

ALIEN TECHNOLOGY®

ALH-9000

ALH-9001

USER'S GUIDE

02/06/12



ALIEN®

ALH-9000
ALH-9001
ALH-9000 EMA
ALH-9001 EMA

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FCC Compliance

This equipment has been tested and found to comply with the limits for 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 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 the user will be required to correct the interference at his own expense.

Any change or modification to this product voids the user's authority to operate per FCC Part 15 Subpart A. Section 15.21 regulations.

Industry Canada Compliance

Operation is subject to the following two conditions: (1) this device may not cause interference and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This device has been designed to operate with an antenna having a maximum gain of 6dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Caution

Reader antennas should be positioned so that personnel in the area for prolonged periods may safely remain at least 23 cm (9 in) in an uncontrolled environment from the antenna's surface. See FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

European Radio Compliance

This Equipment has been tested and found compliant with the following Mandatory Specifications:

EN 302 208

Electromagnetic Compatibility and Radio spectrum Matters (ERM) Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with Power levels of 2w ERP.

Part 1: Technical requirements and methods of measurements.

Part 2: Harmonized EN under article 3.2 of R&TTE Directive.

EN60950

Safety of information technology equipment.

This radio must be used with the external mains to DC power adaptor, supplied with the product.

EN 301 489

Electromagnetic compatibility and Radio spectrum Matters (ERM) Electromagnetic Compatibility (EMC) standards for Radio equipment and services:

Part 1: Common technical requirements

Part 3: Specific conditions for short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz.

CE 11770



Alien Technology®

User's Guide

ALH-9000, ALH-9001

02/06/12



Table of Contents

CHAPTER 1 INTRODUCTION.....	1
About this Manual	1
Who should read this manual?.....	1
How to use the battery correctly	1
Caution when using.....	1
Components and Features	1
Package components.....	2
Handheld Components.....	3
Description of Each Component.....	4
CHAPTER 2 BASIC FUNCTIONS.....	5
Power and Battery	5
Switch On Backup Battery.....	5
Detaching the Main Battery	5
Attaching the Main Battery	6
Charging.....	6
Power On and Off.....	7
Checking the Battery Gauge	8
Backup Battery	9
Disposal of Battery	9
System Reset.....	9
Soft (Warm) Reset.....	9
Hard (Cold) Reset	10
Using a MicroSD Card	10
Installing a MicroSD Card.....	10
System Settings	12
Setting Brightness	12
Screen Calibration.....	13
Setting Volume and Sounds	13
Setting the Date and Time.....	14
Using the Keypad.....	15
Inputting Data.....	15
Using the <Fun> Button	16
Using the Soft Input Panel	16
Using the Stylus	17
Using ActiveSync	17
Installing Microsoft ActiveSync Program	17
Connecting PC to PDA.....	18
Transmitting Data	19
Firmware Upgrade	21
Boot Menu.....	23
CHAPTER 3 RFID TAG READER	24
Starting the ALH-900x RFID Demo Software.....	24
Inventory Utility	25
Geiger Tag Utility.....	26
Tag Access Utility	27
Basic Access Tab	27
Advanced Access Tab	29

Tag Mask.....	31
Tag Mask – Scan.....	32
Tag Mask – Specify	32
Tag Mask – Presets.....	34
Reader Settings	35
CHAPTER 4 BARCODE SCANNER (1D & 2D).....	36
BarcodeDemo	36
Using the BarcodeEmulator	37
Setting Barcode Symbology	39
Barcode Scanning Beam Position	41
Correct Scanning Beam Position	41
Incorrect Scanning Beam Position	41
CHAPTER 5 WIRELESS LAN	42
Powering Up the WLAN Radio	42
Configuring the WLAN Connection.....	42
Checking WLAN Information	43
CHAPTER 6 BLUETOOTH.....	44
Turning on Bluetooth.....	44
Connecting Bluetooth Printers (SPP)	44
CHAPTER 7 USING GPS	47
Executing GPS Demo Program	47
CHAPTER 8 USING THE CAMERA	48
Using the Camera	48
CHAPTER 9 USING A SIM CARD	50
Installing SIM Card.....	50
Configure the Remote Access Server (RAS).....	50
Making the 3G Network Connection.....	52
APPENDIX	53
Configuration.....	53

Chapter 1

Introduction

About this Manual

This manual provides you with safety information, technical support information, and sources for additional product information.

Who should read this manual?

This manual is written for the person who is responsible for installing, configuring, and maintaining the ALH-900x handheld. This manual provides you with information about the features of the ALH-900x, and how to install, configure, operate, and maintain it. Before you work with the ALH-900x, you should be familiar with your network and general networking terms, such as IP address.

Before you handle and operate your ALH-900x, please read through and become familiar with the contents of this manual.

How to use the battery correctly

- Do not touch the terminals of the battery with any metal objects.
- If you do not use the battery for a long time after charging, keep it at room temperature.
- Depending on the age of the battery and the operating time while using it, the charge capacity can be reduced.
- You must charge the device with only the provided adaptor.

Caution when using

- Careless use or repair attempts may damage the unit or stored data. Alien is not responsible for this damage, so important data should be kept separately.
- If you have a problem, do not try to repair or disassemble the product yourself; please contact Alien customer service.
- Do not use where devices sensitive to electromagnetic radiation are operating, such as a hospital, airplane, etc., or risk of interference may occur.
- The unit may malfunction at very high or low temperatures, or in a very humid environment.
- Please do not use sharp objects to touch the screen, or damage may result. Use only soft objects, like your finger or the included stylus, on the touchscreen.

Components and Features

The ALH-900x mobile computer is a small, ergonomically designed PDA, built on the Microsoft window CE Operating System. The PDA is equipped with an, RFID tag reader, MicroSD card reader, wireless modem, 1D or 2D barcode scanner, and optional GPS and camera modules.

Package components

After opening the product packaging box, check the items listed as below. If there are missing or defective items, please contact the Alien customer support, or your place of purchase.



Handheld Components



Description of Each Component

Part	Descriptions
UHF Reader	The 900MHz UHF RFID tag reader module.
1D/2D Barcode Scanner	The laser beam is emitted through this window. Do not look directly at the laser!
Reset Button	Enables you to perform a Soft Reset. Press along with the <Power> button to perform a Hard Reset.
Microphone	Records audio from the surrounding environment.
WLAN LED	Indicates WLAN power on-off status.
Battery Latch	Allows you to detach the main battery.
Main Battery	Provides primary power to the unit.
Volume Buttons	Adjusts the volume, when you also press the <Fun> button.
Function Buttons (F7, F8)	Allows you to perform common actions.
Function Button (F9)	Allows you to perform common actions, like scan for an RFID tag.
Speaker	Built-in speaker emits various sound effects.
USB Sync Connector	Allows you to connect and send data to a PC via a USB sync cable.
Earphone Jack	Allows you to connect earphones.
L/R Arrow Key	Moves the cursor left and right. When also pressing the <Fun> button, moves the cursor up and down.
Power LED	Illuminates red when the battery is charging and green when it is fully charged.
Cradle Connector	Interfaces with the cradle, when docked.
Camera (ALR-9001)	Allows you to capture and store photographic images.
Cradle Connector	Enables you to sync with a PC, while charging the batteries.
Keypad	Allows you to input key presses (numbers, letters, and symbols).
Touchscreen	Displays running programs, and allows you to control them directly, using the stylus and touchscreen.
Hand Strap Hole	Enables you to attach the hand strap and/or stylus in a convenient location, while using the device for a long period of time.

Chapter 2

Basic Functions

Power and Battery

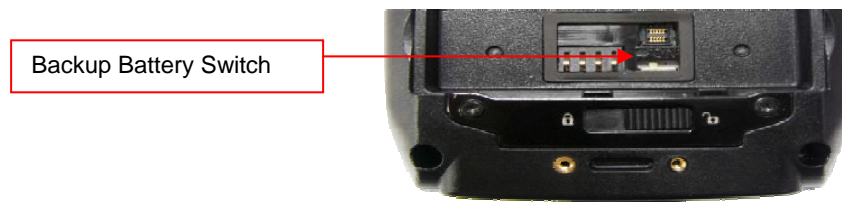
The ALH-900x battery system is composed of main battery, an optional pistol grip battery, and a backup battery. The main battery supplies the power to the system and RAM which retains saved data. A backup battery saves the data in RAM in the situation where the main battery is discharged completely.

Main Battery: 3,000 mAh, 3.7v Lithium-Polymer
 Pistol-Grip Battery (optional): 4,400 mAh, 3.7v Lithium-Ion
 Backup Battery: 100 mAh, 3.7v Lithium-Polymer

Switch on the backup battery when first setting up the ALH-900x, and then install the main battery and charge it completely.

Switch On Backup Battery

The image below shows the battery compartment, after the main battery has already been removed. Slide the lever to the right to switch on the backup battery.

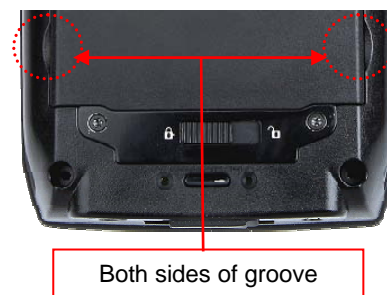
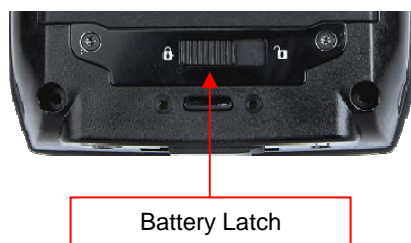


Re-attach the main battery to the back battery compartment of the PDA. Confirm that the battery latch locked firmly (see below).

Connect the adaptor to the PDA adaptor connecting jack, and check to make sure the Power LED is illuminated red, and then allow it to charge completely until it the Power LED turns green.

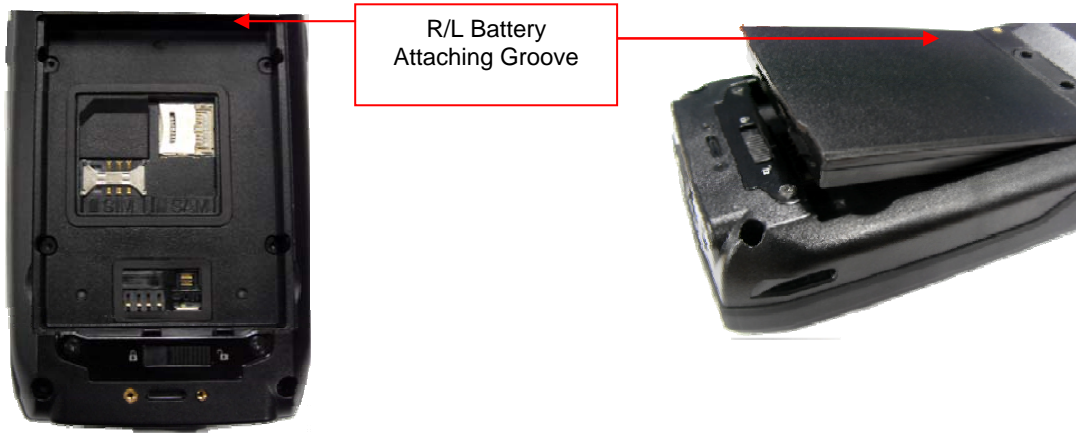
Detaching the Main Battery

The images below show the back-bottom of the handheld unit. Slide the battery latch to the right (**UNLOCK** side), and then lift the main battery out of the compartment along both sides of groove.



Attaching the Main Battery

Put the top part of battery into the upward groove, and then press down on the bottom part of the battery into the battery compartment. Slide the battery latch to the left (**LOCK** side) to attach the battery firmly.



Charging

You must charge the battery only with the provided adapter or cradle. The Power LED illuminates red while charging and green when charging is complete.

Connecting Adapter

1. Plug the adapter cable to 110V socket.
2. Connect adapter DC cable to the power connecting jack of the main body.
3. "Power LED" is red while charging.



⚠ Caution:

You must charge the battery by using only the dedicated adapter provided by Alien, or your device may be damaged.

Power On and Off

Pressing the <Power> button once causes the device to enter low-power (sleep) mode. Pressing <Power> button once again activates the system.

Power On and Off With <Power> Button



Power Off:

1. When the system is on, press the <Power> button for a couple of seconds and the backlight will be turned off and it will enter the low-power sleep mode.

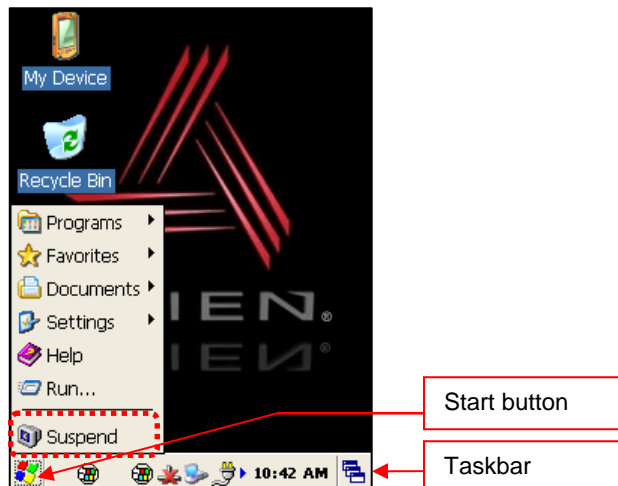
Power On:

1. When the system is off, press the <Power> button quickly, and the backlight will turn on and wake up the system.
2. The power will be turned on automatically when you connect to the ActiveSync USB cable.

Even though the unit's power is off, the data stored in RAM will be saved, and those programs which have been running before the power was turned off will resume where they left off. If the main battery and backup battery are both discharged, the RAM data will disappear and the system will be start up as if from a cold reboot.

Power Off With <Start> Menu

You can put the handheld to sleep by pressing the Start button in the lower-left corner of the screen and selecting "Suspend".



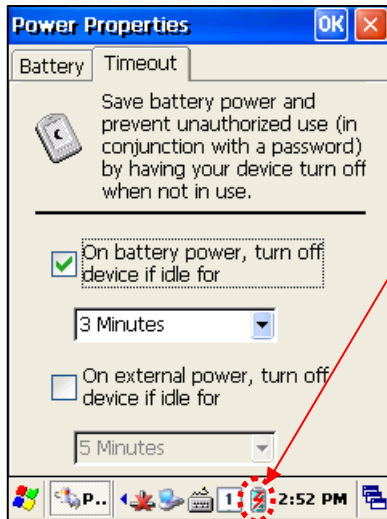
Taskbar: Displays the currently running programs.

Start button: Activates the start menu to execute new programs.

Power Off Automatically

If the device has not been used for a period of time, the system will enter low-power (sleep) mode automatically. Carefully setting the sleep mode time in the Power Management control panel can save power and prolong the life of the battery.

