

# Mifare<sup>®</sup> Card Issuer

PCR310/PCR320 programmer for

MF700/LBR700 Reader

## User's Manual

REV.I

December 29, 2009

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## Understand the MAD and Non-MAD

Before you operate Mifare Card Issuer (Programmer), you have to know something about MAD and Non-MAD.

MAD Format Card			Non-MAD Format Card			
MAD	Block 0	Manufacturer Code	Sector 0	Block 0	Manufacturer Code	
Sector(0)	Block 1	MAD	Other User Data	Block 1	Sector Security	
	Block 2	AID(n)		Block 2		
	Block 3	Sector Security		Block 3		
.			.			
.			.			
.			.			
Application	Block 0	User Data	Application	Block 0	User Data	
Sector (n)	Block 1		Sector Security	Sector (fixed)		Block 1
	Block 2					Block 2
	Block 3			Block 3		

When using MAD application, Mifare Application Directory (MAD) is stored at sector 0 for Mifare Standard 1K card (or at sector 0 and sector 16 for Mifare standard 4K card) According to MAD, get AID and its mating Application Sector number. When using Non-MAD application, the parameter of Non-MAD Sector number will directly lead the Application Sector Number.

### Card Security will be update as below after issued card:

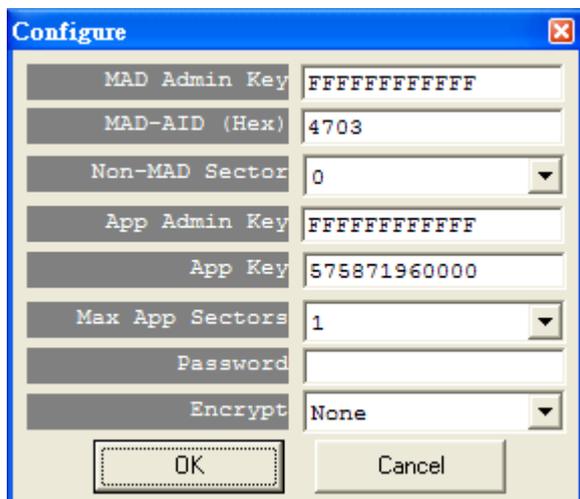
MAD Sector	Block 0	Manufacturer Code
Sector (0)	Block 1	MAD
	Block 2	AID
	Block 3	KEY_A <sup>1</sup> is Read Only, MAD Admin Key <sup>2</sup> is Read/Write (KEY_B)
.		
.		
Application	Block 0	User Data
Sector (n)	Block 1	
	Block 2	
	Block 3	

1. KEY\_A = A0A1A2A3A4A5, this is the fixed KEY of MAD, it can be used for read only.
2. MAD Admin Key is the key for the MAD card issuer to manage MAD card. It can be used for Read and Write.
3. App Key is the key for the MF700/LBR700 reader to read the data or Application Sector. It can be used for Read only..
4. App Admin Key is the key for the Application manager to issue the card and write data into the card. It can be used for Read and Write.

## Configure the Parameters of MF700/LBR700 Card Issue

According to MAD or Non-MAD application, you have to set the Card Issuer parameters before issuing the card.

Click [Configure] to begin settings the parameters: (Example as below)



1. **MAD Admin Key** (Default=FFFFFFFFFFFF, KEY\_B):

The key is for the Administrator to plan the MAD application and it can assign the AID and its mating Sector number.

2. **MAD-AID** (Hex, Default=4703):

If you have application AID from Mifare MAD group, you may set this AID number into MAD-AID to become the identifier of your application. (or you may assign AID number by yourself for your

application if you did not apply AID from Mifare MAD Group.). The default 4703 is AID for Access Control & Security application of GIGA-TMS INC.

3. **Non-MAD Sector#** (Default=1)

For the Non-MAD application, you have to set Non-MAD Sector number. By means of this setting, the User-Data is written into the Sector of the set Non-MAD Sector number. MF700/LBR700 Reader only can read the data on the set Non-MAD sector if the card is Non-MAD format.

4. **App Admin Key** (Default=FFFFFFFFFFFF, KEY\_B):

The key is used for managing the data in the Application Sector. It can be used for Reading and Writing the data.

5. **App Key** (Default=FFFFFFFFFFFF, KEY\_A)

The key can only read the data. MF700/LBR700/DF700 Reader is using the App Key to authenticate with the card.

6. **Max App Sectors** (Default=1) for multi sectors in use.

7. **Password** (Default=Blank)

The Mifare Card Issuer software is with Logon Password protection. If you set with password, you have to enter Password every time when you execute the Mifare Card Issuer.

8. **Encrypt (Default=None)**

Fraud prevention, Select Encrypt Mode (None, Encrypt 1, Encrypt 2, Encrypt 3, Encrypt 4, Encrypt 5) to protected your card data. (Remark: Encrypt mode must to work together with the same encrypt mode of MF700/LBR700 configure utility.)

### Remark:

When you exit the Mifare Card Issuer software, it would automatically store all these keys and parameters you have set. However, these keys might be lost if the computer is broken. So you must well keep all these keys to avoid any problem when the computer is broken.

