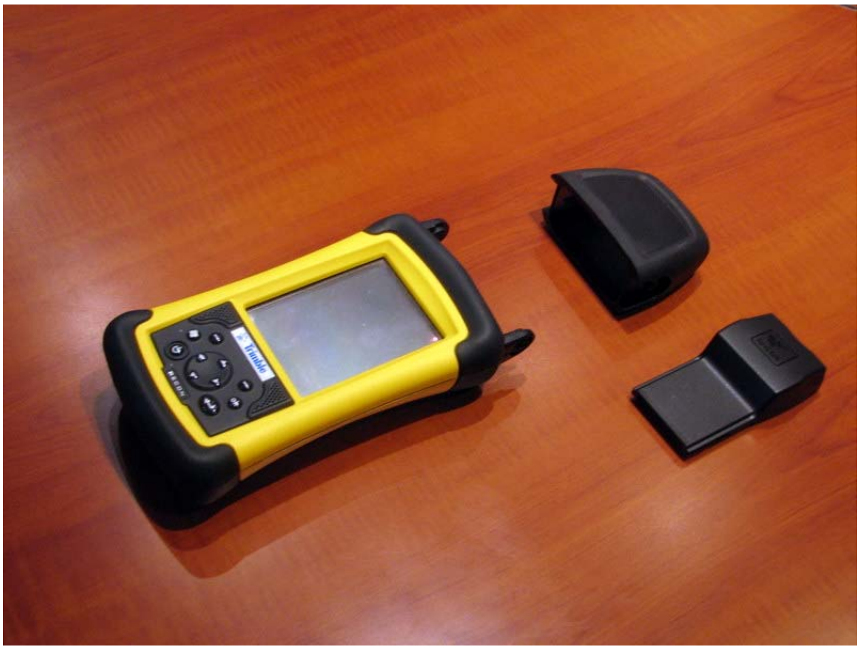
Hi·G·Tek

Wireless Monitoring Platform
for Security & Management

Master Hand Held Terminal

IGMA51433 / 916



User Manual

UM4722
Rev: 1.2A

Table of Content

Attention

• Hi-G-Tek's MHHT RFID Reader, FCC ID: OB6-IGMA51916 is distributed to a commercial/industrial use only, and should only be handled by personnel authorized by Hi-G-Tek representatives.

• Installation must be performed according to this User Guide.

• The use of any antenna other than those certified with the product is expressly forbidden in accordance with FCC rules CFR47 part 15.204 and part 15.203.

The FCC Wants You to Know

This device complies with Part 15 of the FCC Rules. 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."

Pursuant to Part 15 of the FCC rules, limits for a Class B digital device. 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:

a) Reorient or relocate the receiving antenna.

b) Increase the separation between the equipment and receiver.

c) Connect the equipment to an outlet on a circuit different from that to which the
receiver is connected.

d) Consult the dealer or an experienced radio/TV technician.

FCC Warning

Modifications not expressly approved by the manufacturer could void the user
authority to operate the equipment under FCC Rules.

1 Overview

The Master Handheld Terminal is a compact RFID reader module for PDA / Pocket PC with a compact flash (CF) card interface. The reader plugs into a standard CF connector, it has been designed to allow pocket PC's and mobile handhelds both short and long range access to Hi-G-Tek's electronic seal /tag for a various RFID applications

The module is powered from the PDA's power, both LF & HF antennas are completely integrated, the reader uses two RF channels (L.F, H.F) for communication with the electronic seal / tag:
High Frequency channel: Transmit/Receive at 433.92 MHz or 916.5 MHz (different models, where 433 MHz model used mainly in Europe, Africa and other designated countries as per the local telecommunication regulations) FSK modulated with 40 kHz deviation and 16 kHz data.
Low frequency channel: Transmit/Receive at 127 kHz, AM, 4 kHz data rate.

Hi-G-Tek HHT version 1.0.5 is a **H**and**H**eld **T**ernminal application running on a Pocket PC device equipped with Hi-G-Tek CF Reader. The application enables the user to perform several of Active RFID operations using publicly available High-Frequency Radio. These operations include:

1. **Arming a DataSeal (Set)** - writing data to the DataSeal and setting its status to "Set" (armed).
2. **Updating Data (Write Data) –** changing the data of an armed DataSeal.
3. **Reading Data (Read Data) –** reading data of an armed DataSeal.
4. **Reading DataSeal (Read) –** reading DataSeal status, events and data.
5. **Searching DataSeals (Verify) –** searching for neighboring DataSeals.
6. **Reading DataSeal Data/Status (Address Verify) –** reading DataSeal status and data.
7. **Menu** – view recently read Data Seals.

1.1 System Requirements

Your device should meet these minimum requirements:

- Pocket PC running Windows Mobile 2003 or 2003SE with Compact Framework 2.0
- Available CompactFlash card slot

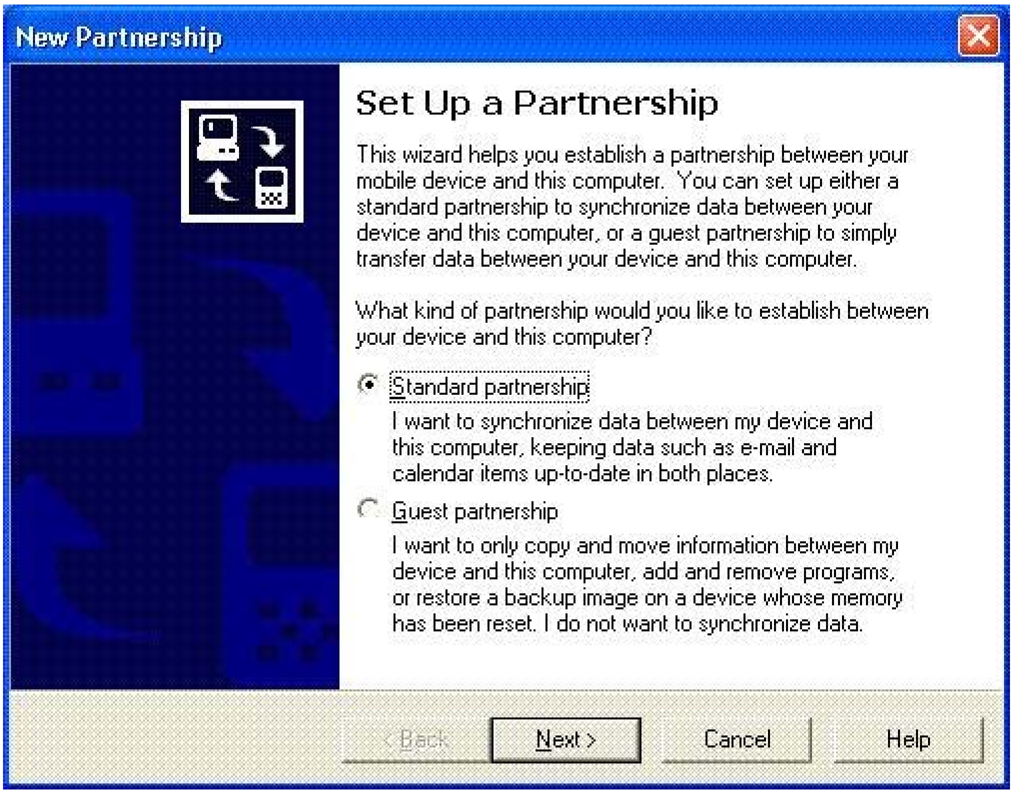
1.2 CF RFID Module installation

- Carefully insert the RFID module into the CompactFlash slot of your PDA.
- There is no need to install any drivers with this RFID card.
- Please not that only one card may be used at a time

2 Installation

This section describe how to set up the Pocket PC for the first time

1. Put the PPC on the cradle and plug in the USB connector to the PC.
2. Windows XP should identify it as the new hardware.
3. Install the ActiveSync 3.8.
4. After installation ended you should get the following screen for creation of "partnership":



