RADIODETECTION®

RD5100™H₂O+

Precision water and gas industry pipe locator and transmitter

Operation manual

SPX®

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Section 1 Preface

Before you begin

Thank you for your interest in Radiodetection's RD5100™H$_2$O+ cable and pipe locator.

The RD5100H$_2$O+ delivers the latest in locating technology in a powerful yet ergonomic and light-weight design.

Please read this user manual in its entirety before attempting to use the RD5100H$_2$O+ system.

Radiodetection products, including this manual, are under continuous development. The information contained within is accurate at the time of publication; however the RD5100H$_2$O+, this manual and all its contents are subject to change.

Radiodetection Limited reserves the right to modify the product without notice and some product changes may have taken place after this user manual was published.

Contact your local Radiodetection dealer or visit www.radiodetection.com for the latest information about the RD5100H20+ product family, including this manual.

1.1 Important notices

General

The performance of any cable and pipe locator may be affected when used in close proximity to ferrous materials such as manhole covers, steel-toe boots, mobile phones and nearby vehicles. Keep a distance of 1 or 2m from these objects when taking critical measurements such as depth and current readings.

This instrument, or family of instruments, will not be permanently damaged by reasonable electrostatic discharge and has been tested in accordance with IEC 801-2. However, in extreme cases temporary malfunction may occur. If this happens, switch off, wait and switch on again. If the instrument still malfunctions, disconnect the batteries for a few seconds.

Safety

⚠ WARNING: Failure to comply with safety warnings can cause serious injury or death.

CAUTION: Failure to comply with safety cautions can result in damage to equipment or property.

This equipment must be used only by suitably qualified and trained personnel, and only after fully reading this Operation Manual.

⚡ WARNING: Direct connection to live conductors is POTENTIALLY LETHAL. Direct connections to live conductors should be attempted by fully qualified personnel only using the relevant products that allow connections to energized lines.

⚠ WARNING: The transmitter is capable of outputting potentially lethal voltages. Take care when applying signals to any pipe or cable and be sure to notify other technicians who may be working on the line.

⚠ WARNING: Reduce audio level before using headphones to avoid damaging your hearing.

⚠ WARNING: This equipment is NOT approved for use in areas where hazardous gases may be present.

⚠ WARNING: Before removing the transmitter battery pack, switch off the unit and disconnect all cables.

⚠ WARNING: The RD5100H$_2$O+ locator will detect most buried conductors but there are some objects, including live objects, which do not radiate any detectable signal. The RD5100H$_2$O+, or any other electromagnetic locator, cannot detect these objects so proceed with caution. There are also some live cables which the RD5100H$_2$O+ will not be able to detect in Power mode. The RD5100H$_2$O+ does not indicate whether a signal is from a single cable or from several in close proximity.

CAUTION: The battery cover, the accessory cover and the headphone cover protect the locator's sockets from debris and water ingress. If they get damaged or lost, contact Radiodetection or your local service representative for a replacement one.

Batteries

⚠ WARNING: Batteries can get hot after prolonged use at full output power. Take care while replacing or handling batteries.

⚠ WARNING: Do not tamper with, or attempt to disassemble the battery packs.

CAUTION: If battery failure is suspected return the entire unit to an authorized repair center for investigation and repair. Local, national or International Air Transport Association (IATA) transport regulations may restrict the shipment of faulty batteries. Check with your courier for restrictions and best practice guidelines. Your local Radiodetection representative will be able to direct you to our authorized repair centers.

⚠ WARNING: Exposing the battery to a high temperature above 60°C (140°F) may activate safety systems and cause a permanent battery failure.

Disposal

This symbol on the product, accessories or literature indicates that the product and its electronic accessories (for example, charger, headset and USB cable) must not be treated as domestic waste, but must be disposed of professionally. It is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your disposal service or product supplier.

Please dispose of this device in a manner appropriate to the relevant legal requirements at the end of its product life.

Batteries should be disposed of in accordance with your company's work practice, and / or the relevant laws or guidelines in your country or municipality.

1.2 Compliance

EU Compliance

This equipment complies with the following EU Directives:

RED (Radio Equipment Directive): 2014/53/EU

EMC (Electromagnetic Compatibility Directive): 2014/30/EU

EMF (Electromagnetic Fields Directive): 1999/519/EC

ROHS (Restriction of Hazardous Substances Directive): 2011/65/EU

WEEE (Waste Electrical and Electronic Equipment Directive): 2012/19/EU.

FCC Compliance Statement

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- The equipment may not cause harmful interference
- The equipment must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Modifications: Any modifications made to this equipment not approved by Radiodetection may void the authority granted to the user by the FCC to operate this equipment.

Industry Canada Compliance Statements

ICES-003 Class A Notice:

- This Class A digital apparatus complies with Canadian ICES-003.

Avis NMB-003, Classe A:

- Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

1.3 Intellectual property

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Trademarks and Notices. The following are trademarks of Radiodetection: RD5100, SideStep, Dynamic Overload Protection, eCert, TruDepth, RD Manager, Peak+, StrikeAlert. The design of the RD5100H$_2$O+ locators and transmitters has been registered. The design of the 4 chevrons has been registered.

The Bluetooth word, mark and logos are registered trademarks of Bluetooth Sig, Inc. and any use of such trademarks by Radiodetection is under license. Windows and Windows XP are either registered trademarks or trademarks of Microsoft Corporation in the United States and / or other countries.

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Section 2 Introduction

2.1 About this manual

This manual provides cable and pipe survey professionals with comprehensive operating instructions for the RD5100™H$_2$O+ locator and transmitter system. Before operating the RD5100H$_2$O+ system it is very important that you read this manual, noting all safety warnings, cautions and procedures.

Additional documentation

The full product specification and RD5100 Manager manual are available to download from www.radiodetection.com.

2.2 About the RD5100H$_2$O+

The RD5100H$_2$O+ locator is ergonomically designed to provide the operator with a balanced, light weight tool that encourages extended use in most environments.

A wide range of accessories are available to enhance the performance and to add extra functionality.

For more information about the Precision Locate Accessories Range, visit:

www.radiodetection.com/accessories

2.3 Extended warranty

RD5100H$_2$O+ locators and transmitters are covered by a one year warranty as standard.

Users can extend the warranty period to a total of three years by registering their products (locators and transmitters) within three months from purchase.

Registration is performed using the RD5100 Manager PC software. See Section 12.3 for further details.

From time to time Radiodetection may release new software to improve the performance or add new functionality to products. By registering the user will have the option of subscribing to e-mail alerts advising about any new software and special offers related to its product range.

Users can opt out any time from receiving software and technical notifications or just from receiving marketing material.

2.4 eCert^{TM}

The RD5100H$_2$O+ has been designed so that it does not require regular calibration. However, as with all safety equipment, it is recommended that a service should be carried out at least once a year either at Radiodetection's service center or an approved Radiodetection service center. Alternatively eCert^{TM} may be used to validate the calibration of the RD5100H$_2$O+ locator.

eCert is a novel Radiodetection technique that allows the user to validate the original factory calibration of the RD5100H$_2$O+ locator, providing the user with the confidence that the locator continues to meet its original factory calibration. eCert also carries out a functional test on the locator providing the user with the confidence that the locator continues to provide the same performance as it did when it first left the factory. eCert can be carried out on site without the need to return the locator to a service center, saving time and expense. Each time the locator passes eCert, the user can view or print a dated eCert validation certificate.

A detailed explanation of eCert is provided in Section 12.6.

2.5 Manual outline

Section 1 includes an overview of safety procedures and notices. Review them before moving on to Section 2 and the rest of this manual.

Section 2 provides an introduction to the RD5100H2O+.

Section 3 provides an overview of the RD5100H$_2$O+ system with annotated diagrams of the locator and transmitter.

Section 4 introduces basic setup and operation using the RD5100H$_2$O+ locator's menu system.

Section 5 introduces the theory and practice of cable and pipe location using the RD5100H$_2$O+ locator and transmitter.

Section 6 introduces depth and current readings.

Section 7 provides general locating tips.

Section 8 introduces the range of accessories that are compatible with the RD5100H$_2$O+ system.

Section 9 includes several appendices with reference material and other technical information.

2.6 Safety

Read this manual in its entirety before attempting to operate the RD5100H$_2$O+ locator or transmitter. Note all safety notices in the preface and throughout this manual.

You are responsible for determining whether the conditions are suitable for using this device. Always carry out a risk assessment of the site to be inspected.

Follow your company and national safety procedures and or requirements when operating this equipment in any environment or workplace. If you are unsure what policies or procedures apply, contact your company or site's occupational health and safety officer or your local government for more information.

Do not use this equipment if you suspect that any component or accessory is damaged or faulty.

Before inserting the earth stake into the ground, ensure there are no shallow cables or services that could be damaged by the earth stake.

Use authorized accessories only. Incompatible accessories may damage the equipment or give inaccurate readings.

If you intend to uncover a sub-surface utility by digging, you must follow your company, region and country's codes of practice for excavation.

Keep this equipment clean and arrange for regular services with an authorized Radiodetection service center. More information can be found in the Appendix or from your local Radiodetection representative.

It is important to regularly clean and sanitize products which may become contaminated through contact with foul water or other contaminants.

Headphone use: you need to remain alert to traffic and other hazards that are normally heard outdoors. Always turn the volume down before plugging headphones into an audio source and use only the minimum level, necessary to take your measurements. Excessive exposure to loud sounds can cause hearing damage.

Do not attempt to open or dismantle any part of this equipment unless directed specifically by this manual. Doing so may render the equipment faulty and may void the manufacturer's warranty.

You are responsible for determining whether you consider the measurement results to be valid and for any conclusions that are reached or any measures that are taken as a result thereof. Radiodetection can neither guarantee the validity of any measuring results nor can we accept liability for any such results. We are on no account able to accept liability for any damage which may be caused as a consequence of the use of these results. Please see the Standard Warranty Terms enclosed with the product for further information.

2.7 Training

Radiodetection provides training services for most Radiodetection products. Our qualified instructors will train equipment operators or other personnel at your preferred location or at Radiodetection headquarters.

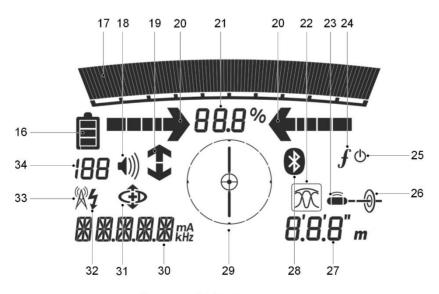For more information go to www.radiodetection.com or contact your local Radiodetection representative.

Figure 3-1: RD5100H$_2$O+ locator

Section 3 System overview

3.1 RD5100H$_2$O+ locator

Refer to Figure 3-1.

Locator features

1   Keypad.
2   Bluetooth® module antenna.
3   Liquid Crystal Display (LCD) with backlight.
4   Battery compartment.

NOTE: The RD5100H$_2$O+ is supplied with non-rechargeable D type batteries. It is possible to use a Li-Ion rechargeable battery pack by purchasing the optional battery compartment from Radiodetection.

5   Headphone jack.
6   Accessory socket.
7   Mini USB-B socket (Internal to battery compartment).
8   Speaker.

Locator keypad

9   Power key ⏻: Switches the unit on and off. Provides access to the set-up options menu.
10 Up arrow key ⬆: Increase gain (in power and radio modes).
11 Backlight sensor: Provides automatic control of the LCD display backlight.
12 Transmit key ⓉⓍ: Send an iLOC command to a paired transmitter.
13 Target Position Indicator (TPI) key ⊟: Turn TPI mode On/Off.
14 Down arrow key ⬇: Decrease gain (in power and radio modes).
15 Frequency key ƒ: Scroll through frequencies from low to high.