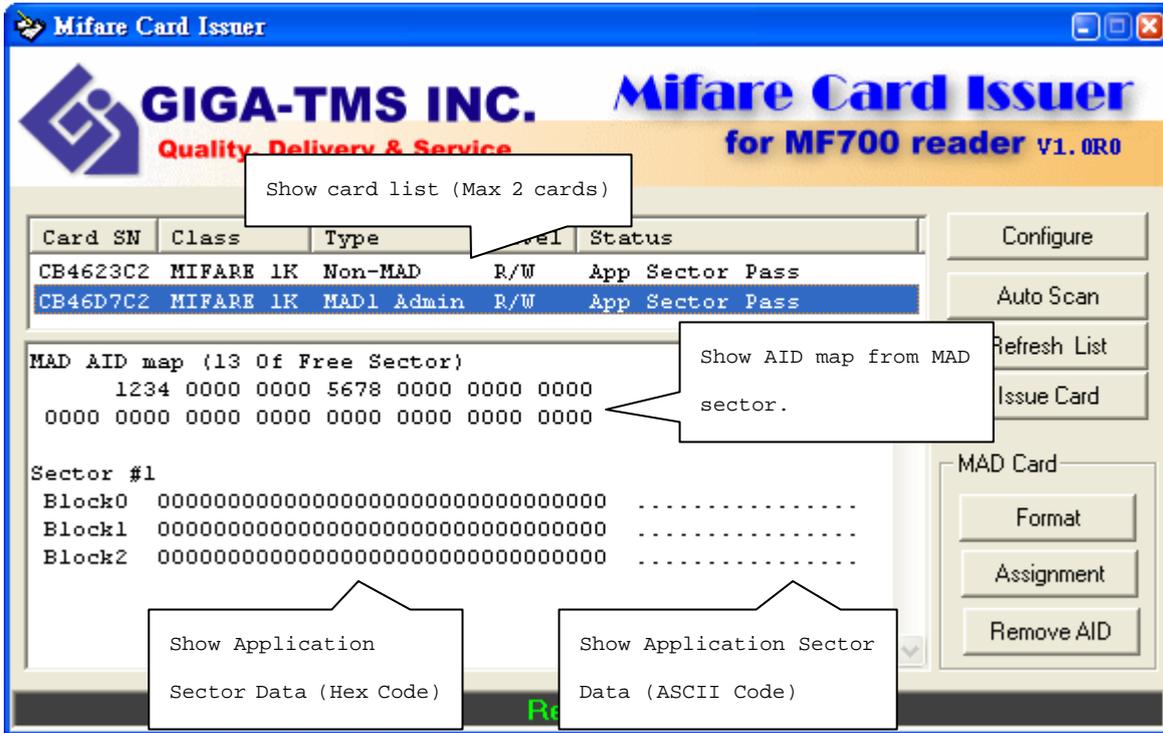
**Connect the PCR310U programmer**

Prepare for issuing the card, you have to connect the PCR310 programmer to the computer through USB port. If this is your first time to use PCR310 Programmer for your computer, you need to install USB Driver for PCR310. Get the DISK5219 USB driver and put into CD-ROM drive to install it. Just follow the on-screen instructions. After USB driver is installed, click [AutoScan] on Mifare<sup>®</sup> Card Issuer software, it would find and get PCR310 programmer connection with it.

## Issue Data into Non-MAD or MAD card

Mifare Card Issuer provides three kinds of data formats to write the card: Wiegand, User-Data and Card Holder Information. The way to write data into MAD card or Non-MAD card is the same. (Refer to ANNEX. A). If you want to issue a MAD card, you must format the card first and then issue the card. (Please first refer to the Paragraph of Create and Manage your MAD card).

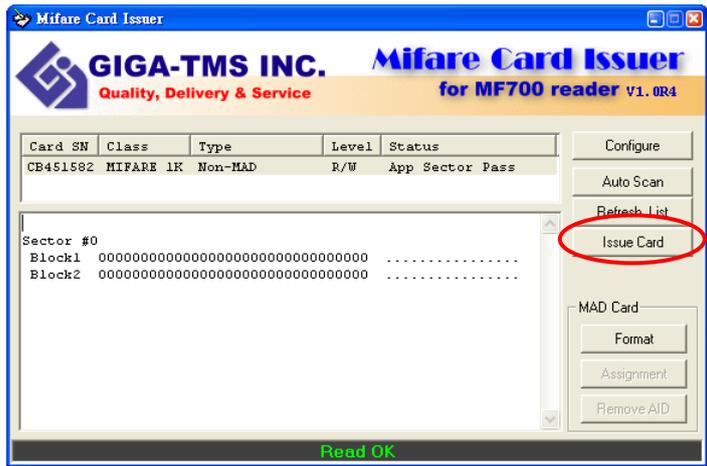
Put a new (or two) card (MAD or Non-MAD) into PCR310 programmer, example as below:



1. Card CB4623C2 is a Mifare Standard 1K card, and card type is Non-MAD format, the App Sector is writeable.
2. Card CB46D7C2 is a Mifare Standard 1K card, and card type is MAD format, the App Sector is writeable.

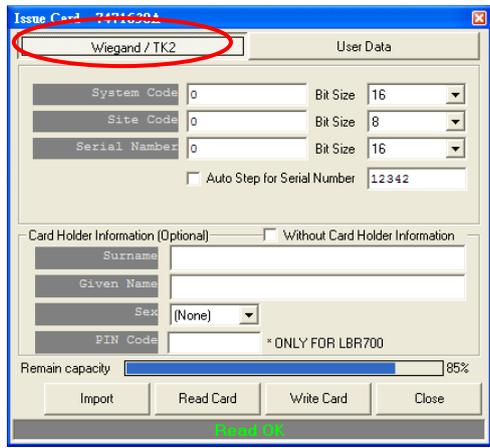
**To issue a Wiegand Format card , example as below:**

**Step 1:**  
 Select the Card CB4451582 for example (if you put two cards on PCR310 programer). Click [Issue Card] to write sector data.

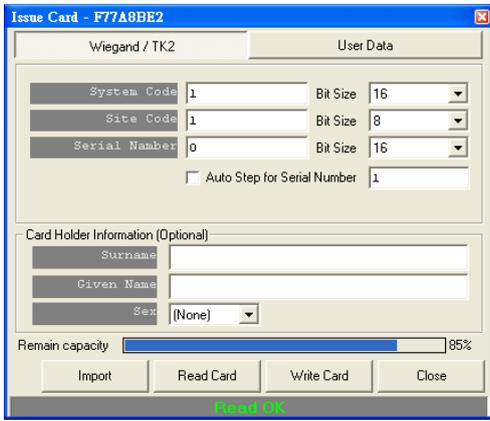


**Step 2:**  
 Select [Wiegand Format]

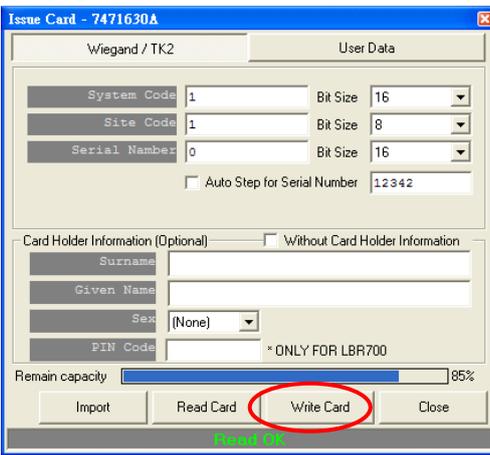
Note:  
 You also can configure your "Bit Size" for "System Code", "Site Code" and "Serial Number" fields.