[Start] > [Settings] > [Control Panel] > [Power] > [Timeout]



Power Icon

- You can also double click <Power> icon on the Taskbar to enter this screen.
- To activate the device after it has gone to sleep automatically, press the <Power> button.

Battery Discharging

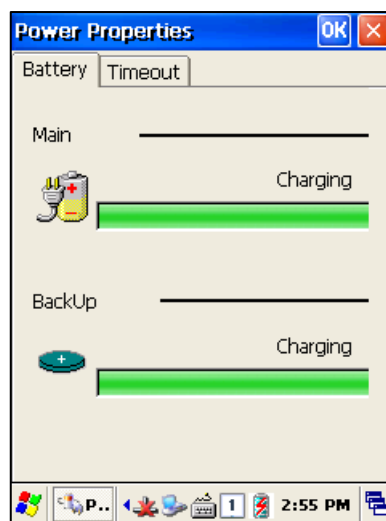
If the main battery discharges completely while the system is turned on, the device will go into low-power (sleep) mode automatically, and even pressing the <Power> button will not cause the system to turn on. In this case, you should fully charge the main battery and then press the <Power> button to turn on the handheld.

Checking the Battery Gauge

Battery life is largely affected by the user's usage habits. The battery may need up to twelve hours to charge completely.

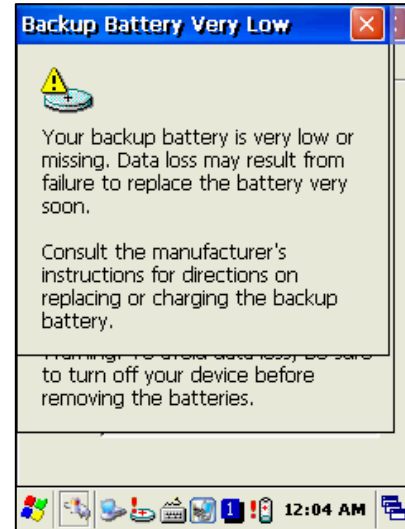
Checking Battery Gauge

[Start] > [Settings] > [Control Panel] > [Power] > [Battery]



Low Power Warning

If the remaining battery charge cannot support the running system any more, a low power warning message window will appear on the screen. You will need to press the <Power> button to turn off the power, and charge the battery as soon as possible.



Backup Battery

The backup battery can safely maintain the RAM data, even when the main battery is discharged completely.

⚠ Caution:

If the main battery and the backup battery are both discharged, the RAM data will be lost. Any unsaved data in the running programs will be lost. After charging and rebooting, the system will not be restored to its previous state.

Disposal of Battery

If the battery becomes damaged or reaches its end-of-life, you need to purchase a new one. Please dispose the used batteries in an approved location.

System Reset

If there is no response from the handheld, or an application is locked up and stops responding, then a reset of the handheld may be necessary. Resetting the system is also required when you want to upgrade firmware,

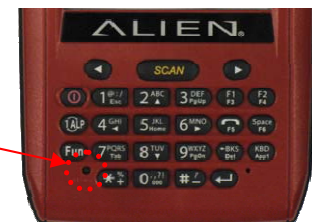
Soft (Warm) Reset

If there is no response from the system, you should first perform a soft reset. A soft reset will halt running programs and the user memory will be deleted. Installed programs and saved data are not affected. Use the stylus pen to press <Reset> button briefly. The screen will go black momentarily before the system reboots again.

Soft Reset

- Press Reset button.
- System will reboot.
- Desktop appears in about ten seconds.
- Your registry information, copied files, and installed programs are all retained.

Reset Button



Hard (Cold) Reset

A Hard Reset (which is sometimes called a Cold Reset) initializes the hardware completely. The user's installed programs, files, and registry values will be retained, but the real-time data and date/time will be reset. You need to reset the time and date after performed Hard Reset. You should only perform a Hard Reset when the Soft Reset fails to restore the system. Hold the <Power> button while using the stylus pen to press the <Reset> button, then release both of them simultaneously. The screen will go black momentarily before the system restarts again.

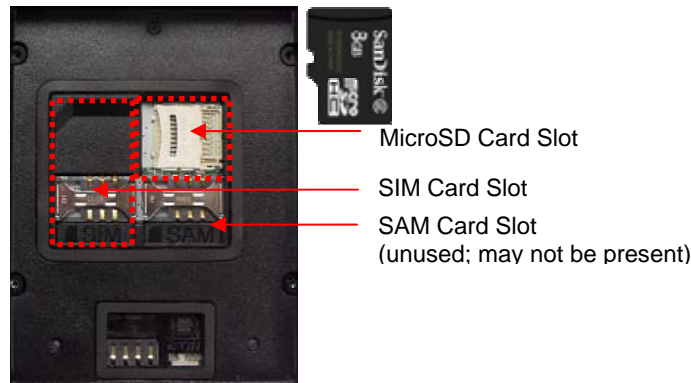
Hard Reset

- Press Power and Reset buttons together.
- System will reboot.
- Desktop reappears in about ten seconds.
- Time & date window will pop up and need to be reconfigured.

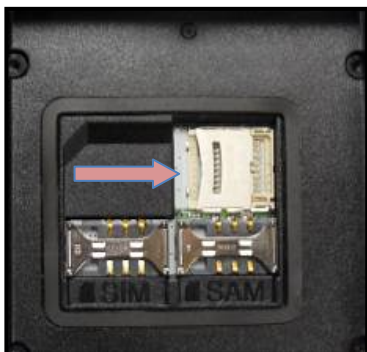


Using a MicroSD Card

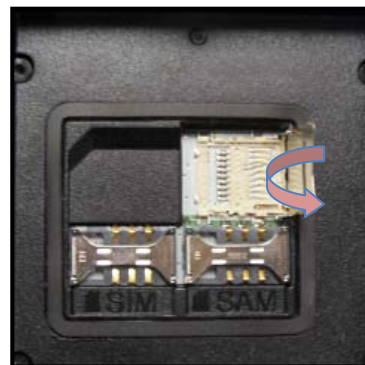
The image below is with the battery compartment off. There is one MicroSD card slot, and one SIM card slot. Instructions for inserting and configuring a SIM card, for 3G network communications, are given in the chapter, "Using a SIM Card".



Installing a MicroSD Card



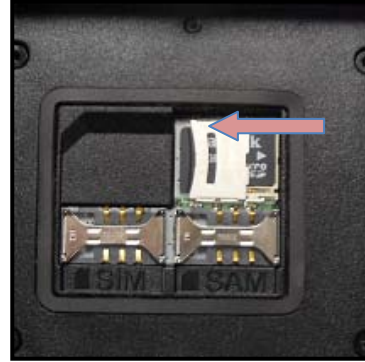
Carefully slide the metal cover to the right, along the direction of the arrow, to open it.



Lift the cover up along arrow direction.

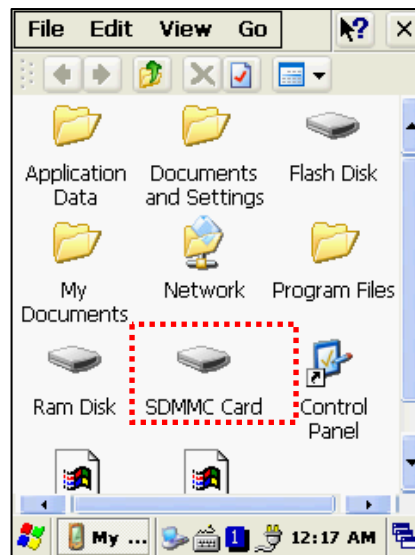


Set the MicroSD card into the slot and lower the cover again.



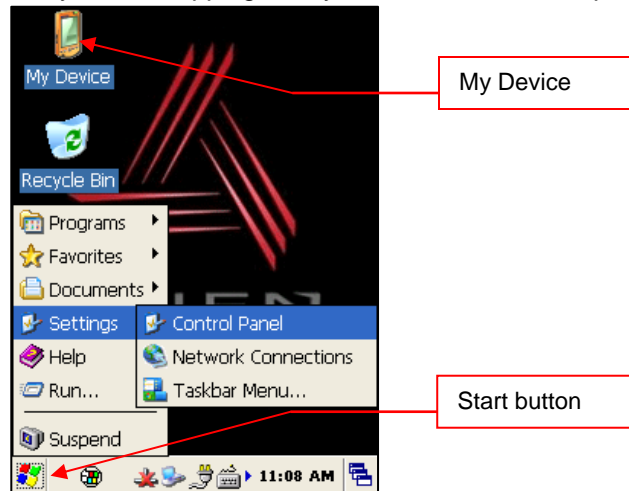
Slide the cover to the left to lock it, and reattach the main battery.

You can find the MicroSD memory card icon in the file explorer, after inserting the MicroSD card.



System Settings

Most of the system settings can be changed through the system Control Panel, which is accessed via the Start button, or by double-tapping on My Device on the desktop.

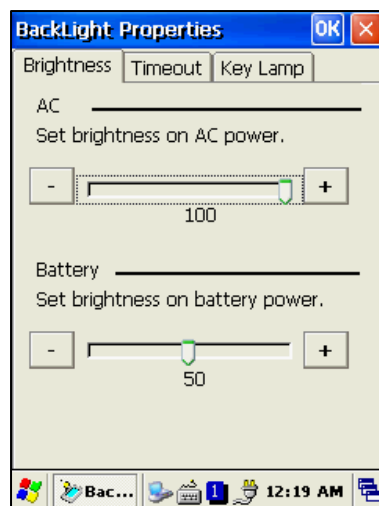


Setting Brightness

Brightness is set at 80% at the factory, and screen brightness is the biggest part of your power consumption, so you might need to adjust it to suit your actual need.

[Start] > [Settings] > [Control Panel] > [Backlight]

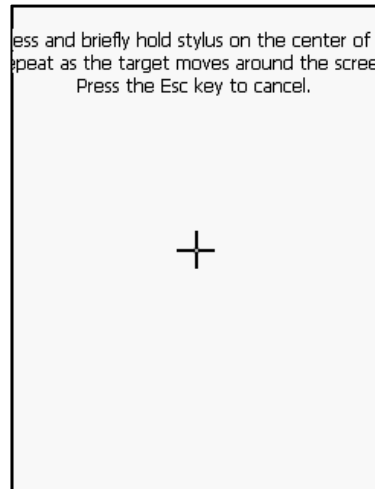
You can adjust the brightness while on AC or battery power, the idle timeout for when the screen should dim, and the idle timeout for when the keypad lamps should dim.



Screen Calibration

The first time the device is used, or if you haven't used the device for a long time, you may find that you cannot accurately select the place where you touch with the stylus. In this case, you need to perform the screen calibration.

[Start] > [Settings] > [Control Panel] > [Stylus] > [Calibration] > [Recalibrate]

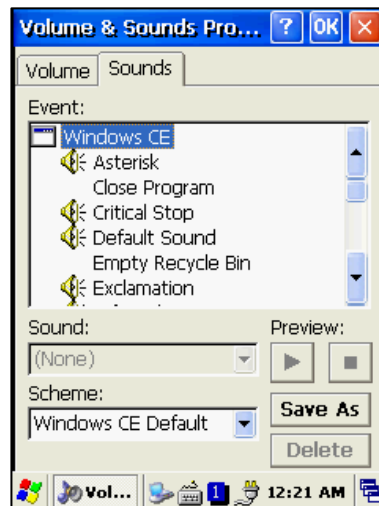
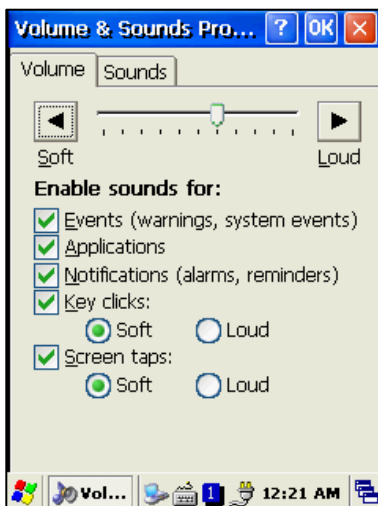


Press and hold the stylus pen briefly on the center of the cross symbol, and repeat five times as it moves around the screen. Finish by pressing the Enter key on the keypad.

Setting Volume and Sounds

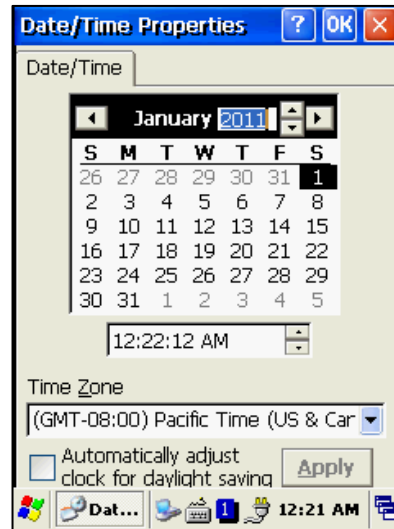
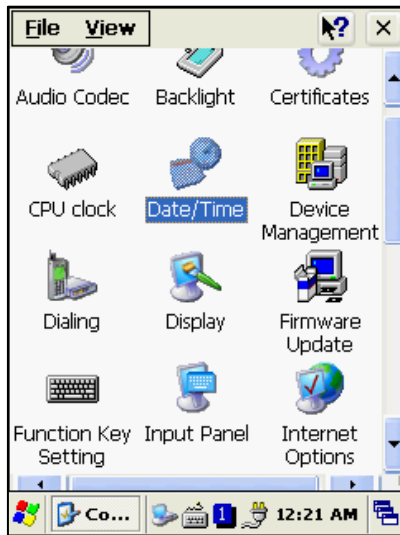
Volume is already set at 80% at the factory, and you can adjust volume as needed at the Volume and Sounds control panel.

[Start] > [Settings] > [Control Panel] > [Volume and Sounds]



Setting the Date and Time

[Start] > [Settings] > [Control Panel] > [Date and Time]



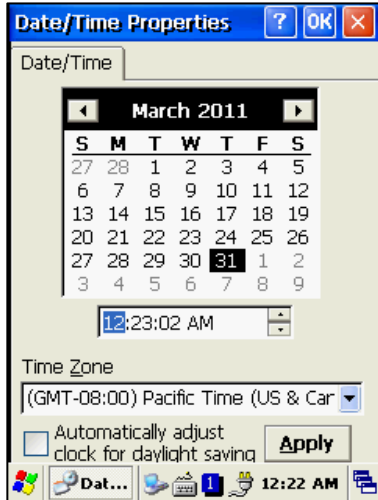
Setting Year:
Double-click the year, and click the up and down arrow button to set it.