Set Up a Partnership

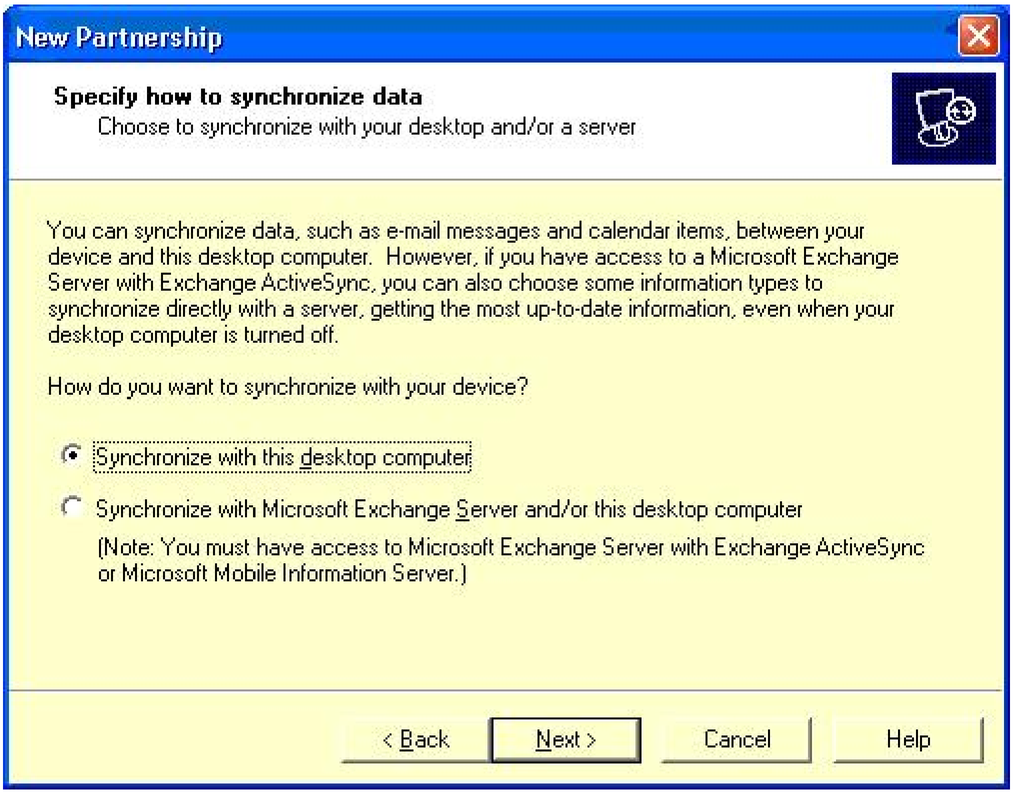
This wizard helps you establish a partnership between your mobile device and this computer. You can set up either a standard partnership to synchronize data between your device and this computer, or a guest partnership to simply transfer data between your device and this computer.

What kind of partnership would you like to establish between your device and this computer?

● Standard partnership
I want to synchronize data between my device and this computer, keeping data such as e-mail and calendar items up-to-date in both places.

○ Guest partnership
I want to only copy and move information between my device and this computer, add and remove programs, or restore a backup image on a device whose memory has been reset. I do not want to synchronize data.

5. Make the above selections (standard partnership) and hit next. You should get the following screen:



Specify how to synchronize data
Choose to synchronize with your desktop and/or a server

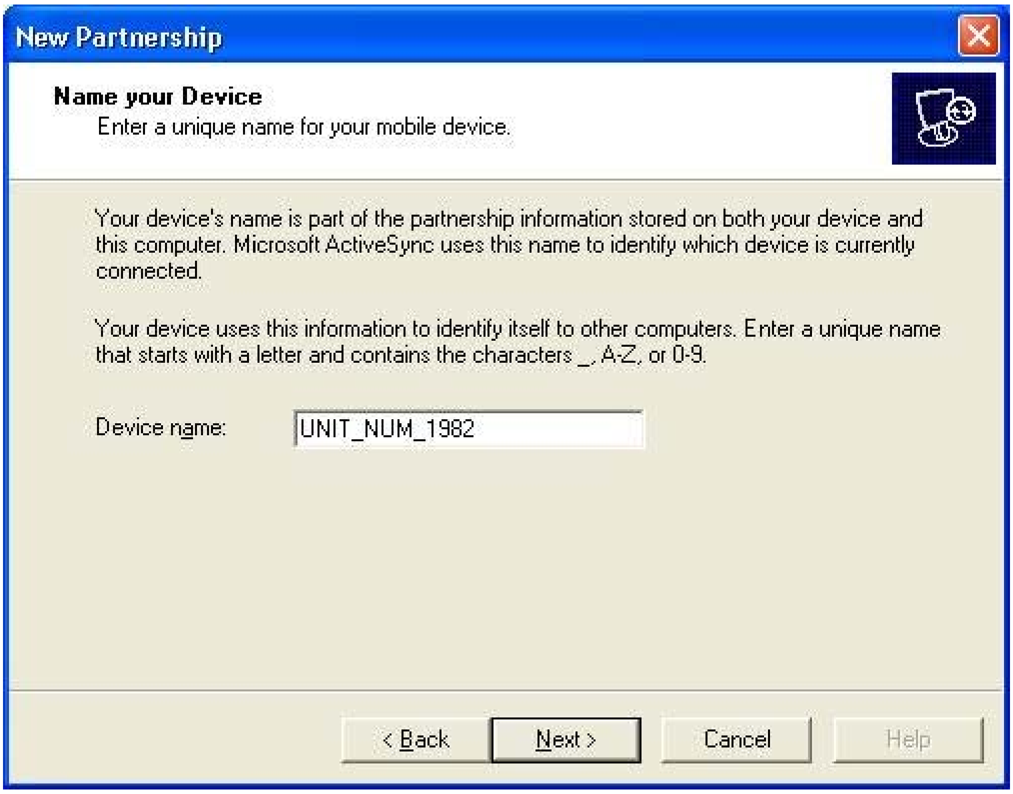
You can synchronize data, such as e-mail messages and calendar items, between your device and this desktop computer. However, if you have access to a Microsoft Exchange Server with Exchange ActiveSync, you can also choose some information types to synchronize directly with a server, getting the most up-to-date information, even when your desktop computer is turned off.

How do you want to synchronize with your device?

● Synchronize with this desktop computer

○ Synchronize with Microsoft Exchange Server and/or this desktop computer
(Note: You must have access to Microsoft Exchange Server with Exchange ActiveSync or Microsoft Mobile Information Server.)

6. Make the above selection (w/desktop) and hit next. You should get the following screen:



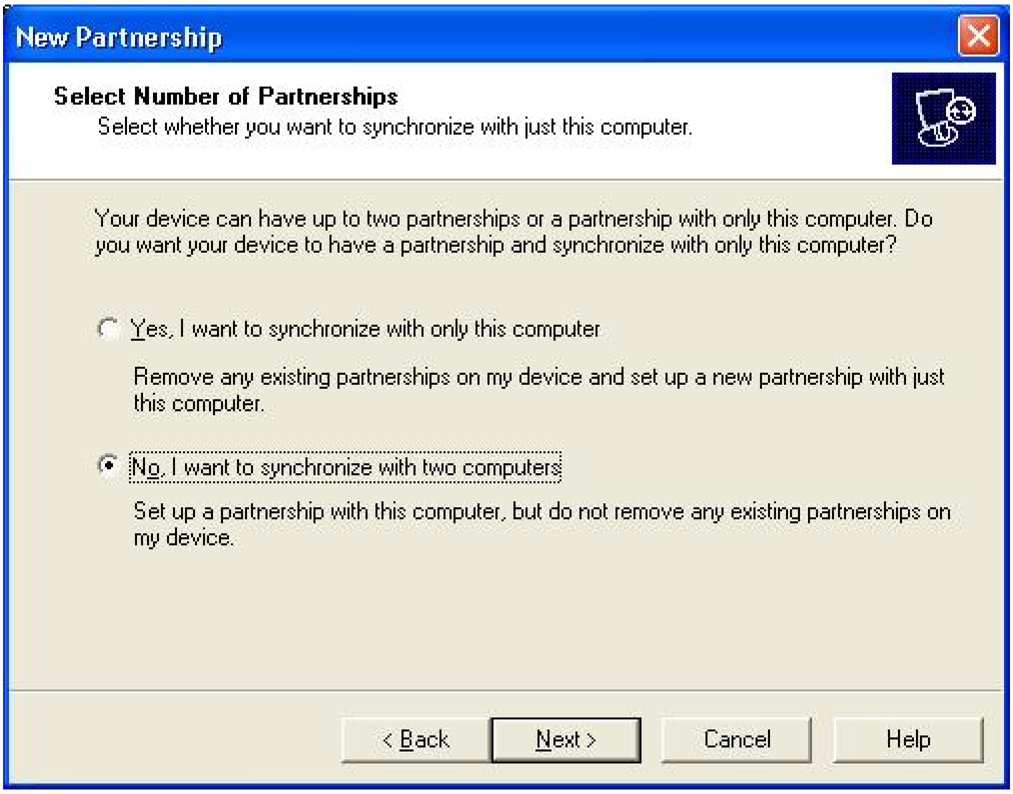
Name your Device
Enter a unique name for your mobile device.

