Nordic ID RF650 User's Manual

Version 1.0

June 1st, 2004

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1   EC Declaration of Conformity

Nordic ID hereby declares, that Nordic ID RF650 wireless data collection systems have been tested according to the standards EN 300 328-2 and EN 301 489-17.

The equipment conforms to the essential requirements of the Directive 1999/5/EC.

Salo 1.6.2004,

Jorma Lalla, Managing Director
Nordic ID Oy

2 General information

2.1 The purpose of the use of the Nordic ID RF650

The Nordic ID RF650 Hand Terminal (RF650) and Wireless Remote Access Platform (WRAP, Access Server) are designed to be used as a part of a Nordic ID Wireless Data Collection and Communication System in accordance with this User's Manual. Any inappropriate use of the equipment for any other purpose is strictly prohibited.

Please note that national and/or local regulations and/or laws may limit or regulate the use of all or any part of the RF650 Hand Terminal, WRAP or the system.

2.2 Copyright and Disclaimer

All rights to this manual are owned solely by Nordic ID Oy (referred to in this user's guide also as Nordic ID). All rights reserved. The copying of this manual without the written permission from Nordic ID by any means is strictly prohibited excluding cases where the copying is related to end-customer or system integrator use.

In order to enhance the functionality of its products, Nordic ID reserves the right to change the technical specifications or functions of its products within the scope of any existing applicable standards or regulations.

Nordic ID assumes no responsibility if any of its products is used in unlawful ways.

2.3 Version information

The reader of this manual is advised to check for possible newer editions of this User's Manual. For more information on latest version, please visit our Internet-pages at http://www.nordicid.com.

2.4 User safety information

Nordic ID products have not been designed, intended nor inspected to be used in any life support related device or system related function nor as a part of any other critical system and are granted no functional warranty if used in any of the applications mentioned above.

Specific versions of RF650 Hand Terminal contain a Laser Scanner Module, an RFID reader/writer or both. The laser of the Laser Scanner Module is a Class II Laser, which are deemed safe for the use they are applied for in this product.

User's should never look directly into the laser and must refrain from directing the laser at the eyes of other persons or animals. It should also be noted, that some electronic sensors may be effected by laser light. Please note that shiny surfaces may reflect the laser beam into unexpected directions.

The RFID reader/writer used in specific versions of the RF650 emit RF-energy and may thus cause disturbances to electronic equipment when used inappropriately.

The radio parts of the RF650 Hand Terminal and the WRAP emit radio frequency energy. Although the radio frequency energy levels normally emitted from these products comply with applicable regulations, users with pacemakers are warned of possible interference to pacemaker functions. Customers of systems using the RF650 Hand Terminal and/or WRAP are advised to educate the end-users of possible danger to pacemakers in order to avoid personal injury.

The RF650 Hand Terminal is supplied with a Laser light warning label located in the back of the unit. See below.

ENGLISH
LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER

DEUTCH

SUOMI
VAARA LASERSATEILYÄ
ÄLÄ TUIJOTA SÄTEESEEN
LUOKKA 2 LASER

SVENSKA

LASERSTRAHLEN
NICHT DIREKT IN DEN LASERSTRAHL SCHAUEN
LASERPRODUKT DER KLASSE 2

VARNING LASERSTÅLNING
STIRRA EJ IN I STRÅLEN
KLASS 2 LASER

DANSK
LASERLYF
SE IKKE IND I STRÅLEN
KLASSE 2 LASER

ITALIANO
LUCE LASER
NON FISSARE IL RAGGIOPRODOTTO
AL LASER DI CLASSE 2

FRANÇAIS
LUMIERE LASER
NE PAS REGARDER LE RAYON FIXEMENT
PRODUIT LASER DE CLASSE 2

ESPAÑOL
LUZ LASER
NO MIRE FIJAMENTE EL HAZ
PRODUCTO LASER DE LA CLASE 2

NEDERLANDS
LASERLICHT NIET IN STRAAL STAREN
KLASSE-2 LASER

NORSK
LASERLYS IKKE STIRR INN I LYSSTRÅLEN
LASER, KLASSE 2

PORTUGUÊS
LUZ DE LASER NÃO FIXAR O RAIO LUMINOSO
PRODUTO LASER DA CLASSE 2

Please check the WRAP User's Manual for specific instructions relating to the installation and placement of the WRAP unit.

2.5   FCC related information

The RF650 has been tested according to FCC regulations.

2.5.1   FCC Compliance Statement

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

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver in connected.

- Consult the dealer or an experienced radio/TV technician for help.

FCC NOTICE

1. Use only the power cord and connector cables supplied by Nordic ID to connect the equipment.

2. Use only shielded cables to connect I/O devices to this equipment.

3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2.5.2 FCC Class B Part 15 and WRAP

The radiated output power of the WRAP is far below the FCC radio frequency exposure limits. Nevertheless, the WRAP should be used in such a manner that the potential for human contact during normal operation is minimized.

2.6 IC related information

This device complies with Part 15 of the FCC Rules and with RSS-210 of Industry Canada.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

2.7 Warranty

Nordic ID grants warranty to its products according to the Nordic ID General Sales Conditions.

Warranty will be void, should the Nordic ID products be used in ways in contradiction with the instructions laid out in this User's Manual, or should the products' housing be opened or tampered with.

The products mentioned in this User's Manual are to be used only according to the instructions described in this manual. Faultless and safe operation of the products can be guaranteed only if the transport, storage, operation and handling of the devices are appropriate. This also applies to the maintenance of the products.

To prevent damage to products please follow normal ESD related procedures when handling the products. Switch off power from devices (remove rechargeable batteries from Hand Terminal or remove the Hand Terminal from the Desk Top Charger and disconnect the power input from the WRAP) when connecting or disconnecting serial cable connections.

