Service Manual

Model : **LCDM-1000**

(Cash Dispensing Unit)

Total Page : 41 pages (including cover)

Date : **November, 2005**

Version : **V3.53(INT)**

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Revision Record

Rev. No	Date	Description of Change	Page
V3.0(INT)	02.04.01		
V3.51(INT)	04.12.10	Over-Reject Action Added	P.30~33
V3.52(INT)	05.11.23	Rated consuming current	P.4
V3.53(INT)	07.02.05	Add Motor Stop Error Cause	P.29

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= Contents =

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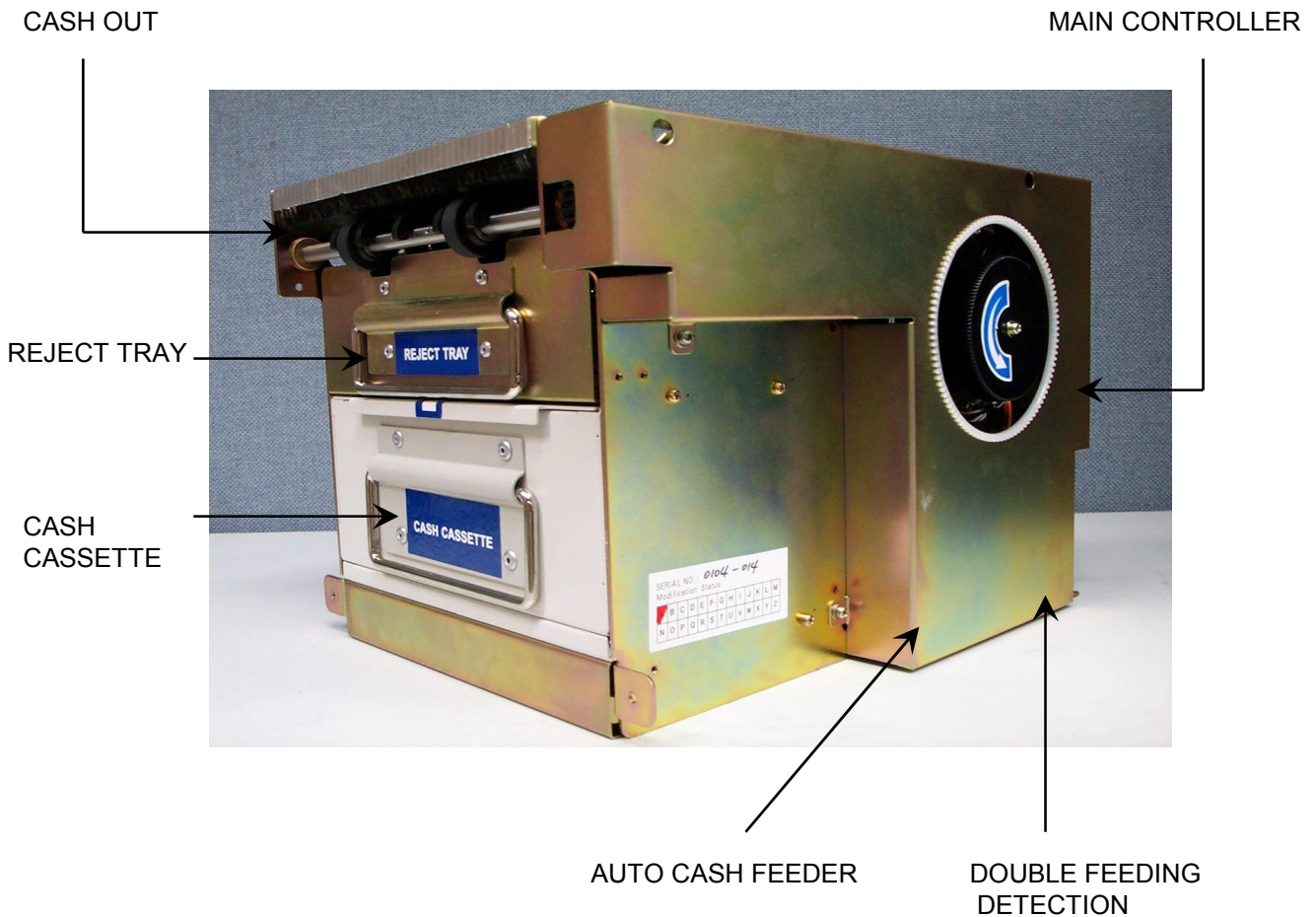
1. Functional Description

1-1. Introduction

This Specification is related to LCDM-1000 which is applied to ATM for Retail Market & other Bill Exchanger.

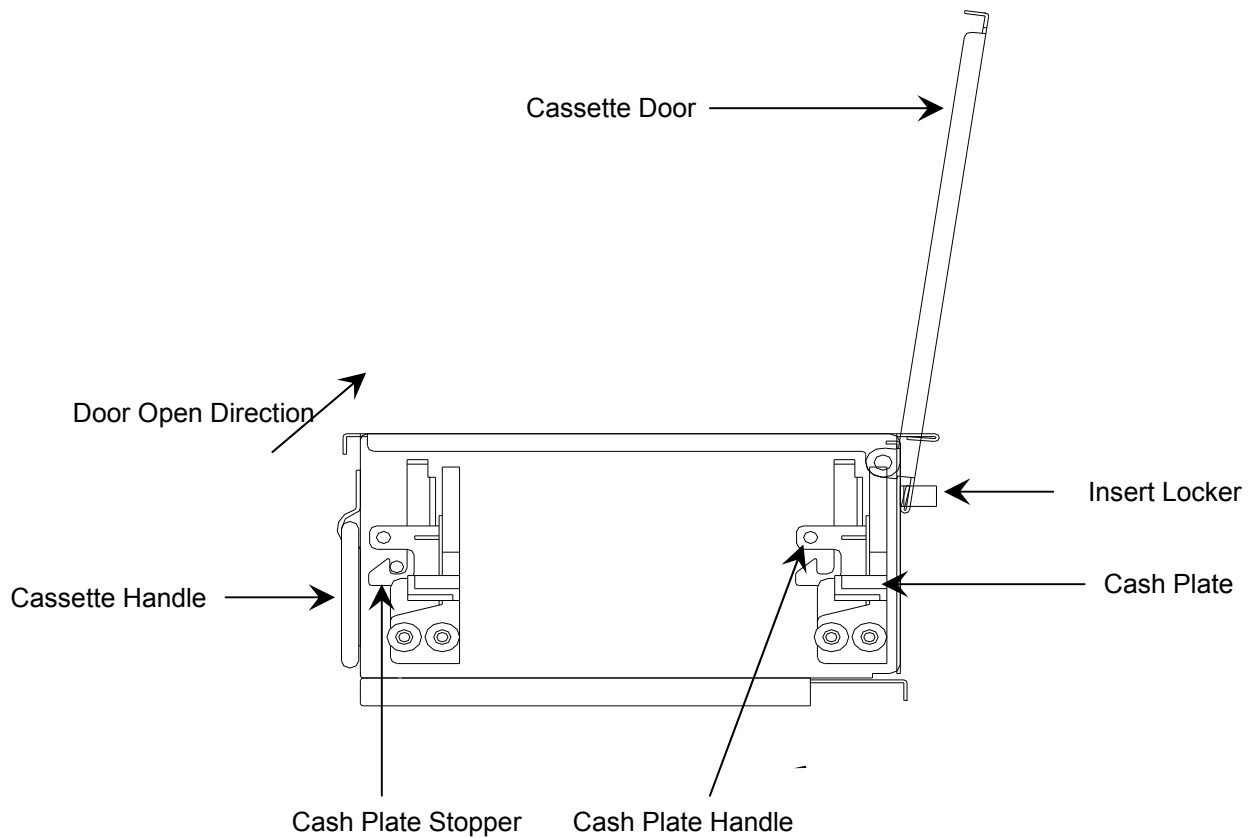LCDM-1000 consists of Feed Module,Cash Cassette,Reject Tray & Main Controller.Features is below

CASH OUT

MAIN CONTROLLER

REJECT TRAY

CASH CASSETTE

AUTO CASH FEEDER

DOUBLE FEEDING DETECTION

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1-2. Specification

No	Term	Specifications
1	Denomination	1 denomination
2	Cassette Capacity	Approx. 1,000 notes (123mm)
3	Dispensing Speed	3 note/sec.
4	Usage Notes Size	height : 62mm~78mm , width : 100mm~162mm
5	Double Feeding Detection	Included (Mechanical Method)
6	Reject Tray Capacity	Approximate 30 notes
7	Access Type	Front Type
8	Input Voltage	DC 24V
9	Interface	RS 232C
10	Dimension	310.2(D) x 225(H) x 270.5(W) (Unit:mm)
11	Near-End Detection	Approx. 30 ~50 notes
12	Bill-End Detection	0 or Approx. 10~30 notes (by setting dip switch, refer to product spec chapter 4.4)
13	Rated Consuming Current	Load current, continuous MIN - 0.16A MAX - 1.4A Load current, peak Max - 3.6A
14	Operation Temperature	5 °C ~ 40 °C
15	Storage Temperature	-10 °C ~ 60 °C
16	Operation Humidity	20% ~ 80% RH
17	Storage Humidity	10% ~ 90% RH

1-3. Cash Cassette Structure

Cash cassette do the role of transporting inserted bill one by
one to next module and consists of Cassette Door,Cassette Body
& Cassette base

Cassette Door

Door Open Direction

Insert Locker

Cassette Handle

Cash Plate

Cash Plate Stopper   Cash Plate Handle

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1-3-1. Capacity & Currency of Cash cassette

Capacity is approximately 123 mm(I.E about 1,000 bills can be

stacked base on new note) & usable currency dimension is as below diagram

Minimum		Maximum	
Height	Width	Height	Width
62mm	100mm	78mm	162mm

1-3-2. Cash cassette door

Cash cassette door is magnetically closed & can be opened

If pushed label direction without special locker

1-3-3. Cash Cassette Body

Cash cassette body consists of frame,pushing plate & stopper.

Pushing plate moves bill to "Pick-up roller" along with side- slot by power of spring.

Hook & Axle of stopper is in the rear of "pushing plate & frame" respectively.

Stopper is automatically closed & opened by backing pushing plate and

opening door respectively.

1-3-4. Cash Cassette Base

When cash cassette is inserted, the part of transporting open automatically

by the function of Cash cassette base which is located in the part

of transporting part.

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1-3-5. Bill-End Detection

The Bill-End detection can be decided by dip switch (the 1st switch on the S2).

If you set the switch "ON", the unit continues to dispense until approximately 10~30 bills remains, and then Bill-End sign will displayed with stopping the unit.

Else if you set the switch "OFF", the unit continues to dispense until none of bills remain, and then Bill-End sign will displayed with stopping the unit.
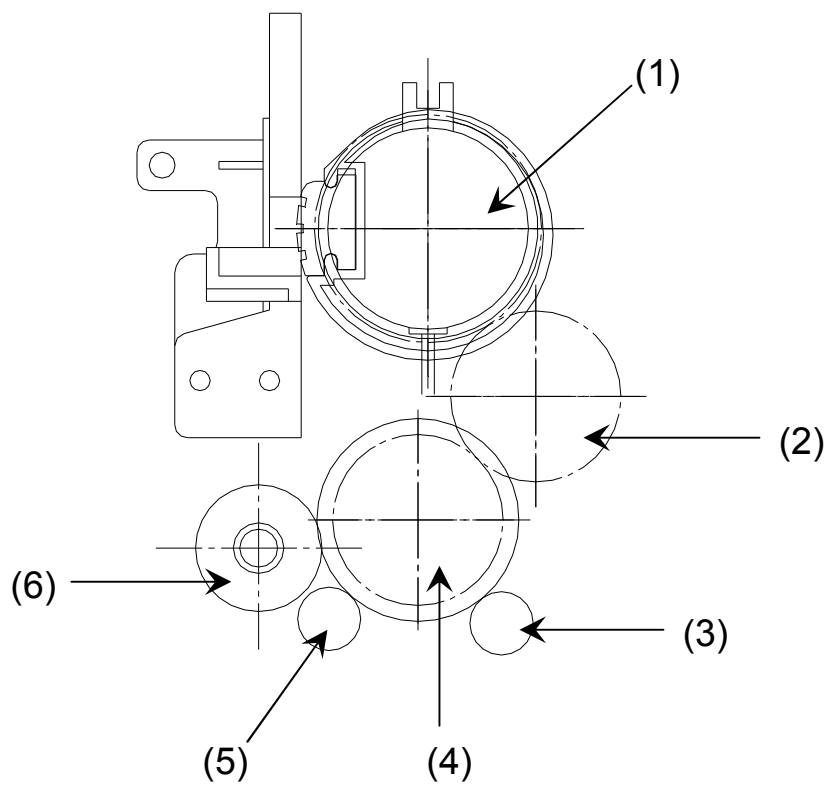
There is hole in the front of "Cash Cassette" and detection process is done by this hole. (Please refer to the layout of sensor for location)

1-4. Feed Module Structure

Feed Module consists of auto cash feeder part , double feeding detection part , diverting mechanism part , cash delivery part and Feature is shown below.