**Step 3:**  
 Input System Code, Site Code and Serial Number in the Wiegand Fields.



**Step 4:**  
 Click [Write] to write all Wiegand Fields into Card.



Note:

1. Auto Step: Automatically step the number. If this function is Enabled, it will step the number with the set step value for the sequential number. This function is only for the "Serial Number" field.
2. Wiegand Format as below: (Max 16 bytes for Wiegand Format)

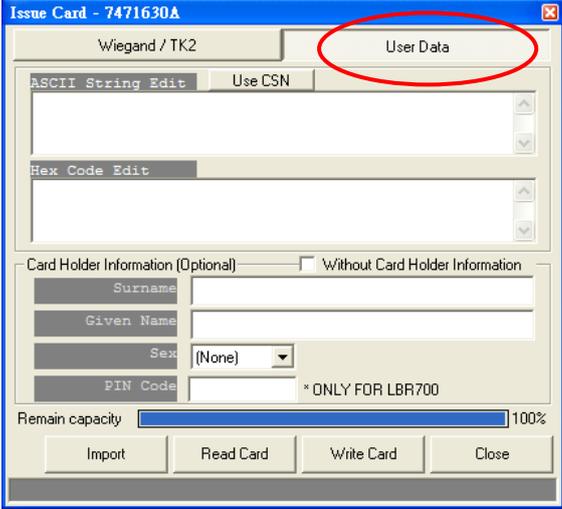
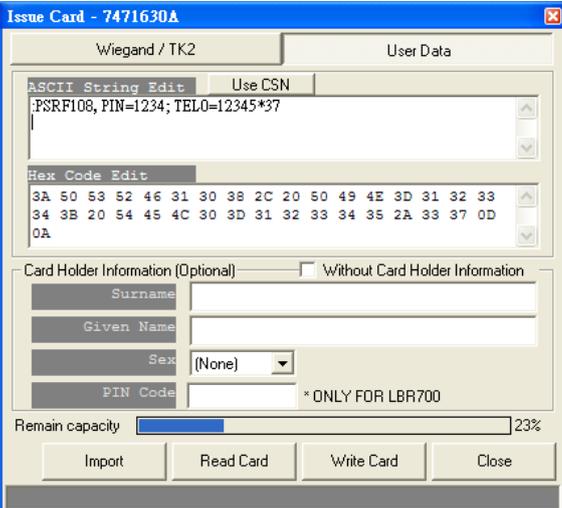
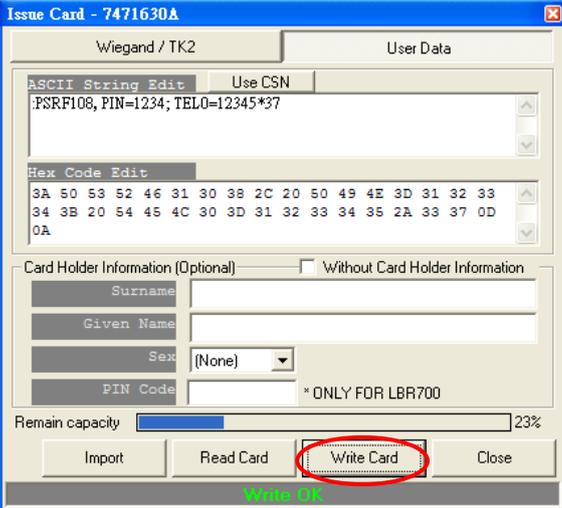
Fields	Bit Size	Memory Order
System Code	8~42	3 (MSB)
Site Code	8~42	2
Serial Number	8~42	1 (LSB)

Remark: The MF700/LBR700 reader will read number of data size by "Number Of Bits" set.

Example for Wiegand 44bits (Standard Bits Sequence and "Serial Number" bit size=18):

Parity Bit	System Code		Site Code		Serial Number		Parity Bit
Even	b16	b1	b8	b1	b18	b1	Odd
b44 (Even)			b23	b22 (Odd)			b1

**To issue a User-Data card , example as below:**

<p><b>Step1:</b></p> <p>Click [Issue Card] and select [User Data] button.</p>	
<p><b>Step 2:</b></p> <p>Input Hex Code in "Hex Code Edit" or Input ASCII string in "ASCII String Edit".</p>	
<p><b>Step 3:</b></p> <p>Click [Write Card] to write user data into the card.</p>	

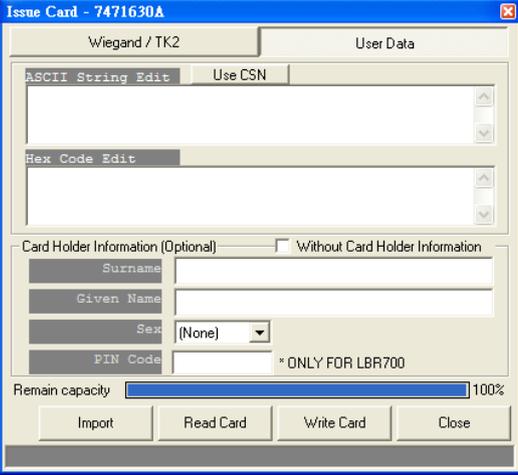
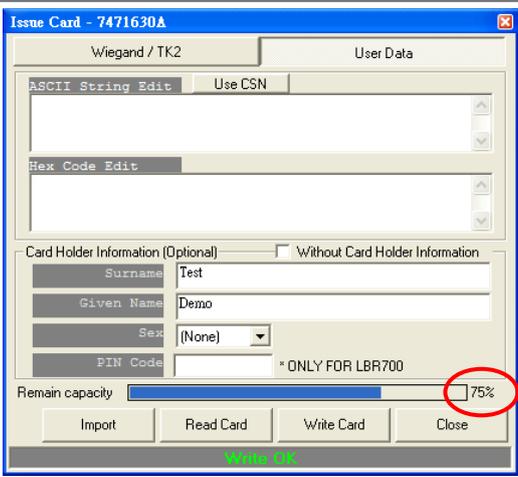
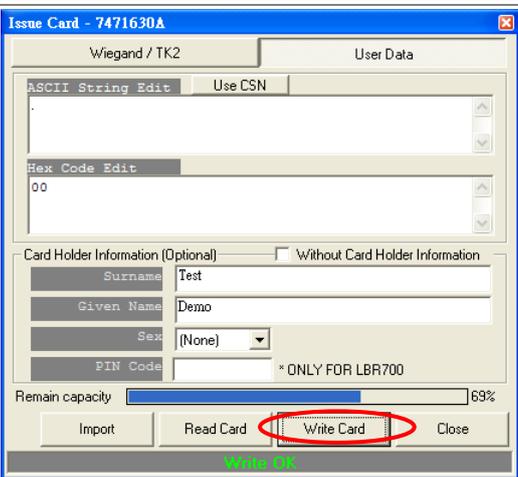
**Note:**

1. In User Data format, customer can write HEX Code or ASCII String into the card, and the user data can be defined by customer himself.
2. Click "Use CSN" will input the card serial number to ASCII String Edit box.