Your device's name is part of the partnership information stored on both your device and this computer. Microsoft ActiveSync uses this name to identify which device is currently connected.

Your device uses this information to identify itself to other computers. Enter a unique name that starts with a letter and contains the characters _, A-Z, or 0-9.

Device name: UNIT_NUM_1982

7. Give a unique device name for each PPC device and hit next. You should get the following screen:



New Partnership

Select Number of Partnerships
Select whether you want to synchronize with just this computer.

Your device can have up to two partnerships or a partnership with only this computer. Do you want your device to have a partnership and synchronize with only this computer?

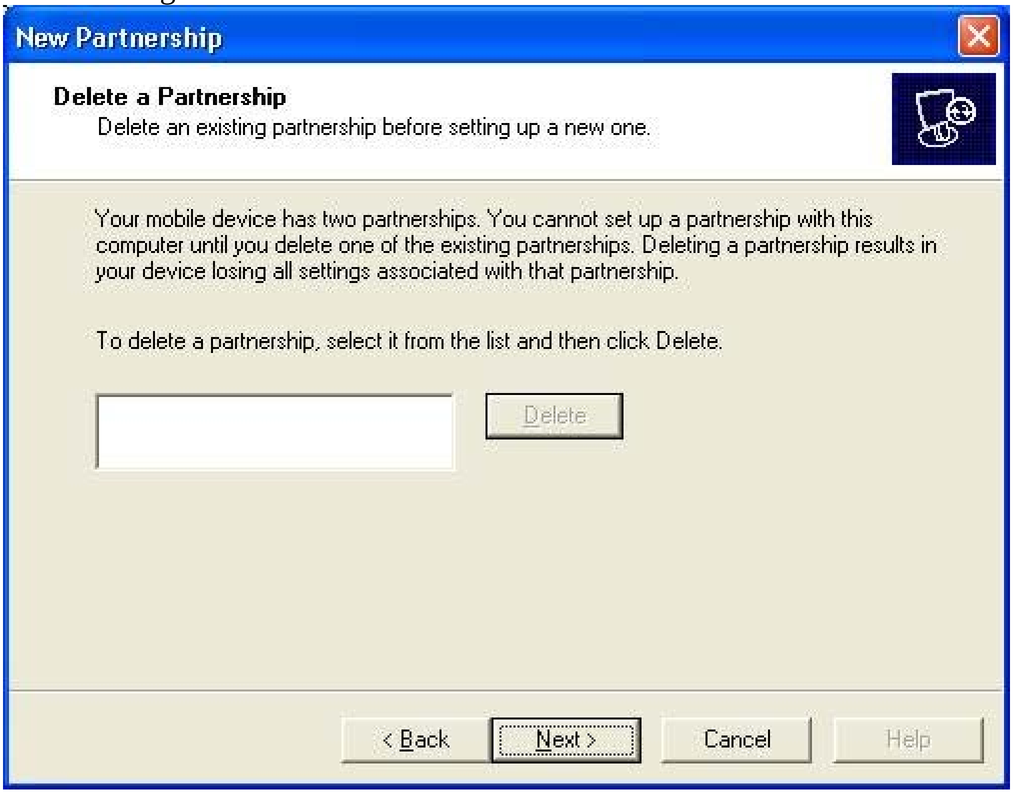
○ Yes, I want to synchronize with only this computer

Remove any existing partnerships on my device and set up a new partnership with just this computer.

● No, I want to synchronize with two computers

Set up a partnership with this computer, but do not remove any existing partnerships on my device.

8. Make the above selection (two computers) and hit next. You should get the following screen:



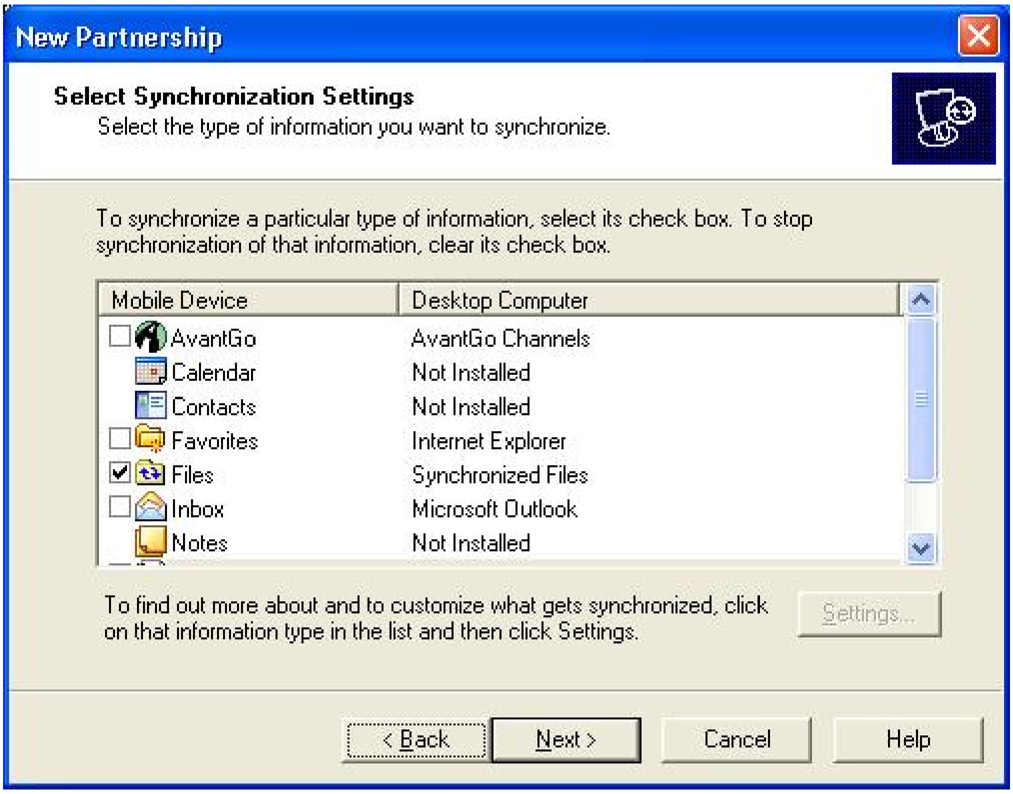
New Partnership

Delete a Partnership
Delete an existing partnership before setting up a new one.

Your mobile device has two partnerships. You cannot set up a partnership with this computer until you delete one of the existing partnerships. Deleting a partnership results in your device losing all settings associated with that partnership.

To delete a partnership, select it from the list and then click Delete.

9. Hit next. You should get the following screen:



New Partnership

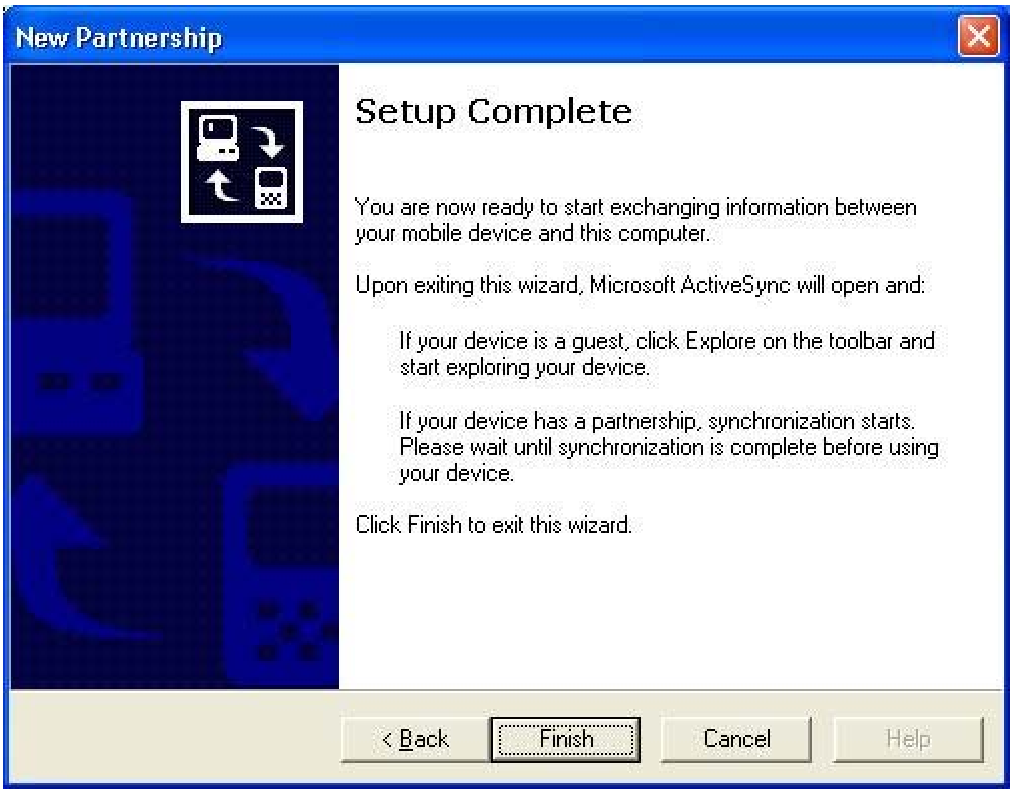
Select Synchronization Settings
Select the type of information you want to synchronize.

