Functional description

RFID Reader ST 500

(Users Interface Description)

ADVANCED ID™
ASIA ENGINEERING CO.,LTD.

Stand Alone READER ST500
Users Interface Description

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Contents :

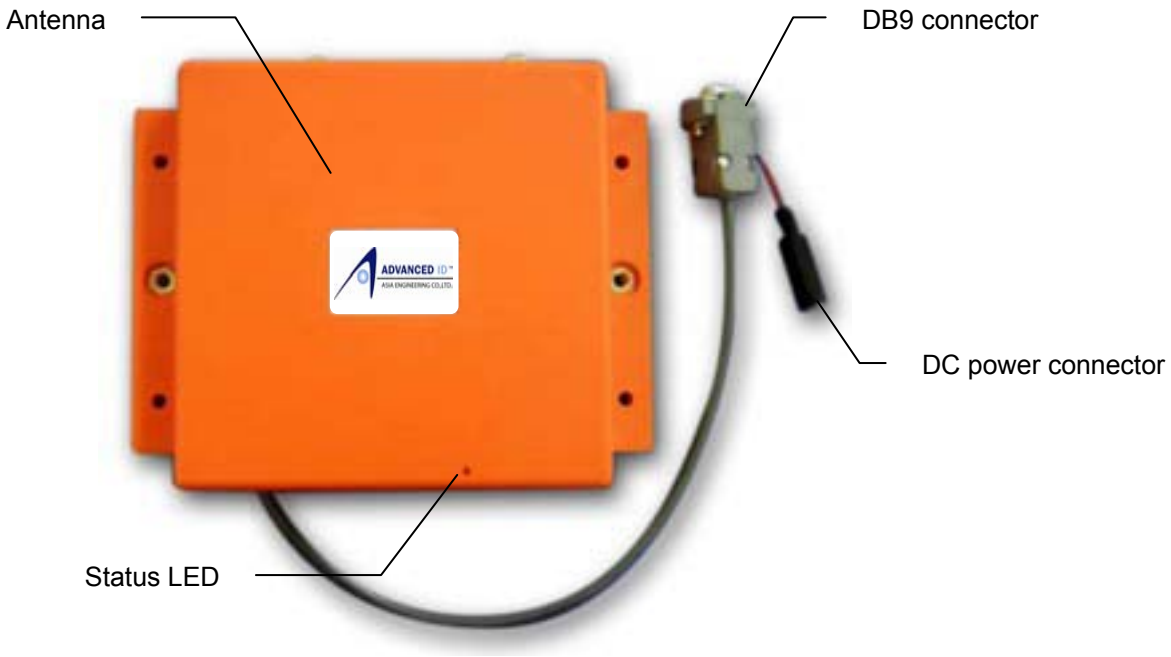
Revision Index

Revision	Date	Author	Change Record
1_00	2008-01-08	Saran Yimsricharoenkit	-
1_01	2008-03-13	Soemsak Lpps	- FCC Statement

- Set **OWNER ID** first and be sure the owner ID is **NOT NULL**.(*see owner*)

1. Pictures of UHF RFID Stand Alone Reader ST500

Front of Stand Alone Reader and components



Package Contents

1. Stand Alone Reader ST500 (*please see left pictures*)
2. RS232 Communication cable

3. Switching Power supply

4. Support CD

2. Pre-installation Precautions

Take note of the following precautions before you connect the RFID Reader components together or change any RFID Reader setting
precautions before you connect the RFID Reader components together or change any RFID Reader setting

- **Don't open** any of the components. Opening them may **cause severe damage** to the reader and components.
- Hold or fix Stand Alone reader tightly and don't drop any components (**they are breakable**).
- "Configuration Setting" is **ONLY** for advanced users. Users who want to use these features **MUST** follow instructions carefully and take responsibility for any damages that may result. "Use it at your own risk".

- Default setting: Owner ID / Physical Location data entry is ASCII, reading type is ISO and EM.

3. Abstract

This document describes the user interface of the Stand Alone RFID reader ST500 for release 1.03 and further.

4. General description

The Stand Alone reader ST500 is a robust, long read range, multi-protocol UHF RFID reader for outdoor and indoor use. It employs Advanced ID's state of the art technology that combines high performance and reliability with ease of use.
The unit supports the protocols EM4022, EM4222, ISO16000-6B, EPC C0, EPC C1 and EPC C1 Gen 2 and is upgradeable for future protocols. It may read tags, read user data and write user data into tags as well as program EPC C1 Gen 2 numbers into tags.
It is designed to be used for all portable applications in the specific area warehouse management, livestock tracing or inventory applications.
Its unique User Interface enables easy integration into tracing systems where goods are associated to customers or owners.
Some examples of applications are:

- Customer number is entered followed by reading all the goods that are being shipped to that customer. The procedure repeats for all other customers. At the end, the database will clearly list what goods were shipped to what customer.
- In an auction market for livestock the sanitary inspector enters first the new owner ID and then the animals he just bought. He repeats this procedure for each new owner. At the end the database will register ownership changes of each animal as well as the respective grouping allowing trace back in case of decease outbreak.
- A tire manufacturer supplies racing tires to several teams. When each team fetch their tires, there code is scanned followed by the tires they take. Billing, degrading study and ownership is then easily traced after the race has finished and the tires are brought back for analysis.
- In a supermarket reception gate, the operator scans each incoming pallet and types in the number of boxes in each one. Like this incoming inventory is easily made even if each box is nor tagged. This manual entry is compared with the due quantity that was previously written on the tag of the pallet.
- In a pig farm, pigs get their food only if they didn't eat yet. The information if he already eat or not is written in the tag of the animal allowing weight development control without networking several readers.