Locator display icons

16 Battery icon: Indicates the battery level.
17 Signal strength bargraph with peak marker.
18 Volume level.
19 Current direction arrows.
20 Null / Proportional Left/Right arrows: Indicates the location of the target relative to the locator.
21 Signal strength readout.
22 Antenna mode icon: Indicates mode selection (Guidance / Peak).
23 Sonde icon: Indicates that a sonde signal source is selected.
24 Transmitter communication status – confirms successful iLOC™ communication.
25 Transmitter standby indicator.
26 Line icon: Indicates that a line signal source is selected.
27 Depth: Indication of depth reading.
28 Bluetooth status icon: A flashing icon means pairing is in progress. A solid icon indicates a connection is active.
29 Compass: Displays the direction of the cable or pipe relative to the locator.
30 Measured values: Frequency or current readout (mode dependent).
31 Current Detection (CD) mode icon.
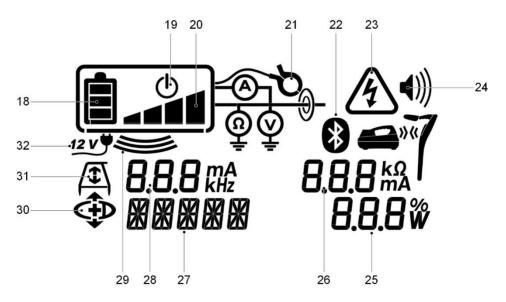32 Power mode icon.
33 Radio mode icon.
34 Sensitivity readout.

<p style="text-align: center">Figure 3-2: RD5100H$_2$O+Tx transmitter</p>

3.2 RD5100H$_2$O+ transmitter

Transmitter features

1   LCD.
2   Keypad.
3   Bluetooth® module.
4   Removable accessory tray.
5   Side support.
6   Speaker (internal).
7   D-cells battery holder.
8   Optional Lithium-Ion rechargeable battery pack.

Accessory tray contents

9   Earth stake: Spiral earth stake.
10 Magnet: Hi-strength magnet with M4 eyebolt.
11 Earth lead: Earth spool 10m.
12 Direct connection lead: Transmitter direct connection lead.

Transmitter keypad

13 Power key ⏻: Switches the unit on and off. Opens the transmitter menu.
14 Frequency key ⓕ: Selects frequency. Menu navigation key.
15 Measure key ⓥ: Used to take voltage and impedance measurements. Opens a sub menu.
16 Down arrow ⬇ key: Adjusts the output signal level. Scrolls through the menu options.
17 Up arrow ⬆ key: Adjusts the output signal level. Scrolls through the menu options.

Transmitter screen icons

18 Battery icon: Indicates the battery level.
19 Standby icon: Appears when the transmitter is in Standby Mode.
20 Output level: Displays an indication of transmitter output power as a bargraph.
21 Clamp icon: Indicates when a signal clamp or other accessory is connected.
22 Bluetooth® icon: Indicates status of Bluetooth.
23 Voltage warning indicator: Indicates that the transmitter is outputting potentially hazardous voltage levels.
24 Volume icon: Displays the volume level.

25 Output power level: Displays the output power in watts or as a percentage.
26 Resistance measurements: Displays the resistance or current in Direct Connection mode.
27 Alphanumeric description of selected operation mode.
28 Accessory or Measurement indicators: Indicates if an accessory is connected or if measure mode is active.
29 Induction indicator: Appears when the transmitter is in Induction mode.
30 CD mode: Indicates that the transmitter is in Current Detection mode.
31 A-Frame: Indicates when the transmitter is in Fault-Find Mode.
32 DC icon: Appears when the transmitter is powered from a DC source.

3.3 Using the locator and transmitter menu

The RD5100H$_2$O+ locator and transmitter menus allow you to select or change system options. Once entered, the menu is navigated using the arrow keys. Navigation is consistent on both the transmitter and the locator. In the menu the options will appear in the bottom left-hand corner of the display.

Note. When you browse the locator menu, the ⓕ and ⊖ keys act as left and right arrows. When browsing the transmitter menu the ⓕ and ⓥ keys act as left and right arrows. The right arrow enters a submenu and the left arrow selects the option and returns to the previous menu.

Navigating the locator menu

1   Press the ⏻ key to enter the menu.
2   Use the ⬆ or ⬇ keys to scroll through the menu options.
3   Press the ⊖ key to enter the option's submenu.
4   Use the ⬆ or ⬇ arrows to scroll through the submenu options.
5   Press the ⓕ key to make a selection and return to the previous menu.
6   Press the ⏻ key to return to the main operation screen.

Locator menu options

Table 3.1: Locator menu options

VOL	Adjust the speaker volume from 0 (mute) to 3 (loudest).
BT	Configure Bluetooth® options. Parameters include: • ON - Enable Bluetooth® • OFF - Disable Bluetooth® • RESET - Resets the Bluetooth® pairing • PAIR - Pairs the locator with the transmitter • STDBY - Places the locator in standby.
CDR	Performs a Current Direction (CD) Reset (Alternatively press and hold the ⓕ key when in CD mode).
INFO	Access information options. Parameters include: • ECERT - Displays the last eCert test date • TEST - Run a Self-Test • CAL - Display the date of the most recent service recalibration.
LANG	Select menu language.
FREQ	Enable or disable individual frequencies.
ALERT	Enable or disable Strike*Alert*.
COMPA	Enable or disable display of the Compass feature.

Navigating the transmitter menu

1. Press the ⓞ key to enter the menu.
2. Use the ⬆ or ⬇ keys to scroll through the menu options.
3. Press the ⓥ key to enter the option's submenu.

4. Use the ⬆ or ⬇ keys to scroll through the submenu options.
5. Press the ⓕ key to confirm selection and return to the previous level or exit the menu.
6. Press the ⓞ key to return to the main operation screen.

Transmitter menu options

Table 3.2: Transmitter menu options

VOL	Adjust the speaker volume from 0 (mute) to 3 (loudest).
FREQ	Enable or disable individual frequencies.
BOOST	Boost transmitter output for a specified period of time (in minutes).
LANG	Select menu language.
OPT F	Run SideStep*auto*™ to auto-select a locate frequency for the connected utility.
BATT	Set battery type: Alkaline, NiMH or Li-Ion. Select Eco mode (alkaline batteries only).
MAX P	Set the transmitter to output its maximum wattage.
MODEL	Match the transmitter setting to the model of your locator.
MAX V	Set the output voltage to maximum (90V).
BT	Configure Bluetooth® options. Parameters include: ON - Enable Bluetooth® OFF - Disable Bluetooth® RESET - Resets the Bluetooth® pairing PAIR - Pairs the locator with the transmitter STDBY - Places the locator in standby.

Section 4 Operation

4.1 First use

Power options

RD5100H$_2$O+ systems are shipped as standard configured to use non rechargeable D-cell alkaline batteries.

Both the locator and transmitter can also be powered using good quality rechargeable D-cell NiMH batteries. In addition the locator and transmitter can be powered respectively by optional accessory NiMH and Li-Ion rechargeable battery packs. It's important to set the correct battery chemistry in the locator to optimize performance, see Section 4.5.

Transmitters can also be powered using optional accessory mains or vehicle power adapters.

Inserting batteries

RD5100H$_2$O+ systems are shipped with non-rechargeable D-cell battery trays. Suitable alkaline or NiMH batteries should be fitted in the battery compartment before your first use.

On the Locator:

To fit the D-cell batteries in the locator, unlatch the battery compartment as shown in Figure 4.1.
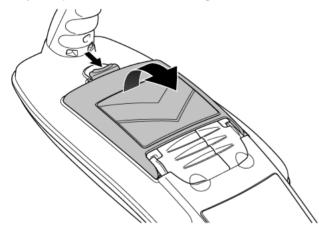

Figure 4.1: Open the battery compartment

Insert two good quality D-cell batteries as shown in Figure 4.2.

NOTE: Pay attention to the polarity of the cells when inserting them in the battery tray.
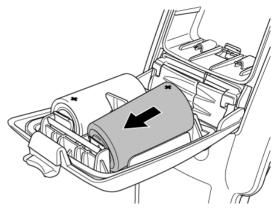
Close the battery compartment.

Figure 4.2: Inserting locator batteries

On the transmitter:

To fit the D-cell batteries in the transmitter, unlatch the accessory tray. The battery compartment is located underneath the transmitter body. Use the turnkey to unlatch the battery compartment. Insert eight D-Cell Alkaline or NiMH batteries.
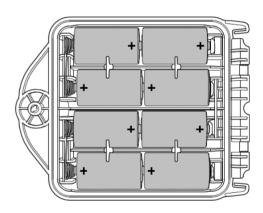

Figure 4.3: D-cell battery trays

Battery status

The locator and transmitter displays provide a battery level indicator (Refer to the illustrations in Section 3). When battery replacement is necessary, the display shows a flashing battery icon.

NOTE: Prolonged use of high power output on the transmitter will reduce battery life.

Removing / fitting battery packs

Locator battery pack:

1   Open the battery compartment using the release catch (Refer to Figure 4.1).

2   If using a Li-Ion battery pack un-plug the lead connector (Refer to Figure 4.7).

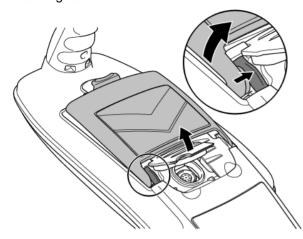3   Lift the accessory cover slightly and press the battery retaining latch inwards.

Figure 4.4: Press the retaining latch inwards

4   Rotate the battery pack away and up from the latch.

5   Repeat on the other side to release the battery pack completely then lift the battery pack away.
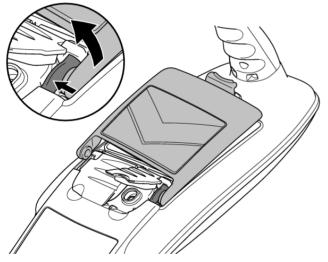

Figure 4.5: Repeat then lift the battery pack away

To fit a new battery, lift both accessory covers slightly, then gently push the replacement pack into place until it

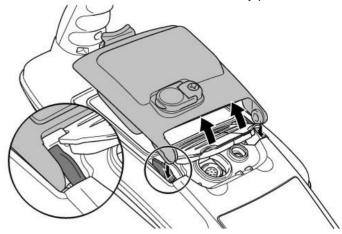clicks on both sides, then close the battery pack.

Figure 4.6: Installing a new battery pack

If using the Li-ion battery pack, plug the lead into the battery connector (Refer to Figure 4.7).
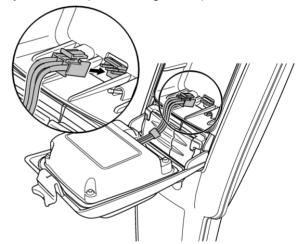

Figure 4.7: Connecting the Li Ion lead

NOTE: Fully charge your lithium-ion battery pack before its first use.

Transmitter battery pack:
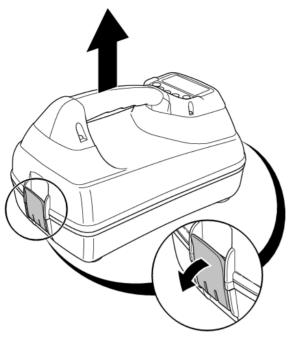
1   Unlatch then remove the accessory tray.