Feed motor

Note Path (Delivery)

Diverter

Pick-up Roller

One-way Roller

Double Detect Roller
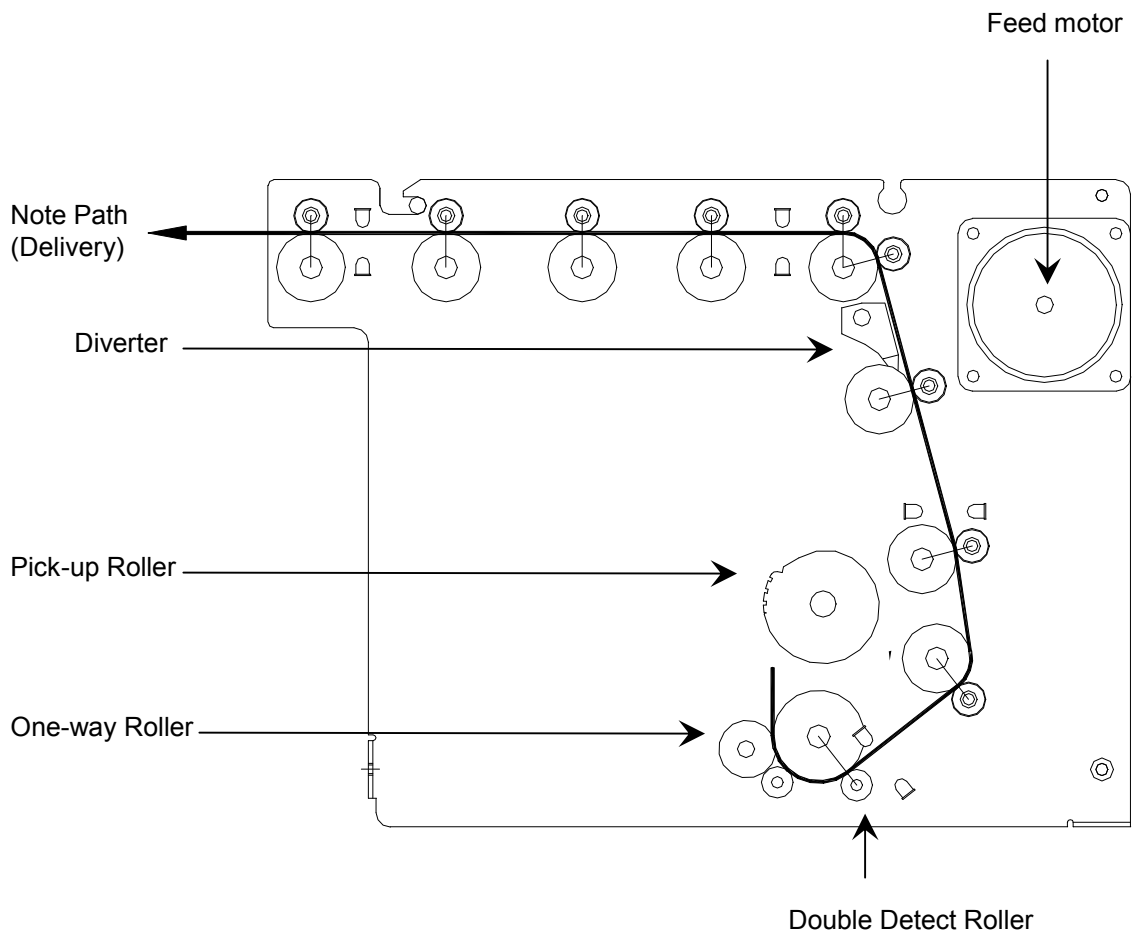
1-4-1. Auto Cash Feeder Part

< Auto Cash Feeder >

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(1) Features

- Friction roller feeding

- Feeding speed : 3 bills/sec

- Force transportation by clutch on/off

(2) Description

NO	Description	Function
(1)	SHAFT PICK-UP ROLLER ASS'Y	Pick-up & moving bills in the cash cassette
(2)	SHAFT SPACE CONNECTION ASS'Y	Force transportation of (1) & (4) parts
(3)	ROLLER IDLE	Moving bills by spring force
(4)	SHAFT FEED ROLLER ASS'Y	Separation & moving bills which was picked up
(5)	BEARING R-1030	Moving bills by spring force
(6)	SHAFT ONEWAY ROLLER ASS'Y	Separation of bills which was pick-up

1-4-2. Double Feeding Detection Part
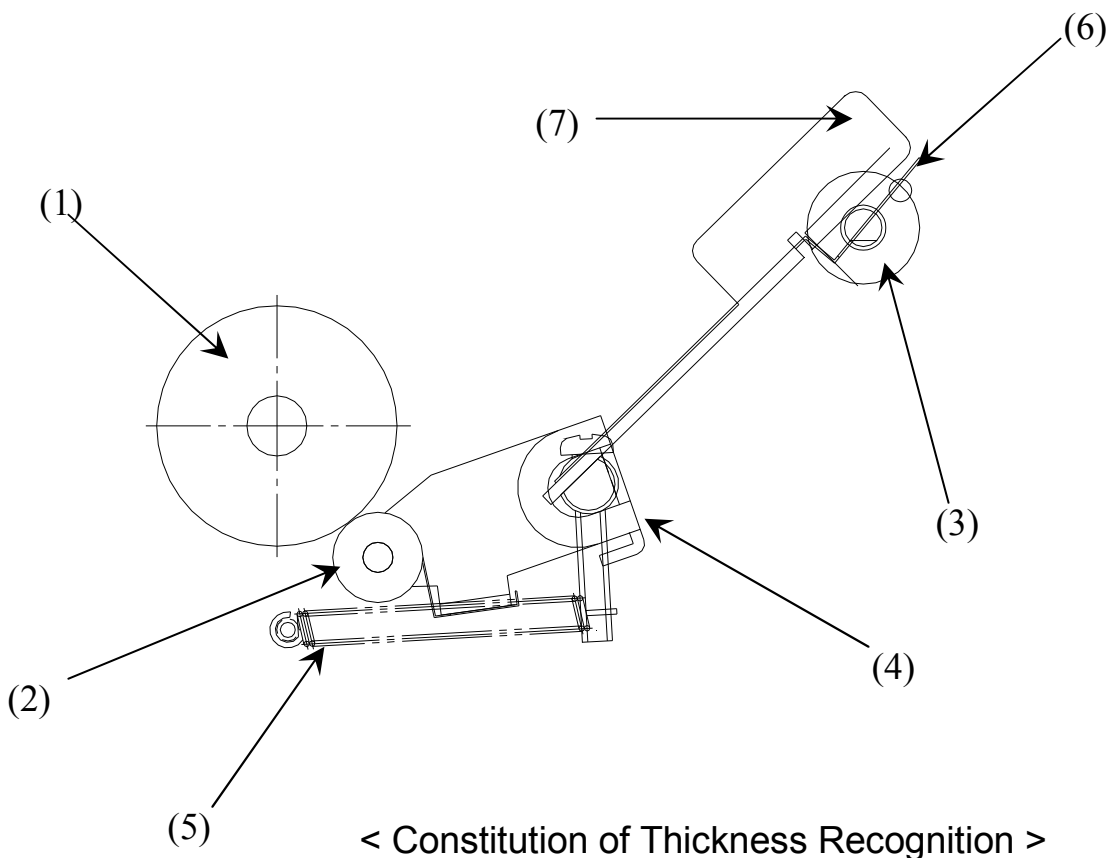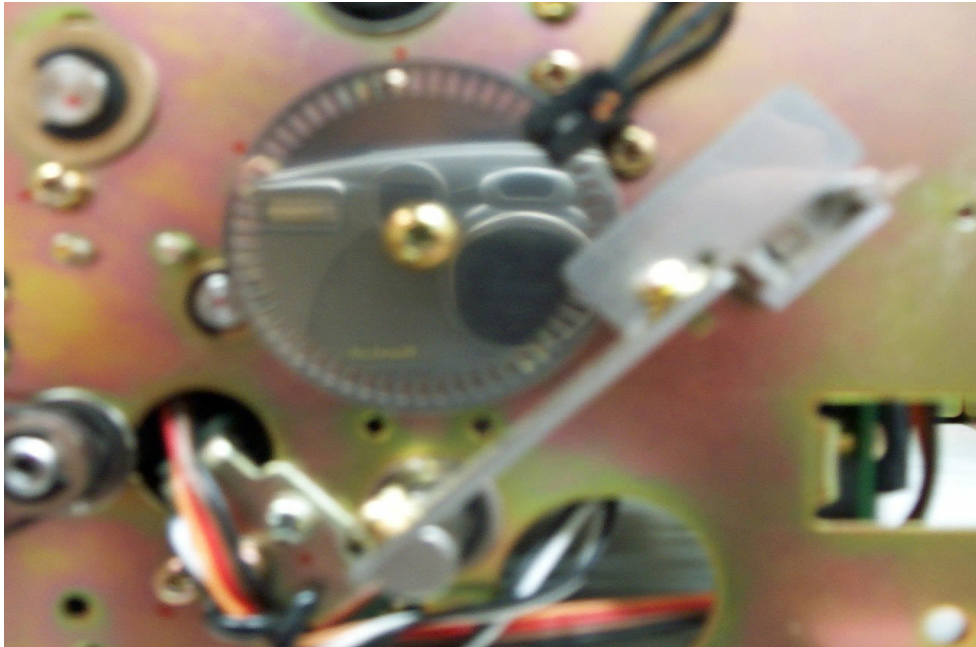
< Constitution of Thickness Recognition >

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(1) Features

- Thickness recognition by Mechanical Amplification

- Thickness recognition by RVDT segment for rotation

(2) Description

NO	Description	Function
(1)	SHAFT FEED ROLLER ASS'Y	DATUM ROLLER of thickness recognition Outer dimension is important
(2)	BEARING R 1240	DETECT ROLLER, amplification role with rotation as the center of (4) part
(3)	RVDT segment (LP06M3R)	Recognize rotation displacement Minute & fast speed of recognition
(4)	ARM D/D HINGE	DETECT ROLLER' rotation LINK and transporting rotation power to (7)
(5)	SPRING RVDT TENSION	Push power to DETECT ROLLER
(6)	PLATE D/D SENSOR	RVDT' rotation STOPPER and transporting exact displacement using Elasticity
(7)	LEVER D/D HINGE	Transporting (4) rotation power with amplification using RVDT

