

**ALIEN TECHNOLOGY®**

# **ALR-H460**

## **User Guide**



**ALR-H460**

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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.

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.

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

### **Caution**

To comply with RF exposure requirements, a minimum separation distance of 0 mm must be maintained between the user's body and the device, including the antenna. This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government. The exposure standard for wireless devices employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR performance is TBD W/kg. See FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields." This device was tested for typical body-Support operations. Third-party belt-clips, holsters, and similar accessories used with this device should not contain any metallic components. Body-worn accessories that do not meet these requirements may not comply with RF exposure requirements and should be avoided. Use only the supplied antenna.

**Alien Technology®**

# User Guide

## ALR-H460 Handheld



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# Chapter 1

## Introduction

### About this Manual

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

#### Who should read this manual?

This manual is written for personnel responsible for installing, configuring, and maintaining the Alien ALR-H460 handheld. This manual provides information about the features of the ALR-H460, and how to install, configure, operate, and maintain it.

Before you operating ALR-H460, please read through and become familiar with the contents of this manual.

#### Introduction

The Alien ALR-H460 is a high performance and expandable Android-powered handheld terminal, with data capture, data processing, and wireless communication. Easy deployment, reduced complexity and decreased maintenance are just some of the benefits of using the Alien ALR-H460 handheld.

The ALR-H460 meets industrial level IP64 (IEC sealing), and is perfect for routine applications, such as: railway inspection, road/parking toll, vehicle inspection, logistics express, power inspection, warehousing management, chain retail, etc. Whether the mobile operators are working indoors or outdoors, with the Alien ALR-H460, business applications are always highly efficient and on-line.

The Alien ALR-H460 comes with worldwide cellular 4G capability. Multi-channel data and voice communication guarantees real-time communication and data efficiency.

#### Precautions When Using the Battery

1. Do not leave device unused for extended periods of time, either in the product or in storage. When the battery has been unused for 6 months, check the charge status and charge or send unit in for depot battery replacement
2. The typical estimated life of a Lithium-Ion battery is about two or three years, or 300 to 500 charge cycles, whichever occurs first. One charge cycle is a period of use from fully charged, to fully discharged, and fully recharged again. Expect a two to three-year life expectancy for batteries that do not run through complete charge cycles.
3. Rechargeable Lithium-Ion batteries have a limited life and will gradually lose their capacity to hold a charge. This loss of capacity (aging) is irreversible. As the battery loses capacity, the length of time it will power the product (run time) decreases.
4. Lithium-Ion batteries continue to slowly discharge (self-discharge) when not in use or while in storage. Routinely check the battery's charge status.
5. Observe and note the run time that a new fully-charged battery provides for powering your product. Use the new battery run time as a basis to compare run times for older

batteries. The run time of the handheld battery will vary depending on the product's configuration and the applications run.

6. Routinely check the battery's charge status.
7. Carefully monitor batteries that are approaching the end of their estimated life.
8. Consider replacing the battery with a new one if either of the following conditions occur:
  - The battery run time drops below about 80% of the original run time.
  - The battery charge time increases significantly.
9. Always follow the charging instructions provided with your product. Refer to the product's user manual and/or online help for detailed information about charging its battery.
10. Charge or discharge the battery to approximately 50% of capacity before storage.
11. Charge the battery to approximately 50% of capacity at least once every six months.
12. Remove the battery and store it separately from the product.
13. Store the battery at temperatures between 5 °C and 20 °C (41 °F and 68 °F).

## Precautions When Using the Handheld

- Careless use or repair attempts may damage the unit or stored data and will void any warranties. Alien is not responsible for this damage.
- If a problem occurs, do not try to repair or disassemble the product; 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 a fingertip or soft end stylus, on the touchscreen.
- The handheld may only be connected to a USB interface version 2 or greater
- Do Not connect to a Powered USB interface

## Components and Features

Component Identification	
RFID/Barcode CPU Unit	 A black handheld device with a red base, featuring a keypad and a small screen.
Pistol Grip	 A black ergonomic handle designed for gripping.
Cradle	 A black rectangular charging station with a slot for the CPU unit.
Wall Charger	 A black power adapter with a standard three-prong plug.
Charging/Data Cable	 A coiled black cable with a USB connector at one end.
Plus: SIM card removal tool & strap	

## Handheld Components



## Handheld Buttons

Button	Function
<b>Power Button</b>	Press and hold to turn the device on or off
<b>Left/Right SCAN Button Left FUNCTION Button</b>	Auxiliary buttons to provide additional application-specific functionality for custom programs. Scan buttons act the same as the pistol grip in the Alien RFID Demo.

## Device Specifications

Physical Characteristics	
<b>Dimensions</b>	178 x 86.2 x 146 mm (7.0 x 3.4 x 5.7 in)
<b>Weight</b>	650g (23 oz.)
<b>Screen</b>	5.2 in. FHD (1920 x 1080)
<b>Battery</b>	8000 mAh sealed internal Li-Po
<b>Expansion Slot</b>	Micro SD, up to 128 GB
<b>SIM Slot</b>	1 SIM card plus another SIM card OR microSD card
<b>Audio</b>	Speaker
<b>Camera</b>	13 MP Auto Focus with Flash
<b>Keyboard</b>	Soft main keyboard, 4 front hard keys

Performance Characteristics	
<b>CPU</b>	Cortex-A53 1.45GHz quad core
<b>OS</b>	Android 6.0
<b>Memory</b>	2 GB RAM, 16 GB Flash
<b>Interface</b>	USB 2.0 Type C, OTG
<b>Storage</b>	Micro-SD card
<b>Max Storage Expansion</b>	128 GB