Figure 4.8: Release then remove the accessory tray

2 Turn the release catch, then open the battery compartment.

3 Release the retaining catch (Refer to Figure 4.10) by pressing gently, then lift the battery pack away.

4 Line up the battery pack clips with the corresponding recesses on the transmitter body and press into place (Refer to Figure 4.11).

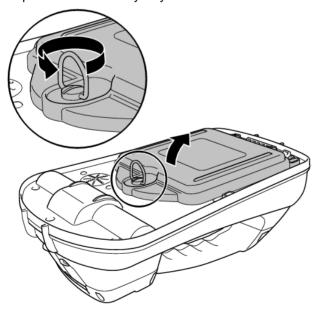5 Close the battery pack, turn the retaining latch and replace the accessory tray.
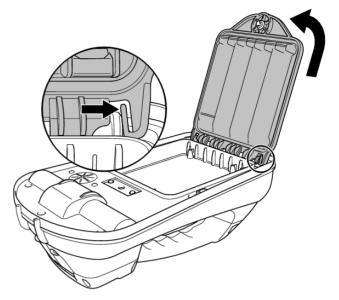

Figure 4.9: Opening the battery compartment

Figure 4.10: Press the release catch and lift the battery pack away
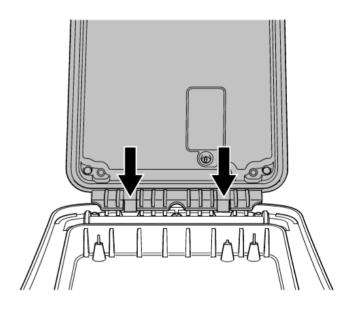

Figure 4.11: Line up the battery pack and press into position

Charging the lithium ion packs

⚠ WARNING: Do not heat the rechargeable battery pack above 45°C (113°F) as this will damage the battery's thermal fuses.

Locator Li-Ion battery pack

To recharge the locator battery pack, connect the battery charger to the DC input connector on the front of the battery pack.
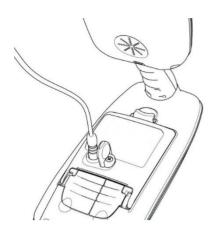
4.3 Keypad actions & shortcuts

Locator key actions

Table 4.1 - Locator key actions

Key	Short press	Long press
⏻	Enter the menu	Switch power off
ƒ	Scroll through locate frequencies from low to high	-
⬭	When using active frequencies: Turn Target Position Indicator (TPI) ON/OFF.	-
⬆⬇	Increase and decrease gain. RD5100H$_2$O+ automatically sets gain to mid-point when pressed	Rapidly increase and decrease gain steps in 1dB increments
Tx	Send iLOC command to a paired transmitter	Enter the Transmitter power setting for use over iLOC

Figure 4.12 - Charging the locator Li-ion battery pack

Transmitter Li-Ion battery pack

To recharge the battery pack, remove the pack from the transmitter and connect the transmitter battery charger.

Figure 4.13 - Charging the transmitter Li-Ion battery pack

For more information about recharging batteries see the instructions that came with your charger.

4.2 Power on / off

Switch the locator or transmitter on by pressing the ⏻ key.

To switch the locator or transmitter off, press and hold the ⏻ key until the screen blanks off.

NOTE. The locator will automatically power off after 5 minutes if no keys are pressed.

Transmitter key actions

Table 4.2 - Transmitter key actions

Key	Short press	Long press
⏻	Enter the menu	Switch power off
ƒ	Scroll through locate frequencies from low to high	-
V A Ω	Take voltage and impedance measurements using selected frequency	Take voltage and impedance measurements at a standardized frequency
⬆ ⬇	Adjusts the output signal	Select standby ⬇ / maximum standard power ⬆

NOTE: to scroll through frequencies from high to low, hold ƒ while pressing the ⬇ button (applies to both locators and transmitters).

4.4 Locate modes

The RD5100H$_2$O+ locator supports automatic selection of Guidance and Peak modes to suit the particular application or the local environment. The locator switches to Guidance mode when an active frequency is selected and Peak mode when a passive frequency is selected.

PEAK: For accurate locating, the Peak bargraph provides a visual readout of the signal strength. The Peak signal is found directly over the buried utility (Peak mode is automatically selected in Power or Radio modes).

GUIDANCE: Proportional arrows and a switchable ballistic directional 'needle' (TPI) combine with audio left/right indication for rapidly tracing the general path of a buried utility.

Switch the TPI ON/OFF by holding the ⊜ key. Guidance mode is automatically selected with active frequencies which include: 512Hz/640Hz, 4096Hz, 8kHz, 9.8kHz, 33kHz, 65kHz, 83kHz and 131kHz.

For more information on selection of locator modes to assist with cable and pipe location, refer to Section 5.2.

4.5 System setup

The RD5100H$_2$O+ locator and transmitter settings can be accessed via the menu. Once in the menu it is possible to change settings according to your personal preferences and operating requirements. Some examples of setting changes are shown below.

Refer to the locator and transmitter menu options (Table 3.2) for more information.

NOTE: These procedures refer to both the transmitter and locator unless stated otherwise.

Before changing settings, ensure the locator or transmitter is switched on by pressing the ⏻ key for two seconds.

Language

The locator and transmitter support a number of languages. You can specify your preferred language using the menu system.

To select your preferred menu language:

1 Press the ⏻ key to enter the menu.

2 Scroll to the **LANG** menu using the ⬆ or ⬇ keys.

3 Press the ⊜ key (on the locator) or the V A Ω key (on the transmitter) to enter the LANG menu.

4 Scroll through the language options using the ⬆ or ⬇ keys.

5 Press the ƒ key to accept your selection and return to the main menu.

6 Press the ⏻ key to return to the main operation screen.

Battery type

RD5100H$_2$O+ locators and transmitters support Lithium-Ion, Alkaline or Nickel Metal Hydride batteries.

The RD5100H$_2$O+ locator automatically adjusts to the battery type used.

Set the RD5100H$_2$O+Tx transmitter battery type to match the currently installed type. This is to ensure optimal performance and correct battery level indication.

To set the battery type on the RD5100H2O+Tx:

1 Press the ⏻ key to enter the menu.

2 Scroll to the **BATT** menu using the ⬆ or ⬇ arrows.

3 Press the V A Ω key on the transmitter to enter the BATT menu.

4 Scroll through the battery options using the ⬆ or ⬇ keys.

5 Press the ƒ key to accept your selection and return to the main menu.

6 Press the ⏻ key to return to the main operation screen.

Power network frequency

Locator units are available to purchase with either 50Hz or 60Hz. This parameter is not customer configurable.

Measurement units

Locator units are available to purchase with either Metric or Imperial (USA customary) units. This parameter is not customer configurable.

Enabling / disabling frequencies

The locator and transmitter support a wide range of frequencies and there may be times when some of these frequencies are not used. It is possible to quickly enable or disable frequencies using the menu system.

To enable or disable frequencies:

1   Press the ⏻ key to enter the menu.

2   Scroll to the **FREQ** menu using the ⬆ or ⬇ keys.

3   Press the ⊖ key (on the locator) or the key (on the transmitter) to enter the FREQ menu.

4   Scroll through the frequency options using the ⬆ or ⬇ keys.

5   Press the ⊖ key (on the locator) or the key (on the transmitter) to enter the frequency.

6   Scroll to OFF or ON using the ⬆ or ⬇ keys.

7   Press the ⓕ key to accept your selection and return to frequency menu.

8   If you wish to make any further changes follow steps 4 to 6. If you do not wish to make any further changes press the ⓕ key twice to return to the main operation screen.

Volume control

The transmitter and locator feature an internal speaker to provide critical warnings and assist with cable and pipe location.

To adjust audio level:

⚠ WARNING: Muting audio on the locator will disable the Strike*Alert* audio alarm.

1   Press the ⏻ key to enter the menu.

2   Scroll to the **VOL** menu the ⬆ or ⬇ arrows.

3   Press the ⊖ key (locator) or the key (transmitter) to enter the **VOL** menu.

4   Scroll through the volume options using the ⬆ or ⬇ keys.

5   Press the ⓕ key to accept your selection and return to the main menu.

6   Press the ⏻ key to return to the main operation screen.

4.6 Dynamic Overload Protection™

Dynamic Overload Protection™ (DOP) allows you to locate accurately in areas with high levels of electromagnetic interference, such as sub-stations and beneath high-voltage transmission lines. DOP works by disregarding signal spikes that would otherwise overwhelm the RD5100H$_2$O+ locator's digital signal processor. DOP is an integrated feature of all RD5100H$_2$O+ locators. No action is required by the user.

NOTE: In cases of high levels of electromagnetic interference, the DOP will not be able to prevent the RD5100H$_2$O+ from becoming overloaded. If the RD5100H$_2$O+ becomes overloaded, users will be alerted by a flashing mode icon. Both the depth and current measurements will be disabled in the event of an overload.

4.7 TruDepth™ measurement

The RD5100H$_2$O+ locator uses TruDepth™ to measure depth automatically when a good quality reading can be assured.

NOTE: TruDepth only indicates a locate depth when:

- The locator is correctly oriented above the target line, cable or sonde
- The local signal conditions are assessed as be good enough to ensure an accurate reading.

To help you orientate the locator correctly, you can use the locator's compass feature on the screen.

Depth measurement values are displayed in either metric or imperial units which are factory configured.

For more information on measuring depth, refer to Section 6.

4.8 Strike*Alert*™

Strike*Alert*™ detects the possible presence of shallow utilities, and warns the operator with a series of flashing asterisks on the display and an audible alarm, characterized by a rapid warbling sound.

Strike*Alert* will activate in Power, Active transmit and sonde locate modes.

RD5100H$_2$O+ locators are shipped with Strike*Alert* enabled by default; this can be disabled by accessing the

Strike*Alert* ('ALERT') menu and setting StrikeAlert to OFF.

Strike*Alert* can also be disabled using the RD5100 Manager PC software. Refer to the RD5100 Manager operation manual for further information.

⚠️ WARNING: Muting audio on the locator will disable Strike*Alert* Audio alarm.

4.9 Backlight

The transmitter and locator feature a backlight to improve LCD visibility when required. The locator's backlight is controlled by an ambient light sensor and does not require adjustment by the user.

The transmitter's LCD backlight is activated whenever you press a key. The backlight will automatically switch off after a few minutes.

4.10 Bluetooth wireless

RD5100H2O+ locators feature a Bluetooth wireless module as standard, providing the ability to connect to a RD5100H2O+ Tx transmitter.

Refer to Section 12 for further information about Bluetooth wireless connections and how to pair your devices.

NOTE: The RD5100H2O+ locator wireless features may be subject to national and or local regulations. Consult your local authorities for more information.

⚠️WARNING! Do not attempt any wireless connection in areas where such technology is considered hazardous. This may include: petrochemical facilities, medical facilities or around navigation equipment.

4.11 Transmitter power output

The transmitter supports several power output modes to help you select the optimal settings for your requirements whilst helping to prolong battery life.

Adjusting power output

To adjust the power output:

1   Press the ⬆️ or ⬇️ keys to increase or decrease power output.

Boost

Boost allows the transmitter to output its maximum output power. Boost mode can be set to operate for a specified period of time.

To configure boost:

1   Press the ⏻ key to enter the menu.

2   Scroll to the **BOOST** menu using the ⬆️ or ⬇️ keys.

3   Press the key to enter the BOOST menu.

4   Set the BOOST duration using the ⬆️ or ⬇️ keys. You can choose 5, 10, 15 and 20 minute periods or ON for continuous operation.