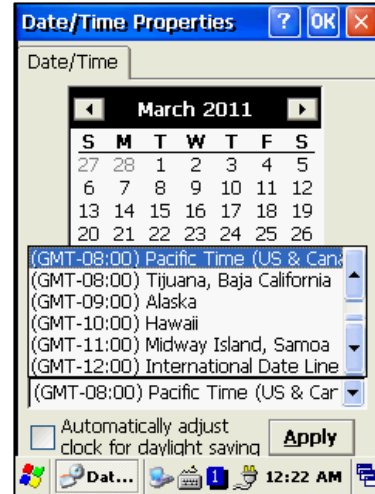
Setting Month:
Double-click the month or click the Left/Right arrows to set the month.



Setting Day:
Click the day directly to set the day.



Setting Time:
Use the up and down arrow to set the time, and click AM/PM in the time area directly.



Setting Time Zone:
Click the down arrow to select your time zone, and finish by clicking the apply button.

Using the Keypad

The physical keypad enables you to input numbers, letters and special symbols. You can also execute other preset functions with the <Fun> button.

If you'd like to change the current input mode, press the <1 ALP> button on the keypad as it steps through the following sequence:

"1" (Numeric) -> "a" (lowercase letters) -> "A" (uppercase letters) -> "1"



Clicking the input mode icon on the taskbar also changes the input mode.

Inputting Data

Numeric Keypad Mode, "1": Press the <1 ALP> button or keypad icon on the taskbar to change to the numeric mode. Pressing a keypad button will directly enter the number printed on that key.

Alphabet Keypad Mode, “A,a”: Press the <1 ALP> button or keypad icon on the taskbar to change to the lowercase (a) or uppercase (A) mode. Each keypad button has 2-4 letters or symbols. Pressing the button once causes the first letter or symbol to be entered; quickly pressing twice causes the second letter or symbol to be entered, and the third letter or symbol requires the button to be pressed three times quickly.

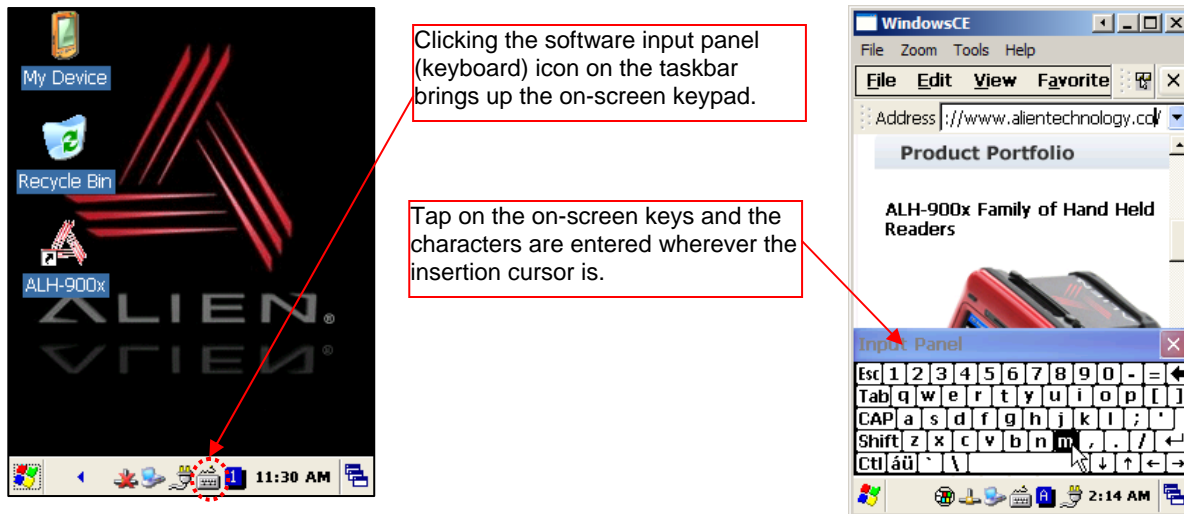
Using the <Fun> Button

Pressing <Fun> button and other buttons simultaneously can activate various functions, as below:

Fun + Button	Descriptions
<Esc>	Cancels the selected command or the program’s current task.
Volume button <Up>, <Down>	Increases or decreases the sound volume.
<3>, <9>	Performs page-Up or page-Down operations.
<2>, <4>, <5>, <6>, <8>	Moves the cursor Left, Right, Up, Down, and Home.
	Deletes a letter located to the right of the cursor.
<7>	Works like a Tab key.
<*>, <0>, <#>	Enables you to input +, 000, and – symbols.
<F3>, <F4>	Enables you to use as two additional function buttons.

Using the Soft Input Panel

Sometimes, when entering data on-screen, it is easier to use the stylus and the soft input panel to enter text. You can configure the layout of the soft input panel in the Input Panel control panel.



Using the Stylus

You can tie the stylus to the hole in the hand strap connector, to allow you to use the stylus like a mouse on a PC. The hand strap has a small integrated holster for storing the stylus safely.



Use the stylus to:

- Select a letter on the onscreen soft keypad.
- Select a program on the desktop or taskbar.
- Select a button, tab bar, or other control in an application window.

Caution:

Please do not use sharp objects on the touch screen. Use only the supplied stylus; otherwise you could seriously damage the touch screen.

Using ActiveSync

The ActiveSync interface synchronizes data between the PC and handheld device, so that you can install programs, copy, transition, and delete data, etc.

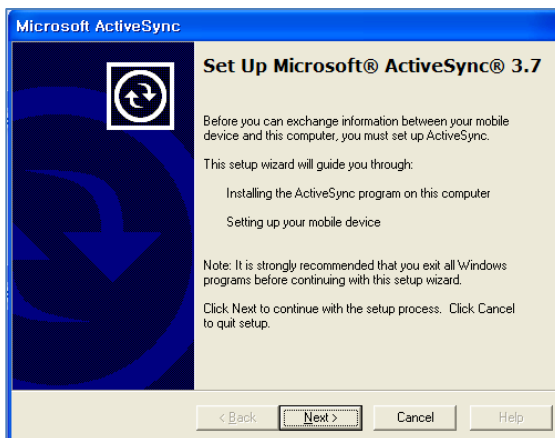
Installing Microsoft ActiveSync Program

Download the latest version of the ActiveSync program from the Microsoft website, and install it to your PC.

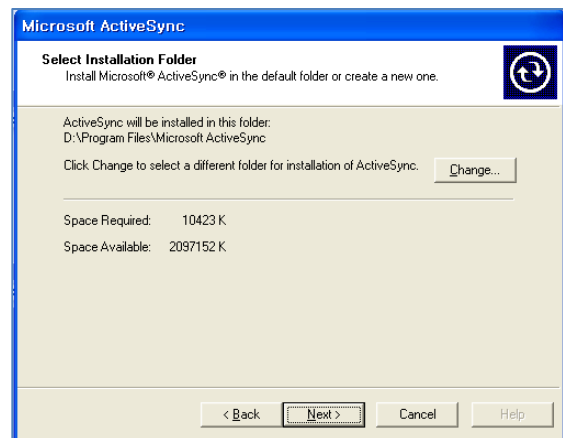
<http://www.microsoft.com/downloads/>

Caution:

You must use ActiveSync v3.7 version or later.



Click the [Next] button.



Designate the installation folder, and then click the <Next> button.



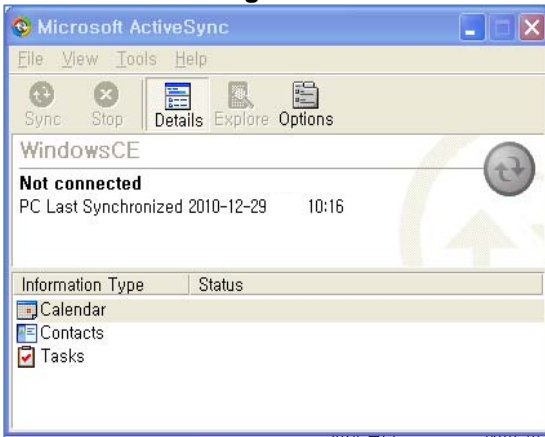
The installation was finished. Now when you use the USB cable to connect to the USB port on your computer, ActiveSync will automatically detect the device and make a connection.

Connecting PC to PDA

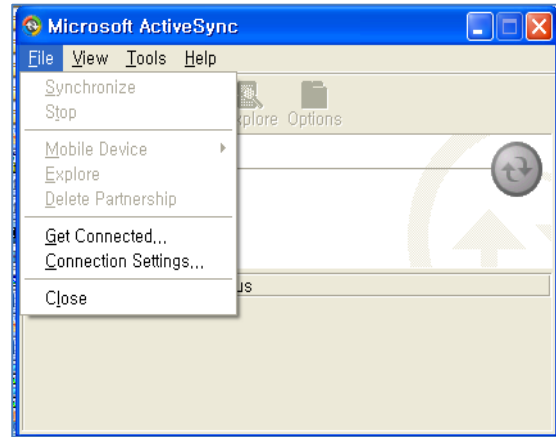
On the PC:

[Start] > [Programs] > [Microsoft ActiveSync]

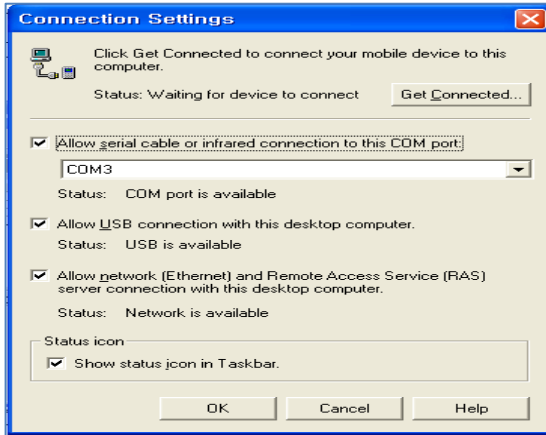
Windows XP Configuration



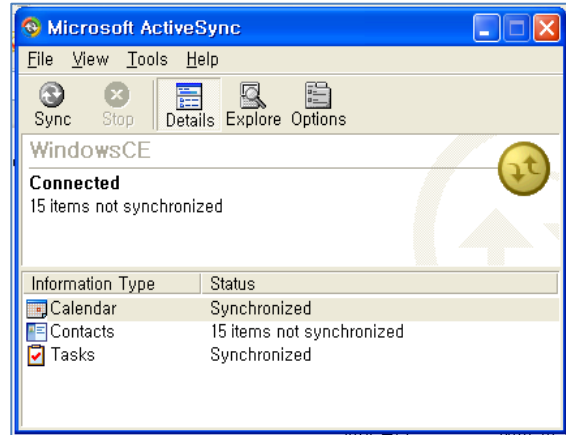
Executing Microsoft ActiveSync program.



Click [File], Click [Get Connected].



Select <Allow USB connection with this desktop computer>, press OK button.



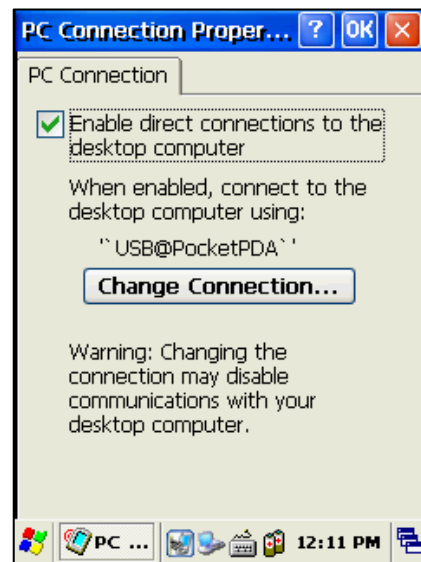
ActiveSync connected to PDA.

Handheld Configuration

[Start] > [Settings] > [Control Panel] > [PC Connection]



Double click PC Connection icon



To check if set to connected to USB Sync cable

Transmitting Data

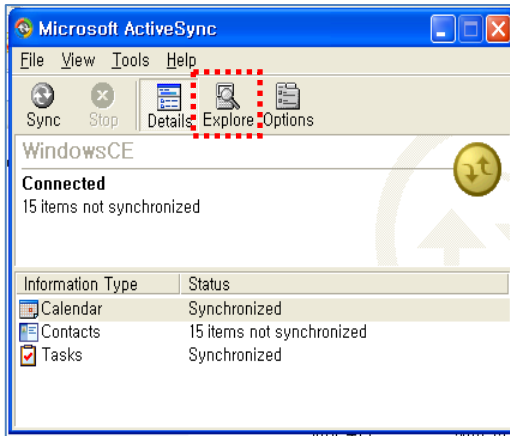
Use the USB cable to connect the PC and the handheld device. You can check the state of the ActiveSync connection on your PC taskbar.



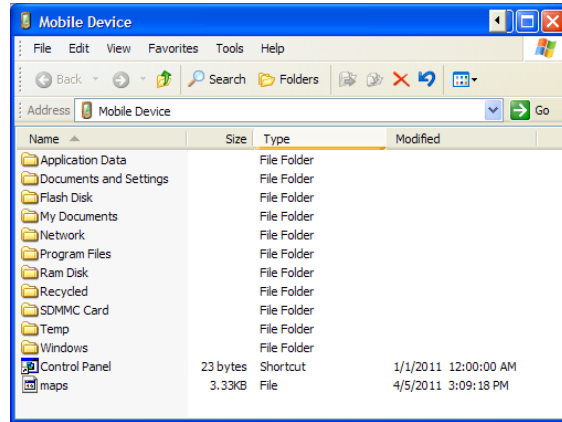
Connected state



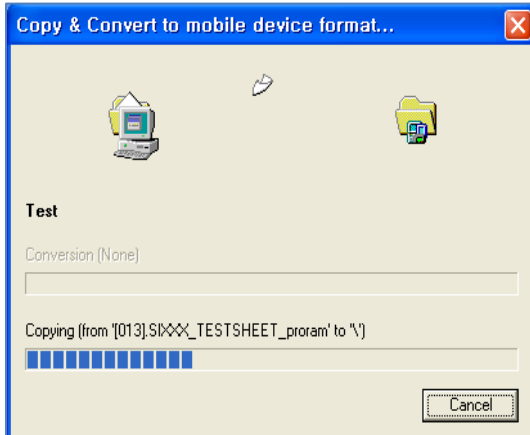
Disconnected state



After ActiveSync is connected, click the Explore button.



Browse to the folder on the handheld where you would like to copy a file.



Drag and drop (from handheld to PC, or from PC to handheld) to copy files.

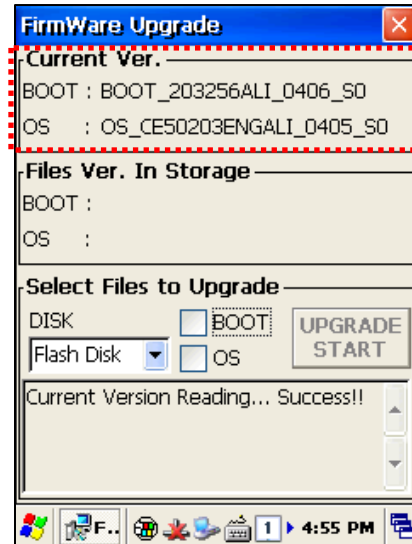
Firmware Upgrade

[Start] > [Settings] > [Control Panel] > [Firmware Update]

You can check the handheld's firmware version in the Firmware Update control panel. It is also possible to load a new firmware image (from either the Flash disk or a MicroSD card) using this utility. Firmware updates require a hard reset to finish the process.