User Environmental Characteristics	
<b>Operating Temp.</b>	-10°C to 50°C
<b>Storage Temp.</b>	-40°C to 70°C
<b>Humidity</b>	5%RH-95%RH (non-condensing)
<b>Drop Survival</b>	1.0 m drop, 6 sides
<b>Sealing</b>	IP64
<b>ESD</b>	=/-15kV air discharge, +/-6 kV conductive discharge

**Wireless Communication**

<b>WAN</b>	WWAN (America) (2G: 850/900/1800/1900, 3G: 850/900/1700/1900, 4G: B2, B4, B7, B12, B17)
<b>WLAN</b>	IEEE802.11 a/b/g/n, 2.4/5 GHz dual-band internal antenna
<b>WPAN</b>	Bluetooth 4.0 BLE

**RFID / Barcode**

<b>RFID (UHF)</b>	EPC Class1 Gen2 / ISO18000-6C
<b>Barcode Scanner</b>	2D laser scanner (SE4710)

**Development Environment**

<b>SDK</b>	Alien SDK
<b>Programming Language</b>	Java
<b>Development Tool</b>	Android Studio

# Chapter 2

## Basic Functions

### Power and Battery

The ALR-H460 battery system consists of a sealed 8,000 mAh internal Lithium-Polymer battery.

#### Battery Charging

Place the handheld into the Charging Cradle.

Connect the adapter with the power cable to charge the device or connect it directly to the handheld.



#### CAUTION

You must charge the battery with the power supply adapter provided by Alien Technology, or your device may be damaged



#### Power On and Off

Press and hold the 'Power' button on the side to turn the device on and off.

### SIM and microSD Card Installation

Access to the SIM and microSD card carrier is on the right-side of the H460 data terminal. Remove the plastic cover by pulling the right-hand side of the cover until the outside of the slot is visible.



Once the cover is removed, use the included SIM card removal tool to push into the release slot which will push the carrier out. The carrier may be pulled out at this point. Please note that the

carrier is “upside down” and when re-inserting with cards in place, ensure that the device itself is facing down, so the cards stay in place. Push the carrier in completely, replace the plastic cover and the device is now ready to use with the cards inserted.

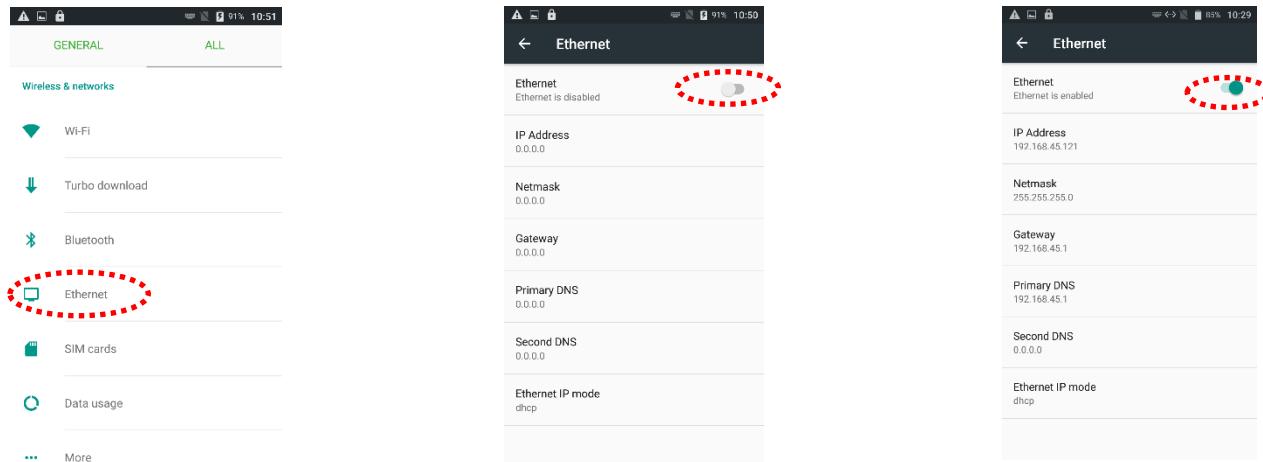


## OTG Network Connectivity

In addition to Wi-Fi, Bluetooth and Cellular communication, the ALR-H460 also supports OTG USB-LAN adapters for direct RJ45 network connectivity for DCHP and Static IPv4 connections.

To enable Ethernet on H460,

1. Plug OTG compliant USB adapter (please note a USB 2.0 Type C type connector is required) into H460 (Note: OTG is **NOT** supported through the charge cradle)
2. Navigate to Settings → Ethernet
3. Enable Ethernet on H460
4. Review settings after connection is established
5. Open web browser and try accessing a web page or ping the handheld from another computer.