5   Press the *f* key to accept your changes and exit the BOOST menu.

6   Press the ⏻ key to exit the menu.

To enable boost:

1   First configure the boost duration using the procedure above.

2   Press and hold the ⬆️ key until **BOOST** appears on the transmitter LCD.

3   The transmitter will automatically exit boost mode after the selected duration.

To disable boost:

1   Press the ⬇️ key to disable boost.

4.12 Transmitter Eco mode

When using alkaline D-Cells in the transmitter you can extend the effective use of the batteries by enabling Eco mode.

In Eco mode the power output of the transmitter reduces when the batteries can no longer provide the required output power.

When Eco mode is active and the power output has been reduced, the display alternates between 'POWER' and the current output power level.

The transmitter will emit three beeps every time the power is reduced. It will then continue emitting two beeps each minute whilst it operates at a reduced power level.

To enable or disable Eco mode.

1 Press the ⏻ key to enter the menu

2 Scroll to the **BATT** menu using the ⬆ or ⬇ keys and enter it by pressing the key.

3 Scroll through the battery options using the ⬆ or ⬇ until **ALK** is displayed. Press the key.

4 Use the ⬆ or ⬇ until **ECO** is displayed and press the ⨍ key to enable Eco Mode.

Or

Select **NORM** and press the ⨍ key to disable Eco mode.

5 Press the ⏻ key to exit the menu.

4.13 Measure mode

The transmitter has the capability of providing impedance measurements by determining the resultant impedance across the crocodile clips of the Direct Connection lead while connected to the utility. These measurements can be useful when assessing sheath fault severity. It is also possible to measure potential voltage that may be present on utilities to warn of potentially dangerous or harmful voltages present.

In measure mode the measurement is derived from an AC signal applied to the utility from the transmitter.

Impedance & voltage measurements

1. Connect the Direct Connection leads to the utility and switch on the transmitter.

2. Hold down the key until **MEAS** is displayed and the measuring icon is activated.

    The transmitter display will now indicate the voltage level measured across the connection leads.

3. Press the key once and the display will indicate the impedance measured across the connection leads.

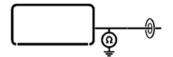   The measurement icon will display the following symbols:

4. To exit **MEAS** mode hold down the key until the display reverts back to the normal operating screen.

Impedance measurements using active frequency

1. Connect the Direct Connection lead to the utility and switch on the transmitter.

2. Select the preferred frequency and output the signal.

3. Press the key once and the display will indicate the impedance measured across the connection leads and also the output power of the transmitter.

4. Press the key once to return to the normal operating screen.

Section 5 Locating cables and pipes

This section introduces the principals and techniques of locating buried cable and pipe utilities with the RD5100H$_2$O+ system. For more information on the theory of cable and pipe location, refer to *ABC & XYZ of locating buried pipes and cables*, which is available to download from www.radiodetection.com

5.1 Frequencies

The RD5100H$_2$O+ locator supports a range of active and passive frequencies.

For a complete list of supported frequencies, refer to www.radiodetection.com

Passive frequencies

Passive frequency detection takes advantage of signals that may be present on buried metallic conductors. The RD5100H$_2$O+ locator supports two types of passive frequencies: **Power** and **Radio** signals.

You can detect these frequencies without the aid of a transmitter if they are present on the utility you are surveying.

Active frequencies

Active frequencies are applied to a buried conductor using the transmitter. The transmitter can apply a signal using three methods:

Direct Connection

In Direct Connection, you connect the transmitter output directly to the utility. The transmitter will then apply a discrete signal which you can locate using the locator. This is the preferred method of applying a transmitter signal to a utility and in the majority of applications will apply a stronger signal to the utility, which may increase the locate distance.

To directly connect to a non-energized conductive utility:

1 Switch the transmitter off.

2 Connect the Direct Connection lead into the transmitter accessory socket.

3 Clip the red connection lead to the utility ensuring that the area around the connection is clean and that a positive connection is achieved.

4 Clip the black connection lead as far away as possible and at 90° to the ground stake or suitable ground point nearby ensuring that a positive connection is achieved.

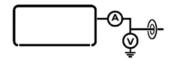5 The display will show the Direct Connection lead connected icon.

Figure 5.1 - Direct connection lead icon

For more information about other signal connection accessories, refer to Section 8.

⚠ WARNING: Direct Connection to live conductors is POTENTIALLY LETHAL. Direct connections to live conductors should be attempted by fully qualified personnel only using the relevant products that allow connections to energized lines.

⚠ WARNING: The transmitter is capable of outputting potentially lethal voltages. Take care when handling the terminals, connection leads and ground stake, notify other technicians working on the line of the hazard and guard exposed conductors to prevent accidental contact.

Induction

In this mode of operation the transmitter is placed on the ground over or near the survey area. If a Direct Connection lead or signal clamp is not plugged into the transmitter, it will automatically go into induction mode. In this mode, only frequencies applicable for induction mode will be made available as the ⓕ key is pressed.

Once activated the transmitter will induce the signal indiscriminately to any nearby buried conductors.

Please note that these signals will also be airborne and it is advisable to keep the distance between the transmitter and locator at least 10m / 30ft – this distance may need to be increased, particularly if depth measurements are taken.

Signal clamp

An optional signal clamp can be connected to the transmitter and clamped around a cable or pipe to apply the transmitter signal. This method of applying the transmitter signal is particularly useful on insulated live wires and removes the need to disconnect the supply to the cable. Clamps are available up to 215mm / 8.5" in diameter.

⚠ WARNING: Do not clamp around uninsulated live conductors.

⚠ WARNING: Before applying or removing the clamp around a power cable, ensure that the clamp is connected to the transmitter at all times.

Selecting frequencies

It is important to select the correct or appropriate frequency for your particular application. For more information see Section 5.1 or refer to the application note "ABC & XYZ of Locating Buried Pipes and Cables", which is available as a free download from www.radiodetection.com

To select a frequency on the locator:

1   Press the ⓕ key to cycle through available frequencies.

2   Alternatively, hold down the ⓕ key and press the ⬆ or ⬇ keys to cycle up or down the range of frequencies.

If locating using an active frequency you must also set your transmitter to output the matching frequency.

You can change your transmitter's output frequency manually using your transmitter's keypad.

To manually select a transmitter output frequency:

1   Press the ⓕ key to cycle through available frequencies.

NOTE: Some frequencies require that you connect an accessory.

5.2 Locate modes

The RD5100H$_2$O+ system supports two locate modes, exclusively dedicated to locating cable and pipes, and to suit your particular application or the local environment. The locator automatically selects the required mode dependent on the selected frequency. Available modes are:

- Guidance
- Peak.

Guidance mode

Guidance arrows provide visual indication of the direction to the target utility, and are designed to get you close to the Peak position faster, before using the TPI to pinpoint the target utility.

Guidance mode is automatically selected when an available active frequency is selected on the locator (Active frequencies include: (512Hz / 640Hz)[i], 4096Hz, 8kHz, 9.8kHz, 33kHz, 65kHz, 83kHz, 131kHz, 200kHz)

NOTE. [i]Model configuration dependent.

Guidance mode offers good performance in distorted fields and provides three indicators to guide the user towards the target line.

The Left and Right Proportional Arrows become shorter as the locator approaches the target, and the TPI needle will move towards its central position. The Signal Strength reading will also reach its maximum value when the locator is positioned above the target.

Any deviation from all three indicators showing the target position in the same location could signal the presence of a distorted field.

In Guidance mode the following indicators are displayed:

- Proportional left and right arrows
- Target Position Indicator (TPI) needle (When enabled)
- Signal strength
- Gain
- Compass
- Current
- Depth.

To select Guidance mode:

Press the ⓕ key to select the required active frequency.

The Guidance mode icon 🉐 is displayed on the LCD.

To enable TPI:

Select Guidance mode then press and hold the ⊖ key to toggle the TPI On / Off.

When using Guidance arrows

Use the proportional arrows to guide the locator along the path of the target cable or pipe.

Peak mode

Peak mode provides the most sensitive and accurate mode for location and depth measurement. It provides a sharp peak response with a corresponding small decrease in sensitivity. Peak mode is automatically selected in Power and Radio modes.

In Peak mode the following indicators are displayed on the LCD:

- Depth (Power mode only)
- Signal strength
- Gain
- Peak bargraph.

To select Peak mode:

1   Press the ⓕ key to select either Power or Radio mode. The Peak mode icon ⌂ is displayed on the LCD.

NOTE: In Power mode the depth value will display automatically, although this value should not be considered accurate until the locator is directly over the target line.

5.3 Compass

The LCD compass provides a visual indication of the direction of the target cable, pipe or sonde. The compass is available for all frequencies apart from Power and Radio. Compass can be enabled or disabled in the configuration menu.

5.4 Trace

Line tracing can be accelerated by switching the locator to Guidance mode with the TPI enabled.

Move the locator left and right while walking along the path of the line to place the TPI needle directly over the line. As you move the locator over the line, the left and right arrows (and an accompanying tone) will indicate if the target line is to the left or right of the locator.

Move the locator to find the Null position. If the position of the Peak and the Null pinpoints correspond, it can be assumed that the pinpoint is accurate. The pinpoint is not precise if the marks do not correspond, but both marks will show an error to the same side. True line position will be close to the Peak position.

The line lies half the distance to the other side of the Peak position as the distance between the Peak and the Null positions.

5.5 Sweep and search

There are a number of techniques available for locating unknown lines in an area. Using these techniques is particularly important before conducting any excavation work to help ensure that buried lines are not damaged.

Passive sweep

A passive sweep is used to locate Power or Radio signals that may radiate from buried conductors.

To perform a passive sweep:

1   Press the ⓕ key to select the passive frequency you wish to locate. You can select from the following passive frequencies:

    • Power

    • Radio.

2   Adjust the sensitivity to maximum; reduce the sensitivity to keep the bar graph on scale when there is a response.

3   Traverse the area in a grid search, at a steady walk, and hold the locator comfortably with the locator in line with the direction of movement and at right angles to any lines that may be crossed.
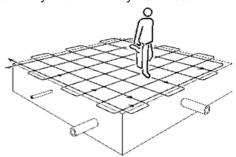

Figure 5.2 - Passive sweep

Stop when the locator response rises to indicate the presence of a line. Pinpoint the line and mark its position. Trace the line out of the area being searched. Resume grid search in the area.

In some areas there may be a confusing amount of 50Hz / 60Hz power signals. Lift the locator 50mm (2") from the ground and continue the sweep.

Switch the locator to Radio Mode. Increase sensitivity to maximum and repeat the above grid search procedure over the area. Pinpoint, mark, and trace out any lines that are located.

In most, but not all areas, Radio mode will locate lines that do not radiate power signals and a grid search should be made in both Power and Radio modes.

Inductive search

An inductive search procedure is a more certain technique for locating unknown lines. This type of search requires a transmitter and locator and two people. This type of search is referred to as a 'two person sweep'. Before starting the sweep, define the area of search and the probable direction of lines crossing the area. Ensure the transmitter is switched on in induction mode.
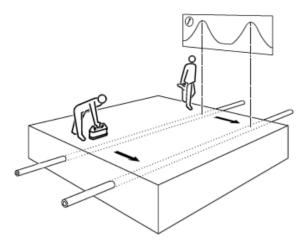
Figure 5.3 - Inductive search

The first person operates the transmitter and the second person operates the locator. The transmitter induces a signal onto lines as it passes over them and the lines are then detected with the locator at a suitable distance away from the transmitter (around 15m (50ft) – although this will depend upon the level of induction power used).