To synchronize a particular type of information, select its check box. To stop synchronization of that information, clear its check box.

Mobile Device	Desktop Computer
□ AvantGo	AvantGo Channels
Calendar	Not Installed
Contacts	Not Installed
□ Favorites	Internet Explorer
☑ Files	Synchronized Files
□ Inbox	Microsoft Outlook
Notes	Not Installed

To find out more about and to customize what gets synchronized, click on that information type in the list and then click Settings.

10. Select file check box only and hit next. You should get the following screen:



New Partnership

Setup Complete

You are now ready to start exchanging information between your mobile device and this computer.

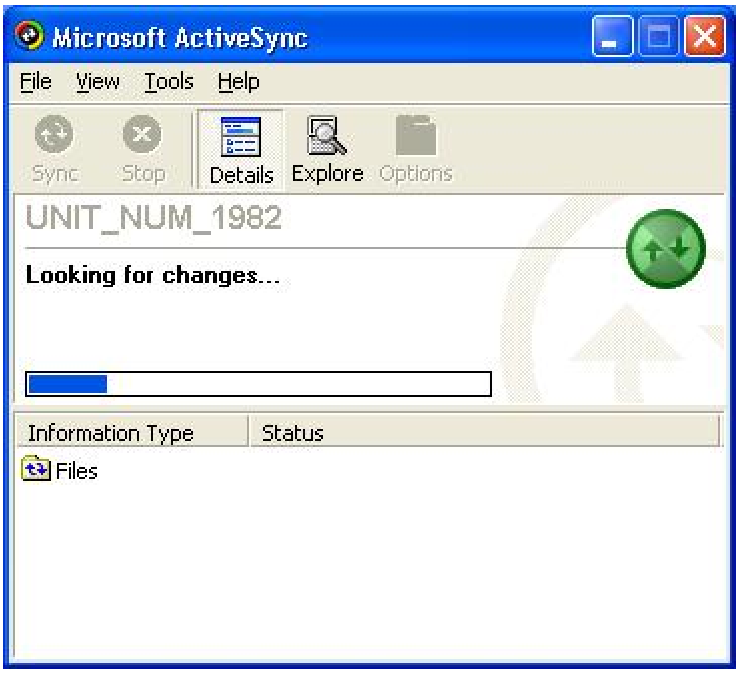
Upon exiting this wizard, Microsoft ActiveSync will open and:

If your device is a guest, click Explore on the toolbar and start exploring your device.

If your device has a partnership, synchronization starts. Please wait until synchronization is complete before using your device.

Click Finish to exit this wizard.

11. Hit Finish. The ActiveSync will be launched:

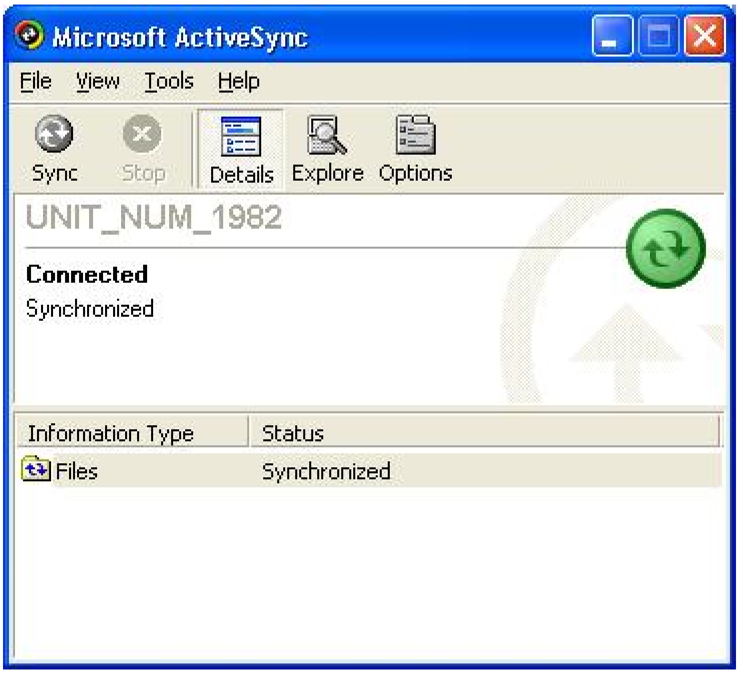


UNIT_NUM_1982

Looking for changes...

Information Type	Status
Files	

12. After ActiveSync finish synchronize you should get the following screen:

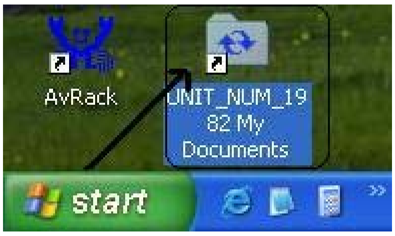


UNIT_NUM_1982

Connected
Synchronized

Information Type	Status
Files	Synchronized

13. For each device ActiveSync a “new directory on the PC under “My documents” with a name “<PPCNAME> My Documents. In our example “the folder (directory) name is “”UNIT_NUM_1982 My documents”. It creates a shortcut for it on the PC desktop as follows:



14. Close the ActiveSync window.
15. Double click on the above newly created shortcut.
16. Open the “Business” directory.
17. Create a new directory “HiGTek” and Open that directory.
18. Create new directory “Settings” and open that directory.
19. On that directory put the application settings file “settings.xml” (see description later in this document).
20. When the HHT application is launched it reads the settings file which defines its working mode.

3 Application Settings

3.1 General description

Hi-G-Tek HHT application enables the user to customize it’s setting using the setting.xml file. This file has the following format:

```
<?xml version="1.0" encoding="utf-8" ?>
<settings xmlns="http://tempuri.org/settings.xsd">
   <options settype="Normal" password="" />
   <fields>
      <udt-field name="UDT" length="6" value="1.0.0" desc="The verion of
            the field list" regex-pattern=".{0,6}" valid-err-msg="Invalid
            version" />
      <container-field name="Container ID" length="11" value="" desc="The
            container ID" regex-pattern="[0-9a-zA-Z]{11}" valid-err-
            msg="Invalid container ID" />
      <field name="Shipment No" length="4" value="" desc="Shipment
            Number" regex-pattern="[0-9a-zA-Z]{4}" valid-err-msg="Invalid
            shipment number. Must be 4 alphanumeric characters. For
            example, A827" />
      <field name="Mechanical Seal No" length="10" value=""
            desc="Mechanical Seal Number" regex-pattern="[0-9a-zA-Z]{10}"
            valid-err-msg="Invalid mechanical seal number. Must be 10
            alphanumeric characters. For example, ABCD123456" />
      <field name="Weight" length="6" value="" desc="Weight" regex-
            pattern="\d{1,6}" valid-err-msg="Invalid weight. Must be upto
            6 digits number. For example, 56233" />
   </fields>
</settings>
```

Figure 1: settings.xml example

Where

settings – is the root element.

options – is a general settings options. It includes the following settings:

settype – the type of Set the CF Reader should perform when the user hit the Set button. The options are: Normal, Soft and Suspended.

password – the password required in order to use the application.

fields – describes the **data structure** of fields stored in the DataSeal. This fields hold the information about the container, shipment etc…. There can be three types of fields:

udt-field – the **data structure** version. There should be **one and only one “udt-field”** field and it should be the first field. This field is, of course, required.

container-field – the container number. There should be **one and only one “container-field”** field and it should be the second field. This field is, of course, required.

field – this could be any additional field of data we want to store in the DataSeal. There can be **no “field” field, one “field” field or more that one “field” field**. Thus, this field is optional.