2.8   Restrictions on use

Nordic ID products have been designed to operate on frequency ranges allocated to the use in questions by local and international laws, regulations and standards. The users of the products are responsible for taking care that all local and international regulations regarding EMI and electrical safety are followed regarding the installation and operation of the products by themselves and/or as part of a system.

Any modifications to the internal parts or the antenna, hardware or software related, other than described by the original manufacturer of the product in question, are strictly prohibited. Nordic ID will not bear any responsibility for use of its products, which have been tampered with.

3   About this manual

This User's Manual contains information about the Nordic ID RF650 Hand Terminal and the RF650 Access Server (WRAP).

Chapter ###

Chapter 3 (About this manual) includes information about this manual and instructions on how to download the latest version of the manual via Internet.

Chapter 4 (Introduction) contains an overview of the RF650 Hand Terminal and the RF650 Access Server. A default basic solution is described and the relation between the RF650 system and the host application is also explained.

Chapter 5 (Getting Started) contains instructions on how to start using your RF 650 Hand Terminal and the RF650 Access Server.

Chapter 6 (Desk Top Charger) contains instructions on how to start using your Desktop Charger.

Chapter 7 (Installation and use) explains the basic installation of the Hand Terminal and WRAP

Chapter 8 (Appendix) Contains useful additional information and contact addresses.

3.1   Checking for latest version of this manual

You can check the latest version of this manual at our Internet-pages at http://www.nordicid.com.

The version and date of the manual are indicated on the front page of the manual. Please note that some functions and characteristics described in any version of this manual might not reflect the functions of the Hand Terminal or the WRAP, if they have firmware relating to earlier versions.

Information concerning the updating of the firmware of the RF650 Hand Terminal and the WRAP are available at the Nordic ID Technical Support web pages at http://www.nordicid.com.

4 Introduction

This chapter contains an overview of the Nordic ID RF650 Wireless Data Collection System, which consists of one or more RF650 Hand Terminal and one or more RF650 Wireless Remote Access Platform (WRAP). The principle of operation and the relation between the RF650 Hand Terminal and WRAP and the Application Software running in the Host Computer are also shortly explained.

4.1   System components

The Nordic ID RF650 Wireless Data Collection System consists of three principal components:

- Nordic ID RF650 Hand Terminal(s)
- Wireless Remote Access Platform(s) (WRAP)
- The Application Software, which runs on the Host Computer. Application Software and Host Computer are not delivered by Nordic ID.

4.1.1 Versions of RF650

The RF650 is available in three different production versions:

- RF650 with Laser Scanner   for bar codes
- RF650 with RFID   for RFID tags
- RF650 with Laser Scanner and RFID   both of the above

4.1.2 Product identification label and serial number

A product ID label is located inside the casing at the bottom of the rechargeable battery holder. The label may be read by opening the battery cover and by removing the batteries. Serial number can be used for tracing product information and service history.

4.2   Basic system operation

The Hand Terminals communicate with the Host computer via the Wireless Remote Access Platform(s) (WRAP). The system can include one or more Hand Terminals and one or more WRAPs. A WRAP can be interfaced directly to the Host Computer using an RS232 interface, or indirectly via different networks (WLAN, GPRS etc.) with network cable or with third party adapters. The Hand Terminals can send/receive data to/from the Host Computer.

The integrity of data transfers between the systems components are always checked using the check sum method. Data transfers are always acknowledged, which assures that possible data loss due to e.g. radio interference is always detected. Detection of data loss generates a resending process.

The maximum number of Hand Terminals per WRAP depends on the make and model of the WRAP. The number of WRAPs is limited by the Bluetooth standard, but may also depend on the make and model of WRAPs.

4.3   General operation of the Hand Terminal

Nordic ID RF650 is a thin client terminal. It is used as a user interface to a Software application in Host Computer. The terminal cannot be utilized without an application and a host computer.

The initial screen of the Hand Terminal displays a prompt (user configurable header text) and an input field. This field can be filled with data from the keyboard or by activating the Laser Scanner for a reading of a bar code or by activating the RFID reader for a reading of an RFID tag.

Any text sent by the Host Computer will clear the screen and show the text received from the Host Computer. Any user input (from the keyboard or the Laser Scanner) would clear the text received from the Host Computer and the initial screen will be displayed again.

The user starts a transaction by using the Hand Terminal keyboard to make an entry, or by scanning a barcode or an RFID tag. The Hand Terminal then sends this data to the Host Computer (via the WRAP and a possible network) and waits for a message from the Host. If the Hand Terminal does not receive a correct message within the specified time-out period, it will generate a "HOST NOT ANSWER" status message on the screen.

4.4   Communication between the WRAP and the Host Computer

4.4.1 Transaction Start

The user of the Hand Terminal sends data to the HOST. The user has executed an action, e.g. pressed the OK-button or scanned a bar code.

The Hand Terminal user initiates sending by:

- Pressing the OK-button when the display shows the start frame
- Pressing a function key (F1-F10), which has been specified to send a character string
- From input field which has been specified to send by pressing OK or after reading with a laser scanner.

Sending sequence of the Hand Terminal consists of:

1. Counting and adding to the frame to be sent the CRC checksum
2. Generating a "processing data" text to the Hand Terminal's screen
3. Sending of the frame
4. Waiting for an answer from the HOST for a time defined by the user as the limit for the timeout.

NOTE: It is not possible to execute any functions while waiting for the ack from the Host system.

4.4.2 The WRAP receives a message from the Hand Terminal

Upon receiving a message from the Hand Terminal, the WRAP will:

- Verify the integrity of the data frame using the CRC method.

If the frame is flawless, it will be forwarded to the RS232 serial interface and to the network connection.

4.4.3 The HOST application receives the frame from the WRAP

The HOST application will receive the frame according to the RF650 HOST protocol.

The HOST application has to execute the following checks before the frame data can be given to business logic handling:

- CRC value is received with the frame. It is needed for checking the cable connection between the WRAP and the HOST. This checking is necessary only when the RS232 cable connection is > 25 m.