Hold the transmitter with its length aligned with the assumed direction of any lines.

The second person holds the locator at the start of the area to be searched and with the locator at right angles to the probable direction of the buried lines. Set the locator sensitivity level as high as possible without the locator picking up any airborne signals directly from the transmitter.

When the transmitter and locator are in line both operators start to move forward in parallel. The operator with the locator sweeps it backwards and forwards, keeping the locator vertical, as they proceed in parallel with the transmitter. This method allows for misalignment of the transmitter, locator and buried line.

The transmitter applies the strongest signal to the lines directly below it, which are then located with the locator. Move the transmitter from side to side to establish the highest signal which indicates that the transmitter is also directly above the line(s).

Mark the ground at the point of each Peak signal detected with the locator. Repeat the search along any other possible paths of lines. Once the positions of any lines have been marked, reverse positions, place the transmitter over and along each line in turn, and trace the line out of the search area.

Section 6 Depth and current readings

6.1 TruDepth™

The RD5100H$_2$O+ locator provides automatic measurement of depth for buried cables, pipes and sondes when the locator is correctly orientated above the target line or sonde.

Current readings are also displayed simultaneously if the locator is orientated correctly (feature not available in sonde or passive frequency modes).

Depth and current readings are automatically displayed simultaneously but if the locator is not correctly orientated neither reading will be displayed.

Depth range and accuracy vary depending on the makeup and type of target utility (for example, cable, pipe or sonde), its depth and external environmental factors like electromagnetic noise, ground conditions and interference.

⚠ WARNING: The accuracy of depth measurement is subject to a number of factors and is meant as a guide only. Never use the depth measurement to define mechanical digging depths. Always follow local safe digging guidelines.

The depth measurement is to the center of the pipe, cable or sonde. The best readings are typically detected from 'active' signals output by a transmitter rather than from passive sources.

The RD5100H$_2$O+ locator is capable of determining cable depth when locating some passive power signals. However passive signals on lines are less suited for measuring depth because accuracy can be compromised by interference, for example, due to the passive signal being present on more than one line.

⚠ WARNING: Do not make depth measurements near bends or tees in the line. Go at least 5m (16ft) from a bend for best accuracy.

TruDepth for buried conductors or sondes

TruDepth and Compass

It is important to note that the RD5100H$_2$O+ locator will only display depth and current (in applicable modes) when the locator is correctly orientated above the target line, cable or sonde. To ensure the locator is correctly orientated, use the Compass[(i)] feature.

NOTE. [(i)]The Compass feature is not a magnetic or GPS enabled compass. The displayed position (north, south, east and west) is relative to the active frequency signal detected by the locator.

When locating lines, make sure the Compass display is in the north-south orientation position.

When locating sondes (see Section 8.4), make sure the Compass display is in the east-west orientation.
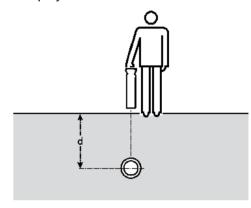

Figure 6.1 - Taking a depth reading

To minimize signal distortion, do not apply the signal by induction. If Direct Connection or signal clamping is not possible, place the transmitter in induction at least 15m (50ft) from the point of any depth measurements.

Depth measurements may not be accurate if there is audible interference or if part of the transmitter signal has coupled to a nearby line.

Confirming the Peak position coincides with a Null position indicates that the position is suitable for making a depth estimate.

Figure 6.2 - Depth readings

- Pinpoint the target line accurately with the locator
- Check the locator is directly over the line, and at right angles to it and the locator is vertical. Adjust the sensitivity level to bring the bar graph indication to approximately 50%.

If the ground appears to radiate a strong field, perhaps near a radio station, check the depth by holding the bottom of the locator 50mm (2") above the ground and subtract this reading from the indicated depth.

6.2 Verifying depth measurements

Check a suspect or critical depth reading by lifting the locator 50mm (2") above the ground and repeating the measurement. If the measured depth increases by the same amount it is a good indication that the depth reading is correct.

When locating for a conductor or sonde, depth measurements should be precise to ±3% if conditions are suitable. However, you may not always know if the conditions are suitable so the following techniques should be used to check critical readings:

• Check that the route of the line is straight for at least 2m (6ft) to either side of the measurement point

• Check that the signal response is reasonably constant over the 15m distance to the transmitter and make depth measurements to either side of the original point

• Check that there are no adjacent lines carrying a significant signal within 1 to 2m (3 to 6ft) of the target line. This is the most common source of error of depth measurements as a strong signal coupled to an adjacent line can often introduce ±50% error

• Make several depth measurements at points slightly displaced from the line's apparent position. The shallowest indication will be the most accurate and will also indicate the line's position most accurately.

Checking depth accuracy

This paragraph describes several quick and easy ways of verifying that the depth reading on the locator when used for markers or conductors and sondes is within acceptable limits.

Refer to this if you are getting inaccurate depth readings from a cable or pipe for which you know the approximate depth. Inaccurate depth readings could be the result of the locator picking up a stronger signal such as another cable or pipe running in close parallel to the target pipe or cable.

There are two ways of checking the calibration of the locator in the field. Both methods require the use of a transmitter:

Method 1

Place the transmitter on top of a non-metallic object, 18" / 500mm in height or more, on the ground and away from any buried lines. Switch the transmitter on in induction mode. Hold the locator with the blade horizontal and pointing towards the front of the transmitter and approximately 5m from the front of the transmitter.

1   Switch the locator on.

2   Select the same frequency as is selected on the transmitter but make sure that this frequency is in the sonde mode.

3   Move the locator from left to right and when the bargraph reading is at its Peak note the depth as indicated on the locator. Measure the distance from the base of the locator to the center of the transmitter using a tape measure.

4   Compare this reading with the depth reading on the locator.

The locator can be considered accurate if the difference between the depth reading on the locator and the distance measured with the tape is less than 10%.

Method 2

1   Apply a signal to a cable or pipe of known depth.

2   Locate the cable or pipe; the locator will display depth on the LCD automatically.

3   Compare the depth reading on the locator with the actual depth.

NOTE: The accuracy of depth measurement is subject to a number of factors and is meant as a guide only. Exercise caution when performing any excavation.

6.3 Current readings

Identifying a utility using current measurements

Measuring current value on a line helps confirm the identity of the line and may provide information about the condition of cable insulation or pipe coating.

About current measurements

The transmitter applies a signal or current onto a target line. The current decreases in strength as the distance from the transmitter increases. This rate of decrease depends on the type of line and on soil conditions. Regardless of the type of line and the frequency being used the rate of decrease should be regular with no sudden drops or changes. Any sudden or abrupt current change indicates that the line or its condition has changed.
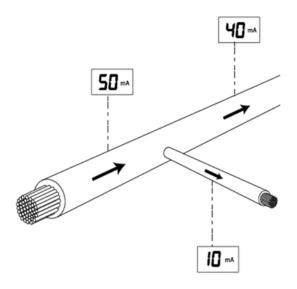
Figure 6.3 - Current readings

In congested areas, where there is more than one line, the locator may sometimes detect a stronger signal from an adjacent line to which the signal has coupled or shares common grounding because it is nearer the surface. Although current measurement compensates for depth, signal response will be less as the depth increases.

The line with the highest current measurement, rather than the line giving the strongest response, is the target line to which the transmitter signal has been connected.

Measuring current provides useful information about the position of bends and intersections. Measuring current after a tee will indicate the main line that pulls more current along its greater length.

Figure 6.4, Figure 6.5 and Figure 6.6 - Taking current readings

Applying a transmitter signal

The transmitter signal can be connected, clamped or induced to the target line in the same way as the signal for line tracing is applied.

⚠ WARNING: Direct Connection to live conductors is POTENTIALLY LETHAL. Direct Connections to live conductors should be attempted by fully qualified personnel only using the relevant products that allow connections to energized lines.

Signal current measurements

Pinpoint the line and confirm the accuracy of the Peak pinpoint with null arrows. Check the locator is directly over the line, with the locator at right angles to it and vertical.

The locator will automatically estimate and display depth on the LCD.

A signal coupled to a nearby line may distort the accuracy of the measurement. If the accuracy of the reading is suspect, sweep the area to check if other nearby lines are radiating the signal. If other signals are causing interference, it may be necessary to make the current measurement at another point along the line.

Because current measurement is a function of depth, it is only available in active locating modes.

Figure 6.7 - Current readings using transmitter signals

Section 7 Locating techniques

7.1 Identifying target utilities

Induction

If several conductors are running in parallel, and it is not possible to connect a transmitter, each line may be located separately. Proceed as follows:

1   Perform a sweep of the area to find the position and number of conductors in the area.

2   Map the direction in which the conductors are going.

To trace the lines:

1   Select induction mode on the transmitter.

2   Select the same frequency as on the locator.

3   Place the transmitter on its side and in line with a conductor (Use the side support tab).

4   Ensure the conductor is directly below the transmitter.

5   This will 'null out' the signal directly below the transmitter, placing no signal on that conductor, and enable the other conductors to be located.

6   Locate each conductor and mark its position.

7   Move the transmitter down the route and continue locating and marking.

8   Trace each conductor out of the search area until the target can be accurately located.

Unwanted signal coupling

Unwanted coupling of the signal from the target line to another nearby line is one of the most common location problems. It leads either to an error in the marked position and depth of the target line or to marking the wrong line. A certain degree of coupling is unavoidable in many situations but there are ways in which a careful user can reduce coupling and increase location reliability.

* Avoid applying the signal by induction. The signal may be coupling to more than one line directly from the transmitter. Use the signal clamp where possible

* Identify points where lines may be bonded or in close proximity to each other. Work toward these points rather than away from them. For example, if gas and water pipes are bonded within a building, apply the signal at the valves or access points in the road rather than in the building

* Reduce coupling to a parallel line by using a low signal frequency where available

* Return signal flowing on another line. Use a double-ended connection to by-pass the ground return if possible

* Choose a signal application point where the line is furthest from other lines and not in a congested area

* When using single-ended connection, site the ground stake as far from the target line as possible and away from other buried lines

* Avoid using existing structures for ground connections; other buried lines may be bonded to them

* A bad ground connection or just laying the ground lead on the surface at right angles to the line may result in less coupling than a good ground provided long distance tracing is not required.
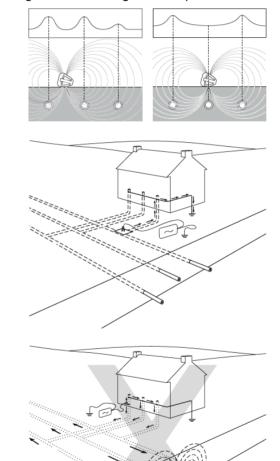
Figure 7.1, Figure 7.2, Figure 7.3 and Figure 7.4 - Nulling utilities & interference from services

Section 8 Using accessories

8.1 About accessories

The transmitter is compatible with a range of accessories.

When an accessory is connected, the transmitter will recognize it and will enable the mode appropriate to the accessory.

Radiodetection supply an accessory sheet with pictures and details of all applicable accessories which is available on www.radiodetection.com

For a full list of supported accessories that are available for purchase, refer to the appendix.

8.2 Headphones

Radiodetection supplies an optional headphone set for the RD5100H$_2$O+ locator. The headphones feature an adjustable headband to ensure a tight fit when used in the field. The accessory headphones also feature volume adjustment for both left and right speakers.