1-4-3. Diverting Mechanism Part
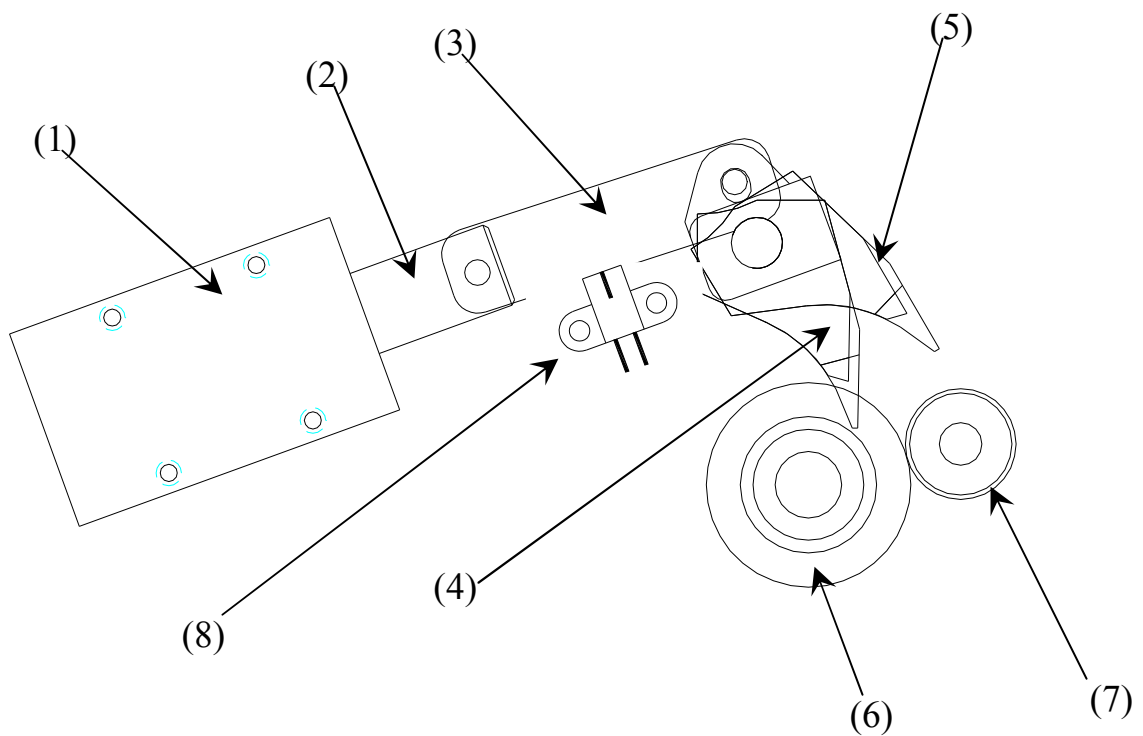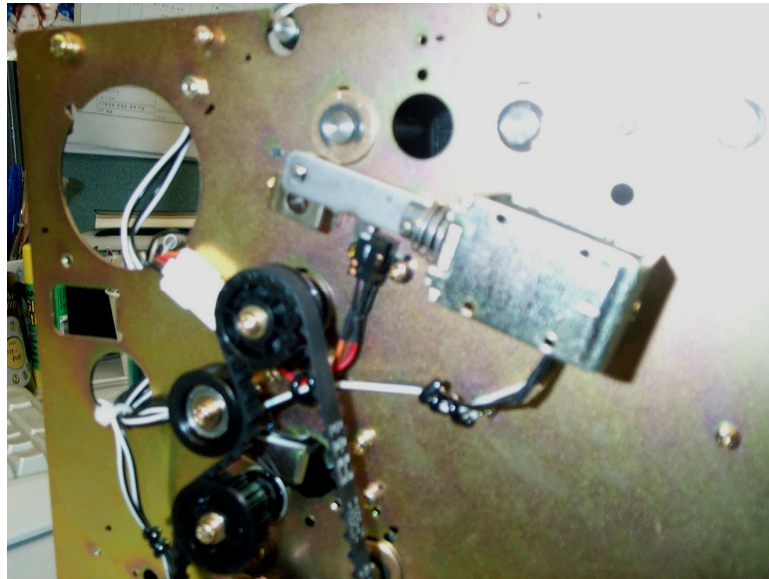
< Constitution of divergence part >

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(1) Features

- A sheet resentment by DC Solenoid

- Simplification of Transportation part by Single PATH Method

(2) Description

| NO	Description	Function
(1)	SOLENOID 1040 JUWON	SOLENOID for Divergence
(2)	SOLENOID PLUNGER	PULL TYPE method PLUNGER
(3)	LINK SOLENOID STAMP	Transporting SOLENOID' round trip movement
(4)	SHAFT DIVERTER ASS'Y (normal location)	GUIDE of transportation part & move according to SOLENOID' movement Decision of EJECT & REJECT
(5)	SHAFT DIVERTER ASS'Y (REJECT movement location)	
(6)	SHAFT ASS'Y CASH FEED 3	Bill moving ROLLER
(7)	ROLLER ASS'Y IDLE 13	Bill moving ROLLER
(8)	SOL SENSOR	Checking the Diverter solenoid

1-4-4. Transportation part

  (1)   Features

- This part consists of working ROLLER & subordinate ROLLER

- Transportation GUIDE is MOLD GUIDE and embodiment of JAM FREE

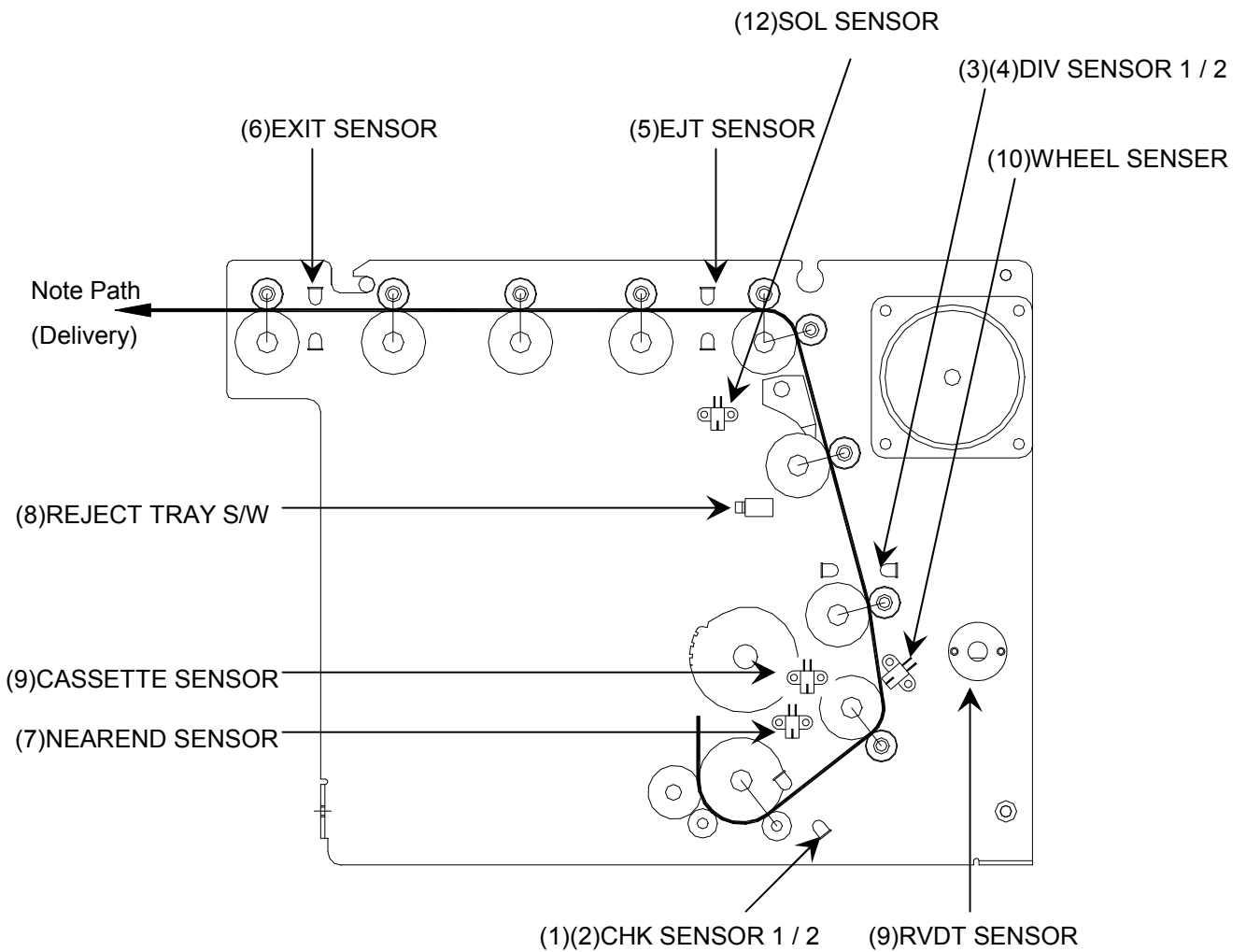- Upper part can be easily separated for Maintenance

(2) Constitution
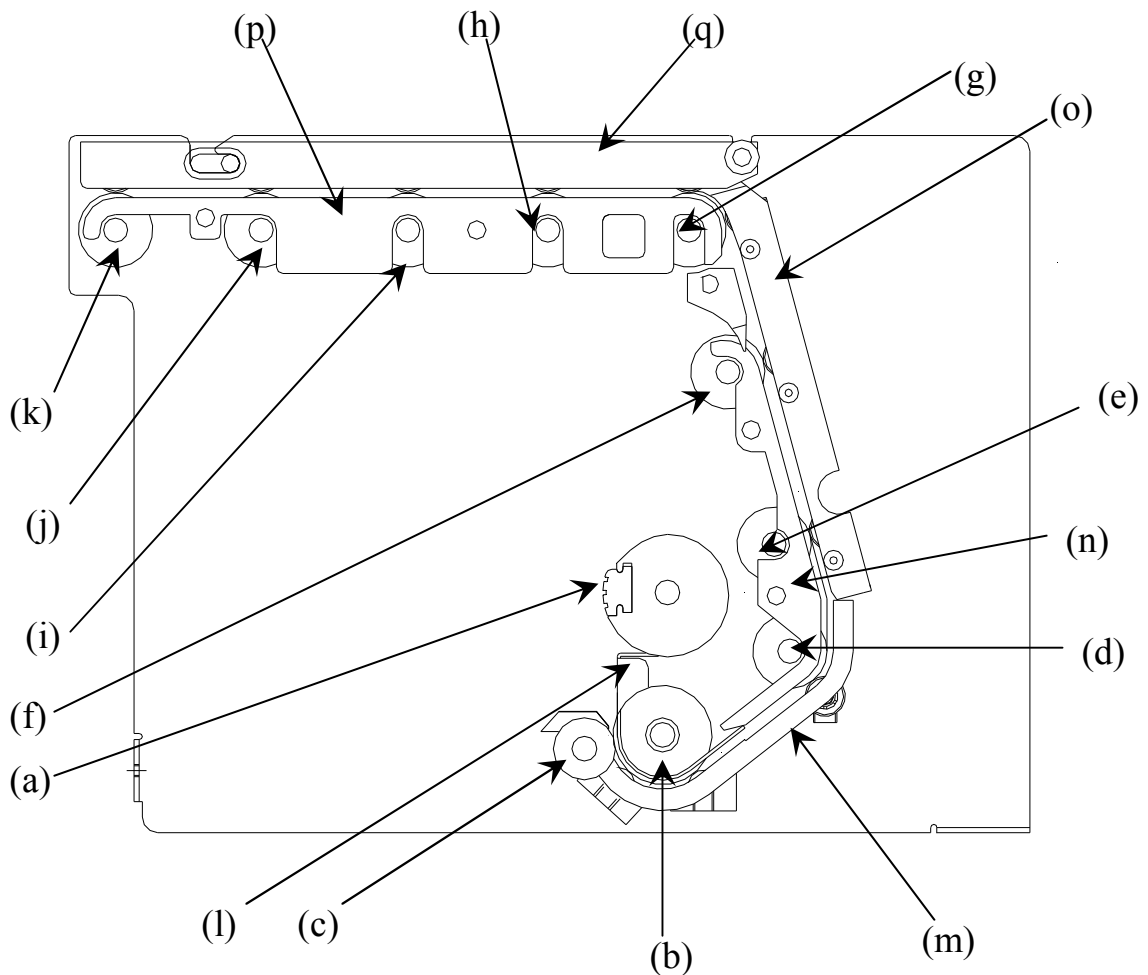
< Constitution of Transportation part >

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- Segment Name

NO	Name
(a)	SHAFT ASS'Y PICK-UP ROLLER
(b)	SHAFT ASS'Y FEED ROLLER
(c)	SHAFT ASS'Y ONEWAY ROLLER
(d)	SHAFT ASS'Y CASH FEED 1
(e)	SHAFT ASS'Y CASH FEED 2
(f)	SHAFT ASS'Y CASH FEED 3
(g)	SHAFT ASS'Y CASH FEED 4
(h)	SHAFT ASS'Y CASH FEED 5
(i)	SHAFT ASS'Y CASH FEED 6
(j)	SHAFT ASS'Y CASH FEED 6
(k)	SHAFT ASS'Y CASH FEED 6
(l)	GUIDE CASH FEED 1
(m)	GUIDE CASH FEED 2 ASS'Y
(n)	GUIDE CASH FEED 3 ASS'Y
(o)	GUIDE CASH FEED 5 ASS'Y
(p)	GUIDE CASH FEED 6 ASS'Y
(q)	GUIDE CASH FEED 7 ASS'Y

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1-4-4. Function & Layout of SENSOR

The number of Sensor is 12. The function & Layout is shown below.