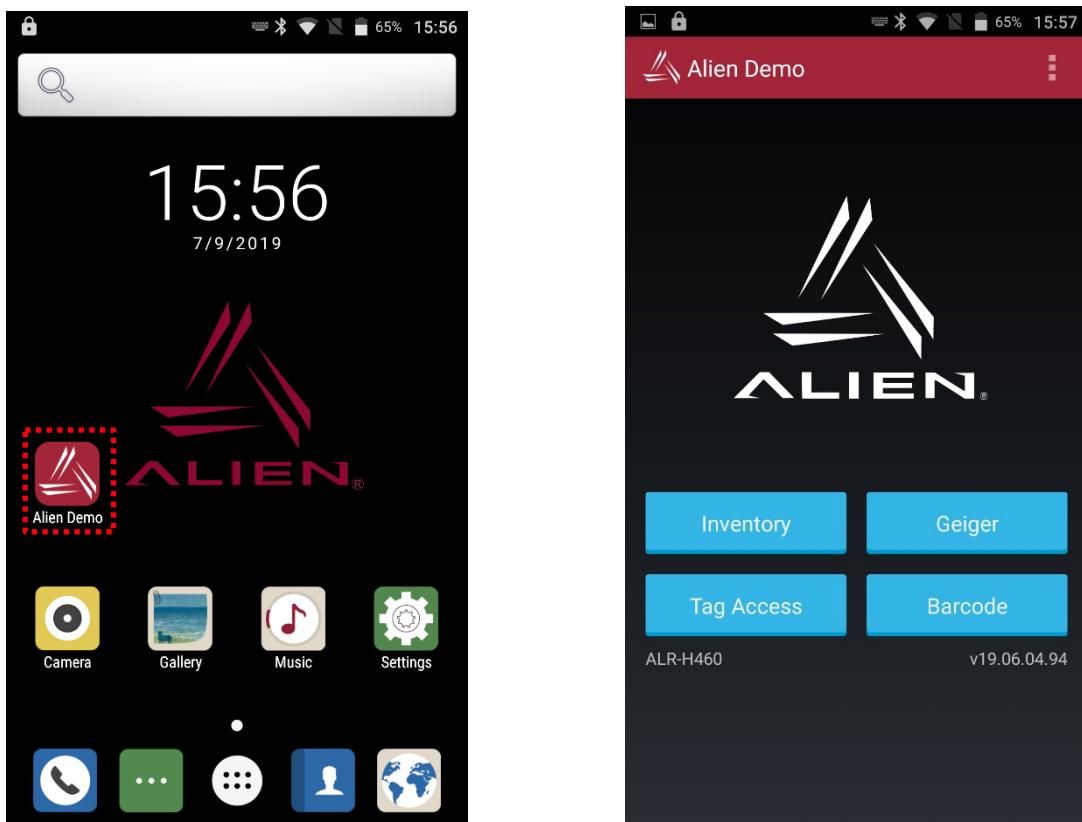


# Chapter 3

## RFID Tag Reader

### Starting the ALR-H460 Demo Software

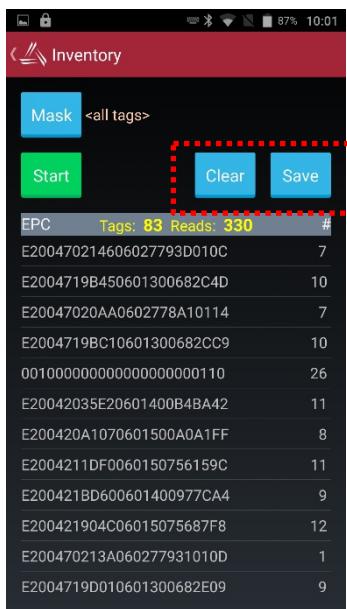
Start Alien Demo Software by tapping on the icon in the OS Applications group.



The main screen of the Alien demo application has buttons for each of its utilities, and a menu item for reader settings

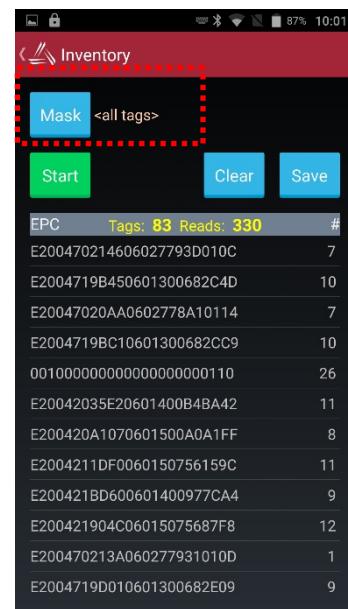
## Inventory Utility

The Inventory utility allows scanning all of tags within range of the reader indicating tag's EPC and read count in a scrollable list. To start and stop the inventory utility, hold the pistol-grip trigger button, or by clicking once on the green Start button. The reader continues to read tags until the release of the trigger or subsequent click of the Stop button. Click the OK button at the bottom-right corner to return to the main screen.



Each tag 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.

User may clear and save the list with the buttons above the list.

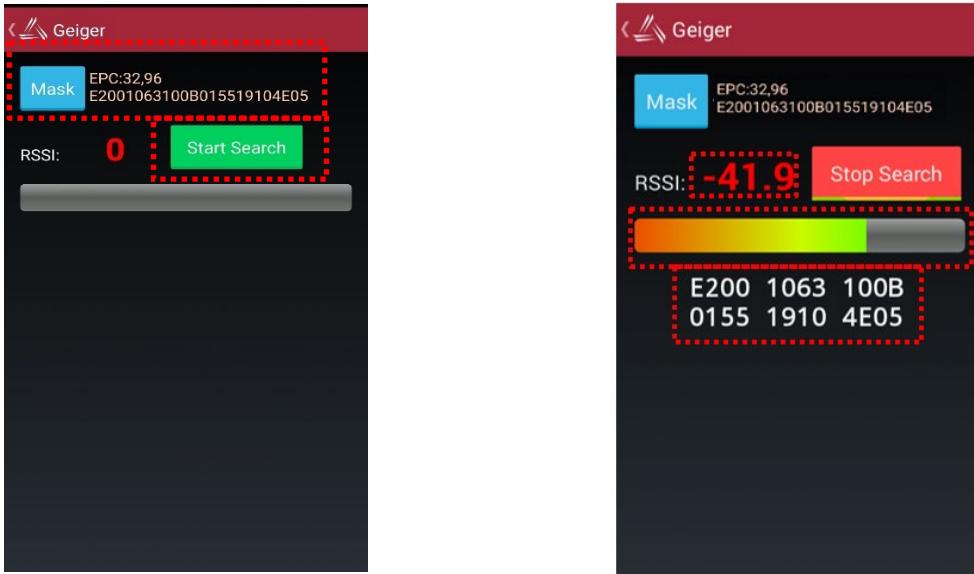


Clicking the Mask button at the top of the Inventory screen goes to a page where a specific subset of tags may be read (see the Tag Mask section). This powerful feature causes the reader to only read the tags of interest – those selected by the mask.

