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USER GUIDE
用户指南

RD7000+™

UNIVERSAL PRECISION ELECTROMAGNETIC AND RF MARKER LOCATOR
万能精确管线电磁及电子标识定位仪

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Radiodetection®

ENGLISH 4

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Preface

About this guide

CAUTION: This guide provides basic operating instructions for the RD7000+ locator and transmitter. It also contains important safety information and guidelines and as such should be read in its entirety before attempting to operate the RD7000+ Locator and transmitter.

This guide is intended as a quick reference guide only. For detailed instructions, including the use of accessories, help with eCert™, CALSafe™*, SurveyCERT™ and automatic logging* please refer to the RD7000+ locator operation, SurveyCERT and RD Manager™ manuals, which are available for download from **www.radiodetection.com**.

The online User Manual library also contains links to the SurveyCERT and RD Manager manuals.

*Logging models only.

⚠ 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! When using the transmitter, switch off the unit and disconnect cables before removing the battery pack.

⚠ WARNING! The RD7000+ locator will detect most buried conductors but there are some objects that do not radiate any detectable signal. The RD7000+, or any other electromagnetic locator, cannot detect these objects so proceed with caution. There are also some live cables which the RD7000+ will not be able to detect in Power mode. The RD7000+ does not indicate whether a signal is from a single cable or from several in close proximity.

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

Extended Warranty

Thank you for purchasing the RD7000+ locator and transmitter.

RD7000+ locators and transmitters are covered by a 1 year warranty as standard.

Customers can extend this warranty to a total of 3 years by registering the products within 3 months of purchase.

Registration is carried out using the RD Manager PC software which can be downloaded from the Radiodetection website. Visit **www.radiodetection.com/RDManager**.

From time to time Radiodetection may release new software to improve the performance or add new functionalities to these products. By registering, users will benefit from subscribing to email 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 or technical notifications as well as from receiving marketing material.

eCert

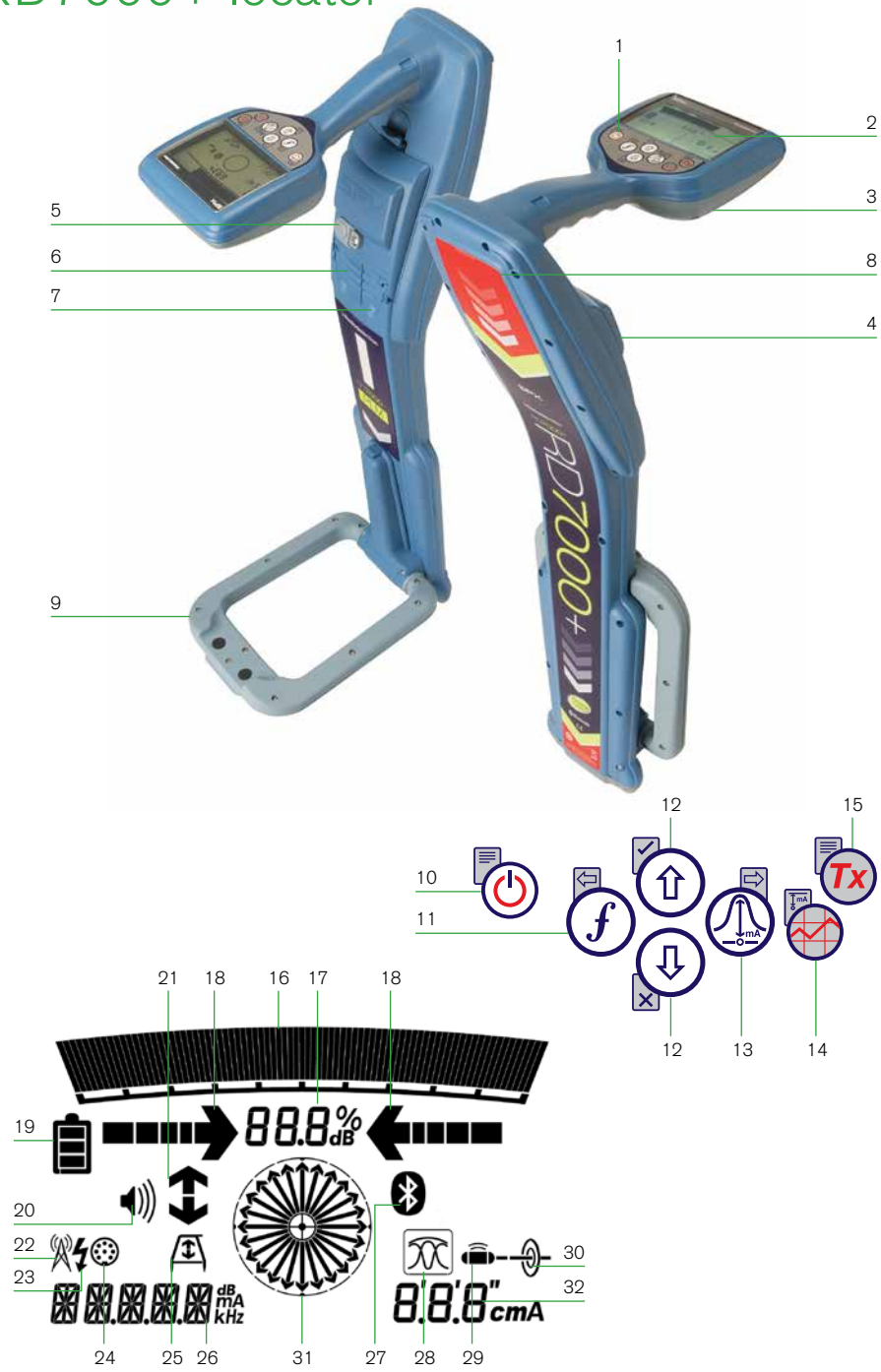
The RD7000+ locator is safety equipment which should be regularly checked to ensure its correct operation.

eCert provides a thorough test of the RD7000+'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 RD Manager software is installed. Additional purchase may be required.

Refer to the RD Manager operation manual for further details.

RD7000+ locator



Locator features

1. Keypad
2. LCD with auto backlight
3. Speaker
4. Battery compartment
5. Battery charger connector
6. Accessory connector
7. Headphone connector
8. Bluetooth® module antenna
9. Marker loop antenna

Locator keypad

10. Power key: Switches the unit on and off. Opens the locator menu.
11. Frequency key: Selects frequency. Closes submenu.
12. Up and down arrows: Adjusts the signal gain. Scrolls through the menu options.
13. Antenna key: With antenna folded up, toggles peak, combined peak/null and null (PLM and TLM models) modes. With antenna folded down, toggles marker and combined (marker/line) modes. Opens a submenu.
14. Graph key: Saves SurveyCERT measurements.
15. Transmitter key: Not used.

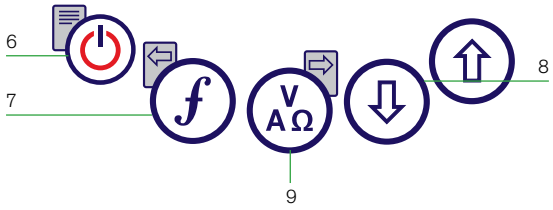
Locator screen icons

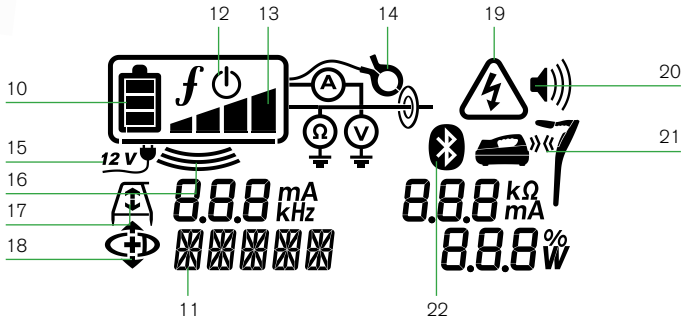
16. Indicates the signal strength and peak marker.
17. Signal strength: Numerical indication of signal strength.
18. Peak / Proportional arrows: Indicates the location of the line relative to the locator.
19. Battery icon: Indicates the battery level.
20. Volume icon: Displays the volume level.
21. Fault-Find arrows (PLM and TLM models only).
22. Radio Mode: Indicates when Radio Mode is active.
23. Power Mode: Indicates when Power Mode is active.
24. Accessory or Measurement indicators: Indicate when an accessory is connected or if measurements are active
25. A-Frame icon: Indicates when the A-Frame is connected.
26. Operating mode indicator.
27. Bluetooth icon: Indicates status of Bluetooth connection. Flashing icon means pairing is in progress. Solid icon indicates an established connection is active.
28. Antenna mode icon: Indicates antenna selection: Peak, Null and combined Peak/Null.
29. Sonde icon: Indicates that sonde signal source is selected (DLM, PLM and TLM models).
30. Line icon: Indicates that line signal source is selected.
31. Compass/Marker mode indicator: Shows the direction of the located cable relative to the locator. Also used as a graphical indication for Marker mode active
32. Current/depth indicator.