Go to the Firmware Update control panel to examine the current firmware version, and perform an upgrade.



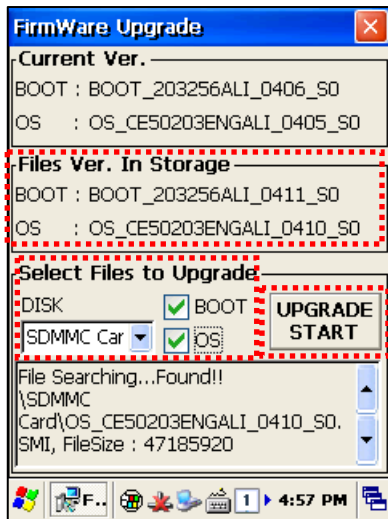
The top area shows the current firmware version (406/405 in this example).

New firmware for the handheld is distributed as two separate image files – one for the bootloader, and one for the main OS image. Upgrading the unit's firmware will reset it to a factory-default state. Any data or programs you may have loaded (except on the Flash Disk) will be removed and you will have to reconfigure the unit afterwards.

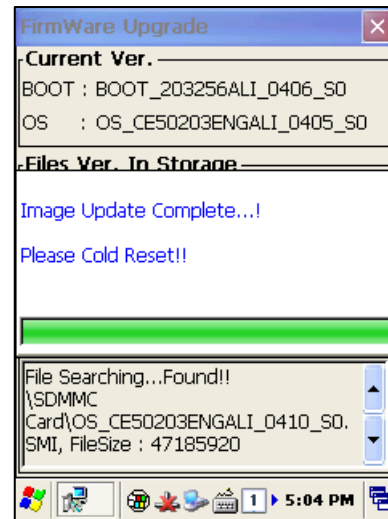
You have two options for copying the new firmware files to the handheld (both methods are explained earlier in the manual):

- Copy them to the top level of a MicroSD card and install the card into the back of the unit.
- Use ActiveSync to copy the files to the top level of the unit's Flash Disk.

Once the two firmware files are in the handheld, use the Firmware Upgrade control panel to install them. In the "Select Files to Upgrade" area, pick either Flash Disk or MicroSD from the DISK pulldown, depending on where you loaded the image files. Check both the BOOT and OS checkboxes to indicate that you want to install both, and it will verify the existence of those files and report their version numbers in the "Files Ver. In Storage" area of the window. If everything looks good, click the Upgrade Start button to begin the installation.



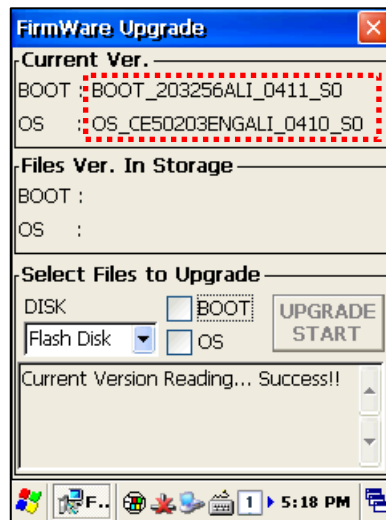
Select the location of the files, and check both the BOOT and OS checkboxes. The new image versions appear in the area just above. Press UPGRADE START to continue.



After the upgrade is complete, you must cold-reset the unit (press Power and the recessed Reset button at the same time).

Do not unplug the reader or attempt to turn it off while the upgrade is taking place!

After the upgrade is complete, you will be prompted to perform a Hard Reset to reboot the system (hold both the Power & “Fun” keys while depressing the recessed reset button with the stylus). When the reader reboots, you can verify the new firmware load through the Firmware Update control panel.



If the reader fails to reboot, it may be because the new firmare image requires the system to be “cleaned” first. In fact, it is a good idea to clean the system after installing new firmware on the handheld. You can either clean the system leaving the Flash partition alone, or clean everything including reformatting the Flash partition. Some OS updates might require this.

In order to clean the system (and recover your reader if it isn’t booting up after the upgrade), you will need to go to the Boot Menu.

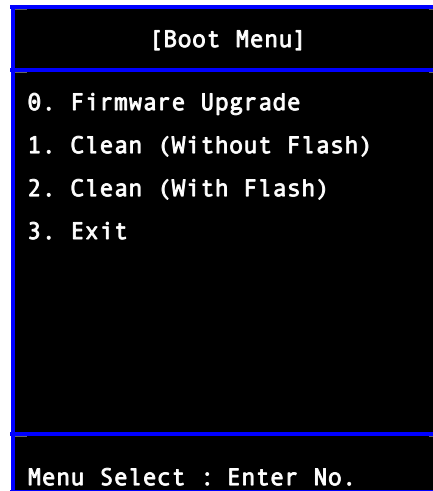
Boot Menu

To perform a Hard Reset and go to the Boot Menu, hold the <Fun> button and the <Reset> button at the same time for a few seconds. The [Boot Menu] window will appear.

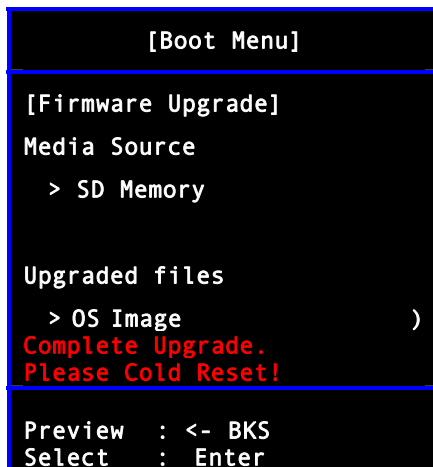


Enter the [Boot Menu] in any of the following situations:

- To upgrade the unit's firmware.
- After an upgrade:
 - to clean the Windows system
 - to clean the Windows system and initialize the Flash Disk



The [Boot Menu] start-up screen, with Firmware Upgrade, and two Clean options.



Press the 0 key to do a Firmware Upgrade. The image files must be on an installed Micro SD memory card. The upgrade will start automatically if a valid image file is detected. Once it is complete, reset the handheld to reboot it.



Press the 1 or 2 keys to clean the system registry. The 2 option also initializes the Flash Disk. Press Backspace to return to the first menu, or Enter to proceed. The unit will automatically reboot.

Chapter 3

RFID Tag Reader

The ALH-900x handheld readers contains a full-featured 900 MHz UHF RFID tag reader. It is able to inventory, selectively read from, and write to, RFID tags which support the EPC Gen2 protocol. The Frequency range is 850MHz - 960MHz, and can be adjusted for different regions.



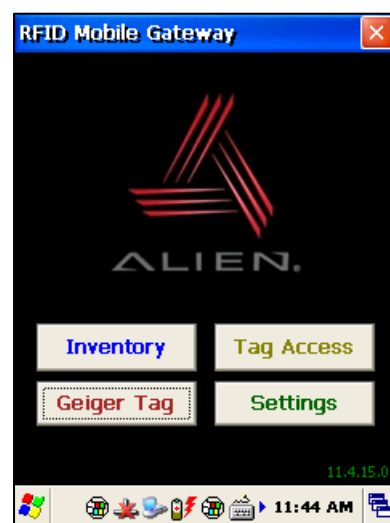
Starting the ALH-900x RFID Demo Software

The Alien RFID demo software is accessible by the RFID Demo icon on the unit's desktop, or it can be launched directly from the Start menu. It provides an example of what you can accomplish with a custom application on the reader.

[Start] > [Programs] > [Alien Demos] > [RFID]



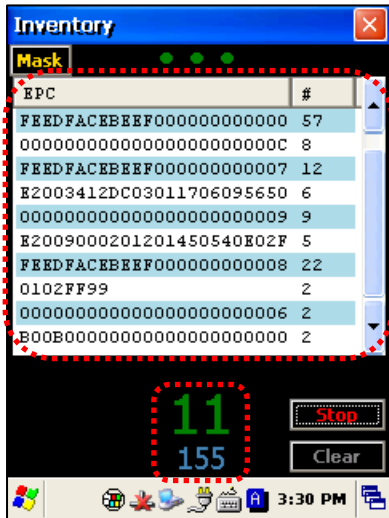
Running the RFID Mobile Gateway demo software.



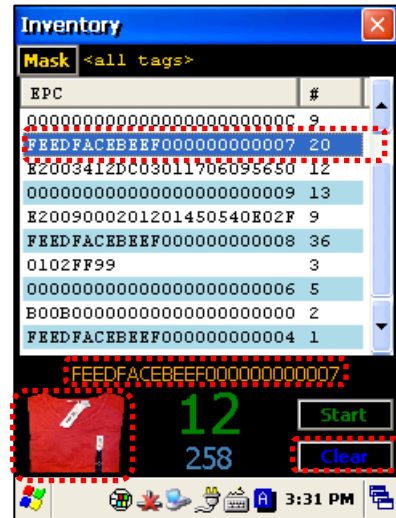
The main screen presents buttons for each of the utilities, and one for general reader settings.

Inventory Utility

The Inventory utility allows you to scan all of the tags within range of the reader, and see each tag's EPC and read count in a scrollable list. You start and stop the inventory utility by either holding the pistol-grip trigger button, or by clicking once on the green Start button. The reader continues to read tags until you release the trigger or click the Stop button. Click the red Close box at the top-right corner to return to the main screen.



Each tag that is read is added to the scrolling list, along with the count for each tag. The number of unique tags and total number of reads is displayed.



Clicking on a tag in the list shows its full EPC below the list, and a representative product image is displayed. Click on the Clear button to clear the list.

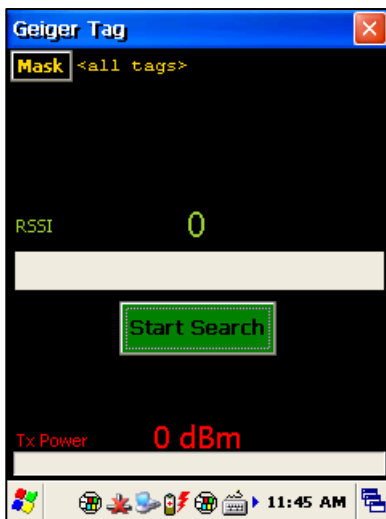


Clicking the yellow Mask button at the top of the Inventory screen takes you to a page where you can specify a subset of tags to read (see the Tag Mask section). This powerful feature causes the reader to only read the tags you want it to read.

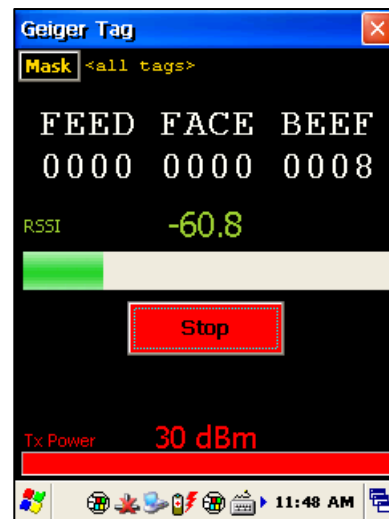
Geiger Tag Utility

The Geiger Tag utility is designed to assist you in finding the location of a particular tag, or one of a group of tags. It does this by measuring the returning signal strength (RSSI) from the tag, and displaying this information on the screen, along with an audible queue. As you scan the reader near a tag, the RSSI increases, and you see and hear the change. In order to help narrow the field of view of the reader as you zero-in on the tag, the reader's output power is scaled down as you get closer to the tag.

To start the Geiger Tag search, either hold the pistol-grip trigger button, or click once on the green Start Search button. The reader continues to read tags until you release the trigger or click the Stop button. Click the red Close box at the top-right corner to return to the main screen.



The Geiger shows the tag's signal strength and the reader's current output power. Use the Start Search button (or pistol-grip trigger) to start the search.



When a tag is read, its EPC is displayed on the screen, along with graphical and numeric readouts of the tag's return signal strength, and the reader's transmitting power.



Having the Geiger react to every tag it sees can quickly become overwhelming. Use the yellow Mask button at the top-left corner to indicate which tag or tags you are interested in finding (see the Tag Mask section).

Narrowing the search down with a tag mask can make the Geiger utility much more effective.

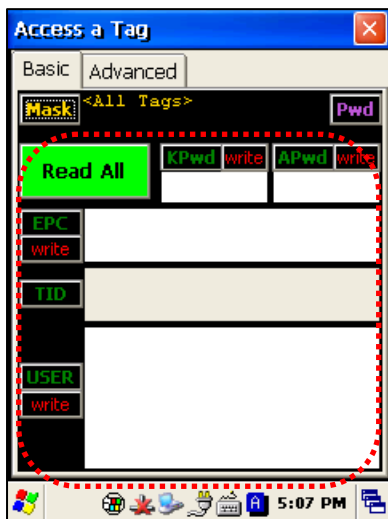
Tag Access Utility

The Tag Access utility allows you to read from and write to specific portions of a tag's memory. The utility is divided up into two separate tabs: the Basic tab and the Advanced tab. The Basic tab gives a quick overview of the tag's memory layout, and gives you basic ability to write new data to the tag. The Advanced tab gives full access (bank, start pointer, and length) over the low-level writing and reading operations, as well as controls for locking and unlocking specific portions of tag memory.

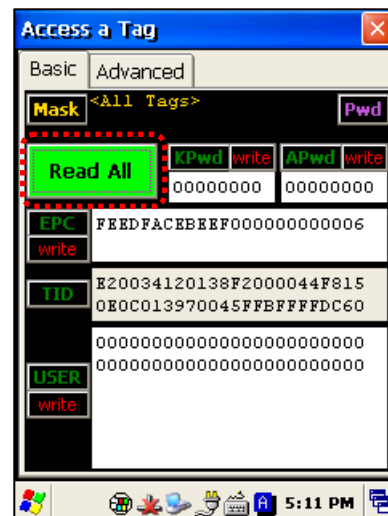
EPC Gen2 tag memory is divided up into four distinct banks: Reserved, EPC, TID, and User. The Reserved bank contains the tag's Access password and Kill password (each two words long), though all tags may not support both passwords. The EPC bank contains the tag's "id" – its EPC code – along with some other information related to the EPC. The TID bank is generally read-only, and contains information about the tag's manufacturer, model, and basic capabilities. Alien Higgs tags contain bits in the TID bank that are guaranteed to be unique from one tag to the next. The User bank may not be present in all tag types, and when it is supported each tag provides different amounts of memory there.

