F56/F53 Bill Dispenser Unit
Maintenance Training Summary

Contents

1, F56/F53 BDU F56/F53 BDU Outline Description
2, D level command / test program
3, Error codes , Maintenance tracking procedure
4, RAS diagnosis / adjustment
5, Replace consumable parts / Regular Maintenance training
6, Repair/Replacement
7, Field Support

Documents for Manintenance training

Document Name	Document No. / file name	Check
Maintenance Manual	P2KD02881-B001	
Operator's Guide	P1KD02881-B001	
Theory of Operation	P3KD02881-0001	
D level Specification	A3KD03234-0001	
Test Program for F56/F53 BDU Operation manual		
Bill analysis tool	billanalysis.xls	
Error code list	K3KD03234-0001	
RAS Specification	K2KD03234-0001	
Parts Catalog	W2KD02881-B001	
Spare Parts List	W1KD03234-0001	

Required tools

Tool Name	Part Number	Check
Power Supply		
Power Supply Cable		
Conversion plug , Voltage transformer		
Test Program	F56BDUTP.EXE	
DLL file		
Firmware		
RS232C cable	-	
TERM cable	-	
Test note	-	
Thickness adjustment media	D15L-0014-0157	
Tension gauge	-	
M3 screw driver		
Minus screw driver		
pincher or spring hook		
Erings for spare	F6-ER2-S ~ ER6	
Dry cloth for cleaning		
Alcohol for rubber cleaning		
Unit for assemble/ disassemble		
- Pool top unit		
- Semi Bunch top unit		
- Additional Lower unit (for standard cassette)		
- Additional Lower unit (for mass strage cassette)		
- Cash cassette (standard)		
- Cash cassette (mass strage)		

Revision control

Revision	Date	Description	Preparer	Approver
01	Mar. 2009	First Release	Yanagida	Fujimoto

1. F56/F53 BDU

F56/F53 BDU Outline Description

Document : P1KD02881-B001 Operator's Guide
P3KD02881-0001 Theory of Operation

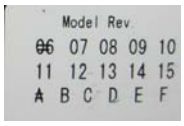
Outline Specification

architectonics of unit

Top unit	KD0323*-C***
Main unit	KD03234-C011,(mass strage cassette : C012)
Cash cassette	KD03234-C520,(mass strage cassette : C560)
Lower unit (option)	KD03234-C900,(mass strage cassette : C950)

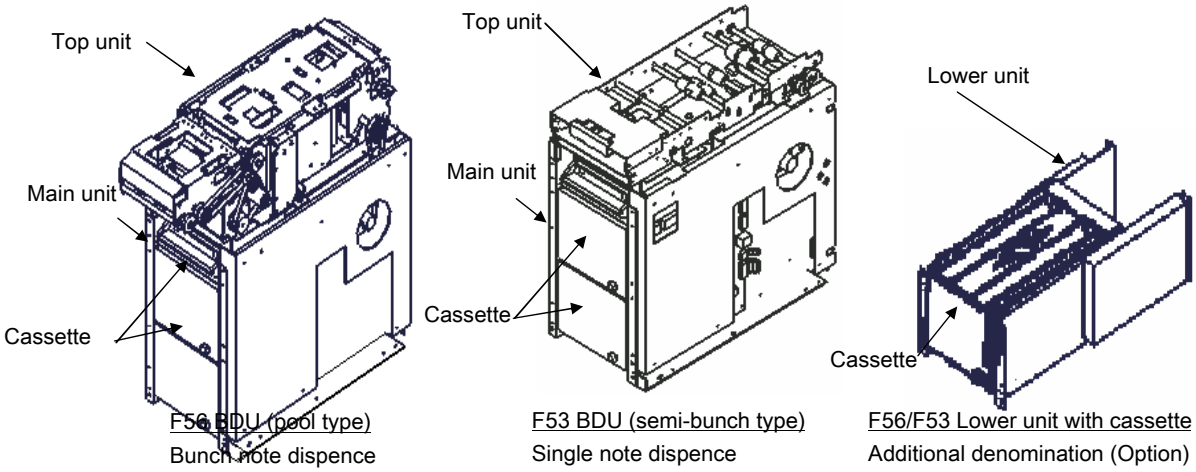
Product Number / Revision confirmation.

Each unit have the lavel that indicate the product number / serial number / revision.



Product No ; KD02881-C500
Serial NO ; KA00002067
Mfg. Date ; Jul. 2005
Revision ; 06A

F56/F53 BDU (standard cassette)



F56 BDU (pool type)
Bunch note dispence
to customer

F53 BDU (semi-bunch type)
Single note dispence
to customer (spray)

F56/F53 Lower unit with cassette
Additional denomination (Option)

Applox.2 notes per sec, short edge first transport

2Denomination as standard (Max 6 Denomi with additional lower unit)

60mm (0.12mm 500)
60mm strage area per cassette. (if 0.12mm and brand-new note, Approx. 500 notes)
1000 120mm
120mm pre cassette if 1000 sheets cassette

DC24V Input Voltage DC24V

RS232C Interface RS232C, USB(option, for only F53)

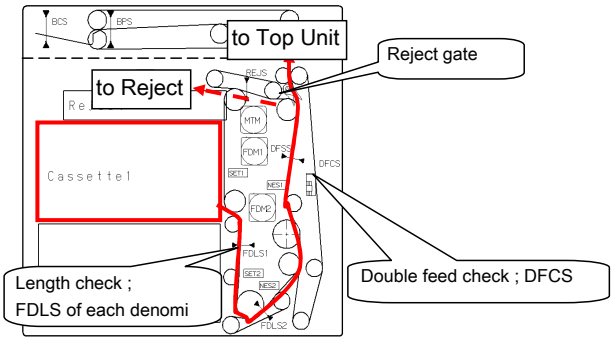
length check, thickness check
parameter setting is available for world currency.