The control unit can store up to 20,000 records (unique tag ID's, Activity's, data written to the tag, and the date / time the tag was scanned) before the non-volatile memory is full. When memory is full, the records are managed on a first in – first out basis, with the oldest record being cleared from memory and a new record added in its place.

NOTE: In this version of the software, the reader will "remember" the first 400 tags it reads. This means that it will not record any duplicate tag ID's within those first 400 tags. However, it will record duplicate tag ID's when the number of tags read exceeds 400.

We recommend downloading the recorded data from time to time to avoid a loss of records due to overrunning memory.

5. Operation

5.1 Read Tags

To start using the Reader to scan tags, (*see package contents*)

- **plug DC jack** from Switching power supply to the reader via DC power connector.
- **plug the AC power cord** in to any single-phase AC voltage between 100 and 240VAC, 50/60 Hz.
- The reader will automatically read all tags that are within the RF beam and record the Activity and the unique tag ID's into memory.

Note: When the reader is reading, red LED will lit on.
You can see Tags' data with PC Application. (*see Support software*)

CAUTION: Reading user memory data increases the data stored against each tag, reducing the total number of tags the Reader can store in its memory.

5.2 Writing data to Tag

Some kinds of tags have an internal memory that can be written with user data. Please check the tag characteristics with the manufacturer.
Data can be written into the Tags with PC application (*see Support software*) in 2 formats as;

- ASCII : normal text
- EPC : the EPC data must according to EPC Tag Data Standards. (Automotive Industry Action Group's (AIAG) B-11 RFID Item Identification Standard.)

5.3 Downloading records from the reader

The ST500 has an internal non-volatile memory where all reading records are kept. They can be downloaded to a PC through a RS232 connection to a PC running a special application. Other options are available on demand.

5.3.1 Downloading through RS232

The ST500 can be connected to any device with a RS232 port. The contents of the memory can then be downloaded using this port.
The supplied PC application "RFID Note" contains this feature and creates a comma separated value (CSV) file for use with other applications.
If you want to integrate the download feature in your own application, please contact your Advanced ID distributor. (*see Support software*)

5.3.2 Other download possibilities

The flexible architecture of the ST500 enables upgrade to other connection possibilities. Advanced ID has the possibility to upgrade your unit for Ethernet, Wireless LAN or other ISN band RF connection. Please contact Advanced ID for the options available.

6. Configuration

The stand alone reader ST500 can be configured to fit particular applications. The configuration can be done with the supplied PC application "RFID Note". (*see Support software*)

6.1 Data length and Start address

The ST500 can store user data into tags as explained before. The number of bytes to be stored and the internal tag address where that data is stored can be set. Data is written in blocks of 8 bytes to the tag. Therefore the data length must be always a multiple of 8. The PC application enables this setting accordingly.
The number of bytes is limited to 32. For application demanding more bytes, please contact your Advanced ID distributor.
The tag address where data will start to be written depends on the tag's internal chip. Please refer to the chip manufacturer's datasheet for details.
As a hint, ISO 16000-6B tags internal user memory start at address 0x12 (18) and EPC Class 1 Gen 2 start at 0x00 (0).
Please contact your Advanced ID distributor for more details. (*see Support software*)

6.2 Read mode

To set the type of tags that will be read. The types of tags that can be read by the reader are as follow.

- ISO-18000-6 Type B (U-Code, HSL)
- ECP Class 1 General 2

6.3 Reader Timeout

The same tag will be stored in the memory only once per reading session. This means if you read tag A now and you read it again and again, it will be stored only once in the memory during this reading session. A new reading session starts automatically when the Reader timeout elapses, when the reader comes out of sleep mode or when the CLEAR key is pressed.

A Reader timeout occurs when the reader does not read any tag for the specified period of time.

Depending on the application, this time can be set.
If, for example, you have an application where it is unlikely that the same tag comes into read range again in a short period of time (ex. conveyor belt) you should set this value to 1 or 2 seconds at most. This means that if the time between 2 consecutive tags is more that 2 seconds you will have a new reading session for each tag, meaning that all tags passing will be read and stored, even if they come more than once in read range.

On the contrary, if you have an application where the same tag may come into read range in a reading session (ex. scanning a herd of sheep when they are in the corral) you would like to prevent the same animal's reading to appear again. In this case you should set the timeout to 2 minutes.
You can set Reader Timeout with PC application. (*see Support software*)

Note : the reader timeout has no influence on the tag counting feature.

6.4 Operation mode

You can set Operation mode with PC application (*see Support software*) in 2 modes as follow;

- **Read ID –** Reader will read only Tag ID.
- **Read ID and Data –** Reader will read Tag ID and also data in the same time.

