RadComm
RADIATION DETECTION SYSTEMS
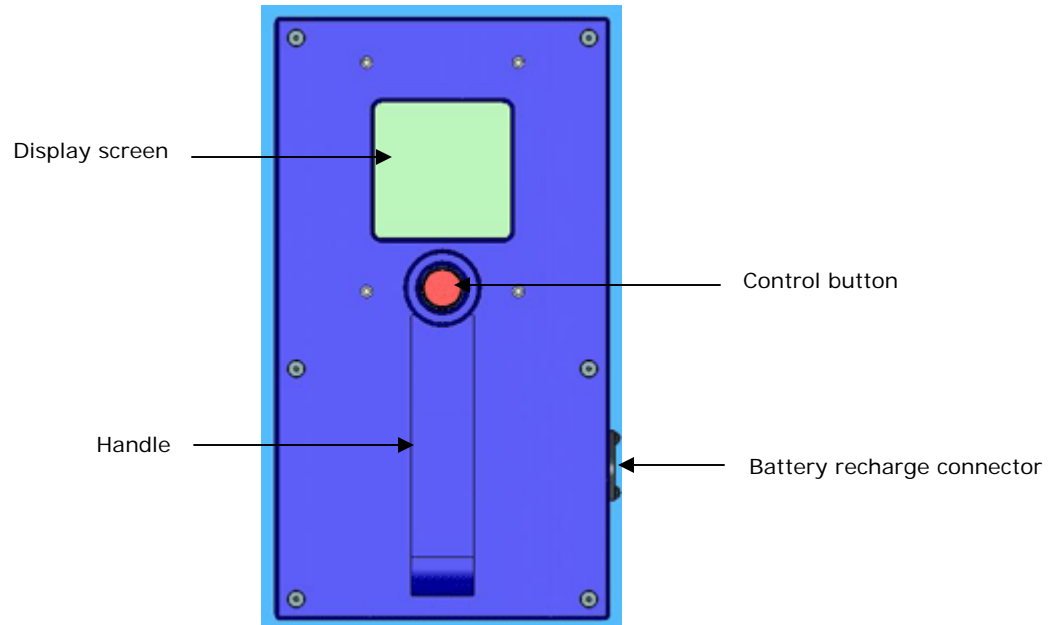
RC2 Portable Radiation

Detector Operating Manual

INTRODUCTION

The occurrence of radioactive material in scrap shipments is increasingly becoming a common problem. Radioactive material occurs in many forms, shapes and sizes and is utilized in every application one could possibly think of; level control gauges in a steel making operation, thickness gauges in aluminum plants for measuring the thickness of foil, smoke detectors, medicine, watch dials, etc. There are also applications where radioactive particles commonly found on Earth are transferred as small particles to processing equipment, thereby contaminating parts such as oil pipe, heat exchangers, "I" beams in mines, etc. For the most part the majority of radioactive material is of low intensity and usually does not pose an immediate exposure problem. However, there are millions of radioactive sources that are presently being used in a variety of applications, where VERY SMALL quantities of radioactive material with VERY HIGH intensity levels WILL pose an immediate danger if personnel are exposed. For these reasons any detection should be handled as though it were a HIGH intensity source.

RadComm radiation detection systems have been designed to detect very low radiation intensity levels from material while buried in scrap. These systems will detect GAMMA and NEUTRON radiation. There are other types of radiation that are virtually impossible to detect when buried in scrap because of distance and the shielding effect of intervening scrap material.

RC2 Portable

Display screen

Control button

Handle

Battery recharge connector

SYSTEM STARTUP

Press the control button to start the RC2 Portable.

The message "PRESS BUTTON FOR MANUAL SETUP" appears with a three second count down. Press the button to enter manual setup mode.

If the button is not pressed, the default settings are displayed followed by the system self-test. The messages, "SYSTEM IS TESTING" appears while the self-test is active. If the system tests OK, the message "SYSTEM IS OK" appears. If the system needs calibration, the message "CALIBRATION IS REQUIRED" appears.

MANUAL SETUP

Manual setup mode allows the operator to change the sensitivity level, the backlight, the display units, and if system startup test is required. To change the setting as it appears, press the button when the desired setting is displayed. The system provides three seconds for each option.

When the message "PLEASE SET SENSITIVITY   DEFAULT=HIGH" appears, press the control button for the desired setting, High, Medium, or Low as it appears.

When the message "PLEASE SET BACKLIGHT   DEFAULT=ON" appears, press the control button for the desired setting, on or off as it appears.

When the message "PLEASE SELECT UNIT   DEFAULT=CPS" appears, press the control button for the desired setting CPS, µR/hr, or nSv/hr as it appears.