(1) Layout of SENSOR

(12)SOL SENSOR

(3)(4)DIV SENSOR 1 / 2

(6)EXIT SENSOR

(5)EJT SENSOR

(10)WHEEL SENSER

Note Path
(Delivery)

(8)REJECT TRAY S/W

(9)CASSETTE SENSOR

(7)NEAREND SENSOR

(1)(2)CHK SENSOR 1 / 2

(9)RVDT SENSOR

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(2) Function of SENSOR

NO	SENSOR Name	Function
(1)	CHK SENSOR 1	Recognition & Length,Width & Slope checking of bill from Cash cassette(motor side)
(2)	CHK SENSOR 2	Recognition & Length,Width & Slope checking of bill from Cash cassette(solenoid side)
(3)	DIV SENSOR 1	Recognition of bill location & role of divergence movement(motor side)
(4)	DIV SENSOR 2	Recognition of bill location & role of divergence movement(solenoid side)
(5)	EJT SENSOR	Recognition of normal bill location
(6)	EXIT SENSOR	Recognition of the location & the number of normal bill
(7)	NEAREND SENSOR	Recognition the number of remaining in the CASH CASSETTE
(8)	REJECT TRAY S/W	Checking the status of REJECT TRAY
(9)	RVDT SENSOR	Recognition of thickness of transported bill
(10)	WHEEL SENSOR	Control of transporting MOTOR speed
(11)	CASSETTE SENSOR	Checking the CASH CASSETTE
(12)	SOL SENSOR	Checking the Diverter solenoid

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1-4-5. Power Transportation part

[1] Features

• Transportation part work by single MOTOR and power for Bill separation

part is transferred & controlled by CLUTCH

[2] Constitution

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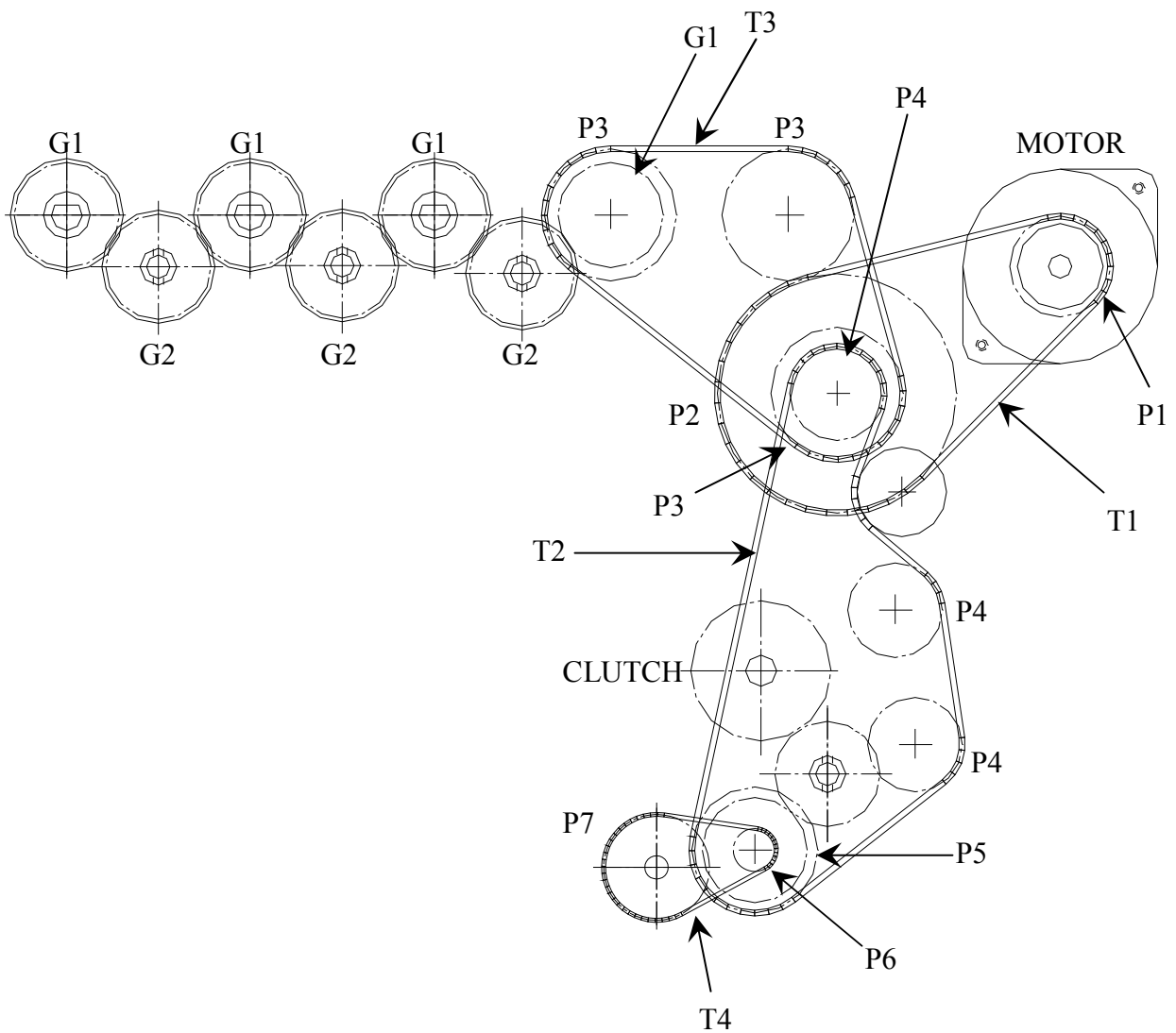
- Segment Name

NO	Name	Function
G1	GEAR FEED (Z:27, M:1)	GEAR for transporting ROLLER
G2	GEAR DFDM DRIVE (Z:27, M:1)	GEAR for transporting POWER
P1	PULLEY MOTOR (XL16, ∅6)	PULLEY MOTOR
P2	PULLEY CASH FEED 1	PULLEY for reduction of speed
P3	PULLEY CASH FEED 2	PULLEY for transporting ROLLER
P4	PULLEY FEED (XL15, ∅8)	PULLEY for transporting ROLLER
P5	PULLEY FEED (XL20, ∅8)	PULLEY for FEED ROLLER working
P6	PULLEY DRV MXL17	For reduction speed of ONEWAY ROLLER
P7	PULLEY REVERSE (MXL42, ∅8)	For reduction speed of ONEWAY ROLLER
T1	BELT TIMING 108XL (W=6.4)	For MOTOR running & Speed reduction
T2	BELT TIMING 140XL (W=6.4)	For transporting torque to PULLEY (driving belt)
T3	BELT TIMING 108XL (W=6.4)	For transporting torque to PULLEY (driving belt)
T4	BELT TIMING 56MXL (W=3.2)	For ONEWAY ROLLER running & Speed Reduction

(3) MOTOR

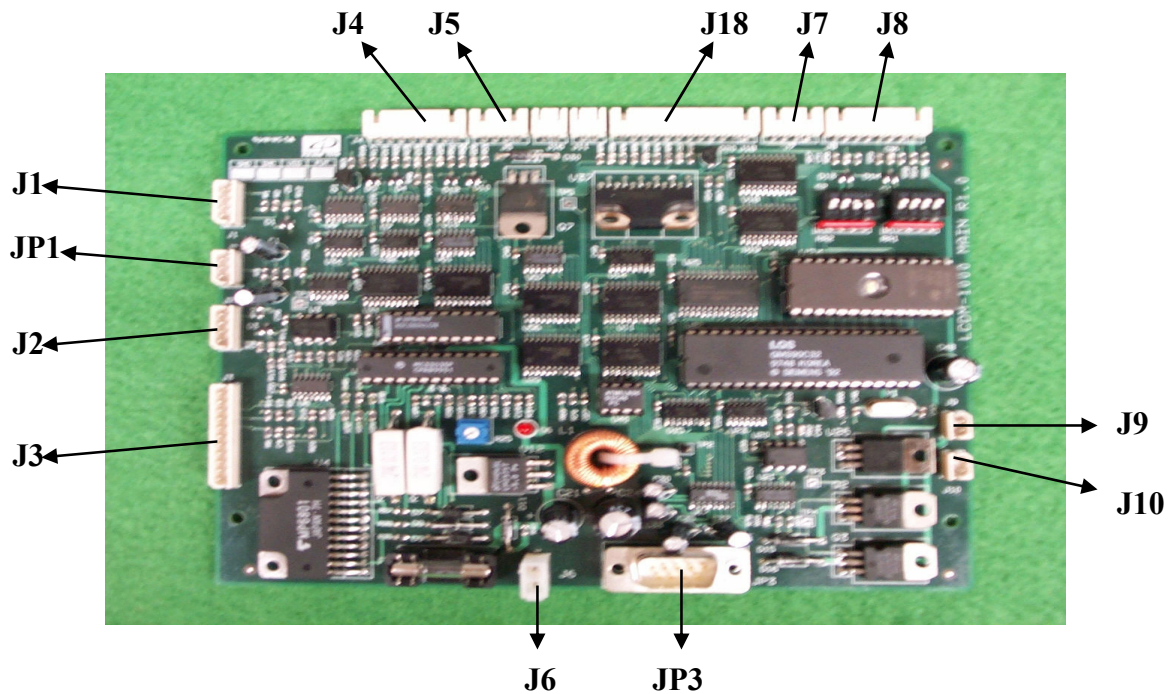- MAKER : Fuji Micro
- TYPE : Brushless DC Motor

TYPE	Voltage	No Load		Load			Rot
		Current	Speed	Torque	Current	Speed	
FB-806	DC 24V	180mA±100mA	4800rpm ±250rpm	1kgf-cm	2400mA±200mA	3500rpm ±200rpm	CW/CCW