Each of the fields' types must have the following attributes:

name – each field must have a unique name. "udt-field" and "container-field" have a predefined names "UDT" and "Container ID" respectively.
length – the number of characters (ASCII characters) the field holds.
value – the field's default value.
desc – the field's description.
regex-pattern – regular expression pattern used to validate the value entered by the user for that field. The application validates the user input by matching the user input against the regex-pattern. If it matches then the input is valid, otherwise an error message is displayed (see details below). If an empty value is set (that is, regex-pattern="") then the application checks only that the value typed is no longer that the above **length** attribute. The Application employs the .Net Framework Nondeterministic Finite Automaton (NFA) engine for the value matching.
valid-err – the message to be displayed to the user should the field value typed is invalid. See regex-pattern above.

If there is a need to change the data structure of the fields in the DataSeal the user, or rather, the system administrator should do the followings:

1. Create a new settings.xml file or update the xisting one.
2. Increment the UDT version (udt-field).
3. Store the new settings file (settings.xml) under "\My Documents\Business\HiGTek\Settings" folder in the Pocket PC device.

3.2 Settings Schema

The previous section gave a description of the application settings using the "settings.xml" file. This section brings the format XML Schema of the "settings.xml" file:

```
<?xml version="1.0" ?>
<xs:schema id="seal" targetNamespace="http://tempuri.org/seal.xsd"
      xmlns:mstns="http://tempuri.org/seal.xsd"
      xmlns="http://tempuri.org/seal.xsd"
      xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:msdata="urn:schemas-microsoft-com:xml-msdata"
      attributeFormDefault="unqualified"
      elementFormDefault="unqualified">


   <xs:element name="seal" msdata:IsDataSet="true"
         msdata:EnforceConstraints="False">
      <xs:complexType>
         <xs:sequence>
               <xs:element name="general" type="mstns:general-Type"
                     maxOccurs="1" minOccurs="1" />
               <xs:element name="data" type="mstns:data-Type"
                     maxOccurs="1" minOccurs="1" />
               <xs:element name="events" type="mstns:events-Type"
                     maxOccurs="1" minOccurs="1" />
         </xs:sequence>
      </xs:complexType>
   </xs:element>


   <xs:complexType name="data-Type">
      <xs:sequence>
            <xs:element name="field" type="mstns:field-Type" />
      </xs:sequence>
   </xs:complexType>


   <xs:complexType name="field-Type">
      <xs:sequence />
      <xs:attribute name="name" type="xs:string" />
      <xs:attribute name="value" type="xs:string" />
   </xs:complexType>

   <xs:complexType name="events-Type">
      <xs:sequence>
            <xs:sequence />
            <xs:element name="event" type="mstns:event-Type" />
      </xs:sequence>
   </xs:complexType>


   <xs:complexType name="event-Type">
      <xs:sequence />
      <xs:attribute name="number" type="xs:string" />
      <xs:attribute name="code" type="xs:string" />
      <xs:attribute name="name" type="xs:string" />
      <xs:attribute name="time" type="xs:string" />
      <xs:attribute name="stamp" type="xs:string" />
      <xs:attribute name="checksum" type="xs:string" />
      <xs:attribute name="reader-id" type="xs:string" />
      <xs:attribute name="stamp-ex" type="xs:string" />
      <xs:attribute name="checksum-ex" type="xs:string" />
   </xs:complexType>


   <xs:complexType name="general-Type">
      <xs:sequence />
      <xs:attribute name="seal-id" type="xs:string" />
      <xs:attribute name="UDT" type="xs:string" />
      <xs:attribute name="container-id" type="xs:string" />
      <xs:attribute name="time" type="xs:dateTime" />
      <xs:attribute name="status" type="xs:string" />
      <xs:attribute name="stamp" type="xs:string" />
   </xs:complexType>


</xs:schema>
```

Figure 2: XML Schema for settings.xml file

3.3 Predefined Seals

The Hi-G-Tek enables to user to perform various operation on a DataSeal using HF RF. But in order to perform those operations the user need to supply the Seal ID of the DataSeal. One way is to physically take the DataSeal, read it’s it from the label put on it and type that ID manually. How ever there are times were there is a list of predefined seals the the user should work with. In this case, the user can put a file, “seals.txt”, with the list of those under the “\My Documents\Business\HiGTek\PredefinedSeals” folder. Each seal ID should be put in a new line as in the following example:

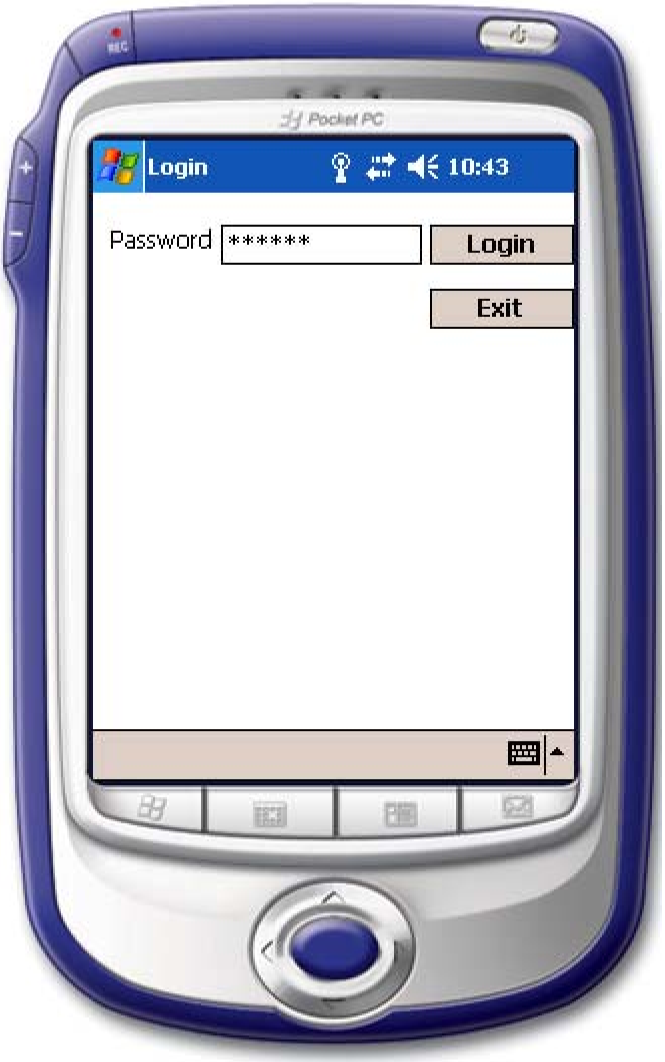
```
IOBA08388686
IABA01053175
IFBA16777702
IFBA16777667
```

Figure 3: seals.txt example

4 Application Operation

4.1 System Login

Once Hi-G-Tek HHT is launched, the user is asked to provide the password for running the application. This password is defined in the application settings (“settings.xml” file).



Password ******

Figure 4: Login Screen

Upon entering the right password, the user gets the application main screen.