When the message "TEST SYSTEM ON STARTUP   DEFAULT=YES" appears, press the control button for the desired setting, yes or no as it appears.

When the message "WISH TO SAVE THE SETTINGS   DEFAULT=YES" appears, press the control button for the desired setting, yes or no as it appears.

NORMAL OPERATION

The display screen shows the software release number in the upper left corner. The upper right corner of the screen shows the remaining battery power. The bottom two rows of the display show the Background Setting, B.SET and the Alarm Setting, A.SET.

Background setting is a system calculated background average.

Alarm setting is the reading at which the RC2 Portable will alarm. This is controlled by the sensitivity level of high, medium, or low.

The centre of the screen shows the measured reading. Press the control button to scroll through the three units settings, CPS: counts per second; μR/hr: microRads per hour; and nSv/hr: nanoSeiverts per hour.

If the radiation level exceeds the display range, the message "SYSTEM IS OUT OF RANGE" appears indicating that the radiation level is very extreme. Move the RC2 Portable further away from the source to return to normal operation.

Press and hold the control button to turn off the RC2 Portable. The message "RELEASE THE BUTTON FOR POWERDOWN" appears.

RADIATION SAFETY PROCEDURE

A qualified radiation safety professional should be consulted and a formal response to radioactive sources should be developed. The following section, Reacting to High Counts, is provided as a guideline only in helping develop this procedure. RadComm is not responsible for any use or misuse of the RC2 Portable.

REACTING TO HIGH COUNTS

Table one shows the action to take relative to the counts displayed on the RC2 screen. When approaching a suspected source the RC2 Portable must always be held between the operator and the suspected source. When sources are to be isolated, an appropriate container for radioactive sources must be used.

Low indicates that the source may be safely approached and removed from the area. Under no circumstances should an enclosed source be further exposed or opened. Caution indicates that the source may be hot and should only be handled by a qualified radiation professional.

Isolate indicates that the entire load should be isolated with no attempt to remove the source. Only qualified radiation professionals should attempt to isolate and remove the actual source.

Readings in CPS Approximately 20,000CPS=10microSv/hr	Distance From Contact Of The Source Of Radiation Measured In Meters				
	On Contact	< 1m	< 2m	< 5m	> 5m
1 to 5,000	LOW	LOW	CAUTION	UNUSUAL	ISOLATE
5,001 TO 10,000	LOW	CAUTION	UNUSUAL	ISOLATE	ISOLATE
10,001 TO 30,000	CAUTION	CAUTION	ISOLATE	ACTION	ACTION
30,001 TO 80,000	ISOLATE	ISOLATE	ACTION	ACTION	ACTION
>120,000	ACTION	ACTION	ACTION	ACTION	ACTION

Table 1: CPS and Action to Take

Battery Recharging

The battery symbol shows five blocks indicating the approximate remaining power. When the battery charge is at one block, the battery symbol will flash. When the battery power is at approximately ten minutes, the RC2 Portable will beep. Plug the RC2 Portable Detector to a suitable power supply using the battery recharger provided. With the RC2 Portable off, the time for a full recharge is approximately three hours. With the RC2 Portable on, the recharge time is considerably longer. For best results, do not recharge with the RC2 Portable on.

RC2 Portable Guide for Using Li-Po Battery

(Standard Safety Precautions Must Be Followed)

Very Important Notice!!!

It is extremely dangerous to charge an over discharged, low voltage Li-Po battery in the portable. To help avoid this, the microcontroller in the portable constantly measures the battery voltage, and it features a battery life indicator on LCD screen, low battery flash warning, low battery audio warning and low battery auto shut off functions. Please follow the guide as shown below, otherwise, the system could get severe damage.

Li-Po Battery Charging

➢ When the battery life indicator flashes or the low battery audio warning is heard, you **MUST turn off** the portable and charge the battery as soon as possible. Do not wait until the portable shut itself off because of low battery.

➢ It is recommended to check the battery indicator on the screen in regular basis, charge the battery when there is only one or two bars left. **You must charge the battery when there is an audio beep.**

➢ The Li-Po battery exhibits self-discharge. **If the portable runs regularly, charge the battery every 2 days. If the portable will not be used for a long time, recharge the battery every 15 days to keep it from over discharging.**

➢ Never charge the battery in an environment greater than 35°C or less than 0°C.

➢ Charge the battery in an open ventilated area and far away from combustible items. Always charge Li-Po batteries on surfaces that are not flammable.

➢ Never charge a Li-Po pack that has ballooned or swelled due to over / under charging or has been punctured or damaged.

