



RS-111 Handy-Scint USER MANUAL

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Firmware Version 3v05

Part number P-1315.04.02



Sales, Support and Customisation

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Revision History			
Date	Revision	ECO #	Description
NA	01.00	NA	Initial Release
June, 2009	01.02	NA	Incorporate Comments, JC
Oct 2011	03.00	NA	Released as Version 3.0 - JC
Mar 29, 2013	03.01	NA	Reformat Manual
Apr 29, 2013	04.00	NA	Current Release
Jan 08, 2014	04.01	NA	Update information in Section 1.1
Apr 10, 2014	04.02	NA	Revise Warranty, Appendix Z

Product Manual - Disclaimers:

Due to our efforts to continuously improve this product; specifications, dimensions, operating features and procedures described in this manual are subject to frequent changes. The printed version of this manual reflects only the configuration current at the time of printing. The most current version of the manual is provided in electronic format on the Product Support CD supplied with the instrument. Please refer to the electronic version of the manual for the most accurate interpretation.

PRODUCT STATEMENT

The RS-111 is a joint venture between RADIATION SOLUTIONS INC a Mississauga (Toronto) based geophysical equipment manufacturer and GEORADIS a Czech Republic based design company who were previously part of Exploranium but are now an independent private company.

ADVISORY

NOTE: Users are advised that the manual and software supplied with the instrument are current when manufactured, however, a program of continuous improvement means that many new features are added and old ones improved with time. **Users are advised to contact RSI directly for new releases including new manuals and software.**

NOTE: USERS ARE REMINDED THAT THE RS-111, IN COMMON WITH OTHER SIMILAR INSTRUMENTS, USES A Sodium-Iodide CRYSTAL AS THE DETECTOR. THIS CRYSTAL IS FRAGILE AND EVEN THOUGH THE UNIT HAS BEEN RUGGEDISED FOR FIELD USE GREAT CARE SHOULD BE TAKEN TO AVOID ABUSING THE INSTRUMENT AS THE VERY EXPENSIVE CRYSTAL IS NOT COVERED UNDER WARRANTY.



CONFIDENTIAL DISCLOSURE

USERS ARE HEREBY NOTIFIED THAT THIS MANUAL CONTAINS TECHNICAL INFORMATION OF A PROPRIETARY NATURE. THIS INFORMATION IS NECESSARY FOR TECHNICALLY KNOWLEDGEABLE USERS TO UNDERSTAND SYSTEM OPERATION AND TO SATISFY THEMSELVES THAT THE SYSTEM IS PERFORMING CORRECTLY.

RADIATION SOLUTIONS INC ACCEPTS THAT IT IS THE RIGHT OF SUCH USERS TO BE PRIVY TO THIS INFORMATION. HOWEVER THIS DOCUMENTATION IS PROVIDED SOLELY FOR THE BENEFIT OF OWNERS OF THE HANDY-SCINT HANDHELD DETECTOR SYSTEM AND DISSEMINATION OF THE DETAILED TECHNICAL INFORMATION PROVIDED MAY BE CONSIDERED AS LEGALLY CONTRAVENING THE NORMAL SUPPLIER/CUSTOMER RELATIONSHIP.

UNAUTHORIZED RELEASE OF DETAILED TECHNICAL INFORMATION TO A THIRD PARTY WILL BE CONSIDERED AS A CONTRAVENTION OF USER AGREEMENTS.

Manufactured by Radiation Solutions Inc, 386 Watline Ave, Mississauga, Ontario, Canada, L4Z 1X2

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System Requirements:

Hardware:

- Protective Boot with straps

Firmware:

- 3v05 (current version)

1.0 INTRODUCTION

1.1 GENERAL

The **RS-111 HANDY-SCINT** is a compact hand held radiation detector specifically designed to quickly determine the location of radioactive material. The high sensitivity **RS-111** is an ideal instrument for Geophysical Survey applications by quickly and simply detecting Gamma Ray emitting radioactive sources in various combinations and situations.



1.1.1 Main Features

- High sensitivity detector - NaI/Tl crystal 30 x 30 mm (1,18" x 1,18") - 21.2 cm³ (1.3 in³).
- 4 ½ digits - numeric LCD display.
- Display readings in counts per second.
- Audio sampling rate 10 per second.
- User-Adjustable audio threshold.
- Use-Adjustable audio volume.
- Automatic warning of high dose rate.
- Plastic protection boot with carrying straps.
- Fully weatherproof – fully water and dust protected.
- Lightweight and well balanced 1.3 kg (2.8 lb).
- Powered from 4 AA type batteries - minimum 12 hour battery life at 20°C.
- Supplied with NiMH rechargeable batteries (Alkaline batteries usable).
- Fully automatic battery charger integrated in unit.
- Supplied in rugged carrying case with molded insert.