Connect the 3.5mm headphone jack into the locator's headphone socket, which is located next to the accessory panel.

⚠ WARNING: Before wearing headphones, lower the locator's volume levels to help prevent damage to your hearing.

⚠ WARNING: Wearing headphones may impede your awareness to dangers in the field such as moving traffic or other heavy machinery. Exercise caution!

8.3 Transmitter clamps

The transmitter clamp fits around a pipe or cable and safely applies a signal to a live insulated cable without interrupting or disconnecting the supply. The clamp applies a very discriminating signal to a target line with reduced coupling to other lines. A clamp can sometimes be a more effective method of applying the signal than Direct Connection.

The target line will carry the strongest signal. The other lines will carry the weaker return signal. If the system comprises only two conductors, they may carry equal signals.

⚠ WARNING: Do not clamp around uninsulated live conductors

⚠ WARNING: Before applying or removing the clamp around a power cable, ensure that the clamp is connected to the transmitter at all times.

The clamp may buzz or vibrate if it is placed around a power cable that has significant net current flow. This is normal and does not harm the equipment.

Connecting the clamp

1   Plug the clamp into the transmitter output socket.
2   Put the clamp around the pipe or cable and ensure that the jaws are closed. Switch the transmitter on.
3   The display will show the Clamp connected icon:

Figure 8.1 - Clamp connected icon

The line should be grounded (earthed) on each side of the clamp for the signal to transfer to the line. Ground the line if necessary. An insulated cable may be traced even if it has no actual ground connection, providing a reasonable length is buried either side of the clamp to provide capacitive coupling to ground (earth).

NOTE: It is not necessary to make a ground connection from the transmitter when using the clamp.

Transmitter clamp range

Standard signal clamps

The standard clamps apply the transmitter signal very selectively and effectively to a target cable up to 130mm (5¼") in diameter using frequencies from 8kHz to 200kHz.

The standard and small clamps have a double spring action for positive toroidal contact.
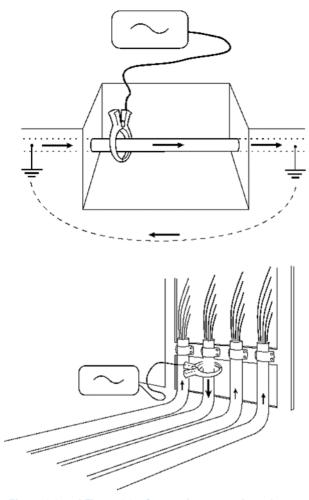
Figure 8.2 and Figure 8.3 - Connecting transmitter clamps

⚠ WARNING: The transmitter must only be connected to live services using the appropriate accessory such as a plug connector or live cable connector.

8.4 Sondes

Sonde overview

A sonde is a self-contained battery operated transmitter used for tracing the paths of pipes, ducts, sewers and drains and in the precise location of blockages or collapses. The sonde can be fitted to a flexible rod for insertion or pushing through pipes and the smaller diameter sondes can be used in conjunction with jetting machines, and blown through the duct. The RD5100H$_2$O+ locator can then be used to locate the sonde.

Choosing a suitable sonde

Radiodetection offers a wide range of sondes to suit most applications: From the 6mm (¼") diameter S6 33kHz Microsonde which, with a range of 2m (6.6"), targets fiber-optic micro ducting or other small non-conductive pipes, to the 33kHz Super Sonde, which with a depth range of 15m (50ft) targets deep sewer pipes.

Consult the precision locate accessory range brochure or web page on www.radiodetection.com for a full list of all available sondes and their technical specifications.

Check that the sonde has sufficient range for the application and is dimensionally small enough and sufficiently robust for the application. Ensure that the frequency of the sonde corresponds with the locator frequency; the locator will not locate the sonde unless the frequencies are the same. Sondes are marked with their transmitting frequency. Ensure that the means of propelling the sonde is available together with the correct fittings and couplings.

Preparation

Insert a new battery into the sonde. A new battery or a freshly recharged battery should be used at the beginning of each day and preferably at the start of each new job.

Before inserting the sonde, check that the sonde and locator are at the same frequency and working correctly. To do this, place the sonde on the ground at a distance from the locator that is equal to the rated depth of the sonde. Point the locator at the sonde with the locator in line with the sonde (the opposite of using the locator to locate a line) and check that the barograph reading exceeds 50% at maximum sensitivity.

Propelling a sonde

Sondes have a thread at one end for connecting to drain rods, or to other devices for inserting and propelling the sonde along a drain or duct. Sondes may be floated along drains at the end of a tether and floats are available for fitting to the sewer sonde and super sonde. Sondes can be strapped to high-pressure water jets or similar devices used for cleaning, maintaining and inspecting drains. Sondes used in underground drilling and boring operations are normally housed in the boring or drill head behind the boring or drill bit.

Locating and tracing a sonde

Insert the sonde in the drain or duct access and locate it while it is still just in view at the drain or duct entrance. Hold the locator vertical directly over the sonde with the locator in line with the sonde. Adjust the locator sensitivity so the bar graph reads between 60% and 80%.

The sonde radiates a Peak field from the center of its axis with a ghost signal at each end of the Peak. Move the locator a little way behind and then in front of the axis of the sonde to detect the ghost signals. Finding the two ghost signals positively confirms the location. Reduce the locator sensitivity to lose the ghost signals but still

indicate a clear Peak response directly over the sonde. Locator sensitivity is now set for tracing the duct or drain unless the distance between sonde and locator changes.

Propel the sonde three paces along the drain or duct and stop. Place the locator over the supposed position of the sonde. Do not adjust the sensitivity level.
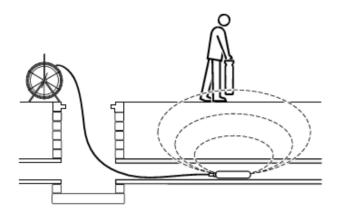

Figure 8.4 Sonde deployment

To locate a sonde:

1 Move the locator backwards and forwards and stop when the bar graph indicates a Peak. You can use the LCD compass to orient the blade of the locator with the direction of the sonde.

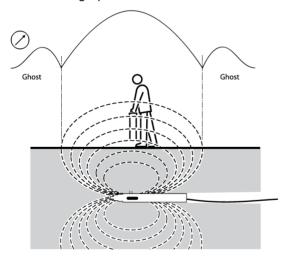2 Rotate the locator as if the blade is a pivot. Stop when the bar graph indicates a Peak.

Figure 8.5 - Locating a sonde

3 Move the locator from side to side until the bar graph indicates a Peak.

4 Repeat 1, 2 and 3 with the locator vertical and resting on or just above the ground. The locator should then be directly above the sonde with the locator in line with it. Mark the position of the sonde and its direction.

5 Propel the sonde a further 1 or 2m, pinpoint, and mark the position. Repeat this pinpoint procedure at similar intervals along the line of the drain or duct until the survey is completed.

Checking sonde depth

The RD5100H$_2$O+ locator will automatically display the depth of a located sonde providing the locator is correctly oriented and positioned above the sonde. Using the LCD compass as a guide, rotate the locator until the compass indicates the sonde is in East / West position.

Figure 8.6 - Calculating sonde depth

Calculation method

Pinpoint the sonde. Move the locator in front of the sonde and still with the locator in line with it, increase sensitivity to find the Peak of the ghost signal. Move the locator to behind the sonde ensuring that the locator blade is always in line with the sonde. Find the null positions A and B (See Figure 8.5). Measure the distance between them and multiply by 0.7 to give an approximate depth measurement.

FlexiTrace

The FlexiTrace is a traceable plastic covered fiberglass rod incorporating wire conductors and is used for locating small diameter, non-metallic pipes to a depth of 3m (10ft). The FlexiTrace can be inserted into a pipe or duct as small as 9mm (3/8") internal diameter, and with a minimum bend radius of 250mm. Batteries are not required, as the FlexiTrace is powered by any Radiodetection transmitter.

The FlexiTrace has a maximum power rating of 1W. When using the FlexiTrace with the RD5100H$_2$O+Tx transmitter, the output limit must be set to 1W in the MAX P menu and the output voltage limit set to LOW in the MAX V menu.

⚠ WARNING: Failure to follow the RD5100H$_2$O+Tx instructions above may result in the tip of the FlexiTrace

becoming too hot to touch, resulting in risk of personal injury and damage to the equipment.

The FlexiTrace can be used in two modes: Sonde mode or Line mode. In sonde mode only the tip of the FlexiTrace is energized whilst in line mode its whole length is energized.

To use as a sonde, connect both transmitter leads to the FlexiTrace stud terminals. As the FlexiTrace terminals are not color coded it does not matter to which terminals the leads are connected. To use the FlexiTrace in line mode, connect the red transmitter lead to one of the FlexiTrace terminals and connect the black transmitter lead to a suitable ground connection.
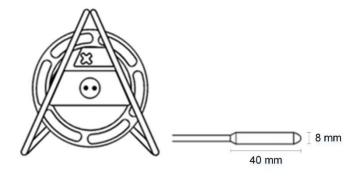

Figure 8.7 - FlexiTrace

Section 9 Current Direction (CD)

9.1 Understanding CD

Current Direction recognition is a feature that helps to positively identify a line at points distant from the application of the signal. It is highly desirable, if not essential, for positive identification of long distance lines. These lines can be traced and positively identified through congested areas or when running parallel to other lines.

The CD feature on the RD5100H2O+ locator indicates the direction of the current flow on a line. Identity of the target line is established if the locator display indicates that the current is flowing forward and away from the point of application of the transmitter signal.

A signal that has coupled onto adjacent lines finds a return path to the point of the original signal application. This is indicated by the locator arrow pointing back towards the transmitter.

This is in contrast to the forward pointing arrow indicating the target line.

The CD transmitter signal should be directly coupled to the target line with a remote ground connection. Most CD signals are low frequency, making them unsuitable for connection with a normal clamp or induction. These can however be applied with a transmitter CD clamp.

Using Current Direction (CD) to aid line identification

The RD5100H2O+ locator and RD5100H2O+ Tx feature the 4kHz CD frequency to help you determine the direction of current through a target line.

NOTE: The transmitter and locator must both have the same CD frequency or frequencies installed to enable the feature to be used. If you have more than one CD frequency installed ensure that the transmitter and locator are both set to the same CD frequency.

Figure 10.1: Current Direction

To select the CD frequency, proceed as follows:

Transmitter

1   Switch the transmitter off

2   Connect the transmitter to target cable or pipe, either by Direct Connection or by using a CD clamp

3   Switch the transmitter on

4   Press the Ⓕ key until the CD frequency is displayed

CD is a combination of two frequencies, a CD frequency and a locate frequency.

Locator

1   Press the Ⓕ key until the CD frequency is displayed, indicated by the CD icon and two small arrows above the frequency value.

4 kHz CD

The RD5100H2O+ features Current Direction using a 4 kHz frequency. This frequency is designed to enable you to use CD to identify a target line on higher impedance cables such as telephone cables and CATV.

9.2 CD reset

About CD reset

When you trace a signal on very long target lines, the transmitter signal gradually bleeds into the ground by capacitance. This means the phase angle of the remaining signal gradually changes. A CD Reset can be used to re-establish correct CD operation.

To perform a CD reset, press and hold the ⊗ key

This is referred to as phase-shift and can occur whenever an alternating current signal is flowing in a system of conductors that have a significant capacitance or inductance. The relative phase angle between the two frequencies will alter, but only over extended distances.