## Geiger Tag Utility

The Geiger Tag utility is designed to assist 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 and vibratory queue. As the reader passes near a tag, the RSSI increases, and the change will be audible and visual.

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 trigger is released or stop button is clicked. Click the red Close box at the top-right corner to return to the main screen.



The Geiger shows tag signal strength. Use the Start Search button (or pistol-grip trigger) to start the search.

Use the **Mask** button to refine search of specific tags.

When a tag is read, the EPC is displayed on the screen, along with graphical and numeric readout of the tag's return signal strength.

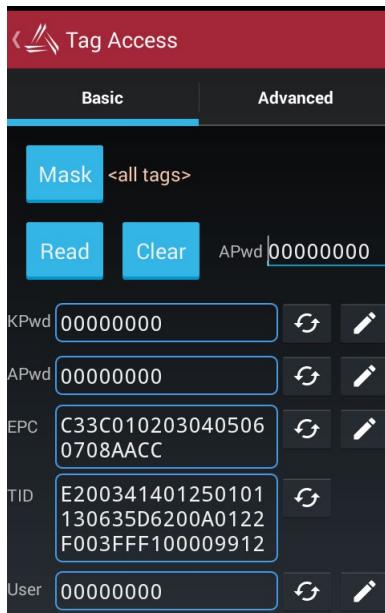
## Tag Access Utility

The Tag Access utility allows reading from and writing 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 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.

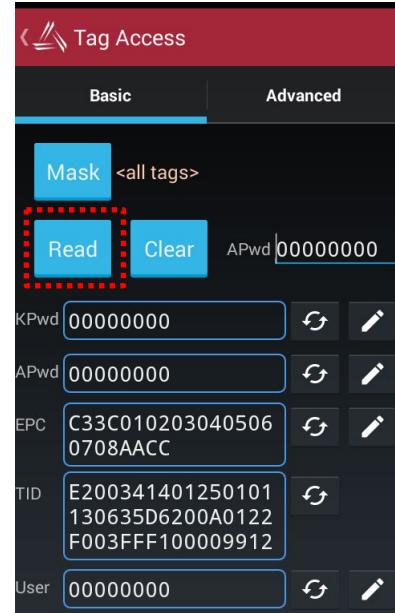
EPC Gen2 tag memory is divided up into four distinct banks: Reserved, EPC, TID, and User. The Reserved bank contains the tag's Access password and Kill password (each two words long), though all tags may not support both passwords. The EPC bank contains the tag's "id" – its Electronic Product Code (or "EPC") – along with some other information related to the EPC. The TID bank is 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 present, each tag provides different amounts of available user memory.

## Basic Access Tab

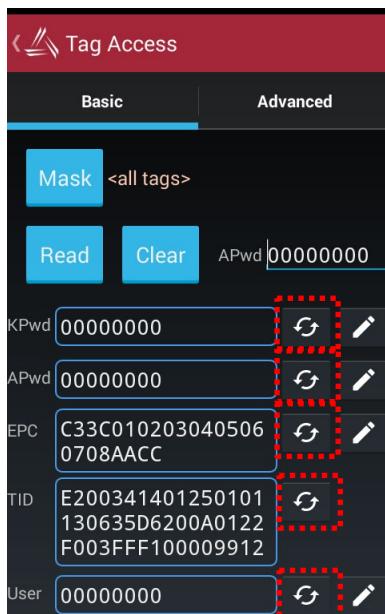
The Basic Access tab has text fields for each of the separate fields of tag memory. Clicking the **Read** button (or pulling the pistol-grip trigger) causes the reader to try and read all of the data for each of the fields, from whatever tag is in the field. The separate fields fill in, one-by-one, as 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.



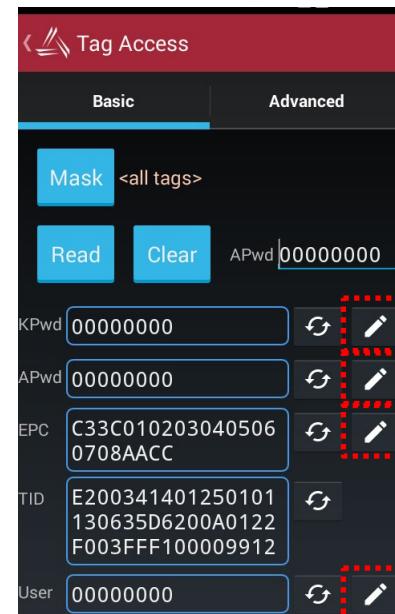
The **Basic Access** tab gives a visual overview of all of the fields in tag memory.



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

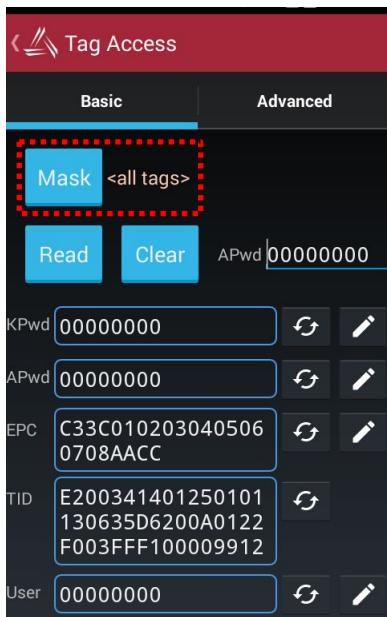


Pressing one of the small “refresh” buttons labeling each memory field will cause the reader to only read data from that field.