➢ When charging, connect the portable to charger first, then plug charger to the wall. After charging, unplug charger from the wall before disconnecting the portable from the charger.

➢ If you notice your Li-Po battery pack is swelling, stop the charging process immediately.

➢ You should immediately stop charging a battery that is overheating, smelling, changing color or having any distortion etc.

➢ Do not open the lid of portable when charging the battery.

Li-Po Battery Handling & Storage

• Never, under ANY circumstances, let the positive and negative battery leads touch. It can lead to cell ballooning, cell damage or fire or an explosion.

• Do not store or transport batteries where they can come into contact with sharp or metallic objects.

• Do not store your Li-Po pack in extreme temperatures below 0C or above 50C.

• Store your Li-Po pack in a safe and non flammable container away from flammable objects. A Li-Po Sack or metal / ceramic storage container is best.

• Avoid mechanical shock to the cells.

• Never incinerate or dispose the cells in fire, for these may cause burning of the cells.

• The cells should never be soaked with liquids such as water, drinks or oil.

Optional Docking Station

The Docking station system consists of 2 main components - the RC2/DS docking Station Console and the RC/2 Portable detector (mounted inside the RC2/DS). Its primary functions are to charge the internal RC/2 Portable batteries and to provide monitoring in the immediate area around the console. The unit incorporates circuitry that includes smart battery charger, AC to DC power supply, monitoring indicator, audio/visual alarms and alarm reset. The RC/2 scans the ambient background radiation levels on a continuous basis while mounted inside the console. The portable establishes a continuous running average and automatically sets tracking alarm threshold levels to typically 1.75 times the ambient background radiation level. The RC2/DS is capable of detecting a SEALED radioactive source of Cesium 137 with an on-contact exposure rate of 10 micro Sv/hr (1 mR/hr) from a distance of up to 3m (10 feet) in air. The detection capability of the unit has been designed to alert personnel to a potential radiation hazard if a radioactive source were to be of significant quantity. These alarms can be reset via the front panel alarm reset pushbutton.
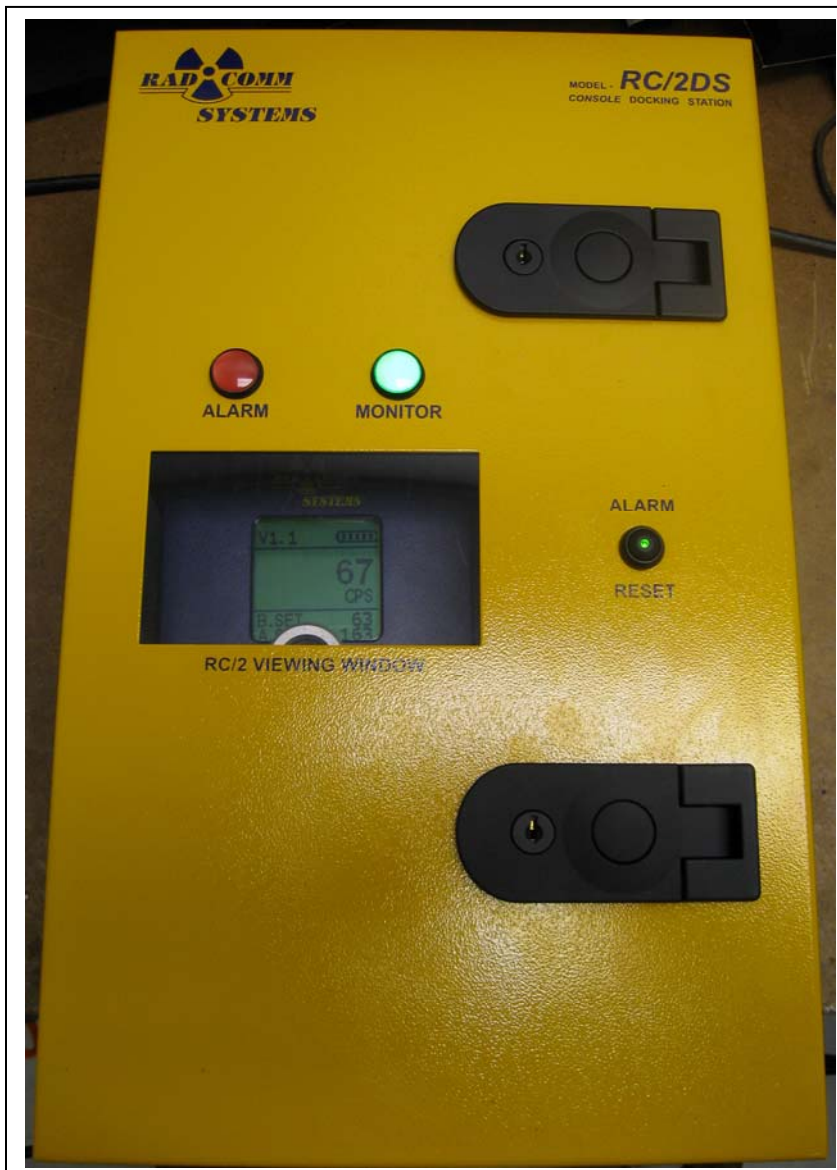

