

# **Mifare<sup>®</sup> Card Issuer**

### 2E-M310U programmer

## **User's Manual**

REV.G November 21, 2008

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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 Fo	rmat Card	N	Ion-MAD	Format Card
MAD	Block 0	Manufacturer Code		Block 0	Manufacturer Code
Sector(0)	Block 1	MAD	Sector 0	Block 1	Other User Data
	Block 2	AID(n)		Block 2	
	Block 3	Sector Security		Block 3	Sector Security
×	Block 0			Block 0	
Application	Application Block 1 User Data		Application	Block 1	User Data
Sector (n)	Block 2		Sector	Block 2	
Block 3 Sector Security		(fixed)	Block 3	Sector Security	

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, <b>MAD Admin Key<sup>2</sup></b> is Read/Write (KEY_B)
		· ·
Application	Block 0	
Sector (n)	Block 1	User Data
	Block 2	
	Block 3	App Key <sup>3</sup> is read only (KEY_A), App Admin Key <sup>4</sup> is Read/Write (KEY_B)

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)

Configure	×
MAD Admin Key	FFFFFFFFFF
MAD-AID (Hex)	4703
Non-MAD Sector	0 🔹
App Admin Key	FFFFFFFFFF
App Key	575871960000
Max App Sectors	1
Password	
Encrypt	None
OK	Cancel

 MAD Admin Key (Default=FFFFFFFFFFF, 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=FFFFFFFFFFFFFF, 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=FFFFFFFFFFFFF, KEY\_A)

The key can only read the data. MF700/LBR700 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 2E-M310U programmer

Prepare for issuing the card, you have to connect the 2E-M310U programmer to the computer through USB port. If this is your first time to use 2E-M310U Programmer for you computer, you need to install USB Driver for 2E-M310U. 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 2E-M310U 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 2E-M310U programmer, example as below:

See Mifare Card Issuer	- • •
GIGA-TMS INC. Mifare Card Quality Delivery & Service for MF700 rd	eader v1. 0R0
Show card list (Max 2 cards)       Card SN     Class       Type       CB4523C2       MIRADE       IK       Non-MAD       P(W       Approx	
CB46D7C2 MIFARE 1K MAD1 Admin R/W App Sector Pass	Auto Scan
MAD AID map (13 Of Free Sector)         Show AID map from 1           1234 0000 0000 5678 0000 0000 0000         sector.           0000 0000 0000 0000 0000 0000         sector.	MAD Refresh List
Sector #1 Block0 00000000000000000000000000000000000	MAD Card Format Assignment Remove AID
Sector Data (Hex Code) Data (ASCII Code)	

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:



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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.

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

2. Wiegand Format as below: (Max 16 bytes for Wiegand Format)

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		Sit	te Code Serial Number			Parity Bit		
Even	b16	bl	b8		b1	b18		b1	Odd
b44		(Even)		b23	b22		(Odd)		b1



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

Step1:	Issue Card - 7471630A
Click [Issue Card] and	Wiegand / TK2 User Data
select [User Data]	ASCII String Edit Use CSN
Select [USEL Data]	
button.	Hex Code Edit
	Card Holder Information (Optional) Without Card Holder Information
	Given Name
	Sex None
	PIN Code * ONLY FOR LBR700
	Import Read Card Write Card Close
Step 2:	Issue Card - 7471630A
Input Hex Code in "Hex	Wiegand / TK2 User Data
Code Edit" or Input	ASCII String Edit Use CSN PSRF108, PIN=1234; TELO=12345*37
ACOLT strains in MACOLT	
	Hex Code Edit 3A 50 53 52 46 31 30 38 2C 20 50 49 4E 3D 31 32 33
String Edit".	34 3B 20 54 45 4C 30 3D 31 32 33 34 35 2A 33 37 0D 0A
	Card Holder Information (Optional) Without Card Holder Information
	Given Name
	Sex (None)
	PIN Code × ONLY FOR LBR700
	Import Read Card Write Card Close
Step 3:	Issue Card - 7471630A
Click [Write Card] to	Wiegand / TK2 User Data
write upor data into	ASCII String Edit Use CSN PSRF108, PIN=1234; TELO=12345*37
wille user data into	
the card.	Hex Code Edit 3A 50 53 52 46 31 30 38 2C 20 50 49 4E 3D 31 32 33
	34 3B 20 54 45 4C 30 3D 31 32 33 34 35 2A 33 37 0D 0A
	Card Holder Information (Optional)
	Given Name
	Sex (None)
	PIN Code × ONLY FOR LBR700
	Import Read Card Write Card Close
	Vite ok
	PIN Code     * ONLY FOR LBR700       Remain capacity     23%       Import     Read Card     Write Card       Virite: OK     Virite: OK

#### 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

Step 1:		Issue Card - 7471630A Viegand / TK2 User Data
Move cursor to "Card		ASCII String Edit Use CSN
Holder Information"		
fields.		Hex Code Edit
	$\sim$ 1	
		Card Holder Information (Optional)
	$\sim$	Surname
		Sex (None)
		PIN Code *ONLY FOR LBR700
		Remain capacity 100%
		Import Head Lard Write Card Close
Stop 2:		Issue Card - 7471630A
		Wiegand / TK2 User Data
Input Surname, Given		ASCII String Edit Use CSN
Name, Sex and User Data		
		Hex Code Edit
		Card Holder Information (Optional) Without Card Holder Information
		Given Name Demo
		Sex (None)
		PIN Code × ONLY FOR LBR700 Remain capacity 75%
		Import Read Card Write Card Close
		Write OK
Step 3:		Issue Card - 7471630A
Click [Write Card] to		Wiegand / TK2 User Data
write user data into		
		Var Cada Edit
the card.		
		Card Holder Information (Uptional) Without Lard Holder Information Surname Test
		Given Name Demo
		Séx (None) ▼ PIN Code × ONLY FOR LBR700
		Remain capacity 69%
		Import Read Card Write Card Close
		Write OK