Tx-1, Tx-5 and Tx-10 transmitters









Transmitter features

1. Keypad.
2. LCD.
3. Removable accessory tray.
4. D-cell battery tray.
5. Rechargeable battery pack (Optional).

Transmitter keypad

6. Power key ⏻: Switches the unit on and off. Opens the transmitter menu.
7. Frequency key ƒ: Selects frequency. Menu navigation key.
8. Up and down arrows ⇧ ⇩: Adjusts the output signal. Scrolls through the menu options.
9. Measure key V A Ω: Opens a sub menu. Used to take voltage and impedance measurements.

Transmitter screen icons

10. Battery icon: Indicates the battery level.
11. Alphanumeric description of selected operation mode.
12. Standby icon: Appears when the transmitter is in Standby mode.
13. Output level: Displays transmitter output power.
14. Clamp icon: Indicates when a clamp or other plug is connected.
15. DC icon: Appears when the transmitter is powered from a DC source.
16. Induction indicator: Appears when the transmitter is in Induction mode.
17. A-Frame (Tx-5 and Tx-10 only): Indicates when the transmitter is in Fault-Find mode.
18. CD Mode indicator (Tx-10 only): Indicates that the transmitter is in Current Direction mode. For use with RD8000™ locators only.
19. Voltage warning indicator: Indicates that the transmitter is outputting potentially hazardous voltage levels.
20. Volume icon: Displays the volume level.
21. Pairing icon (Tx-5B and Tx-10B only): For use with RD8000 locators only.
22. Bluetooth icon (Tx-5B and Tx-10B only). For use with RD8000 locators only.

Before you begin

IMPORTANT! This guide is intended to be a quick reference guide. We recommend you read the operation manual before you attempt to operate the RD7000+ locator!

First use

For safety reasons RD7000+ locators are shipped with the Li-Ion battery packs disconnected and transmitters with no D cells in the battery tray.

To connect the Li-Ion battery pack open the RD7000+ battery compartment and plug the battery lead into the battery connector.

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.

System setup

It is important that you set up the system according to your personal preferences and operating requirements before you conduct your first survey. You can set the system up using the RD7000+ menu as described below.

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

Before changing settings, switch the locator or transmitter on by pressing the ⏻ key.

NOTE: Once the system is switched on, pressing the ⏻ key momentarily will activate the locator or transmitter menu.

Using the menus

The RD7000+ 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. When in the menu, most on-screen icons will temporarily disappear and the menu options will appear in the bottom left-hand corner of the display. Note that when browsing the locator menu, the ƒ and 🔔 keys act as left and right arrows. When browsing the transmitter menu the ƒ and V/AΩ keys act as left and right arrows. The right arrow enters a submenu and the left arrow returns to the previous menu.

NOTE: When you select an option and press the ƒ key, the option will be enabled automatically.

Locator menu options

- VOL: Adjust the speaker volume from 0 (mute) to 3 (loudest).
- BT: Enable, disable, reset or pair Bluetooth connections. Also defines the protocol used when connecting to a PC or PDA.
- UNITS: Select metric or imperial units.

- CAL: Displays the date of original factory calibration and the most recent service calibration or eCert calibration validation.
- MARKR: Enable or disable individual utility markers.
- LANG: Select menus language.
- POWER: Select power frequency: 50 or 60Hz.
- ANT: Enable or disable any antenna mode with the exception of Peak.
- FREQ: Enable or disable individual frequencies.
- ALERT: Enable or disable Strike*Alert*™.
- BATT: Set battery type: ALK, NiMH or Li-ION.
- COMP: Enable or disable display of the Compass feature.

To navigate 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 ⇩ keys to scroll through the submenu options.
5. Press the ƒ key to confirm a selection and return to the previous menu.
6. Press the ⏻ key to return to the main operation screen.

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 menus language.
- OPT F: Enable or disable SideStep*auto*™.
- BATT: Set battery type: ALK, NiMH or Li-ION – Also select Eco mode for alkaline batteries only.
- MAX P: Allow the transmitter to output its maximum wattage.
- MODEL: Specify the model of your locator.
- MAX V: Set the output voltage.
- BT: Enable, disable or pair Bluetooth connections to a RD8000 locator (Bluetooth models only).

To navigate 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 V/AΩ key to enter the option's submenu.
4. Use the ⇧ or ⇩ keys to scroll through the submenu options.

5. Press the f key to return to the previous level or exit the menu.
6. Press the ⏻ key to return to the main operation screen.

Examples of using the menu, selecting options and making changes:

Language

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/D key (on the transmitter) to enter the LANG menu.
4. Scroll up or down to select your preferred language.
5. Press the f key to accept your selection and return to the main menu.
6. Press the ⏻ key to return to the main operation screen.

Power / mains frequency (locator only)

To select the correct frequency (50 or 60Hz) for your country or region's power supply:

1. Press the ⏻ key to enter the menu.
2. Scroll to the POWER menu using the ⇧ or ⇩ keys.
3. Press the 🔔 key to enter the POWER menu.
4. Scroll up or down to select the correct frequency.
5. Press the f key to accept your selection and return to the main menu.
6. Press the ⏻ key to return to the main operation screen.

Units (locator only)

The RD7000+ locator allows you to work in Metric or Imperial (US customary) units.
To select your preferred units of measurements:

1. Press the ⏻ key to enter the menu.
2. Scroll to the UNIT option using the ⇧ or ⇩ keys.
3. Press the 🔔 key to enter the UNIT submenu.
4. Scroll up or down to select Metric or Imperial units.
5. Press the f key to accept your selection and return to the main menu.
6. Press the ⏻ key to return to the main operation screen.

Batteries

The locator and transmitter are battery powered.

The RD7000+ locators are provided with a rechargeable Lithium-ion (Li-Ion) battery pack as standard. The RD7000+ locators can also be powered using good quality D-cell alkaline or NiMH batteries.

Transmitters can be powered by D-cell alkaline batteries (as standard), D-cell NiMH batteries, or by an optional accessory Li-Ion battery pack. Alternatively, you can power the transmitter from a mains or vehicle power source using a Radiodetection supplied optional accessory adapter.

If using D-Cells it is important to set the system to match the currently installed battery type to ensure optimal performance and correct battery level indication.

To set your battery type:

1. Press the ⏻ key to enter the menu.
2. Scroll to the BATT menu using the ⇧ or ⇩ arrows.
3. Press the 🔔 key (on the locator) or the V/A/D key (on the transmitter) to enter the BATT menu.
4. Scroll up or down to select the correct battery type.
5. Press the f key to accept your selection and return to the main menu.
6. Press the ⏻ key to return to the main operation screen.

When using alkaline batteries Eco mode can be selected to maximize their usage. When Eco mode is selected the transmitter automatically reduces its max power output when the batteries cannot longer supply enough energy.

Shutting down

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

Locating pipes and cables

Passive Frequencies

Passive frequency detection takes advantage of signals that are already present on buried metallic conductors. The RD7000+ supports three types of passive frequencies: power, radio, CPS (DL models only). You can detect these frequencies without the aid of the transmitter.

Active Frequencies

Active frequencies are applied direct to the pipe or cable using the transmitter. The transmitter can apply a signal using three methods:

Direct connection

In direct connection, you connect the transmitter directly to the pipe or cable you wish to survey. The transmitter will then apply a discrete signal to the line, which you can trace using the locator. This method provides the best signal on an individual line and enables the use of lower frequencies, which can be traced for longer distances.

Connecting the transmitter to a pipe or line requires the use of a direct connection lead and a ground stake to complete the circuit.

⚠ 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.

Induction

The transmitter is placed on the ground over or near the survey area. You select the appropriate frequency. The transmitter will then induce the signal indiscriminately to any nearby metallic conductor. In induction mode, using higher frequencies is generally recommended as they are induced more easily onto nearby conductors.

Clamp

The optional signal clamp can be used to apply the transmitter signal to an insulated live wire or pipe up to 8.5"/215mm 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.

Refer to the Signal Clamps paragraph in the Using Accessories section.

Locating RF Markers

The RD7000+ locator enables users to locate most common RF utility markers. These are also referred to as Electronic Marker System (EMS) and Omni markers.

To enable marker locate mode lower the marker loop antenna. To disable the marker locate mode fold the loop antenna up.

Marker types

The RD7000+ can detect 9 different RF Markers, as shown in the table below.

UTILITY	COLOR	DISPLAY ABBREVIATION	FREQUENCY
French Power	Natural	PFR	40.0kHz
General / Non-drinkable water	Purple	PUR	66.35kHz
Cable TV	Black/Orange	CTV	77.0kHz
Gas	Yellow	GAS	83.0kHz
Telephone/Telecoms	Orange	TEL	101.4kHz
Sanitary	Green	SAN	121.6kHz
German Power	Blue/Red	PDE	134.0kHz
Water	Blue	H20	145.7kHz
Electrical Power*	Red	PWR	169.8kHz

*Use of the red Electrical Power (PWR) marker locate mode is subject to radio licensing restrictions for Short Range Devices in the EU and possibly other countries. It is the responsibility of the user to ensure that the red Power (PWR) marker locate mode is only enabled in countries where radio licensing restrictions do not apply at the operating frequency of 169kHz.