6.5 Communication mode

You can set Communication mode with PC application (*see Support software*) in 2 modes as follow;

- **Send records only if required**
  while reader is connecting to PC if reader read some Tag ID, reader will send records to PC only when you click on “Load Data” button.
- **Send record when data was stored**
  while reader is connecting to PC, reader will send records every time if reader read some Tag ID.

6.6 LED

The ST500 lit on when a positive reading is made.
The LED can be turned off in the feature is not desired. (*see Support software*)

6.7 Date format

The date format for the display can be changed:

Date format	Example
Europe	DD/MM/YYYY: 23/11/2006
USA	MM/DD/YYYY: 11/23/2006

You can easily set the time and date of the ST500 to the time and date of the computer or enter manually the time and date using the PC application.
(*see Support software*)

7. Support software (PC Applications)

This chapter describes how to use PC software to control ST500 RFID reader, for examples;

- to download tag ID read by the unit
- to write data into tags(ISO-EM tag, EPC tag)
- to edit tag data
- to configure operation for the unit

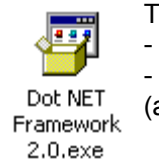
Installation short descriptions : AAE Support CD. (*see in packing contents*)

1. Insert CD into CD-Rom drive.
2. Auto run window will appear.
3. Click on **RFID Note** to start installation
4. Follow the instructions.

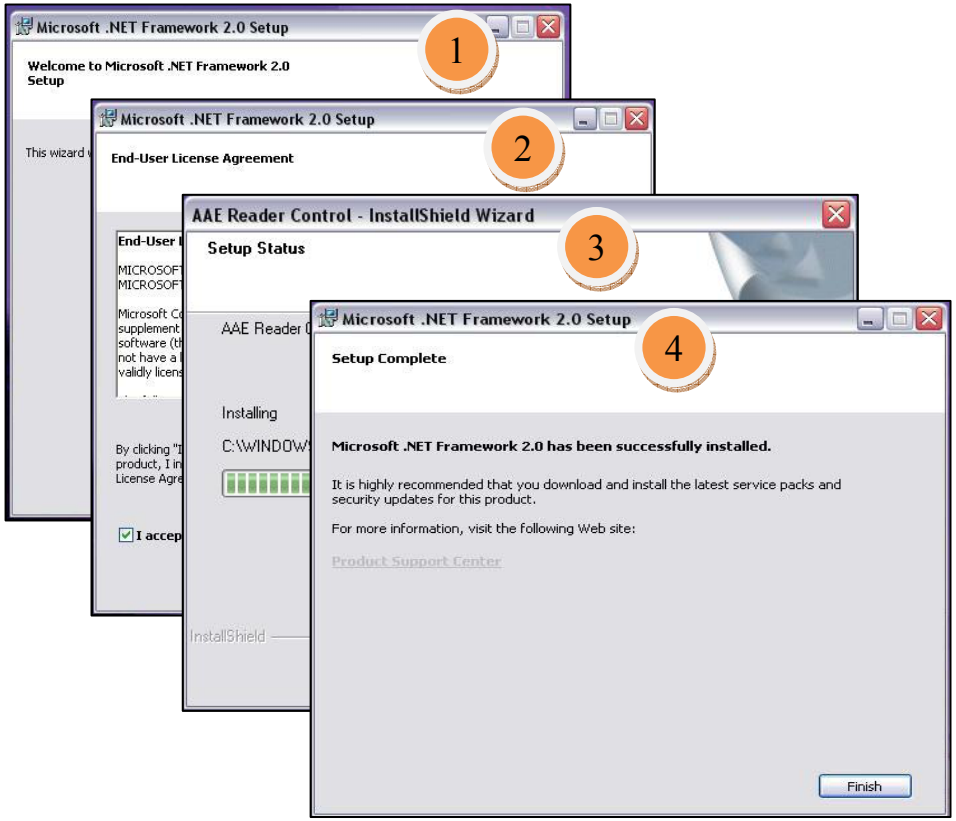
Note : MS dot net frame work 2.0 and FlashSTA software will be installed to your pc automatically.
If CD is not auto run, please see next sections. (manual installation)

7.1 Dot Net Frame work 2 (manual installation)

This step is required if your PC does not already have .Net Framework v1 (only) already installed. If it does, setup software will skip to next section.



To install Dot Net Framework 2.0
- double click the **Dot Net Framework 2.0.exe** icon (as left picture)
- follow the instructions in dialogue boxes until installation is finish. (as lower picture)