2. H/W Constitution

2-1. Layout of MAIN BOARD

SENSOR Circuit

DIP SWITCH

CPU,ROM,RAM

EEPROM

RVDT
Circuit

Solenoid,Clutch

BLDC MOTOR

RS232
Communication
Circuit

24V → 5V
Conversion
Circuit

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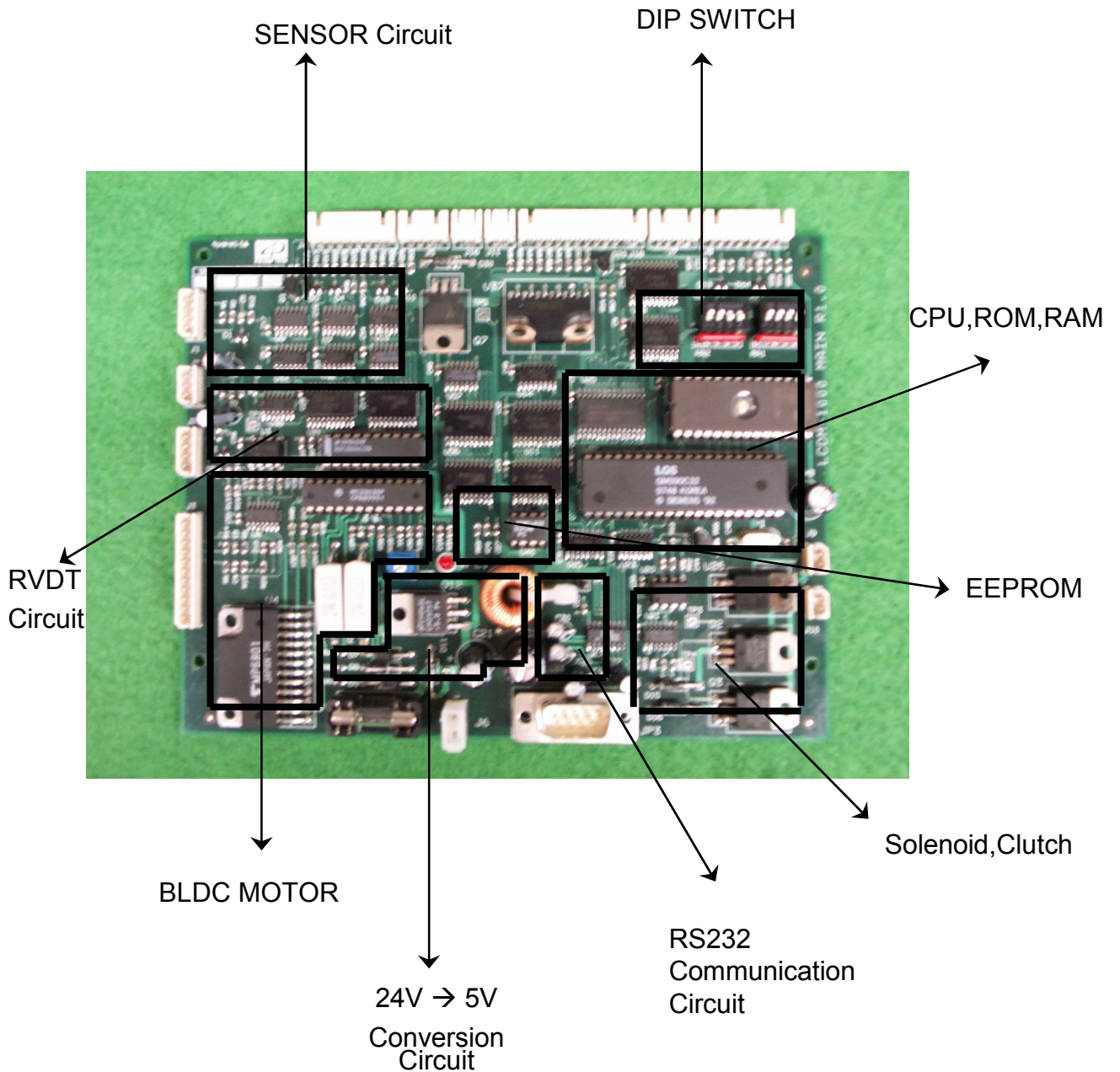
2-2. Connector Layout of MAIN BOARD

J4	CHK1,DIV1 Sensor for accepting & emitting sensor
J5	EJT,EXIT emitting sensor
J18	Reject tray switch , Cassette Sensor,SOL sensor
J7	EJT,EXIT accepting Sensor
J8	CHK2,DIV2 accepting & emitting Sensor
J9	Diverter Solenoid
J10	Clutch
JP3	RS232 Communication
J6	Power
J3	Brushless DC Motor
J2	Wheel Sensor
JP1	RVDT
J1	Near-end Sensor

3. Error Code & Recommended Actions

3-1. Error code

Code	Meaning	Recommended Action
30H	GOOD	
31H	Normal stop	
32H	Pickup error	TABLE 1
33H	JAM at CHK Sensor	TABLE 2
34H	Overflow bill	TABLE 3
35H	JAM at EXIT Sensor or EJT Sensor	TABLE 3
36H	JAM at DIV Sensor	TABLE 4
37H	Undefined command	
38H	Bill-End	TABLE 10
3BH	Note request error	TABLE 11
3CH	Counting Error(between DIV Sensor and EJT Sensor)	TABLE 3
3DH	Counting Error(between EJT Sensor and EXIT Sensor)	TABLE 3
3FH	Reject Tray is not recognized	TABLE 5
41H	Motor stop	TABLE 6
43H	Timeout(From DIV Sensor to EJT Sensor)	TABLE 3
44H	Over Reject	TABLE 7
45H	Cassette is not recognized	TABLE 8
47H	Dispensing timeout	TABLE 1
49H	Diverter solenoid or SOL Sensor error	TABLE 9
4AH	SOL Sensor	TABLE 9
4EH	Purge error(JAM at DIV Sensor)	TABLE 4

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3-2. Recommended Actions

TABLE 1

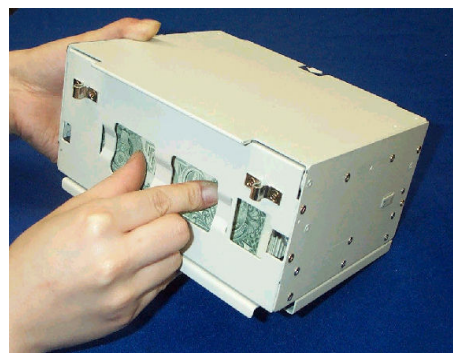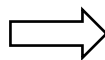| CODE	32H, 47H
Meaning	Pickup error
Check Point	- Is CASH CASSETTE located properly? - Is Bill inserted proper in the CASH CASSETTE ? - Is Push plate work smoothly in CASH CASSETTE? - Is any bill out from CASH CASSETTE?
Action	- Re install CASH CASSETTE after checking above

< Normal loading >

< Abnormal loading >

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TABLE 2

CODE	33H
Meaning	JAM at CHK Sensor
Check Point	- Is CHK SENSOR 1& 2 normal? - Is the assembling condition of GUIDE CASH FEED 1& GUIDE CASH FEED 3 ASS'Y normal ? - Is idle roller rotation in the GUIDE CASH FEED 2 ASS'Y normal? - Is fixing screw in GUIDE CASH FEED 1 / 2 / 3 ASS'Y normal?
Action	- Try again after checking above situation. - In case of Jam, Turn a knob shown below

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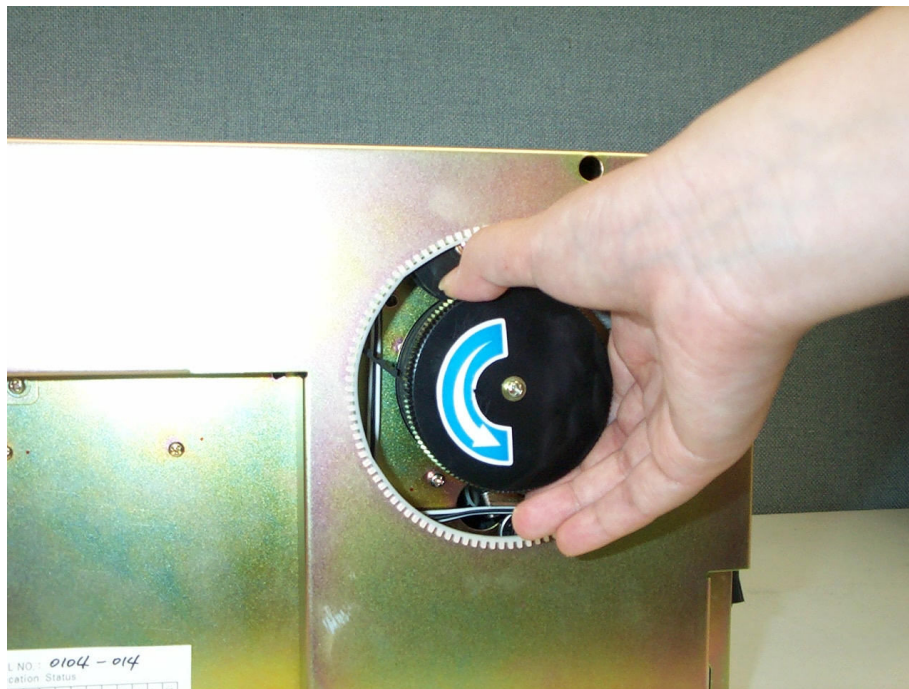
TABLE 3

CODE	34H, 35H, 3CH, 3DH, 43H
Meaning	- Overflow bill - JAM at EXIT Sensor or EJT Sensor - Counting Error(between DIV Sensor and EJT Sensor) - Counting Error(between EJT Sensor and EXIT Sensor) - Timeout(From DIV Sensor to EJT Sensor)
Check Point	- Are EXIT SENSOR & EJT SENSOR normal? - Is LOCKING device in GUIDE CASH FEED 7 ASS'Y locked normally? - Is idle roller rotation status in GUIDE CASH FEED 7 ASS'Y normal?
Action	- Try again after checking above situation. - Replace ASS'Y in case of roller rotation problem in GUIDE CASH FEED 7 ASS'Y.

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TABLE 4

CODE	36H, 4EH
Meaning	- JAM at DIV Sensor - Purge error(JAM at DIV Sensor)
Check Point	- Is DIV SENSOR 1 / 2 normal? - Is GAP between SHAFT DIVERTER ASS'Y and SHAFT ASS'Y CASH FEED proper? - Is idle roller rotation in GUIDE CASH FEED 5 ASS'Y normal?
Action	- Try again after checking above situation. - In case of interference between SHAFT DIVERTER ASS'Y & SHAFT ASS'Y CASH FEED 3, Adjust location of SOLENOID PIN(Please refer to below picture) - Replace ASS'Y in case of idle roller rotation problem in GUIDE CASH FEED 7 ASS'Y.
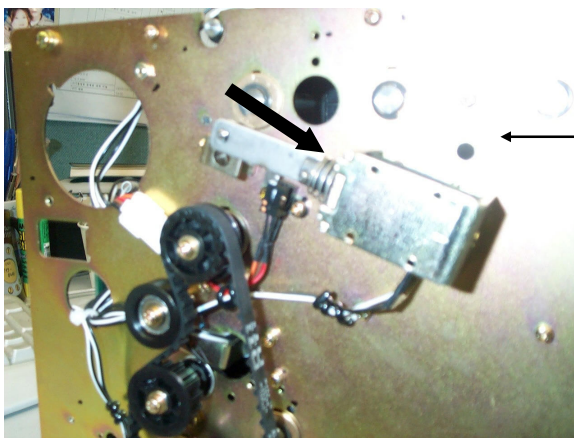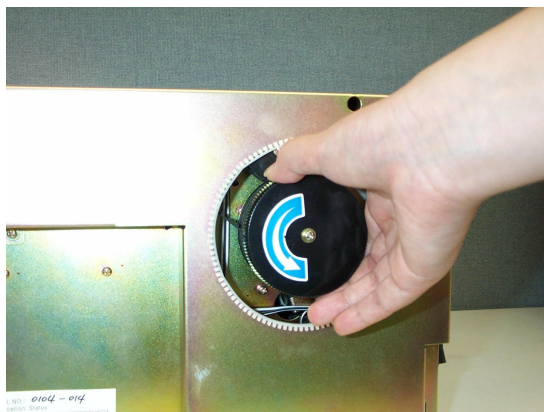
Solenoid and Solenoid pin should be adjusted in arrow direction

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TABLE 5

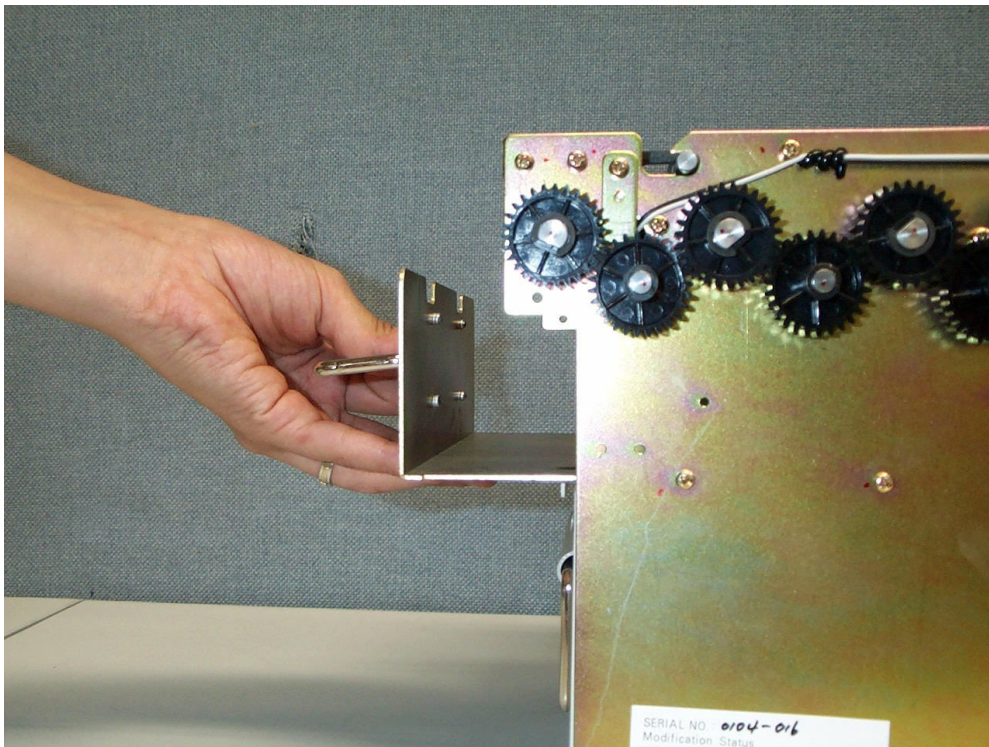| CODE	3FH
Meaning	REJECT TRAY is not recognized
Check Point	- Is the location of REJECT TRAY normal? - Is the location of J18 CONNECTOR normal?
Action	- Insert REJECT TRAY to main body. - Connect J18 CONNECTOR in the MAIN PCB.