Figure 10.2: CD reset

Figure 10.2 illustrates a buried line with significant capacitance to ground. It illustrates the gradual phase-shift that occurs along the line. The diagram shows a reference point on each waveform. At first, the reference point occurs right on the Peak of a positive half cycle (A). It gradually moves towards the zero crossing point (D) and ends up on the Peak of a negative half cycle (F). The direction has shifted from forwards to backwards. At the intermediate point (D) the current flow cannot be determined. At this point the CD arrows on the RD5100H2O+ locator will flash on and off. In the example shown in the illustration, by returning to (C) which is the last point at which a CD reading was achieved, and performing a CD reset, the response at (C) will be equivalent to that of (A).

In most cases the phase angle shift does not occur until many kilometers from the transmitter and in some cases a CD reset may only be required every 20 kilometers (15 miles).

Performing a CD reset

You should perform a CD reset every time you select a CD frequency. CD reset can only be performed when in CD mode.

To perform a CD reset:

While using any CD frequency,

1   Press and hold the ⊗ key

Alternatively

1   Press the ⏻ key to enter the menu

2   Scroll to the **CDR** menu using the ⬆ or ⬇ keys

3   Press the ⊗ key to enter the CDR menu

4   Press the ⨍ key to reset CD and exit to the main menu

Section 10 Bluetooth wireless connections

RD5100H2O+ locators feature a Bluetooth wireless module, as standard, providing the ability to connect to iLOC enabled transmitters such as RD5100H2O+ Tx.

NOTE: The RD5100H2O+ locator wireless features may be subject to national and or local regulations. Consult your local authorities for more information.

⚠WARNING! Do not attempt any wireless connection in areas where such technology is considered hazardous. This may include: petrochemical facilities, medical facilities or around navigation equipment.

10.1 Switching Bluetooth On

By default RD5100H2O+ locators and RD5100H2O+ Tx transmitters are shipped with the Bluetooth wireless connection module disabled.

To switch Bluetooth On:

1   Press the ⏻ key to enter the menu

2   Scroll to the **BT** menu using the ⇧ or ⇩ keys

3   Press the ⊗ key (locator) or the key (transmitter) to enter the BT menu

4   Scroll up or down to the **ON** option

5   Press the ⨍ key to switch Bluetooth ON and return to the previous menu

10.2 Switching Bluetooth off

You can switch Bluetooth off to prolong battery life or comply with regulations in areas where wireless communications are considered hazardous.

To switch Bluetooth off:

1   Press the ⏻ key to enter the menu

2   Scroll to the BT menu using the ⇧ or ⇩ keys

3   Press the ⊗ key (locator) or the key (transmitter) to enter the BT menu

4   Scroll up or down to the OFF option

Press the ⨍ key to switch Bluetooth off and return to the previous menu

10.3 Pairing to a transmitter

To pair to a transmitter you require a Bluetooth enabled model such as the Tx-5B or Tx-10B.

Before you begin, try to switch off all nearby Bluetooth equipment as they may interfere with the locator and transmitter's pairing process.

On the locator:

1   Press the ⏻ key to enter the menu

2   Scroll to the **BT** menu using the ⇧ or ⇩ keys

3   Press the ⊗ key to enter the BT menu

4   Scroll to the **PAIR** menu and press the ⊗ key to enter it

5   Scroll to the **BT-TX** option

On the transmitter:

6   Press the ⏻ key to enter the menu

7   Scroll to the **BT** menu using the ⇧ or ⇩ keys

8   Press the key to enter the BT menu

9   Scroll to the **PAIR** option

Starting the pairing process:

10 Press the ⨍ key on the transmitter followed by the ⨍ key on the locator.

NOTE: You should press these keys within a 30 second window otherwise the connection may time out

11 The transmitter and the locator will now attempt to pair

When pairing is in progress, the transmitter and locator will display a flashing Bluetooth icon. Pairing can take up to a minute. If the pairing process is successful, the transmitter will display the ⟩⟩⟨⟨ icon and the locator will display a

persistent Bluetooth icon for the duration of the connection.

If pairing fails, ensure that any nearby Bluetooth devices are switched off or invisible then repeat the process.

Once the locator and transmitter have successfully paired the transmitter should be power cycled to complete the process. You can then use iLOC to remotely change the transmitter's output frequency and power levels from the locator. See Section 13 for further details.

10.4 Bluetooth standby mode

When using the Bluetooth connection on the RD5100H2O+, the Bluetooth module is by default kept in standby mode. This can help to increase the locator battery life and in some applications reduce potential interference from the Bluetooth module.

The RD5100H2O+ locator provides users with the option to set the Bluetooth module to STANDBY or ON. In the ON position the Bluetooth module will be permanently ready to send data, which can help to speed up the transfer times compared to that of modules set to STANDBY mode

To set Bluetooth to STDBY :

1   Press the ⏻ key to enter the menu

2   Scroll to the **BT** menu using the ⇧ or ⇩ keys

3   Press the ⊛ key to enter the BT menu

4   Scroll up or down to the **STDBY** menu

5   Press the ⨍ key to confirm your choice

To set Bluetooth connection mode to ON:

1   Press the ⏻ key to enter the menu

2   Scroll to the **BT** menu using the ⇧ or ⇩ keys

3   Press the ⊛ key to enter the BT menu

4   Scroll up or down to the **ON** option

5   Press the ⨍ key to confirm your choice

10.5 Troubleshooting

Successful wireless communication depends on a number of factors including: battery life, electromagnetic interference, device memory and physical obstructions.

Ensure that the RD5100H2O+ locator and transmitter are sufficiently charged for wireless communication.

Excessive electromagnetic interference can limit the range of wireless communication and / or corrupt data.

Resetting connections

If you experience problems with the RD5100H2O+ wireless Bluetooth technology features, Radiodetection recommends resetting the connection and then pairing your device again. To reset the wireless connections:

6   Press the ⏻ key to enter the menu

7   Scroll to the **BT** menu using the ⇧ or ⇩ keys

8   Press the ⊛ key to enter the BT menu

9   Scroll up or down to the **RESET** menu

10 Press the ⨍ key and the locator will purge all current connections

11 Re-pair your devices as described in section 4.4

Bluetooth error codes

If an error occurs when attempting to perform any Bluetooth command using the locator to the transmitter or the locator to a PC or PDA, the LCD will display a code to help you resolve the problem on the locator.

The codes are as follows:

BT Code	Description
BT001	Bluetooth not configured for this unit
BT002	Internal Bluetooth error
BT003	Locator not paired with transmitter
BT004	Locator not paired with PC / PDA
BT005	Paired but connection attempt failed. Power cycling may be required
BT006	Corrupt response received from transmitter
BT007	Indeterminate response received from transmitter
BT008	No response received from transmitter
BT009	Corrupt response received from PDA
BT010	Transmission to PDA failure
TX???	Transmitter unable to change to the requested frequency – check that the transmitter model is set correctly

Table 12.1: Bluetooth error codes

Section 11 iLOC

iLOC is a standard feature of the RD5100H2O+ locator and transmitter. iLOC lets you control the transmitter remotely using your locator. With iLOC you can adjust the output frequency, power settings and use SideStep™. iLOC commands are sent over a Bluetooth module that can operate at distances of up to 450m / 1400ft in direct line of sight.

To use iLOC, the transmitter and locator must be paired using the procedure described in Section 5.3.

NOTE: Operating in built up areas and in areas with high electromagnetic interference may reduce iLOC's performance.

11.1 Using iLOC

Locator and transmitter need to be switched ON and paired to use iLOC.

For optimum performance:

• Minimize obstructions in line of sight

• Raise the transmitter off the ground by 30-60cm (1-2ft)
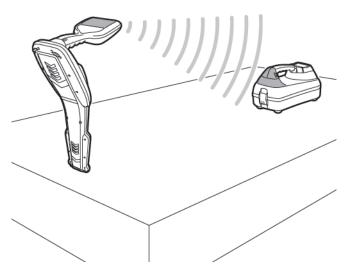
• Point the screen of the locator towards the transmitter

Figure 13.1 Using iLOC

NOTE: If any iLOC commands fail, move closer to the transmitter and repeat the process.

11.2 iLOC functions

Changing frequencies

Once the transmitter and the locator are paired, you can change the transmitter's output frequency remotely using the locator:

1 On the locator, select the frequency you want by pressing the ⓕ key until the frequency is displayed on screen.

2 iLOC commands are sent using the (Tx) key, press it to send the new frequency to the transmitter.

3 The locator's LCD will display **SEND** momentarily and then **OK** if the transfer is successful.

4 If the transfer is unsuccessful, the LCD will display an error code. Refer to table 13.1 for a list of codes and their meaning.

If the process fails, you may be out of range or there may be an error in the connection. Move closer to the transmitter and retry the procedure. If the connection continues to fail, return to the transmitter and reset the connection using the procedure described in Section 11.

NOTE: If you are locating a sonde frequency, an iLOC command to a paired transmitter will automatically set that transmitter to standby to eliminate interference rom the transmitter.

Adjusting power

iLOC lets you adjust the transmitter's power output remotely; you can also put the transmitter into standby mode and then wake it remotely.

To adjust the power output:

1 Transmitter power options are located in the **TXOUT** menu on the locator. Press and hold the (Tx) key to display the TXOUT menu

2 Press the ⓦ key to enter the TXOUT menu

3 Scroll up or down through the power output options; these are:

  • **STDBY**: Transmitter standby mode, the connection is still active but the output is disabled

  • **LOW**: Low power output

  • **MED**: Medium power output

- **HIGH**: High power output
- **BOOST**: Temporarily boosts transmitter power output to its maximum level

4   Once you have selected the mode you want, press the ⓕ key to confirm

5   Press and hold the ⓣ key to select the new setting and exit the menu

6   Press the ⓣ key once to send the settings to the transmitter

NOTE: Once you have stored the transmitter power setting in the locator, the locator will change the transmitter to that setting when you change the frequency with the locator.

Sleep / wake the transmitter

To help you prolong battery life you can put the transmitter in standby mode (sleep), and reactivate it again, using the locator.

To put the transmitter into standby mode, set the TXOUT menu on the locator to **STDBY** using the "Changing transmitter power output" procedure described above in section 13.2

This will disable the transmitter output.

To re-activate the transmitter output, select any power mode from LOW to BOOST using the same procedure.

If the process fails, you may be out of range or there may be an error in the connection. Move closer to the transmitter and retry the procedure. If the connection continues to fail, return to the transmitter and reset the connection using the procedure described in Section 12.7

11.3 SideStep™

If you are using a preferred locate frequency and having difficulty locating the utility, interference could be affecting the locate signal. SideStep allows the locator to change the locate frequency by several Hertz.

This 'new' locate frequency can be sent via the Bluetooth connection to the transmitter and will automatically change the transmitter frequency to match the 'new' locate frequency.

To step the frequency:

1   On the locator, select the frequency you want by pressing the ⓕ key until the frequency is displayed on screen

2   To step the frequency, press and hold the ⓕ key until **STEP** appears on the LCD

3   Press the ⓣ key to send the SideStep command to the transmitter

4   If the command is sent successfully, an asterisk (*) will appear on the locator next to the frequency and STEP will appear on the transmitter below the frequency

5   Repeat this process to disable SideStep

Section 12 Appendices

12.1 Care and maintenance

The RD5100H$_2$O+ locator and transmitter are robust, durable and weatherproof. However you can extend your equipment's life by following these care and maintenance guidelines.

General

Store the equipment in a clean and dry environment.

Ensure all terminals and connection sockets are clean, free of debris and corrosion and are undamaged.

Do not use this equipment when damaged or faulty.