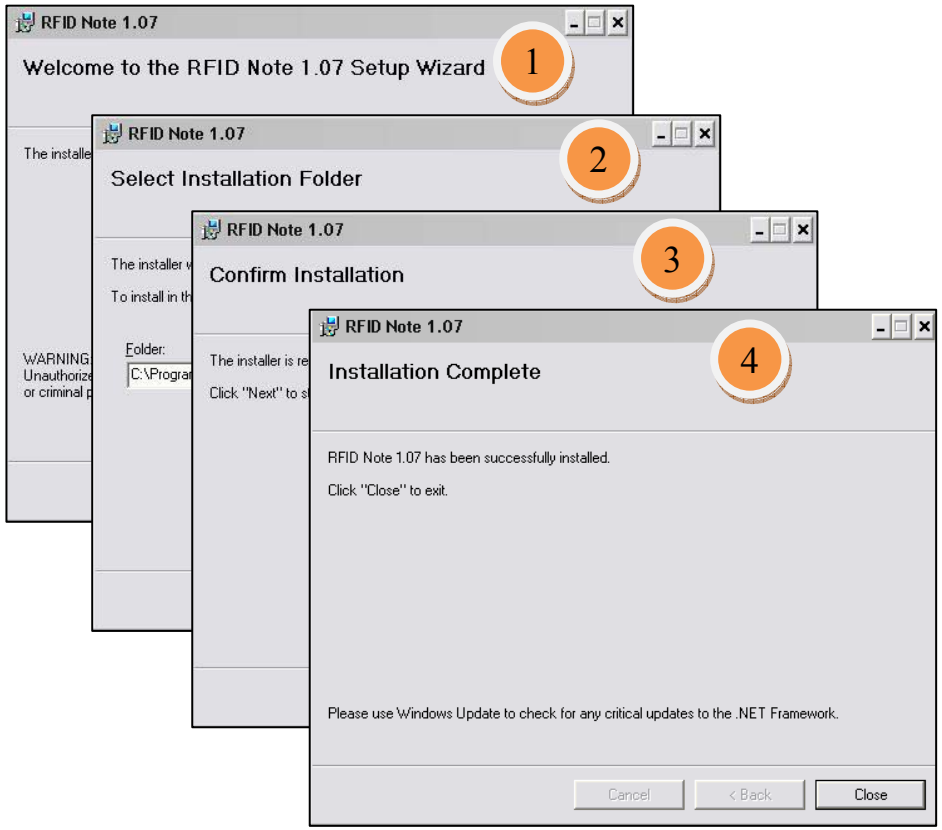
Note : Support software are in AAE Support CD/PC Application.

7.2 RFID Note (manual installation)

RFID Note is a pc application for controlling storing data from Reader to PC, reader configuration and some operations which users want to control the reader via PC.
Note : RFID Note version D1.11 supports Stand alone Reader Firmware version 1.03 and further.

7.2.1 Installation RFID Note

To Install RFID Note,
- double click on **RFID Note R 1.xx Setup.msi** icon (as left picture)
- follow the instructions in dialogue boxes until installation is finish. (as lower picture)



7.2.2 Start RFID Note

To start RFID Note
- connect the Unit to PC with **RS232 communication cable.** (male side connect to unit and female side connect to pc)
- switch “ON” the unit
- double click on **RFID Note icon** (as a left picture)
- then RFID Note starting window (*see lower picture*) and Connection tab window will appear.

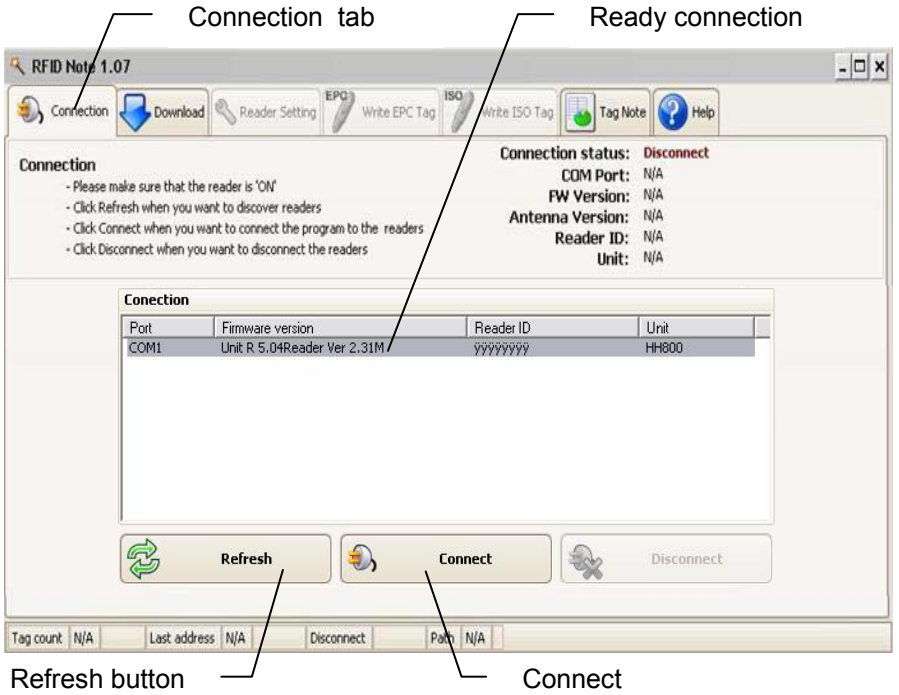
Note : RS232 communication cable is in the reader package. (*see package contents*)

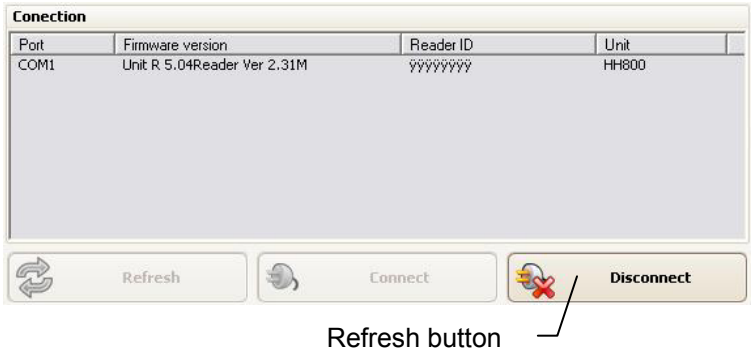
7.2.3 Connection tab (checking Reader connection)

This is the first and most important tab in RFID Note you will see. This tab is use for checking connection between reader and pc. It is automatically searching for the reader when you first start RFID Note. It will show the details of reader and ready connection comport. (*please see right pictures*)

To start connection
- click on **Connect button** then you will move to Download tab.