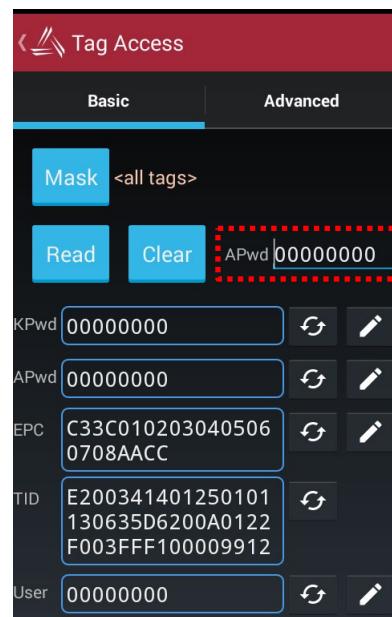


Pressing one of the pencil-type “write” buttons causes the reader to write the shown data to the tag. Data may be edited in the field before writing it to the tag. The field turns white or red, depending on the success of the write operation.

When there are many tags in the field, the **Basic Access** tab can have difficulty reading all of the data from the same tag by clicking Read All button. To make sure that the same tag is being addressed throughout the operation, a tag mask should be set by using the blue **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, the same password must be provided as part of the access operation in order for it to succeed. Click the violet **APwd** field at the top-right corner to do this.



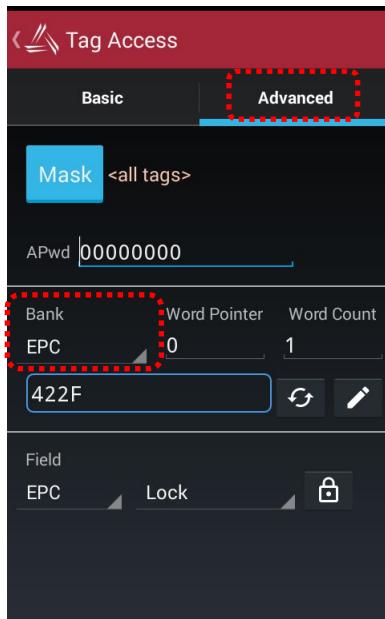
The **Mask** button restricts the reader to only access one tag at a time.



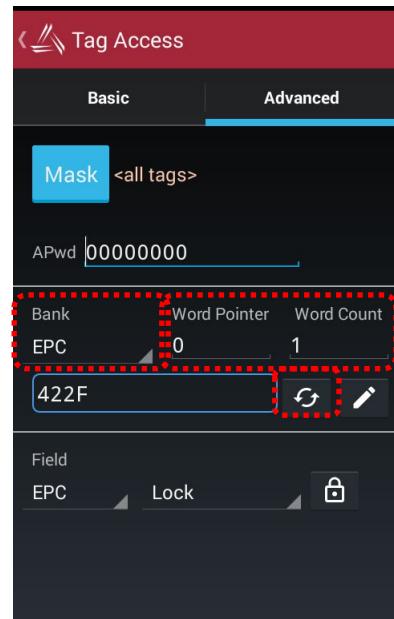
The **APwd** field is where to enter the Access Password, for accessing tag memory that may have been locked.

## Advanced Access Tab

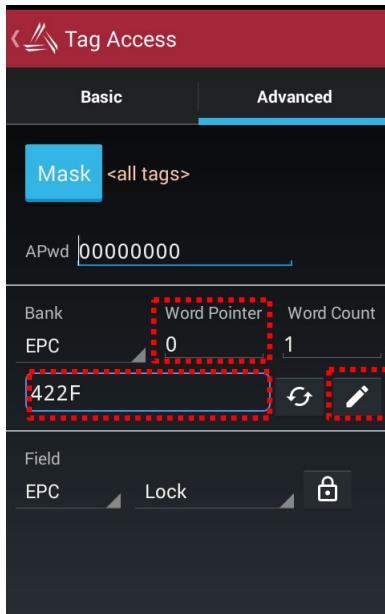
The Advanced Access tab has three general control areas: Read, Write, and Lock. All three operations requiring specification of which bank of tag memory to access (Reserved, EPC, TID, and User). When reading and writing, the offset must be specified into that particular bank of memory. The reading operation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



Three operations in Advanced Access:  
**Read, Write, and Lock.** Each requires specification to a particular memory bank.



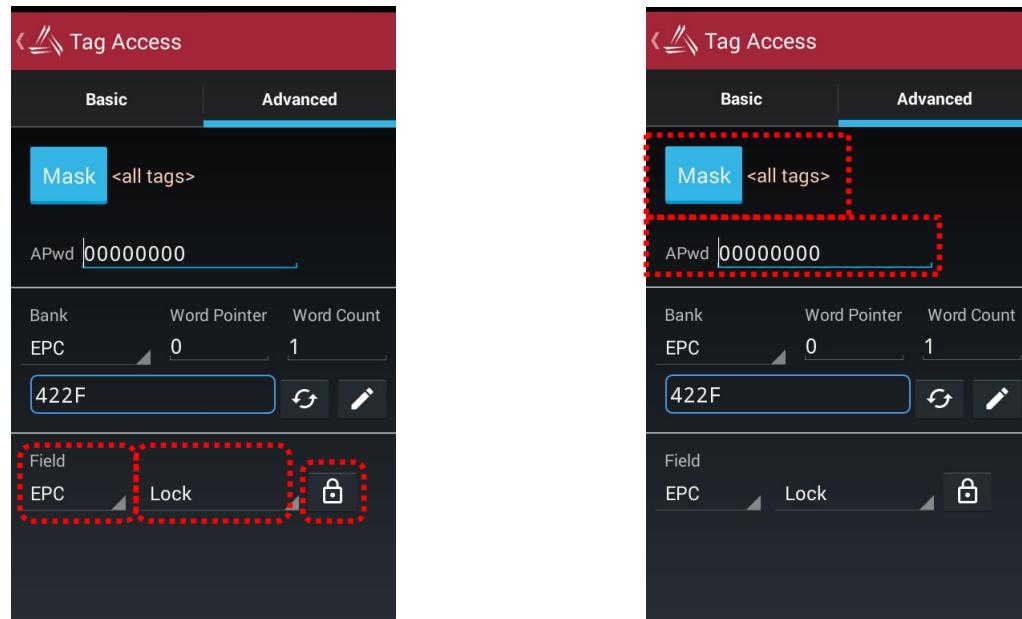
To read from a memory bank, select the **Bank**, start **Word Pointer**, and **Word Count**, then click the read/refresh button. Note that the tag's EPC starts at word #2 of the EPC bank.