low note detection of bills in the cassette
30 Applox. 30 notes

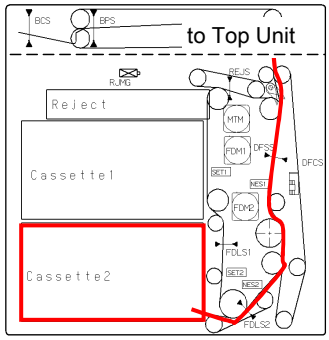
Bill transporting route in F56/F53 BDU

Main Unit

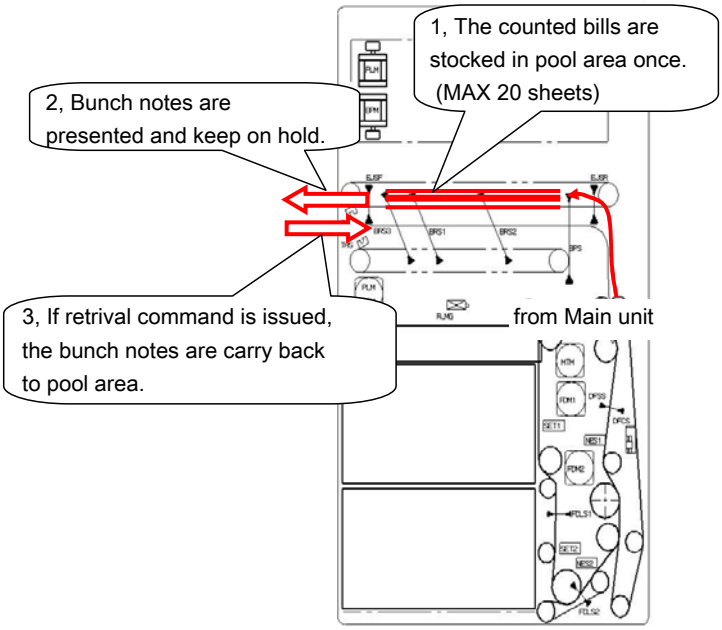
from 1st cassette



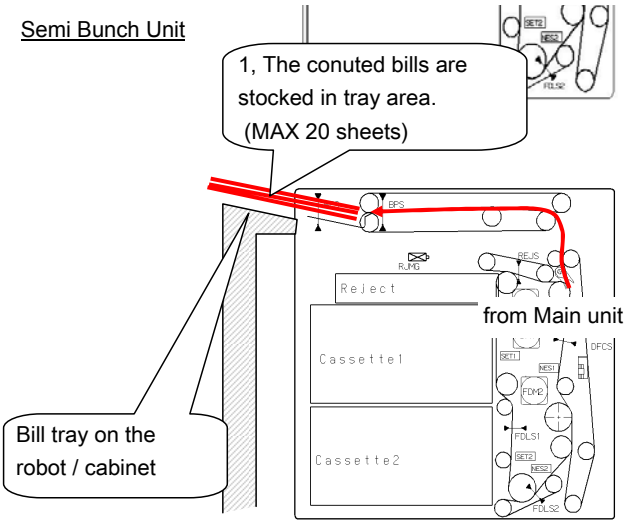
from 2nd cassette



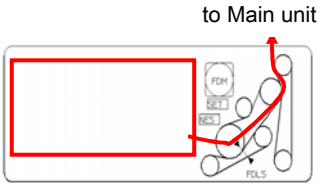
Pool Unit



Semi Bunch Unit

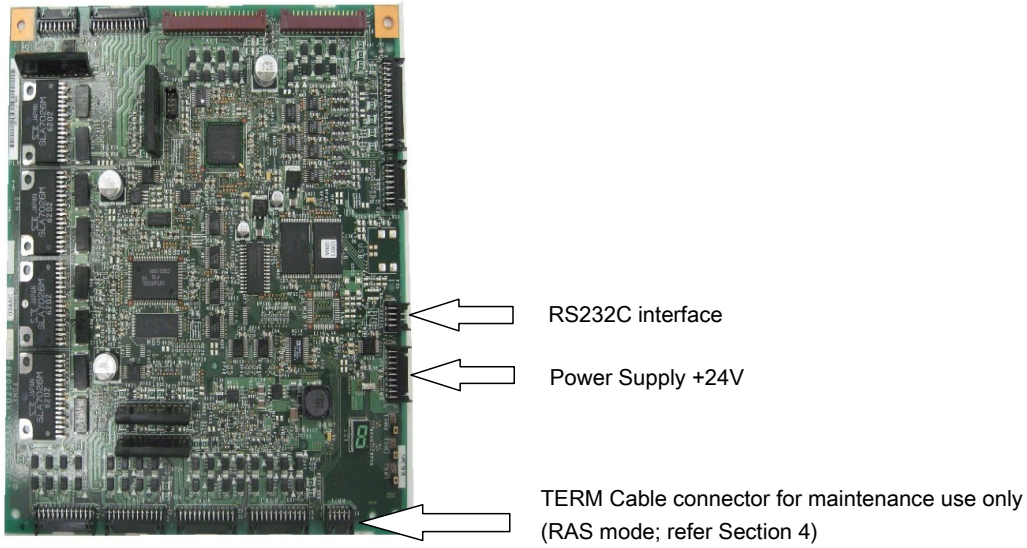


Lower Unit



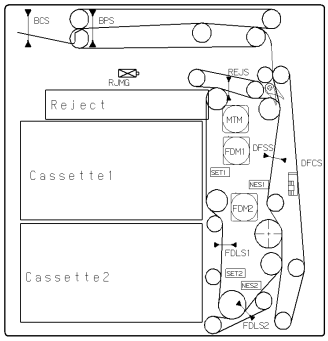
(Interface)

Connection of POWER supply and interface cable



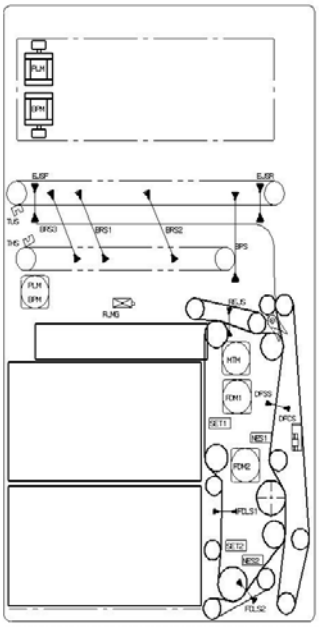
Electrical parts location

F53 BDU



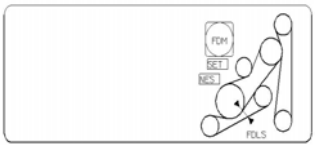
BCS	Bill in tray sensor (monitor)
BPS	Bill count sensor
REJS	Reject bill path sensor
DFSS	Thickness timing sensor
FDLS1(2)	Feed Sensor
MTM	Main Transport motor
FDM1(2)	Feed Motor
DFCS	Thickness sensor
SET1(2)	Denomination Switch
NES1(2)	Low note detect
RJMG	Reject Magnet

F56 BDU



PLM	Pool table motor
BPM	Pool transport motor
EJSF/R	Exit sensor F/R
BRS1.2.3	Pool section sensor
TUS	Table detection (Up)
THS	Table detection (Home)
BPS	Bill count sensor
REJS	Reject bill path sensor
DFSS	Thickness timing sensor
FDLS1(2)	Feed Sensor
MTM	Main Transport motor
FDM1(2)	Feed Motor
DFCS	Thickness sensor
SET1(2)	Denomination Switch
NES1(2)	Low note detect
RJMG	Reject Magnet

Additional Lower

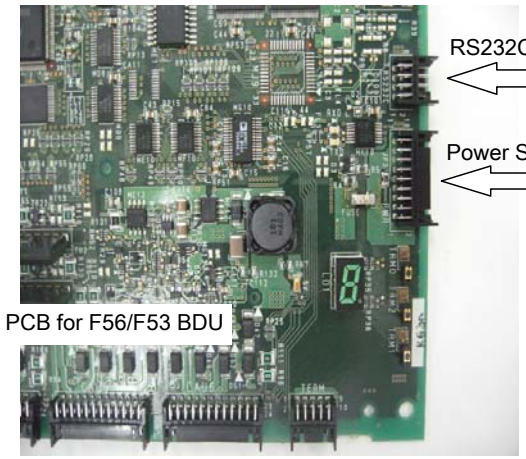


FDM	Feed Motor
SET	Denomination Switch
NES	Low note detect
FDLS	Feed Sensor

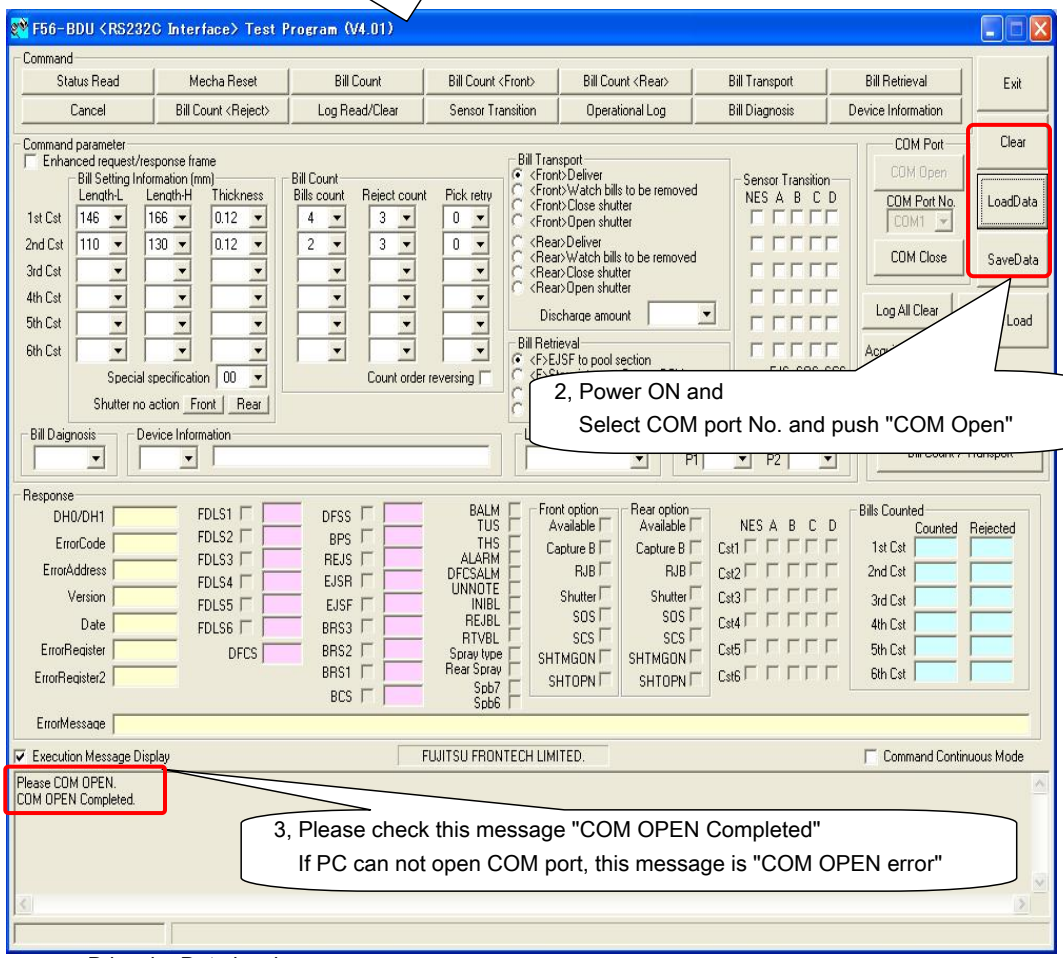
2. D level command / test program

Document : A3KD03234-0001 D level Specification
Test Program for F56/F53 BDU Operation manual