Basic Access Tab

The Basic Access tab has text fields for each of the separate fields of tag memory. Clicking the Read All button (or pulling the pistol-grip trigger) causes the reader to try and read all of the data for each of the fields, from whatever tag is in the field. The separate fields fill in, one-by-one, as the data is read. Since there is no definitive way of knowing how much User memory a tag has, the reader simply reads the User data two words (32 bits) at a time, until a failure occurs.



The Basic Access tab gives a visual overview of all of the fields in tag memory.



Pressing the Read All button (or pulling the pistol-grip trigger) fills in each memory field with data from the tag.

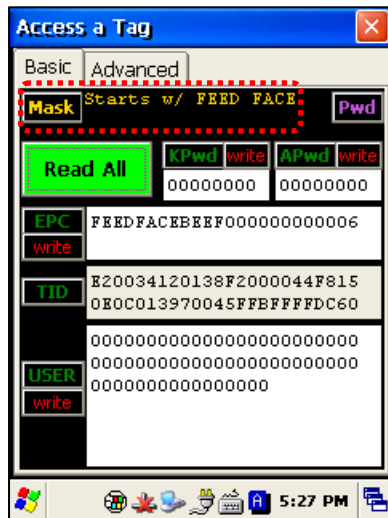


Pressing the small green buttons labeling each memory field will cause the reader to only read data from that field.



Pressing the red “write” buttons cause the reader to write the shown data to the tag. You can edit the data in the field before writing it to the tag. The field turns orange while writing, and then turns white or red, depending on the success of the write operation.

When there are many tags in the field, the Basic Access tab can have difficulty reading all of the data from the same tag when you click the Read All button. To make sure that you are accessing the same tag throughout the operation, you should set a tag mask, using the yellow Mask button at the top-left corner of the screen. Also, when the tag has some of its memory fields locked with an access password, you must provide that same password as part of the access operation in order for it to succeed. You use the violet Pwd button at the top-right corner to do this.



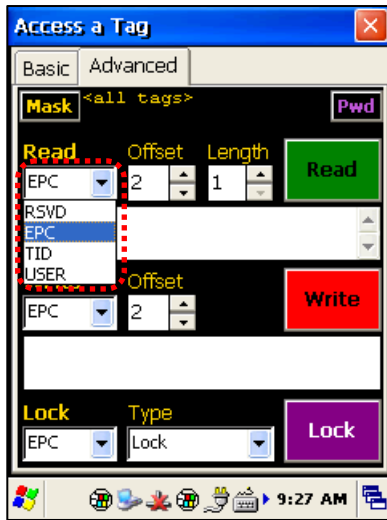
The yellow Mask button lets you restrict the reader to only access one tag at a time.



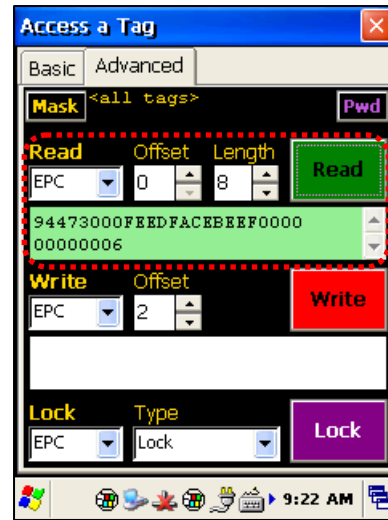
The violet Pwd button opens up a dialog window where you can enter in an Access Password, for accessing tag memory that may have been locked.

Advanced Access Tab

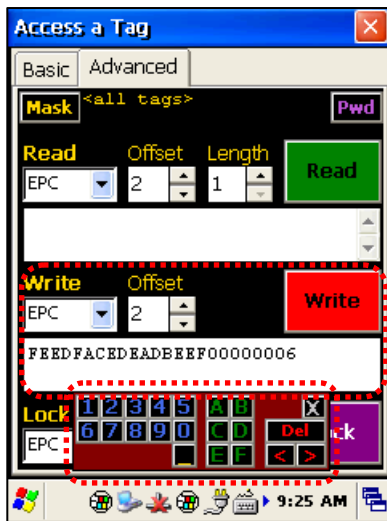
The Advanced Access tab has three general control areas: Read, Write, and Lock. All three operations require you to specify the bank of tag memory to access (Reserved, EPC, TID, and User). When reading and writing, you must specify the offset into that bank of memory where you would like to access. The reading operation also requires you to specify the length of the data to read. Both the offset and length parameters are measured in words (1 word = 2 bytes = 16 bits).



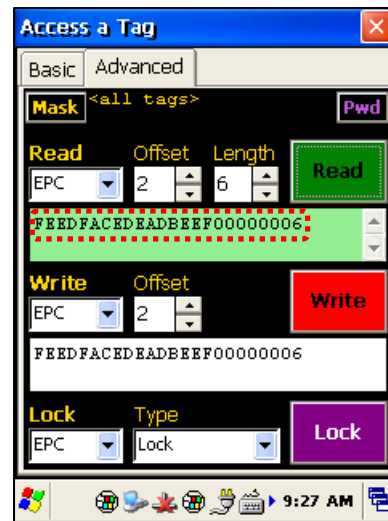
Three main areas in Advanced Access: Read, Write, and Lock. Each requires you to specify a memory bank.



Note in this read that the tag's actual EPC code (FEEDFACEBEEF...) is two words offset into the EPC bank.



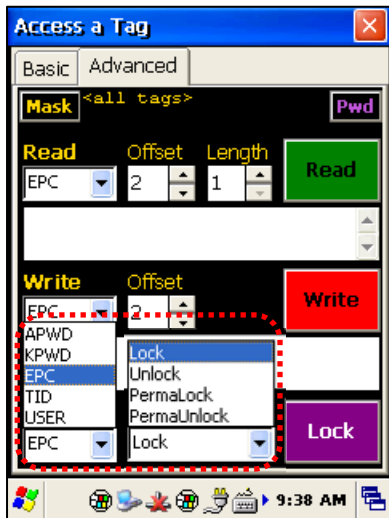
You must enter the hex data to write in the field. The helpful popup keypad makes entering tag data easy.



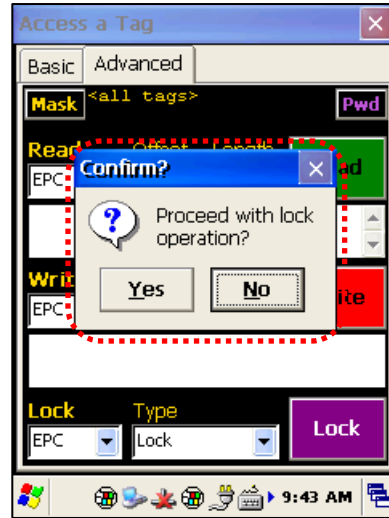
Verifying the success of the write, with another read (of just the EPC code). Now FEEDFACEDEADBEEF...

When locking, you have the option of locking the Access Password and Kill Password (both in the Reserved bank) separately, so the Lock command has a list of tag memory *fields* instead of *banks*. The other parameter is the type of lock: Lock, Unlock, PermaLock, and PermaUnlock. All locking operations require you to confirm by clicking OK to an alert message. The “Perma” options are, well, permanent, so use caution.

Locking a field doesn’t immediately protect it until you also write a non-zero Access Password to the tag (and you should probably lock that field as well!). Please refer to the EPC Gen2 Protocol Specification for complete details on how the various locking operations affect the tag’s behavior.



You must enter the hex data to write in the field. The helpful popup keypad makes entering hex data easy.



Verifying the success of the write, with another read (of just the EPC code). Now FEEDFACEDEADBEEF...

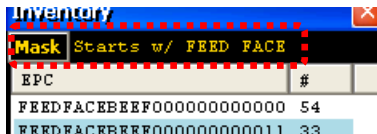


As on the Basic Access tab, you have full access to the tag Mask and current Access Password in this tab. On this screen, the read operation failed for two reasons: the mask doesn’t match the tag’s new EPC (FEEDFACEDEADBEEF...) and we’re trying to access it with an incorrect Access Password.

Tag Mask

When the application first launches, it is configured to look for and report every tag it sees. You don't always want to read every tag – perhaps you are searching for only one class of product, or are trying to access one particular tag in order to write data to it. The Gen 2 protocol provides for something called a select mask - a filter definition that is broadcast to all of the tags in the field before each operation, that specifies which tags are allowed to participate in that operation.

The ALH-900x demo software allows you to specify a tag mask, which is used transparently in each of the utility screens. The current mask is displayed at the top of each screen in yellow text, alongside the Mask button that brings up the Tag Mask whenever it is clicked.



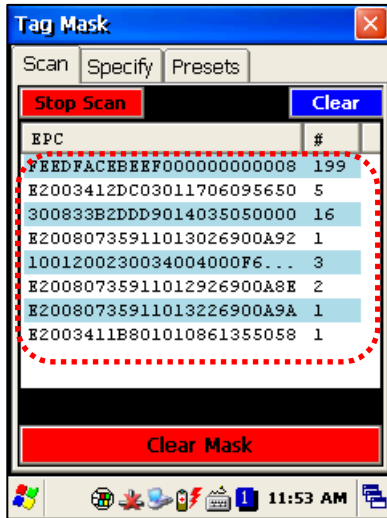
At its heart, a tag mask defines a piece of data that must match exactly a specific portion of the tag's memory. This includes the memory bank (not just the EPC bank), a pointer offset into that bank, and the actual hex data to match against.

In reality, you don't always want to have to think about memory banks and pointer offsets – you just want to find that pair of jeans that is on the wrong rack, or you only care about “pallet tags”, however that is defined for you. The Tag Mask screen therefore gives you three ways to pick a tag mask:

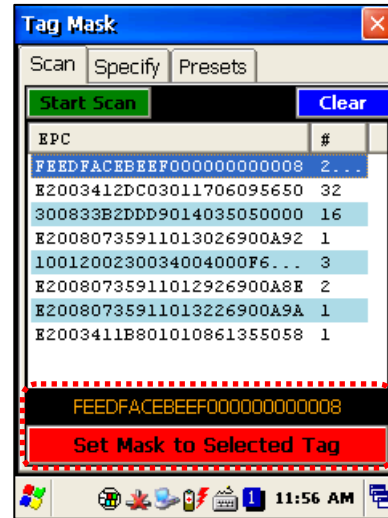
1. Scanning the field and picking a tag from a list.
2. Exactly defining the bank, offset, and hex data.
3. Picking a named mask from a preset list

Once you have defined and set your mask, just close the Tag Mask window and your new mask will be displayed at the top of the screen you were originally on, and it will be used in subsequent operations.

Tag Mask – Scan



The Scan tab acts just like the Inventory screen – start/stop the reader with the trigger or Start Scan button, and all tags in range are displayed.



Select a tag from the list and click the Set Mask to Selected Tag button. Click an empty part of the list and click the Clear Mask button to clear the mask.



Masks defined with the Scan method are displayed on the utility screens as simply the full EPC of the tag.

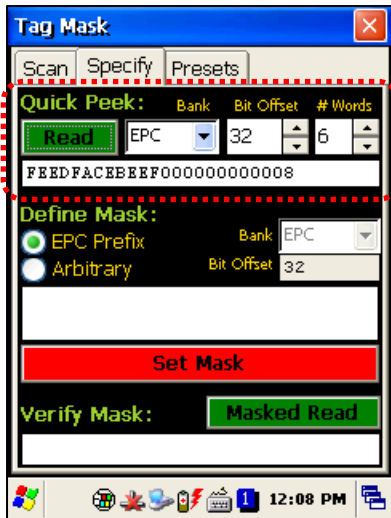
Tag Mask – Specify

The Tag Mask “Specify” tab allows you to do three things: take a quick peek at tag memory (to help you determine your mask definition), define an arbitrary or “EPC Prefix” mask, and verify your mask.

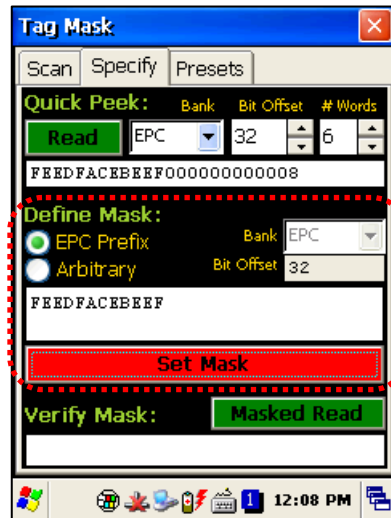
The upper Quick Peek section lets you choose a bank, pointer offset, and number of words to read. Clicking the green Read button will query any tag in the field (without any masking) and report the data from that tag.

The middle section is where you actually define your mask. There are two options here: create a mask based on an EPC prefix (i.e. “all tags starting with...”), or create an arbitrary mask. If you select EPC Prefix, the only thing you have to provide is the hex data representing the initial part of the EPC code for your tags (the other controls are disabled). If you select Arbitrary, you choose the bank and pointer offset, along with the mask data. Click the red Set Mask button to define your mask.

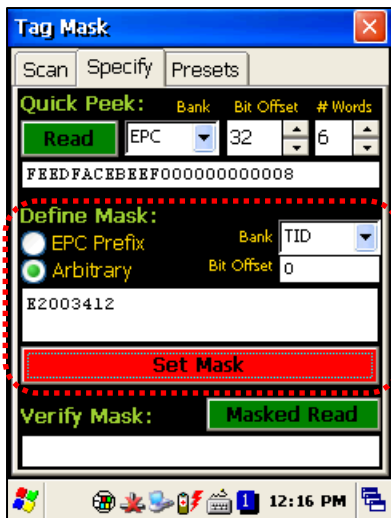
After you’ve defined a mask, you can do a quick verification by clicking the green Masked Read button in the Verify Mask section at the bottom. Any responding tag’s EPC will be shown in the text field there.



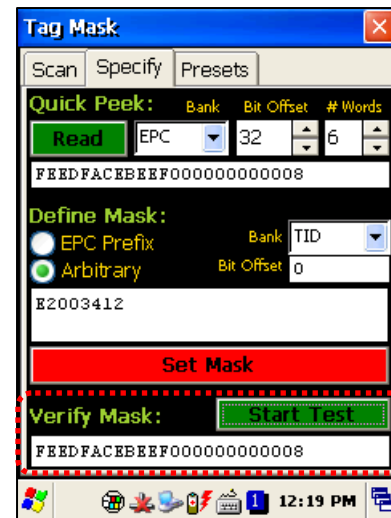
The Quick Peek section lets you get a glimpse of an actual tag's memory, to help you define your mask.



Defining a mask based on an EPC prefix is easy – just click the radio button, enter the EPC data and click Set Mask.



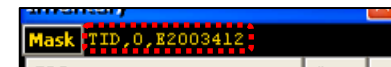
Defining an arbitrary mask requires you to specify the bank and offset, along with the data. This TID mask example selects all Alien Higgs3 tags.



Using the Verify Mask feature, you can make sure you've entered the mask correctly. Be sure to test tags that match as well as tags that don't match.