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CODE	41H
Meaning	Motor stop
Check Point	- Is any obstacle in Power Transportation part? - Is the location of J3 CONNECTOR correct? - Is the location of J2 CONNECTOR correct? - Is the wheel sensor normal or not? - Is the wheel assembled on its center point properly? (Is the wheel assembled with biased position?)
Action	-Try again after checking above situation. - Check J3 CONNECTOR. - Check J2 CONNECTOR - Replace with new wheel senor (Interrupt sensor) - Assemble the wheel on the center position.

TABLE 7

CODE	44H
Meaning	Over Reject

Check Point	- Are the banknotes normally loaded in the CASH CASSETTE ?
	- Are the DIP SWITCHES properly set to your banknotes?
	- Check the reject code referred to the below Table 7-1.
	  (To catch the reject code on TEST PROGRAM, you should
	    set the dip switch #3 to OFF like the Table 7-2.)

Action	- Please do the proper service action for each case referred to the Table 7.

< Table 7-1 : Reject Code>

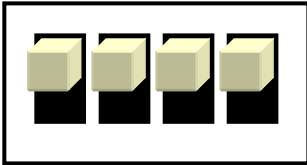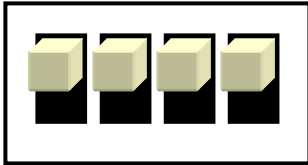| Reject Code	Suspected Cause
33	The distance between banknotes is too close.
3F	One more banknote is picked and followed in the final pickup trial.
36	One more banknote is picked up during the processing the dispense command.
38	The banknote is skewed too much on the diverter sensor.
3C	The banknotes suspected as double are detected.
3D	The thickness of banknote is abnormally thin.
35	The banknote length is so long that it may be the overlapped banknotes.
3E	The banknote length is so short that it may be the damaged or folded banknote.
9C 80	Either check sensor could not detect the banknote.
9C 9E 9C 9F	The length measured on check sensors is not out of limit.
9C 9D	The banknote passed on check sensors is considered as too much skewed.
9C 03 9C 00	The banknote are not normally passing on the check sensor because of fast consequential pickup.

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TABLE 7

CODE	44H
Meaning	Over Reject

< Table 7-2 Dip Switch Setting for Display of Reject Code >

ON

OFF

S2 : 1   2   3   4   S1: 1   2   3   4

< Choice of Currency >
ON : Height of Note 73mm ~ 78mm
OFF: Height of Note 62mm ~ 72mm

< Operation Mode >
ON : On-Line Operation
OFF: Auto Test in Lab.

< Baud Rate >
ON : 9600 bps
OFF: 38400 bps

<Thickness Criterion >
ON : 0.10 ~ 0.12 (ex. USD)
OFF: 0.13 ~ 0.15 (ex. CAD)

<Display of Reject code >
ON : Non-Display
OFF: Display

< Definition of Bill-End (option) >
ON : 10~30 remain
OFF: No bill remains

!! *Please turn on power again after changing the Dip Switch* !!

TABLE 7

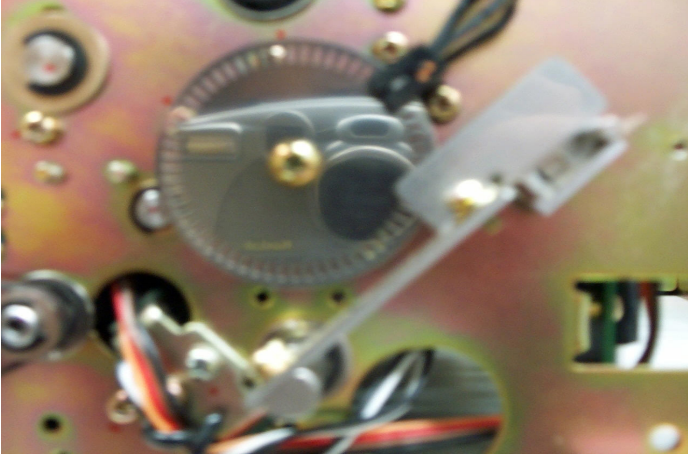| CODE	44H
Meaning	Over Reject

< Table 7-3 Over Reject by Double Detect Problem (Code: 3C) >

Case 1. PLATE D/D SENSOR deflected by external force.
   : It should be positioned like the picture and attached to RVDT SENSOR
     BLOCK and PIN properly.
   : If the deflection is too serious, you should replace with new ones.

Case 2. Abnormal RVDT Sensor, Shaft Error in Production
   : It is rare case but sometimes the sensor or shaft error in production
     causes such a over-reject. It should be very serious and difficult
     to fix that in customer's house. It is recommended the RVDT should
     be replaced with new one.

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CODE	44H
Meaning	Over Reject

< Table 7-4 Abnormal Clutch or Pick-up Roller (Code: 9C 03, 9C 00) >

It may be caused by the out-of-quality clutch, which is sticking to the power transmission all the time. So the clutch should be replaced with new one.

Otherwise, the abnormal pick-up roller may cause the over-reject. It needs replacement with new one, in order to fix the problem.

< Table 7-5 Skew, Obstacle on Path (Code: 9C 80, 9C 9D, 9C 9E, 9F) >

In case of piece cut from the bad banknote or improper material on the path, it enables to cause the skew amplification, which can occur over-reject.
The note be changed with new one or the path should be cleared by dispensing the thick note size paper.

TABLE 8

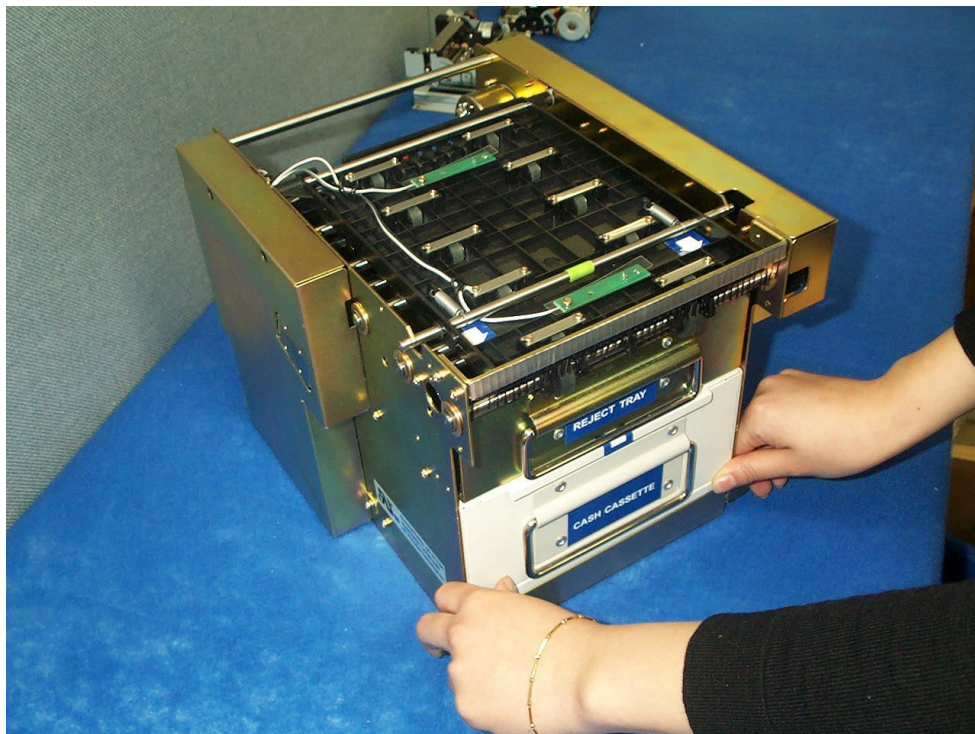| CODE	45H
Meaning	Cassette is not recognized
Check Point	- Is Cassette fully inserted to main body? - Is the location of J18 CONNECTOR correct?
Action	-Try again after checking above situation. - Check J18 CONNECTOR

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TABLE 9

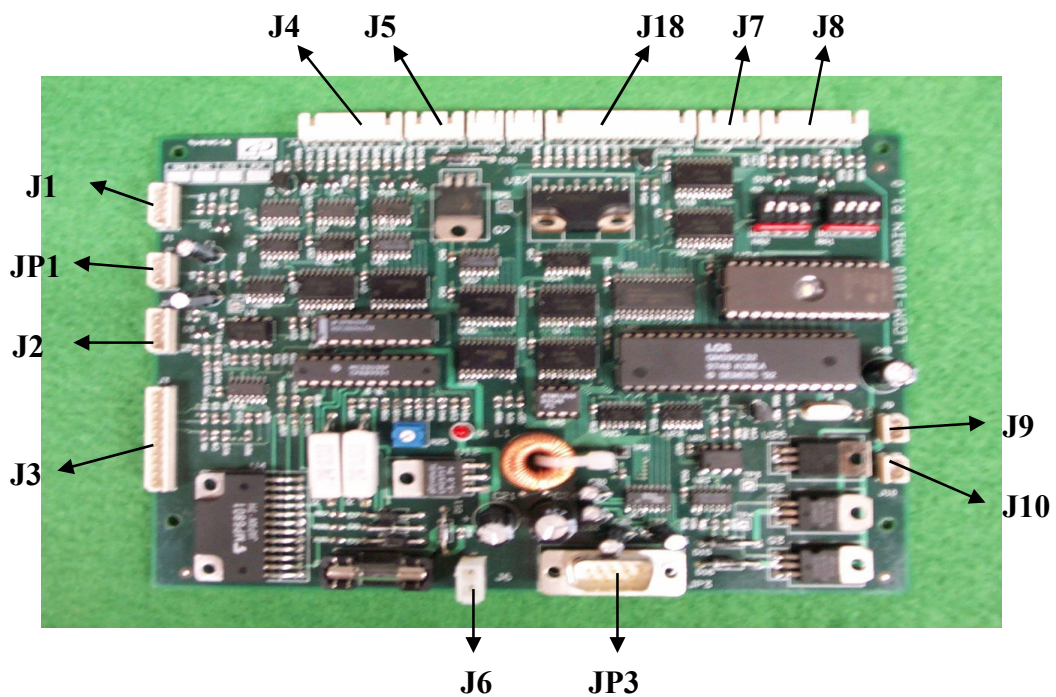| CODE	49H, 4AH
Meaning	- Diverter solenoid or SOL Sensor error - SOL Sensor error
Check Point	- Is the location of J18 CONNECTOR correct? - Is the location of J9 CONNECTOR correct?
Action	-Try again after checking above situation. - Check J18 CONNECTOR. - Check J9 CONNECTOR

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TABLE 10

CODE	38H
Meaning	- Bill-End
Check Point	- Is enough notes in the CASH CASSETTE?
Action	- Loading notes in the CASH CASSETTE

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TABLE 11

CODE	3BH
Meaning	-Note request error
Check Point	- Is requested dispensing notes of one transaction correct?
Action	- Dispensing notes of one transaction is from 1 note to 20 notes