2.0 SYSTEM OPERATION

2.1 Batteries

To load batteries, open the back door and remove the battery holder, load batteries in the battery holder – ensure correct polarity. Slide the Battery Holder back into the base of the RS-111 ensuring the battery terminals on the unit match the battery holder. Close the back door.



2.2 Button

The RS-111 Handy-Scint instrument has only ONE control which is the PUSH-BUTTON on the handle referred to as **BUTTON**. The Button has 3 primary actions:

- **Short CLICK** (less than 1 second button action)
- **Long CLICK** – typically 3 second with display feedback
- **Extra long CLICK** for instrument switch OFF.



2.3 Display

The Display is a backlit LCD display. Display Backlighting is required in low light conditions to make the display readable. The Backlight is controlled automatically by an ambient light sensor under the main panel. To conserve battery power the backlight automatically switches off after 10 minutes of inaction (backlight timeout). The backlight may be re-activated with a short **CLICK**. The maximum numeric range is from -19999 to +19999. Various character combinations are used as abbreviations of important messages as noted below.



2.4 Power ON – First Time or after Battery Re-install

Hold the button down until all display segments light up and (**LO BAT 188.8.8**) is seen on the display then release the button.

The display changes to “**tESt**” as the unit carries out internal verification tests. If the test shows a malfunction see Section 2.6. The unit automatically recognizes if new batteries are inserted. When

tESt

new batteries are inserted it is necessary to select the type of batteries used. The display shows “nrb” or “rb”:

nrb = non-rechargeable batteries (Alkaline)

rb = rechargeable batteries (NiMH)

NOTE: Power on without battery change jumps past the nrb/rb selection.

Press the button for less than 1 second to switch between these selections, select the correct message then hold the button down for more than 3 seconds to activate the selection.

The display then successively shows **b5**, **b4**, **b3**, **b2** and **b1** as the local background is computed then finally shows the normal display in cps.

2.5 Power ON – Normal

Hold the button down until all display segments light up and (**LO BAT 188.8.8**) is seen on the display then release the button.

The display changes to “tEst” as the unit carries out internal verification tests.



tEst

The display then successively shows **b5**, **b4**, **b3**, **b2** and **b1** as the local background is computed then finally shows the normal display in cps.

2.6 Power ON - Errors

Where an error is detected the display message “tEst” will be replaced by “Er n” where “n” is the number of the error message. The error message remains on the display for 15 seconds or until confirmed by user with a short CLICK. The unit then continues with the next tests. When all tests are completed the unit switches to the main working mode regardless of the presence of any error, so it is important that the user makes note of the error. See **Section 2.14** below for an explanation of these errors

2.7 Survey Display

In the Survey mode, the unit measures radiation at a 10 times per second rate and displays data as 1/second. The 1/10sec data are used for the audio and the integrated value is shown on the display as shown in counts/second (cps).



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2.8 Audio

At power on, the local background is computed over a 5 second period and used to compute the audio threshold. While measuring the background measurement the display shows “b5”, “b4”, ..., “b1” to indicate progress. Then the unit computes the actual average background and related audio threshold.

The unit temporarily shows this computed background measurement on the display before automatically switching to Survey mode.



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The RS-111 has an audio speaker inside the unit. The audio tone is automatically activated when the radiation level rises above the computed Audio Threshold. Once the Threshold is exceeded then the rate of audio clicks will reflect the incoming count rate.

VOLUME:

Data volume can be set as follows. At Power ON press the button until “Ldn #” is seen on the display.

- # = 0 = Audio OFF
- # = 1 = low volume
- # = 2 = high volume

Use a short button click to swap values and a long click to enter the requested value and leave the setup mode. If no action takes place within 20 seconds the setup mode is terminated by timeout.

2.9 Re-acquire Radiation Background

The AUDIO THRESHOLD is set using the preset parameter factor (usually 3 Sigma). The relation between Audio Threshold and local background is explained in the following example.

Local background level = 100 cps

3 sigma = 30cps (1 sigma = sq. rt of signal)

Alarm Threshold = 130cps

So if the count rate goes above 130 cps the audio will automatically sound.