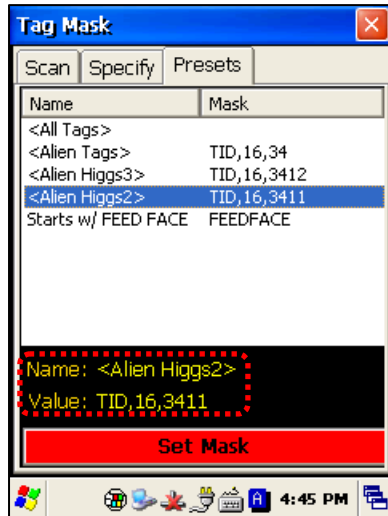
Masks defined with the EPC Prefix method are displayed on the utility screens as that initial part of the EPC.



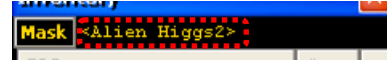
Masks defined with the Arbitrary method are displayed on the utility screens with the bank, offset, and data.

Tag Mask – Presets

The third way to set a tag mask is with the Presets tab. This screen shows a list of pre-defined tag masks, such as “all tags”, “all Higgs3 tags”, etc. These presets are hard-coded in the application right now, but will be user-configurable in the future.



Pick one of the selections from the Presets list, and you can see the displayed name and mask definition. Click the Set Mask button to use it.

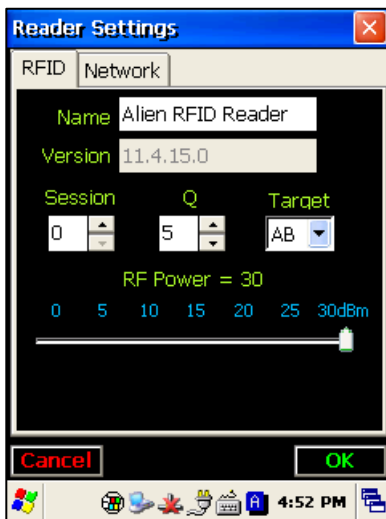


Masks chosen from the Presets tab are shown on the utility screens with the display name in the mask preset definition. Your mask presets might display “Blue Jeans” or “Pallet Tags” instead.

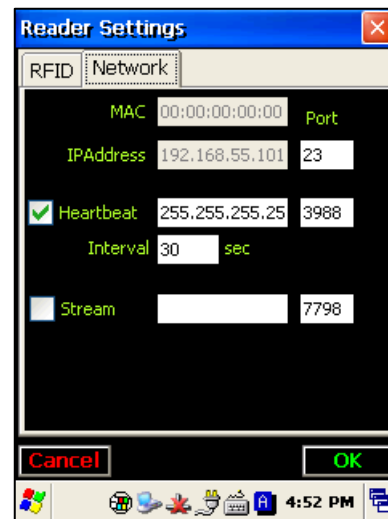
Reader Settings

The Reader Settings screen allows you to see and change certain parameters of the RFID reader, such as transmit power, and some Gen2-specific parameters on the RFID tab. There is a second Network tab with some additional parameters related to the reader's network interface and some common Alien features, such as a Heartbeat and TagStream functionality.

To commit any changes made on the Reader Settings pages, you must click the OK button at the lower-right corner. Clicking the Cancel button or the Close (X) button in the top-right corner returns you to the main screen without applying any of the changes that you made.



The RFID tab has controls for RF Power and some Gen2 parameters, such as Session, Q, and Inventory Target.



The Network tab shows the reader's MAC and IP addresses, as well as fields and checkbox controls for the Heartbeat server (for UDP-based discovery), and a TCP-based TagStream feature.

Chapter 4

Barcode Scanner (1D & 2D)

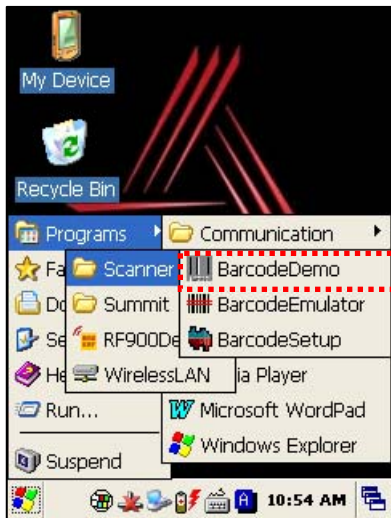
The ALH-9000 comes equipped with a 1D barcode scanner, and the ALH-9001 is equipped with a 2D barcode scanner. Both models are designed to recognize all known 1D and 2D barcodes.



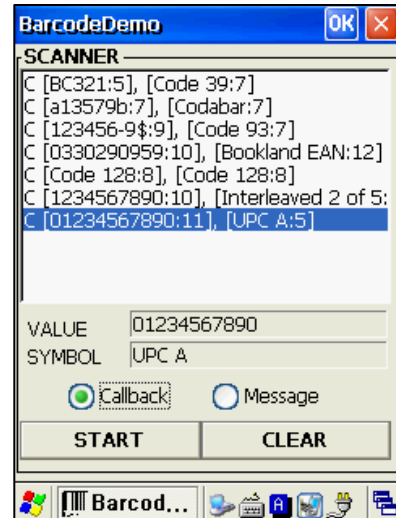
BarcodeDemo

The BarcodeDemo application is accessible from the Start menu. It provides an example of what you can accomplish with a custom application on the handheld.

[Start] > [Programs] > [Alien Demos] > [Scanner] > [BarcodeDemo]



Starting the BarcodeDemo app.

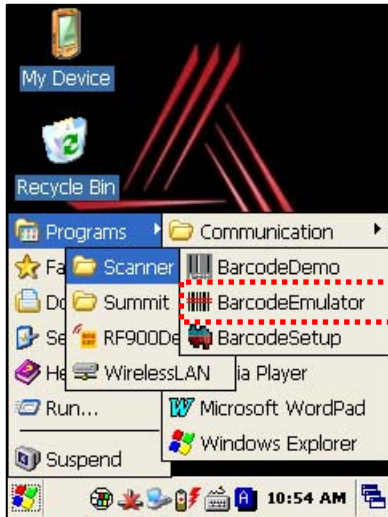


Press the Start button to read a barcode.

Using the BarcodeEmulator

The BarcodeEmulator program enables you to input scanned barcode data anywhere you can manually enter text. It runs in the System Tray, and sends keyboard events directly into whatever application is in the foreground. The icon in the System Tray lets you set the barcode value input type, scan button, scan sound, and so on.

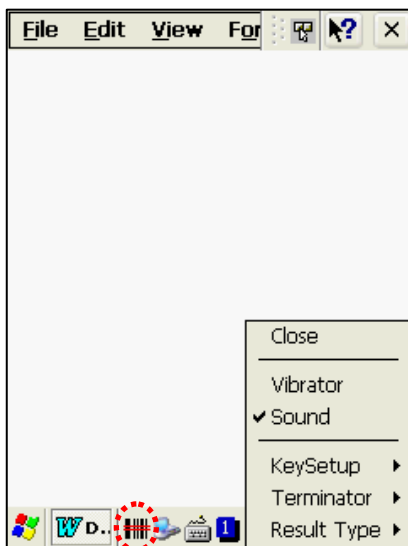
[Start] > [Programs] > [Scanner] > [BarcodeEmulator]



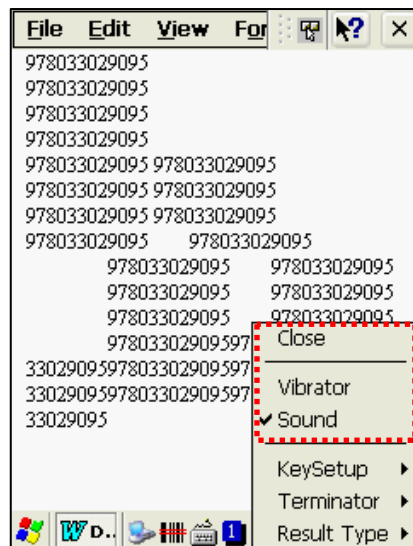
Starting the BarcodeEmulator



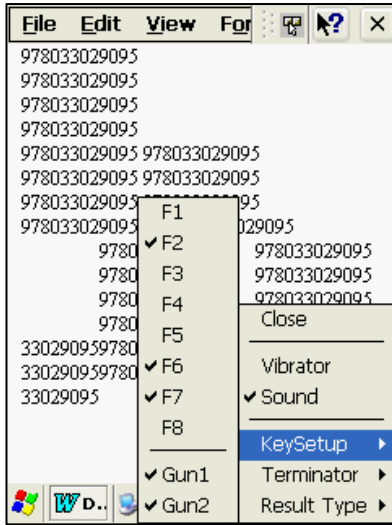
The BarcodeEmulator icon is shown on the taskbar.



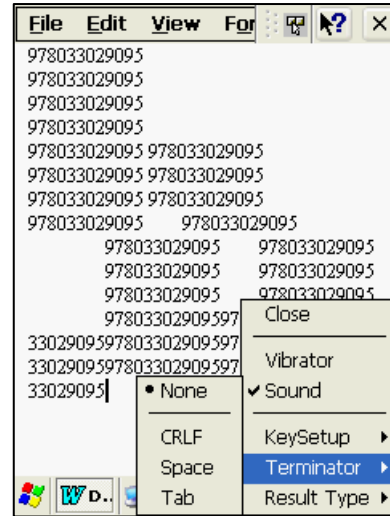
Run WordPad Program, then click the BarcodeEmulator Icon



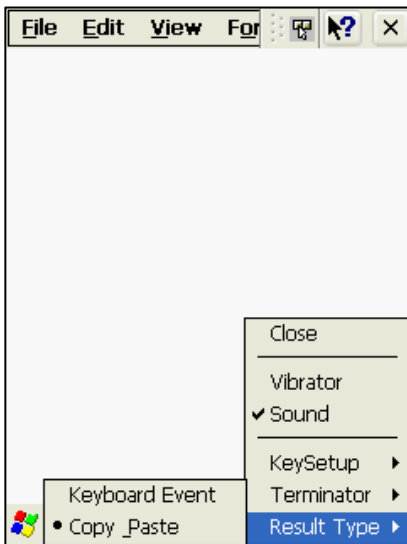
Sound:
A beep sounds when a barcode is scanned.
Vibrator:
The unit vibrates when a barcode is scanned.
Close:
Exits the Emulator Program



Key Setup
F1-F8: Hardware Keypad
Gun1, Gun2: Gun Trigger



Terminator
None: Do not terminate the barcode value.
CRLF: Barcode ends with a standard terminator.
Space: Barcode ends with a "Space" character.
Tab: Barcode ends with a "Tab" character.

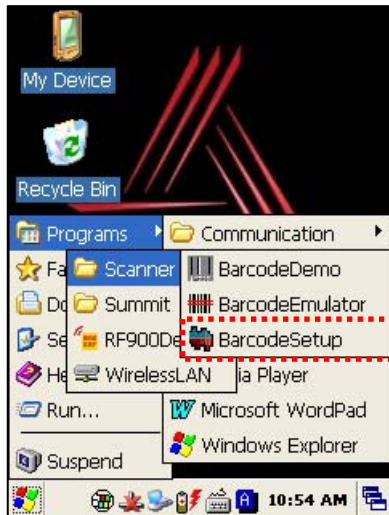


Result Type
Keyboard Event:
Barcode digits are inputted one-by-one.
Copy Paste:
Barcode data is stored on the clipboard and can be pasted later.

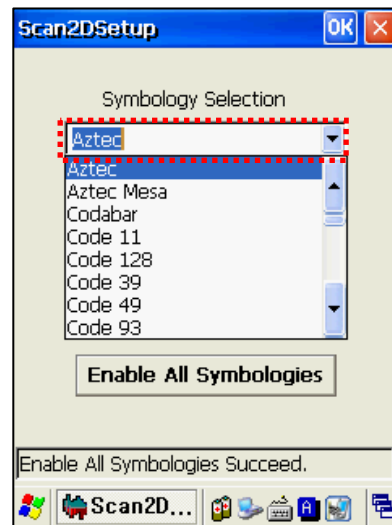
Setting Barcode Symbology

There are many different barcode encoding standards, depending on the region and industry. You must make sure that the barcode scanner is set to decode the types of barcodes that you expect to encounter. Selecting too many symbologies can increase the time it takes to decode a scanned barcode once it has been scanned.

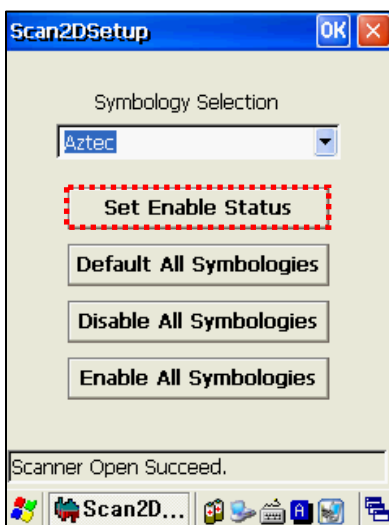
[Start] > [Programs] > [Alien Demos] > [Scanner] > [BarcodeSetup]



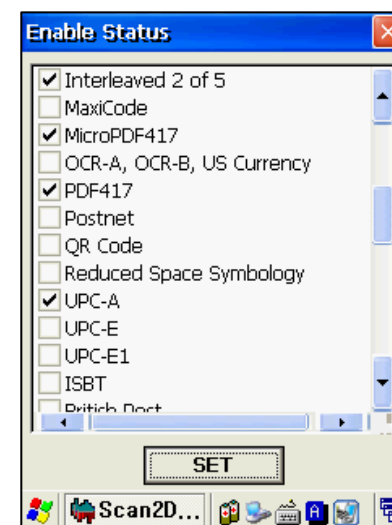
Running the BarcodeSetup program.



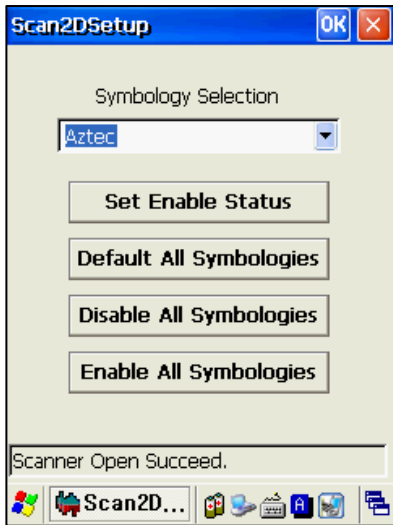
Set the Barcode type in detail.



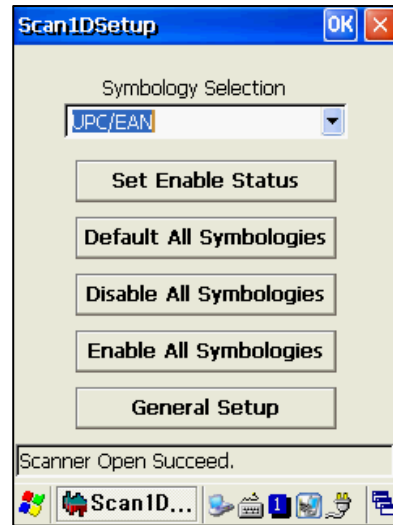
Click Set Enable Status button.