4.2 Main Screen

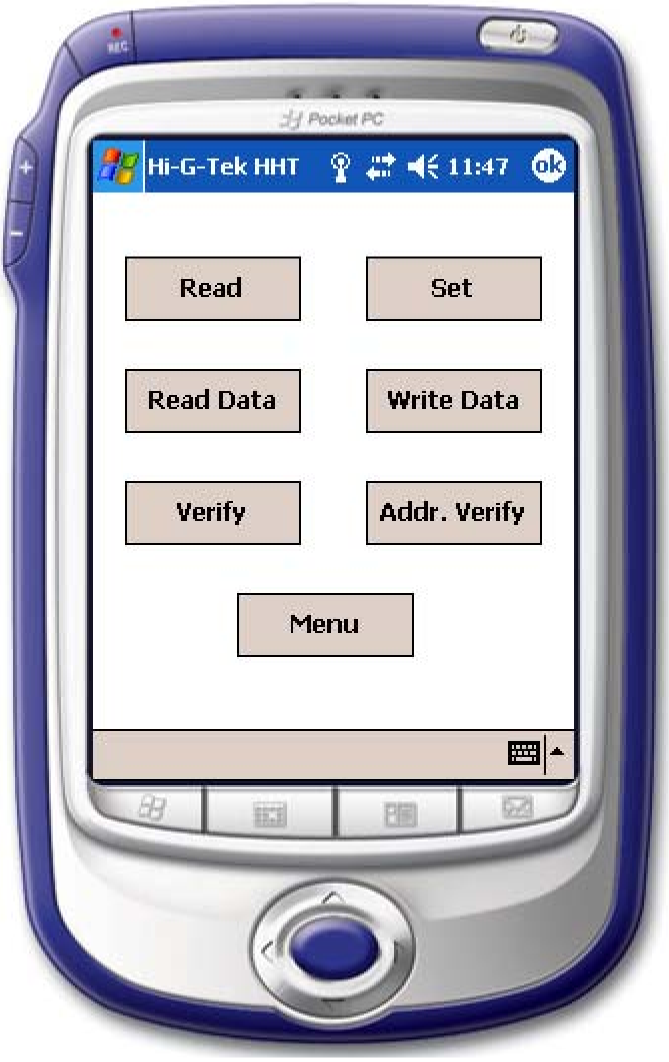


Figure 5: Main Screen

1. **Read** – reading DataSeal status, events and data.
2. **Set** - Arming a DataSeal. Writing data to the DataSeal and setting its status to “Set” (armed).
3. **Read Data** – reading data of an armed DataSeal.
4. **Write Data** – changing the data of an armed DataSeal.
5. **Verify** – searching for neighboring DataSeals.
6. **Addressed (Addr.) Verify** – reading DataSeal status and data.
7. **Menu** – view recently read Data Seals.

4.3 Select Seal Screen

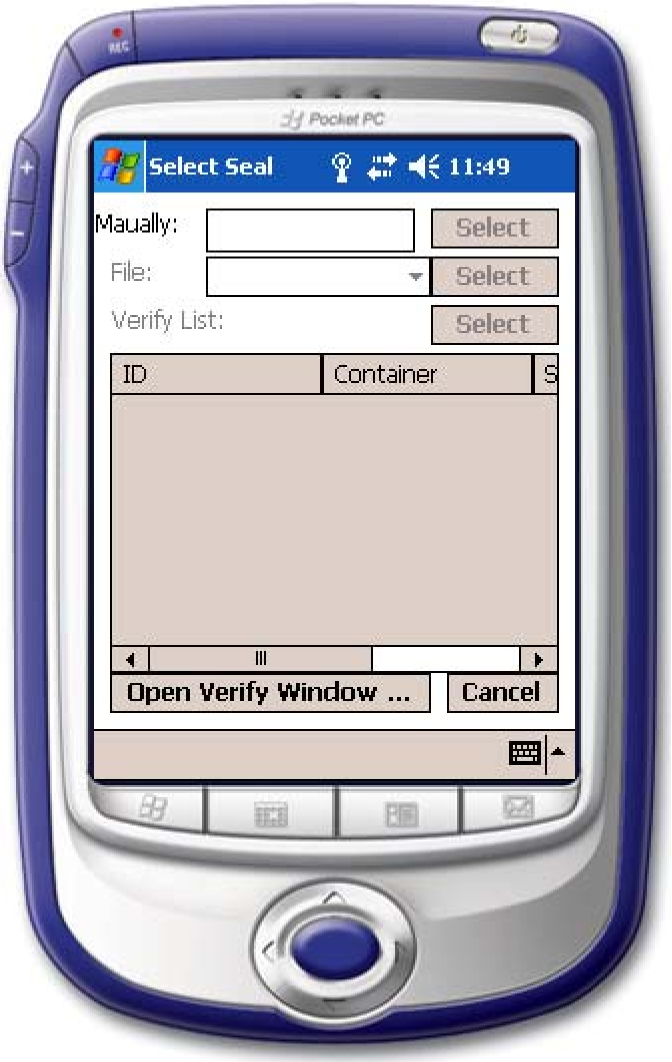
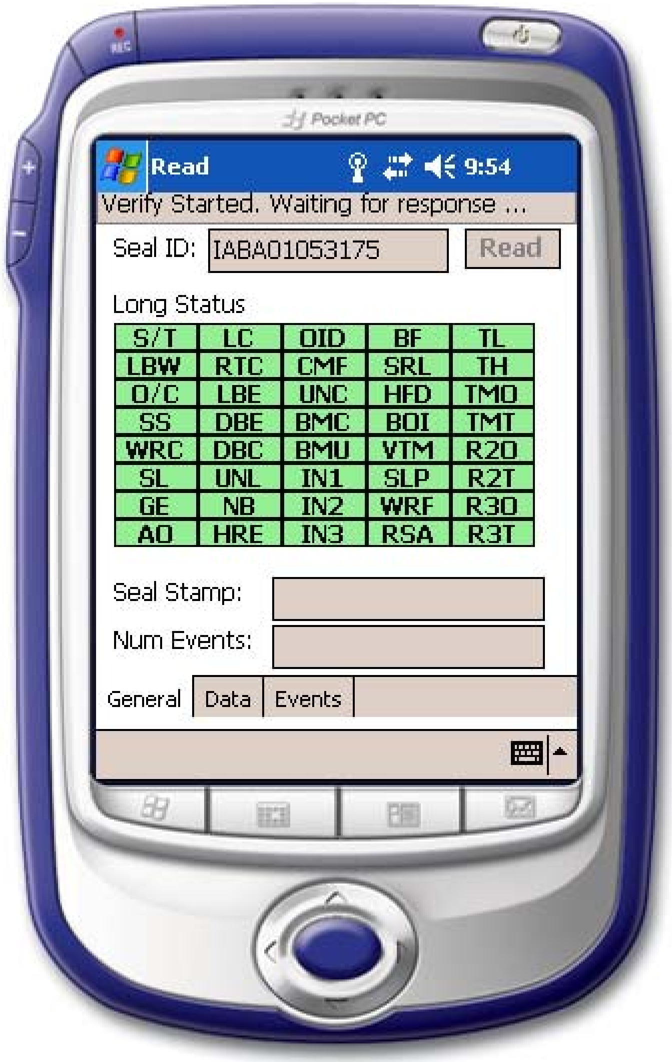


Figure 6: Select Seal Screen

When pressing on either one of Read, Set, Read Data, Write Data or Addressed Verify buttons – the application displays first the “Select Seal Screen”. On this screen the user to should select the target DataSeal, that is, for example, if the user hit the Set button the target DataSeal id the seal which the user want to “arm”.
There are three options for selecting DataSeal:

1. Entering the Seal ID manually and hitting the respective select button. The select button appears as disable as long as the user does not type a legal Seal ID. Once a legal Seal ID in entered the button change it’s state to “enabled”.
2. Selecting from a predefined seal list and hitting the respective select button.
3. Selecting from “verify list” seals. If the “verify” list is empty or for any other reason the user wants to update the verify list the user can hit the “Open Verify Window …” button and execute Verify again.

4.4 Read – reading DataSeal status, data and events



Verify Started. Waiting for response ...

Seal ID: IABA01053175

Long Status

S/T	LC	OID	BF	TL
LBW	RTC	CMF	SRL	TH
O/C	LBE	UNC	HFD	TMO
SS	DBE	BMC	BOI	TMT
WRC	DBC	BMU	VTM	R2O
SL	UNL	IN1	SLP	R2T
GE	NB	IN2	WRF	R3O
AO	HRE	IN3	RSA	R3T

Seal Stamp:

