

PM-1401GN Users Guide

1.Introduction

The PM-1401GN is one member of a family of handheld instruments that were designed to search for nuclear and radioactive materials. This instrument combines both gamma and neutron detectors in a small, easily carried package with excellent sensitivity.

2.General Information

While this instrument measures radiation, it was not designed as a personal protection device. The numerical values shown on the display are an indication of the radiation field and should not be used for personal dosimetry.

2.1Alarms

Alarm levels are derived from the ambient background. When the instrument is turned on, it acquires a background reading and calculates the alarm levels for both gamma and neutron. Visual, audible and external vibration alarms (if installed) indicate the presence of radiation above the alarm threshold.

2.2False alarms

All radiation detection systems experience false alarms. The number of false alarms is dependent on many factors such as changes in ambient background radiation and system set-up. Under normal conditions we recommend a system set-up that produces a maximum of 2 false alarms per 8 hours of operation. The occasional “chirp“ from the unit lets the operator know that the unit is still functioning.

2.3Vibrator

The PM-1401GN has a provision for an external vibrator that is activated when the unit alarms. This vibrator can be carried in a pocket or strapped on the operator’s wrist.

3.Battery installation

The units are shipped without the battery. To install the battery open the screw cover located on the right end of the unit with a coin or other suitable tool. Insert a single “AA” alkaline battery into the battery holder positive (+) end first. Reinstall the screw cover. The display should display the word test [tESt]. Tighten the screw cover until it is snug.

4.Operation

4.1 Turning the unit on/off

When the instrument has a good battery installed and is turned off, the word OFF will be displayed on the front panel. To turn the instrument on, press the blue mode button. All of the segments of the display will turn on for approximately 1 second, followed by the word test [tESt]. After the self-tests are completed, the instrument

will begin a background accumulation indicated by displaying the word CAL. When a numerical value such as 0008 is displayed the instrument is ready to use.

The PM-1401GN may be turned off at any time except when the display is showing the word test [tESt]. To turn the instrument off, press and hold the light button. Within 1-2 seconds press and hold the mode button while continuing to hold the light button. 2 – 4 seconds later the display will indicate OFF and the buttons may be released. If the word CAL is displayed, release both buttons and repeat the process.

4.2 Display

The instrument has a 4 digit display to show gamma radiation levels and 2 smaller digit to show neutron radiation levels. The gamma radiation level is displayed in microR/hr. The neutron radiation level is displayed in counts/second. If a gamma alarm condition is detected the 4 gamma digits will flash. If a neutron alarm condition exists the 2 neutron digits will flash.

4.3 Getting a new background

During the course of normal operations, particularly if you are moving from place to place the ambient background radiation levels will change. This will most frequently be noticed when the instrument begins to alarm more frequently than usual without any radioactive sources present. Under these circumstances it will be necessary to have the instrument acquire a new background. To do this press and hold the blue mode button until the word CAL appears on the display. The unit is now acquiring a new background. This process takes 36 seconds. When the display returns to the normal numeric display the unit has the new background and is ready for normal operation.

4.4 Set-up (if available)

In some instances you will be issued a unit with the setup modes locked out. Under these conditions there is no operator setup to be performed and the remainder of this section may be ignored.

There are three items that may be changed in the setup mode. These items are the alarm multiplier value, audible alarm (on/off), and vibration alarm (on/off). To enter the setup mode, press and hold the blue mode button. The word CAL will be displayed first. Continue to hold the button until the screen shows the following display [n X.X] where the “X.X” is replaced with the alarm level multiplier such as “5.0”.

To change the alarm multiplier value, press the light button and the number part of the display will flash. While the number is flashing pressing the light button will increase the value and pressing the mode button will decrease the value.

To step to the next item press the mode button. The display shows [1-on] or [1-of]. This is the setting for the audible alarm [1-on] indicates that the audible alarm is enabled and the unit will beep in the event of an alarm. [1-of] indicates the audible

alarm is disabled and the unit will not beep. Pressing the light button will toggle the value between on and off.

To step to the next item press the mode button. The display shows [2-on] or [2-of]. This is the setting for the vibration alarm [2-on] indicates that the vibration alarm is enabled and the external vibrator will vibrate in the event of an alarm. [2-of] indicates the vibration alarm is disabled and the unit will not vibrate. Pressing the light button will toggle the value between on and off.

To exit the setup mode, do not press any buttons for a period of 5 to 10 seconds. After this period of time the unit will return to the CAL mode and any changes you have made to the setup parameters will be saved.

5 Troubleshooting

Troubleshooting in the field is limited to replacing the battery. Most of the problems that have been analyzed can be traced to low battery or a poor quality battery. Use only fresh, high quality alkaline batteries. To change batteries refer to section 3. The PM-1401GN is an extremely low power device and as such the unit should be allowed to stand without the battery for 1 to 2 minutes to allow internal circuits to discharge. This is especially important if you are experiencing problems with the unit.

6 Specifications

Gamma detector	Scintillator CsI(Tl) with photodiode;
Dimensions of gamma detector	10x10x50mm (5cm ³); .39x.39x1.97in(.3in ³)
Neutron detector	He-3 proportional counter filled with mixture of He-3 (8atm) and argon (2atm), volume of He-3 is 0.32dm ³ (1.93in ³);
dimensions of the neutron detector	Ø18, length -140mm Ø.71,length - 5.5in
Dimensions of the instrument	(32x57x185 mm) 1.26x2.24x7.28 in
Weight	(0.365kg) 13 oz
Waterproof	IP67 (optionally water resistant to 20 m)
Operating temperature range	(-30 up to +50°C) -22 up to +122°F
Storage temperature range	-50 up to +50°C -58 up to +122°F
Alarming device	visual; audible and vibration
Energy range on gamma channel	from 33keV up to 3MeV
Batteries	1 (AA) Alkaline battery
Battery lifetime	600 h
response time	less than 1s
900 records stored in non-volatile memory. Information exchange with PC using the IR channel	Yes