**Remark:**

**You may set the "Max App Sectors" in "Configure", to get more sectors for data size.**

**To issue a "Card Holder Information" card , example as below**

<p><b>Step 1:</b> Move cursor to "Card Holder Information" fields.</p>	
<p><b>Step 2:</b> Input Surname, Given Name, Sex and User Data</p>	
<p><b>Step 3:</b> Click [Write Card] to write user data into the card.</p>	

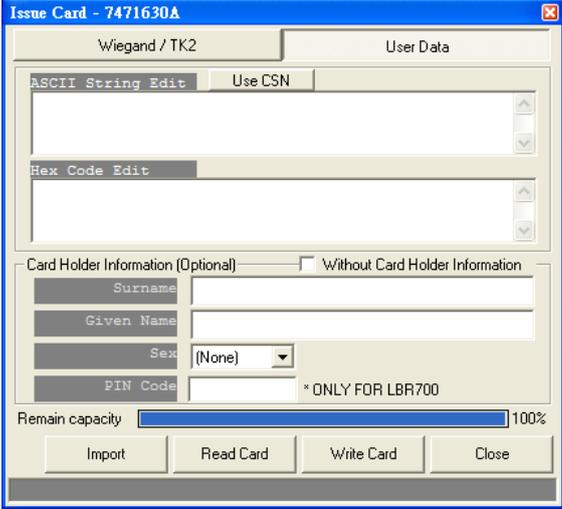
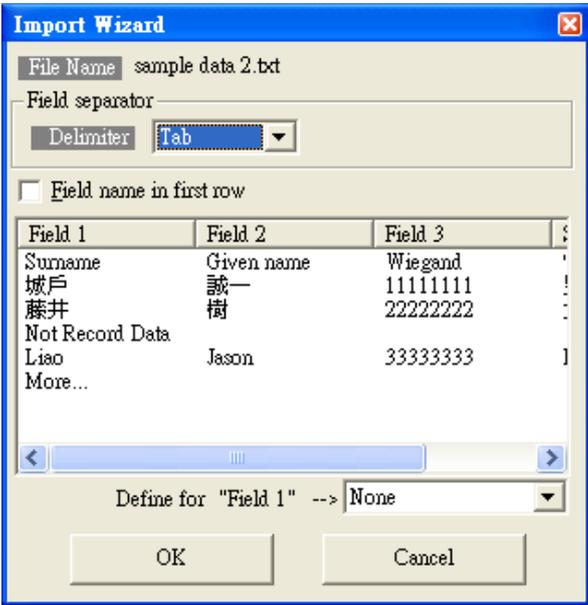
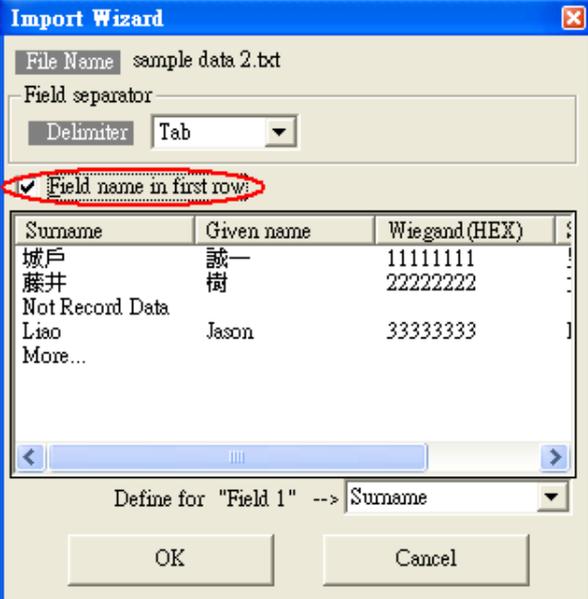
Note:

"Card Holder Information" format is defined by MAD, and use ASCII String data for each fields.  
The total data length for all the 4 fields (Surname, Given Name, Sex and User Data) is 46 ASCII characters maximum.

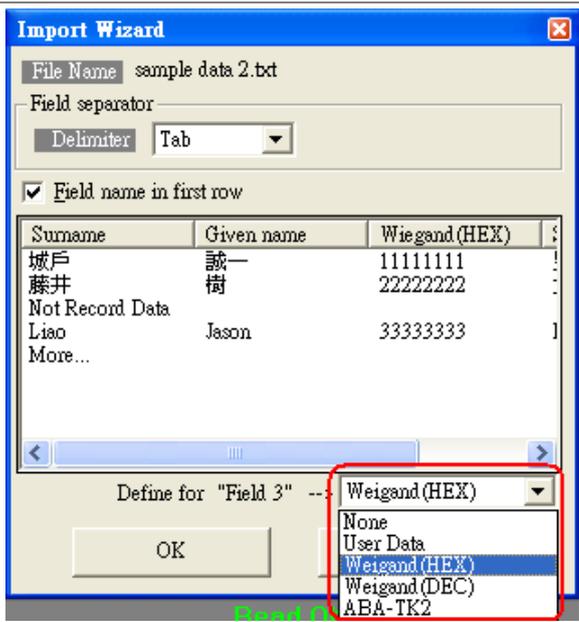
**Remark:**

1. You may set the "Max App Sectors" in "Configure", to get more sectors for data size.
2. Set up "Pass Code for" LBR700 Reader and max 8 digits.

