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## ***FG70 Technical Documentation***



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# FG70

# Product Manual

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**Note: This manual can be applied to standard version and Mifare version of FG70. However, in section 4.2.5, only Mifare version has the card function, standard version not has this function**

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## Regulatory Standards Compliance

### A. EMI Warning

#### FCC Class A Certification

This device complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

**Warning!** This equipment has been tested and found to comply with the limits for a 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 the instructions, may cause harmful interference to 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.

### B. CE Mark Declaration of Conformance

This product complies with the requirements of the Low Voltage Directive 73/23/EEC (UL 60950) and the EMC Directive 89/336/EEC (ETS 300 329).

CE mark	
EMC directive	89/336/EEC (ETS 300 329)
Safety (low voltage directive)	73/23/EEC (UL 60950)

## Revision History

Rev. #	Date	Updated By	Description
1.0.0	2003.03.15	P.C. Hung	Initial
1.0.1	2003.04.22	Joe Kuo	Matching mode modification
1.0.2	2003.09.22	NT.Tsai	Adding matching process for card
1.0.3	2004.01.15	ZR. Huang	Adding attendance function
1.1.0	2004.02.10	ZR. Huang	Combining Mifare version with standard version

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# 1. FG70 Node Installation

## 1.1. Packing List

Before you begin installing your FG70, please make sure that the following materials have been shipped:

- | 1 FG70 Installation Guide
- | 1 FG70 Product Manual
- | 1 CD
- | 1 certificate of warranty
- | 1 FG70
- | 1 hanger
- | 2 Plastic covers
- | 4 screws
- | 1 AC to DC adaptor (optional)
- | 1 identification card (optional, it is applied to Mifare version)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

### 1.1.1. Preparation of tools / parts

You'll need some tools and parts to for the installation. The required tools / parts are listed in the following Table.

Item	Function	Quantity	Description
Cross-head screwdriver	Tool	1	
Flower-head screwdriver	Tool	1	
Plastic screw receiver	Part	N	Insert into the wall for screw receiving
Screw	Part	N (4-10)	M4; Fasten the hanger against the wall

## 1.2. Starting Installation

For details of how to install FG70 onto its companion hanger, please refer to “FG70 Installation Guide” for instructions.