However, once set, if the local Background average increases to more than 130 cps then the audio will sound continuously and the audio tone changes will be difficult to hear small local changes. Similarly if the local Background goes down to 50 cps then the local radiation would need to increase very substantially before the audio sounds – thus effectively desensitizing the audio system.

To set up a new Audio threshold the user must re-acquire the Radiation Background. Pressing the button shortly (short CLICK) at any time will activate background reset and the unit will automatically return to main measure mode. While upgrading the background messages “b 5”, “b 4”, ..., “b 1” indicates progress.

2.10 ALARM THRESHOLD SETTING

The alarm threshold is set in Sigma (Standard Deviating) unit. To set a new threshold level, with the unit operating – press and hold the button until the display shows this figure.



Short presses of the button move from 1SD to 5SD – select the one you want then press and hold the button until the display goes blank, release it and you will see the “b 5”, “b 4”, ..., “b 1” countdown to compute a new background and apply the new audio threshold.

In Geophysics, most users select **3SDs**

2.11 Dose Rate Display

The default display of the RS-111 is in counts/sec – cps – and this is the measure of the Local Background radiation in cps.

For this detector the calibration coefficient for Ra-226 is approximately 1.0. Thus in this mode the display is in cps but can also be read as Dose Rate for Ra-226 in uGy/h units.

RSI can change the internal setting of the unit to display Dose Rate in Cs-137 in uGy/h units – but in this case the display cannot be read in cps as the calibration coefficients are different. Users in the field can request special software from RSI to change this feature if required but we prefer to do this in the factory for simplicity. Contact RSI if this is an issue

2.12 POWER OFF

To power OFF the unit, press and hold the **BUTTON** and the unit powers OFF. The display shows a countdown “**OFF 3**”, “**OFF 2**”, “**OFF 1**” then the unit finally powers off. At anytime before power OFF, if the **BUTTON** is released the unit continues to function.

2.13 Low Battery

When the Batteries are getting low an indication **LOWBAT** will appear on display. User should replace the batteries or, if using rechargeable batteries, connect the unit to an electricity supply.

2.14 Error messages

Er 1 – Number of counts from detector is less than 10 cps. Bad detector or wrong energy calibration.

Er 2 – Number of counts from detector is more 1000 cps. Noisy detector or wrong energy calibration.

Er 3 – Internal voltage +3 V out of tolerance range 10 %.

Er 4 – Internal voltage +4 V out of tolerance range 10 %.

Er 5 – internal voltage -3 V out of tolerance range 10 %.

Er 6 – High voltage error.

Er 7 – Default parameters reset.

Er 8 – Battery current greater than 300 mA.

LO-BAT – battery voltage is less than 4.2V

APPENDIX A – Technical Data

System comprises: RS 111 HANDY-SCINT

- Rechargeable Batteries + 110/220V charger
- Plastic protection boot, User manual

Display - reflective LCD with backlight - 4½ segment LCD – max 19999

Energy range - 30 keV to 3.0 MeV

Detector - NaI/Tl 30 x 30 mm (1,18" x 1,18") 21.2 cm³ (1.3 in³)

Temperature range: Working: -10°C to + 50°C, Storage: -20°C to + 60°C

Operation - Single touch button with multifunction

Audio - Miniature loudspeaker, audio pitch proportional to registered gamma ray intensity

Weight - 1.3 kg (2.8 lb).

Size - L x W x H 22 x 6.5 x 14.5 cm

Appendix Z WARRANTY



Radiation Solutions Inc Warranty

RS-111 (Handy-Scint) series products are provided with a one (1) year return to factory limited warranty against defects in materials and workmanship from the date the Products are placed at the disposal of the Buyer at the named place of delivery. **The warranty does not cover damage caused by improper use or unauthorized repairs.**

Repairs of defects will be performed by RSI at no charge to the Buyer, subject to the limitations. To request warranty service, the Buyer must call RSI's service coordinator for a return material authorization (RMA) number.

The Buyer is responsible for all the shipping, customs clearance costs and risk of loss of returning the repaired or replaced Products to the Buyer. RSI will own all parts removed from repaired Products or all Products replaced.

RSI's warranty does not include breakage of the crystal for any reason. RSI does warrant the detectors to be complete and fully operational to their published specifications at the time of delivery and to maintain the minimum resolution and performance for a period of one year under normal operating condition.

Complete details of the “*Standard Terms and Conditions*” may be obtained by contacting RSI.

For more information or to make a warranty claim contact RSI.

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