If required and permitted use RD Manager to enable this frequency.

Using accessories

The locator and transmitter are compatible with a wide range of accessories. For detailed information on using any of the accessories below please refer to the RD7000+ locator operation manual.

Signal clamps

When it is not possible to connect directly onto a pipe or cable, or induction mode is unsuitable, a transmitter signal clamp may be used. The clamp is plugged into the output of the transmitter and provides a means of applying a locate signal to an insulated live wire. This is particularly useful with live insulated cables as it removes the need to disable the power and break the line.

⚠ 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.

To locate or identify individual lines a locator signal clamp can be connected to the accessory socket of the locator and can be clamped around individual pipes or cables.

Stethoscopes

At times, it may not be possible to use a clamp around a cable because of congestion or inaccessibility. A stethoscope antenna should be used in place of a clamp to identify cables.

Radiodetection supplies a range of stethoscopes to suit most applications.

To use a stethoscope, connect it to the locator's accessory socket. The locator will automatically detect the device and filter out location modes that are irrelevant.

Sondes and FlexiTrace

Sondes are battery powered transmitters that are useful for tracing non-metallic pipes. The RD7000+ can detect a range of sonde frequencies, including those transmitted by Flexisondes, GatorCam™4 or flexiprobe™ pushrod systems and P350 flexitrax™ crawlers.

For a detailed guide on locating sondes, please refer to the operation manual.

A FlexiTrace is a traceable fiberglass rod incorporating wire conductors with a sonde at the end. It is connected to the output of the transmitter and is typically used in small diameter, non-metallic pipes. The user has the option of locating the entire length of the cable or choosing to locate only the tip of the cable.

The FlexiTrace has a maximum power rating of 1W. When using the FlexiTrace with a Radiodetection Tx-5(B) or Tx-10(B) 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.

No settings are required for the Tx-1 transmitter.

WARNING: Failure to follow the Tx-5(B) or Tx-10(B) 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.

Fault-finding with an A-Frame

The RD7000+ PLM and TLM models have the ability to detect cable sheath faults accurately using an A-Frame accessory. The Tx-5 and Tx-10 provide a fault finding signal that can be detected by the A-Frame as a result of the signal bleeding to ground through damaged cable sheaths.

For a detailed guide to fault-finding, please refer to the operation manual.

Plug / Live cable connector

The plug connector is connected to the output of the transmitter and is used to put a signal onto a line and trace it from a domestic mains plug to the service cable in the street.

The live cable connector can be used to apply a signal to a live cable. Only suitably qualified personnel should use this equipment.

Submersible Double Depth Antenna

This antenna is connected to the locator and used to locate pipes and cables underwater at depths down to 100 metres.

WARNING: use of the submersible antenna should be by fully licensed and experienced personnel only, and only after fully reading the operation manual!

Transmitter Rechargeable battery packs

Rechargeable battery packs for the transmitter are available and are supplied with suitable chargers. The rechargeable battery packs provide superior performance over traditional alkaline batteries.

Bluetooth wireless connections

RD7000+ locators feature a Bluetooth wireless module, as standard, providing the ability to connect to compatible devices such as PCs, laptops or handheld devices running a compatible application.

NOTE: The RD7000+ locator wireless features may be subject to national and or local regulations. Please 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.

Switching Bluetooth on

By default RD7000+ locators and Bluetooth enabled transmitters are shipped with the Bluetooth wireless connection module disabled.

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 A/a key (transmitter) to enter the BT menu.
4. Scroll up or down to the ON option.
5. Press the ƒ key to switch Bluetooth ON and return to the previous menu.

Switching Bluetooth off

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

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 A/a key (transmitter) to enter the BT menu.
4. Scroll up or down to the OFF option.
5. Press the ƒ key to switch Bluetooth off and return to the previous menu.

Pairing to a PDA or PC

Connection requirements:

- Any RD7000+ locator.
- A compatible Bluetooth enabled PDA or Bluetooth enabled PC or Laptop.

NOTE: The procedure below describes the pairing process between a RD7000+ locator and a PDA. Pairing to a PC follows the same steps for the RD7000+ locator and similar steps for your PC or laptop. Consult your PC or laptop Bluetooth pairing instructions to pair with the RD7000+ locator.

Pair the RD7000+ locator to your PDA using your PDA's Bluetooth software.

NOTE: The procedure for pairing your PDA may differ depending on the PDA make and model. The following procedure should apply to most PDAs.

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 up or down to the PAIR menu.

5. Press the key to enter the PAIR menu.
6. Scroll up or down to the BT-PC option.
7. Press the key and the locator will attempt to pair with your PDA.

On your PDA:

8. From the PDA's **Start menu**, select **Settings** then select the **Connections Tab** followed by the **Bluetooth icon.**
9. Ensure the Bluetooth radio is switched on and make the PDA visible to other devices.
10. Select the Devices tab and scan for new partnerships.
11. Create a partnership with the RD7M_xxx device.
12. If asked for a passkey, enter 1234.
13. Select the COM Ports tab and make a New Outgoing Port with the RD7000+ locator. Note the port number of the selected COM port.

Troubleshooting

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

Ensure that the RD7000+ locator and any other wireless device is sufficiently charged for wireless communication. Note that many PDAs will suspend wireless connections when their battery capacity drops below a threshold percentage. Consult your device's documentation for more information.

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

Your PDA device may have insufficient memory to maintain a wireless link, particularly if the connection is sustained over an hour or longer. Make sure you quit applications on your PDA using the method described in your device's documentation.

Resetting connections

If you experience problems with the RD7000+ wireless Bluetooth technology features, Radiodetection recommends resetting the connection and then pairing your device again:

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 RESET menu.
5. Press the key and the locator will purge all current connections.
6. Re-pair your devices.

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
BT004	Locator not paired with PC/PDA
BT005	Paired but connection attempt failed. Power cycling may be required

Survey Measurements

The RD7000+ locator models can transmit survey measurements to a paired Pocket PC (or PDA) with GPS, running a compatible application such as SurveyCERT.

Saving measurements

To save survey measurements, press the key.

To achieve accurate results the locator must be kept as still as possible during the saving process.

If your PC or PDA is out of reach the locator will display an error code. To avoid these errors disable the Bluetooth survey measurements transmission or ensure that your PC or PDA is within range and correctly paired.

NOTE: A flashing depth and/or current reading display means that the measurement is poor and should be taken again. Poor readings may be caused by nearby conductors or sources of electromagnetic interference.

To obtain SurveyCERT for PDA:

SurveyCERT for PDAs and its operation manual are available as a free download from the Radiodetection website:

1. Visit **www.radiodetection.com**.
2. Using the menu bar, go to **Support -> SurveyCERT.**
3. Click on the RD7000+ SurveyCERT link to get to the SurveyCERT download page and follow the instructions.

CALSafe

CALSafe enabled RD7000+ (PLM and TLM models only) are equipped with a system which does not permit them to function once they are beyond the expected service/ calibration date.

When the unit is within 30 days of the service due date the unit will display at startup the number of days left. The locator will stop functioning on the service due date.

You can edit the CALSafe service due date or disable this function using the RD Manager PC software. Refer to its operation manual for further information.

Automatic Logging

RD7000+ logging models (PLM and TLM) offer a powerful data logging system which records all the instrument's critical parameters and warnings in its internal memory at the rate of 1/sec.

The automatic logging system is always active and cannot be disabled. Its memory is capable of storing at least 1 year's worth of normal usage data – based on 4 hours operation per day, 5 days per week, 20 days per month.

Logs can be retrieved using the RD Manager PC application for usage analysis and survey validation. Refer to its operation manual for further information.

Important notices

When reporting any problems to your Radiodetection Dealer or Supplier it is important to quote the unit serial number and the purchase date.

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 five seconds and then reinstall and switch the unit on.

Compliance

EU Compliance

This equipment complies with the following EU Directives:

- R&TTE Directive: 1999/5/EC
- Low Voltage Directive: 2006/95/EC
- EMC Directive: 2004/108/EC

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.

NOTE: 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.

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.

Care and maintenance

The RD7000+ 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 good quality Alkaline or NiMH batteries only.

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

Only use Radiodetection approved Li-Ion battery packs.

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

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 this equipment with 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 so that they do not require regular calibration. However, as with all safety equipment, it is recommended that they are serviced at least once a year either at Radiodetection or an approved repair center.

Regularly check your equipment using eCert; this automatic validation test ensures the equipment is valid according to its original factory calibration.

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 RD7000+ locator or any Radiodetection product.

RD Manager

The RD Manager is the RD7000+ locator system PC companion and it allows you to manage and customize your locator. It also allows software upgrades to both the locator and transmitter.

You can use RD Manager to register your products to obtain 2 years extended warranty, setup your locator by performing a number of maintenance tasks such adjusting date and time, activating and de-activating active frequencies or RF markers, or by setting-up functions like CALSafe or Strike*Alert.*

RD Manager is also used to retrieve and analyze internal logged data (PLM and TLM only).

RD Manager is compatible with PCs running Microsoft Windows XP, Vista, Windows 7 and Windows 8.