- The processing of two similar messages must be avoided in the HOST application. Depending on CRC, MN (message number) and ID (own IP number) values can be checked to detect if the frame is the same as the one already in process.

4.4.4 The HOST application handles the frame

HOST application handles the frame data. The HOST application must have the commID number of the Hand Terminal during the whole data processing time so that application is able to answer to the correct Hand Terminal.

4.4.5 HOST sends an answer to the Hand Terminal via WRAP

When the HOST application has processed the Hand Terminal's frame it sends an answer to the Hand Terminal of the frame according to the command HOST RF650 protocol.

It is recommended that the HOST application is programmed to keep in memory the last frame sent for each Hand Terminal, so that the host can answer any retransmission requests of Hand Terminals as quickly as possible.

4.4.6 The WRAP sends the frame to the Hand Terminal

When the WRAP has received the frame from the HOST it does the following:

- The CRC is checked
- A frame is sent to the Hand Terminal.

4.4.7 The Hand Terminal receives a frame from the WRAP

When the Hand Terminal has received the frame from the WRAP it does the following:

- The CRC is checked
- Frame commands are executed
- A short beep is generated.

4.4.8 Transaction End

The Hand Terminal and the WRAP are ready for a new transaction.

5 Getting Started

5.1 Unpacking the unit

Nordic ID products are packaged in carton boxes (boxes include the Nordic ID logo and colors). The standard package includes typically the RF650 Hand Terminal, rechargeable batteries (2 pcs), Desk Top Charger, the power supply for the charger with power cord and the connector cable for the Hand Terminal.

The WRAP is packaged separately. The package contains the WRAP and the power supply together with the power cord.

Please check the equipment upon arrival. Check that the boxes are intact and contain no visibly damaged parts. If you note any parts, which seem damaged, please contact your local Nordic ID Sales Representative or Nordic ID Technical Support.

5.2 Charging the batteries

Before using the RF650 Hand Terminal you must place the rechargeable batteries into the Hand Terminal battery compartment. Open the battery case cover in the back of the Hand Terminal and place the batteries in the battery holder. Place the batteries according to the polarity indicators in the holder.

When charging the batteries from fully discharged status, the charging process takes approximately 2,5 hours.

Charging alkaline batteries in the charger may damage the charger as well as the batteries.

5.3 Activating the Hand Terminal

The Hand Terminal does not have a separate power switch (ON/OFF). With adequately charged batteries, the Hand Terminal is always ready to function by pressing any key. The Hand Terminal will resume its standby state 90 seconds after the last user function (key press).

The Start up screen asks for a 4 digit PIN-code. The default factory setting of the PIN-code is 1234.

5.4   Resetting the Hand Terminal

The Hand Terminal can be reset by pressing SHIFT+DEL (press SHIFT and while keeping the SHIFT-key down press DEL). The Hand Terminal will automatically reset when installing new batteries.

During reset, the Hand Terminal will beep twice.

5.5   Symbols of the display

Special symbols will be shown on the right side of the display depending on the function:

SHIFTLOCK. This function will be ON or OFF by pressing the shift key.

TRANSACTION. This sign shows up, when the Hand Terminal is communicating with the HOST.

EXTERNAL READER. This sign shows up, when the external reader is activated. (SHIFTLOCK + laser button).

5.6   Sound

Resetting Hand Terminal	2 beeps
Transaction failure	5 beeps
Bad battery condition	1 beeps with "low battery" text
Reception of message	At least 1 beep, can be more.
Successful reading of laser scanner	1 beep
Opening keylock	1 long beep
Wrong password	3 fast beeps

5.7   Keyboard

Key function table:

Key	Function with shift key (shift + key pressed at the same time).	Function with SHIFTLOCK	Normal function
Laser	***	External reader will be activated if allowed by the current input field.	In scanner mode: The Laser reader will be activated if allowed by the current input field. In light mode: The bright led will be on as long as key is down.
F1	***	F6	F1
F2	***	F7	F2
F3	***	F8	F3
F4	***	F9	F4
F5	***	F10	F5
OK	Keylock ON / OFF	Normal function	The cursor will be moved to the next field and/or the content of the field sent to the HOST if allowed by the current field definition
Arrow up	Scrolls display upward	Moves the cursor step by step to the left.	Displays the previous field of the form.
Arrow down	Scrolls display downward	Moves the cursor step by step to the right.	Displays the next field of the form.
Shift	***	SHIFTLOCK OFF	SHIFTLOCK ON
7	***	ABC abc	7
8	***	DEF def	8
9	***	GHI ghi	9
4	***	JKL jkl	4
5	***	MNO mno	5
6	***	PQR pqr	6
1	Receiver mode on/off	STU stu	1
2	***	VWX vwx	2
3	***	YZĂÄÖ yzåäö	3
.	Scanner / Light	↵ : ; ! ? " # & @ |	.
0	MENU	< > [ ] Ü { } ( ) ü	0
-	Backlight (option)	Spc + * / % = $ £ ± ½	-
DEL	Reset	Normal function	Removes a character from the current field.

5.8 F-Keys

The F-Keys F1 - F10 can be programmed to include recurring strings.

The F-Keys function in two different ways:

1. By pressing an F-Key, a string is printed in the current field. If the length of the string exceeds the length of the field, the excess characters will be omitted. If the field already contains a text, this will be replaced by the new text.

2. By pressing an F-key, the string of characters is sent to the HOST.

5.9 Character map

The picture below contains the default character map of the RF650 Hand Terminal.

Nordic ID is able to add customer specific or language specific characters to the character map or provide tools for character map modification. Nordic ID may charge an extra fee for the character map modification or the tools.