Make a check mark on the barcode which you want to use, and then click the <SET> button.



2D Symbology Selection:
 Initialize all the symbologies to the factory default values, disable or enable all of the symbologies.



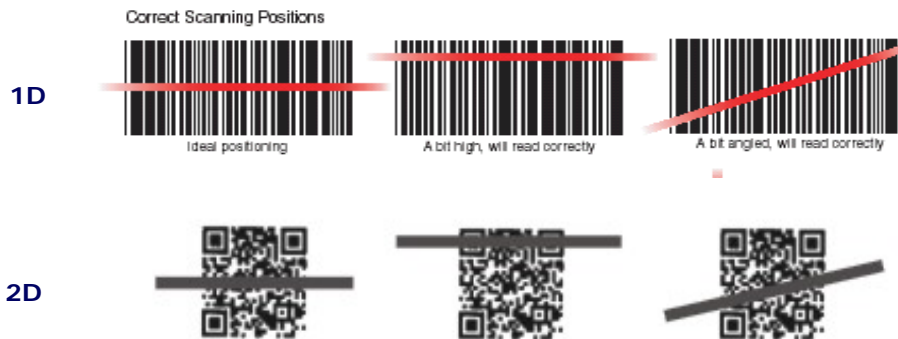
1D Symbology Selection:
 Initialize all the symbologies to the factory default values, enable or disable all of the symbologies. General Setup lets you set Linear Security levels, and bi-directional redundancy.

Barcode Scanning Beam Position

1. Remove any protective film from the window of barcode scanner.
2. Launch the **BarcodeDemo** program.
3. Point the laser beam at the barcode.
 - Adjust the distance according to the size of barcode.
 - The scan will stop automatically when the barcode is read, or after ten seconds, if no barcode is detected.

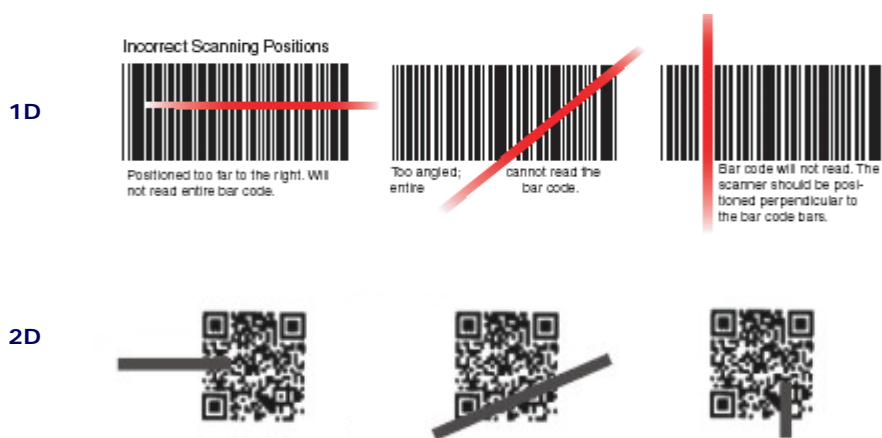
Correct Scanning Beam Position

1. The smaller the size of the barcode, the closer the handheld needs to be. The effective scanning range is 1.5-12 inches (40-300mm). If the unit fails to scan the barcode, adjust the scan angle and distance.
2. The laser beam is a red thick line, when scanning a barcode.



Incorrect Scanning Beam Position

1. The laser beam must pass across the entire barcode.
2. It will not scan the barcode if the laser beam crosses only part of the barcode.



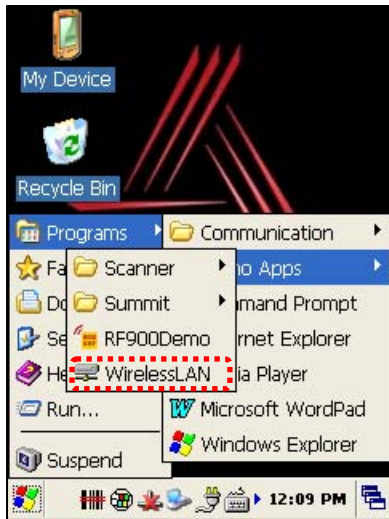
Chapter 5

Wireless LAN

The ALH-900x handheld readers are equipped with an internal 802.11 radio module to transfer data, and interface the unit with your network using wireless communication. It supports TCP/IP network protocols, and can communicate with a host computer directly.

Powering Up the WLAN Radio

[Start] > [Programs] > [Alien Demos] > [WirelessLAN]

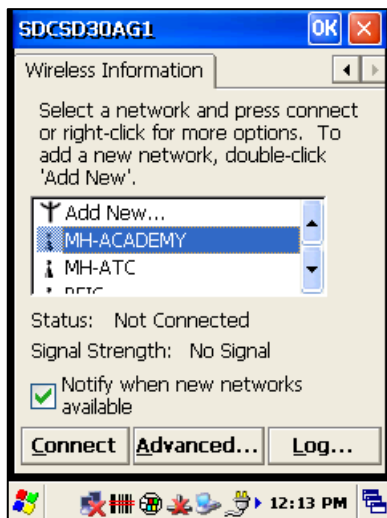


Running the WirelessLAN program.

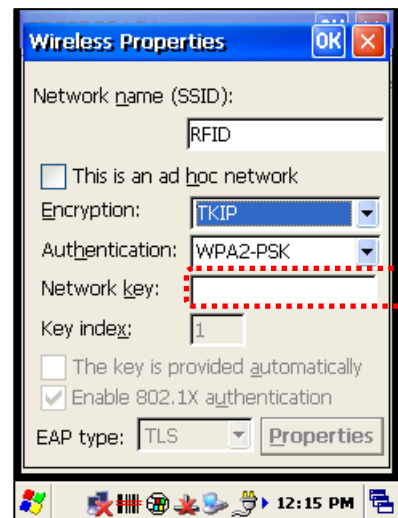


Select <WLAN ON>, and then click the OK button.

Configuring the WLAN Connection

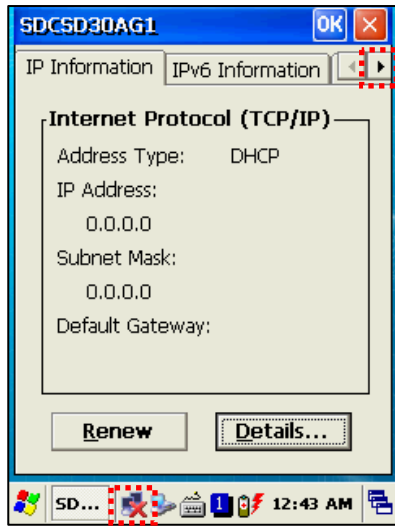


The network selector appears. Double click a suitable wireless server from the list of access points.



Input the encryption and authentication modes, and wireless password, and then click OK button.


Checking WLAN Information



Double click WLAN icon on the taskbar to check WLAN information. Use the right-arrow button at the top to get back to the Wireless Information tab.



Click Start > Programs > Demo Apps > WirelessLAN, and then select <WLAN OFF> to stop WLAN communication.

When connected, the WLAN LED illuminates green and the WLAN icon on the taskbar shows: 

If not connected, the WLAN LED and icon will be off: 

Additional features of the WLAN module can be accessed from the Summit Client Utility:

[Start] > [Programs] > [Alien Demos] > [Summit] > [scu]

Full documentation for the Summit Client Utility can be found on their website:

http://www.summitdatacom.com/Documents/summit_users_guide_3_03.html



The Summit Client Utility provides five tabs of configuration and diagnostic information. The admin password is "SUMMIT" (all capitals).

Chapter 6

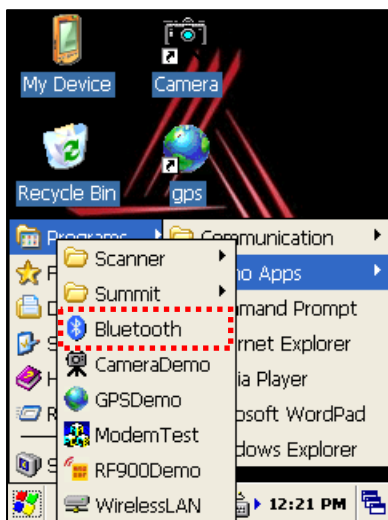
Bluetooth

The ALH-900x handheld readers feature Bluetooth technology for wireless communication with other devices, such as wireless printers, supporting the Serial Printer Profile (SPP). By default, the Bluetooth service is turned off.

Turning on Bluetooth

The Bluetooth radio is turned off by default. To use Bluetooth, turn it on first with the Bluetooth application.

[Start] > [Programs] > [Alien Demos] > [Bluetooth]



Use the Bluetooth program to turn the Bluetooth radio on and off.

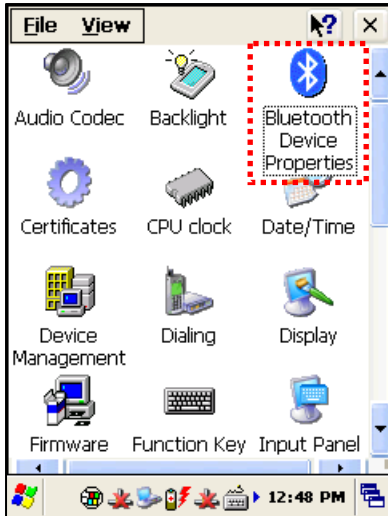


Select <Bluetooth ON>, and then click the OK button.

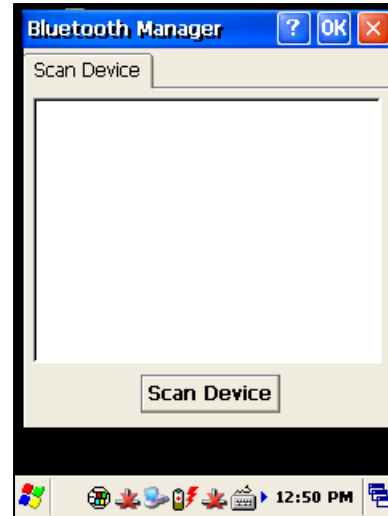
Connecting Bluetooth Printers (SPP)

The Bluetooth Device Properties control panel connects to a printer through a virtual serial port. The SPP Bluetooth device will appear as a virtual Com port: generally COM3, with a baud rate of 9600 bps.

[Start] > [Settings] > [Control Panel] > [Bluetooth Device Properties]



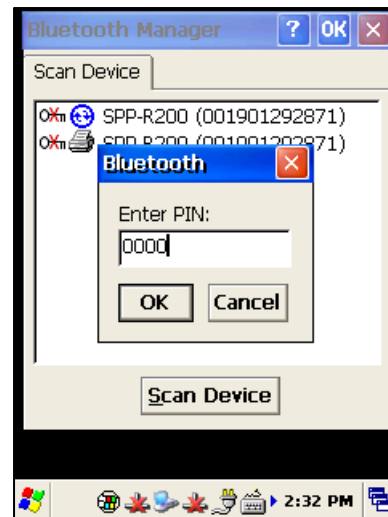
You'll find the Bluetooth Device Properties utility in the Control Panel.



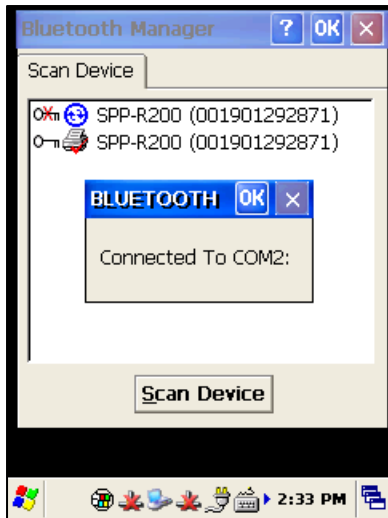
Click the Scan Device button to look for available Bluetooth devices.



Here we've discovered a Bixolon SPP-R200 mobile printer. Double-tap it and select "Trusted" to set up the link.



Most devices require you to enter a PIN.



Double-tap the printer again and select "Active". The printer will then be assigned a COM port. The handheld will automatically reconnect with the printer when needed, if it is nearby.

Chapter 7

Using GPS

The ALH-9001 handheld reader contains an internal GPS module for finding the geographic location of the handheld reader. The GPS service requires line-of-sight visibility with at least four of the constellation of orbiting GPS satellites, so the speed of the initial fix and the accuracy of all data depend greatly on the quality of the signal from the orbiting satellites. Being inside of or in between buildings, under tree cover, or near heavy electrical machinery can degrade the quality of the GPS data.

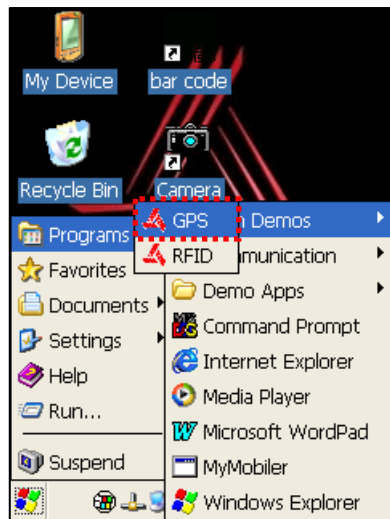
The GPS receiver appears as a serial Com port, COM6, with a baud rate of 9600.

Executing GPS Demo Program

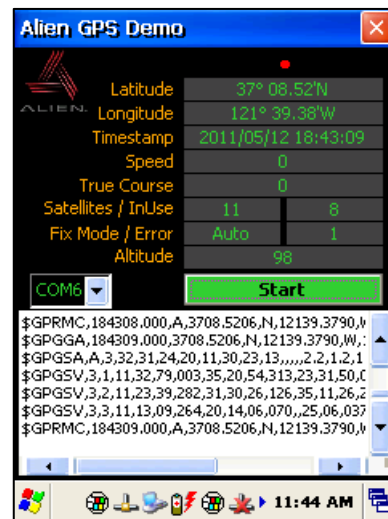
Find an open place outdoors to check your GPS signals. Depending on your actual environment, the time to receive a fix and location data is different - about 3-10 minutes is typical. After receiving a GPS fix the first time, it takes less time to receive GPS data on subsequent attempts.

The Alien GPS demo software is accessible by the Alien GPS icon on the unit's desktop, or it can be launched directly from the Start menu.

[Start] > [Program] > [Alien Demos] > [GPS]



Starting the GPS demo program.



Start/stop receiving GPS data with the button. Watch raw NMEA data in the lower window. Wait outside for a satellite fix, and then observe decoded data in the fields at the top of the screen.