For more information about RD Manager refer to its operation manual.

To obtain RD Manager:

1. Go to **www.radiodetection.com/RDManager**.
2. Follow the instructions.

Software Upgrades

From time to time, Radiodetection may release software upgrades to enhance features and improve performance of the RD7000+ 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 RD Manager software upgrade screen. Refer to its operation manual for further information.

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

NOTE: To be able to upgrade your products software you need to have created an account using RD Manager and you need a live internet connection. An optional special PSU adaptor may be required to update your transmitter software.

eCert

The RD7000+ locator is safety equipment which should be regularly checked to ensure its correct operation.

eCert provides a thorough test of the RD7000+'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 RD Manager software is installed. Additional purchase may be required.

Refer to the RD Manager operation manual for further details.

NOTE: eCert does not work with transmitters.

Warranty and extended warranty

RD7000+ locators and transmitters are covered by a 1 year warranty as standard.

Customers can extend the warranty period to a total of 3 years by registering their products (locators and transmitters) within 3 months of purchase.

Registration is done using the RD Manager PC software.

From time to time Radiodetection may release new software to improve the performance or add new functionality to its products. By registering, users will benefit from subscribing to email 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.

Registering using email

You can also register your product(s) by sending an email to **rd-support@spx.com**.

You will need to provide the following compulsory details:

1. Date of Purchase.
2. Serial Number of each of your qualifying products (RD7000+ locators and transmitters).
3. Your email address.
4. Your Company Name.
5. Contact Name.
6. Address.
7. Telephone Number.
8. Country of residence.
9. Indicate that you do not wish to receive e-mail alerts advising about any new software release (OPT OUT) – by default you will receive email notifications.

10. Indicate that you do not wish to receive e-mail or other marketing material with new product information or special offers and promotions related to its product range (OPT OUT) – by default you will receive marketing material.

Standard Warranty Terms

Subject to the conditions set out herein, Radiodetection Limited expressly and exclusively provides the following warranty to original end user buyers of Radiodetection products. Radiodetection hereby warrants that its products shall be free from defects in material and workmanship for one year starting from point of sale to end customer. Extensions of this warranty period are available where the same terms and conditions apply.

Statement of warranty conditions

The sole and exclusive warranty for any Radiodetection product found to be defective is repair or replacement of the defective product at Radiodetection's sole discretion. Repaired parts or replacement products will be provided by Radiodetection on an exchange basis and will be either new or refurbished to be functionally equivalent to new.

In the event this exclusive remedy is deemed to have failed of its essential purpose, Radiodetection's liability shall not exceed the purchase price of the Radiodetection product. In no event will Radiodetection be liable for any direct, indirect, special, incidental, consequential or punitive damages (including lost profit) whether based on warranty, contract, tort or any other legal theory.

Warranty services will be provided only with the original invoice or sales receipt (indicating the date of purchase, model name and dealer's name) within the warranty period. This warranty covers only the hardware components of the Radiodetection product. Data storage media or accessories must be removed prior to submission of the product for warranty service.

Radiodetection will not be responsible for loss or erasure of data storage media or accessories. Radiodetection is not responsible for transportation costs and risks associated with transportation of the product. The existence of a defect shall be determined by Radiodetection in accordance with procedures established by Radiodetection.

This warranty is in lieu of any other warranty, express or implied, including any implied warranty of merchantability or fitness for a particular purpose.

This warranty does not cover:

a. periodic maintenance and repair or parts replacement due to wear and tear

b. consumables (components that are expected to require periodic replacement during the lifetime of a product such as non-rechargeable batteries, bulbs, etc.)

c. damage or defects caused by use, operation or treatment of the product inconsistent with its intended use

d. damage or changes to the product as a result of:

   i. misuse, including: - treatment resulting in physical, cosmetic or surface damage or changes to the product or damage to liquid crystal displays

   ii. failure to install or use the product for its normal purpose or in accordance with Radiodetection's instructions on installation or use

   iii. failure to maintain the product in accordance with Radiodetection's instructions on proper maintenance

   iv. installation or use of the product in a manner inconsistent with the technical or safety laws or standards in the country where it is installed or used

   v. virus infections or use of the product with software not provided with the product or incorrectly installed software

   vi. the condition of or defects in systems with which the product is used or incorporated except other 'Radiodetection products' designed to be used with the product

   vii. use of the product with accessories, peripheral equipment and other products of a type, condition and standard other than prescribed by Radiodetection

   viii. repair or attempted repair by persons who are not Radiodetection warranted and certified repair houses

   ix. adjustments or adaptations without Radiodetection's prior written consent, including:

      i. upgrading the product beyond specifications or features described in the instruction manual, or

      ii. modifications to the product to conform it to national or local technical or safety standards in countries other than those for which the product was specifically designed and manufactured

   x. neglect e.g. opening of cases where there are no user replaceable parts

   xi. accidents, fire, liquids, chemicals, other substances, flooding, vibrations, excessive heat, improper ventilation, power surges, excess or incorrect supply or input voltage, radiation, electrostatic discharges including lighting, other external forces and impacts.

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Radiodetection®

序言

关于本指南

注意：本指南提供了RD7000+定位仪和发射机的基本操作说明。本指南中包含重要的安全信息和指导，在操作RD7000+定位仪和发射机前应完整阅读本指南。

本指南仅用作快速参考指南。有关详细说明，包括配件的使用，eCERT™，CALSafe™*，SurveyCERT™和自动日志*的帮助，请参考RD7000+定位仪操作手册、SurveyCERT和RD Manager™手册，可从www.radiodetection.com下载上述内容。

在线用户手册库还包含SurveyCERT和RD Manager手册的链接。

*仅限日志型号。

⚠ 警告！和带电导体直连可能具有致命危险。与带电导体的直连仅可由具有充分资质的人员操作，并仅使用允许和通电线路连接的相关产品。

⚠ 警告！发射机能输出具有可致命的电压。将信号引用于管道或电缆时应注意，要确保通知可能在线路上工作的其他技术人员。

⚠ 警告！在使用耳机前，应降低音量，避免损伤您的听力。

⚠ 警告！在可能存在危险气体的区域不得使用本设备。

⚠ 警告！在使用发射机时，应先关闭发射机，然后断开电缆连接，最后去掉电池。

⚠ 警告！RD7000+定位仪可探测到大部分埋设导体，但有部分物体并不发射可探测的信号。RD7000+或其它电磁定位仪无法探测到这些物体，所以在操作时要小心谨慎。还有一些带电线缆，RD7000+在电力模式下无法探测到。在近距离的情况下，RD7000+无法表明信号是来自单个电缆还是多个电缆。