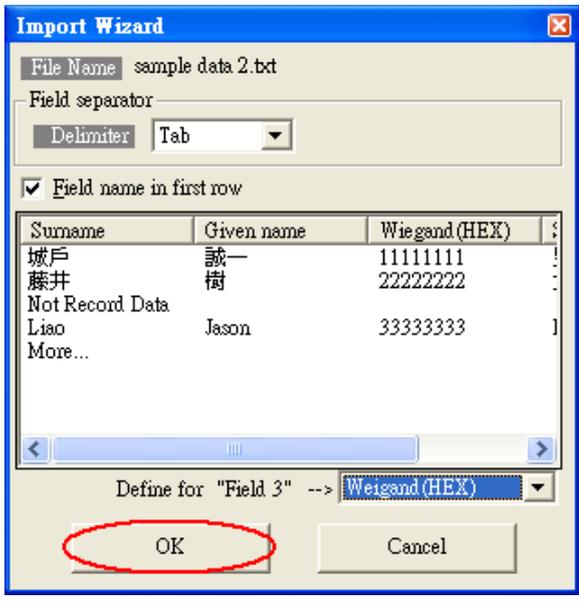
**To Import users from file**

<p><b>Step 1:</b> Click "Import"</p>																						
<p><b>Step 2:</b> Select user list file.  Example: Select "sample data 2.txt"</p>	 <table border="1" data-bbox="692 949 1254 1120"> <thead> <tr> <th>Field 1</th> <th>Field 2</th> <th>Field 3</th> </tr> </thead> <tbody> <tr> <td>Surname</td> <td>Given name</td> <td>Wiegand</td> </tr> <tr> <td>城戸</td> <td>誠一</td> <td>11111111</td> </tr> <tr> <td>藤井</td> <td>樹</td> <td>22222222</td> </tr> <tr> <td>Not Record Data</td> <td></td> <td></td> </tr> <tr> <td>Liao</td> <td>Jason</td> <td>33333333</td> </tr> <tr> <td>More...</td> <td></td> <td></td> </tr> </tbody> </table>	Field 1	Field 2	Field 3	Surname	Given name	Wiegand	城戸	誠一	11111111	藤井	樹	22222222	Not Record Data			Liao	Jason	33333333	More...		
Field 1	Field 2	Field 3																				
Surname	Given name	Wiegand																				
城戸	誠一	11111111																				
藤井	樹	22222222																				
Not Record Data																						
Liao	Jason	33333333																				
More...																						
<p><b>Step 3:</b> Enable "Field name in first row", if first row are field name.</p>	 <table border="1" data-bbox="692 1576 1254 1724"> <thead> <tr> <th>Surname</th> <th>Given name</th> <th>Wiegand(HEX)</th> </tr> </thead> <tbody> <tr> <td>城戸</td> <td>誠一</td> <td>11111111</td> </tr> <tr> <td>藤井</td> <td>樹</td> <td>22222222</td> </tr> <tr> <td>Not Record Data</td> <td></td> <td></td> </tr> <tr> <td>Liao</td> <td>Jason</td> <td>33333333</td> </tr> <tr> <td>More...</td> <td></td> <td></td> </tr> </tbody> </table>	Surname	Given name	Wiegand(HEX)	城戸	誠一	11111111	藤井	樹	22222222	Not Record Data			Liao	Jason	33333333	More...					
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Not Record Data																						
Liao	Jason	33333333																				
More...																						

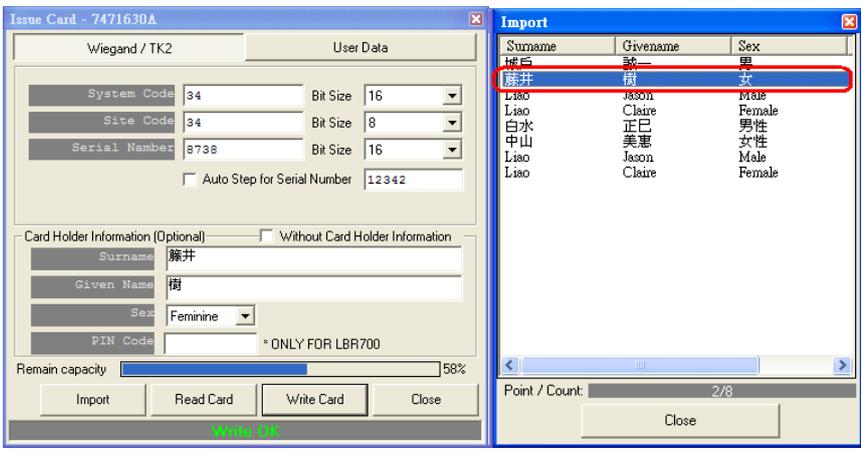
**Step 4:**  
Redefine field name



**Step 5:**  
Click "OK" when fields define finished.



**Step 6:**  
Select user, and the user will assign to corresponding fields.



**Remark:**  
Support file format: Text , CSV, Excel (Need Microsoft® Excel installed first)

## Create and Manage your MAD card

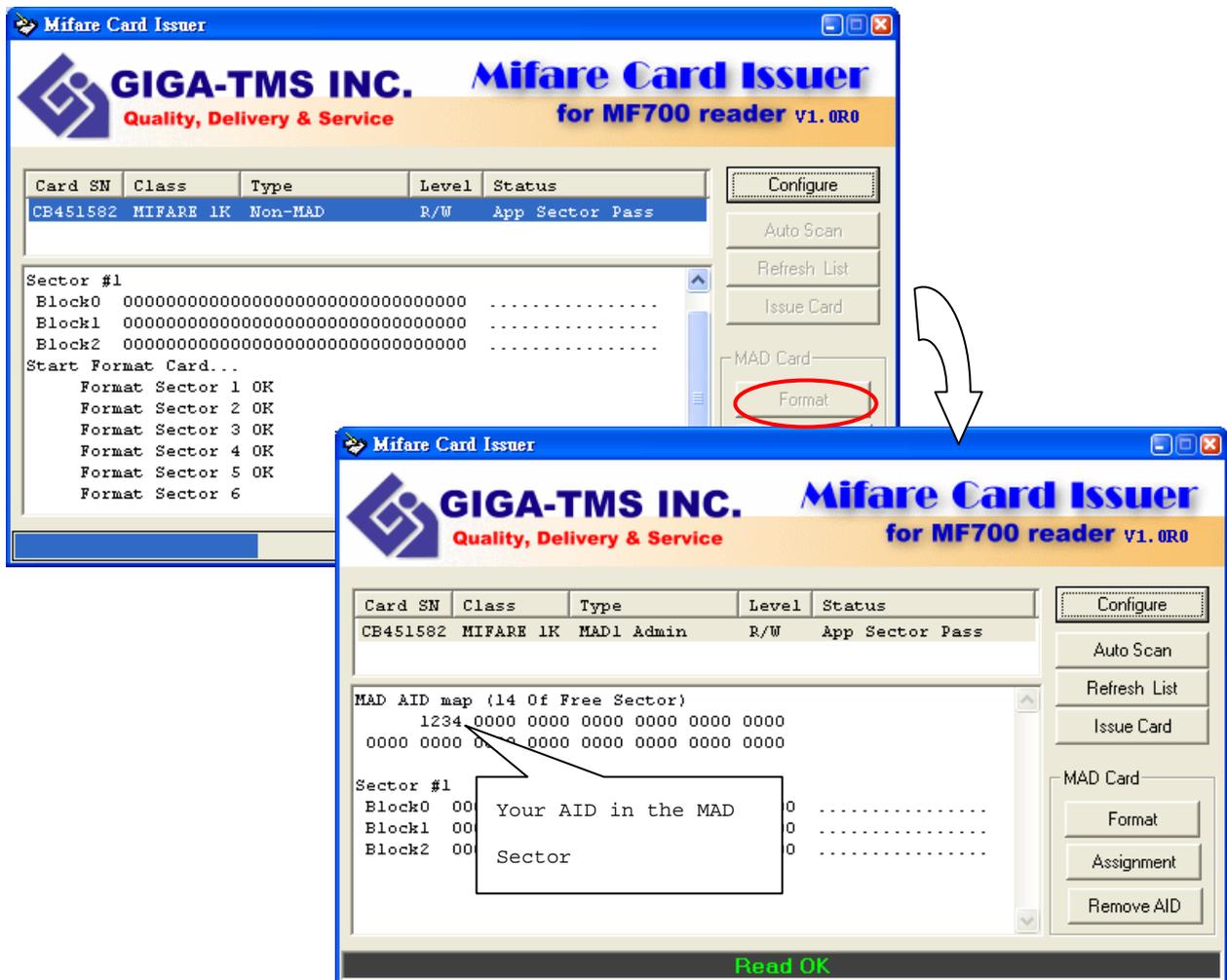
If you are issuing MAD card, you may use "Format", "Assignment" and "Remove AID" to create and manage your MAD card.