5.10 Initial display

After power-up, the RF650 Hand Terminal will start to search for a WRAP, and the display will show the following information:
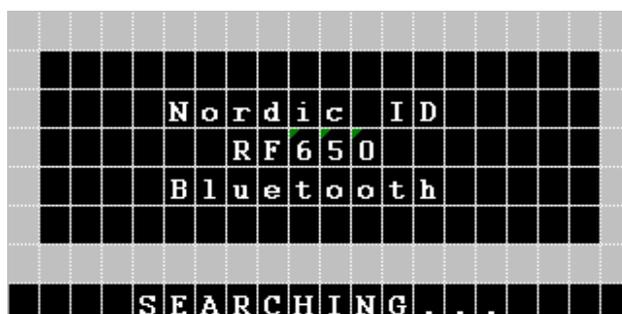
After locating the WRAP, the RF650 Hand Terminal and the WRAP will initiate the connection, and the display will show the following information:

```
         Nordic  ID
           RF650
         Bluetooth


   CONNECTING...
```
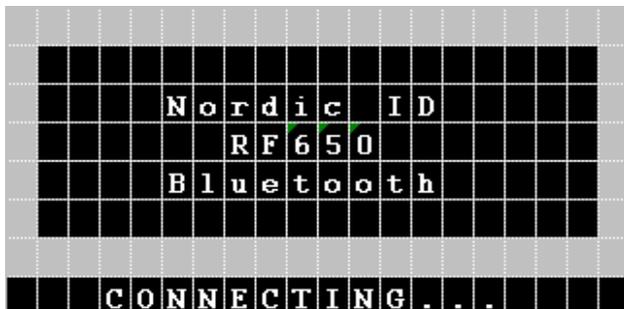
After the RF650 Hand Terminal and the WRAP have the connection defined and ready for data transfers between the RF650 Hand Terminal and the Host Application, the display will show the following initial display (for a short time):

```
NID  RF650

  _____

         CONNECTED
```
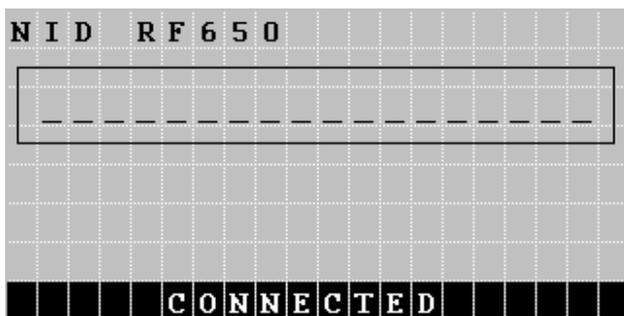
An initial display will always appear if no fields are defined. This will usually occur when the Hand Terminal is activated or its RAM is cleared. The initial display includes a heading, which may be defined by the user. The input field consists of max. 18 characters.

0	<	H	E	A	D	I	N	G	>										
1																			
2		_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_
3																			

A string of characters in the initial display can be sent to the HOST by pressing the OK button. Alternatively, the field contents may be read using the Laser Scanner.

NOTE! Usually the Host Application has been defined to take control of the display contents immediately after the connection between the RF650 and the WRAP has been established.

5.11 Setting the PIN-code

Before the RF650 Hand Terminal can be used in a host application environment, the PIN-code of the Bluetooth system needs to be set on the Hand Terminal.

Standard practice is that the system administrator sets the PIN-code on the Hand Terminal units.

How to set the PIN-code on the RF650 Hand Terminal

The PIN-code is set using the "Settings" menu on the unit.

1. Press SHIFT + 0 from the keyboard (Shift needs to be pressed down as you press 0)
2. Select "Settings" with the arrow keys and press OK
3. Type in the password (0000-9999), **or if it has not been set up, just press OK**
4. Select "PIN code" and press OK
5. Type in a PIN-code between 0000-9999 and press OK

After setting up the PIN-code, a screen that searches for the Base Stations will appear:

```
* * * B a s e   S t a t i o n s * * * *
#
#
#
#
#
S E A R C H      P I N     M E N U
        C O N N E C T E D
```
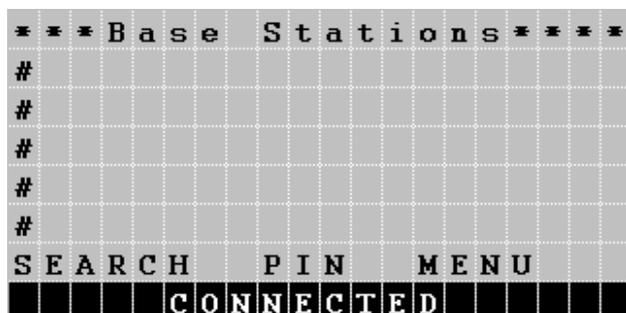
5.12 Searching for the Base Stations

Select [SEARCH] and press OK.

The RF650 Hand Terminal will begin to search for base stations automatically after power-up and this will usually take 15 – 30 seconds. A list will appear on the RF650 display listing all the names of the Bluetooth devices nearby.

```
***Base Stations***
Nid_019
Nid_006
#
#
#
SEARCH   PIN   MENU
████NO MORE BS████
```

Other Bluetooth devices apart from WRAP (such as mobile phones) may also appear on the list. The WRAP can be recognized by the name, which the system administrator has set for it. If there are no WRAPs listed when the text "NO MORE BS" appears on the display, restart the search process by selecting [SEARCH]. Select a WRAP, which has the same PIN-code as the Hand Terminal, from the list and press OK. After selecting the WRAP the Hand Terminal will form a connection to the WRAP.

After the Hand Terminal has succeeded in connecting with the WRAP the Hand Terminal will receive the Bluetooth addresses of all the Base Stations that are connected to the network (have the same PIN-code). The Bluetooth addresses will be saved in the memory of the Hand Terminal. When the connection to the network has been successfully performed, the Hand Terminal will beep three times quickly in succession, after which it will beep separate beeps one each for a found WRAPs (e.g. five WRAPs found, five beeps).