Connection Test Program (TP) and BDU

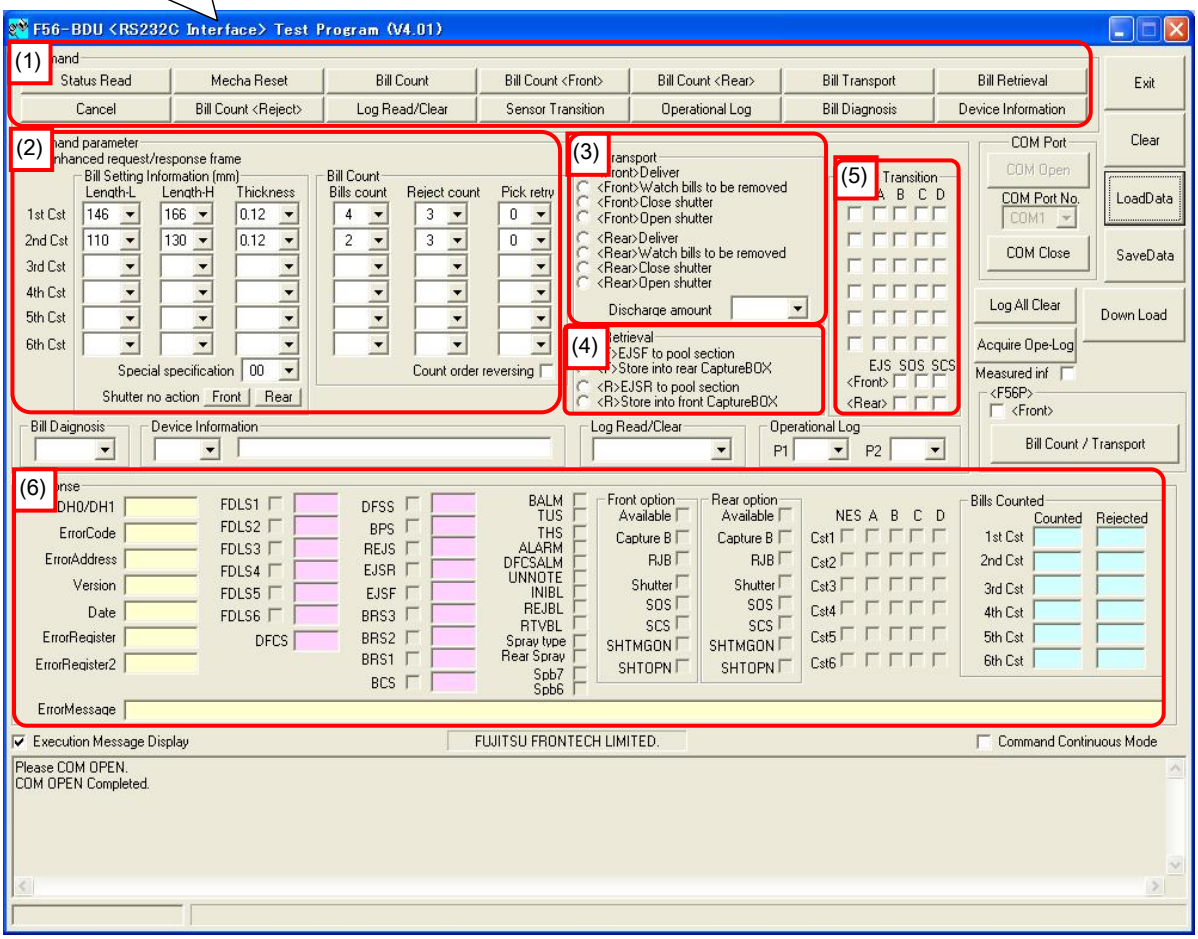


1, Please start "F56bduTP.exe"
in the same folder as "FKBDULDV.DLL



D level = Data level

3, Please set some command parameters and issue command.



(1) F56/F53BDU　F56/F53 BDU accept these commands.

Status Read・・・・・・・・ reports the status of sensors, cassettes,and so on.
Mecha Reset・・・・・・・ initializes F56-BDU and specifies bill information setting for each cassette.
Bill Count・・・・・・・・・・ feeds a bill one by one from a specified cassette.
Bill Count<front>・・・・ feeds a bill one by one from a specified cassette (for only F56)
Bill Count<rear>・・・・・ feeds a bill one by one from a specified cassette (for only F56)
Bill Transport・・・・・・・ transports the pooled bills to presenter (for only F56)
Bill Retrival・・・・・・・・・ deposit to pool section or Escrow bin (for only F56)
Cancel・・・・・・・・・・・・ terminate processing of a request frame.
Bill Count<reject>・・・ transports bills to reject box.
Log Read/Clear・・・・・ reads/clears statistics information
Sensor Transition・・・ monitors sensor status and sends a response when detecting a change in this status.
Operational Log
Bill Diagnosis・・・・・・ calculates the length and the thickness of the bill of each denomination.
Device Information・・ is used to know device information.

(2) Bill count parameter
Setting of bill parameter for each denomination
(3) Bill transport command parameter (for only F56)
(4) Bill Retrival command parameter (for only F56)
(5) Sensor transition command parameter
(6) Response frame・・・・・・ response frame contents are displayed in this area. (sensor level, error code, messages)

Informations that is displayed here(6) should be checked for maintenance

Please see D-level specification for more detail

Section 1 of Maintenance Manual

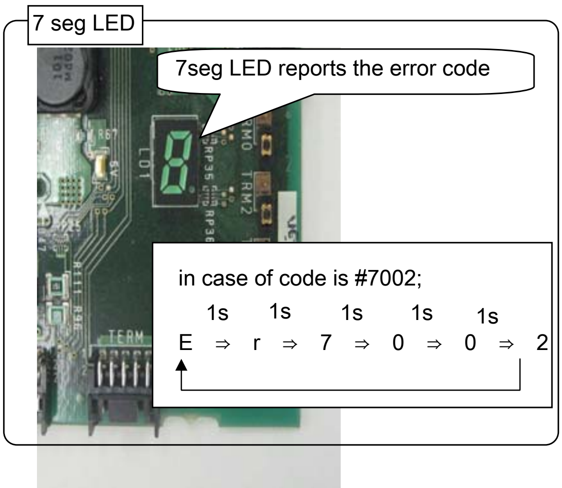
3. Error codes , Maintenance tracking procedure

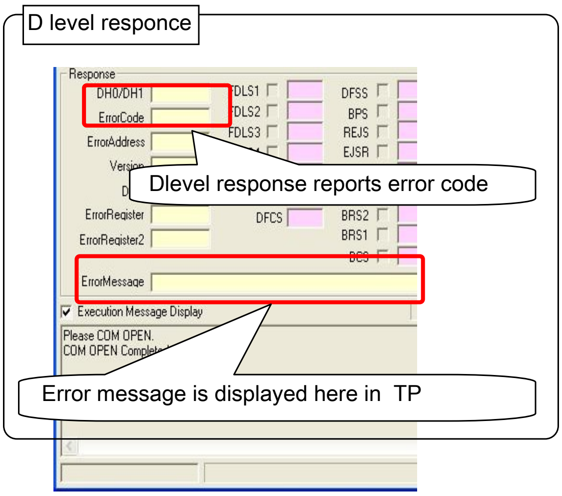
Document : K3KD03234-0001 Error code list
P2KD02881-B001 Maintenance manual (Section 1.5)

3-1 Error code confirmation

LED

Error code is displayed at 7 seg LED and is reported as the one of Dlevel response information.





3-2 Maintenance tracking procedure

7002 (FDLS2) In case of error code 7002(bill remaining at FDLS2)

Error code	Possibly faulty location																																														
	Check										Cleaning /Check																							Adjustment/ Setting			Replacement/ Adjustment			Replacement				Other			
	Medium remain	PWR	RS232C	UPUS	UPUD	CAU1	CAU2	CAU3_CAU6	SHTF	SHTR	FDLS1	FDLS2	FDLS3	FDLS4	FDLS5	FDLS6	DFSS	REJS	BPS	BRS1/BRS2/BRS3	EJSR	EJSF	SOSF, SCSF	SOSR, SCSR	BS1A, BS1B, BS1C, BS1D	BS2A, BS2B, BS2C, BS2D	BS3A, BS3B, BS3C, BS3D	BS4A, BS3B, BS4C, BS4D	BS5A, BS3B, BS5C, BS5D	BS6A, BS3B, BS6C, BS6D	RJBF, FSHT, FRBOX	RJBR, RSHT, RRBOX	THS, TUS	DFCS1RAS31	Gap of the gate	Cassette guide	Transfer motor(MTM)	Transfer motor(BPM)	Table motor(PLM)	Pick/ Sub roller	Top unit	Lower unit	PCB	Command sequence	Cassette installation	Bill replenishment	Program download
4800								2						2																										3		4	5			1	
5000				1	1																												2						3		4		4				
5001				1	1																												2						3		4		4				
5100				1	1																												2						3		4		4				
5102				1	1																												2						3		4		4				
52xx				3																2																					4		4	1			
7001	1					3					2																														4		4				
7002	1						3					2																													4		4				
7003	1							3					2																													4	4				
7004	1							3						2																												4	4				
7005	1							3							2																						Recoverd					4	4				
7006	1							3								2																										4	4				
7009	1					3											2																								4		4				

Recoverd

1st action remove the remaining media → END

↓ NOT Recoverd

2nd action check/replece the FDLS2 sensor — Recoverd → END

↓ NOT Recoverd

3rd acrtion CAU2 check the CAU2 connector — Recoverd → END

↓ NOT Recoverd

4th action PCB replace the PCB or BDU

Please see Section 1.5 of Maintenance manual for more detail

Section 1.4, 1.5 of Maintenance Manual

NOTE1 : Major Error Codes in the field

These are the major errors that FTEC had experienced in 5 years (approx. 20,000 unit) in the field,
and these 3errors accounts for 90% of the field errors.

Error code	Detail	Coping process
n8-00	Jam is occurred at **n** denomination. (In many cases, the bill is jamed in the cassette.)	Remove the jamed bill in the cassette. And it is very important to inform the bill loading procedure and the use prohibition bills to your customers.
FC-00	POWER shut out during bill counting	**FC-00** ↓ issue "**bill count**" command. Then BDU will return the bill count number information to APL and the error code is **FD-00**. ↓ Issue "**mecha reset**" command. Then you can use. ~~Some FTEC customer don't have~~ this algorithm in APL software. Therefore, many PCBs ware returned back the repair center as broken part.
83-00 84-00	Long Bill Thickness error	If the pick roller worn out, the reject rate is increase. Please replace the pick rollers if reject rate is increase.