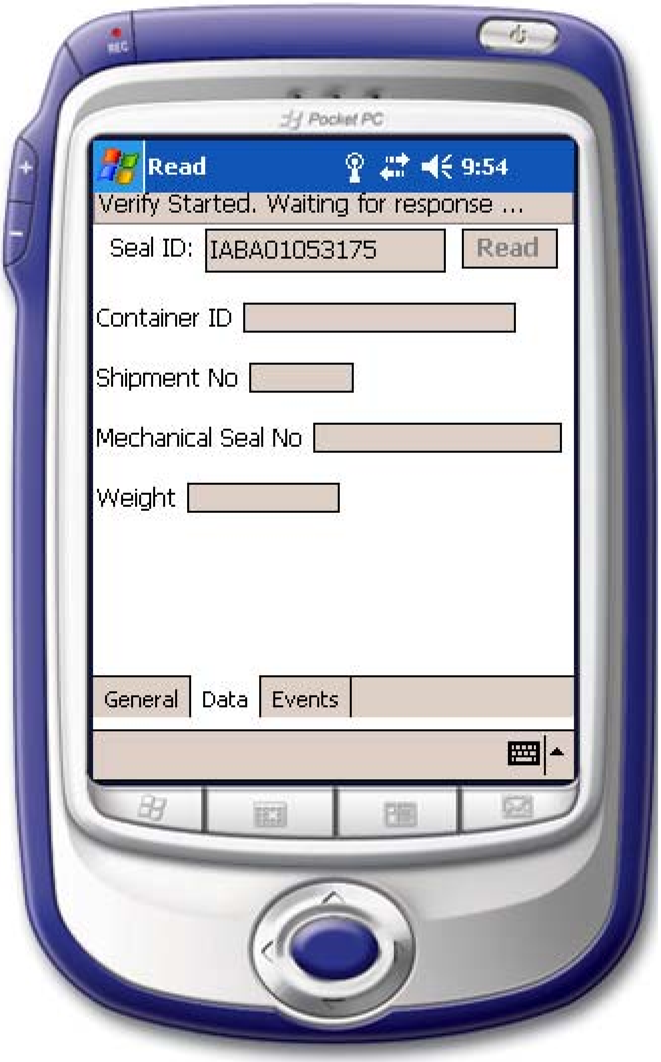
Num Events:

Figure 7 Read Screen –General Tab Page

When hitting the Read button on the main screen the user is prompt select the target DataSeal, and the application starts the read process.
The Read screen displays the target DataSeal status, data and events.
The Application reads the status and data first and then the events. There are three tab pages in this screen:

- **General** – displays the DataSeal status as well as the DataSeal stamp and number of events.
- **Data** – displays the read data.
- **Events** – displays all DataSeal's events.

All the data read is stored in a file named "<SealID>.txt" under "\My Documents\Business\HiGTek\ReadSeals" folder. This data can be viewed later in the Menu screen.



Verify Started. Waiting for response ...

Seal ID: IABA01053175

Container ID

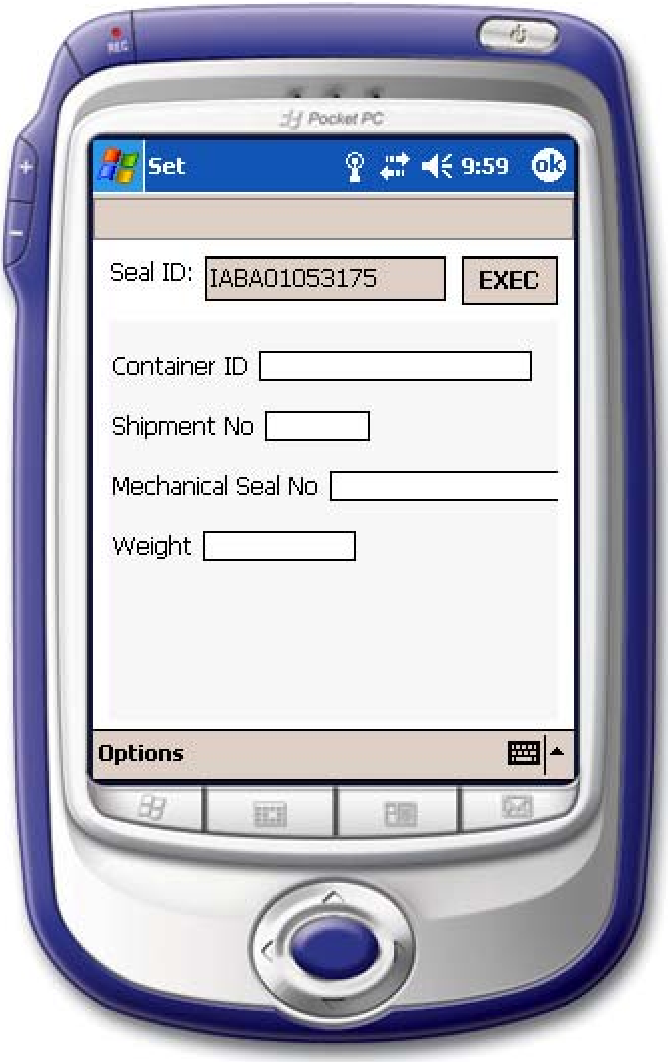
Shipment No

Mechanical Seal No

Weight

Figure 8 Read Screen –Data Tab Page

4.5 Set – arming the DataSeal



Set
9:59
ok

Seal ID: IABA01053175
EXEC

Container ID
Shipment No
Mechanical Seal No
Weight

Figure 9 Set Screen

When hitting the Set button on the main screen the user is prompt select the target DataSeal, and then after the application displays the Set screen.

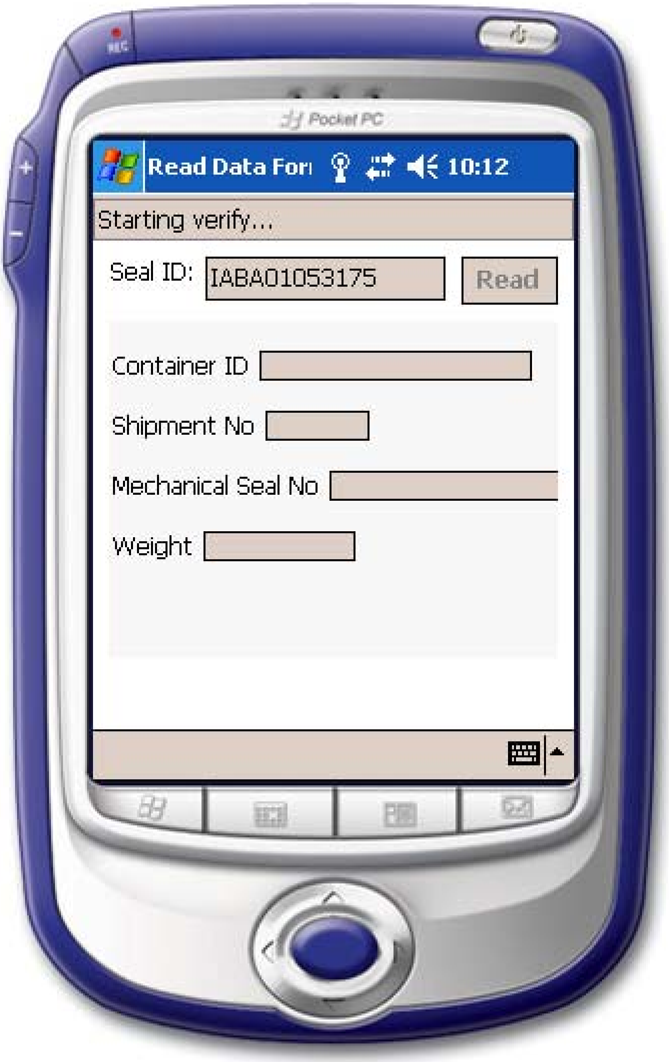
The Set screen enables the user to “arm” the DataSeal, that is, to write the data to the data seal and “initialize” (Set) the DataSeal. The ““initialization” clears the DataSeal tamper status and DataSeal events. The DataSeal must be in a “Closed” state in order to successfully complete the Set process.

The user has to supply the data fields (container ID, Shipment Number, etc …) to be written to the DataSeal and hit the EXEC button. The data the user enters is validated against the validation rule in the application settings.

The Options menu gives the user the following options:

1. **Container ID Only** – only the Container ID field will be written.
2. **Set Only** – make “initialization” (Set) only – no data will be written. Choosing Set Only disables he Container ID Only as it has no meaning.

