and hold the "M" button for 3 seconds.

Note: While the DOSE-GARD is off, no radiation will be detected or accumulated.



Fig 2.10 Off Mode Display

2.11 FLOW CHART REPRESENTATION OF MENU

Following is a short hand description of the menu function.

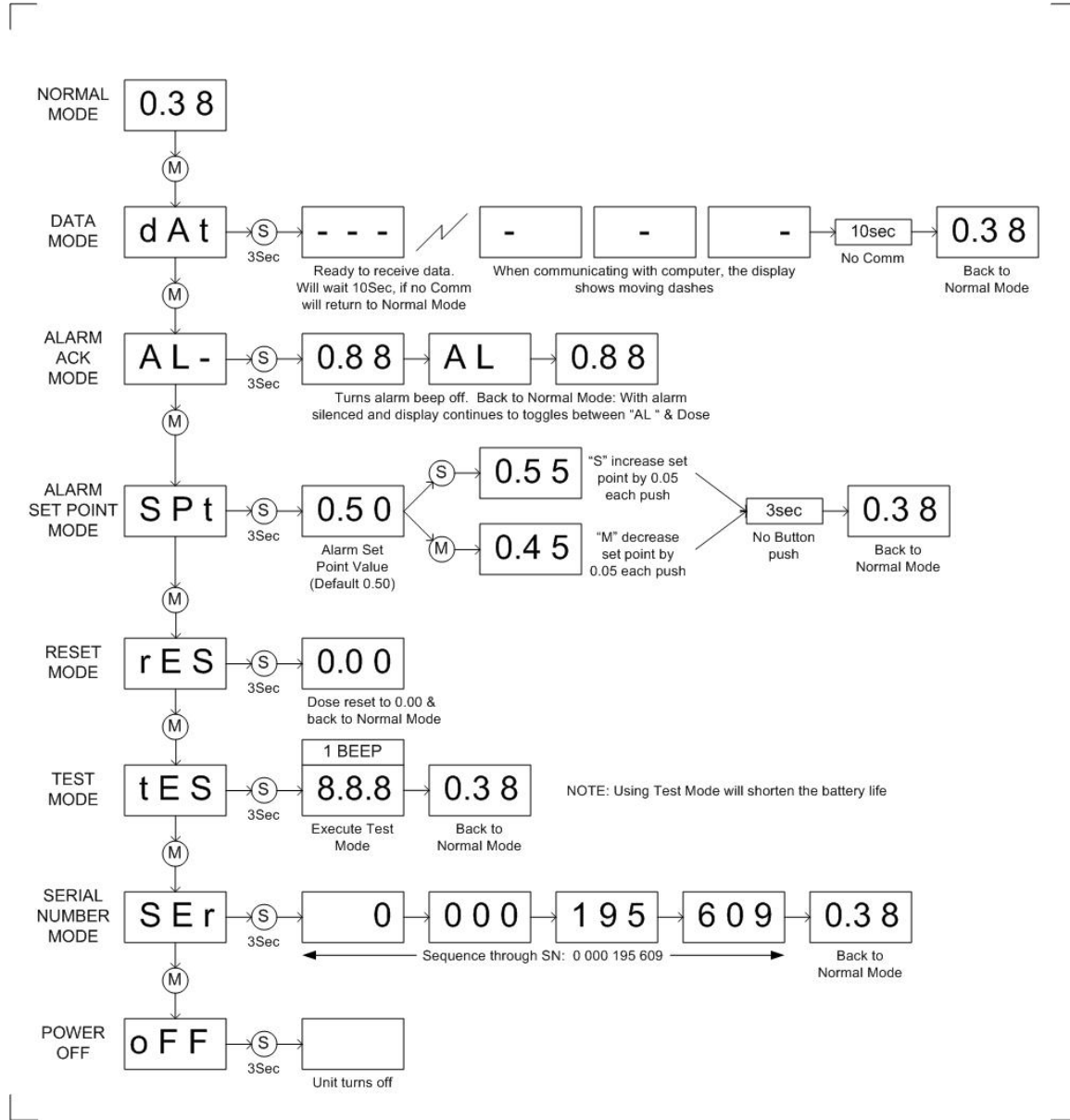


Fig 2.11 Menu Flow Chart

CHAPTER 3

DOSE-GARD® ALERTS & DISPLAYS

3.1 NORMAL DISPLAY & DOSE EFFECTS:

The DOSE-GARD® display normally shows the total accumulated since the previous reset using floating point Rem (Roentgen Equivalent Man) units. The range in Rem is 0.00 to 999. The display is equivalent to cSv (.01 Sv = 1Rem).

3.2 ALARM ALERT:

If the Accumulated Dose (Rem) is equal to or higher than the Alarm Set Point (SPt) stored in the DOSE-GARD®, then the alarm alert will display and sound. The display will toggle between the Rem reading for two seconds and "AL" indication for two seconds. The alarm will continue to sound at a rate of one second on and one second off for one minute.

After that, the alarm will sound for ½ second every thirty seconds. The alarm can be silenced by acknowledging it (see AL- Mode). The display will continue to indicate an alarm condition even after acknowledgement.

The audible and visible alarms can be reset by changing the Alarm Set Point (see SPt mode) to a value higher than the accumulated dose reading, or resetting the dosimeter to 0.00 (see rES mode).

3.3 BATTERY LOW ALERT:

The battery low indication is via "bAt" shown on the display, alternating with the normal dose read-out.