⚠ 警告！在全功率输出下长时间使用后，电池可能变热。在更换或处理电池时要小心谨慎。

延长质保

感谢您购买RD7000+接收机和发射机！

RD7000+接收机和发射机的标准质保期为一年。

顾客可以在购买产品后3个月内，通过产品注册将质保期延长至三年。

产品注册要通过RD Manager电脑软件完成，可从雷迪网站上下载该软件。请访问www/radiodetection.com/RDManager。

英国雷迪可能不时发布新的软件，来改进这些产品的性能或增加新功能。通过产品注册，用户可获得电邮订阅提醒，了解产品相关的新软件和特别服务。

用户还能随时选择退出，不再接收软件或技术通知，或不再接收营销材料。

eCert™

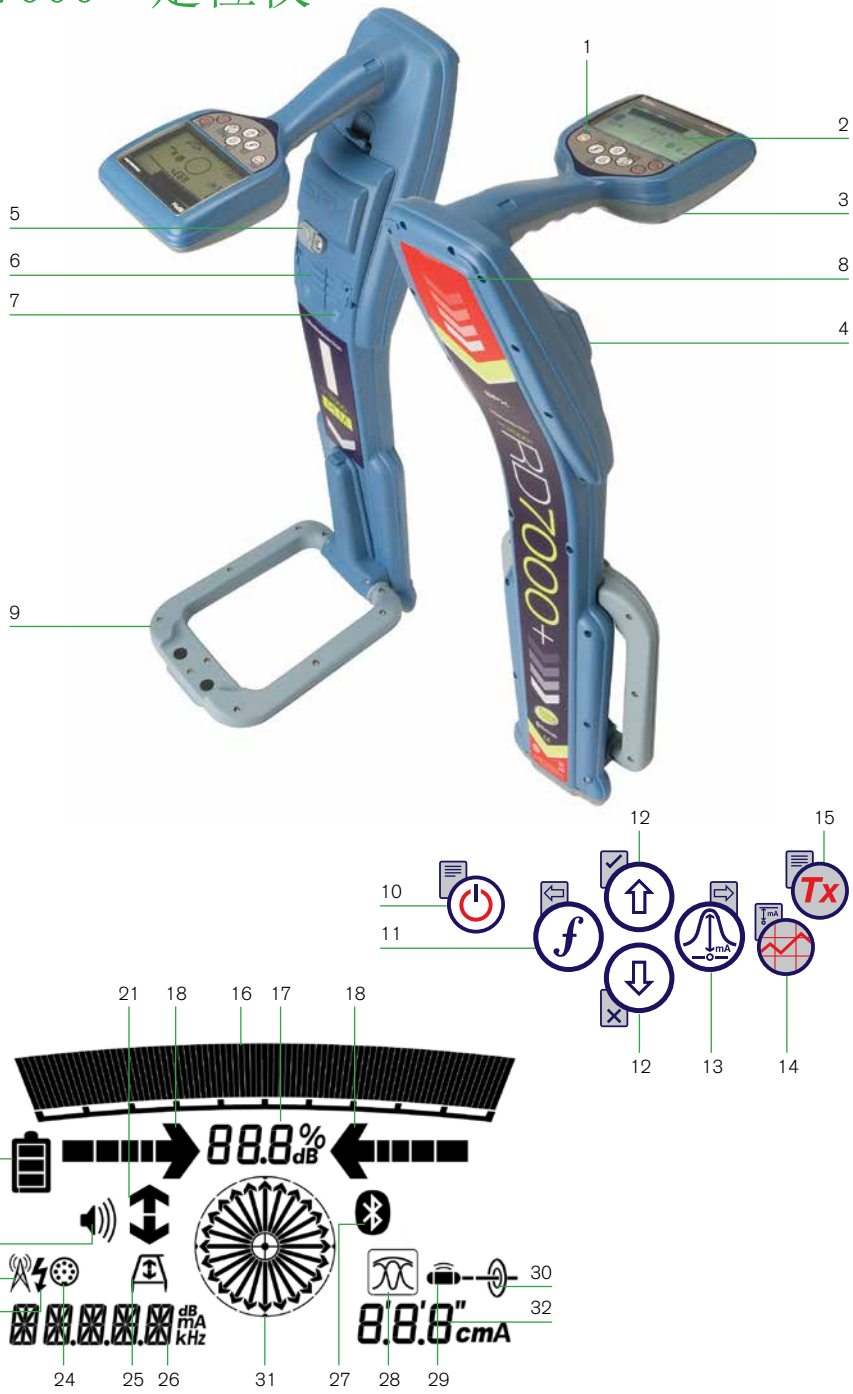
RD7000+定位仪是一种安全设备，应定期检查本设备，确保其正常的工作状态。

eCert可对RD7000+定位管线和电子标识进行全面测试，在获得合格的测试结果时，将提供英国雷迪标定证明。

要运行eCert，应将定位仪与连网的电脑相连，且该电脑上已安装RD Manager软件。可能需要额外的购买。

有关更多信息，请参考RD Manager操作手册。

RD7000+ 定位仪



定位仪功能

1. 键盘
2. 含自动背光的LCD显示屏
3. 扬声器
4. 电池盒
5. 电池充电连接器
6. 配件连接器
7. 耳机连接器
8. 蓝牙模块天线
9. 标识环路天线

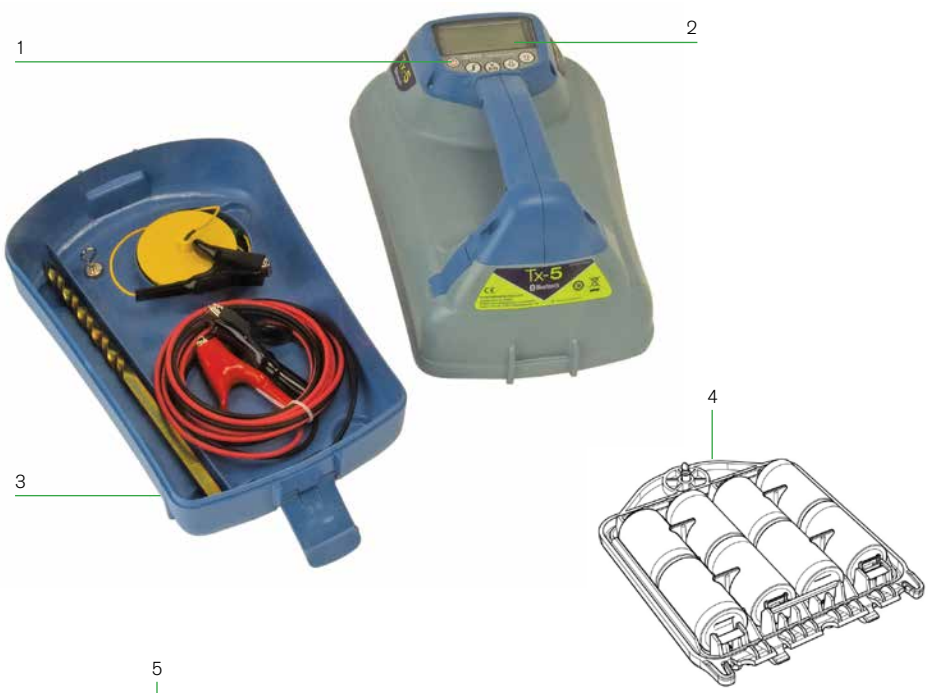
Locator keypad

10. 电源键 ⏻: 打开或关闭该键。打开定位仪菜单。
11. 频率键 ƒ: 选择频率。关闭子菜单。
12. 上下箭头 ⇧ ⇩: 调整所获信号。在菜单选项中滚动。
13. 天线键: 当天线向上时，触发峰值，混合峰/谷值，谷值，单天线和导航模式。当天线向下时，触发标识和混合（标识/管线）模式。打开子菜单
14. 图表键: 保存SurveyCERT测量值。
15. 发射机键 Tx: 将启用iLOC定位仪上的iLOC™命令发送至启用iLOC的发射机上。

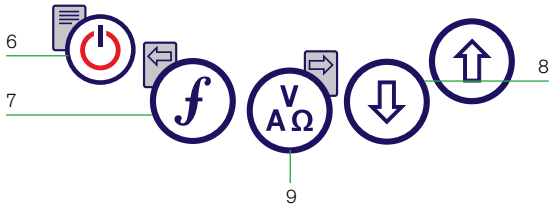
接收机屏幕图标

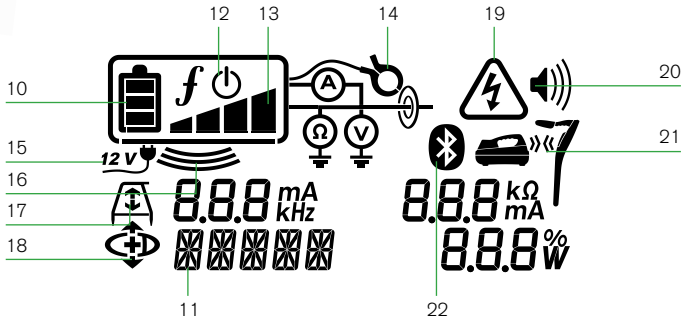
16. 表示信号强度和峰值标识。
17. 信号强度：对信号强度的数字表示。
18. 峰值/比例箭头：表示线路和定位仪的相对位置。
19. 电池图标：表示电池量。
20. 音量图标：显示音量。
21. 故障查找箭头（只适用于PLM和TLM型号）。
22. 无线电模式：表示当前开启无线电模式。
23. 电源模式：表示当前开启电源模式。
24. 配件或测量指示器：表示已连接配件或启用测量。
25. A型图标：表示已连接A型支架。
26. 工作模式指示器。
27. 蓝牙图标：表示蓝牙连接的状态。若该图标闪烁，则表示正在进行配对。若图标常亮，则表示已建立连接。
28. 天线模式图标：表示天线选择：峰值、谷值、峰谷值。
29. 探头图标：表示选中了探头信号源（DLM,PLM,和TLM型号）。
30. 管线图标：表示信号源来自管线。
31. 罗盘/标识模式指示器：表示定位管线与定位仪的相对方向。在标识模式下，也用作图形指示。
32. 电流/深度指示器。

Tx-1，Tx-5和Tx-10发射机









发射机功能

1. 键盘
2. LCD显示屏
3. 可拆卸配件盒
4. 1号电池盒
5. 可充电电池组（可选）

发射机键盘

6. 电源键: 打开和关闭该键。打开发射机菜单。
7. 频率键: 选择频率。菜单导航键。
8. 上下箭头: 调整所获信号。在菜单选项中滚动。
9. 测量键: 打开子菜单。用于进行电压和阻抗测量。

发射机屏幕图标

10. 电池图标：表示电池量。
11. 对选定操作模式的字母数字说明。
12. 待命图标：当发射机处于待命状态时会出现该图标。
13. 输出水平：显示发射机的输出功率。
14. 接线板图标：表示已连接接线板或其他插头。
15. 直流电源图标：当发射机通过直流电源供电会出现该图标。
16. 感应指示器：当发射机处于感应模式时会出现该图标。
17. A框（仅限Tx-5和Tx-10）：表示发射机处于故障查找模式。
18. 电流方向模式指示器（仅限Tx-10）：表示发射机正处于电流方向模式。适用于RD8000系列管线仪。
19. 电压警告指示器：表示发射机的电压水平具有潜在危险性。
20. 音量图标：表示音量。
21. 配对图标（仅限Tx-5B和Tx-10B）。只适用于RD8000系列管线仪。
22. 蓝牙图标（仅限Tx-5B和Tx-10B 。只适用于RD8000系列管线仪。