If the reader can not be found,
- please check RS232 connection and be sure the unit is switched “On”
- click on **Refresh button** to rescan for the connection.





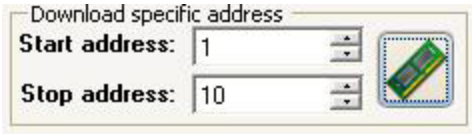
Note : you can disconnect unit any time by clicking on Disconnect button

7.2.4 Download tab

This tab is use for management the data from the unit.
For example;

- download tag ID read by unit. (you can download all the data or select from the specific address)
- download data from SD card.
- make a online(real time) communication between unit an pc.
- edit tag data, etc.

To download all data from the unit;
- click on **Download button.**
- then all data read by unit will be downloaded into your pc automatically. (*see right picture*)



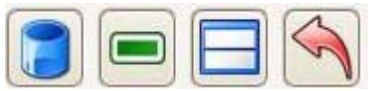
To download data from the specific address with this operation box.
- input Start address to download.
- input Stop address.
- click on this button.(*left picture*)

To download data from SD card;
- connect SD card to pc.
- click on **SD button** and browse path to your SD card.

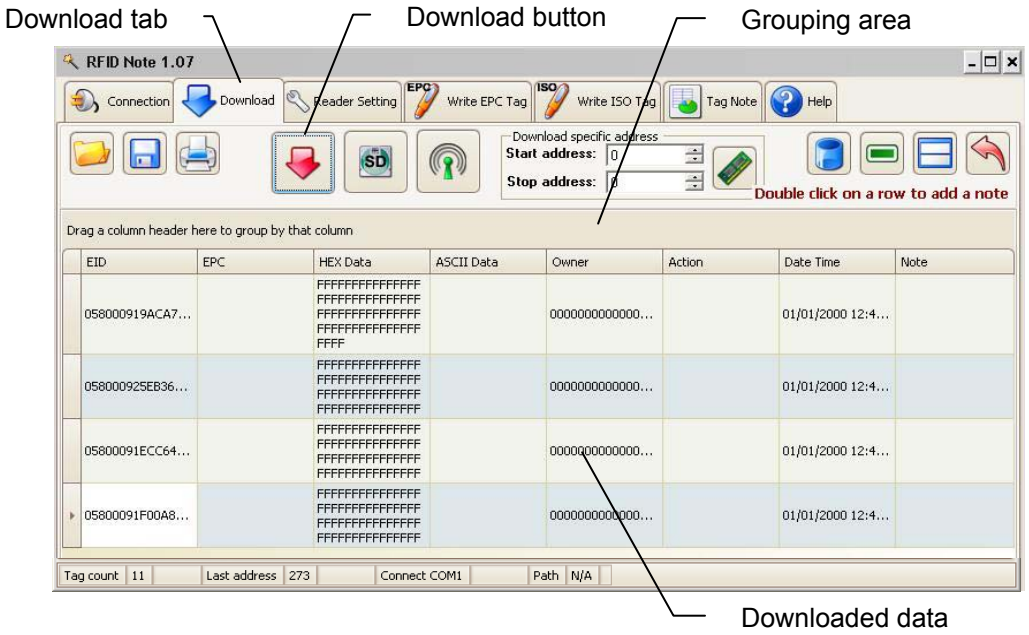
To make an Online Communication (real time) between the unit and pc;
- click on **Online button** to start online mode.
- click **Pause button** to stop online mode.

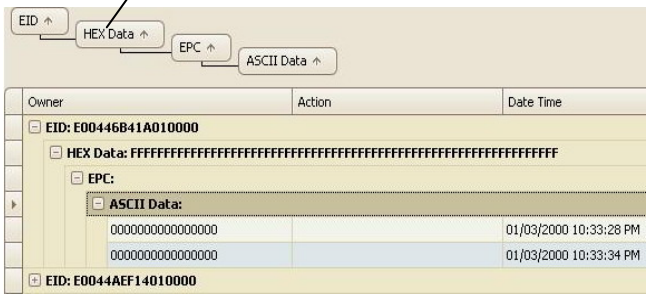
Note : In Online mode, every Action you input into the unit(press key board) will be on RFID Note directly.

You can Open(AID file, XML), Save(AID file, Excel, XML, HTML), and Print your AID file with these 3 buttons .
Note : AID file is a default data format for RFID Note.



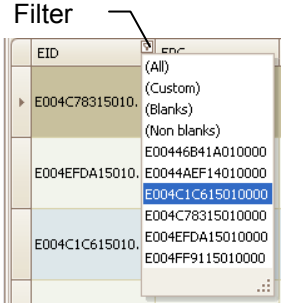
You can perform Clear data grid, Delete rows, Grid customization, and Delete filter with 4 buttons.(*left picture*)





You can Group data by
- dragging column header on Grouping area.
- data will be grouped by a name of header column.