The Hand Terminal is now ready to communicate with the host system. The host system may have a function, which allows only Hand Terminals with a certain **CommID** to use the system. The system administrator has to see to it that CommIDs of all new Hand Terminals to be used in the system are saved in the host system.

CommID is a unique identification number for the Hand Terminal. By using the CommID, the Host System is able to separate the Hand Terminals from each other. CommID is printed on the ID label located under the rechargeable batteries of the Hand Terminal but may also be checked from the internal menu (INFO).

5.13 Input fields

The RF650 Hand Terminal has a virtual display page of 12 x 20 characters. The actual display size is 8 x 20 characters, thus 2/3 of the virtual page can be viewed at a time.

Depending on the application, the HOST can send fields to the Hand Terminal. These fields may be filled using the keyboard or the Laser Scanner (or RFID reader). Fields are typically underlined.

5.14 Locked fields

Fields can generally be filled with text using the keyboard. An exception to this is caused by locked fields. When a locked field is active, the cursor is the same length as the field. A locked field cannot be read by the Laser Scanner (or by the RFID reader) either. A locked field functions like a button the content of which can be sent to the HOST by pressing OK.

5.15 Filling fields using the laser scanner

1. A field can be defined to be filled using the Laser Scanner (or RFID reader) and sent to the HOST.

2. A field can be defined to be filled using the Laser Scanner (or RFID reader) but not to be sent to the HOST.

3. A field can be defined not to be filled using the Laser Scanner (or RFID reader).

NOTE! If a field already contains text, it will be replaced by the new text.

5.16 Writing text in a field

An active field is indicated by the cursor. An active field can be filled with text using the keyboard and/or using the Laser Scanner (or RFID reader).

You can move the cursor in the field step by step using the arrow keys if SHIFTLOCK is ON.

5.17 Writing letters

Letters can be written in a field when the SHIFTLOCK is ON by pressing the number keys containing letters. When a key is pressed once, the first indicated letter will appear. When pressed twice the second letter will be shown, and so on.

CAPITAL or small letters can be changed by pressing a key for at least 1.2 seconds.

5.18 Removing letters

Letters may be removed from a field with the DEL key.
An entire field can be cleared by pressing the DEL key for at least 0.5 seconds.

5.19 Moving between fields

You can move between the fields using the arrow keys.
By pressing the OK key, you can move to the next field.

5.20 Menu

The settings of the Hand Terminal can be changed through the Menu. The Menu will be activated by pressing the keys SHIFT + 0.

You can move in the Menu using the arrow keys. The desired item is selected by pressing the OK key. You can move backwards in the Menu by pressing OK when the cursor is on the << selection.

NOTE! After choosing an item in the Menu, it must be confirmed by pressing the OK key. A changed setting will be signalled by a beep.

5.21 Main user settings

The most important settings can be changed using a password (0000 - 9999). The Initial setting is 0000.

5.22 Adjustments

Key sounds	On / Off
Volume	Beep level. Three different levels.
Battery	0 for rechargeable batteries
	1 for alkaline batteries.

5.23 Info

Information about battery condition (power level) and software version info.

5.24 Versions of the RF650

The RF650 is available in three different versions (RF650 with Laser Scanner for bar codes, RF650 with RFID reader/writer for RFID tags and RF650 with both the Laser Scanner and the RFID reader/writer.

6 Desk Top Charger

6.1   General information

The Desk Top Charger is used for charging the rechargeable batteries of the RF650 Hand Terminal. It is a fast charger, which reduces the charging time. Batteries are charged without removing them from the Hand Terminal. The charging procedure is directed through the Hand Terminal.

6.2   Safety information

The Desk Top Charger includes several safety features. The software of the Hand Terminal includes a routine, which controls the Desk Top Charger. If the routine detects that the Hand Terminal contains normal batteries instead of rechargeable batteries, the charging process is interrupted (max. 10 minutes from the start of the process). The Hand Terminal charging routine also checks the functioning of the Desk Top Charger and interrupts the charging process, if the Desk Top Charger is found to be functioning in an abnormal way.

NOTE! Nordic ID recommends the use of Nordic ID approved/supplied rechargeable batteries. The use of other brands or normal non-rechargeable batteries may cause problems.

WARNING! Do not attempt to charge normal alkaline or other normal batteries. The Desk Top Charger is intended to be used only to charge specified batteries.

WARNING! TO AVOID DAMAGE OR ACCIDENTS, THE DESK TOP CHARGER MUST NOT BE USED FOR ANY OTHER PURPOSE THAN THAT STATED IN THIS MANUAL.

6.3   Desk Top Charger system components

- Desk Top Charger
- Power Supply
- Nordic ID approved AA-size rechargeable batteries

6.4   Connectors

The Desk Top Charger includes 3 connectors:

- Hand Terminal connector
- Power supply connector
- RS232C serial connector
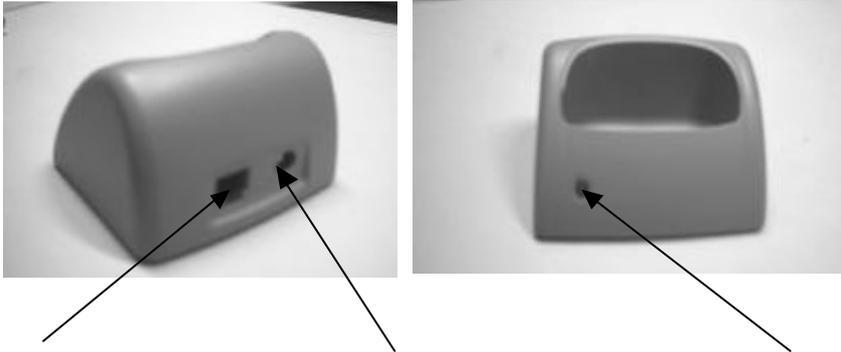
RS232 serial connector   Power supply (7,5 VDC)   Charging indicator

6.5   Charging indicator

The Desk Top Charger has a Charging Indicator (red LED light) located on the left side of the front part of the casing. See section 6.7 Charging the batteries.