### 1. [Format] to create your MAD cards and include your AID.

You may format all new cards with MAD Format first. After formatted, all the sectors on the card will be protected with MAD Admin KEY (KEY\_B). If you have set AID when you configure to set the Mifare Card Issuer parameters, it would write AID into MAD Sector when you format the cards, and it would automatically mate AID to Sector #1 and the Sector #1 would be protected with App Key (KEY\_A : Read Only) and App Admin Key (KEY\_B: Read/Write).

Note: If Sector#1 has been used with other Application, It would mate AID to Sector#2 or other free sector when the card is formatted.

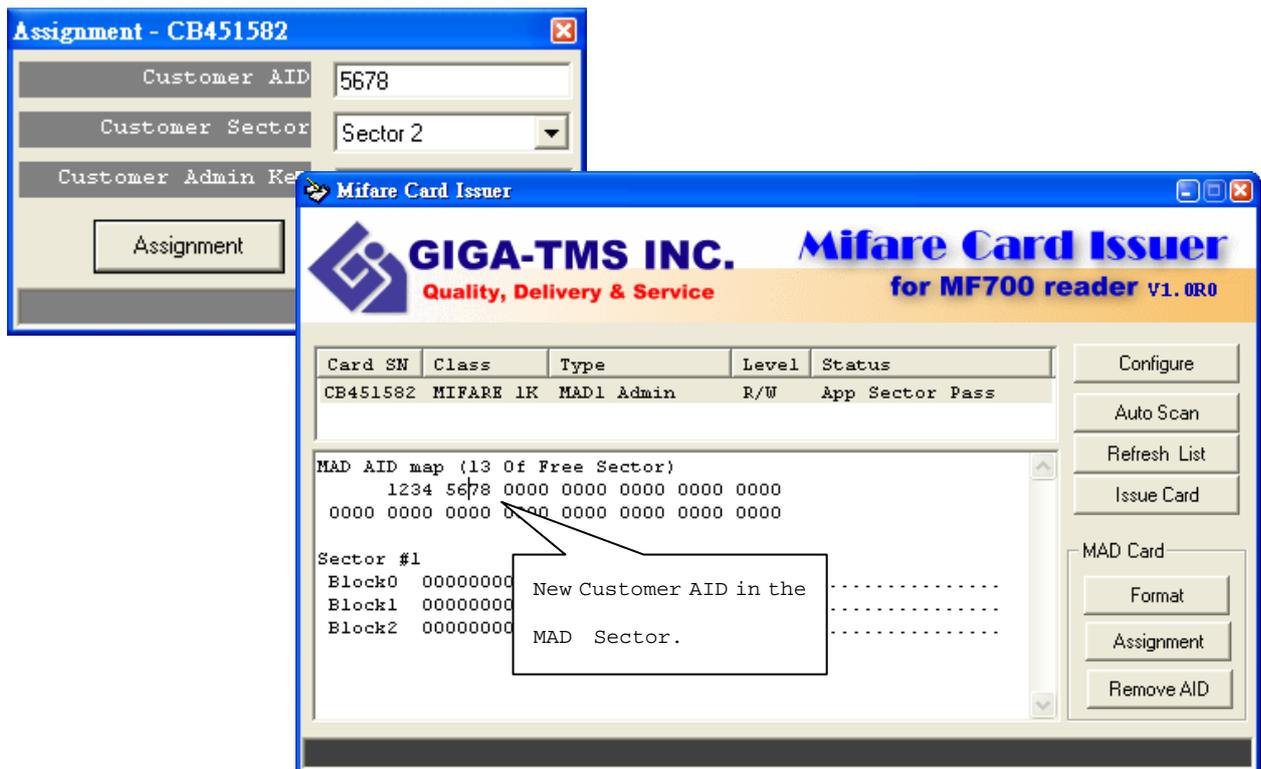
To format a Non-MAD card to a MAD format card , for example as below (AID=1234):



2. [Assignment] your customer AID into your MAD card.

You may also put the Customer AID into your MAD card and you may assign the Customer AID to use the Customer Sector#. And let the Customer Sector# be protected with Customer Admin Key (KEY\_B: Read / Write, Default=FFFFFFFFFFFF).

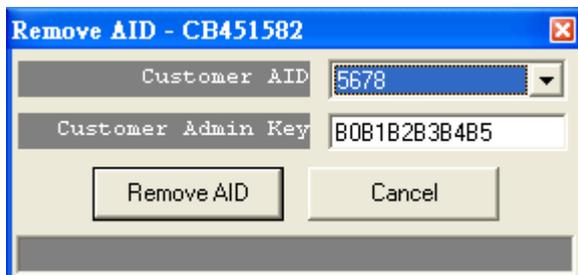
For example, to Assignment the AID=5678 to Sector 2 with KEY=B0B1B2B3B4B5 (KEY\_B) protected as below:



3. [Remove AID] from your MAD card..