To write data to a memory bank, select the start **Word Pointer** to write to, and enter the hex-formatted data, then click the pencil/write button.

When locking, the Access Password and Kill Password (both in the Reserved bank) may be locked 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 requiring confirmation 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 a non-zero Access Password is written to the tag (and should be locked as well). Please refer to the EPC Gen2 Protocol Specification for complete details on how the various locking operations affect the tag’s behavior.



## Tag Mask

By default, the demo application is configured to search for any all tags it sees. In the case where the user is searching for a sub-set or very specific series of product / tag EPC such as a SGTIN-96, the Gen 2 protocol provides a feature called a select mask which is 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 ALR-H460 allows the user 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 near the Mask button. Each utility has its own mask, so use caution when switching from the Inventory to the Geiger to the Tag Access screens.

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, instead of having to consider memory banks and pointer offsets – in an effort to find that pair of jeans that is on the wrong rack, or a “pallet tag”, however that is defined. The Tag Mask screen therefore offers four ways to pick a tag mask:

1. Scanning the field for tags (or loading a text file of EPCs) 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
4. Selecting a pre-defined asset (RFID+barcode+picture)

Once you have defined and set a mask, simply close the Tag Mask window and the new mask will be displayed at the top of the previous screen, and it will be used in subsequent operations.

## Tag Mask – Scan

Epc	Count	Rssi
B3B300000000000000000000000000001		
B3B300000000000000000000000000037	4	-66.8
B3B300000000000000000000000000025	1	-67.9
<b>B3B300000000000000000000000000001</b>	<b>1</b>	<b>-65.9</b>
B3B300000000000000000000000000005	1	-60.8
B3B300000000000000000000000000038	1	-61.8
B3B30000000000000000000000000000B	2	-66.8
B3B300000000000000000000000000006	2	-64.3
B3B300000000000000000000000000030	1	-69.7

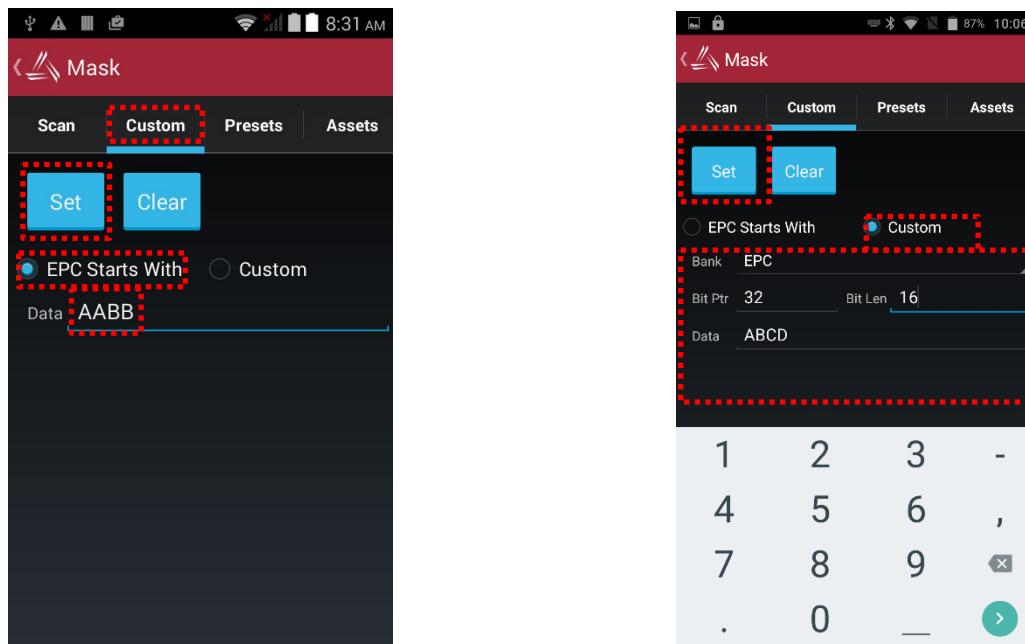
The **Scan** tab acts just like the Inventory screen – start/stop the reader with the trigger or Scan button, and all tags in range are displayed.

After scanning, select a tag from the list and click the **Set** button.  
To clear the mask, click the Clear button.

## Tag Mask – Custom

The Tag Mask “Custom” tab allows definition of an arbitrary mask on any portion of a tag’s memory, or a simpler “EPC Prefix” mask.