6.6   Battery types

Type of battery	2 pcs rechargeable NiCd or NiMH type size AA batteries
Charging methods	Quick charge and trickle
Charging current	650 mA
Charging time	About 1,5 h (with 850 mAh capacity battery)
	About 2,5 h (with 1400 mAh capacity battery)

WARNING!   To avoid the risk of personal injury or damage to property, do not attempt to charge non-rechargeable batteries.

6.7   Charging the batteries

WARNING!   Do not attempt to charge regular or alkaline batteries as this may cause an explosion.

Charging batteries using the Desk Top Charger:

- Batteries must be correctly inserted inside the Hand Terminal.
- Please check that the Hand Terminal batteries are of a rechargeable type (NiCd or NiMH).
- Check that the settings for the Hand Terminal have been configured as follows:

  MENU > ADJUSTMENTS > BATTERY > 0.

- Connect the power adapter to the power supply connector of the charger (see picture above).
- Place the Hand Terminal in the Desk Top Charger.
- The Charging Indicator LED will remain ON during quick charging.
- The LED will start to blink when the battery is fully charged. The light of the LED will then be reduced to indicate a trickle charge current.

The RF650 is placed in the Desk Top Charger by holding the Hand Terminal lightly with one hand and placing it gently on top of the Desk Top Charger. The bottom part of the Hand Terminals casing fits the shape of the large opening on top of the Desk Top Charger. Gently push the Hand Terminal down until the connectors mate (a low beep followed by a high beep are generated from the Hand Terminal if the Desk Top Charger is connected to a power supply, which in turn is connected to a power outlet). See the picture below.

NOTE! The Desk Top Charger may only be used with the Power Supply provided by the manufacturer.

The Hand Terminal cannot be used during battery charging.

It is normal for the base of the charger to warm during charging.

6.7.1 Audio signals and the Charging Indicator LED

Charging indicator

Quick charge   The LED remains on
Trickle charge   The LED (red) blinks

Audio signals

Three successive beeps   Charging not allowed (the Hand Terminal
                                         does not contain rechargeable batteries).

Two successive beeps (long-short)   The battery is being charged

7 Installation and use

7.1   Basic installation of the RF650 Hand Terminal

Basic Installation of the RF650 Hand Terminal is straightforward. Select a place for the Desk Top Charger, in which the Hand Terminal can be stored when not in use. Avoid direct sunlight, extreme temperatures and wet or humid surroundings. The RF650 is intended for indoor use.

7.2   Installation of the WRAP

The WRAP should be installed according to the instructions in the product manual for the WRAP.

Specific instructions for use are usually provided by the System Integrator providing the Host Application solution to the customer.

8 Appendix

The Appendix contains useful information, contact addresses and other additional information regarding the products mentioned in this User's Manual or products otherwise useful in connection of using the RF650, WRAP or system.

8.1 Technical specifications of the RF650 Hand Terminal

Technical Data	
Operating frequency	2400 to 2483.5 MHz (ISM radio band)
Transmit power	Power class 1 (+4 to +20 dBm)
Antenna gain	0 dBi
Data transfer rate	721 Kbit/s Asymmetric, 432.6 Kbit/s Symmetric
Operating temperature	0 to +60 Celsius (32 to 140 Fahrenheit)
Hand Terminal	
Size L x H x W	173 x 22(41) x 54 (79) mm
Weight incl. batteries	257 g with barcode scanner (0,567 lbs) 237 g without barcode scanner (0,523 lbs)
Power supply	2 pcs AA-size rechargeable batteries NiMH / NiCd or normal alkaline batteries
Voltage range	Min 2 V, typical 2.4 V, max 3.3 V
Display	8 x 20 characters with backlight
Keyboard	22 silicone rubber keys
Barcode support	All common types
User input	By keyboard, barcode scanner or RFID reader / writer (13.56 MHz and 125 kHz)
Drop resistance	From a height of 1 m on to concrete
WRAP	
Size L x H x W	130 x 80 x 35 mm
Power Supply	Input: 100 - 240 VAC 50Hz / 60Hz Output: 12 VDC, 830 mA
Interface	2 x RS232: 19200, N, 8, 1 (CTS/RTS) Connectors Modular 6-pin RJ45 for Ethernet DC-jack for power supply

Product Highlights
RS232 interface for connecting to external devices
Highly ergonomic design
Light weight and compact
Easy to use one hand operation
Integrated antenna
7 terminals communicate simultaneously with the WRAP (may vary depending on model)
WRAP can also be used relay mode and in "site survey" mode
Integrated barcode scanner and/or RFID reader/writer

8.2   Technical specifications of the Desk Top Charger

Rechargeable batteries	2 pcs size AA NiCd or NiMH rechargeable battery
Charging methods	Quick charge and trickle charge modes
Power Supply	Input: 100 - 240 VAC 50Hz / 60Hz
	Output: 7,5 VDC, 1200 mA
Charging current	650 mA
Charging time	About 1,5 h (with 850 mAh capacity battery)
	About 2,5 h (with 1400 mAh capacity battery)

8.3 Minimum system requirements for software installation

The specific requirements for the installation of the RF650 Hand Terminal into any system are based on the Bluetooth 1.1 Standard and require the use of a compliant WRAP (Wireless Remote Access Platform).

The specific requirements for the installation of the WRAP (Wireless Remote Access Platform) into any system are based on the Bluetooth 1.1 Standard for the radio part and on the applicable network connection method (LAN, GPRS etc.). Detailed requirements for the WRAP can be found from the documentation of the WRAP.

The RF650 Hand Terminal and the WRAP contain all the necessary software required to establish, maintain and end the radio communication link between the Hand Terminal and the WRAP.