4.6 Read Data – reading the DataSeal Data



Read Data Forı

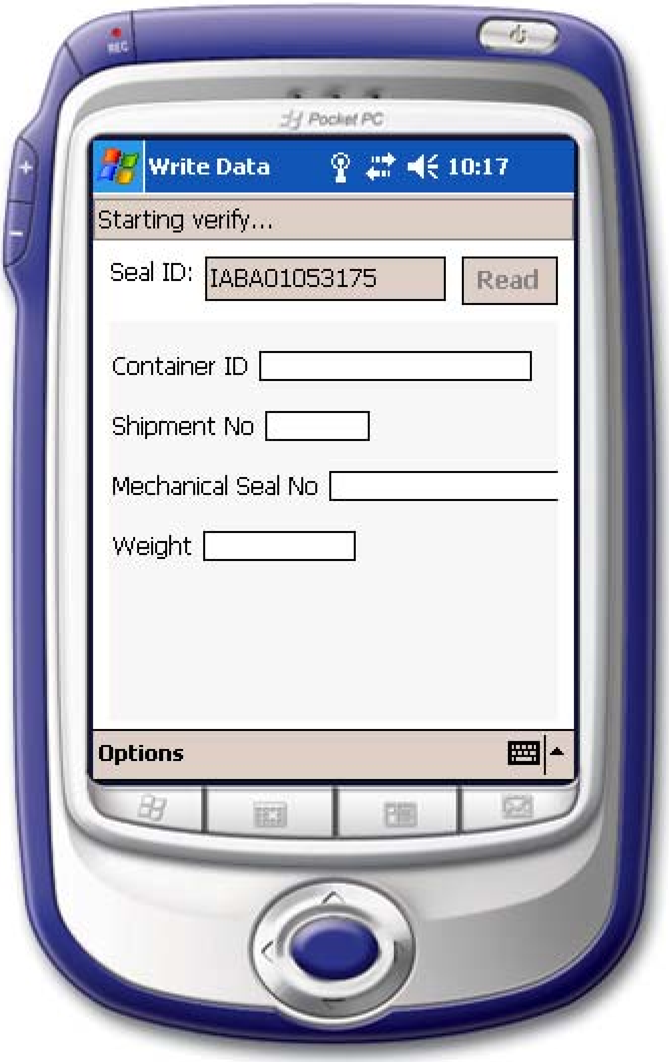
Starting verify...

Seal ID: IABA01053175

Figure 10 Read Data Screen

When hitting the Read Data button on the main screen the user is prompt select the target DataSeal, and then after the application displays the Read Data screen.

4.7 Write Data – writing data to the DataSeal



Write Data

Starting verify...

Seal ID: IABA01053175

Container ID

Shipment No

Mechanical Seal No

Weight

Figure 11 Write Data Screen

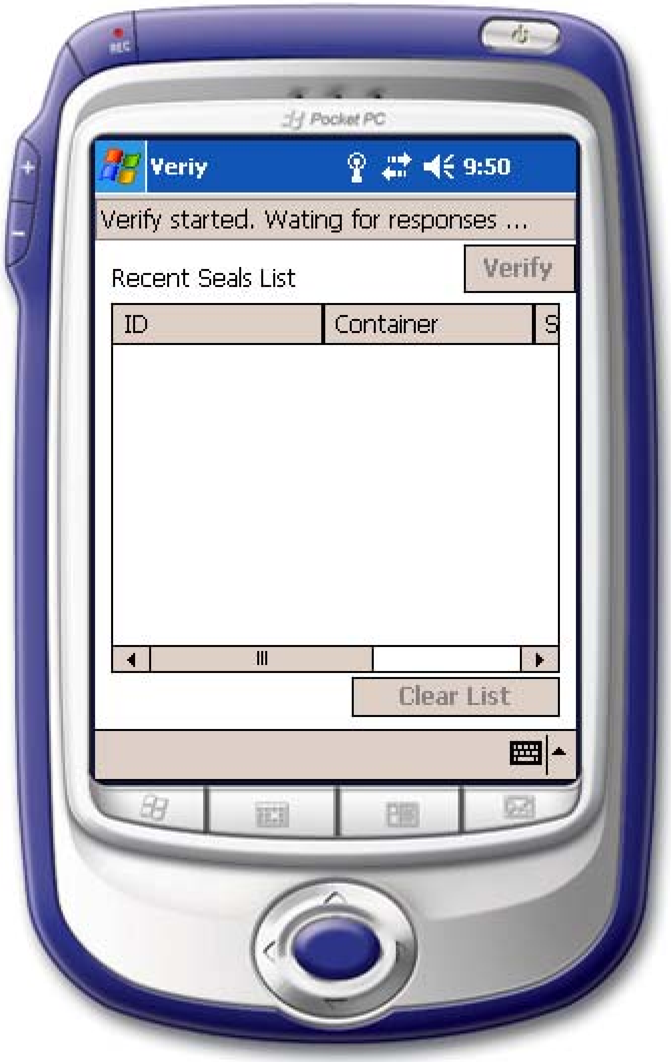
When hitting the Write Data button on the main screen the user is prompt select the target DataSeal, and then after the application displays the Write Data screen.

The purpose of the Write Data screen is to enable the user to modify the data fields in the DataSeal after it has been “armed” (Set). Typically, the user will perform this operation if some mistake was made putting the data in Set screen.

The application reads first the fields from the DataSeal and displays them the user. Then the user can modify the data fields (container ID, Shipment Number, etc …) hit the EXEC button. The data the user enters is validated against the validation rule in the application settings.

The user can choose to write the container ID only using the Options menu.

4.8 Verify – searching “neighboring” DataSeals



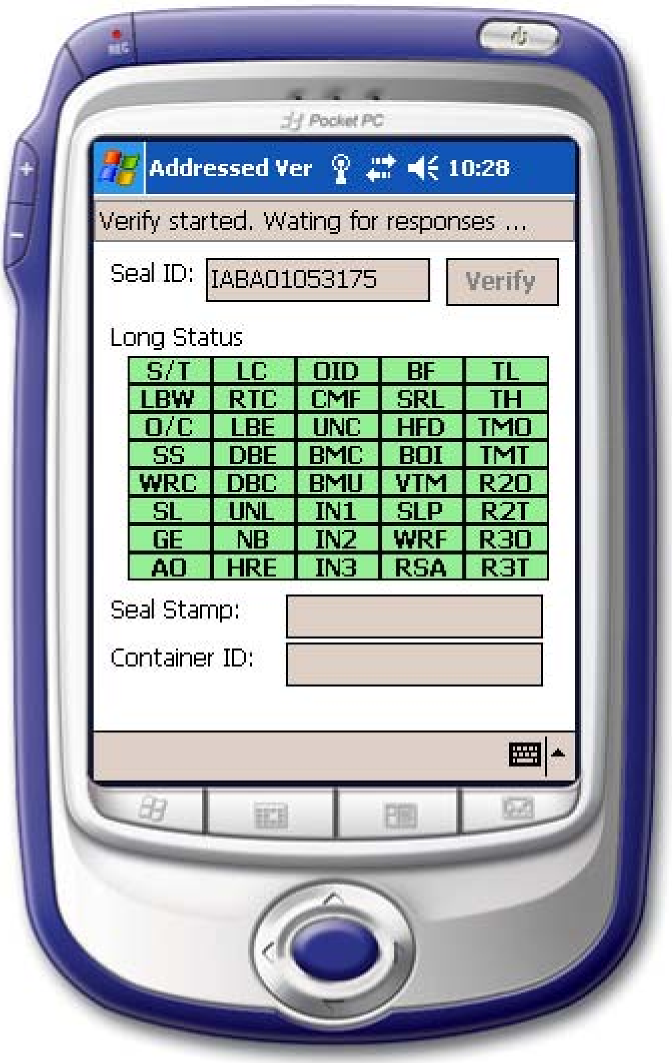
Verify started. Wating for responses ...

Figure 12: Verify Screen

Upon hitting the Verify button on the main screen or on the
The Verify screen enables there user to detect “neighboring” seals using RFID Verify broadcast message. Seals receiving this message reply and the application adds them to the “verify list”. For each DataSeal the application displays the following information:

- Seal ID
- Container ID
- Seal Status
- Seal Stamp

4.9 Addressed Verify – reading DataSeal status and data



Verify started. Wating for responses ...

Seal ID: IABA01053175 Verify

Long Status

S/T	LC	OID	BF	TL
LBW	RTC	CMF	SRL	TH
O/C	LBE	UNC	HFD	TMO
SS	DBE	BMC	BOI	TMT
WRC	DBC	BMU	VTM	R2O
SL	UNL	IN1	SLP	R2T
GE	NB	IN2	WRF	R3O
AO	HRE	IN3	RSA	R3T

Seal Stamp:

Container ID:

Figure 13 Addressed Verify Screen

When hitting the Addr. Verify button on the main screen the user is prompt select the target DataSeal, and the application starts the read process.

The Addressed Verify screen displays the target DataSeal status, seal stamp and container ID.

4.10 Menu –display previous read DataSeals

This screen displays the information of previously read DataSeal in the Read screen.