在您开始之前

请注意，本指南仅作为快速参考指南使用。我们建议您在操作RD7000+定位仪前，先阅读操作手册！

首次使用

出于安全原因，RD7000+定位仪在运送时将断开锂电池的连接，且发射机的电池盒中没有1号电池。

要连接锂电池，请打开RD7000+电池盒，将电池引线插入电池连接器。

要在发射机中装入1号电池，请打开配件盒。电池盒位于发射机机体的下方。用转键打开电池盒。插入八个1号碱性或镍氢电池。

系统设置

您应根据您的个人偏好和操作要求来设置系统，然后再进行第一次探测，这一点很重要。您可以使用下面的RD7000+菜单来设置系统。

注意：除非另有说明，这些程序同时包括发射机和定位仪。

在更改设置前，按下 ⏻ 键，打开接收机或发射机。

注意：打开系统后，点击 ⏻ 键，将激活接收机或发射机菜单。

使用菜单

通过RD7000+接收机和发射机菜单，您可以选择或更改系统选项。进入菜单后，会有箭头键来导航菜单。发射机和接收机上的导航是一样的。在菜单中，屏幕上的大部分图标会暂时消失，在显示屏的左下角会出现菜单选项。请注意，在浏览定位仪菜单时，ƒ 和 🔔 键将作为左右箭头使用。在浏览发射机菜单时，ƒ 和 V/A/Ω 键作为左右箭头使用。点击右箭头，将进入子菜单，点击左箭头则会返回上一个菜单。

注意：当您选择好选项并按下 ƒ 键时，该选项将自动启用。

定位仪菜单选项

- VOL：在0（静音）和3（最高）之间调节扬声器的音量。
- BT：启用、禁用、重设或配对蓝牙连接。在接入个人电脑或个人掌上电脑（PDA）时将确定所使用的协议。
- UNITS：选择公制或英制。
- CAL：显示出厂标定日期，以及最近一次维护标定或eCert标定验证的日期。
- MARKER：启用或禁用单个设施标识。
- LANG：选择菜单语言。
- POWER：选择电源频率：50或60Hz。
- ANT：启用或禁用天线模式，峰值除外。
- FREQ：启用或禁用单个频率。

- ALERT：启用或禁用Strike*Alert*™。
- BATT：设置电源类型：碱性电池、镍氢电池或锂电池。
- COMP：启用或禁用罗盘功能的显示。

在接收机菜单上导航：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键在菜单选项中滚动。
3. 按下 🔔 键进入选项的子菜单。
4. 使用 ⇧ 或 ⇩ 键在子菜单选项中滚动。
5. 按下 ƒ 键确认选择，并返回上一个菜单。
6. 按下 ⏻ 键，返回主操作屏幕。

发射机菜单选项

- VOL：在0（静音）和3（最高）之间调节扬声器的音量。
- FREQ：启用或禁用单个频率。
- BOOST：在规定的时间内（按分钟计）增强发射机的输出功率。
- LANG：选择菜单语言。
- OPT F：启用或禁用SideStep*auto*™（仅限蓝牙型号）。
- BATT：设置电源类型：碱性电池、镍氢电池或锂电池。并且仅为碱性电池选择Eco模式。
- MAX P：允许发射机输出最大功率。
- MODEL：说明您定位仪的型号。
- MAX V：设定输出电压。
- BT：启用、禁用或配对蓝牙连接（仅限蓝牙型号）。

在发射机菜单上导航：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键在菜单选项中滚动。
3. 按下 V/A/Ω 键进入选项的子菜单。
4. 使用 ⇧ 或 ⇩ 键在子菜单选项中滚动。
5. 按下 ƒ 键，返回上一级或退出菜单。
6. 按下 ⏻ 键，返回主操作屏幕。

有关如何使用菜单、选择选项、以及作出更改的示例：

语言

要选择您的偏好菜单语言，请完成以下步骤：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键在LANG菜单中滚动。
3. 按下定位仪上的 键，或发射机上的 键进入LANG菜单。
4. 向上或向下滚动，选择您偏好的语言。
5. 按下 ƒ 键，接受您的选择，并返回主菜单。
6. 按下 ⏻ 键，返回主操作屏幕。

电源/主频（仅限接收机）

若要选择您所在国家或地区的合适电源频率（50或60Hz），请完成以下步骤：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至POWER菜单。
3. 按下接收机上的 键，进入POWER菜单。
4. 向上或向下滚动，选择合适的频率。
5. 按下 ƒ 键，接受您的选择，并返回主菜单。
6. 按下 ⏻ 键，返回主操作屏幕。

单位（仅限接收机）

RD7000+定位仪可以让您在公制或英制（美国习惯）单位中工作。

若要选择您偏好的测量单位，请完成以下步骤：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至UNIT菜单。
3. 按下接收机上的 键，进入UNIT子菜单。
4. 向上或向下滚动，选择公制或英制。
5. 按下 ƒ 键，接受您的选择，并返回主菜单。
6. 按下 ⏻ 键，返回主操作屏幕。

电池

接收机和发射机均由电池提供电力。

RD7000+接收机的标配是可充电锂电池。RD7000+接收机还可通过优质的1号碱性电池或镍氢电池供电。

发射机可通过标配的1号碱性电池，1号镍氢电池，或可选配件锂电池组供电。此外，您还可以使用英国雷迪公司提供的可选配件适配器，从总线或车辆电源对发射机供电。

若使用1号电池，应使系统的设置和当前安装的电池类型匹配，确保最佳性能和正确的电量显示，这一点很重要。

若要设置您的电源类型，请完成以下步骤：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至BATT菜单。
3. 按下接收机上的 键，或发射机上的 键进入BATT菜单。
4. 向上或向下滚动，选择正确的电池类型。
5. 按下 ƒ 键，确认您的选择，并返回主菜单 。
6. 按下 ⏻ 键，返回主操作屏幕。

在使用碱性电池时，可以选择Eco模式来提高电池的利用度。选择Eco模式时，当电池不能再提供足够电力时，发射机会自动降低其最大输出功率。

关闭

若要关闭接收机或发射机，请按住 ⏻ 键，直至屏幕变为空白。

定位管道和电缆

被动频率

被动频率系利用掩埋金属导体上已有的信号。RD7000+支持三种被动频率：电力、无线电、阴极保护（只限于DL型号)。无需发射机的协助，您就可以探测到这些频率。

主动频率

主动频率系通过发射机直接将频率应用于管道或电缆。发射机可以通过三种方法发出信号：

直接连接

在直接连接中，您可把发射机和您希望探测的管道或电缆直接相连。然后发射机将向线路发出离散信号，您可以利用定位仪追踪到该信号。该方法提供了单个线路上的最佳信号，可以使用较低的频率，并可在较长的距离上追踪到该频率。

若要将发射机和管道或线路连接，需要使用直连导线和地桩来完成线路。

⚠ 警告！与带电导体直连可能具有致命危险。与带电导体的直接连接仅应由具有充分资质的人员操作，并仅使用允许和通电线路连接的相关产品。

感应

将发射机置于地面上探测区域的上方或附近。您可以选择恰当的频率。然后发射机将把信号随机地引向附近的任何金属导体。在感应模式下，通常建议使用高频，因为这样较容易引向附近的导体。

夹钳

可以使用可选的信号夹钳，将发射机的信号施加于绝缘带电导线或直径最大8.5"/215mm 的管道。

⚠ 警告！不要将夹钳用于未绝缘的带电导体。

⚠ 警告！将夹钳用于电源线缆或从电源线缆上移除夹钳之前，应确保夹钳始终和发射机相连。

请参考配件使用章节中的信号夹钳段落。

定位电子标识

RD7000+定位仪可使用户定位最常见的设施电子标识，亦称为电子标识系统（EMS）和Omni标识。

若要启用标识定位模式，将标识的环形天线调低。若要禁用标识定位模式，则将环形天线叠起。

标识类型

RD7000+可以探测9种不同的电子标识，如下表所示。

设施	颜色	显示缩写	频率
法国电力	自然色	PFR	40.0kHz
一般/不可饮用水	紫色	PUR	66.35 kHz
有线电视	黑色/橘色	CTV	77.0 kHz
燃气	黄色	GAS	83.0 kHz
电话/电信	橘色	TEL	101.4 kHz
排水设施	绿色	SAN	121.6 kHz
德国电力	蓝色/红色	PDE	134.0 kHz
供水	蓝色	H2O	145.7 kHz
电力*	红色	PWR	169.8 kHz

*红色电力标识定位模式的使用，需要遵循欧盟和可能其它国家的短程装置无线电许可限制。用户应负责确保仅在不限制使用169kHz频率的国家启用红色电源（PWR）标识定位模式。

使用配件

定位仪和发射机和大量的配件兼容。有关使用以下任何配件的详细信息，请参考RD7000+定位仪操作手册。

信号夹钳

当无法直接连接到管道或线缆时，或不宜使用感应模式时，可使用发射机信号夹钳。将夹钳插入发射机的输出口，就可以将定位信号施加于绝缘带电导线。这对带电绝缘线缆而言尤为有用，因为不需要再关闭电源和断开线路。