NOTE2 : Major Feedback Improvements

Error code	Detail	Coping process
n8-00	Jam is occurred at **n** denomination. (In many cases, the bill is jamed in the cassette.)	Distribution of the Bill Loading Manual →Please see the attached sheet Improve the bill exit slit of the cassette. →Configuration change After this action, the jam at this portion was hardly genarated.
-	Cassette damege by dropping	FTEC test result is height 800mm drop is OK. But some customers required the storonger cassette and we improved the margin of the strength of the cassette. Please see the report sheet for the detail

4. RAS

RAS diagnosis

Document : K2KD03234-0001 RAS Specification

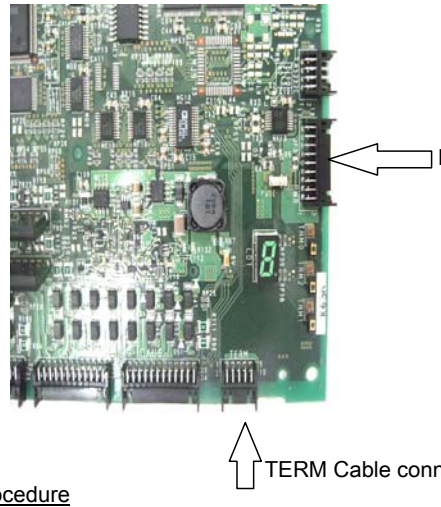
Tools TERM interface cable

4-1 PC RAS

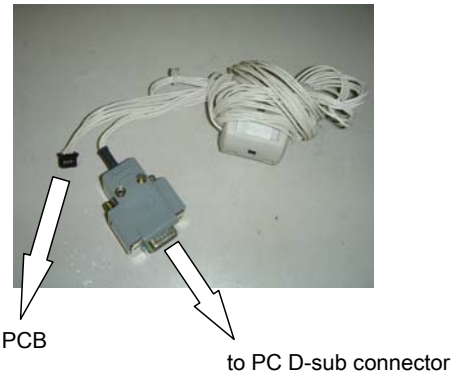
Function

- Mechanical operation test for each electorical parts
- sensor ON/OFF and emitting level check
- adjustment
- setting
- Read out information

Connection

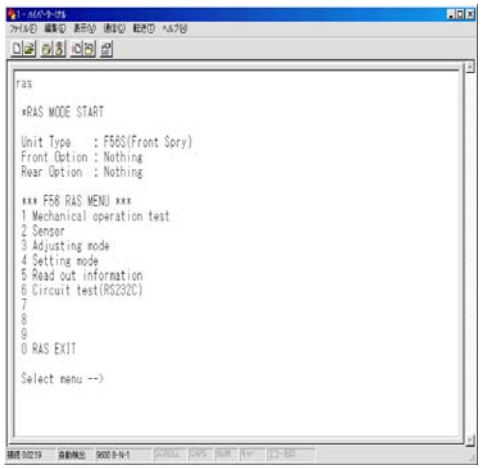


TERM interface cable for PC RAS



Procedure

1 POWER ON
2 Start communication soft.
Windows
In case of windows, Start menu □ Program □ Accessory □ Communication □ Hyper Terminal
3 Communication settings
(1) Com port select
(2) Communication speed 9600bit/s, Transmission code=8-bit data
4 "ras" Input "ras", then RAS mode is started.



In case of check ON/OFF of DFSS
(RAS No. is 21)

(1)Please select menu "2" and press enter key
(2) Please "1" and press enter key
(3) Please "0" (main unit) and press enter key.
(4) Please block / open the sensor by paper of your finger.
(5) Please check the status of FDLS is switch ON/OFF.

Please see RAS specification for more detail

Section 3 of Maintenance Manual

4-2 RAS

Local RAS (On-board RAS, without interface cable and PC)

Function

- Mechanical reset test
- Sensor ON/OFF check
- Thickness sensor output check
- Thickness sensor adjustment

Procedure

TRM2 ON (default; OFF) ・・・ Fig.1

↓

POWER ON

↓

7 seg LED start to count up the number

This number is the RAS command number shown Table 2.

↓

TRM2 OFF if the number on the 7seg LED is you want to do. (RAS command start)

↓

TRM2 ON if you finish and the LED count up again. (RAS command end)

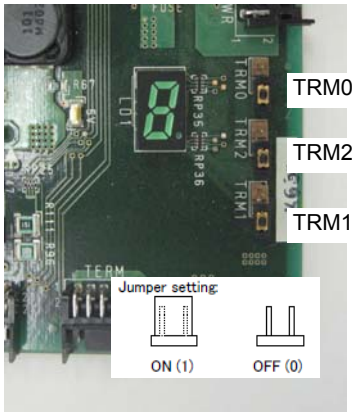


Fig.1 Jumper setting

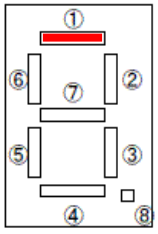
Command list

No.	Mode	Operation
0	Mechanical reset test	Operate the mechanical reset continuously.
1	Display the sensor	Display the sensor part1 on 7seg.
2	Display the sensor	Display the sensor part2 on 7seg.
3	Display the sensor	Display the sensor part3 on 7seg.
4	Display the sensor	Display the sensor part4 on 7seg.
5	Display the sensor	Display the sensor part5 on 7seg.
6	Display the sensor	Display the sensor part6 on 7seg.
7	Display the sensor	Display the sensor part7 on 7seg.
8	Display the sensor	Display the sensor part8 on 7seg.
9	Display the sensor	Display the sensor part9 on 7seg.
A	Display the thickness sensor	Display the thickness sensor data on 7seg. (HEX display)
B	Adjust thickness sensor	The thickness sensor is adjusted.
C	Local RAS mode end	-

Table2 RAS command table

In case of you want to check DFSS sensor ON/OFF (dead or alive)

POWER OFF ⇒ TRM2 ON ⇒ POWER ON ⇒ TRM2 OFF when the LED displayed "2"
Please block the sensor by a paper of finger Please check the LED is blinking
TRM2 OFF (RAS end)



No.	⑧	⑦	⑥	⑤	④	③	②	①
1	-	-	FDLS6	FDLS5	FDLS4	FDLS3	FDLS2	FDLS1
2	BRS1	BRS2	BRS3	EJSF	EJSR	REJS	BPS	DFSS
3	TUS	THS	RJBR	RJBF	SOSR	SCSR	SOSF	SCSF
4	-	-	-	-	RRBOX	RSHT	FRBOX	FSHT
5	BS2A	BS2B	BS2C	BS2D	BS1A	BS1B	BS1C	BS1D
6	BS4A	BS4B	BS4C	BS4D	BS3A	BS3B	BS3C	BS3D
7	BS6A	BS6B	BS6C	BS6D	BS5A	BS5B	BS5C	BS5D
8	-	-	NES6	NES5	NES4	NES3	NES2	NES1
9	-	BCS(op)	-	-	-	-	-	-

Fig.3 Sensor ON/OFF check table

Please see RAS specification for more detail

Section 3 of Maintenance Manual

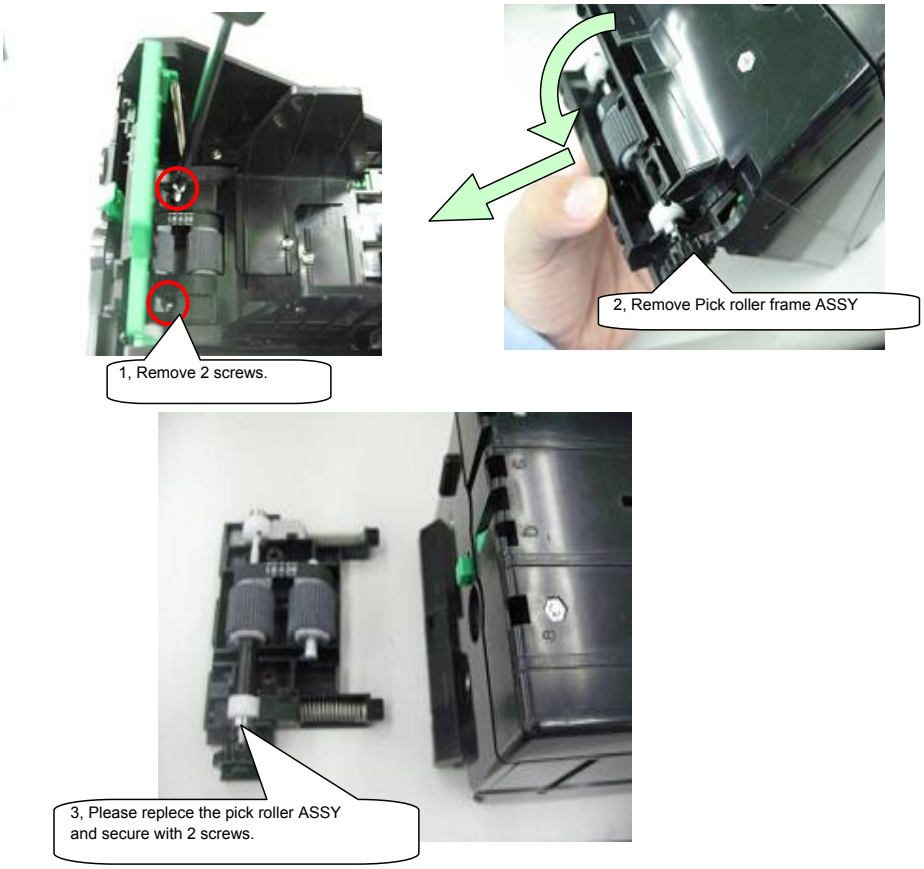
5. Replace consumable parts / Regular Maintenance training

Document : P2KD02881-B001 Maintenance manual (Appendix)

Tools Soft dry cloth
Alcohol for rubber cleaning
M3 screw driver

5-1 Replece the consumable part

(1) Cassette Pick roller



5-2 Regular maintenance (cleaning / check)

-1 Cleaning of Belts, Rollers, Sensors.