## 2. Specification

### 2.1. Mechanical specifications

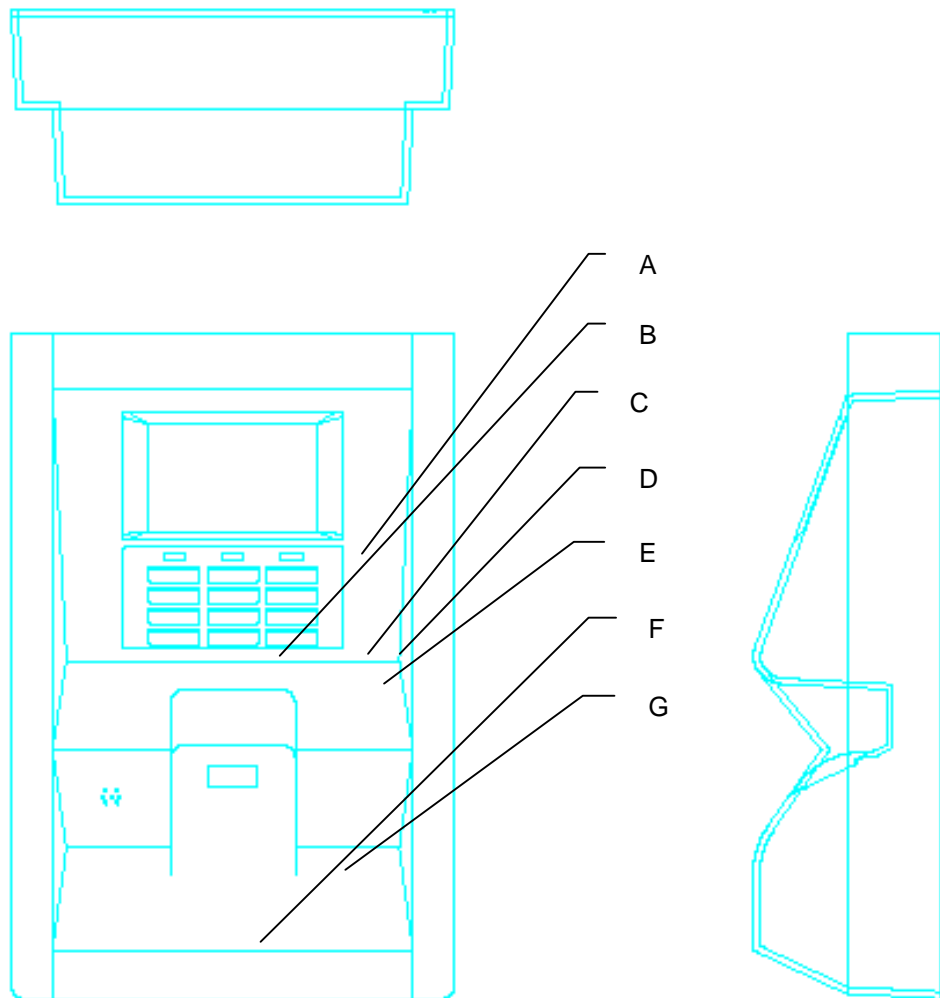


Figure 2.1 Schematic outlook of FG70 from the top, front and side views

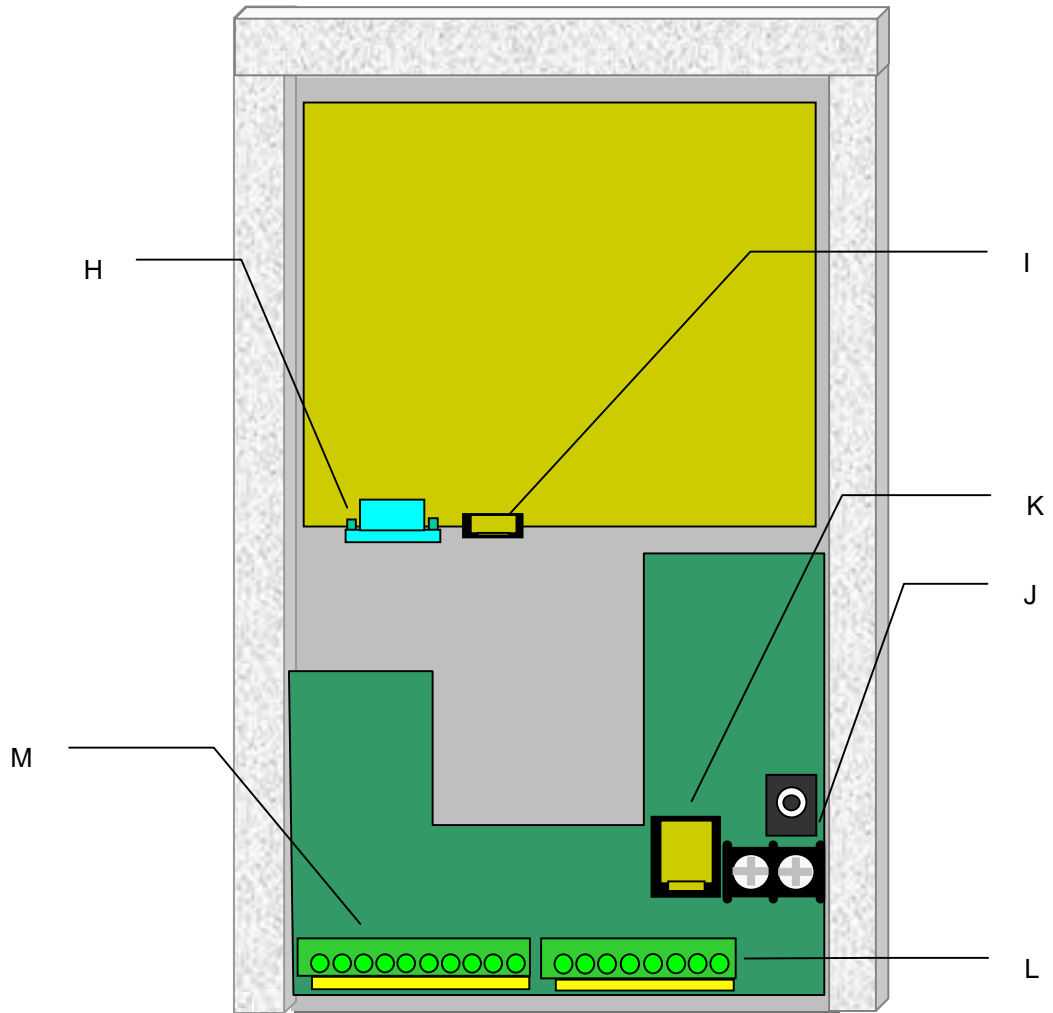


Figure 2.2 Schematic outlook of FG70 from the back view

## 2.2. Description of components

- A LCD to display the information of system
- B LED 1 to indicate the status of power
- C LED 2 to indicate the status of control
- D LED 3 to indicate the status of door / lock
- E Keypad to input the ID for verification or maintenance
- F Speaker to indicate the results of events or system alarms
- G Fingerprint scanner to collect fingerprints for verification
- H RS232
- I Ethernet
- J DC 24 V power supply
- K External link
- L Input
- M Output

## 2.3. Electrical Specifications

### 2.3.1. Block diagram

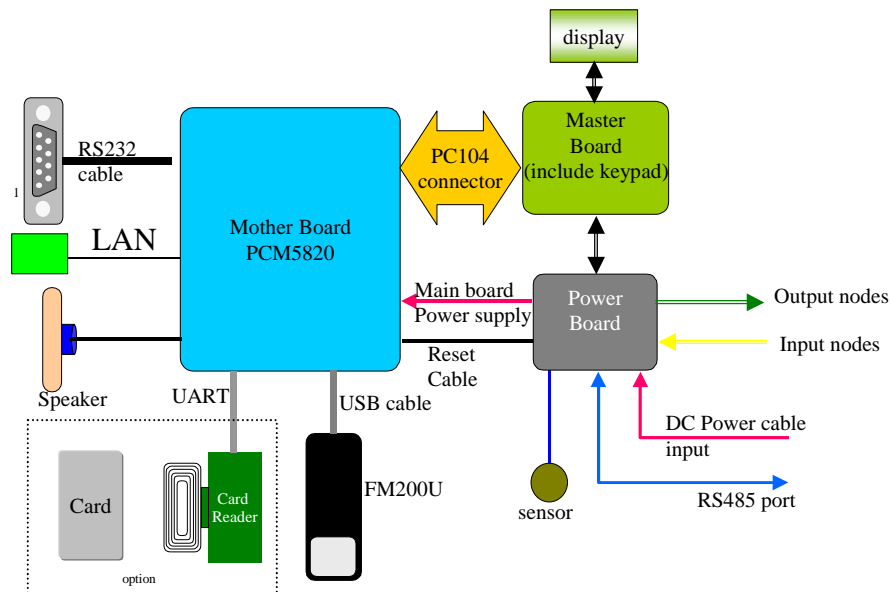


Figure 2.3 Block diagram of FG70

n FG70 comes with an embedded high-performance NS Geode GX1-300 processor on-board. Mother board also supports an SDRAM SODIMM socket that can accept up to 128 MB memory. On-board features include an Ethernet interface, audio interface, socket for Compact Flash Card, Enhanced IDE interface with up to Ultra DMA transfer protocol, one parallel port, two serial ports (RS-232 and RS-232/422/485) with DB-9 connector as COM1, and a mini-DIN PS/2 keyboard/mouse interface.

n The fingerprint scanner (FM200) is connected with Main board through USB port. This optical module is a high-performance fingerprint

scanner based on CMOS sensing technology. This module could also support normal / sleep modes switch for economic power consumption.

**n** Master board is to decode LCD module, keypad, general I/O and data backup. Power board is to manage power transform, sensor detection and I/O control.

### 2.3.2. Electrical characteristics

Item	Parameter	Min	Typical	Max	Units
DC input	DC power supply voltage	20		30	V
Input current	Active input current			830	mA
Power consumption	(Standalone only) system power consumption including normal / sleep modes			20	W
Operation voltage 1	Internal work voltage @ DC+5V	4.9		5.1	V
Operation voltage 2	Internal work voltage @ DC+3.3V	3.0		3.6	V
Power noise	Internal DC voltage of noise			70	mV <sub>rms</sub>
Battery voltage	Internal backup battery	2	3.6	4.2	V
Power adoption of output nodes	Rated Carrying Current for relay node(s)			10	A
	Rated Carrying Current for signal node(s)			300	mA
MTBF			34868		hours

## 3. Introduction

### 3.1. Overview

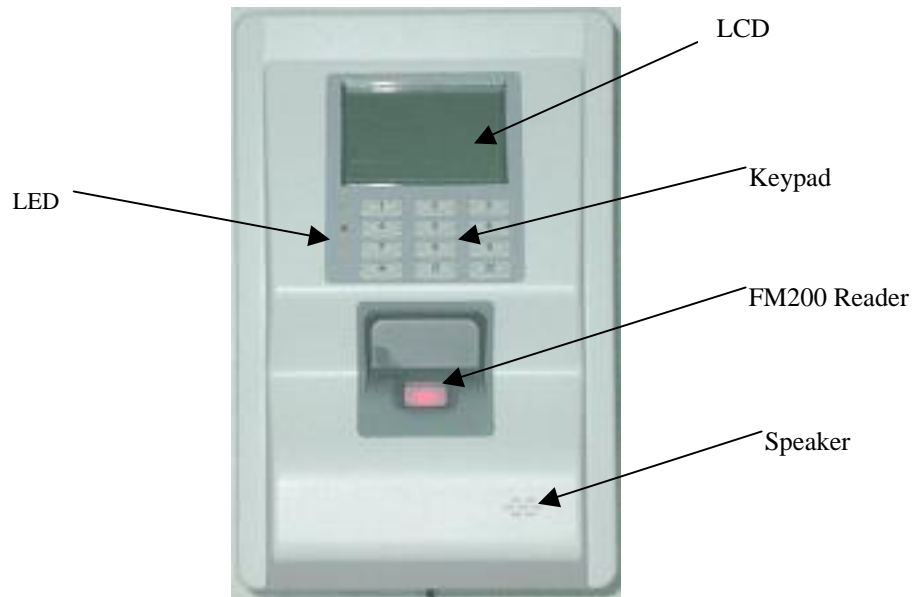


Figure 3-1. The 5 integral parts of FG70

There are 5 integral parts on FG70. They are described as follow.

1. LCD: Display the messages
2. LED: Show device / event status
3. Keypad: Input ID, password or other instructions.
4. FM200 reader: Snap fingerprint
5. Speaker: Play sounds of specific operation

The default initial screen, after system startup, is shown as Figure 3-2.

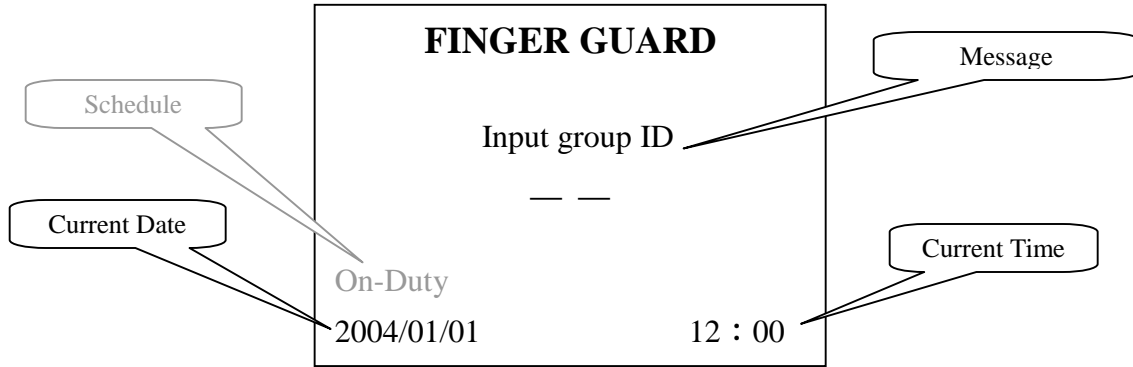


Figure 3-2. The default initial screen after system startup

Attendance (schedule) function: the system can select whether use this function or not by FG70 Host. If use it, the system decide the user's access base on the schedule. It can edit the name of schedule and lock setting, and so on, by FG70 Host. The detail is in FG70 Host management manual The system will bring up the schedule menu screen (is shown as Figure 3-3 example)to select schedule by pressing “\*”, pressing “\*” again, the screen will back to original screen. ◦

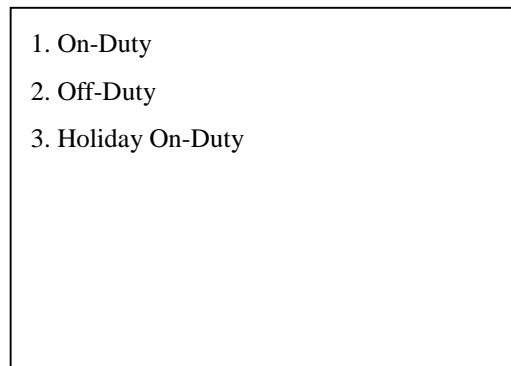


Figure 3-3. Schedule menu.

LED's :

LED	On	Blinking
Green	Ready to operation	Verifying or Identifying
Red	—	Warning
Orange	Always lock or Always unlock	—

## 3.2. Status of Door and Lock

### 3.2.1. Always Locked (Orange LED On)

The door is always locked and is not accessible by all kinds of authentication.

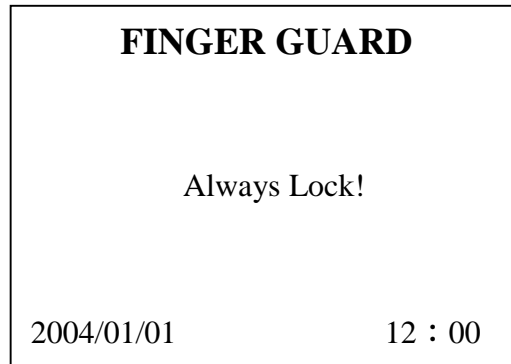


Figure 3-4. Always Locked

### 3.2.2. Always unlocked (Orange LED On)

The door is always unlocked and user can open the door without the need to verify his / her identity.

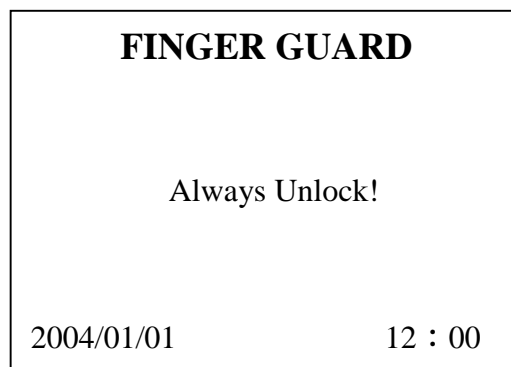


Figure 3-5. Always Unlocked

### 3.3. Abnormal status for door / lock

In the abnormal status for either the door or lock, red LED will blink and the system will make beeping noise to call for attention. Any one of the following scenarios could lead to the occurrence of the pre-set alarm.

- Door stay open for more than a specified period of time
- Imperfect locked - door is not closed completely so the loc is not in its right position
- Prized open – a specific combination of door / lock status ( open / locked)

To avoid any misunderstanding of the security policy, please check the door and lock status constantly.

### 3.4. Emergency Matching (User ID+ The third Finger Verification)

There are occasions that a legal user might be threatened by some mob or terrorist to assess FG70. In such case, a so-called “emergency-matching” could be chosen by the legal user to notify others automatically. .

- Send emergency event to control center
- The lock control could be configured to be locked or unlocked
- When the corresponding emergency notification fails to be delivered to the control center, a screen as follow will be displayed.

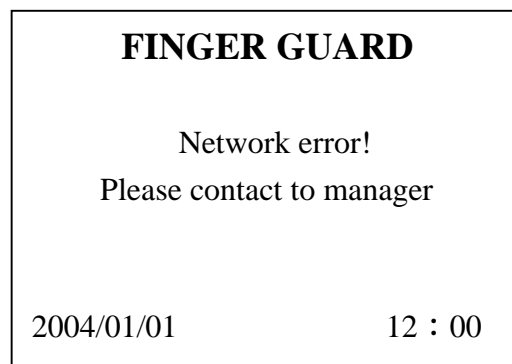


Figure 3-6. Can not send emergency event to control center

## 4. Operation Mode

When done with the configuration in Administration Mode, exit the Administration mode will go to the Operation Mode.

### 4.1. Matching Mode

There are 4 matching mode in FG70 which describe as below:

1. Mode 1:  
Support one-to-one verification and one-to-group, one-to-many identification.
2. Mode 2:  
Support one-to-one verification and one-to-group identification.
3. Mode 3:  
Support one-to-one verification only.
4. Mode 4:  
Support one-to-one verification and one-to-many identification. It is the default matching mode of FG70.

### 4.2. Verification and Identification

When none of the keys is pressed, the system will go to sleep mode. The default screen is shown as Figure 4-1.

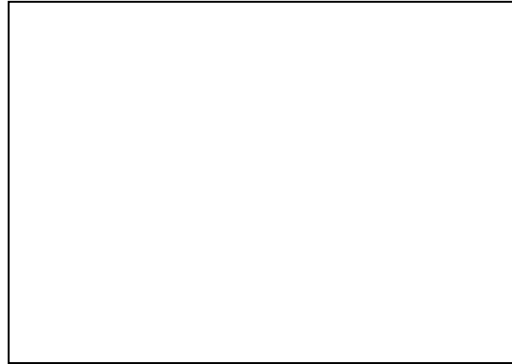


Figure 4-1. Standby screen

In standby screen of matching mode 1 or 2, when any key is pressed, the system will wake up and bring up the Group Matching Screen as shown in Figure 4-2

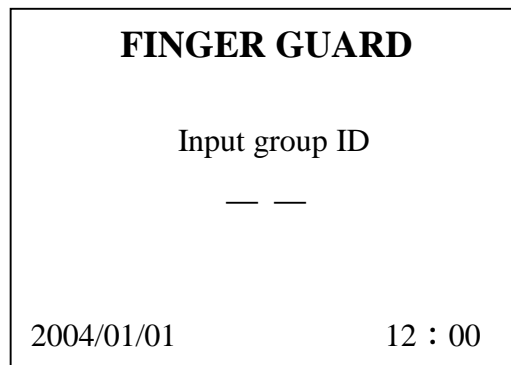


Figure 4-2. Default screen of matching mode 1 or 2

In standby screen of matching mode 3 or 4, when any key is pressed, the system will wake up and bring up the User Matching Screen which shown as Figure 4-3

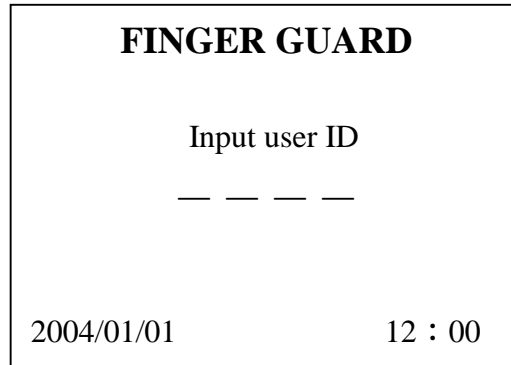


Figure 4-3. Default screen of matching mode 3 or 4

#### 4.2.1. Group ID + Fingerprint verification

User may input Group ID (default value is 01), then place fingerprint to identify themselves in specific group. If the group id exists, the screen is shown as Figure 4-4, otherwise the screen is shown as Figure 4-5.

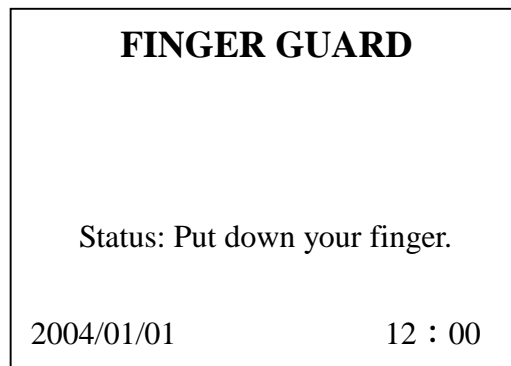


Figure 4-4. The screen after valid group id is pressed

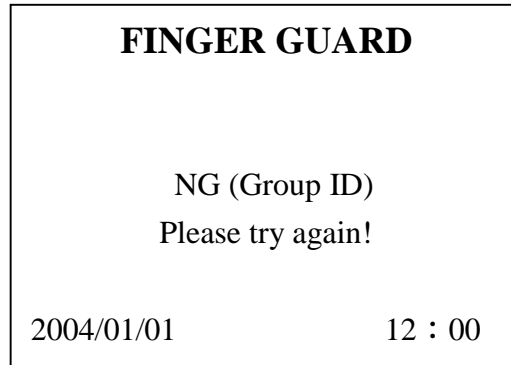


Figure 4-5. The screen after invalid group id is pressed

If the group id exists and the user is identified successfully, then system will check the user's shift and the valid period of user's profile. The details are described in section 4.3.

If the group id exists but the user is not identified successfully, then the screen is shown as Figure 4-6.

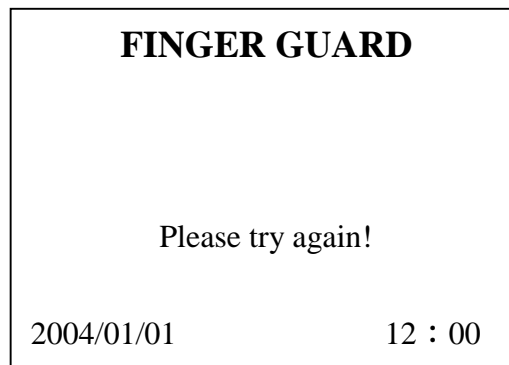


Figure 4-6. Verify or identify failed

If the continuous NG count is more than allowed NG count, then the screen is shown as Figure 4-7.

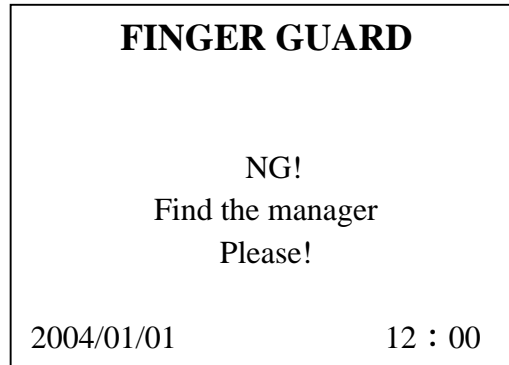


Figure 4-7. Verify or identify failed after allowed NG counts

### 4.2.2. Fingerprint-Only identification

When in default screen or sleep mode of operation mode, user may place fingerprint directly to identify themselves. In matching mode 1 or 2, FG70 assumes the default user group 01. In matching mode 4, FG70 identify all of enrolled users. If user is identified successfully, then system will check the user's shift and the valid period of user's profile. The details of successful identification are described in section 4.3.

If user is not identified successfully, then the screen is shown as Figure 4-7.

### 4.2.3. User ID + Fingerprint verification

In default screen of matching mode 3 or 4, or press “#” in default screen of matching mode 1 or 2, then screen will be bring up shown as Figure 4-3.

User input the User ID then place fingerprint to verify the user. If the User ID doesn't exist, then the screen is shown as Figure 4-8.

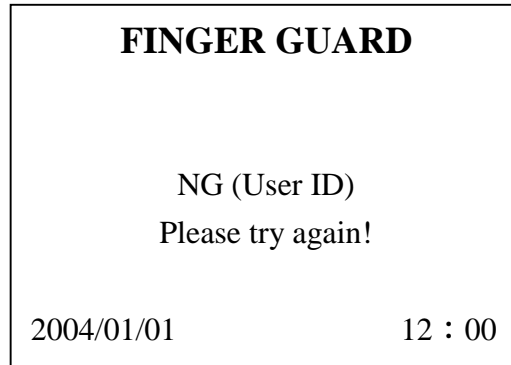


Figure 4-8. Invalid User ID

If the User ID exists and the user is verified, then system will check the user's shift and the valid period of user's profile. The details of successful identification are described in section 4.3.

If the User ID exists but the user is not verified, then the screen is shown as Figure 4-6.

If the continuous NG count is more than allowed NG count, then the screen is shown as Figure 4-7.

#### 4.2.4. User ID + Password verification

In default screen of matching mode 3 or 4, or press “#” in default screen of matching mode 1 or 2, then screen, shown as Figure 4-3, will be bring up. After input valid user ID, then screen, such as Figure 4-4, after input any key, if the user's password is enabled, user may input password in screen, shown as Figure 4-9.

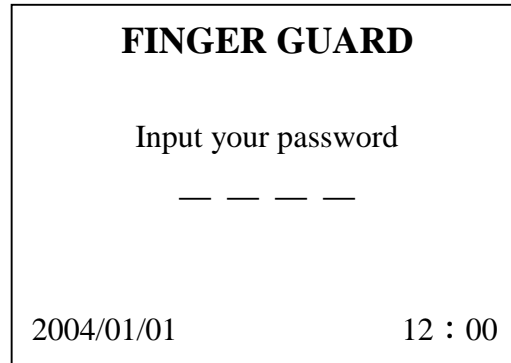


Figure 4-9. The user id exists

If the User ID exists and the password user input is correct, then system will check the user's shift and the valid period of user's profile. The details of successful identification are described in section 4.3.

If the password input is not correct, then the screen is shown as Figure 4-10

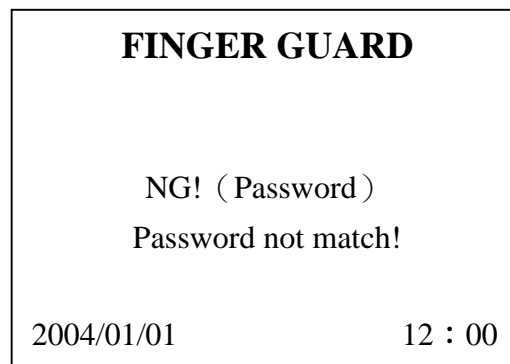


Figure 4-10. The user id exists but password is incorrect

#### **4.2.5. Card + User ID + Fingerprint verification + Password verification**

This section is only applied to Mifare version, standard version is not suitable for this section. In default screen, if user uses the invalid identification card, then the screen is shown as Figure 4-11 because the User ID can not be found. If the

continuous NG count is more than allowed NG count, then the screen is shown as Figure 4-7.

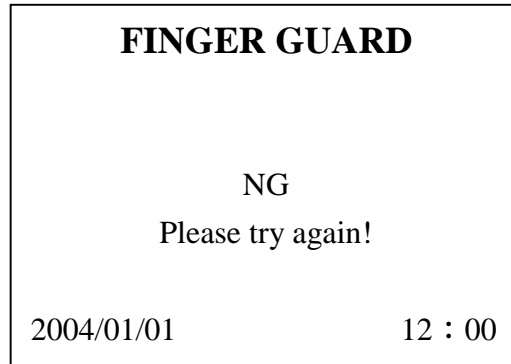


Figure 4-11. Invalid User ID

In default screen, if user uses the valid identification card, the screen is shown as Figure 4-12, because the User ID can be found, then. Then, if the valid identification card can be read the finger of user data, the screen is shown as Figure 4-13. Otherwise, the screen is shown as Figure 4-14. At this time, User can place fingerprint or input the password to verify the user. [ Annotation]

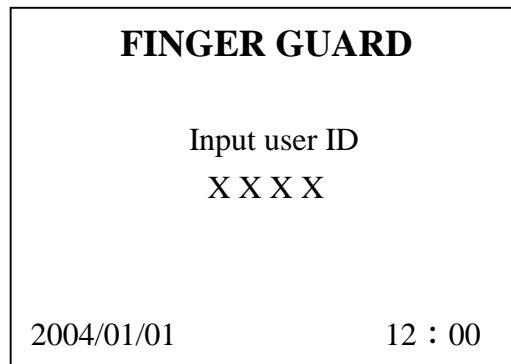


Figure 4-12. existing user for the valid card

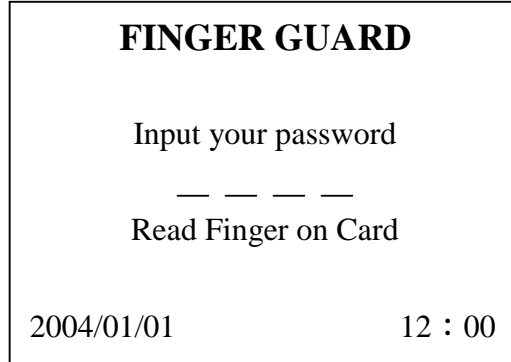


Figure 4-13. Matching with finger data.

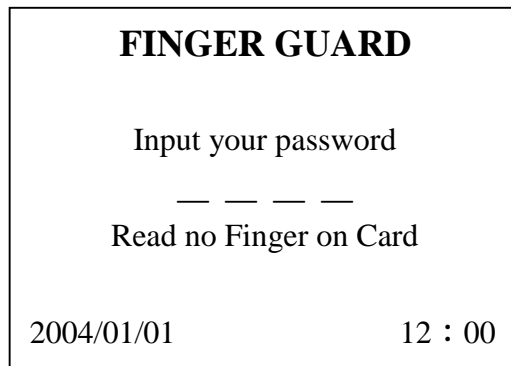


Figure 4-14. Matching with finger data

If the user is verified, then system will check the user's shift and the valid period of user's profile. The details of successful identification are described in section 4.3.

If the User ID exists but the user is not verified, then the screen is shown as Figure 4-6.

If the continuous NG count is more than allowed NG count, then the screen is shown as Figure 4-7.

### 4.3. Additional Check

After successful verification with the identity, system will check the user's shift and valid period of user's profile. First, system will check if the user's profile is still valid. If the

user profile is out of date, then the screen is shown as Figure 4-15.

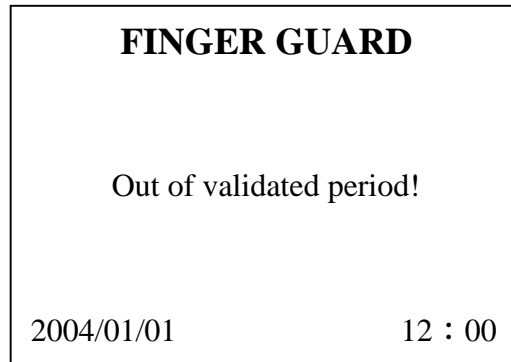


Figure 4-15. The user profile is out of valid period

If the user's profile is still valid, then system will check the user's shift. If it is out of working time according the shift definition, then the access will be denied, as shown in Figure 4-16.

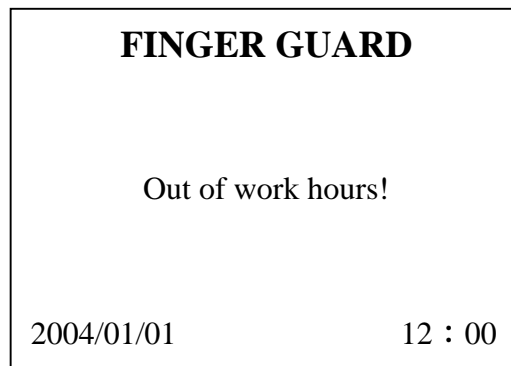


Figure 4-16. Out of work hours

If the user that be set to no door access, the access will be denied as well, as shown in Figure 4-17.

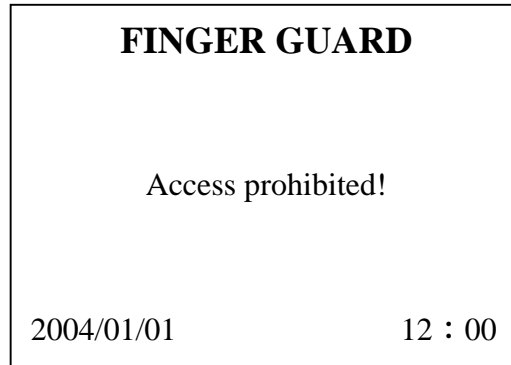


Figure 4-17. Access prohibited

If the user is in valid period and can open door by user's shift, then the screen is shown as Figure 4-18.

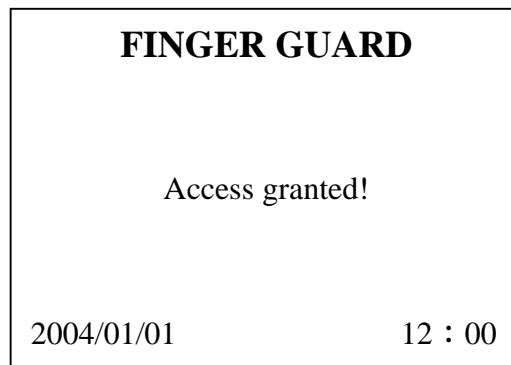
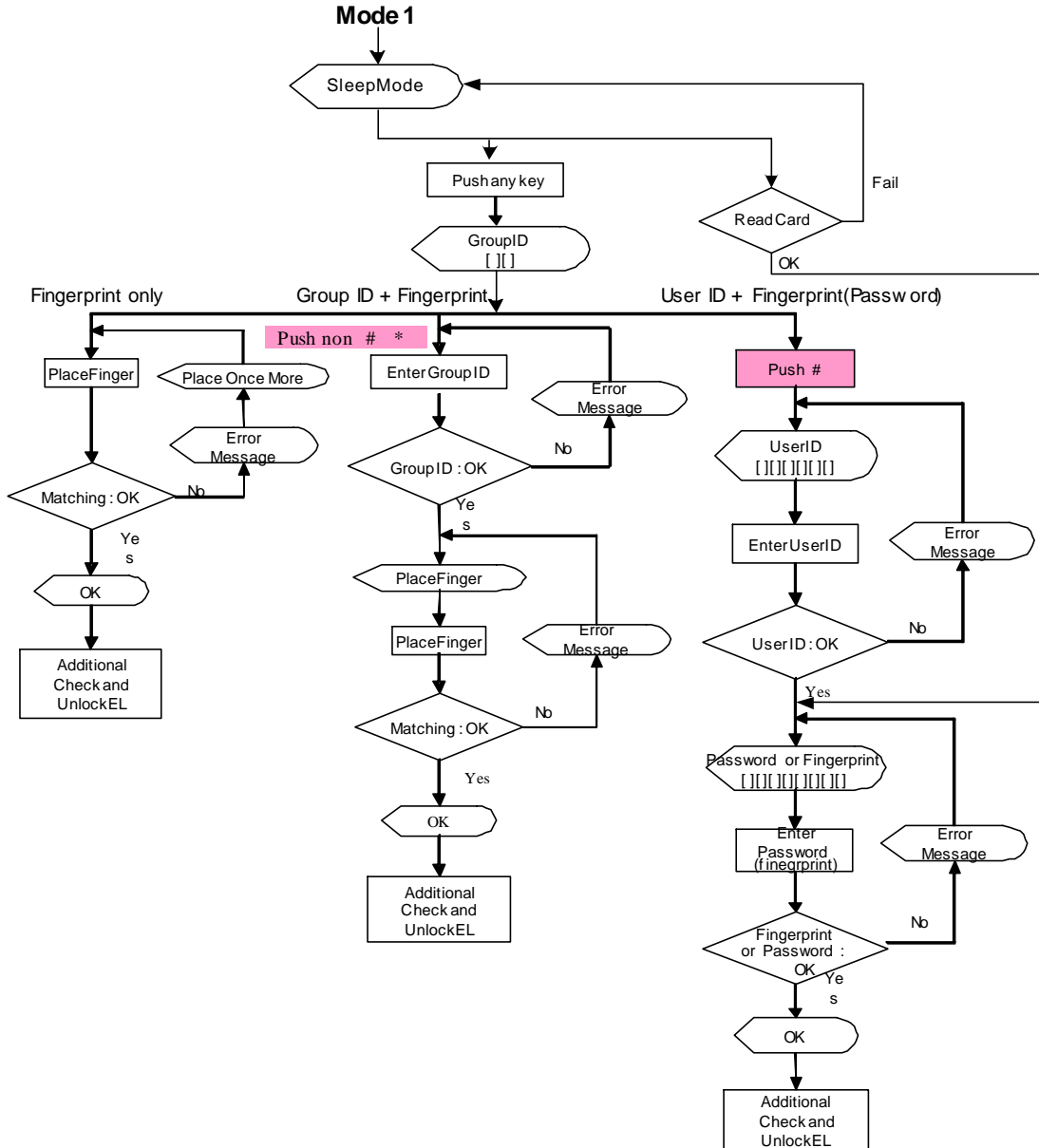


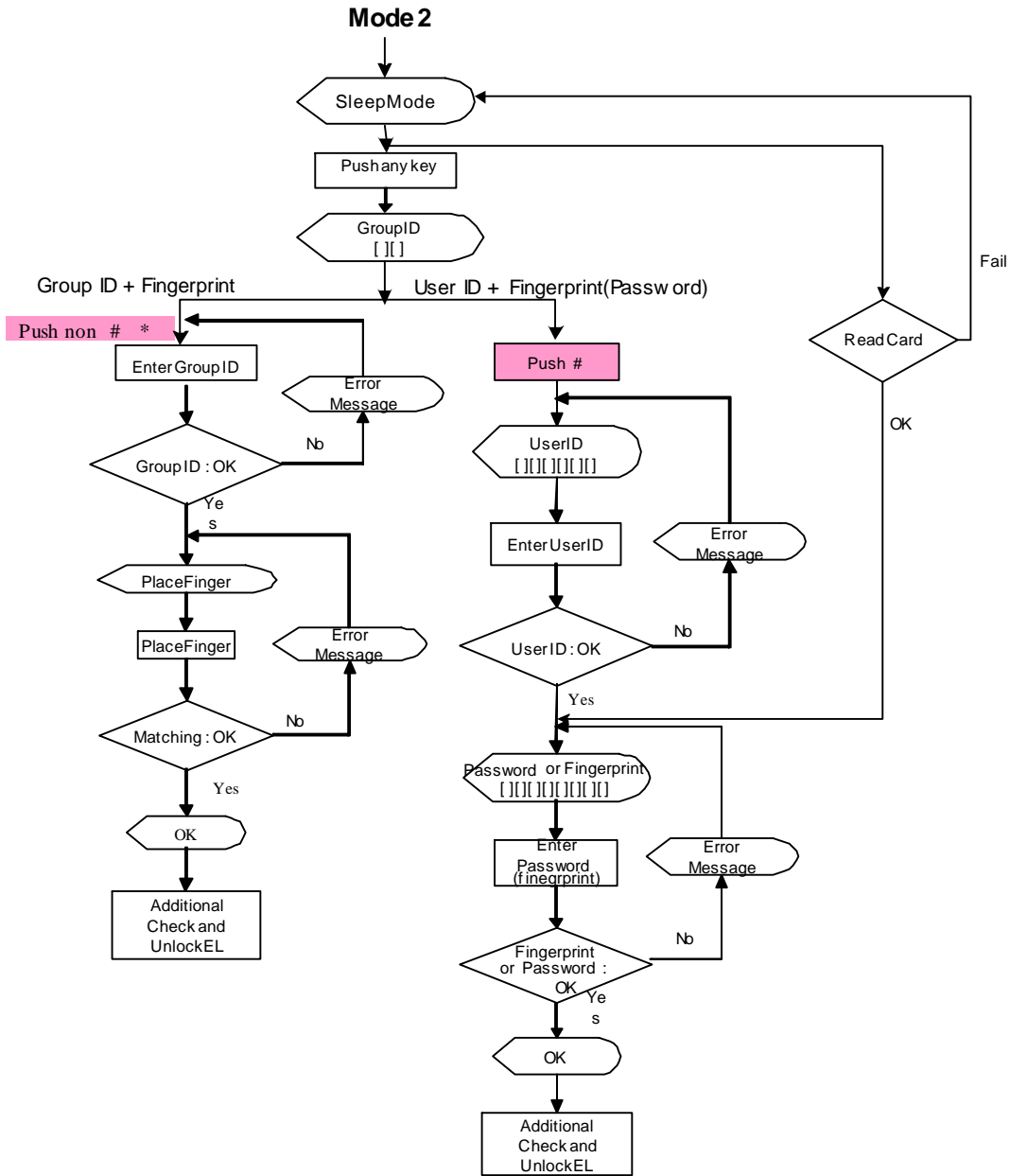
Figure 4-18. Access granted

## 4.4. Authentication Process Flow

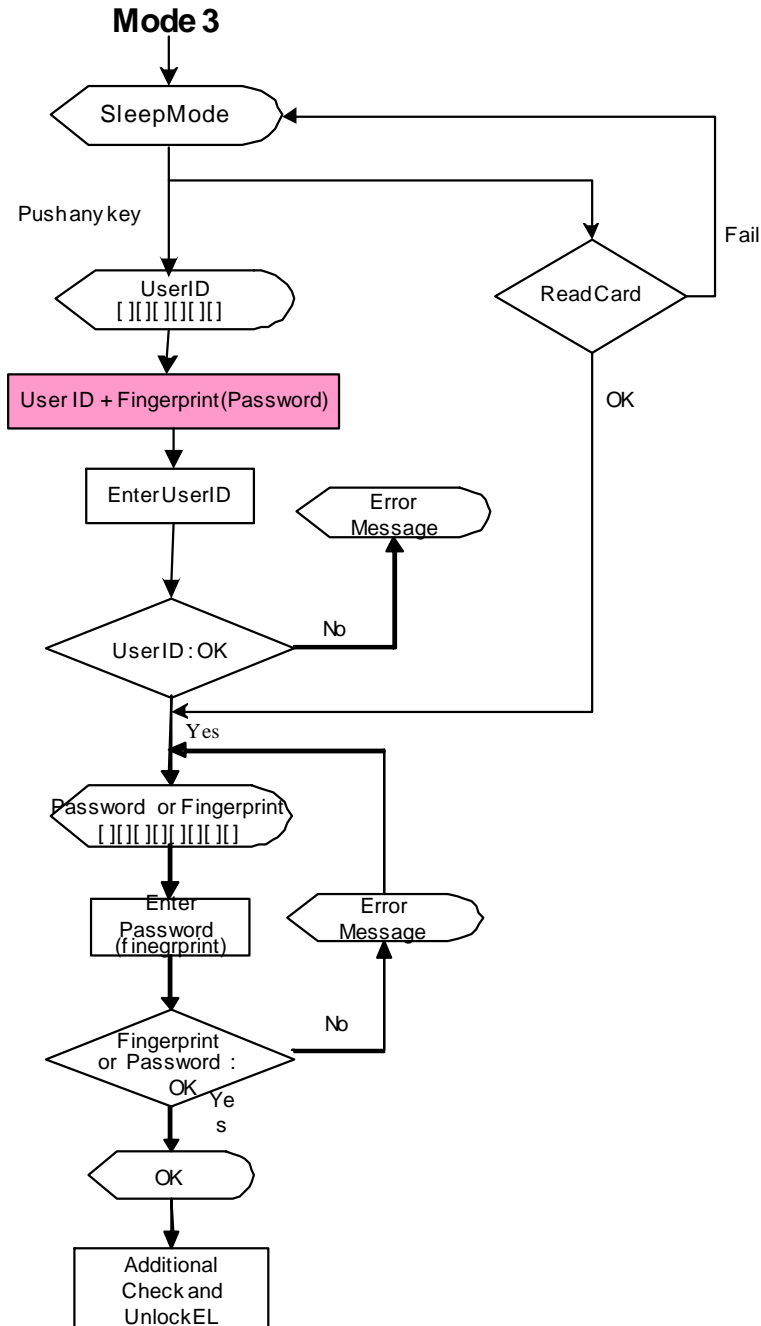
### 4.4.1. Process Flow of Mode 1



## 4.4.2. Process Flow of Mode 2



### 4.4.3. Process Flow of Mode 3





## 5. Finger Placement

### 5.1. Finger Placement

When placing finger on the reader, try to stretch your finger as flat as possible and slightly put it on the sensor. The central point of your finger should be as close to the central area of the sensor as possible. Do not push your finger with force or drag your finger, as such behavior will likely cause your fingerprint to distort and affect the authentication. If you feel that your finger is not placed correctly, remove your finger first and then replace it on the sensor. If the surface of your intended finger is damaged, please use another enrolled finger if available.

The following figures exemplifies several correct and incorrect finger placements:



Figure 5-1. Correct



Figure 5-2. Too near the upper edge



Figure 5-3. Too near the right edge.

## 5.2. Central Point of Fingerprint

The following figures illustrate the central point of each fingerprint type. The enclosed area is the central point.



Figure 5-4. Central point of right loop fingerprint



Figure 5-5. Central point of whorl fingerprint



Figure 5-6. Central point of left loop fingerprint



Figure 5-7. Central point of arch fingerprint

## 5.3. Finger Moisture Suggestion

Whether the finger is too dry or too wet will have great influence on fingerprint snapping and authentication. If the finger is too wet, the minutiae taken will be blurred by too much moisture. To solve the problem, try to dry your hand before authentication. On the other hand, if the finger is too dry, the minutiae would be too difficult to take, thus disabling the authentication. In this case, try to rub or oil your hand to keep moisture.

## Annotation

### Annotation 1 : Standard of Mifare card

The International Standards Organization (ISO) defined it ; The relative standard is ISO14443 (proximity cards) 。

### Annotation 2 : Advantage of Mifare card

- n Among of the contactless card products, it provides the most security level for safe protection. ( In industry, there is only one to own public key for encryption among of the contactless card products )
- n It is fully verified and tested by VISA and TNO.
- n There are organs operating independently to verify the relative products.
- n Mifare can provide the most types of the product to be chose, and it also can meet any different requirement.
- n There are .two hundred and fifty million cards in sales volume.
- n It is installed in the world wide and worked very well.
- n There are numerous card, card reader, terminal suppliers. It is very easy to get them.
- n The architecture is open, convenient, safe and easy.
- n It is a candidate to fight the deception when we do the contact billing.
- n It can work very well in the poor environment, and it is a reliable technology, and it doesn't need to be maintain in general.
- n It is full tolerance for next generation of production.

### Annotation 3 : Usage Pictures of the Mifare card for FG70