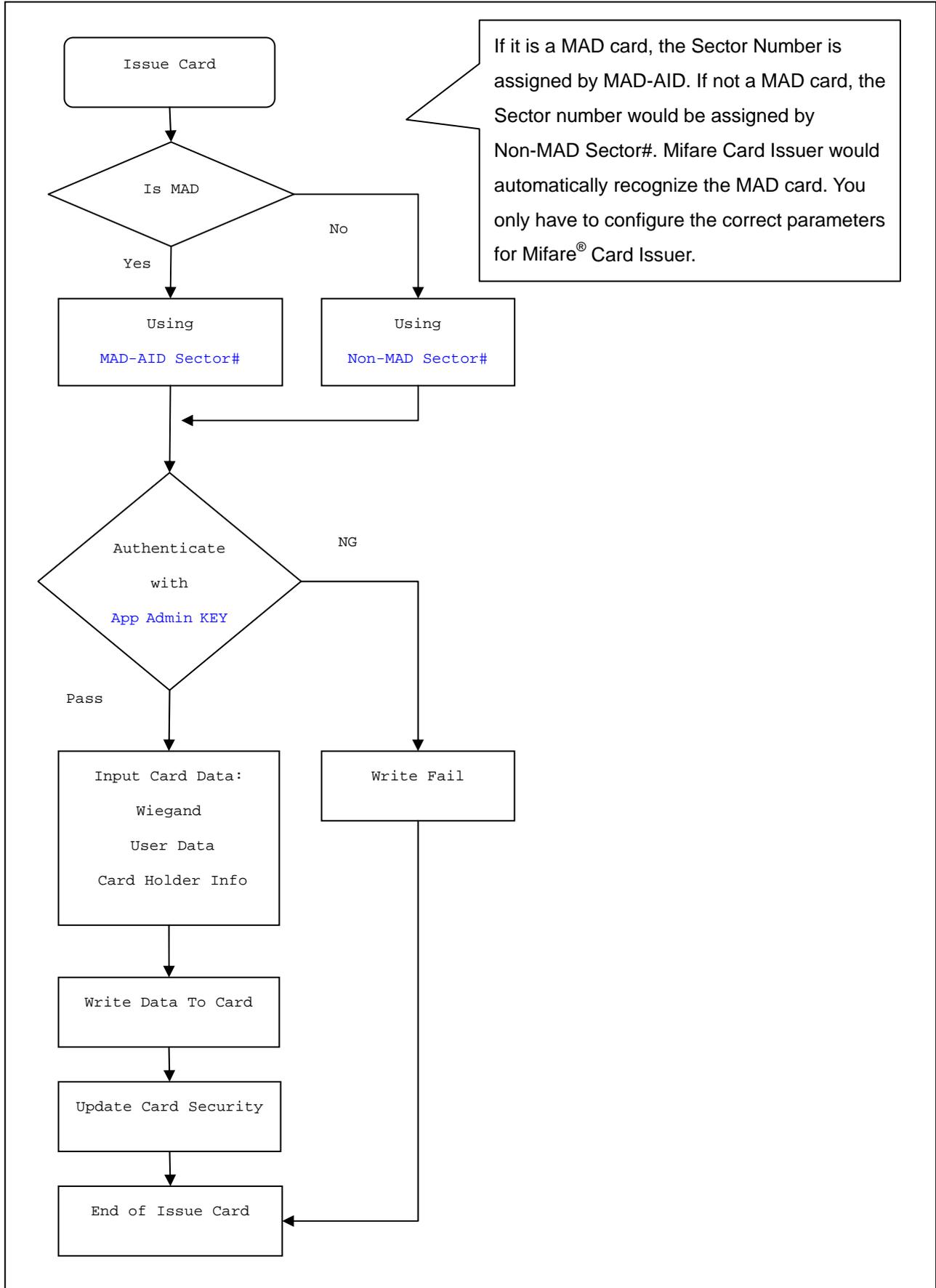
You may also to remove the issued AID from your MAD card. The AID pointer sector will be free and protected with MAD Admin Key after the AID be removed.

For Example, to remove the AID=5687 from your MAD card.



Remark: The customer Admin Key must be set in "Customer Admin Key" field, to free the AID pointer sector.

**ANNEX A. Issue Card flow chart**



**ANNEX B. Without Card Holder Information Format**

Storing card holder information using RLC (Run-Length-Coding)

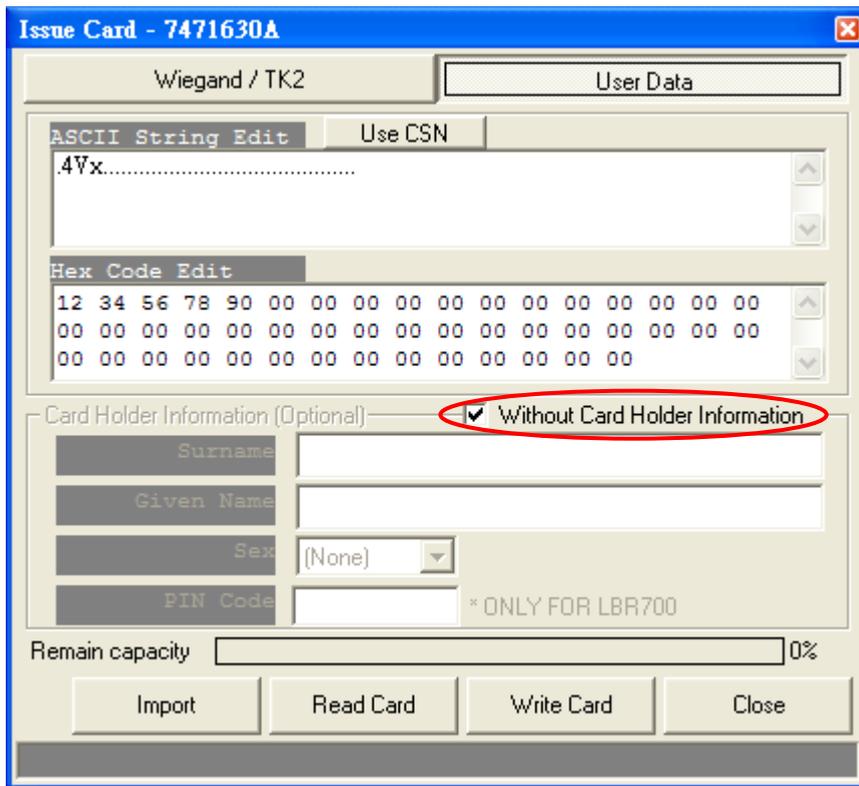
byte n	byte n-1	.....	byte 1	byte 0
00	last character		character 1	<b>type length&lt;n&gt;</b>

byte 0: **length** = lower 6 bit (number of used bytes including 0x00, max. 63)