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

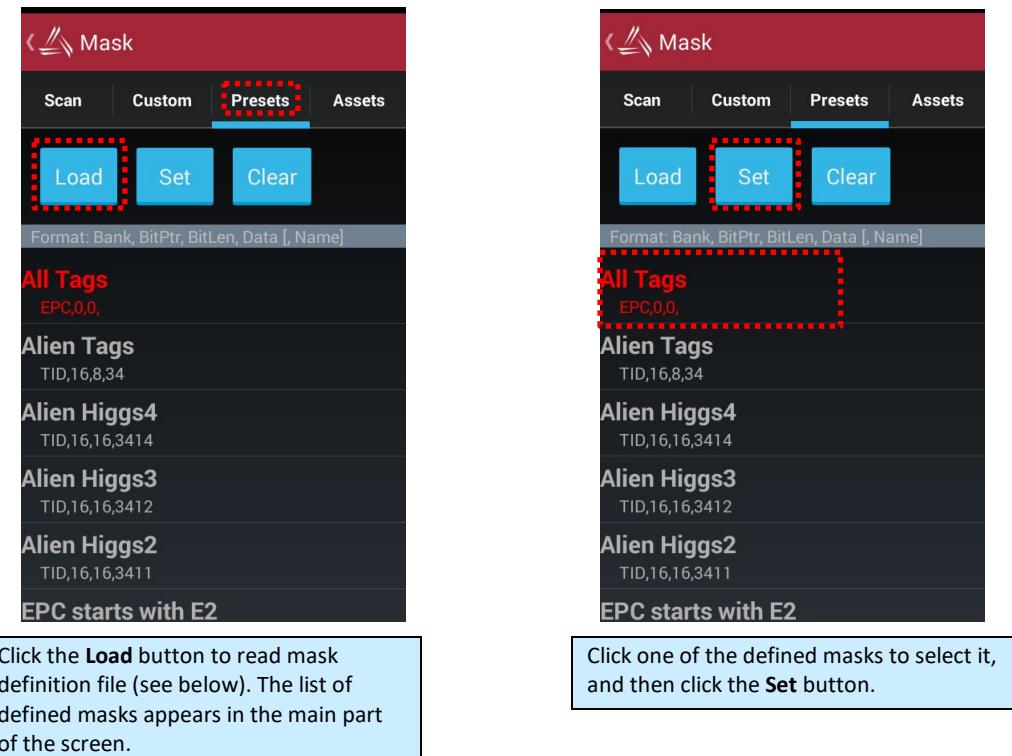


Defining a mask based on an EPC prefix is easy – just click the “**EPC Starts With**” radio button, enter the EPC data and click the Set button.

Defining a custom mask requires specifying the bank, bit offset, and bit length of the mask, along with the data. Note numeric keyboard automatically appears to enter data.

## Tag Mask – Presets

The third way to set a tag mask is with the Presets tab. This screen can show a list of pre-defined tag masks, such as “all tags”, “all Higgs3 tags”, etc. A list will need to be created, then loaded into the app.

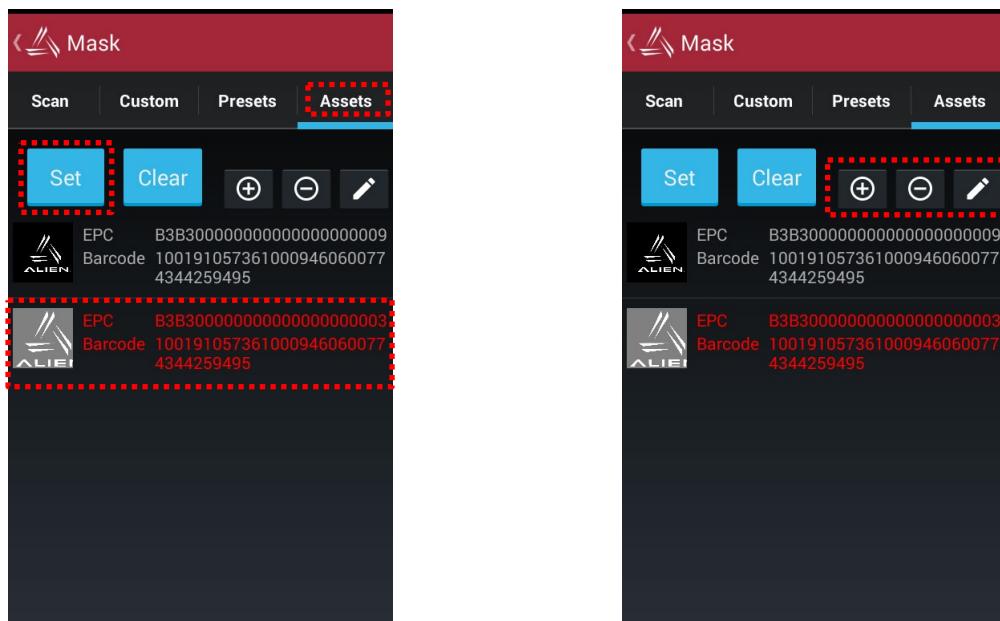


To use your own list of mask presets, just create a text file that you can access with the Load button. Each line of the mask presets file should contain the bank number, bit pointer, but length, mask data, and an optional preset name – all separated by commas. For instance, a `presets.txt` file might look like this:

```
1, 32, 32, 3004ABCD, pallet
1, 32, 32, E2003821, higgs9
1, 32, 32, 00001211, cargo
```

## Tag Mask – Assets

The Assets feature of the Alien demo application shows how you might associate an EPC code, barcode, or a picture to an actual physical asset. By linking those pieces of information, you can cross-reference a barcode scan with the EPC code on that product's RFID tag, and see a picture of the asset each time the tag is read. If you need to search for a particular asset, you can select it from the list of assets, set the Tag Mask to that asset's EPC code, and then use the Geiger utility to go look for that tag. When the tag is detected, the item's picture is shown on the screen for verification, and you can also see the associated barcode as well.

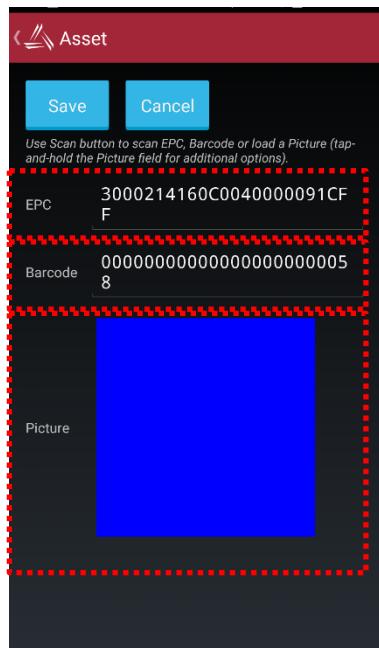


At the Assets mask screen, simply select one of the created assets from the list and then click the **Set** button to mask on that asset.