Note : If you drag 2 groups, you will create inherited groups.(please *see left picture*)



You also can filter data which make you focus on the data you really concern. To do so;
- click on ▼ **Filter triangle button** on column header.
- select filter from drop down list.

Note : You can cancel filter by click on Delete filter button on tools bar. (*see left picture*)

7.2.5 Reader Setting tab

This tab is allow you to change configuration and set up the unit with firmware 5.00 and further. Some commands **will erase all data** and failure to follow instructions correctly may cause severe damage to the unit's memory and may permanently erase your data.

7.2.5.1 Clock

You can set Date format to display on LCD in 2 types (Europe format and USA format) by
- select one type from Date time format drop down list(*see configuration*)
- click on **Set button**

You also can set Clock for the unit by
- input hours in **HH**, minutes in **MM**, and seconds in **SS**.
- select date from Clock setting list
- click on **Set button**

You can set date time to be same as your pc clock by simply clicking on **Set to now button**.

7.2.5.2 Data length and Start address

You can set which address in unit's memory to store the data. **These operations will erase all data in the unit's memory.** (*see configuration*)

- input value into **Start address box**
- input value into **Data length box**
- click on **Set button**

To reset address for ISO/EM tag and EPC class1 Gen2 tag to default value
- click on **Default ISO-1800-6B and EM**
- click on **Default EPC class 1 Gen 2**

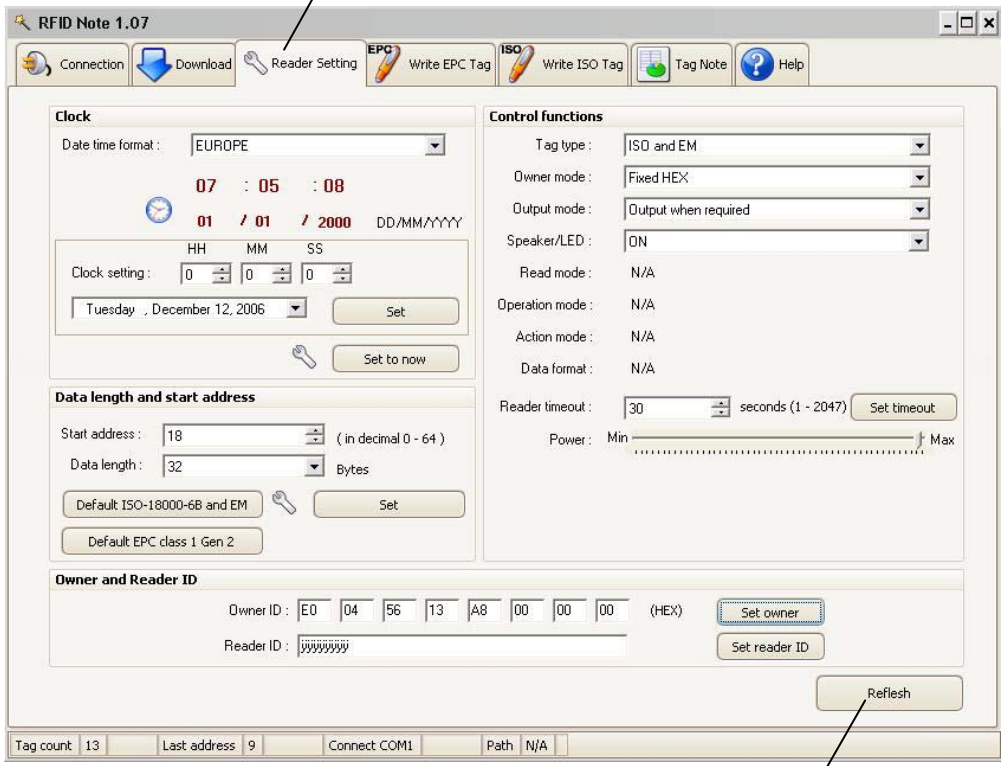
7.2.5.3 Owner and Reader ID

You can set owner ID and Reader ID(unit ID) with this operation box.
To set owner ID (the ID is depended on Control functions setting)
- input value into **Owner ID box** then
- click on **Set owner button**

DISCLAIMER: Some operations will erase all data in the unit's memory. Users understand this and accept the risks – Advanced ID Corporation will not be response for any loss of data through the use of this software; use at your own risk.

7.2.5.4 Control functions

Reader setting tab



Refresh to see unit's setting

You can set the unit's operations here.

Tag type : select tag type which unit will work with. (*see operation for details*)

Owner mode : select type of owner ID.

Output mode : select when unit have to send out data.

Speaker/ LED :switch On/Off speaker and LED when unit is operating.

Read mode : set unit to read mode.

Operation Mode : set read ID operation

Action Mode : set action when read tag.

Data format : set unit's data format.