-2 Cleaning of Thickness rollers

Please clean by dry cloth with alcohol

-3 Smooth behavior check (reject gate)

Please check the reject gate mechanism works smoothly

-4 Check the sensor level

Please check the sensor level with Test Program or RAS.

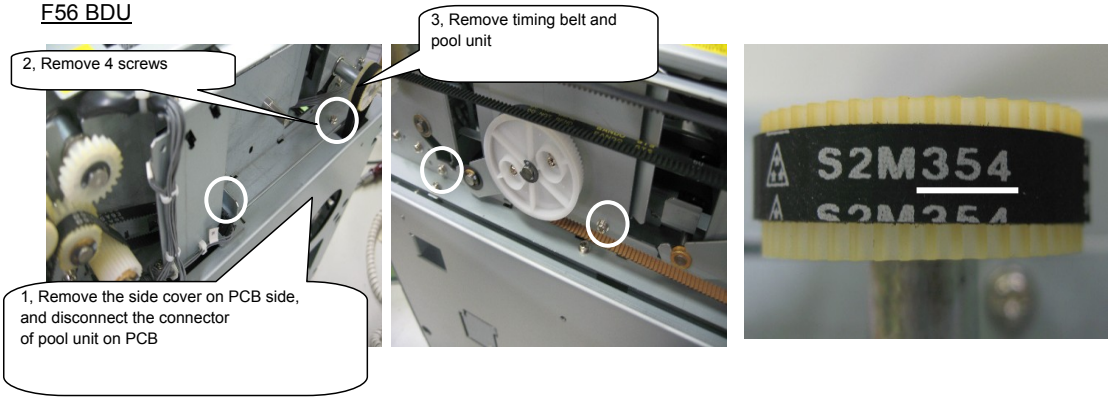
Please see Appendix of Maintenance manual for more detail

Section 2 & Appendix of Maintenance Manual

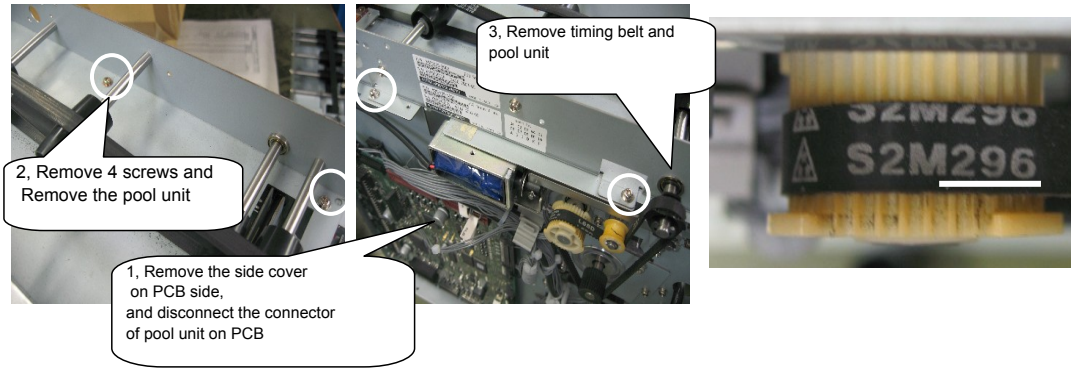
6. Repair / Replace

6-1 Replace of top module

F56 BDU

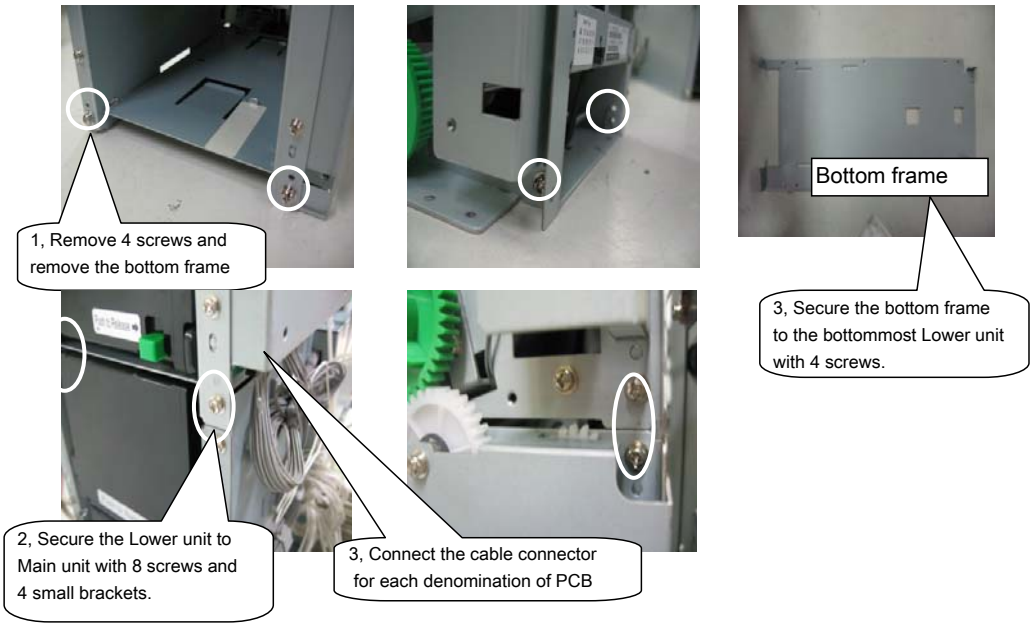


F53 BDU



NOTE1 ; Please adjust the belt tension after replacement.
NOTE2 ; F56 and F53 have the different timing belt.
F56 have length 354mm
F53 have length 296mm

6-2 Connection of Lower unit



6-3 BDU

Disassemble of unit (BDU Unit □ Sub-assembly)

Document : W2KD02881-B001 Parts Catalog
W1KD03234-0001 Spare Parts List

tools M3 screw driver
Minus driver
pincher or spring hook

6-4 ⇒ BDU

Assemble of Unit (Sub-assembly □ BDU Unit)

Document : W2KD02881-B001 Parts Catalog
W1KD03234-0001 Spare Parts List

Scure torque for screws
for metal parts : 9.5± 1kg
for plastic parts : 6.5± 1kg

tools M3 screw driver
Minus driver
pincher or spring hook

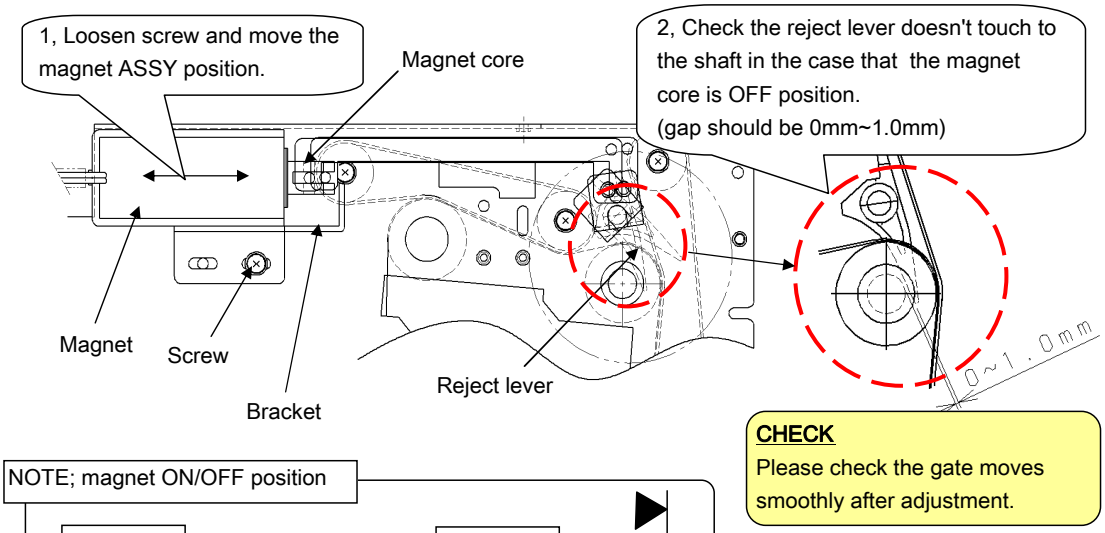
⇒ Please see "Work Instruction Manual"

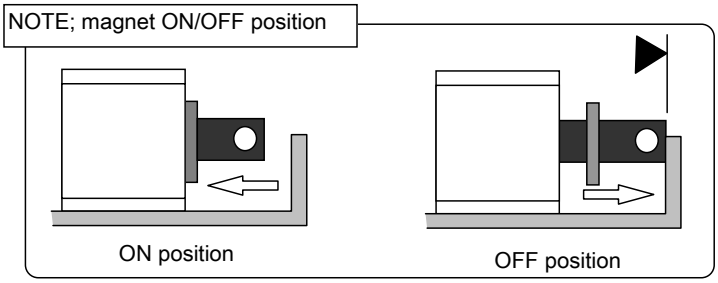
6-5 adjustment

Document : P2KD02881-B001 Maintenance manual

Tools
PC with Test Program
RS232C / TERM interface / Power supply cable
Thickness adjustment media
M3 / minus screw driver
tension gauge