The connection of the WRAP into the host application depends on the host system hardware and operating system and the host application software. The specifications are usually checked and verified by the System Integrator.

For further information, please contact Nordic ID Technical Support.

8.4 Useful links

The following links contain useful information relating to either Nordic ID, Bluetooth or related subjects:

Nordic ID   http://www.nordicid.com

Bluetooth   http://www.bluetooth.com

WRAP   http://www.bluegiga.com

8.5 Trademarks

Nordic ID and Nordic ID logo are registered trademarks of Nordic ID Oy.

All terms mentioned in this User's Guide that are known to be trademarks or service marks have been appropriately marked in the list below with either the ©, ® or the ™ symbol.

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Company / Owner of the Trademark	Trademark
Bluegiga Technologies	WRAP ©
Bluetooth SIG inc.	Bluetooth ©

8.6 Programming the RF650 laser scanner module

A laser diode produces a single beam of coherent light, which deflects off a mirror, and is emitted from the laser engine used inside the RF650. The total deflection of the single beam is 53° (standard version), and the scan frequency is 39 scans per second.

When the laser beam strikes a bar code, the dark bars absorb most of the light while the light spaces reflect most of it. Thus, changes in the reflected light can be used to deduce the bar code into electronic format. A photo diode is used to sense the reflected laser light and generate a current proportional to the reflected light signal. The current then produces an analogue voltage, which is further amplified, filtered to minimise noise related problems and then finally sent to a digitiser, which transforms the analogue signal into digital form representing the bar code.

The DBP data is then sent to the decoder board for processing into a host-compatible format and further applications are based on the software used.

Technical specifications

The technical specifications of the laser engine used in the RF650 are listed in the table below.

ITEM	SPECIFICATION
Scan repetition rate	39 (± 3) scans/sec (bi-directional)
Laser power	1.2mW nominal (Scanning Mode) 0.8mW nominal (Aim Mode)
Laser Class	IEC Class 2 devices
Print contrast	Minimum 25% absolute dark/light reflectance measured at 650nm
Scan angle	53º (typical)
Ambient Light Immunity • Sunlight • Artificial light	10 000 ft. candles / 107.640 lux 450 ft. candles / 4.844 lux

Usable scan distance depends on the bar code size and pitch, quality of the bar code print and ambient light conditions as well as the pitch and angle of the laser beam in reference to the bar code surface. Further information available from Nordic ID upon request.

The laser engine used in the RF650 is programmed during the manufacturing process by defining certain operational parameters with default values. These values may be changed by the user by first setting the unit into a special programming mode and then by scanning special bar codes listed below.

User programmable parameters with detailed descriptions and the respective bar codes are listed in the following chapters and the factory default values are listed in the next section starting at next page.

8.7   Default factory settings of the Laser engine

DEFAULT PARAMETER SETTINGS OF RF650 LASER ENGINE		
Parameter	Parameter number	Default setting
Linear Code Type Security Levels	0x4E	1
UPC-A	0x01	Enable
UPC-E	0x02	Enable
UPC-E1	0x0C	Disable
EAN-8	0x04	Enable
EAN-13	0x03	Enable
Bookland EAN	0x53	Disable
Decode UPC/EAN Supplementals	0x10	Ignore
Decode UPC/EAN Supplemental redundancy	0x50	7
Transmit UPC-A Check Digit	0x28	Enable
Transmit UPC-E Check Digit	0x29	Enable
Transmit UPC-E1 Check Digit	0x2A	Enable
UPC-A Preamble	0x22	System Character
UPC-E Preamble	0x23	System Character
UPC-E1 Preamble	0x24	System Character
Convert UPC-E to A	0x25	Disable
Convert UPC-E1 to A	0x26	Disable
EAN-8 Zero Extend	0x27	Disable
Convert EAN-8 to EAN-13 Type	0xE0	Type is EAN-13
UPC/EAN Security Level	0x4D	0
UPC/EAN Coupon Code	0x55	Disable
USS-128	0x08	Enable
UCC/EAN-128	0x0E	Enable
ISBT 128	0x54	Enable
Code 39	0x00	Enable
Trioptic Code 39	0x0D	Disable
Convert Code 39 to Code 32	0x56	Disable
Code 32 Prefix	0xE7	Disable
Set Length(s) for Code 39	0x12 / 0x13	2-55
Code 39 Full Ascii Conversion	0x11	Disable
Code 93	0x09	Disable
Set Length(s) for Code 93	0x1A / 0x1B	4-55
Interleaved 2 of 5	0x06	Enable
Set Length(s) for I 2 of 5	0x16 / 0x17	14
Interleaved 2 of 5 Check Digit	0x31	Disable

Verification		
Transmit Interleaved 2 of 5 Check Digit	0x2C	Disable
Convert Interleaved 2 of 5 EAN 13	0x52	Disable
Discrete 2 of 5	0x05	Disable
Set Length(s) for Discrete 2 of 5	0x14 / 0x15	12
Codabar	0x07	Disable
Set Lengths for Codabar	0x18 / 0x19	5-55
CLSI Editing	0x36	Disable
NOTIS Editing	0x37	Disable
MSI Plessey	0x0B	Disable
Set Length(s) for MSI Plessey	0x1E / 0x1F	6-55
MSI Plessey Check Digits	0x32	One
Transmit MSI Plessey Check Digit	0x2E	Disable
MSI Plessey Check Digit Algorithm	0x33	Mod 10 / Mod 10
Transmit Code ID Character	0x2D	None

Table 5: Default factory settings

Scanning this bar code returns all Laser engine parameters to factory default values, which are listed in the table above.

SET ALL DEFAULTS

8.8   Status messages of RF650 Hand Terminal

International end-users of RF650 will see different kind of status messages on the bottom of the Hand Terminal screen. There is possible to change a language of status messages by changing configuration bit in eeprom memory. Space for the status message is one line and 20 characters. Characters sets of these languages are Latin-1. If needed a different character set like Russian Cyrillic or Hebrew may be used but this implies that the firmware of the Hand Terminal is changed.