Reader timeout : set timeout for unit.(*see operation for details*)

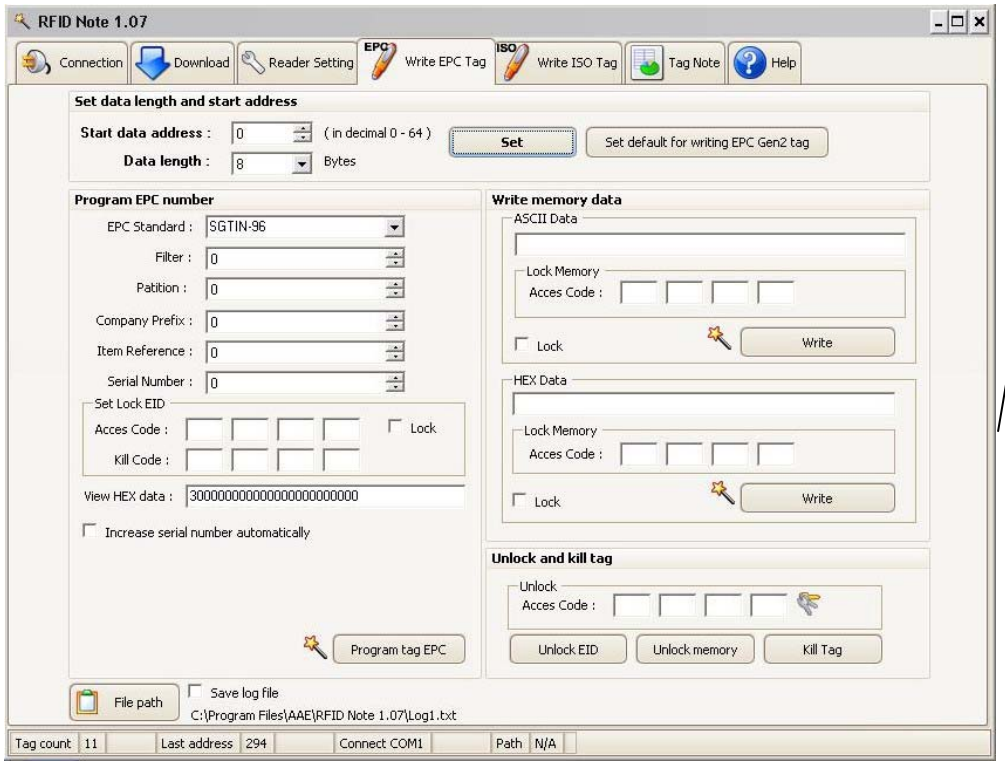
Power : set unit's read/write power. (between 20dB-30dB)

Note : Some options do not permitted to set depend on unit's Firmware version. Please contact your Advanced ID distributor for more details.

To set Reader ID(unit ID)
- input value into **Reader ID box** then
- click on **Set owner button** to confirm

7.2.6 Write EPC tag tab

This tab is use for command unit to write data into EPC tag.



7.2.6.1 Set data length and start address

First of all you need to set data length and start address to match EPC data format.

- input value into **Start data Address box**
- input value into **Data length box**
- click on **Set button**

You can the set value to default value by
- clicking on **Set default for writing EPC Gen 2 tag button**.
- You need to confirm setting because changing these value **will erase all data in the unit's memory.**

Set data address and Data length need your confirmation because these operations will erase all data in the unit's memory. (*see left picture*)

7.2.6.2 Program EPC number

You can select EPC standard which you want to write into tags and the details for each standard will be prompt to be set.

- select one from **EPC Standard drop down list**
- input value into each box
- click on **Program tag EPC**

Set Lock EID : You can set Access Code and Kill Code for preventing writing new EID or data into tag
- input value into **Access Code box**
- input value into **Kill Code box**
- click on **Program tag EPC**

You can save log file to keep the writing details for further use.
- click on **Save log file box**
- click on **File path button** and browse save location

7.2.6.3 Write memory data

ASCII data : you can write ASCII format data into tag according to Data Length and Start Address setting. To do so
- input data into a box
- click on **Write button**

HEX Data : you can write HEX format data into tag according to Data Length and Start Address setting. To do so
- input data into a box
- click on **Write button**

If you want to prevent writing data into tag, you also can lock tags' memory after writing for the first time.
- input Access Code
- click on lock box then
- click on **Write button**

7.2.6.4 Unlock and kill tag

You can **Unlock EID**, **Unlock Tag's Memory** and even **Kill Tag** by using Access Code and Kill Code.

- input Access code

- select operation you want to

7.2.7 Write ISO tag tab

This tab is use for command unit to write data into ISO tag.