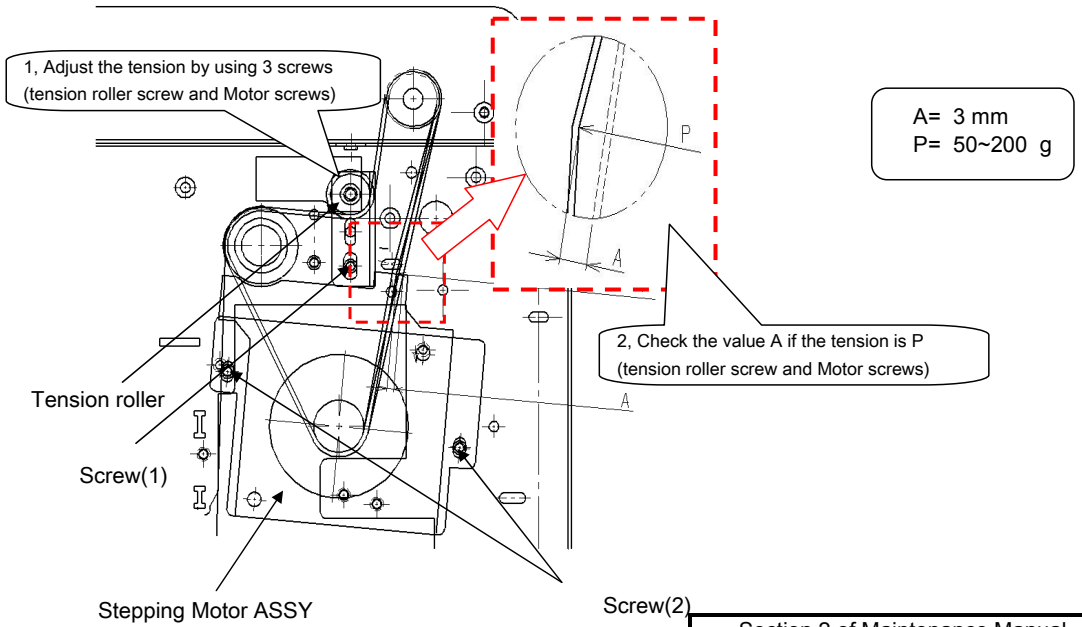
(1) Reject gate adjustment





(2) Timing belt tension adjustment

・ Main transport Motor belt (for both F56 and F53)



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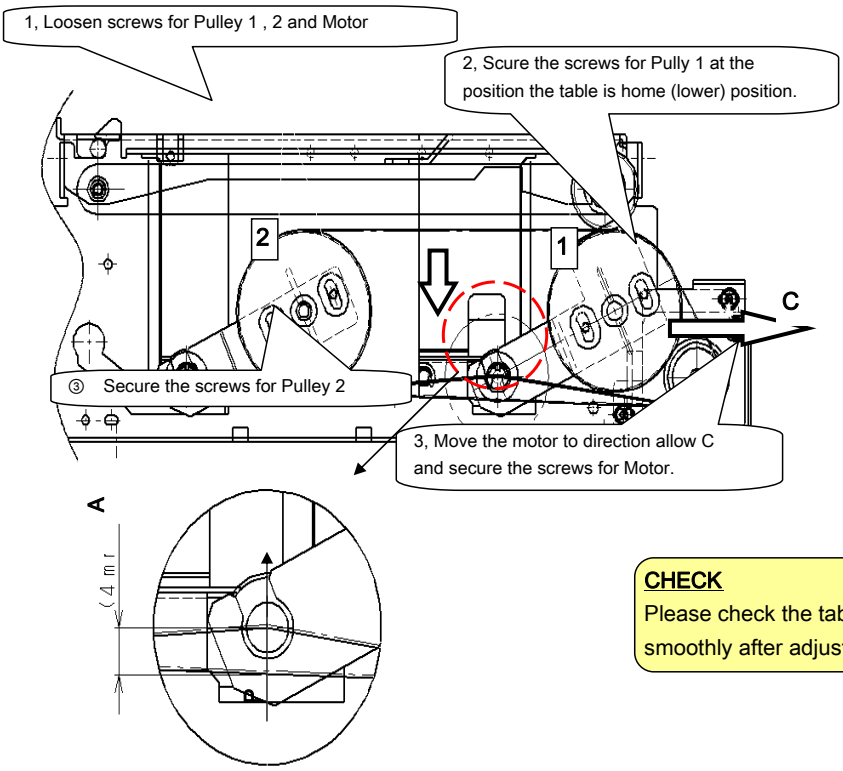
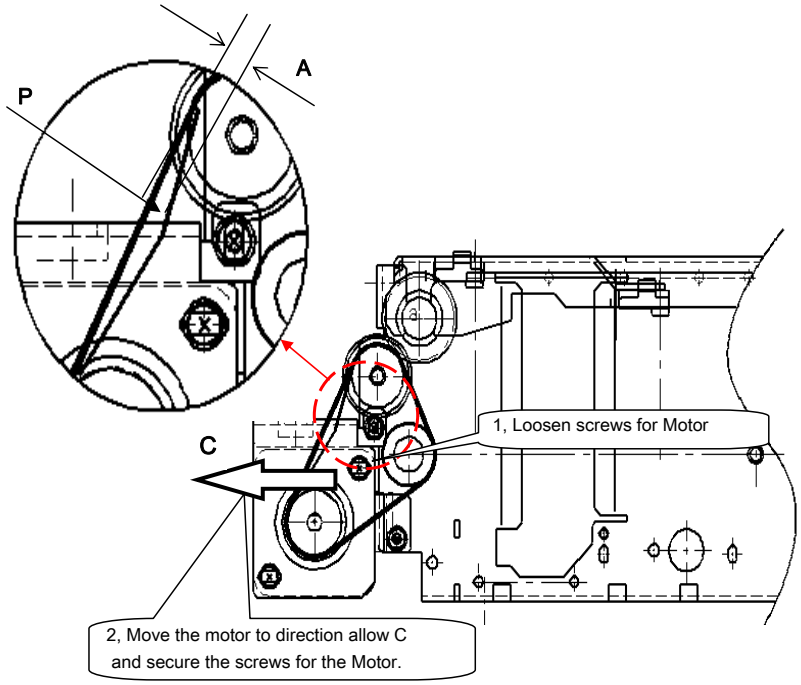
・ Table drive motor belt of Pool unit　(for F56 only)



A= 4 mm
P= 150~250 g

CHECK
Please check the table is move up/down smoothly after adjustment.

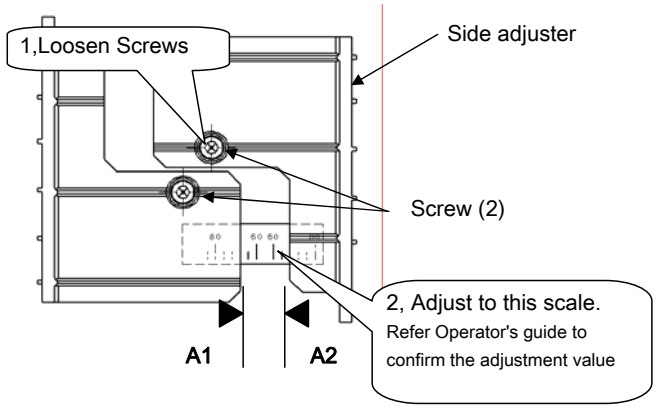
・ Transport moto belt of Pool unit. (For F56 only)



A= 2 mm
P= 80~200 g

(3)　note size adjustment in cash cassette

1, Side Adjuster

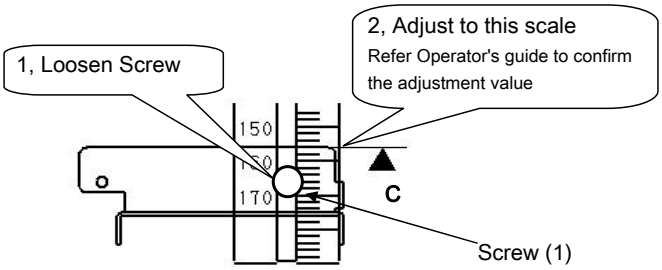


In case of US$ (bill width is 66mm)

A1 = 68
A2 = 68

□Please refer Operator's Guide
for another currency information.

2, Rear Adjuster

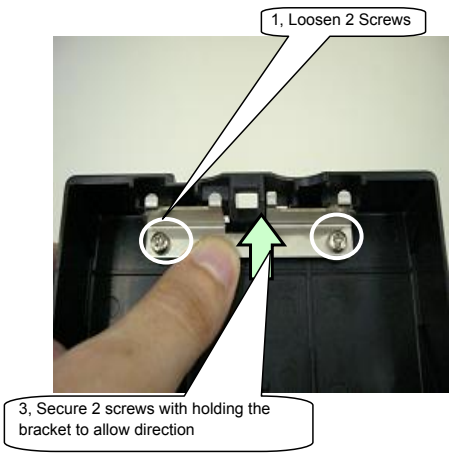


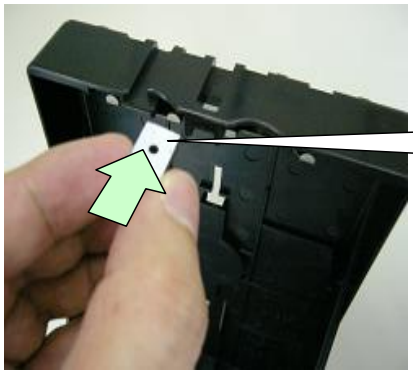
In case of US$ (bill length is 156mm)

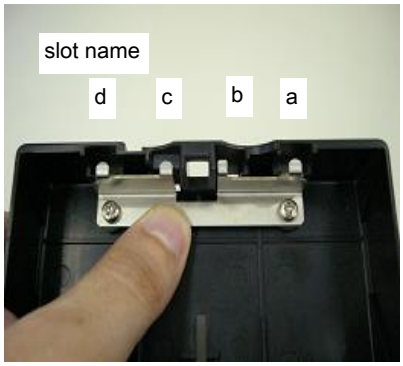
C = 156

□Please refer Operator's Guide
for another currency information.