Batteries and power supply

Use only good quality Alkaline or NiMH batteries.

When using an AC adapter, use only Radiodetection approved adapters.

Only use Radiodetection approved Li-Ion battery packs.

Cleaning

⚠ WARNING: Do not attempt to clean this equipment when it is powered or connected to any power source, including batteries, adapters and live cables.

Ensure the equipment is clean and dry whenever possible.

Clean with a soft, moistened cloth.

If using this equipment in foul water systems or other areas where biological hazards may be present, use an appropriate disinfectant.

Do not use abrasive materials or chemicals as they may damage the casing, including the reflective labels.

Do not use high pressure hoses.

Disassembly

Do not attempt to disassemble this equipment under any circumstances. The locator and transmitter contain no user serviceable parts.

Disassembly may damage the equipment and or reduce its performance and may void the manufacturer's warranty.

Service and maintenance

The locator and transmitter are designed to minimize the requirement for regular calibration. However, as with all safety equipment, it is recommended (and may be required by law) that they are serviced at least once a year, either at Radiodetection or a Radiodetection-approved repair center.

Regularly check your locator for correct operation using eCert (see Section 12.6) and the on-board Self-Test.

NOTE: Service by non-approved service centers or operators may void the manufacturer's warranty.

Radiodetection products, including this guide, are under continuous development and are subject to change without notice. Go to www.radiodetection.com or contact your local Radiodetection representative for the latest information regarding the RD5100H$_2$O+ locator or any Radiodetection product.

12.2 Enhanced Self-Test

RD5100H$_2$O+ locators incorporate an Enhanced Self-Test feature. In addition to the typical checks for display and power functions, the RD5100H$_2$O+ applies test signals to its locating circuitry during a Self-Test to check accuracy and performance.

We recommend that a self-test is run at least weekly, or before each use.

Running a Self-Test

As the Self-Test tests the integrity of the locate circuity, it is important that it is carried out away from large metallic object such as vehicles, or strong electrical signals. To run a Self-Test:

1   Press the ⏻ key to enter the menu.

2   Scroll to the **INFO** menu using the ⇧ or ⇩ keys.

3   Press the ⊖ key to enter the INFO menu.

4   Select TEST using the ⇧ or ⇩ keys.

5   Press the ⊖ key to select **YES.**

6   Press the ⨍ key to begin the Self Test

7   Once the Self-Test is completed, the result (PASS or FAIL) will be displayed.

8   Restart the locator using the ⏻ key.

12.3 RD5100 Manager™

RD5100 Manager is the RD5100H$_2$O+ Locator PC companion and allows you to manage and customize your locator. It also allows software upgrades to both the locator and transmitter.

You can use RD5100 Manager to register your products to extend the warranty to a total of 3 years (see Section 12.4), setup your locator by performing a number of maintenance tasks.

RD5100 Manager is compatible with PCs running with Microsoft Windows XP, Windows 7, Windows 8, Windows 8.1 and Windows 10.

For more information about RD5100 Manager refer to the RD5100 Manager Operation manual.

To Obtain RD5100 Manager:

Contact Radiodetection for eCert and RD5100 Manager availability: Go to www.radiodetection.com

12.4 Warranty and extended warranty

RD5100H$_2$O+ locators and transmitters are covered by a one year warranty as standard.

Customers can extend the warranty period to a total of three years by registering their products (locators and transmitters) within three months from purchase.

Visit **https://portal.radiodetection.com/** to create your company portal account, and use the Product page to register your locator or transmitter.

Information on how to create a company account can be obtained from: **https://support.radiodetection.com**

You can use **RD5100 Manager** to register your products to extend the warranty to a total of 3 years. (See section 9.3)

From time to time Radiodetection may release new software to improve the performance or add new functionalities to his products. By registering users will benefit from subscribing to e-mail alerts advising about any new software and special offers related to its product range.

Users will be able to opt out at any moment from receiving software and technical notifications or just from receiving marketing material.

12.5 Upgrading software

From time to time, Radiodetection may release software upgrades to enhance features and improve performance of the RD5100H$_2$O+ locator or transmitter.

Software upgrades are free of charge.

You can check if your products are up-to-date or upgrade them by using the RD5100 Manager Software upgrade screen. Refer to the RD5100 Manager Operation manual for further information.

E-mail alerts and notification of new software releases are sent to all registered users.

NOTE: To upgrade your software you need to have created an account using RD5100 Manager and have a live internet connection. An optional Radiodetection supplied power source may be required to update your transmitter software.

12.6 eCert^{TM}

The RD5100H$_2$O+ locator should be regularly checked to ensure its correct operation.

eCert provides a thorough test of the RD5100H$_2$O+'s locating circuitry and marker transceiver, and supplies a Radiodetection Calibration Certificate when a positive test result is obtained.

To run eCert, the locator should be connected to an internet-enabled PC, on which the RD5100 Manager software is installed. Additional eCert credits may be required and purchased.

Refer to the RD5100 Manager[i] Operation Manual for further details.

NOTE. [i]Contact Radiodetection for availability of the RD5100 Manager.

NOTE. eCert is not presently available for transmitters.

12.7 List of supported accessories

RD5100H2O+ Locator Accessories	Image	Part number
Headphones		10/RX-HEADPHONES

RD5100H2O+ Transmitter Accessories	Image	Part number
Live Plug Connector		10/TX-LPC-XX *XX= US, UK, EU*
Live Cable Connector (with Crocodile clips)		10/TX-LCC
2" (50mm) Transmitter Signal Clamp		10/TX-CLAMP-50
4" (100mm) Transmitter Signal Clamp		10/TX-CLAMP-100
5" (130mm) Transmitter Signal Clamp		10/TX-CLAMP-130
8.5" (215mm) Transmitter Signal Clamp		10/TX-CLAMP-215
CD Transmitter Clamp		10/TX-CD-CLAMP
Signal Clamp Extension Rod		10/TX-CLAMP-EXTROD
Earth Lead 10m		10/TX-EARTHLEAD
Hi-strength Magnet with M4 eyebolt		10/TX-EARTHLEAD-KIT
Transmitter Connection Kit Contains Earth Reel, Earth Stake, Direct Connection Lead and Magnet		10/TX-CONNECTION-KIT
Tx Direct Connection Lead		10/TX-DC-LEAD
Tx Direct Connection Lead with banana connectors, insulated plug/socket		10/TX-DC-LEAD-BAN
Spiral Earth Stake		10/TX-EARTHSTAKE

Accessories for tracing or locating non-conductive utilities		
Standard Sonde 33kHz, depth up to 5m		10/SONDE-STD-33
Standard Sonde 8kHz, depth up to 5m		10/SONDE-STD-8
Standard Sonde 512Hz, depth up to 5m		10/SONDE-STD-512
Standard Sonde 512Hz single end, depth up to 5m		10/SONDE-STD-512-TW
Sewer Sonde 33kHz, depth up to 8m		10/SONDE-SEWER-33
Super Sonde 33kHz, depth up to 15m		10/SONDE-SUPER-33
4.5" (115mm) Diameter Floats/Pair for Sewer and Super Sondes		10/SONDE-FLOATS
S6 Microsonde Kit, incl. battery and case		10/SONDE-MICRO-33
S9 MiniSonde, incl. battery and case		10/SONDE-MINI-33
S13 Sonde Kit (includes M10 Stud and Plain End Caps, two Batteries and Case)		10/SONDE-S13-33
S18A Sonde 33kHz with M10 Stud End Cap and one D1/3N battery		10/SONDE-S18A-33
S18A Sonde 33kHz Kit with M10 Stud and Plain End Caps and two D1/3N Batteries		10/S18-33-KIT
S18B Sonde 33kHz with Extended Aluminum End Cap for two AA Batteries (batteries included)		10/SONDE-S18B-33
Bendi Sonde with M10 Male End Cap (512Hz continuous)		10/SONDE-BENDI-512
FlexiTrace 50m (Tx powered pushrod transmitter)		10/TRACE50-XX
FlexiTrace 80m (Tx powered pushrod transmitter)		10/TRACE80-XX *XX = D, F, GB, NL*
4.5mm 50m Flexrod		10/FLEXRODF50-4.5
4.5mm 80m Flexrod		10/FLEXRODF80-4.5
6.7mm 50m Flexrod		10/FLEXRODF50-7
6.7mm 100m Flexrod		10/FLEXRODF100-7
6.7mm 150m Flexrod		10/FLEXRODF150-7
9mm 60m Flexrod		10/FLEXRODF60-9
9mm 120m Flexrod		10/FLEXRODF120-9

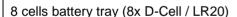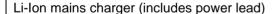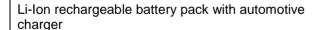| Power options		
RD5100H2O+ Locator accessories		
Li-Ion rechargeable battery pack in gr. grey (no charger) (4 pins)		10/RX51-BATPACK-LION
2 cells battery tray (2x D-Cell / LR20)		10/RX51-2DCELL-TRAY
Li-Ion 12V automotive charger		10/RX-ACHARGER-LION
Li-Ion mains charger (includes power lead)		10/RX-MCHARGER-LION-XX
Li-Ion rechargeable battery pack with auto charger		10/RX51-ABATPACK-LION
Li-Ion rechargeable battery pack with mains charger (includes power lead)		10/RX51-MBATPACK-LION-XX
Li-Ion rechargeable battery pack with mains and automotive charger (includes power lead)		10/RX51-MABATPACK-LION-XX
RD5100H2O+ Transmitter accessories		
Li-Ion rechargeable battery pack (no charger)		10/TX-BATPACK-LION
8 cells battery tray (8x D-Cell / LR20)		10/TX-8DCELL-TRAY
Li-Ion automotive charger		10/TX-ACHARGER-LION
Li-Ion mains charger (includes power lead)		10/TX-MCHARGER-LION-XX
Li-Ion rechargeable battery pack with automotive charger		10/TX-ABATPACK-LION-K
Li-Ion rechargeable battery pack with mains charger (includes power lead)		10/TX-MBATPACK-LION-K-XX
Li-Ion rechargeable battery pack with mains and automotive charger (includes power lead)		10/TX-MABATPACK-LION-K-XX
Mains power supply unit (PSU) (includes power lead)		10/TX-MPSU-XX
12V power supply unit (PSU) - car power lead with isolation transformer		10/TX-APSU
		XX=US, UK, EU or AU

Transport and Storage Accessories	
RD5100H2O+ Locator accessories	
Locator & transmitter universal, soft carry bag	10/LOCATORBAG
RD5100H2O+ flight, hard case	10/RD7K8KCASE
US Hard case	10/RD7K8KCASE-USA

Calibration Certificates, Remote Calibration and PC Software	
eCert™ Calibration Credit	10/RX-ECERT
RD5100Manager™ Check product documentation for details	Visit www.radiodetection.com/rdmanager
Warranty Registration (for free software upgrades)	Visit www.radiodetection.com

For more accessories please visit www.radiodetection.com/accessories

12.8 RD5100H2O+ Package part numbers

RD5100H2O+ Package part numbers	Part Number
5100H2O+ Locator and Transmitter + Soft Bag Kit Metric 50Hz	10/51H2O+M50-KIT
5100H2O+ Locator and Transmitter + Soft Bag Kit Metric 60Hz	10/51H2O+M60-KIT
5100H2O+ Locator and Transmitter + Soft Bag Kit Imperial 50Hz	10/51H2O+I50-KIT
5100H2O+ Locator and Transmitter + Soft Bag Kit Imperial 60Hz	10/51H2O+I60-KIT

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