DOSE-GARD® will test the battery periodically and the low battery display alert will flash continuously once initiated, but will not hamper dosimeter operation. Turning the unit off/on might clear the alarm, but if the battery is truly low, the alarm will return. The battery test level is designed to allow normal operation despite the presence of the alarm.

To force a check of the battery, enter the TEST mode. The battery will be tested 5-10 seconds after the alarm test is complete.

Note: it is recommended that the DOSE-GARDs® be returned to the factory for battery replacement. The factory will replace the battery and the desiccant and the humidity resistance seal, and will charge the ionization chamber, update the Firmware as applicable, and re-calibrate the unit if needed.

3.4 CHAMBER CHARGE ALERT:

After changing the battery, the ionization chamber may require charging. If this occurs, the display will continuously read "CH-". Charging can be accomplished by allowing the dosimeter to remain on for anywhere from a few minutes to a few days, or by exposing the dosimeter to a radiation field. The chamber is charged when the dosimeter returns to the Normal Mode.

3.5 ERROR ALERTS:

In rare cases, the DOSE-GARD[®] may show an error code. The error code will start with an "E" and include two digits, for example "E10". To clear an error code, turn the DOSE-GARD off and on. If the error code persists, contact the factory to get a return authorization number and return the dosimeter for repair.

3.6 FLOW CHART REPRESENTATION OF ALERTS:

Following is a short hand description of the display and beep alerts.

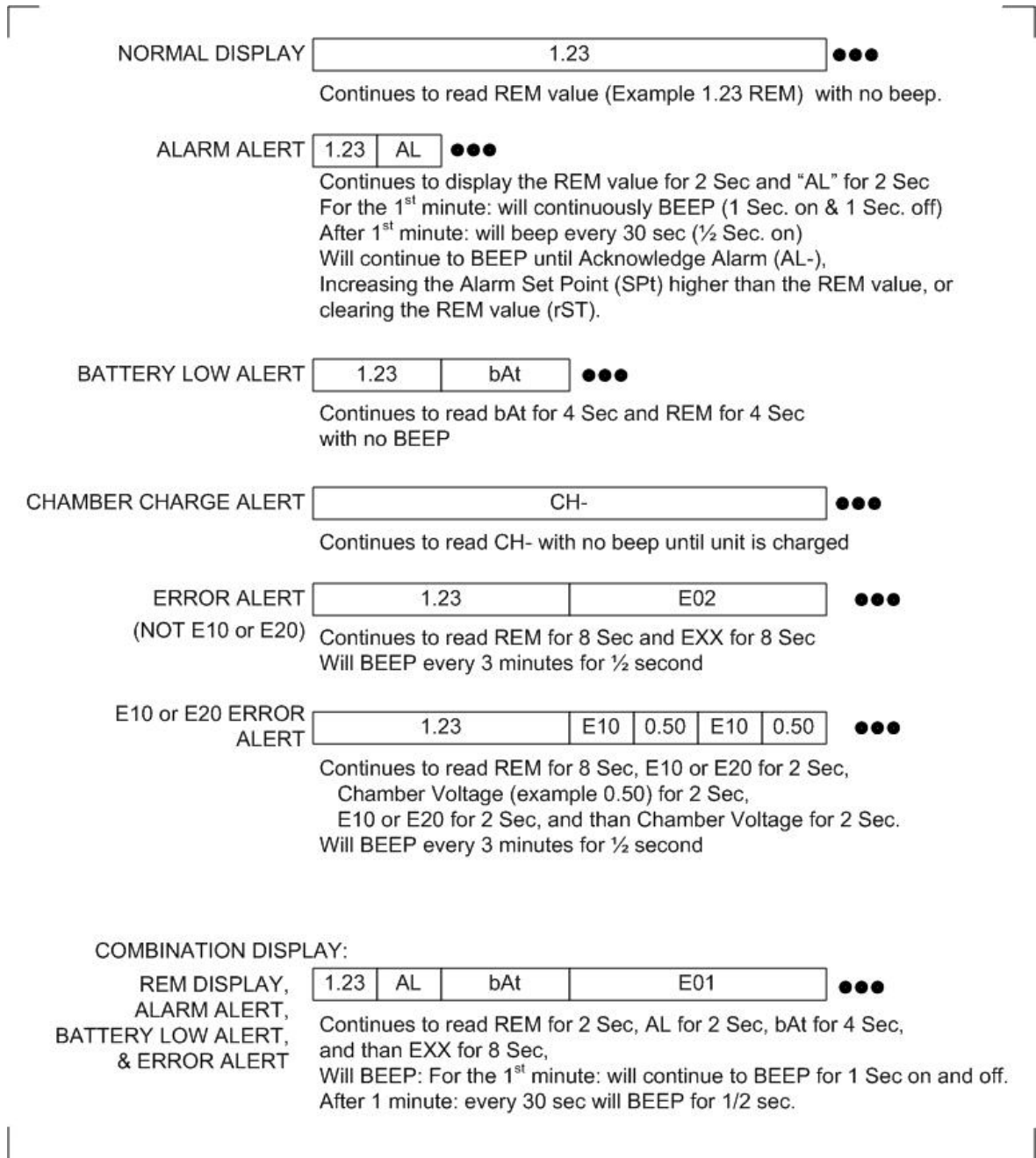


Fig 3.6 Alert Flow Chart