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

Step 1:	Issue Card - 7471630A
Click "Import"	Wiegand / TK2 User Data
-	ASCII String Edit Use CSN
	Hex Code Edit
	Card Holder Information (Optional) Without Card Holder Information
	Given Name
	Sex (None)
	PIN Code × ONLY FOR LBR700
	Import Read Card Write Card Close
Step 2:	Import Wizard
Select user list file.	File Name sample data 2.txt
	Field separator
Frample.	Delimiter Tab
Colort "comple data	Field name in first row
Select "sample data	Field 1 Field 2 Field 3 5
2.txt"	Surname Given name Wiegand 城戶 誠一 11111111
	藤井 樹 22222222 : Not Record Data
	Liao Jason 33333333 I
	1401e
	Define for "Field 1"> None
	OK Cancel
Step 3:	Import Wizard
Enable "Field name in	File Name sample data 2.txt
first row", if first	Field separator
row are field name	Delimiter Tab
Iow are field fiame.	Field name in first row
	Sumame Given name Wiegand (HEX) 5
	城戶
	Not Record Data Liao Jason 33333333 1
	More
	Define for "Field 1"> Surname
	OK Const



#### Remark:

Support file format: Text , CSV, Excel (Need Microsoft<sup>®</sup> 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 many 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):

💝 Mifare Card Issuer						
GIGA-TMS	NC.	Mifa	re Card	ISSL	ier	
Quality, Delivery & Se	ervice	f	or MF700 rea	ader v:	L. 0R0	
			P			
Card SN Class Type	Level	Status		Config	pure	
CB451582 MIFARE IK Non-MAD	R/W	App Sec	tor Pass	Auto S	ican	
1				Refreck	List	
Sector #1			<u> </u>	nellesi		
Block1 000000000000000000000000000000000000	000000000000000000000000000000000000000			Issue	Bard	
Block2 0000000000000000000	000000000000000000000000000000000000000			MAD: Card	\\	
Start Format Card Format Sector 1 OK				mee cara		
Format Sector 2 OK				Form	at	
Format Sector 3 OK	🚵 Mifare Card	Issuer				
Format Sector 4 OK Format Sector 5 OK						000
Format Sector 6	G	IGA-1	MS INC.	/	Aifare Ca	rd Issuer
·		uality, Del	ivery & Service		for MF70	O reader V1. ORO
		,	,			
	Card SN C	lass	Type	Level	Status	Configure
	CB451582 M	IFARE 1K	MAD1 Admin	R/W	App Sector Pass	
						Auto Scan
	MAD ATD man	(14 Of W	ree Sector)			Refresh List
	1234	0000 0000	0000 0000 0000	0000		Issue Card
	0000 0000	0000	0000 0000 0000	0000		
	Sector #1					MAD Card
	Block0 00	Your A	ID in the MAD	0		Format
	Block1 00 Block2 00			0		
		Sector		-		Assignment
						Remove AID
	1					
				Read C	K	

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=FFFFFFFFFFFFFFF).

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

Assignment - CB451582		X				
Customer AI	D 5678					
Customer Secto	<sup>r</sup> Sector 2	-				
Customer Admin Ke	> Mifare Card Issuer					
Assignment	GIGA- Quality, De	TMS INC.	/	Mifare Ca for MF70	rd 0 re	ader V1. OR0
	Card SN Class	Type	Level	Status		Configure
	CB451582 MIFARE 1K	MAD1 Admin	R/W	App Sector Pass		Auto Scan
	MAD AID map (13 0f ) 1234 5678 0000 0000 0000 0000	Free Sector) 0 0000 0000 0000 0 0000 0000 0000	0000	_	~	Refresh List Issue Card
	Sector #1 Block0 000000000 Block1 000000000 Block2 000000000000000000000000000000000000	Jew Customer AID	in the			Format Assignment Remove AID

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



bit0

bit7

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

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

	1			
byte n	byte n-1		byte 1	byte O
00	last character	•••••	character 1	type length <n></n>

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"

Issue Card - 7471630A	X				
Wiegand / TK2 User Data	User Data				
ASCII String Edit Use CSN					
.4Vx	~				
	~				
Hex Code Edit					
	~				
	~				
Card Holder Information (Optional) Without Card Holder Informa	tion				
Surname					
Given Name					
Sex (None)					
PIN Code * ONLY FOR LBR700					
Remain capacity 0%					
Import Read Card Write Card Clo	se				

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

🔑 Mifare Reader Utility (¥1.1R8) -ABA-TK2 LED/Buzzer Reader Mifare Card Information MAD-AID (HEX) 4703 MAD S 1 • FFFFFFFFFFF2 -✓ Used Card (Not issued by PROMAG card issuer) Offset 0 Length Update Reader Auto Scan Language

### ANNEX C. 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 15)





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