(4) Denomination Magnet Setting







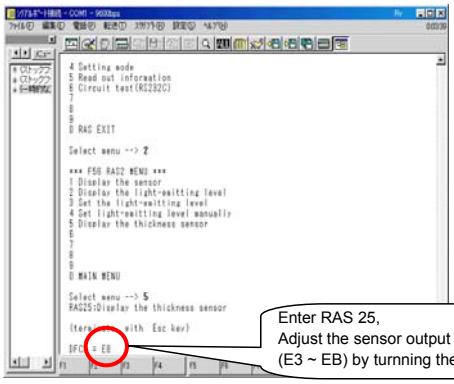
Magnet combination table

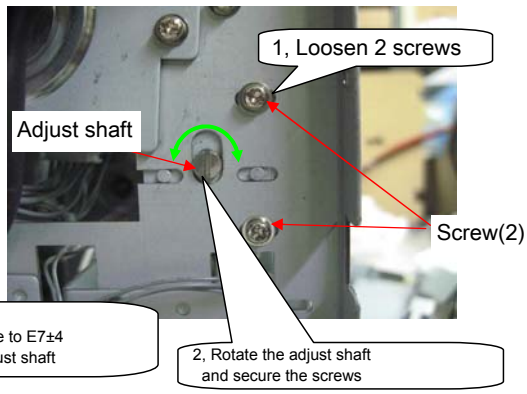
	d	c	b	a
1			●	●
2		●		●
3	●			●
4		●	●	
5	●		●	
6	●	●		

Section 2 of Maintenance Manual

(4)　Thickness sensor adjustment

1, Enter RAS mode ,and execute "25" command (Display the thickness sensor).

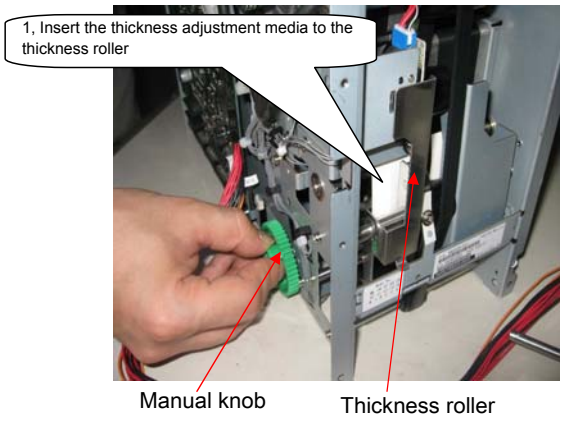


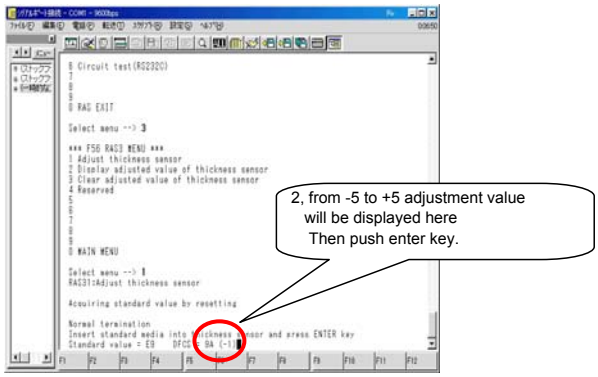


2, Back to top menu of RAS (push ESC 2 times)

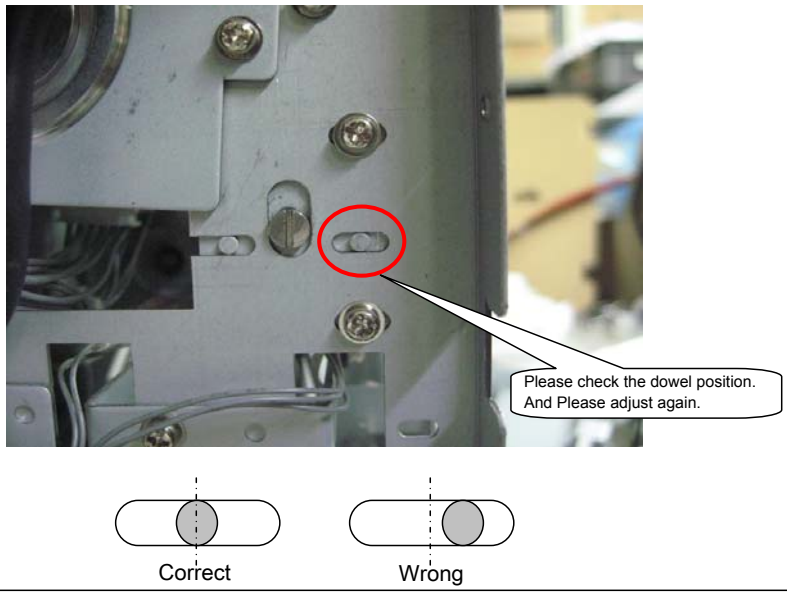
3, Execute RAS "31" , BDU will start the mechanical reset operation.

4, Setting of the correct value





In case of the adjustment value is not displayed…



Section 2 of Maintenance Manual

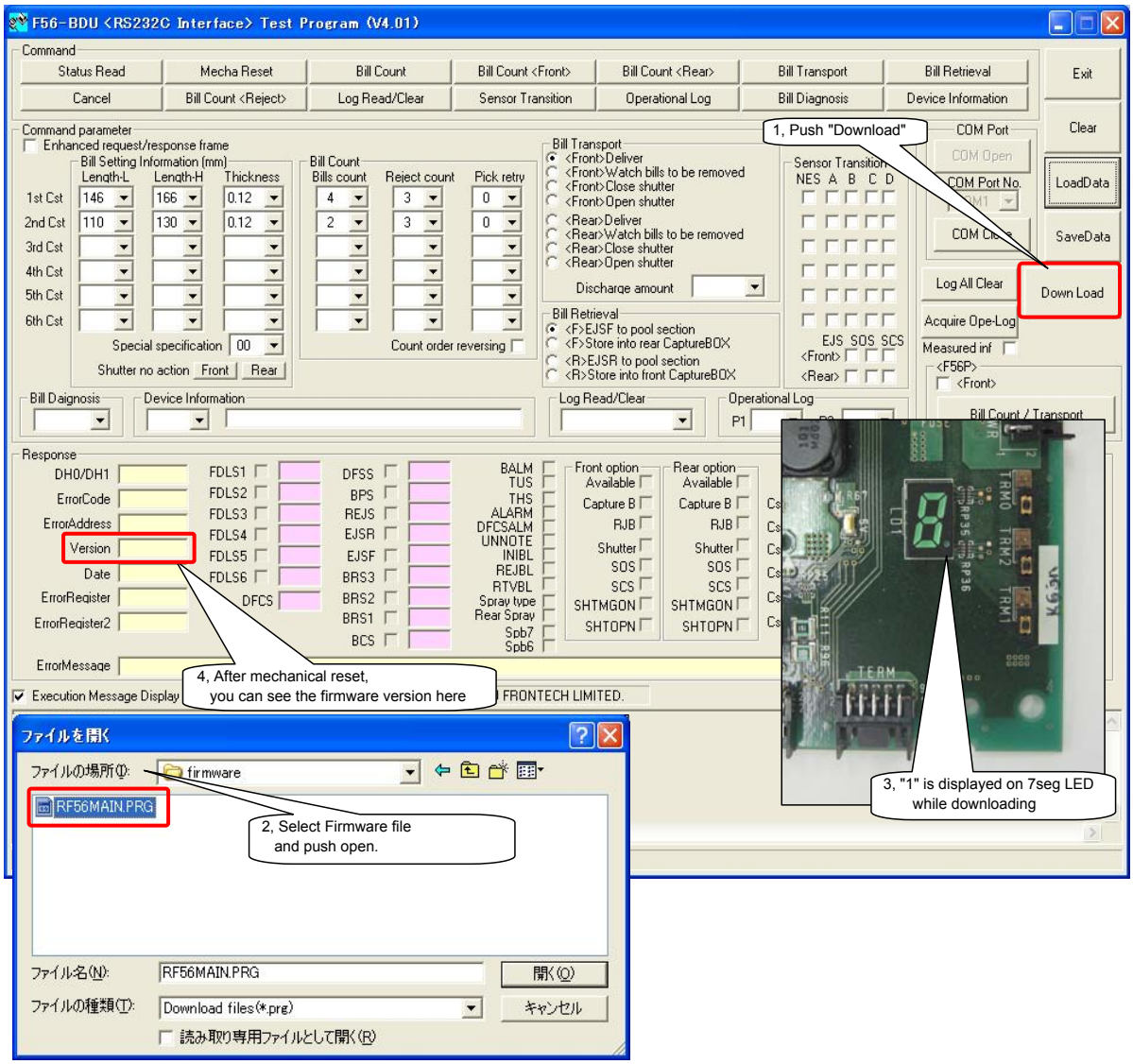
6-6 Test

Tools
- PC with Test Program
- RS232C interface cable
- TERM interface cable
- Power supply and cable
- Test notes

(1) Firmware download and check version No. (if required)

1, "DownLoad" Push "DownLoad" on Test Program window.
2, (.***.prg) Select Firmware file (***.prg)

Push Open then 7seg display indicate number 0 to 1 and download will be starded.
It takes few minutes by download completed)



(2) ON/OFF　　Sensor ON/OFF, light emitting level check

RAS21,22
Confirm with RAS21,22. Refer Section4.