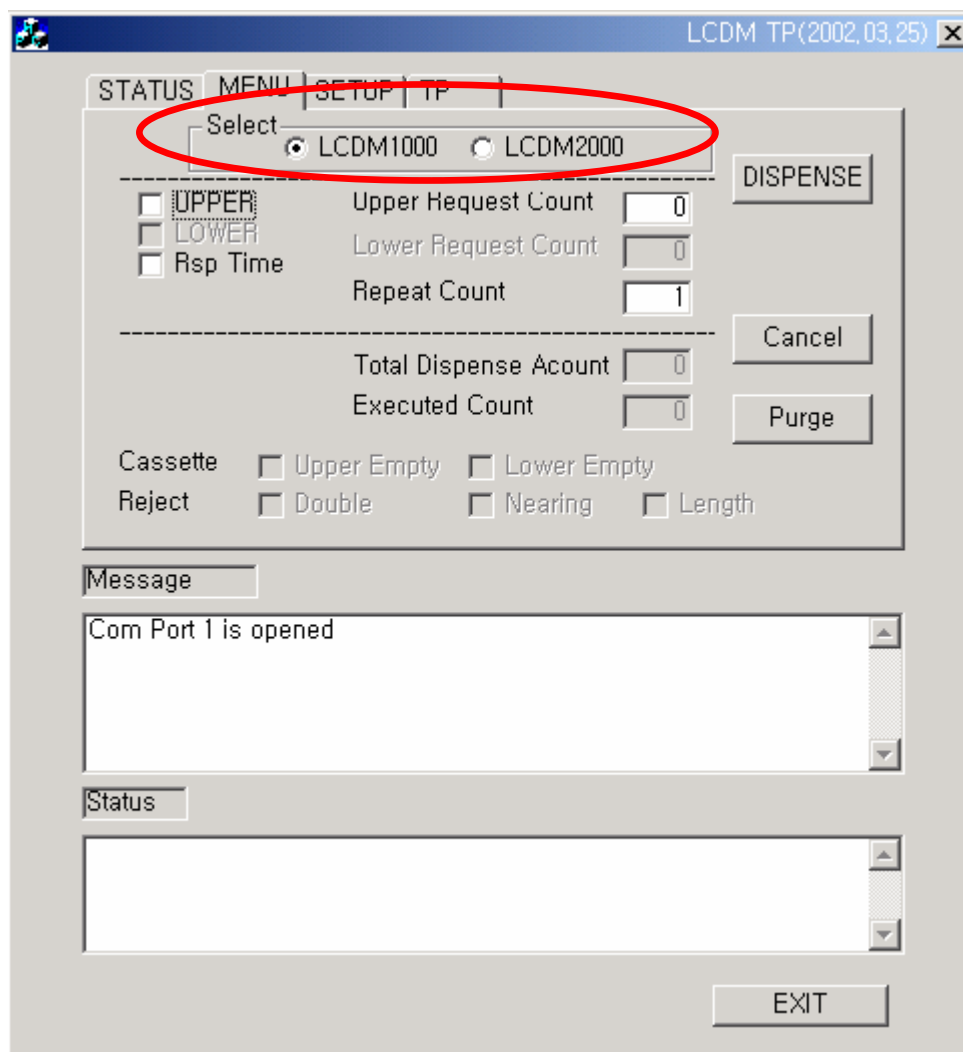*PULOON Technology Inc.*

4. Operating the LCDM-1000

I. SETUP

1) Start the test program "LCDMTP"

2) Maintain default value like below.

(If you need to choose another port, check the other port number)

3) Press "OK" button

< Fig 1 : SETUP PAGE >

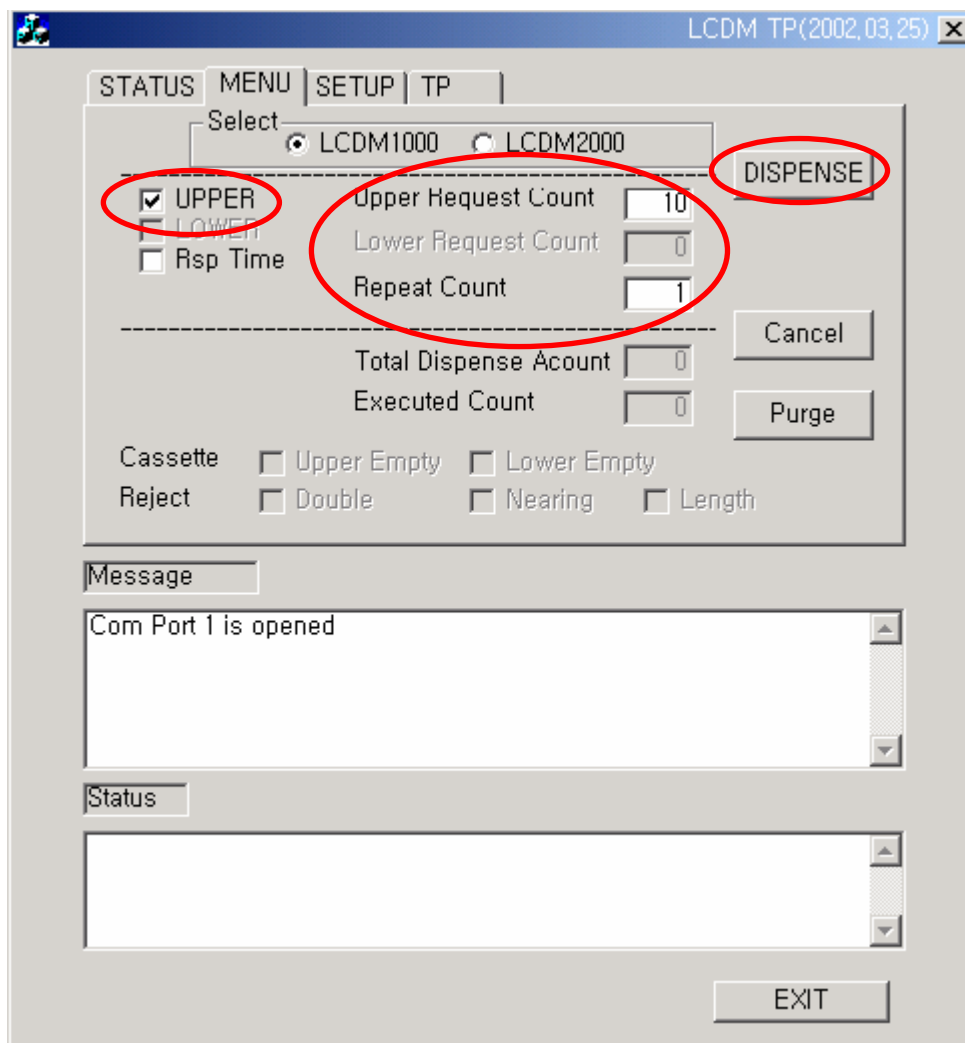*PULOON Technology Inc.*
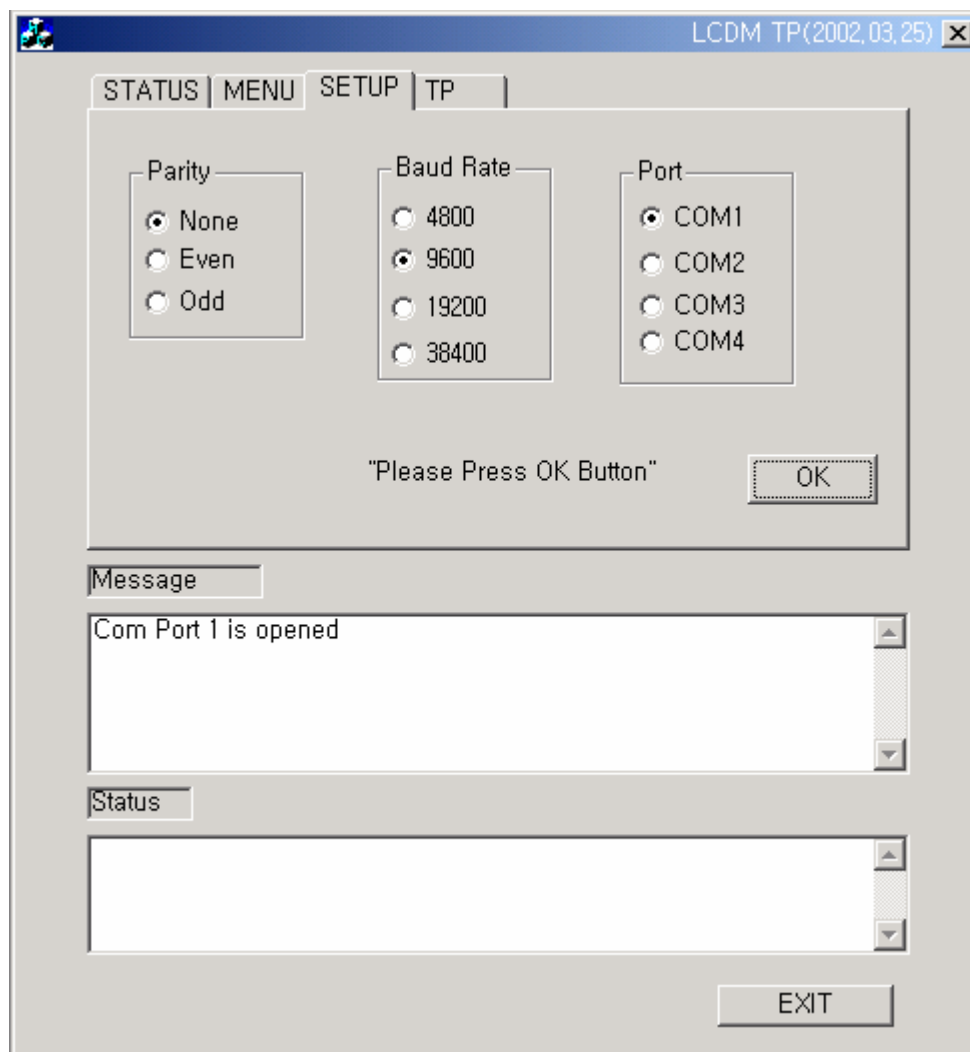
II.   MENU