Chapter 8

Using the Camera

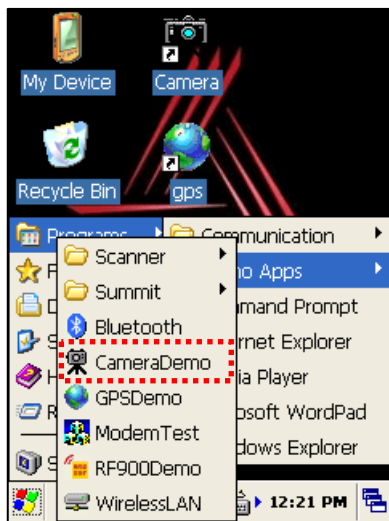
The ALH-9001 is equipped with a 3 megapixel camera which allows for adjustments of brightness, video resolution, picture quality, etc.



Using the Camera

The CameraDemo software is accessible from the Start menu. It provides an example of what you can accomplish with a custom application on the handheld.

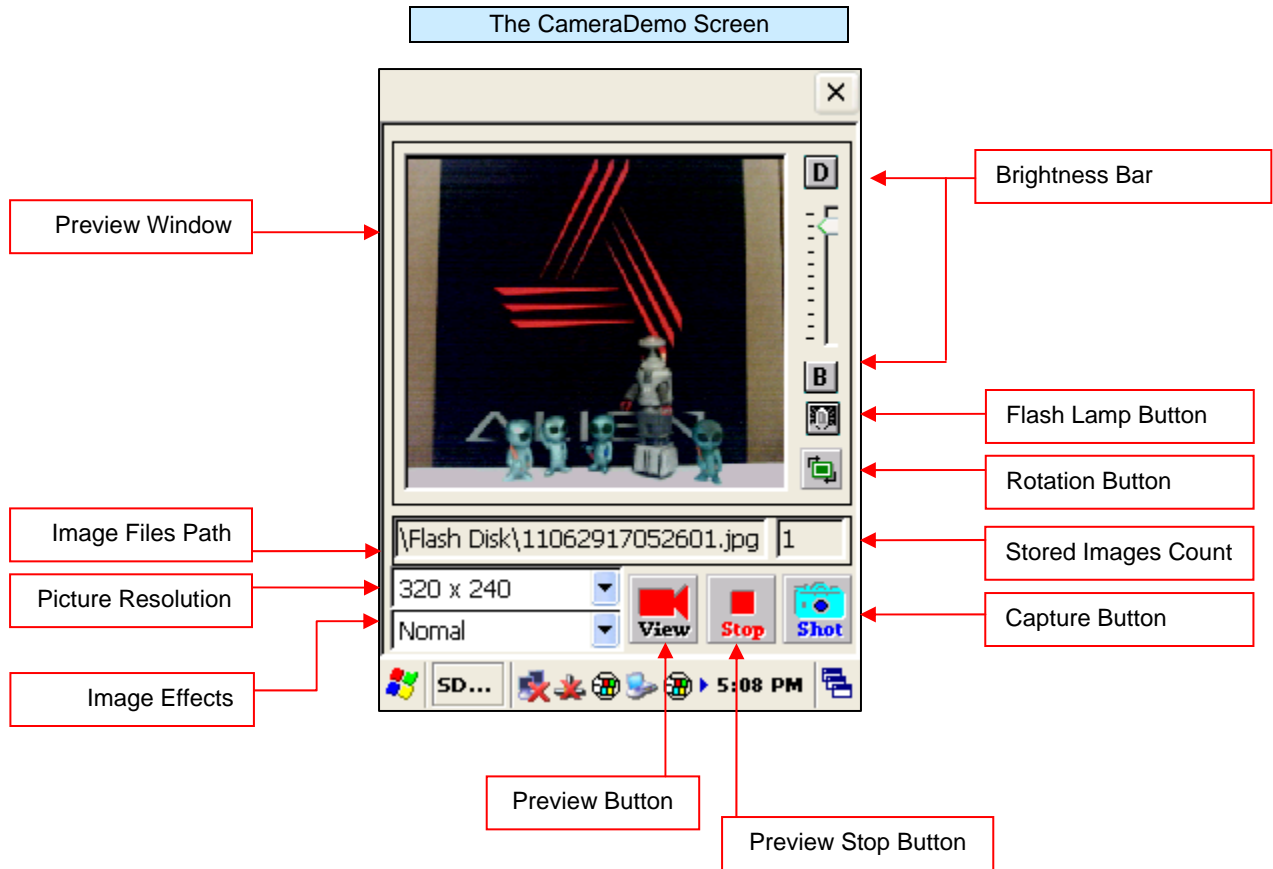
[Start] > [Programs] > [Alien Demos] > [CameraDemo]



Running the CameraDemo Program



CameraDemo Main Screen



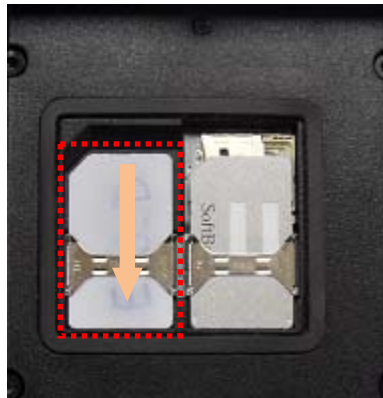
Chapter 9

Using a SIM Card

The ALH-9001 is equipped with a SIM card slot and wireless HSDPA radio supporting enhanced 3G connectivity. After inserting the SIM card, you'll have to do some initial configuration, depending on the wireless carrier you choose. After that, the ALH-9001 can use the 3G network for wireless data communications.

Installing SIM Card

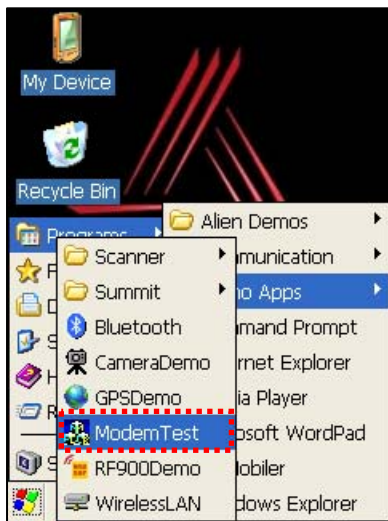
A SIM card can be easily inserted and pulled out along the arrow direction. Note the location of the dog-eared corner of the SIM card (top-left).



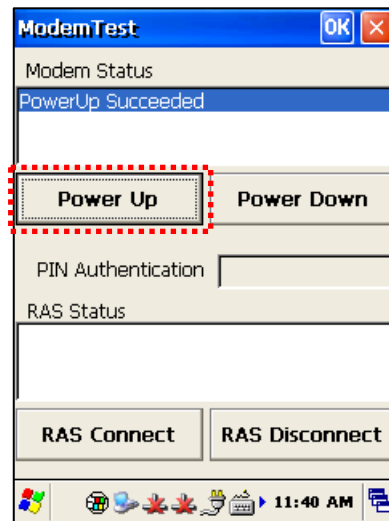
Configure the Remote Access Server (RAS)

To configure the 3G radio, you need to provide settings for your cellular provider's Remote Access Server (RAS) in the ModemControl utility.

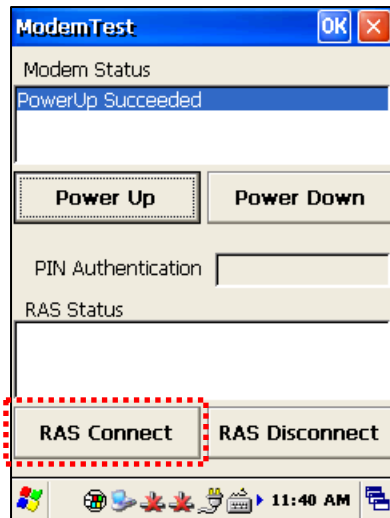
[Start] > [Programs] > [Alien Demos] > [ModemControl]



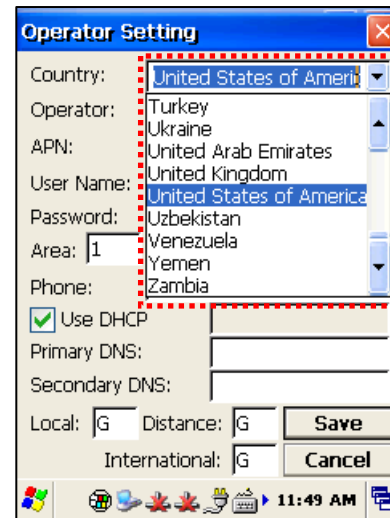
Running the ModemControl Program



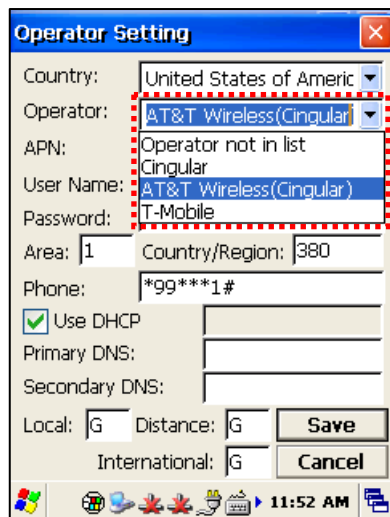
First, click the Power Up button to energize the HSDPA radio.



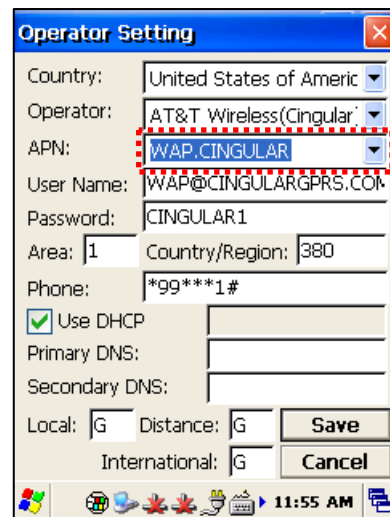
Next, click the RAS Connect button to configure the Remote Access Server (RAS).



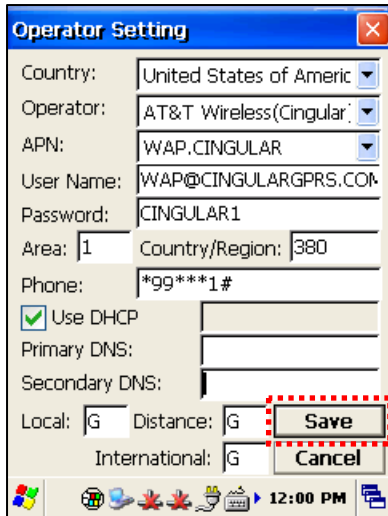
In the Operator Setting screen, first pick the country where you are operating.



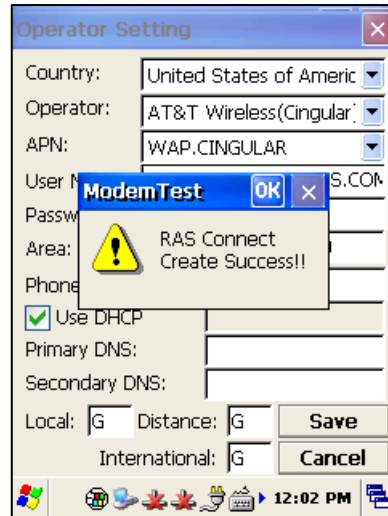
Next, select your wireless operator from the list.



Each wireless operator may offer more than one Access Point Name (APN). Choose the correct one from the list, and the rest of the form should fill in with default values.

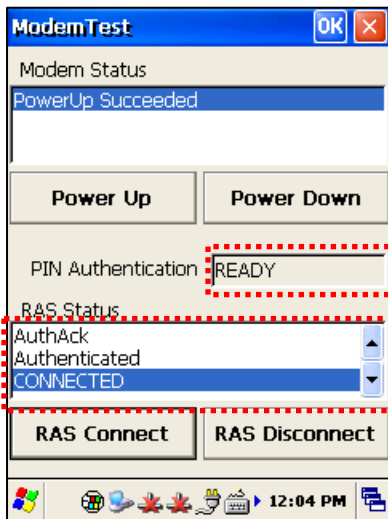


When the settings are as you like them, click the Save button to write them to a configuration file.



A confirmation dialog pops up. Dismiss it and click the close button for the Operator Settings window.

Making the 3G Network Connection



Back at the ModemControl window, confirm that the PIN Authentication shows READY, and the RAS Status should list a sequence of events, followed by Authenticated (and possibly CONNECTED). Minimize the ModemTest window (closing it will close the modem connection too).



You should now have network connectivity through the GPRS interface.

To shut down the GPRS interface, bring up the GPRS Status window and click the Close button. If you need to reconfigure the RAS, you'll need to remove the settings file at /Flash Disk/Phone_UI/gprs.ini and rerun the ModemControl application.

Appendix

Configuration

Physical and Environmental Characteristics

Dimensions	6-1/4" x 3-1/4" x 4-5/8" (5-1/8" with pistol grip) 15.8 cm x 8.0 cm x 11.5 cm (13.5 cm with pistol grip)
Weight	320g
Operation Temperature	-10°C to 50°C
Storage Temperature	-30°C to 60°C
Humidity	Non-condensing
Drop	1.5m drop to concrete

Performance Characteristics

Processor	Marvell™ PXA320 806MHz
Operating System	Windows CE 5.0
Memory	ROM 256MB; RAM 256MB
Display	3.5" QVGA with Backlight; TFT LCD; 240x320 Pixels; Stylus Touch-Screen Interface
Audio	Phone Receiver; Earphone Jack
Communication Port	RS-232 serial port; USB 1.1
Expansion Slot	1 MicroSD Slot (SDHC); 1 SIM Slot;
Keypad	29-key
Notifications	Vibrator, Speaker, LEDs

Power Supply

Main Battery	Lithium ion 3.7V 3,000mAh; Optional 4,400mAh in pistol grip
Backup Battery	Lithium Polymer 3.7V, 100mAh
Adaptor	Input 100VAC ~ 240VAC; Output 5VDC 3A

Network Characteristics

Wireless LAN	WLAN (802.11 b/g)
Bluetooth	Class 2, v2.0 (SPP Only)
GPS	A-GPS with Internal Antenna
Antenna	Internal LAN & WLAN
HSDPA	Wireless HSDPA for Enhanced 3G Connectivity

Data Capture Devices

Barcode Engine	1D Laser Scanner (2D on ALH-9001)
Camera	3.0 Mega-pixels with Autofocus (ALH-9001)

UHF 900MHz RFID Reader

Frequency	850MHz - 930MHz
Reading Range	0m - 7m
Writing Range	0m - 3m
Antenna Gain	2 dBi
Speed	62.5 kbps
RF Output	1W EIRP
Protocol	EPC Gen2 ISO 18000 6C ISO 18000 6B
Multi-Reading	Anti collision