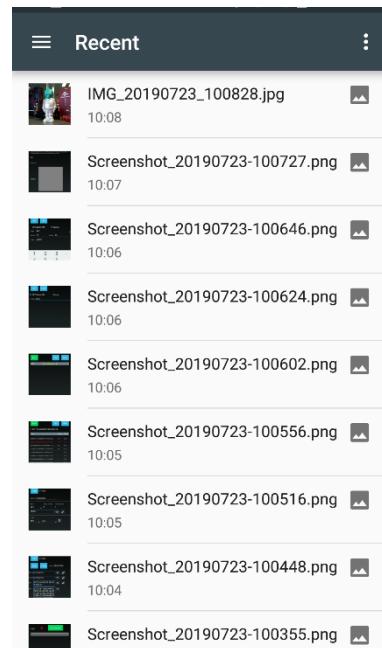
To create a new asset, click the “+” button. To remove or edit an existing asset, select it from the list and then click the “-” or pencil/edit buttons.

There are four steps to creating or editing an asset, and pulling the gun trigger performs each one and advances to the next step. These steps may be skipped, or re-done by manually tapping on one of the step buttons.

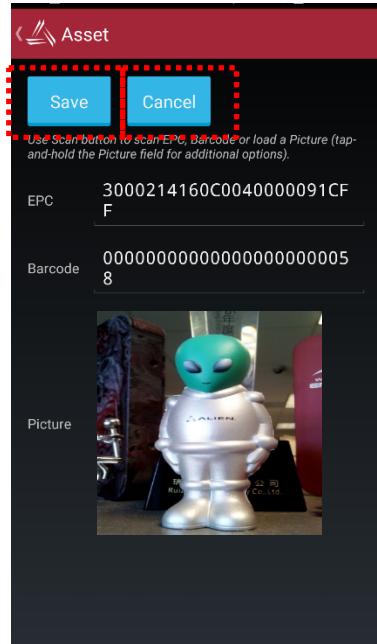
1. RFID – read an RFID tag
2. Barcode – scan a barcode
3. Picture – load an image from a file
4. Save – remember the asset definition



Pull the trigger (or use the Scan button) to scan EPC, barcode, load asset image in sequence, or click on a particular field to edit it.



Tap-and-hold on the Picture field for a popup menu with additional options (Load or Clear the image).



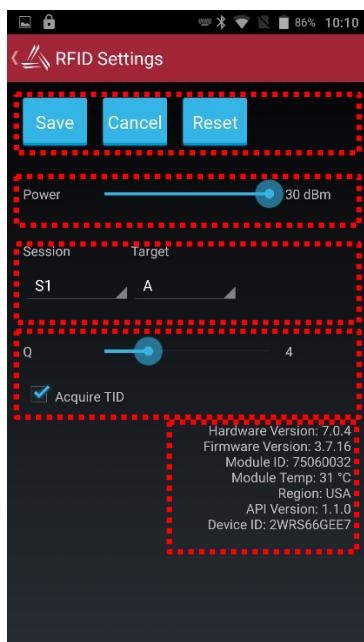
Click the **Save** button to save the changes, or the **Cancel** button to return without saving.

## RFID Settings

The RFID Settings screen allows viewing and changing certain parameters of the RFID reader, such as transmit power, and some Gen2-specific parameters on the RFID tab. Navigate to the RFID Settings screen from the menu button at the top of the main screen. The RFID Settings screen also has useful device, hardware module, and software version information.

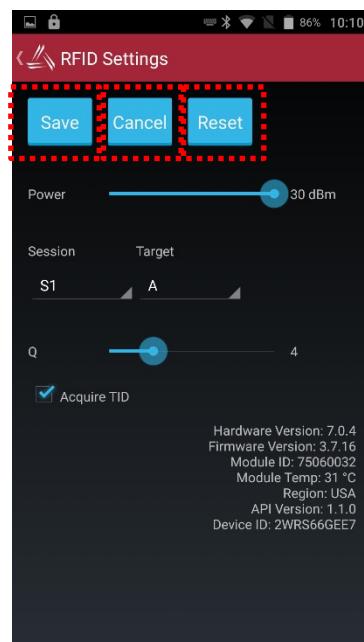


Access the RFID Settings screen from the top Alien Demo screen.



Configure the RFID reader's transmit power, inventory session (1-4), starting Q value (according to how many tags are expected), and inventory Target (usually "A"). Acquiring TID is also an option during Inventory.

Hardware, Firmware, and API versions are shown at the bottom.

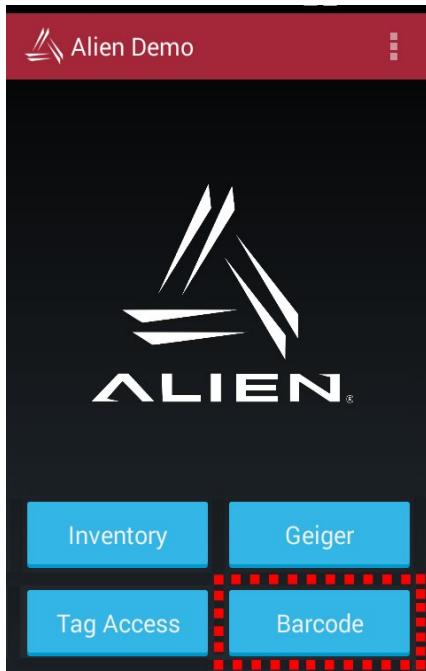


Save stores the current settings.  
Cancel ignores and changes you may have made.  
Reset restores the settings to their default values.

# Chapter 4

## Barcode Scanner

The ALR-H460 comes equipped with a 2D barcode scanner. The Barcode demo application is accessible from the Alien Demo main screen.



Starting the Barcode demo app, toward the bottom of the main demo screen...



Press the Scan button or pull the trigger to read a barcode. The Clear button removes scanned items from the list.