⚠ 警告！不要将夹钳用于未绝缘的带电导体。

⚠ 警告！将夹钳用于电线缆或从电线缆上移除夹钳之前，应确保夹钳始终和发射机相连。

若要定位或确认单个线路，可以将信号夹钳和定位仪的配件插座相连，并夹在单个管道或线缆上。

听诊器

有时候由于线路过挤或无法触及等原因，可能无法在线缆上使用夹钳。这时应使用听诊器，替代夹钳来确认线缆。

英国雷迪提供多种听诊器来满足各种应用需求。

若要使用听诊器，应将听诊器和接收机的配件插座相连。然后接收机将自动探测装置，并过滤无关的定位模式。

探头和FlexiTrace

探头是一种由电池供电的发射机，适合于追踪非金属管道。RD7000+可以探测到多种探头频率，包括由Flexisondes，GatorCam 4TM或flexiprobe TM推杆系统和P350 flexitrax 牵引探头发射的频率。有关定位探头的详细指南，请参考操作手册。

FlexiTrace是一种可追踪玻璃纤维杆，内置线缆导体，末端配有探头。FlexiTrace与发射机的输出端口相连，通常用于定位小口径非金属管道。用户可以选择定位线缆的整个长度，或仅定位线缆的末端。

FlexiTrace的最大额定电源为1W。将FlexiTrace和雷迪Tx-5（B）或Tx-10（B）一同使用时，MAX P菜单中的输出限制必须设为1W，MAX V菜单中的输出电压限制必须设为低。

Tx-1无设置要求。

⚠ 警告：若未遵守上述Tx-5（B）或Tx-10（B）规定，可能导致FlexiTrace的末端过热，造成人身伤害和设备损坏的风险。

利用A字架进行故障查找

RD7000+ PLM和TLM型号能够利用A字架配件来准确探测线缆护套的缺陷。因线缆护套受损致使信号传向地面，这样的故障信号可被Tx-5（B）或Tx-10（B）的A字架探测到。

有关故障查找的详细指导，请参考操作手册。

插座/带电电缆连接器

插座连接器与发射机的输出端口相连，将信号导入线路，并从本地电源插座到街道的工作电缆中追踪该信号。

带电电缆连接器可用于将信号导入带电电缆。只有具备恰当资质的人员才能使用本设备。

水下倍深天线

该天线和定位仪相连，用于定位水下深至100米的管道和线缆。

⚠ 警告：水下天线仅可由具备充分许可和经验的人员在完整阅读操作手册后使用！

发射机可充电电池组

发射机配有可充电电池组和相适配的充电器。相比传统的碱性电池，可充电电池可提供更卓越的性能。

蓝牙无线连接

RD7000+定位仪的标配包含蓝牙无线模块，能够和兼容设备相连，例如、个人电脑、台式机或运行兼容程序的手持设备。

注意：RD7000+定位仪无线功能需要遵守本国或当地规定。请咨询您当地部门了解更多信息。

⚠ 警告！不要在无线连接技术可能存在危险的区域使用该连接，这些区域可能包括：石化设施，医疗设施或导航设备周围。

打开蓝牙

RD7000+接收机和配有蓝牙功能的发射机在运送时已默认禁用蓝牙无线连接模块。

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至BT菜单。
3. 按下 键（接收机）或 键（发射机）进入BT菜单。
4. 向上或向下滚动至ON选项。
5. 按下 ƒ 键，打开蓝牙，返回上一个菜单。

关闭蓝牙

您可以关闭蓝牙以延长电池寿命，或在无线连接视为危险的区域遵守相关规定。

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至BT菜单。
3. 按下 键（接收机）或 键（发射机）进入BT菜单。
4. 向上或向下滚动至OFF选项。
5. 按下 ƒ 键，关闭蓝牙，返回上一个菜单。

与PDA或个人电脑配对

连接要求：

- RD7000+接收机。
- 兼容的配有蓝牙功能的PDA或个人电脑或台式机

注意：下面的流程描述了RD7000+接收机和PDA之间的配对过程。与个人电脑的配对也遵循和RD7000+接收机同样的步骤，和个人电脑或台式机的配对步骤类似。有关和RD7000+接收机配对的方法，请查阅您的个人电脑或台式机配对说明。

使用您的PDA蓝牙软件来配对RD7000+接收机和您的PDA。

注意：根据具体的PDA款式和型号，和您PDA配对的程序可能不尽相同。以下程序适用于大多数PDA。

在接收机上：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至BT菜单。
3. 按下 键进入BT菜单。
4. 上下滚动至PAIR菜单。
5. 按下 键进入PAIR菜单。
6. 上下滚动至BT-PC选项。
7. 按下 ƒ 键，接收机将尝试和您的PDA连接。

在您的PDA上：

8. 从PDA的开始菜单上，选择设置，然后选择连接选项卡，然后选择蓝牙图标。
9. 确保打开蓝牙无线电，使PDA对其它设备可见。
10. 选择设备选项卡，扫描新的匹配对象。
11. 建立与RD7M_xxx设备的连接。
12. 如果询问密码，输入1234。
13. 选择COM端口选项卡，建立与RD7000+接收机的新对外端口。注意所选COM端口上的端口号。

故障解决

成功的无线通讯取决于很多因素，包括：电池寿命，电磁感染，设备内存和物理障碍。

确保RD7000+发射机、接收机和其它无线设备已充满足够电量供无线通讯使用。请注意，很多PDA在电池电量低于阀值时会暂停无线连接。详细信息请查阅您设备的说明书。

过量的电磁干扰会大大限制无线通讯的范围，并且/或破坏数据。

您PDA设备的内存可能不足以维持无线连接，尤其是连接持续超过一小时的情况下。请确保您按照设备说明书中所述的方法，在您的PDA上退出相关程序。

重设连接

若您遇到RD7000+无线蓝牙技术功能的问题，雷迪公司建议重设连接，然后再次配对您的设备：

1. 按下 ⏻ 键进入菜单。
2. 使用 ⇧ 或 ⇩ 键滚动至BT菜单。
3. 按下 🔔 键进入BT菜单。
4. 上下滚动至RESET菜单。
5. 按下 ƒ 键，定位仪将清除所有当前连接。
6. 重新配对您的设备。

蓝牙错误代码

若使用定位仪向发射机或个人电脑或PDA执行蓝牙命令时出现错误，LCD将显示错误代码，来帮助您解决定位仪上的问题。

代码如下所示：

BT代码	说明
BT001	本设备未配置蓝牙
BT002	内部蓝牙错误
BT004	接收机未和个人电脑/PDA配对
BT005	已配对，但连接失败。可能需要重启

探测数据

RD7000+管线仪可用GPS将测量数据传送到匹配的电脑（或PDA)。

保存测量数据

若要保存测量数据，按下 📈 键。

若要获得准确结果，在保存过程中必须尽量保持定位仪的静止状态。

若您的个人电脑或PDA不在附近，则定位仪会显示错误代码。为避免这些错误，应禁用蓝牙测量数据传输，或确保您的个人电脑或PDA在范围内并正确配对。

注意：若深度和/或电流读数闪烁，则表示测量数据不佳，应重新获取。读数不佳的原因可能是周围有导体，或存在电磁干扰源。

为PDA获取SurveyCERT：

可从英国雷迪网站上免费下载为PDA定制的SurveyCERT及其操作手册：

1. 访问www.radiodetection.com。
2. 使用菜单条，前往Support->SurveyCERT。
3. 点击RD7000+ SurveyCERT链接，前往SurveyCERT下载页面，按照说明操作。

CALSafe

对于启用CALSafe的RD7000+定位仪型号（只限于PLM和TLM型号），当其超过预计维护/标定日期后，其所配的系统将不允许该定位仪继续工作。

当其距离既定维护日不到30天时，该机器在启动时将显示剩余的天数。定位仪将在既定维护日停止工作。

您可以编辑CALSafe既定维护日，或利用RD Manager个人电脑软件禁用该功能。有关更多信息，请参考其操作手册。

自动日志记录

RD7000+记录型管线仪（PLM和TLM)提供强大的数据记录系统，可在内部存储中以1/秒的速度记录所有关键参数和警示。

自动日志记录系统始终打开，无法禁用。该系统的内存能存储至少一年的正常使用数据（按每月20天，每周5天，每天4小时工作时间计）。

可使用RD Manager个人电脑程序来提取日志，以进行使用分析和探测验证。有关更多信息，请参考其操作手册。

重要通知

向您的英国雷迪经销商或供应商报告问题时，应提供机器序列号和购买日期。

该（成套）不会因合理的静电放电而受到永久性损害，并已根据IEC 801-2进行测试。但是，在极端的情况下，可能出现临时故障。若发现此情况，请关闭工具，等待一会，然后重新打开。若工具仍然有故障，则断开电池等待五秒，然后重新安装电池再打开机器。