8.9   *"Out of Range!"*

When connection drops: "Out of range" status appears.

	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
Finland					E	i		v	e	r	k	k	o	a	!					
English				O	u	t		o	f		r	a	n	g	e	!				
Germany				K	e	i	n		E	m	p	f	a	n	g	!				
French		C	o	n	n	e	c	t	i	o	n		p	e	r	d	u	e	!	

8.10 "Searching"

RF650 searches for WRAPs (base stations)

Finland	H	a	e	t	a	a	n		t	u	k	i	a	s	e	m	a	a	.	.
English					S	e	a	r	c	h	i	n	g	.	.	.				
Germany						S	u	c	h	e	.	.	.							
French		C	o	n	n	e	c	t	i	o	n		p	e	r	d	u	e	!	

8.11 "Connecting…"

RF650 has found the WRAP and connection is about to established.

Finland					Y	h	d	i	s	t	y	y	.	.	.			
English				C	o	n	n	e	c	t	i	n	g	.	.	.		
Germany					V	e	r	b	i	n	d	e	.	.	.			
French				C	o	n	n	e	c	t	i	o	n	.	.	.		

8.12 "Connected!

Connection with the WRAP has been established!

Finland						Y	h	t	e	y	s							
English						C	o	n	n	e	c	t	e	d				
Germany						V	e	r	b	u	n	d	e	n				
French						C	o	n	n	e	c	t	é					

8.13 "Processing data!

Host Application has processed data and the Hand Terminal is waiting for an answer.

Finland		D	a	t	a	a		k	ä	s	i	t	e	l	l	ä	ä	n	.	.
English		P	r	o	c	e	s	s	i	n	g		d	a	t	a	.	.	.	
Germany		I	n		B	e	a	r	b	e	i	t	u	n	g	.	.	.		
French	E	n		C	o	u	r	s		d	e		T	r	a	i	t	e	m	.

8.14 "No answer from Host"

If the Host Application doesn't answer the "No answer from host" message appears and error beeps are also generated.

Finland	S	o	v	e	l	l	u	s		e	i		v	a	s	t	a	a	!	
English	N	o		A	n	s	w	e	r		F	r	o	m		H	o	s	t	!
Germany			K	e	i	n	e		A	n	t	w	o	r	t	!				
French			A	u	c	u	n	e		R	e	s	p	o	n	s	e	!		

8.15 "Battery low"

Warning is generated when a low battery status is detected.

				L	O	W		B	A	T	T	E	R	Y	!			

8.16 Frequently asked questions

Q: What are the specifications of the integrated laser scanner that RF650 has?

A: It is a high quality laser scanner with a scan angle of 48 degrees, skew tolerance < 55 degrees and pitch angle < 65 degrees. The contrast ration is 30 %.

Q: Can Nordic ID RF650 Hand Terminals read Interleaved 2/5 barcode?

A: It is possible to enable and disable the decode of different Barcode Symbologies by configuring the laser scanner (please see the RF650 Laser Scanner Module Programming Manual). RF650 supports the most common barcodes.

Q: What is the reading distance of the laser scanner?

A: We are using a Symbol laser engine in RF650, which support the most common barcodes, and the reading distance is about 10 - 80 cm.

8.17 Service and Support contacts

If the Hand Terminal is not functioning properly, please contact primarily the reseller/supplier of the products.

Before contacting Nordic ID Service or Nordic ID Technical Support please note the serial number(s) of the Hand Terminal(s) and/or WRAP(s) which seem to be causing the problems before calling. You can contact Nordic ID Service and Nordic ID Technical Support through your supplier or optionally, you may send an email with the above-mentioned information along with your description of the problem and your full contact information to support@nordicid.com. Please remember to include information regarding the provider of the host application used with the RF650 System.

8.18   Sending the unit to service (Service Report Form)

Before sending the unit to service, please contact Nordic ID Service or a Nordic ID Service Partner or Nordic ID Technical Support.

Please have at hand the type of product in question, the serial number(s) of the product(s) and the software version.

If your problem requires servicing of the unit(s), you will receive a Return Authorisation Code, which must be included along with the return address, invoicing information/address and a description of the problem in the packing of the unit(s) to be serviced.

A form for filling in the required information can be downloaded/printed from Nordic ID Support Internet page at the address http://www.nordicid.com.

 You may also use the Service Report form (see following page).

HEADER _____ (*)

Service Report form

Company name   _____

Contact person _____

E-mail address _____

Telephone   _____   Fax   _____

Return address_____

Invoicing address _____

Return method   normal   ☐   express   ☐

Date of purchase   _____   Type of the device _____

Hardware supplier_____

System Integrator _____

Serial number (*) _____

Software version _____

Fault description of the device (in detail if possible)

_____

_____

_____

Do you wish to have a repair cost estimate before the service (circle appropriate
      YES   NO

Do you wish to have an express repair (circle appropriate) (**)
      YES   NO

(**) (if yes, the extra costs will be charged according to the valid service price list)

The Manufacturer grants to the Product a warranty of one year. Manufacturer warrants that the Product is free from defects in materials and workmanship under normal use during the warranty period. The Product shall be returned to the Manufacturer for repair in such cases, as the Customer cannot remedy the problem of error in the unit. Each party will bear the cost of freight to the intended destination of the item to be repaired. Repair service done by manufacturer after the warranty period will be charged according to the valid service price list.

(*) You may continue on additional sheets if necessary, but please mark all related pages with the same header (e.g. your company name and running page number).

8.19   Contact information

Nordic ID International Headquarters

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FINLAND

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Fax: +358 2 727 7720

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Email: info@nordicid.com

Nordic ID United States

Nordic ID

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GA 30157, USA

Telephone: +1 770 445 0095
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