Figure 1 – RC2 Docking station

The RC2/DS serves 2 basic functions; 1) operates as a radiation detection unit when the RC/2 portable is installed, and 2) acts as a battery charger for the RC/2 portable.

Internal RC/2 Portable:

The RC2/DS is equipped with an internal portable RC/2 radiation detector. The RC/2 is located behind the locked front panel door on a built-in shelf. Quick release straps are used for holding the instrument in place. These can be easily and quickly undone when the portable is required for remote applications. There is an 8 pin DIN connector that must be plugged into the side of the portable when mounted in the RC2/DS. The connector serves 2 functions; it will charge the internal RC/2 batteries and transfer the logic control signals to the RC2/DS control circuitry. The RC/2 must be turned on at all times while mounted in the RC2/DS control unit.

Fuse:

The fuse is located inside the RC2/DS cabinet in the top right hand corner. The fuse is in-line with the AC hot line before the systems AC to DC power supply and provides protection against power surges. To remove the fuse the threaded fuse holder cap should be turned counterclockwise. The fuse is a standard - 1/4" x 1 1/4" AGC 2.

Door Latch:

There are two key-lock door latches on the right side of the unit. They are spring loaded press fit latches that snap into place. The latches can remain closed without using the key-lock. To open the latch simply depress the black button.

Alarm Indicator:

The indicator is controlled by the internal logic circuits and is used for alarm conditions. It will illuminate steady ON when there is a detection of radiation. The lamp is a maintenance free LED cluster and is powered by low voltage DC.

Monitoring Indicator:

The indicator is controlled by the internal logic control circuits and indicates the systems operational status. Normal operation is steady ON which means the system is fully operational. Steady OFF means the unit is NOT operational. The system will not be scanning during this period. The lamp is a maintenance free LED cluster and is powered by low voltage DC.

Alarm Reset:

The audio reset is an illuminated pushbutton located on the front panel. This reset will reset both the audio and visual alarms. Once the alarms have been reset the system automatically reactivates the alarm for the next radiation detection.

RC/2 I/O Connector:

The RC/2 I/O connector is located inside at the end of the communication cable. The connector is a standard DIN 8 pin connector. It must be firmly plugged into the bottom right hand side of the RC/2 portable. All communication signals and battery charging voltage (7.2 volts DC) is through this I/O connector.

Latch Key:

The latch key is a standard type that can be made anywhere. The same Key works for both latches.

Front Door:

The front door is weather sealed with an outer hinge on the left side. There is also a RC/2 display viewing window to allow viewing of the RC/2 display without opening the door.

Audio Alarm:

The Audio Alarm is located on the bottom of the Console. The audio will sound under 2 conditions - if the RC/2 Portable detects radiation that exceeds the alarm level settings and/or if there is an alarm detected on any one or all of the remote RCD/1 vehicle monitors. The audio is powered by low voltage DC and is controlled by the internal circuits of the RC/100. The output audio signal level is a continuous 2200 Hz tone with an output of 90 db at approximately 3 ft. The Audio will stay steady ON until it is reset with the RC/100 front panel Audio

AC Input:

There is a 21mm (3/4") conduit hole at the bottom right corner of the cabinet available for the AC power input. The unit requires 100 230 volts AC /50/60 Hz.

WARRANTY

RadComm RC2 Portables are warranted to be free of defects in material and workmanship for a period of one year from date of shipping. This warranty covers parts and labour only. RC2 Portables must be returned to RadComm for repair at the customer's expense. This warranty covers system malfunctions that fail under normal operating conditions and does not include failures caused by negligence, abuse or accidental damage. This warranty is void if factory applied serial numbers have been removed or altered. Use of the RC2 Portable or components for purposes for which they were not intended voids the warranty. This warranty is limited to repair or replacement of RadComm components only and does not cover business losses resulting from the use of RadComm systems howsoever caused. The rechargeable batteries are not covered by this warranty.

FACTORY INFORMATION

Mailing Address: RadComm Systems Corp.
2931 Portland Drive
Oakville, Ontario
Canada
L6H 5S4
Website: www.radcommsystems.com
e-mail: service@radcommsystems.com