合规

欧盟合规

本设备符合以下欧盟指令：

- R&TTE指令：1999/5/EC
- 低电压指令：2006/95/EC
- EMC指令：2004/108/EC

FCC合规声明

本设备符合FCC规则15条的规定。本设备的运作须符合以下两个条件：

- 本设备不会造成有害干扰。
- 本设备必须接受所面临的干扰，包括可能造成意外运作的干扰。

注意：本设备已经过测试，并符合FCC规则15条中对A类数码设备的限制。设定这些限制的目的，是为了对设备在商业环境中运作时提供防范有害干扰的保护。本设备会产生、使用并放射无线电频的能量，若没有根据制造商说明手册安装和使用，可能会对无线电通讯造成有害干扰。本设备在住宅区的使用可能会造成有害干扰，在此情况下，您需要解决此等干扰，并自行承担费用。

修改：

若未经英国雷迪公司许可对本设备作出任何修改，可能会违反FCC关于操作本设备的授权，从而导致用户无权使用本设备。

加拿大行业合规声明

ICES-003 A类通知：

该A类数字设备符合加拿大ICES-003的要求。

培训

英国雷迪公司为大多数雷迪产品提供培训服务。我们有资质的指导员将在贵方偏好的地点或雷迪公司总部，对设备操作员或其他人员进行培训。有关更多信息，敬请访问www.radiodetection.com，或联系您当地的雷迪公司代表。

注意和维护

RD7000+接收机和发射机功能强大、持久，并不受气候影响。但您还可以通过遵循以下注意和维护指导，来延长您设备的使用寿命。

一般要求

将设备存放于清洁干燥的环境中。

确保所有终端和连接插座均干净、无杂物、无腐蚀，且未损坏。

当本设备受损或有故障时请勿使用。

电池和供电

仅使用优质碱性电池或镍氢电池。

在使用交流电适配器时，仅可使用英国雷迪公司批准的适配器。

只可使用英国雷迪公司批准的锂电池。

应根据贵公司的工作规范，以及/或贵国相关法律或指导来处置电池。

清洁

⚠ 警告！当本设备通电或连接到任何电源，包括电池、适配器和带电电缆时，不要尝试清洁本设备。

尽可能确保本设备是清洁干燥的。

用柔软润湿的布料来清洁本设备。

若在污水系统中或可能存在生物风险的其它区域使用本设备，应使用恰当的消毒剂。

不要使用磨料或化学物，因为这些物质会损害套层，包括反光标签。

不要使用高压软管。

拆卸

在任何情况下都不要试图拆卸本设备。定位仪和发射机不包含用户可维护零件。

若进行拆卸，可能会损坏设备，或降低设备性能，并导致制造商的质保失效。

维护

定位仪和发射机在设计上是不需要定期标定的。但是，和所有安全设备一样，建议至少每年在英国雷迪公司或其批准的维修中心对设备进行一次维护。

使用eCert来定期检查您的设备；该自动验证测试可以确保本设备与出厂标定相符。

注意：若由未经批准的维修中心或维修人员维护，可能导致制造商的质保失效。

英国雷迪产品，包括本指南，均在不断的开发之中，因此会在无通知的情况下出现变更。有关RD7000+定位仪或任何雷迪产品的最新信息，请访问www.radiodetection.com或联系您当地的英国雷迪公司代表。

RD Manager

RD Manager是RD7000+定位仪系统的电脑软件，可以让您管理和自定义您的定位仪，并对定位仪和发射机进行软件升级。

您可以使用RD Manager来注册您的产品，获得两年延长的质保，并通过执行一系列维护任务，例如调整日期和时间，激活和撤销当前频率或电子标识，或通过设置功能，例如CALSafe或StrikeAlert，来设置您的定位仪。

RD Manager还可用于提取和分析探测数据及内部日志数据（只限于PLM和TLM型号）。

RD Manager和运行Microsoft Windows XP，Vista，Windows 7及Windows 8的个人电脑兼容。

有关RD Manager的更多信息，请参考其操作手册。

要获取RD Manager：

1. 请访问www.radiodetection.com/RDManager。
2. 按照说明操作。

软件升级

雷迪公司可能不时发布软件升级以增强功能，并提高RD7000+接收机或发射机的性能。

软件升级是免费的。

您可以通过RD Manager软件升级界面来了解您的产品是否最新，或进行升级。有关更多信息，请参考其操作手册。

有关新软件版本的电邮提醒和通知将发送给所有注册的用户。

注意：若要升级您的产品，您需要利用RD Manager创建一个账户，并需要接入互联网。此外还可能需要可选的雷迪电源来更新您的发射机软件。

eCert

RD7000+定位仪是一种安全设备，应定期接受检查，确保其正确运作。

eCert提供了对RD7000+定位线路和标识的全面测试，并在获得正面测试结果时提供英国雷迪标定证明。

要运行eCert，应将定位仪与接入互联网并已安装RD Manager软件的个人电脑相连。可能需要额外购买。

有关更多细节，请参考RD Manager操作手册。

注意：eCert只可和定位仪一同使用。

质保和延长质保

RD7000+接收机和发射机的标准质保期为一年。

顾客可以在购买后三个月内注册自己的产品（接收机和发射机），将质保期延长至三年。

产品注册需通过安装RD Manager软件的个人电脑进行。

英国雷迪公司可能不时发布新的软件，来改进这些产品的性能或增加新功能。通过产品注册，用户可获得电邮订阅提醒，了解产品相关的新软件和特别服务。

用户还能随时选择退出，不再接收软件或技术通知，或不再接收营销材料。

利用邮件注册

您还可以发送电邮至rd-support@spx.com来注册您的产品。

您需要提供以下必要材料：

1. 购买日期
2. 您每个合格产品（RD7000+定位仪和发射机）的序列号
3. 您的电邮地址
4. 您的公司名称
5. 联系人姓名
6. 地址
7. 电话
8. 居住国
9. 表明您不希望收到有关新软件版本的电邮提醒（退出）（默认您将收到电邮通知）。
10. 表明您不希望收到有关新产品信息，或和产品系列有关的特别服务或促销的电邮或其它营销材料（退出）（默认您将收到营销材料）。

标准质保条款

根据本文规定的条件英国，雷迪公司明确且排他性地向雷迪产品的原始终端用户买家提供以下质保。英国雷迪公司在此保证，其产品在销售给终端顾客后一年内不应存在材料和工艺缺陷。此外还有本质保期限的延长服务，适用相同的条款和条件。

质保条件声明

对有缺陷的英国雷迪产品的唯一排他性保证，就是由英国雷迪公司自行决定维修或更换有缺陷的产品。维修的零件或更换的产品将由英国雷迪公司在交换的基础上提供，可以是新产品，也可以是功能上等同于新产品的翻新品。

若该排他性救济被视为未能满足其本质目的，英国雷迪公司的责任不得超过购买雷迪产品的价格。在任何情况下，英国雷迪公司均不对直接、间接、特殊、意外、后续或惩罚性损害赔偿（包括利润损失）承担责任，无论是基于质保、合同、侵权，或其它法理。

质保服务仅在质保期内提供原始发票或销售收据（其中注明购买日期、型号名称和经销商名称）的情况下提供。该质保仅包含雷迪产品的硬件部分。在提交产品接受质保服务前，必须移除数据存储媒介或配件。

英国雷迪公司不对数据存储媒介或配件的损失或删除承担责任。英国雷迪公司不对产品运输相关的运输费和风险承担责任。缺陷的存在应由英国雷迪公司根据其制定的程序来确定。

本质保替代其它所有明确或暗示的保证，包括对适销性或适合特定用途的所有暗示保证。

本质保不包含：

a. 定期维护和维修，或损耗引起的零件更换。
b. 易耗品（预计在产品寿命中需要定期更换的组件，例如不可充电电池、灯泡等）。
c. 未根据设定用途使用、操作或处理产品而导致的损坏或缺陷。
d. 由于以下原因导致的产品损坏或变更：
    i. 不恰当使用，包括：导致产品物理或表面损坏，或产品变更，或液晶显示屏损坏的处理。
    ii. 未根据正常用途或英国雷迪公司安装和使用说明来安装或使用产品。
    iii. 未根据英国雷迪公司恰当维护说明来维护产品。
    iv. 安装或使用产品的方法，和安装或使用该产品所在国的技术或安全法律或标准不符。
    v. 感染病毒，或在产品上使用非原配软件或错误安装的软件。
    vi. 和产品一同使用或整合在一起的条件或系统错误不符合或是由于未使用“雷迪产品”指定配套产品导致的。
    vii. 所使用的配件、外围设备或其它产品的类型、条件或标准与英国雷迪的规定不符。
    viii. 由非英国雷迪公司质保人员和认证维修机构维修或试图维修。
    ix. 未获得英国雷迪公司事先书面同意而进行调整或改装，包括：
        i. 在说明手册规定的规格或功能范围外升级产品，或
        ii. 对产品进行修改，使其符合非产品特定设计和制造国家的国家或当地技术或安全标准。
    x. 疏忽，例如打开非用户可更换的零件。
    xi. 事故，火灾，液体，化学物，或其它物质，洪水，震动，过热，通风不当，电力浪涌，过量或错误供给或输入电压，辐射，静电放电，包括照明，其它外力和冲击。

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