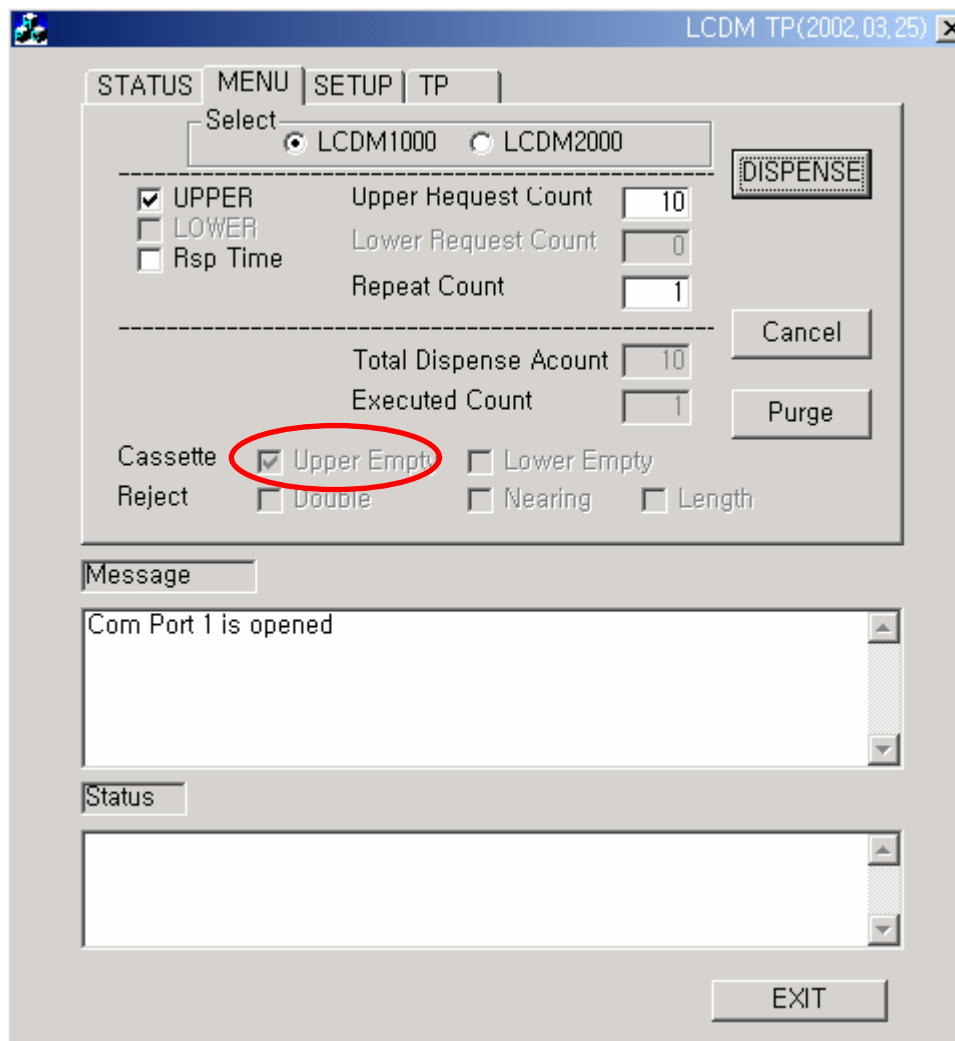1)   Choose LCDM-1000 or LCDM-2000

< Fig 2 : MENU PAGE >

2) DISPENSE

(1) Check UPPER

(2) Fill in the blank of "Upper Request Count" and "Repeat

Count" (Recommended Values are from 1~20 for the XXX

Request Count, and 1~999 for the Repeat Count)
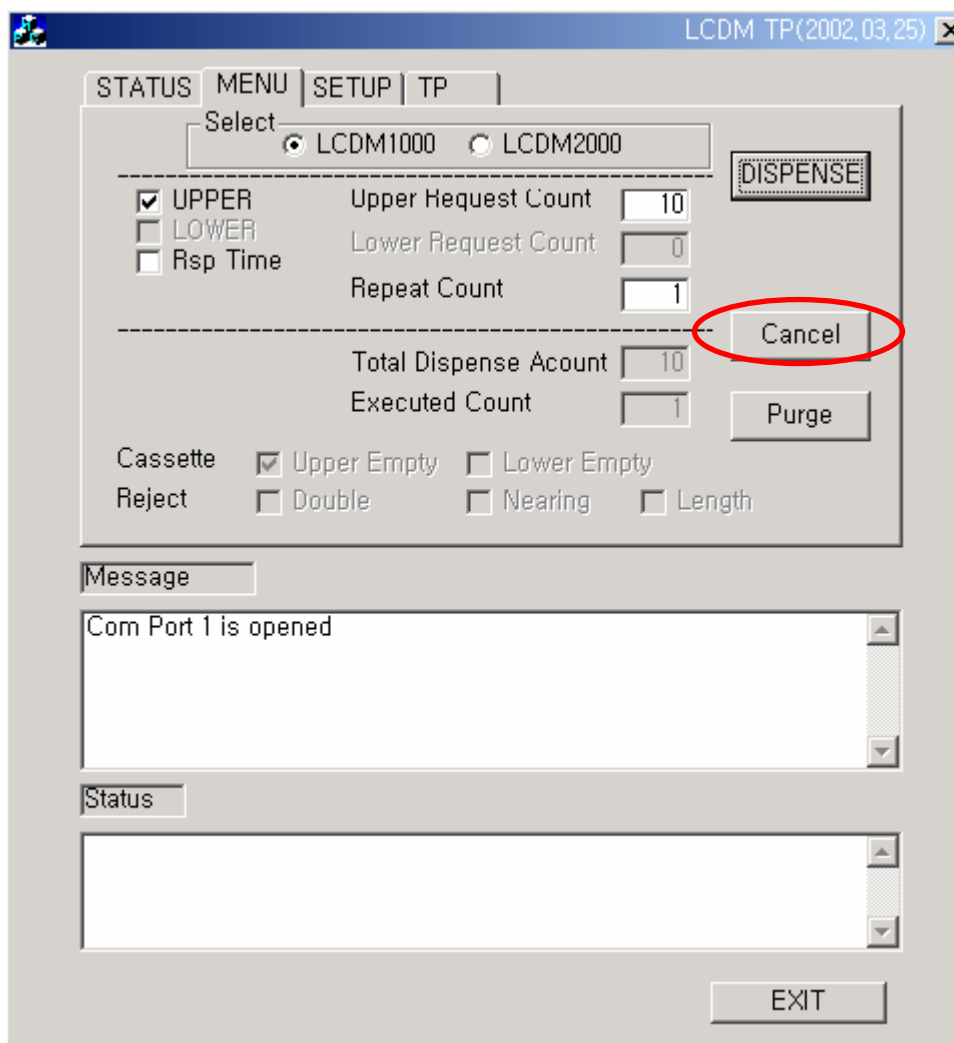
(3) Press the button of "DISPENSE"

<Fig 3 : Ten bills are dispensed 1time from cassette>

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(4) If Near-End occurs, V mark is checked at "Upper Empty"

<Fig 4 : Near-End occurs>

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3)   PURGE

If you want to clear the note in the path, press the button of "Purge"

<Fig 4 : Purge>

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III.   STATUS

1)   Press "STATUS" button and all sensors are rechecked.
        This shows system status for you.
2)   If sensor error occurs, V mark is checked at each column
        accordingly.

< Fig 5 : STATUS PAGE >

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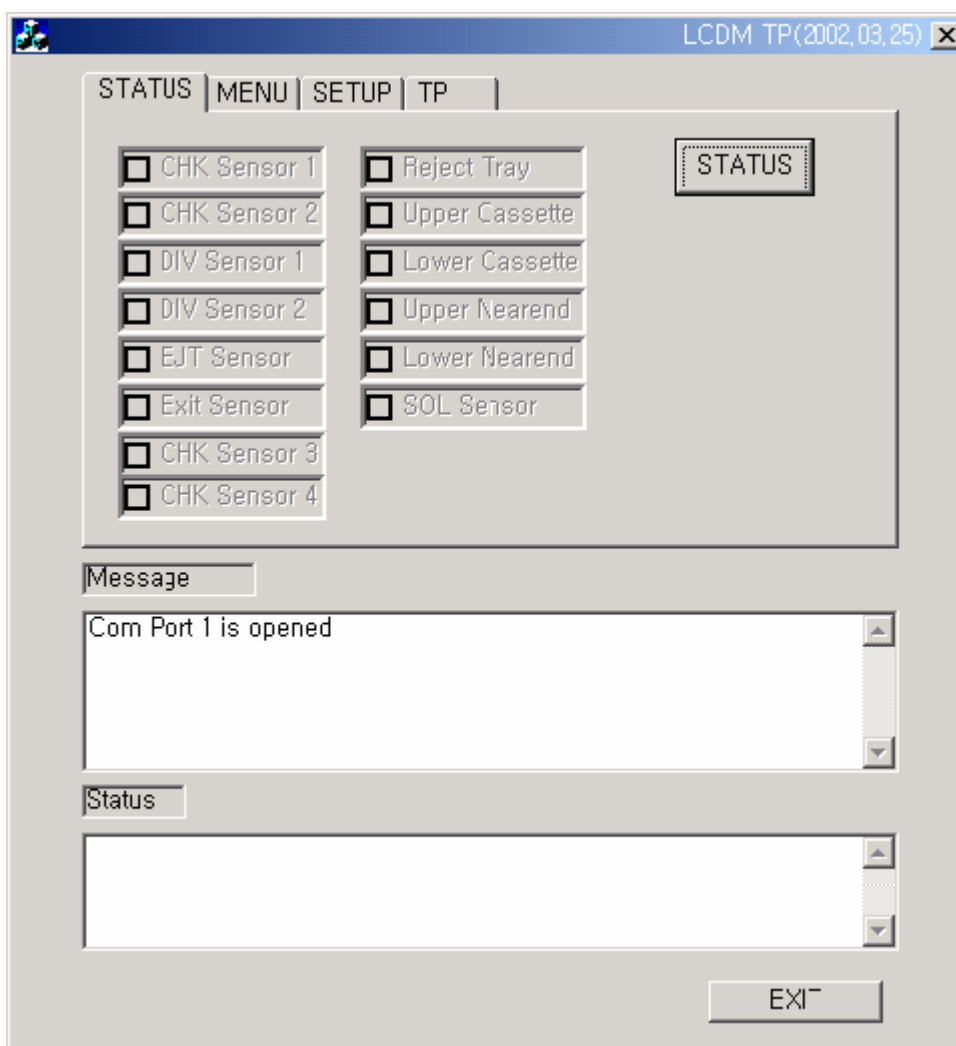
IV.   TP

1)   This page is about test program for checking each function and element of the unit.

2)   Motor Speed, Bill Length, Test Dispense, Diverting, RVDT Value, ROM Version and Clutch Tests can be performed and examined.

3)   The recommended values are shown in the Fig. 7 of next page.
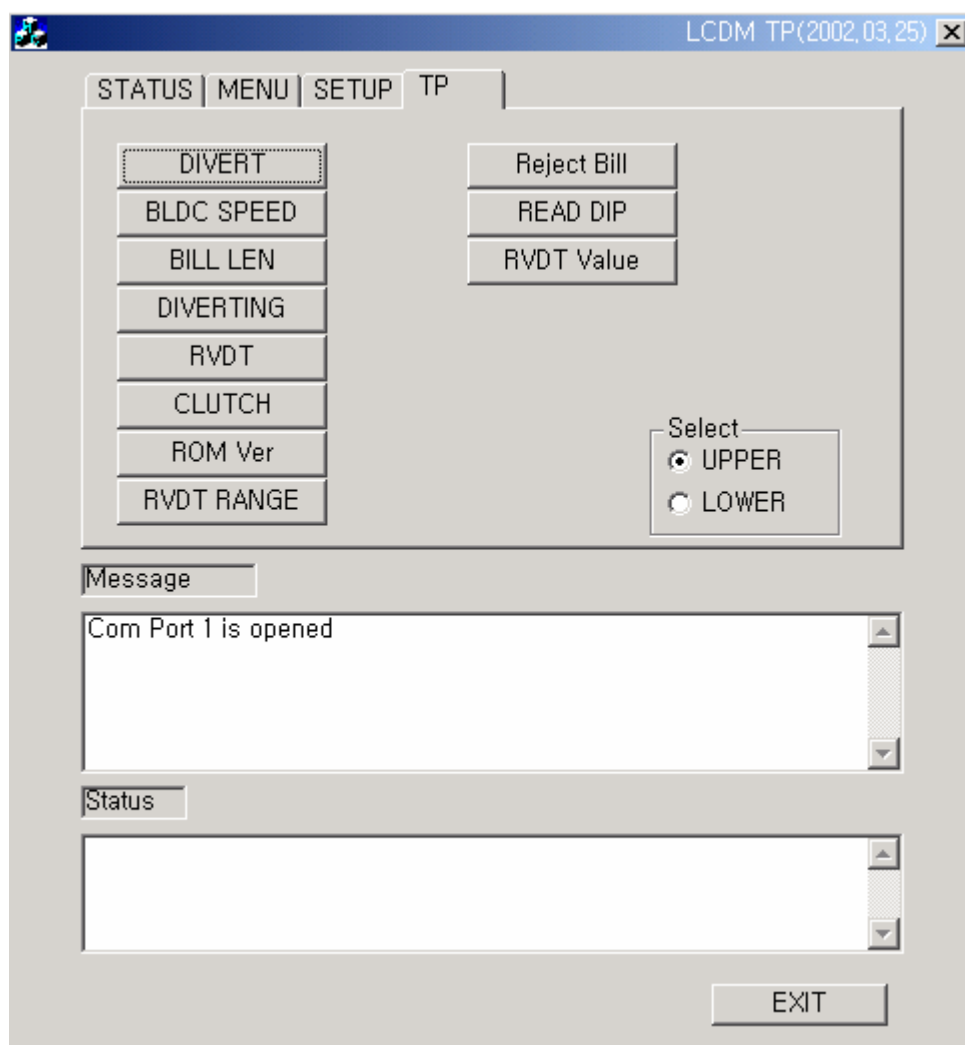
< Fig 6 : TP PAGE >

No.	Command	Element	Check Points			Rec. Range (TP)
1	**BLDC SPEED**	**Motor**	**Rotation Speed**			**6800 ~ 7800**
2	**RVDT**		**No Load (Allowance)**			**- 5 ~ + 5**
3	**BILL LEN**	**Optical Sensor (Length)**	**USD, CAD, etc (app. 63~70 mm)**			**29 ~ 3E**
			KRW, JPY, etc (app. 73~80 mm)			**2F ~ 47**
		RVDT Sensor (Thickness)	**USD**	**Normal**		**Higher than 0500**
				Double		**Lower than 0500**
			CAD	**Normal**		**Higher than 0430**
				Double		**Lower than 0430**
			AUD NZD	**Normal**		**Higher than 04C0**
				Double		**Lower than 04C0**
4	**CLUTCH**	**Clutch**	**Operation Test**			**On/Off**
5	**DIVERT**	**Solenoid**	**Operation Test**			**On/Off**

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