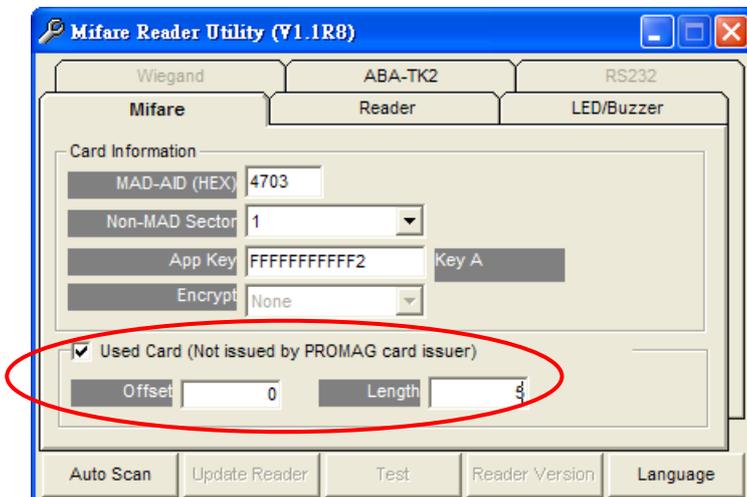
**type** = highest 2 bit (**00**=surname; **01**=given name; **10**=sex; **11**=user data)

byte 1 to <n>: ASCII text as specified in **type** (first character at byte 1; ends with 0x00)

If you want to use raw data for the reader , please mark "Without Card Holder Information"

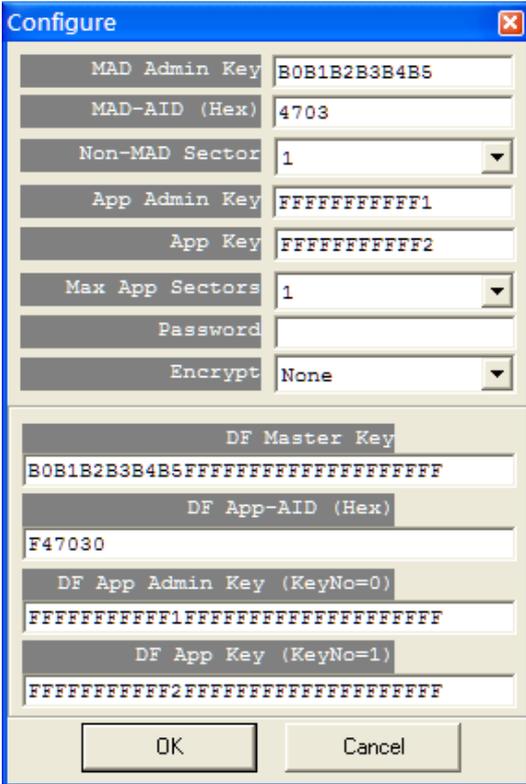


Setup configuration of the reader by "Mifare Reader Utility".



**ANNEX C. DESFire/EV1 Card Issuing(for PCR320)**

**Configuration**



**DF Master Key:**

(Default=00000000000000000000000000000000):

The key is for the Administrator to plan the DESFire Card and it can assign the AID and Format card.

**DF App-AID: (Default=F47030):**

If you have application AID from Mifare MAD group, you may set this AID number into DF App-AID to become the identifier of your application. (or you may assign AID number by yourself for your application if you did not apply AID from Mifare MAD Group.). The default F47030 is AID for Access Control & Security application of GIGA-TMS INC. (FID=0 for User Data).

**DF App Admin Key (KeyNo = 0):**

(Default=00000000000000000000000000000000):

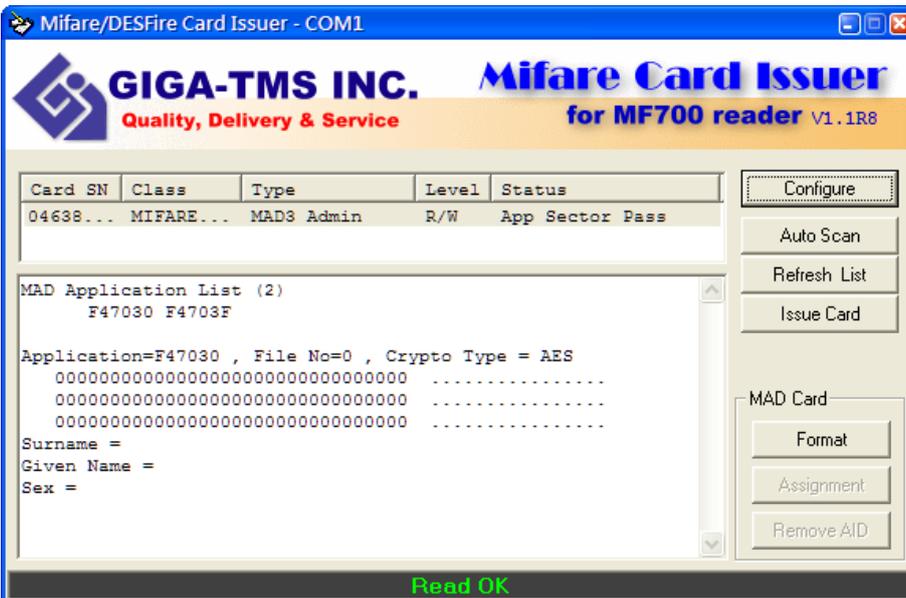
The key is used for managing the data in the Application File.

It can be used for Reading and Writing the data.

**DF App Key (KeyNo = 1): (Default=00000000000000000000000000000000):**

The key can only read the data. MF700/LBR700/DF700 Reader is using the DF App Key to authenticate with the DESFire card.

**Main**



**Application List:**

List of all application in DESFire Card.

**Format:**

Assign two AID in DESFire Card. One is your application AID. The other one is Pass Code application(F4703F).

**(REMARK: If the DF Master Key is not correct, you can not format the card.)**

## **ANNEX D. History**

June 15, 2004 REV.A

Initial Mifare® Card Issuer

June 29, 2004 REV.B

Support Multi Sectors (Page 3).

Support Configurable "Bit Size" for each fields of Wiegand format (Page 5,6).

April 25, 2005 REV.C

Add Encrypt mode for fraud prevention. (MF700)

November 30, 2005 REV.D

Add "Import" function. (Mifare Card Issue V1.1, Page 10)

November 28, 2007 REV.E

Add "Pass Code" function. (Mifare Card Issue V1.2, Page 9)

May 29, 2008 REV.F

Add "Use CSN" function. (Mifare Card Issue V1.1R4 Page 8)

November 21, 2008 REV.G

Add "Without Card Holder Information" function. (Mifare Card Issue V1.1R5, Page 16)

July 16, 2009 REV.H

Add " DESFire Card Issuing " (Mifare Card Issue V1.1R6, Page 17)

December 29, 2009 REV.I

Modify" DESFire/EV1 Card Issuing " (Mifare Card Issue V1.1R8, Page 17)

# PROMAG<sup>®</sup>

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