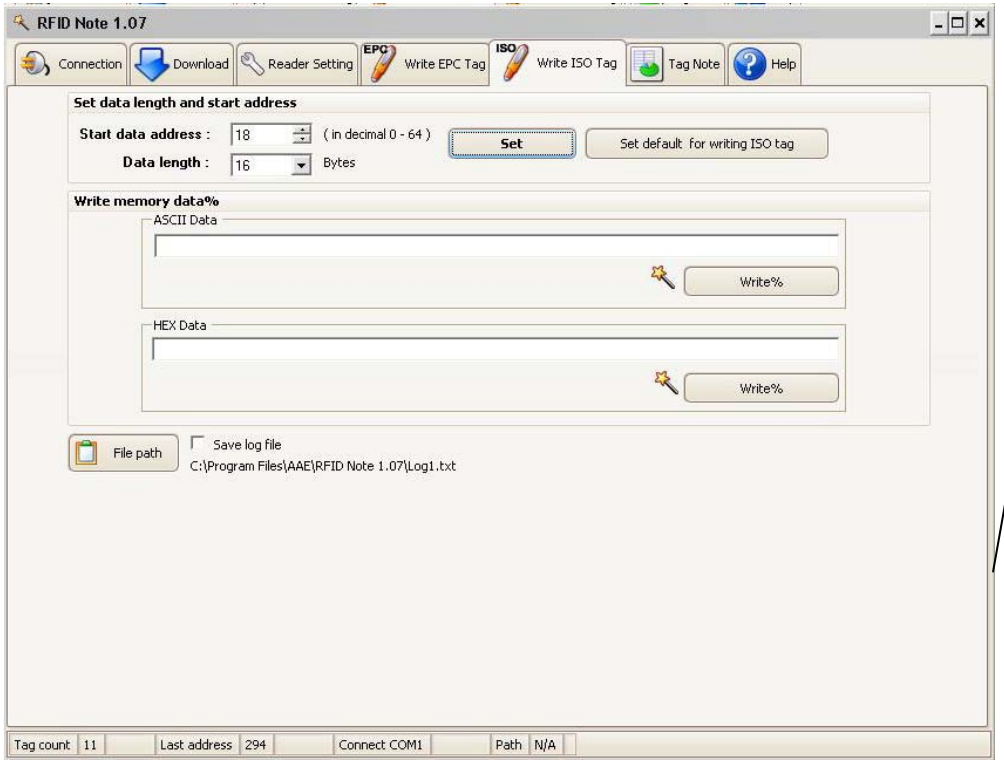
7.2.7.1 Set data length and start address

First of all you need to set data length and start address to match EPC data format.

- input value into **Start data Address box**
- input value into **Data length box**
- click on **Set button**

You can the set value to default value by
- clicking on **Set default for writing ISO tag button**.
- You need to confirm setting because changing these value **will erase all data in the unit's memory.**

You can save log file to keep writing details for further use.
- click on **Save log file box**
- click on **File path button** and browse save location



- input data into a box
- click on **Write button**

Set data address and Data length need your confirmation because these operations will erase all data in the unit's memory. (*see left picture*)

7.2.7.2 Write memory data

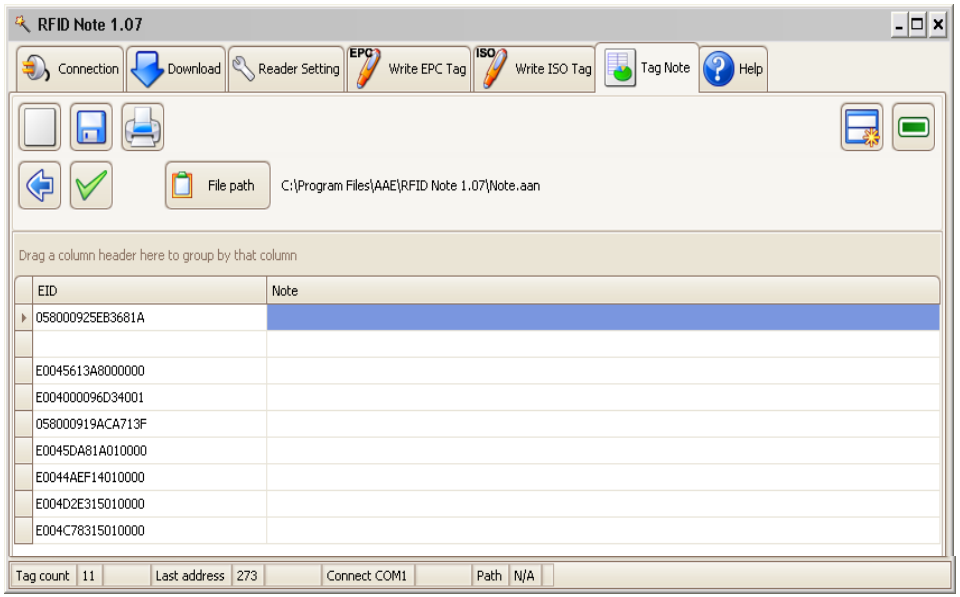
ASCII data : you can write ASCII format data into tag according to Data Length and Start Address setting. To do so
- input data into a box
- click on **Write button**

HEX Data : you can write HEX format data into tag according to Data Length and Start Address setting. To do so

7.2.8 Tag Note Tab

You can add more tag details which you read by unit in this tab and the tag data will be stored in database. You can access to this tab by **double click on any row of Tag ID when you are in Download tab**.

To add details into tag
- click on tag ID you want(a row next to that ID will be prompt)
- input data
- click on **Green Tick button** to confirm



You can create new Note file, Save(AAN file), and Print your AID file with these 3 buttons .
Note : AID file is a default data format for RFID Note.

You can move to Download tab by clicking on **Blue arrow button**(save and back), and confirm changing any details in this tab with **Green tick button**.(save, update and back)

You can add New Row or Delete Row with these buttons.

You can browse file location with by clicking on **File path button**

7.2.9 Help tab

This tab contains Users Interface Description documents, RFID Note software details others support software descriptions, and Firmware support details.

8. FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/TV technician for help.

To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

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.

FCC Radiation Exposure Statement:

"This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter".