



Daffodil
International
University

AUTOMATED TELLER MACHINE(ATM)

AT

ZARA ZAMAN TECHNOLOGY LIMITED

**A Project and Thesis submitted in partial fulfillment of the requirements
for the Award of Degree of
Bachelor of Science in Electrical and Electronic Engineering**

BY

HOSSIN MAHAMUD

(ID#:172-33-522)

AND

MD.RIAD SIKDAR

(ID#:172-33-482)

Supervised by

ENGR. MD. MAHBUB-UD-JAMAN

LECTURER

Department of EEE

**DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING
FACULTY OF ENGINEERING
DAFFODIL INTERNATIONAL UNIVERSITY**

JANUARY 2021

Certification

This is to certify that this project and thesis entitled “AUTOMATED TELLER MACHINE(ATM) AT ZARA ZAMAN TECHNOLOGY LIMITED” is done by the following student under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on 31 October 2020.

Signature of the candidates

Name: HOSSIN MAHAMUD
ID #: 172-33-522

Name: MD.RIAD SIKDAR
ID #: 172-33-482

Countersigned

Md. Mahbub- Ud-Jaman
Lecturer
Department of Electrical and Electronic Engineering
Faculty of Science and Engineering
Daffodil International University.

The project and thesis entitled “AUTOMATED TELLER MACHINE(ATM) AT ZARA ZAMAN TECHNOLOGY LIMITED” submitted by **HOSSIN MAHAMUD, ID No:172-33-522 and MD.RIAD SIKDAR, ID No:172-33-482** Session: Summer 2017 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** on 31 October 2020.

BOARD OF EXAMINERS

Dr. Engr. ...
Professor
Department of EEE, DIU

Chairman

Dr. Engr. ---
Professor
Department of EEE, DIU

Internal Member

Dr. Engr. ---
Professor
Department of EEE, DIU

Internal Member

*This thesis is dedicated to our
parents & teacher's
For their endless love, support
and encouragement...*

CONTENTS

List of Tables	vii
List of Figures	vii
List of Abbreviations	viii
Acknowledgment	ix
Abstract	x
Chapter 1: GENERAL DESCRIPTION	1-5
1.1.Intent and user	1
1.2.Notes	2
Chapter 2: Structure and Working Principle	5-27
2.Card Reader	5
2.1. Motorized Card Reader (ICT3Q8-3A0179)	5
2.1.1 General Description	5
2.1.2 Technical Specification	5
2.1.3. Working Principle	6
2.1.4.Electrical Interface	8
3.Journal Printer	9
3.1. Dot Matrix Journal Printer (DJP-617B)	9
3.1.1. General Description	9
3.1.2. Technical Specification	10
4.Industrial Pc(IPC-010)	11
4.1.General Description	11
4.2.Technical Specification	11
5.Power supply module	13

5.1.General Description	13
5.2.Structure Overview	13
5.3.Technical Specification	14
6.Electrical Interface Industrial PC	17
6.1.Working Principle Scheme	17
7.Capacitor	18
7.1.Working Principle	18
8.H22NL Communication Diagram	19
9.Test Program	20
9.1.Offline diagnose system	20
9.1.1 Switch and Indicator	20
9.1.2 Switch	21
9.1.3.ODS operation	21
9.1.4.Command List	21
9.1.5.Pertial Command Description	23
10.Receipt Printer	25
10.1. Maintenance	25
10.1.1 How to adjust the low-level sensor	25
10.1.2 How to adjust the sensitivity of black mark sensor	25
10.1.3 How to adjust lower guiding plate	25
10.2. Replacement	25
10.2.1 How to replace control board	25
10.2.2 How to replace printer head	26
10.2.3 How to replace paper feeding belt	26
10.3. Cleaning	27
Chapter 3: Advantages and Disadvantages of ATM	28-29
3.1.Advantages of ATM machines	28
3.1.1.Access to hard cash Anywhere at Anytime	28
3.1.2.ATM machines offer financial Inclusion	28

3.1.3.ATM machines offer wide range of services	28
3.1.4.ATM machines are Cheaper to maintain	28
3.2.Disadvantages of ATM machines	29
3.2.1.ATM machines can be targeted by criminals,robbers and hackers	29
3.2.3.ATM machines are costly for the users	29
3.2.4.Obsolescence	29
Chapter 4: Recommendation and Limitation	30
4.1.Recommendation	30
4.2.Limitation	30
Chapter 5: CONCLUSION	31

LIST OF FIGURES

1.1 H22VL outside look	3
1.2 H22VL inside Look	4
2.1 card Reader	5
2.2 Electrical Interface	8
2.3 Dot Matrix Journal Printer	9
2.4 Industrial Pc	11
2.5 Power supply module	13
2.6 Electrical Interface Industrial PC	17
2.7 CD135 Capacitor	18
2.8 H22NL Communication Diagram	19
2.9 Switch and Indicator	20

LIST OF TABLE

2.1. AC Input Specification 14

2.2. Command List 21

List of Abbreviations

ATM	An Automated Teller Machine
RTPA	Real-Time Process Algebra
UDM	Unified Data Model
UPM	Unified Process Model
RTPA-CG	Real-Time Process Algebra Code Generator
AC	Alternating Current
DC	Direct Current
LED	Light-emitting diode

ACKNOWLEDGEMENT

First of all, we give thanks to Allah or God. Then we would like to take this opportunity to express our appreciation and gratitude to our project and thesis supervisor **Engr. Md Mahbub-Ud-Jaman, Lecturer of Department of EEE** for being dedicated in supporting, motivating and guiding us through this project. This project can't be done without his useful advice and helps. Also thank you very much for giving us opportunity to choose this project.

We also want to convey our thankfulness to **Dr. Engr. Name, Professor and Chairperson** of the **Department of EEE** for his help, support and constant encouragement.

Apart from that, we would like to thank our entire friends for sharing knowledge; information and helping us in making this project a success. Also thanks for lending us some tools and equipment.

To our beloved family, we want to give them our deepest love and gratitude for being very supportive and also for their inspiration and encouragement during our studies in this University.

ABSTRACT

An Automated Teller Machine (ATM) is a safety-critical and real-time system that is highly complicated in design and implementation. This paper presents the formal design, specification, and modeling of the ATM system using a denotational mathematics known as Real-Time Process Algebra (RTPA). The conceptual model of the ATM system is introduced as the initial requirements for the system. The architectural model of the ATM system is created using RTPA architectural modeling methodologies and refined by a set of Unified Data Models (UDMs), which share a generic mathematical model of tuples. The static behaviors of the ATM system are specified and refined by a set of Unified Process Models (UPMs) for the ATM transition processing and system supporting processes. The dynamic behaviors of the ATM system are specified and refined by process priority allocation, process deployment, and process dispatch models. Based on the formal design models of the ATM system, code can be automatically generated using the RTPA Code Generator (RTPA-CG), or be seamlessly transformed into programs by programmers. The formal models of ATM may not only serve as a formal design paradigm of real-time software systems, but also a test bench for the expressive power and modeling capability of existing formal methods in software engineering.

CHAPTER 1

GENERAL DESCRIPTION

1.General

1.1.Intent and user

This manual introduces technical information of the hardware models that can be configured in a series of GRG ATMs which is mainly prepared for Hardware Engineers to service and maintenance ATM in field. A series of ATMs are designed on the basis of medullary structure, which provides convenience for the service personnel to replace that defective models as soon as possible in case any failure occurred, and quickly recovered the ATM. we increased our introduction of the latest series ATM including the types of H22N, H38N, H38ND, H46N and etc.

you are supposed to achieve the subjects as below after the training course.

- understand the working principles of all models
- be familiar with the overall ATM structure and the modular interconnects
- master the ATM maintenance and operation via diagnostic unit or LCD service panel
- Manage ATM routine maintenance, for example, replacing printer paper, ribbon, banknote loading, Journal printer survey, cleaning dust and Etc.
- Master ATM toolplus program to recognize break/failure at module level.
- learn the skills of how to analyze is the problem and recover ATM
- disassemble and reassemble each module
- disassemble and reassemble dispenser CDM8240
- maintain envelope deposit unit
- Maintain card reader, received printer, Journal printer, withdrawal shutter, diagnostic unit, IPC, and encryption keypad.

1.2. Notes

- remember to keep the ATM power off before replacing any model

- when servicing modules of the ATM use anti-static wrist strap when you touch circuits board, otherwise the circuits boards might be damaged
- make sure all cables are disconnected before removing replacing or disassembling any modules.

Structure of H22VL

H22VL is a Lobby cash Disoenser

The following two illustrations show the front view of H22NL and the position of the various modules which comprise the ATM



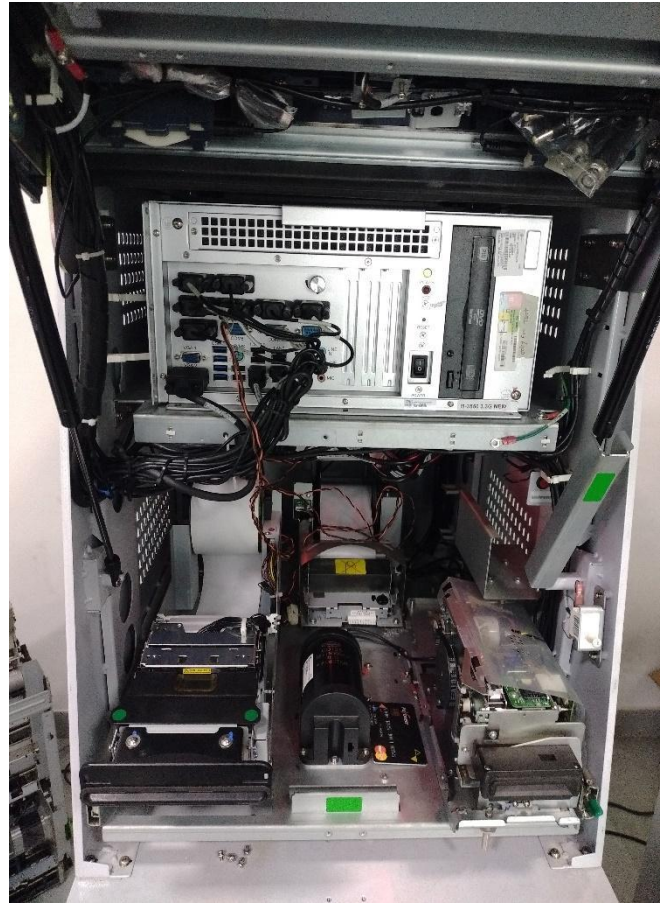
Fig 1.1:H22VL outside look

H22VL Overview(front)

- | | | | |
|----------------------|------------------|-------------------|-------------------|
| 1.Camera(face catch) | 2.User Monitor | 3.Function Keypad | 4.Card Entry Slot |
| 5.Withdrawal Shutter | 6.Numeric Keypad | 7.Receipt Slot | 5.Headphone Jack |



Fig 1.2: H22VL inside Look



H22NL Internal Structure

- 1.Dispenser
- 2.External Cable box
- 3.Receipt printer
- 4.Ups
- 5.Power Switch
- 6.Industrial PC
- 7.DVR
- 8.External Cable Box
- 9.Capacitor
- 10.journal printer
- 11.Spare socket

CHAPTER 2

Structure and Working Principle

2.Card Reader

There are two type of card readers.It equipped with motorized card reader except E300L ATM with DIP card reader,both of card reader read information of card.

2.1. Motorized Card Reader (ICT3Q8-3A0179)

2.1.1 General Description

Three tracks of motorized card reader has the capality of reading and writing simultaneously on the magnetic stripe in compliance with 1607810 and 1507811.It also reads and writes the smart cards in compliace with the ISO7816



Fig 2.1: card Reader

2.1.2 Technical Specification

- Support ISO/IFC Track 1/2/3 read/Write
- Conform to ISO/IFC 7811/7816 high coercivity Card
- Conform to EMV2000 ver 4.0

- SAM1 is assemble on IC contact block,SAM2.5 is optional which is assembled on SAM PCB
- RS232 C/D compatible
- Voltage +24 +10% DC
- Operating temperature/humidity 5°C-50°,20%-80% RH

2.1.3. Working Principle

Magnetic card read/write module is always in passive running mode, receiving commands from industrial PC and executing them. The operations can be fulfilled are described as following,

□ Card take-in operation

Normally the shutter of the card reader is closed to protect the intemal. When the card reader receives the command in takes with magnetic, it will turn into detection status. At this moment if a card is inserted, the "pre-read magnetic head" and "width sensor" will check whether there are records in the magnetic track and whether the width of the card is standard or not. Once both checks have passed, the shutter will be opened, and the card will be taken in automatically and the operation will continue.

□ Magnetic card read/write operation

If the card is magnesc card, the card reader will transport the card from the front to the rear and read/write the second and third track on the card during card movement.

□ IC card read/write operation

If the card is IC card, the card reader will transport the card to IC card read/write position, and the contactor will contact the metal points on the IC card to read/write the card.

□ Card take-out operation

When reading/writing finished, the card reader will wait for transaction end command from the PC. When the PC send the end command, the card will be return to Card in position", waiting to be taken away by the customer.

□ Card capture operation

When magnetic card or IC card gets into the module, when the records is read, the application program may identify whether the card is illegal or overdue according to the

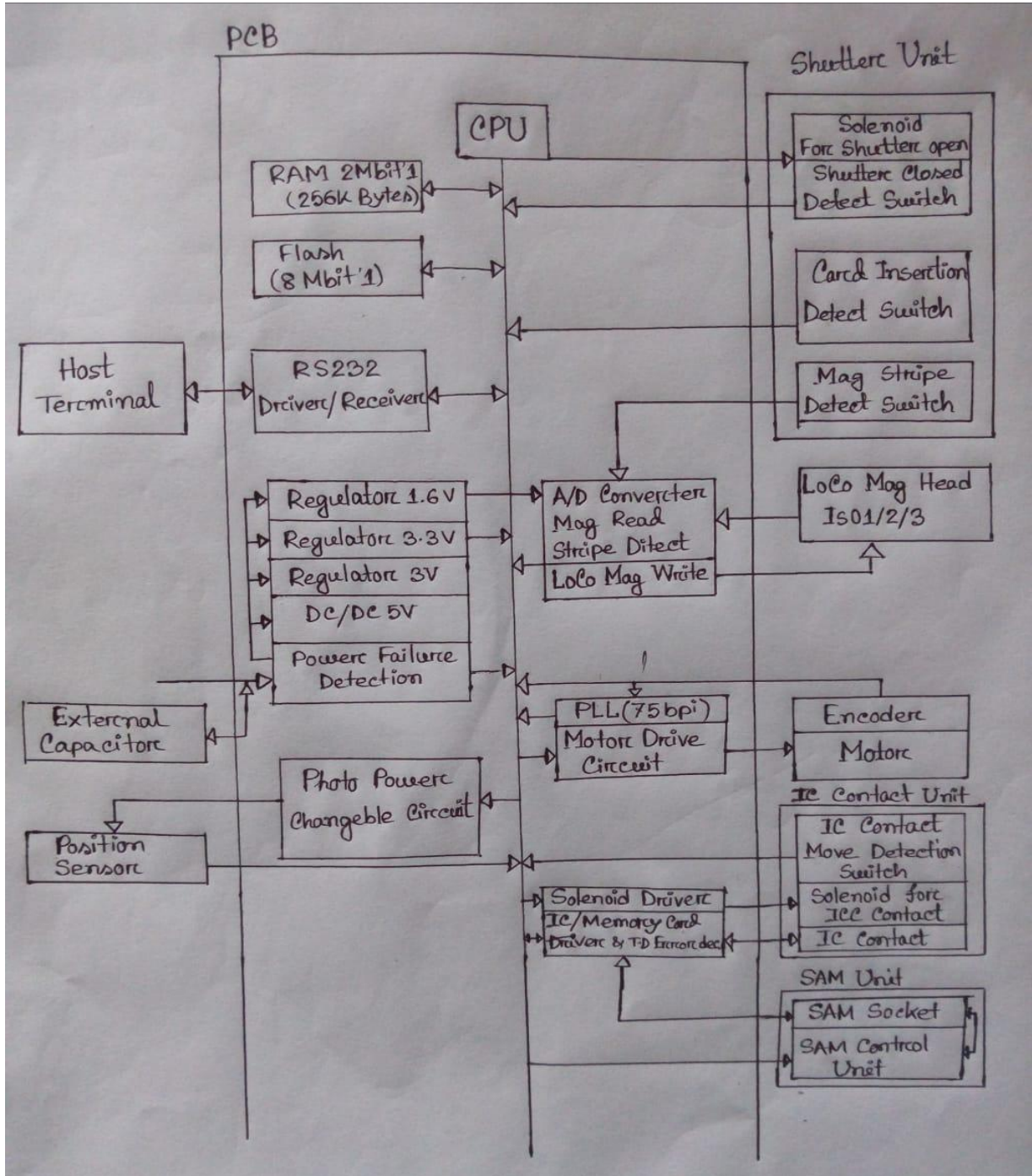
acquired information. And the application program issues card capture command, the card reader will transport the card into the reject bin. During the card in take-out operation, if the card is not taken away within preset time, the application program can also send a card capture command and retrieve the forgotten card into the reject bin.

□ **Card take-out operation when power off (optional)**

When the power supply is abnormal or interrupted suddenly, the module power can be supplied by an external capacitor, this enable the module to transport the card to "card-in position" and wait for the austomer to take away the card.

2.1.4. Electrical Interface

Fig 2.2: Electrical Interface



3. Journal Printer

3.1. Dot Matrix Journal Printer (DJP-617B)

3.1.1. General Description

The dot matrix journal printer characters on the paper by striking printer pins against the ribbon and ribbon contacting the printing paper, Because there are only 9 pins for printing, the printer head should be repeatedly moved from left to right to complete printing of a row of characters, and at the same time, continually newline to complete printing of a whole page.

The journal printer is always in passive running mode, receiving commands from industrial PC and executing them. The operations can be fulfilled are described as following,

- Receiving data and saving it into cache

- Paper feeding and printing

- Winding the paper

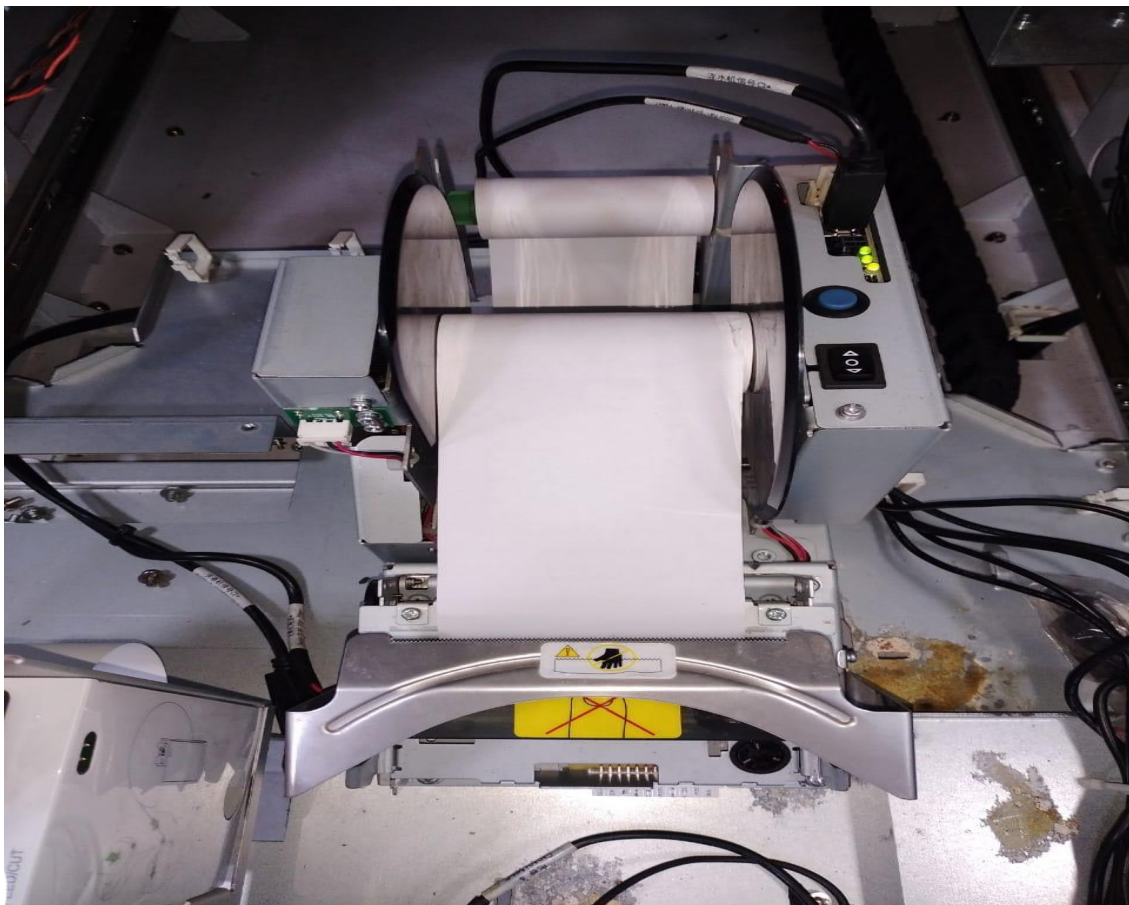


Fig 2.3: Dot Matrix Journal Printer

Dot matrix journal printer overview

1. Paper pocket button
2. Low level paper sensor
3. Base frame
4. Paper feeding Button
5. Self test button
6. Ribbon
7. paper cutter
8. Paper feeding knob
9. Indicator
10. Control Borad
11. Communication connector
12. Power supply connector
13. Control board cover
14. Paper roller bracket

3.1.2. Technical Specification

- Printing method: Dot matrix line printing
- Resolution :400 dot/line
- Printing speed: 3line/s
- Space between dots: 0.293mm
- Space between characters:Configurable (0.3mm-2.7mm)
- Space between lines:Configurable
- Characters per line:40(7×7 dots matrix) max
- Power requirements:5VDC±10%,2VDC±10%
- Operating Temoerature range: -5°C~50°C
- Operating Humidity range :20% ~ 95% RH
- Changing rate of temperature :10° C/H
- Changing rate of humidity : 10% H
- Communication protocol : RS232

4.Industrial Pc(IPC-010)

4.1.General Description

Based on the latest technology of advantech,IPC-010 adopts intel 945G+ICH7 chipset and LGA775 encapsulated CPU which support core 2 duo, pentium 4, pentium D, support DDRII maximum 4GB memory, 2 SATA hard disk interface and on-board integrated RS232 COM port and 8 USB2.0 interface and 2 VGA output. Intergrated ethernet interface and audio output which can be adjust directly are available. The new generation IPC includes IPC-009, IPC-010, IPC-011, IPC-012, IPC-013, IPC-014 from different supplier.



Fig 2.4: Industrial Pc

4.2. Technical Specification

- **Bus type:** Completely compatible with PICMG 2.0 PCI/ISA bus standrad

- **Processor:**LGA775 encapsulated CPU,533/800/1066 MHz system bus,support Intel core 2 duo,Pentium 4,Pentium D and celeron D microprocessor
- **System Chipset:** Intel 945G+ICH7 chipset
- **System Memory:** DDRII slots up to 4GB system memory
- **BIOS:** AMI Bios,support 4M spi interface
- **On board videos:** support 2 VGA ports
- **On board LAN:** Intel 1000Mbps Ethernet LAN,RJ 45 interface
- **IDC controller:** 2 SATA interface and IDE interface
- **Hardware monitoring :** Detect working power,CPU temperature and fans rotate speed primary
- **Power supply :** +5V,+12V,support AT/ATX
- **Multi I/O interface:** 1-FDD,8-USB,1-parallel,10-RS232,1-IrDA,1-PS/2 keyboard/mouse interface
- **Dimension:** 338mm×122mm
- **Operation temperature:** 0-60°
- **Relative humidity:** Relative humidity

5. Power supply module

5.1. General Description

The power supply module is used to transform the input AC current in a number of different DC power supplies for different equipment, for example, the receipt printer, the journal printer, card reader, keypad controller and etc. GPAD311M36-4A is configured on H22N, H22NL and E300L

5.2. Structure Overview

Model: GPAD311M36

1. Switch

2. Fuse

3. AC input

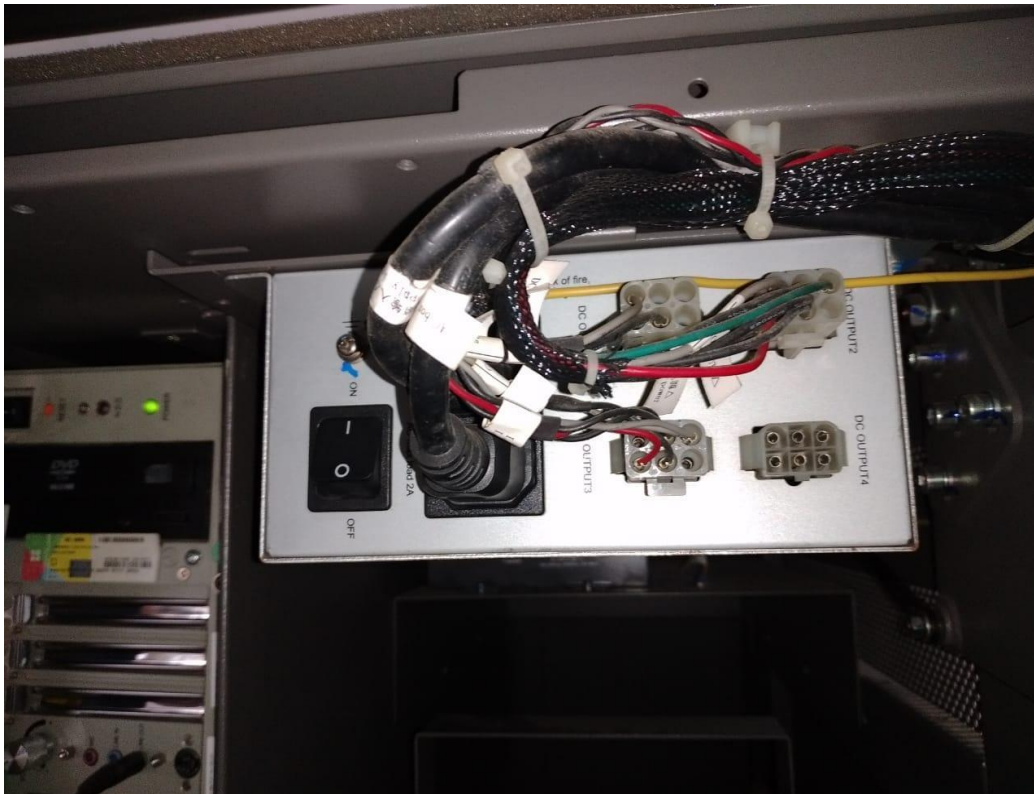


Fig 2.5 Power supply module

Dc OutPut interface

3	2	1
6	5	4

4.DC output:

1: +5V

2:GND

3: +36V

4: +24V

5.GND

6.+12V

5.3.Technical Specification

Input voltage :AC 110/220±50%

Table: 2.1. AC Input Specification

Item	Unit	Min	Normal	MAX	Remark
AC input voltage range	V	90	110	132	Switch automatically
		176	220	264	
	HZ	47	50	63	

Output Voltage : +5V/6A,+12V/5A,+24V/3A,+36v/4.5A

DC Output voltage	Output current range	Voltage regulate precision	Load regulate precision	Noise
-------------------	----------------------	----------------------------	-------------------------	-------

+5A	0.3~6A	4.90 ~5.40V	≤±3%	≤150MV
+12V	0.3~5A	11.0 ~ 12.5V	≤±3%	≤200MV
+24V	0.3A~3A	23.5 ~25.0V	≤±3%	≤250MV
+36V	0.1A~4.5	34.0~38.0V	≤±3%	≤250MV

Over voltage and over current protection

Over voltage and over current protection

Over voltage and over current protection	Unit	Min	Max	Remark
+5V over votlage	V	6	8	Recover automitecally
+12V over voltage	V	13	15.5	Recover automitecally
+24V over voltage	V	27	30	Recover automitecally
+36V over votlage	V	38	42	Recover automitecally
+24 over current	A	13	25	Recover automitecally
+12 current short		Recover automitecally		

Frame Size (Length X width X Height):218×182.5×87mm

6.Electrical Interface Industrial PC

6.1.Working Principle Scheme

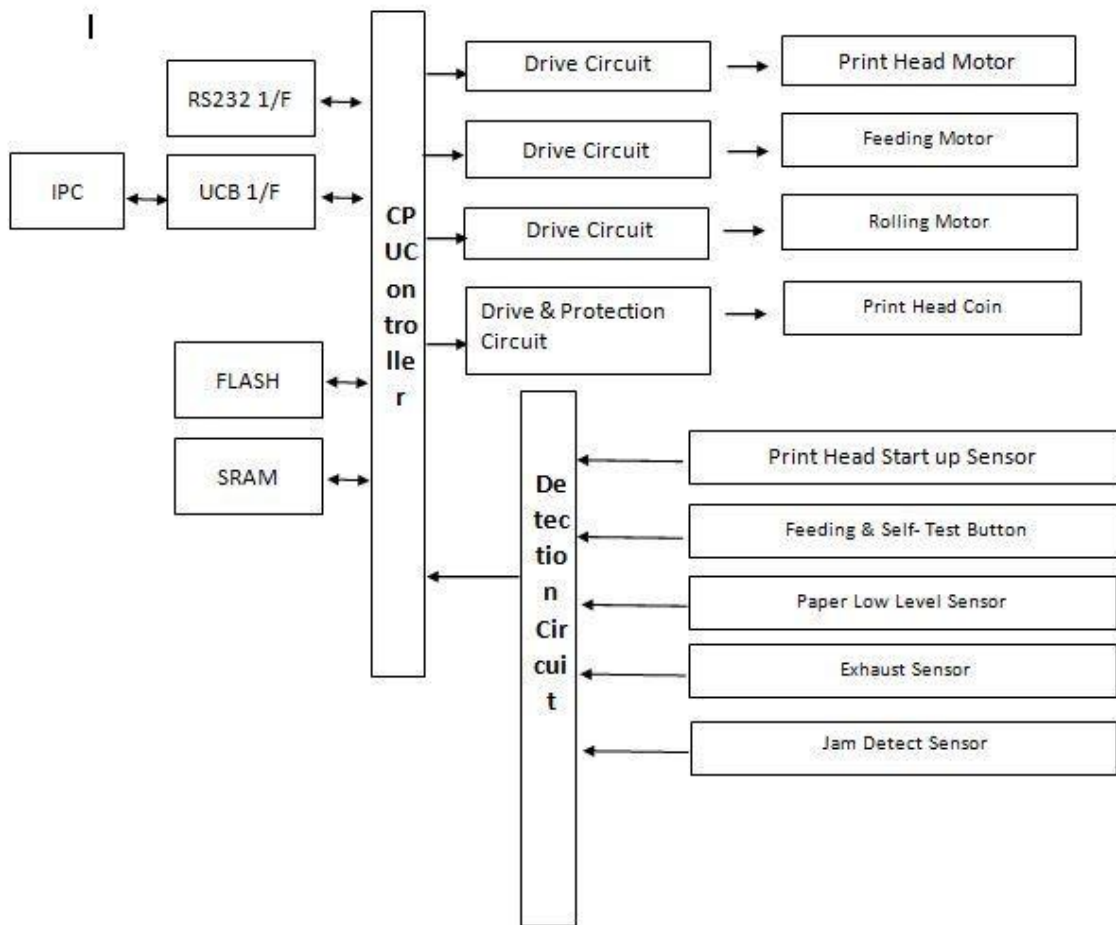


Fig 2.6: Electrical Interface Industrial PC

7.Capacitor

7.1.Working Principle

A capacitor used in a ATM mechine for store charges in an electrical circuit.Capacitor works on the principle that the capacitance of a conductor grow appreciably when an earthed conductor is brought near it.In a capacitor has two plates separated by a distance having equal and opposite charges.



Fig 2.7:

Capacitor

CD135

8.H22NL Communication Diagram

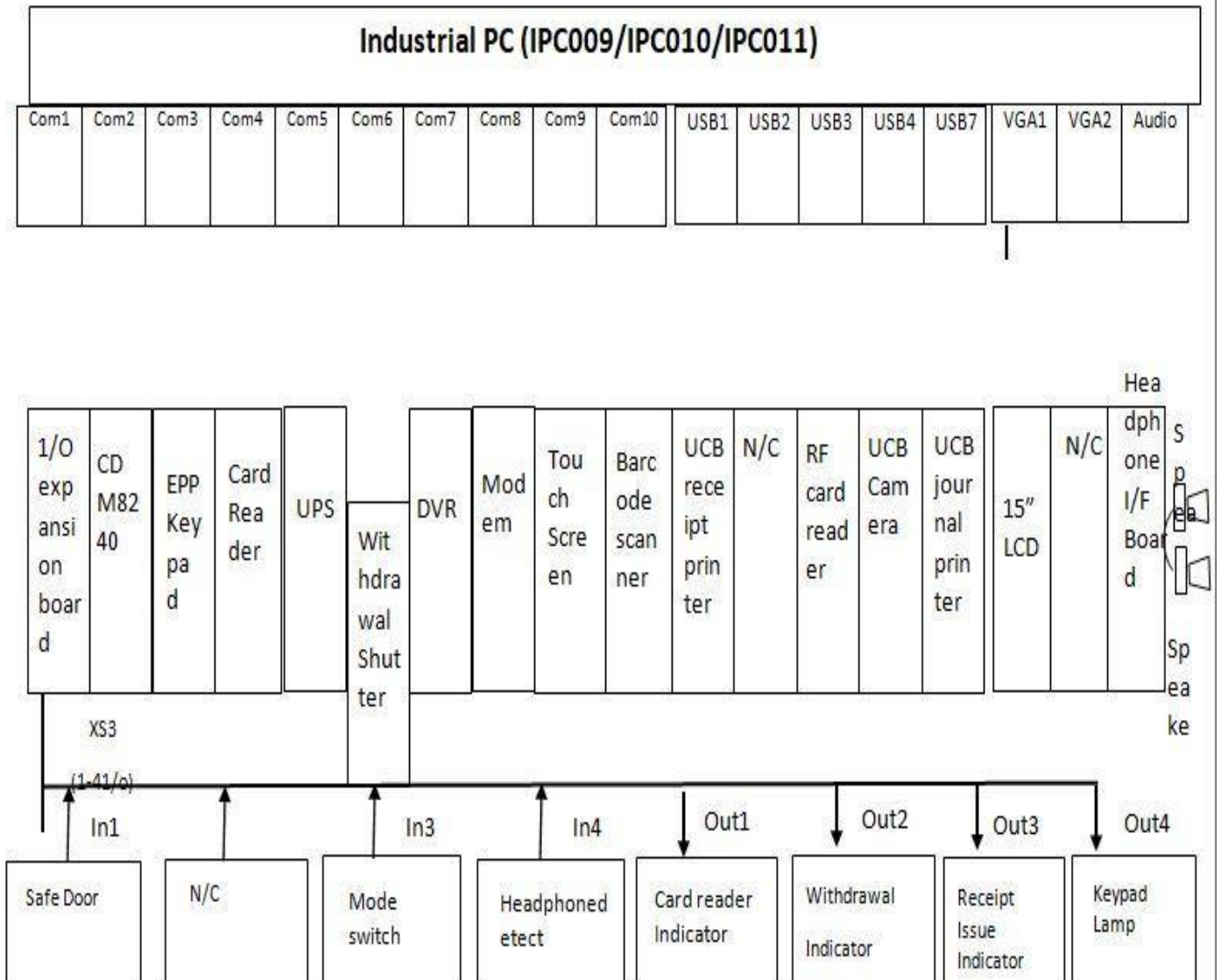


Fig 2.8: H22NL Communication Diagram

9.Test Program

Two testing methods are available to diagnose CDM8240. There are ODS (Offline diagnose system) and Toolplus system. ODS is an Independent test procedure on board to perform maintenance rapidly for field engineer. Toolplus system is on line system test procedure on ATMs.

9.1.Offline diagnose system

9.1.1

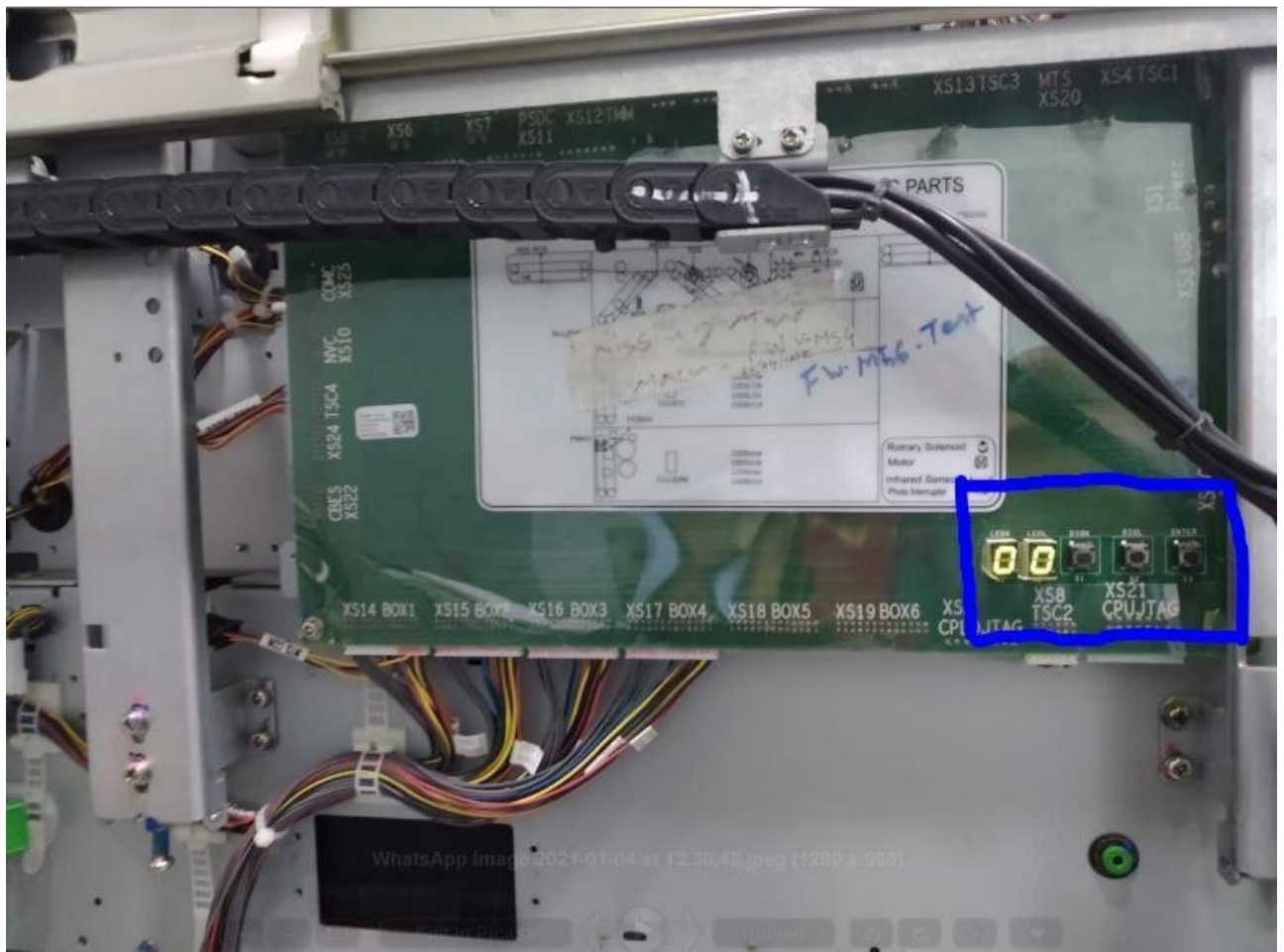


Fig 2.9: Switch and Indicator

9.1.2 Switch

Three pushbutton switches and two 7 segment LEDs are provided on CDM6240 control board. The switch functions for ODS operation are as below

- 1) Press the DIGH switch to increase 1 on the high digit LED (LEDH)
- 2) Press the DIHL switch to increase 1 on the low digit LED (LEDL)
- 3) Press the inter switch to set, start or stop a command

9.1.3. ODS operation

• Enter ods mode

Press two white buttons at the same time to enter ODS mode till two LEDs are flashing. Twinkle is stop if non pressing, at this time, the system waits for ODS command selection shown as below.

• Exit ODS mode

In ODS mode, Press 2 white buttons at the same time till 2 LEDs are flashing. Twinkle is stop after non pressing then the system is in normal mode.

• Command operation

In ODS mode operate DIGH and DIGL switch into a command code, press enter switch. The system need the indicated code as a command. The system displayed the command code while operation is normal. Otherwise, the 4 digit error code will be appeared on two LEDs periodically.

9.1.4. Command List

Table: 2.2. Command List

Command	Description
0x01	Initializes the dispenser, Checks the status of the entire CDM. If failed, the error code is displayed on the LED
0x02	Get the firmware version, The format is X.X.
0x20	Dispenses one note respectively from each cassette, then rejects
0x21	Dispenser one note from 1 st cassette, then rejects
0x22	Dispenser one note from 2 nd cassette, then rejects

0x23	Dispenser one note from 3 rd cassette,then rejects
------	---

0x24	Dispenser one note from 4 th cassette,then rejects
0x25	Dispenser one note from 5 th cassette,then rejects
0x26	Dispenser one note from 6 th cassette,then rejects
0x30	Controls the main motor to rotate for 3 seconds
0x31	Control 1 st pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x32	Control 2 nd pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x33	Control 3 rd pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x34	Control 4 th pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x35	Control 5 th pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x36	Control 6 th pick motor to rotate clockwise for 2 seconds and counterclockwise for 2 seconds,then stop
0x37	Controls the stacker area to rotate,stacker state for 2 seconds,deliver state for 2 second,then hold for stacker state
0x40	Controls the single diverter to move upwards and woenwards for one time
0x41	Controls the bun diverter to move upwards and woenwards for one time
0x50	Gets the static value of MTS
0x51	Adjust the value of MTS
0x60	Gets the status level of the sensor,the level number is displayed on the LED
0x66	Get 1 st and 2 nd cassette ID

0x67	Get 3 rd and 4 th cassette ID
------	---

0x68	Get 5 th and 6 th cassette ID
0x70	Predeliver
0x71	Deliver
0x72	Reject notes which are in PCS
0x73	Retract notes which are in PES
0x80	Cycling Initialization of the dispenser
0x81	Cycling dispensing from wa
0x90	Acquire the authorization of dispensing notes when toolplus is used
0xA3	Set the dispenser to rear mode
0xA4	Set the dispenser to front mode

9.1.5.Pertial Command Description

1.0x50-Gets the static value of MTS

The value is acquired when the main motor reset and no note passes the sensor.The value may float near 0x80,it is better to close the 0x80,allow within 0x76~0x8A

Note:the command is a cycling command,It is paused by pressing the blue button until the LED gets flash

2.0×51-Adjust the value of MTS

The command is used for somewhere can not use the PC but need to adjust the MTS value. It is the same function like using the CDM6240 Toolplus to adjust the MTS value. The adjusted value is displayed on the LED. It is ok when the LED displays the value 80, note that the maximum may not larger than 82 and maximum may not smaller than 7E

3. 0×80- Cycling initializes the dispenser

The dispenser is initialized one time everz five seconds, if failed, corresponding error is given and the command is terminated. This command can be used for maintenanece purpose.

Note: the command is cycling command, it is paused bz pressing the blue button until the LED gets flash.

4. 0×81-Cycling dispensing one note from each cassette

Dispenses one note respectivelz from each cassette every five seconds, if failed, corresponding error is given and the commond is terminated. This command can be used for maintenance purpose.

Note: the command is a cycling command, it is pushed by pressing the blue button until the LED gets flash

5. 0×90-Acquire the dispensing authorization

For security, before using the toolplus to dispense the notes, it is required to acquire the dispensing authorization first

Note: It is necessary to acquired the authorization again in case the toolplus is restarted

6.0×A3-Set the dispenser to rear mode

Before the CDM is sold from the factory, we have already set the dispenser mode peoperly. This command only used after repairing or replacing a new control borad

7.0×A4-Set the dispenser to front mode

Before the CDM is sold from the factory, we have already set the dispenser mode properly. This command only used after repairing or replacenge a new control board

8. 0×60-Get the sensor status

After excuting the command 0×60, select the sensor number via two white buttons and press enter (Blue button), the sensor level is displayed until the blue button is pressed again.

Example

Execute the command 0×60 select the sensor number 0×80 bz pressing two white buttons press blue button, the sensor level of MEDS is displayed.

10.Receipt Printer

Receipt printer is a printer which give money receipt or balance check receipt when transaction done or balance check.

10.1. Maintenance

10.1.1 How to adjust the low-level sensor

Put the paper roller onto the paper bracket, and the length of the paper on the paper roller should be approximately 2 meters, loosen two screws which hold the paper low level sensor assy. Move the cursor assy. to the up until the paper low level indicator V6 lighted, then move it slowly to the low, meanwhile, observe the indicator V6, when the indicator V6 just be turned off, tighten the screws.

10.1.2 How to adjust the sensitivity of black mark sensor

If the paper cutting position is not correct, you can adjust it by the following steps. Please do remember to turn off the power of printer before adjusting.

- 1) Loose the screw that holds the top cover on the printer head. (Note: only two round, don't pull it out)
- 2) Remove the top cover of the printer head, and then tighten the screw.
- 3) Adjust the adjustable resistance with small flat screwdriver, Push the self-test button (blue button), see whether it cuts paper in the middle of the black mark; otherwise, adjust the adjustable resistance again until it cuts paper in the middle of the black mark (As shown on the following.)
- 4) Fix the top cover.

10.1.3 How to adjust lower guiding plate

In case of paper is always jammed at the area of printer head outlet, you should check the edge of lower guiding plate. Make sure the edge of lower guiding plate lower than the outlet of the printer head about 0.5mm. Adjustment method is that loosening the six screws on both sides, and then reposition the lower guiding plate.

10.2. Replacement

10.2.1 How to replace control board

▪ Removal

- 1) Disconnect 2 fiat cables of print head and low level sensor cable.
- 2) Remove the 3 screws that hold the control board cover.

- 3) Disconnect the paper feeding motor cable and button cable.
- 4) Remove 4 screws that hold the control board, and then take the control board out.

▪ **Fitting**

- 1) Put the control board inside (with indicator facing outside) and fix the control board with four screws.
- 2) Connect the paper-feeding motor cable and button cable.
- 3) Fix the cover of the control board with three screws.
- 4) Connect 2 flat cables and low level sensor cable.

10.2.2 How to replace printer head

▪ **Removal**

- 1) Disconnect two cables of printer head
- 2) Remove the lift screws of print head on both sides.
- 3) Open the upper guiding plate.
- 4) Pull out the lift bolt of printer head and press the printer today and make printer head move slightly in horizontal direction at the same time.
- 5) Open the pressing paper bar by pressing the Knob.
- 6) Incline the print head assy. Forwards and upwards and then take it out.

▪ **Fitting**

- 1) Open the pressing paper bar by pressing the knob.
- 2) Open the upper guiding plate.
- 3) Put the head assy. In its position with inclining the print head assy. forwards.
- 4) Close pressing paper bar by lifting the knob and then lift the printer head assy. slowly. The lift bolt of printer head will automatically lock the printer head assy.
- 5) Tighten the lift screws on both sides.
- 6) Connect 2 flat cables and close the upper guiding plate.

10.2.3 How to replace paper feeding belt

▪ **Removal**

- 1) Remove the E clip of the upper guiding plate assy. Take out the shaft of the upper guiding plate and then take out the upper guiding plate.

- 2) Pull out the lift bolt of printer head and take up the printer head assy.
- 3) Remove the six screws that fix the lower guiding plate assy. and then remove the lower guiding plate (as shown in the following fg).
- 4) Remove the E clips (four) on both sides.
- 5) Take down the four bearings on both sides.
- 6) Take down the damaged belt (all together three belts) with details.

▪ **Fitting**

- 1) Fit the belt.
- 2) Fit the bearings on both sides.
- 3) Mount the E clips on both sides with sharp nose pliers.
- 4) Fit the lower guiding plate. Make sure the edge of lower guiding plate is lower than the outlet of the printer head. (About 0.5mm).
- 5) Pull out the lift bolt of printer head and put the print head assy. into its original position.
- 6) Fit the upper guiding plate assy.

10.3. Cleaning

If the effect of print fuzzy, it is likely that the printer head is dirty. Please follow the steps on below to dean the printer head.

- 1) Take out the printer head assy. according to the instruction of the replacement of the printer head.
- 2) Open the pressing paper bar by pressing the Knob.
- 3) Moisten a cotton swab with absolute alcohol, and use it to scrub the printing unit (snuff color area) back and forth slightly till it is clean. Shown as the following figure.
- 4) Fit the print head assy. according to the replacement instruction of the printer head.

CHAPTER 3

Advantages and Disadvantages of ATM

3.1. Advantages of ATM machines

3.1.1. Access to hard cash Anywhere at Anytime

The biggest advantage of ATM machines is that they allow access to cash at any time. In addition to having a limited amount of time to obtain cash, there was only one way of accessing it before 1967, through visiting the nearest bank. This meant that if you lived in remote areas you had to travel all the way to the nearest town. People only had access to withdrawing their cash until 3pm. Thanks to ATM machines, anyone can withdraw cash anywhere at any time of day and night, you can even access 2 ATM machines in Antarctica

3.1.2. ATM machines offer financial Inclusion

ATM machines can be used to deliver banking services in low income countries where only a few people use banks. Interactive Automated Teller Machines, that can dispense and take deposits, help increase financial literacy and facilitate the access to formal financial services in remote areas. Two thirds of the world's population depend on hard cash. Most of these people reside in developing countries where a large portion of them is unbanked. Therefore, the importance of ATM machines in financial inclusion cannot be underestimated. So offering financial inclusion is an advantage of ATM machines.

3.1.3. ATM machines offer wide range of services

ATM's nowadays offer a wide range of services such as cardless transactions, cash deposits, balance enquiry, person to person payment as well as cheque cashing. Wells Fargo, Bank of America and JP Morgan Chase have introduced card free transactions on their ATM machines as well. In some countries, ATM machines sell airline and movie tickets. ATM Machines have the big advantage of offering a wide range of services.

3.1.4. ATM machines are Cheaper to maintain

Compared to brick and mortar, ATM machines are cheaper to build and maintain. Most of the services that can be obtained from a bank teller can be accessed on an Automated Teller Machine. This reduces a bank teller's workload in addition to labour costs. Thus the other advantage of ATM Machines is that they are cheaper to maintain.

3.2. Disadvantages of ATM machines

3.2.1. ATM machines can be targeted by criminals, robbers and hackers

One of the disadvantages of ATM machines is that they are both physically and electronically vulnerable. This makes them an easy target for criminals. Malware can be used to access people's cash. Skimming devices and small cameras can be fitted onto Automated Teller Machines. Other criminals can physically destroy an ATM in order to access cash. People risk being robbed using ATM machines especially in isolated areas. This is a huge disadvantage of ATM Machines.

3.2.2. ATM machines may malfunction

An Automated Teller Machine like any other machine is bound to break down, although this is rare. Some machines may fail to recognise bank cards or can run out of cash. At other times the ATM system goes offline. Also, there is a limit to the amount of cash one can withdraw from an ATM which can be an inconvenience if you require more funds. So the other disadvantage of Automated Teller Machines is that they may breakdown.

3.2.3. ATM machines are costly for the users

Setting up ATM machines can be affordable for financial institutions, but it is not the same for the users. Banks and machine owners obtain a lot of revenue from ATM machines in the form of fees that users are charged for using them. The transaction costs are a huge disadvantage of ATM Machines.

3.2.4. Obsolescence

The other disadvantage of Automated Teller Machines is that they may become obsolete. ATM machines may slowly become obsolete due to the use of debit, credit cards, mobile money and internet banking. Transactions are becoming more digital and the use of physical cash is slowly declining. Also, the major reason people use ATM machines is to withdraw cash, these days, this can be done from any point of sale. Any point of sale (POS) vendor with enough funds can dispense cash quickly and conveniently just like an ATM. Thus, the use of ATM machines may decline in the near future.

CHAPTER 4

Recommendation and Limitation

4.1.Recommendation

- Always keep your enclosings as you direction an ATM. Do not use an ATM if you see anything or anyone suspect
- Using an ATM is not consult if there is low lighting at the ATM location
- Do not use an ATM that looks not okey
- When using an ATM, try to hide the keypad so that no one can see you enter your PIN
- Do not allow anyone to "shoulder surf"
Note: watch you enter your PIN by peering over your shoulder. Try to remember your PIN; do not write it on the reverse side of your card;
- If you plan to carry out different transactions at an ATM, make sure that cash withdrawal is done last;
- When you finish your transactions at an ATM, make sure that:
- You have your cash and card the cash pulled in your possession;

4.2.Limitation

Automated teller mechine (ATM) is an electro-mechanical mechine that is used for making financial transaction basically to withdraw money from personal bank to withdraw money from personal bank accounts.The limitations of ATM's are that it has limited cash disbursement capacity and it lack human interface as it work of pin code.In the otherview,The daily ATM withdrawal limits can range from \$300 up to \$2000 a day.Depending on the bank and the account.SOME banks charge different amounts depending on which their of service.You have signed up for.you'll need to check with your bank to see what exactly your limit is how much you can withdraw.

CHAPTER 5

CONCLUSION

After reviewing this research started above some things are come to the conclusion that at this moment Automated teller machine(ATM) prove that to be more of a liability than a resourceful mechanism as reflex in the downfall in Automated teller machine (ATM) usage across in our globe.The bank also in developing country take up ATM's to improve their own internal process and also for increase facilities and services of their customers.Now customers become conscious about this machine.The growth of ATM rapidly high at the world wide level also in Bangladesh.It is not say that Automated teller machine (ATM) technology cannot one day become must usefull tool in the financial view of everyone's life,but in order for this to be achieved.The security hurdles must be overcome,thus resulting in an increase in customers satisfaction.As these security measure are strengthened to be able to fight cyber fraud customers will finally have peace of mind when managing funds via ATMs.

CHAPTER 6

REFERENCES

[1] Student Book “GRG Banking”

[2] Google