Check items for sensor test
In case of F53 BDU

NAME	ON/OFF check RAS 21	emitting level RAS 22
FDLS1		
FDLS2		
DFSS		
REJS		
BPS		
BCS		

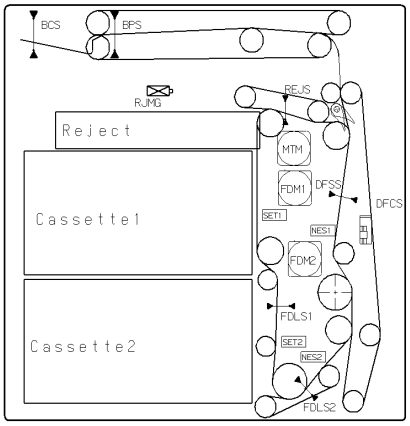
Sensor emitting level is ;
02~07 ; Normal
08~13 ; Required cleaning
14~15 ; Required replace

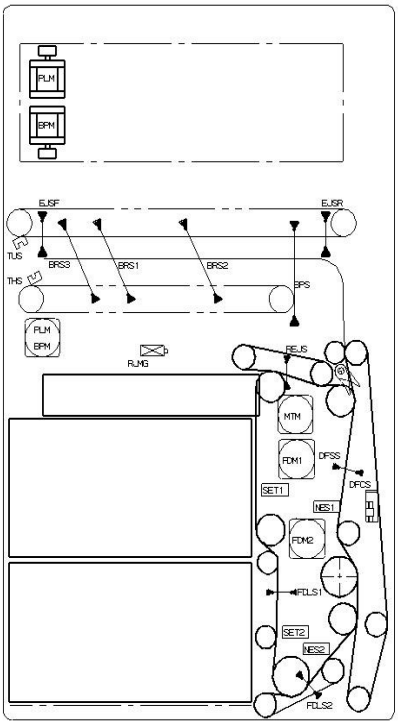
Add below sensors in case of F56 BDU

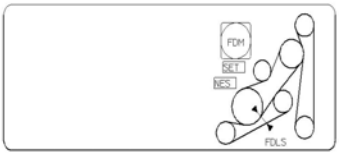
NAME	ON/OFF check	emitting level
BRS1		
BRS2		
BRS3		
EJSF		
EJSR		
TUS		
THS		

In case of Additional Lower Unit

NAME	ON/OFF check	emitting level
FDLSn(n=3~6)		



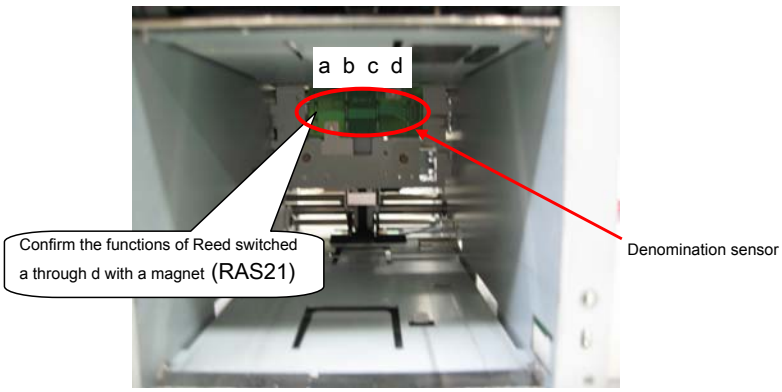




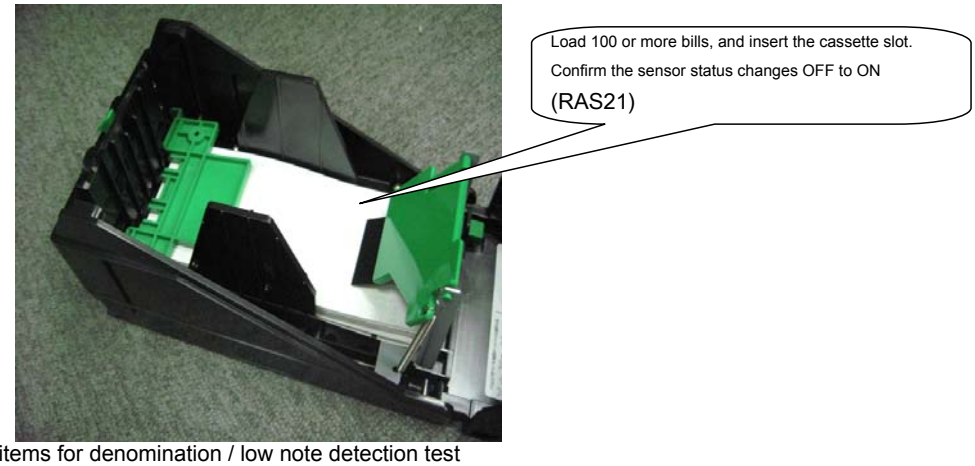
Sensor location of F53　　Sensor location of F56　　Sensor location of Lower

(3) Denomination sensor/ Low note sensor confirmation

Denomination sensor



Low note sensor



Check items for denomination / low note detection test
In case of F53/F56 BDU

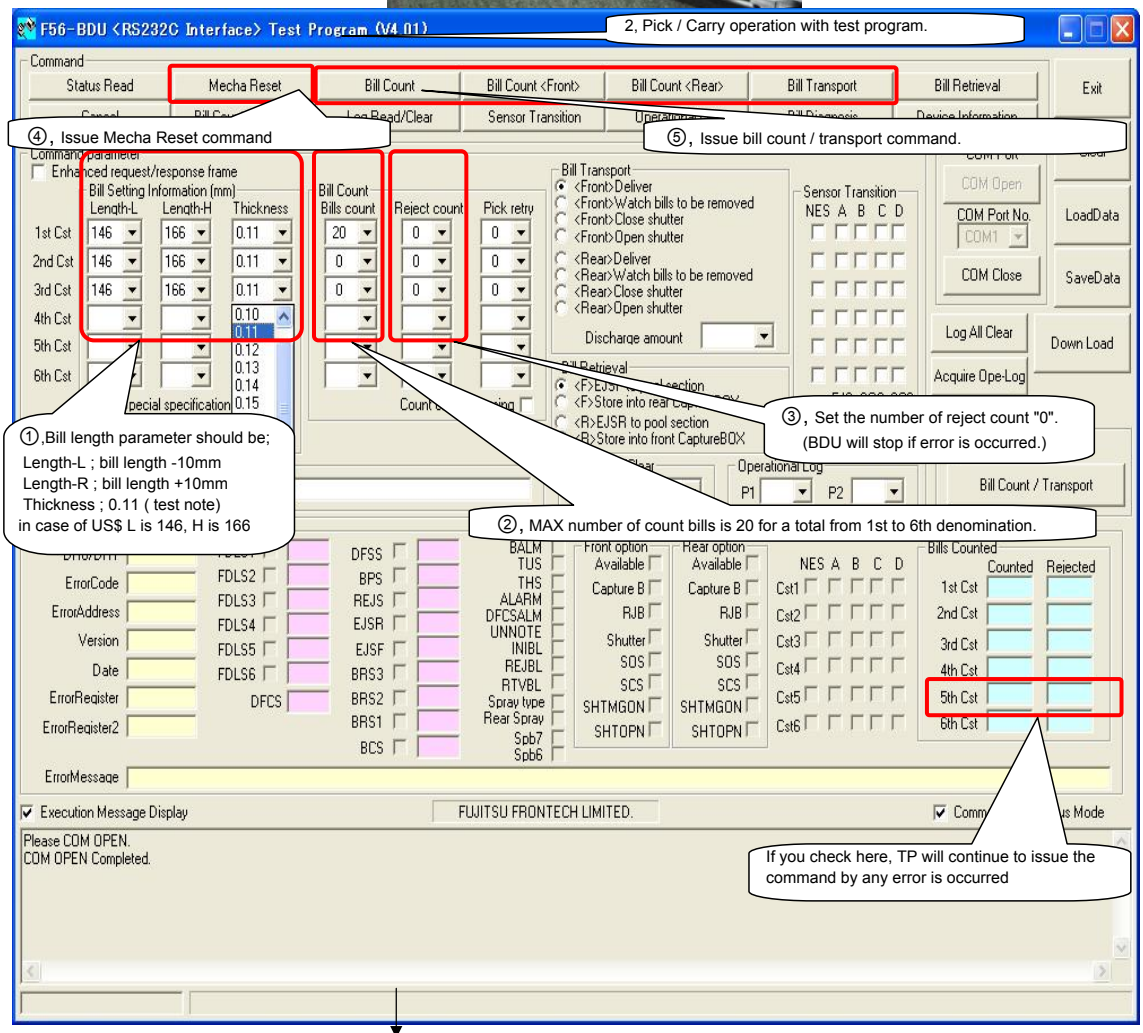
Denomi	Denomination RAS 21	Low note sensor RAS 21
1st		
2nd		

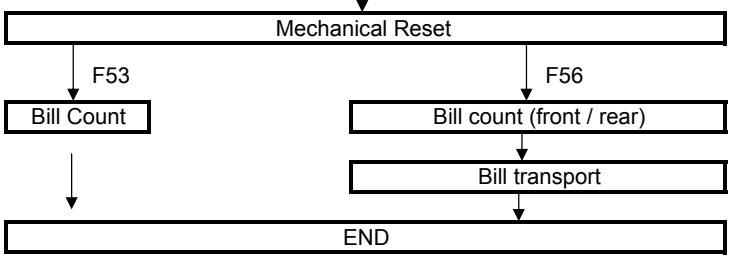
In case of Additional lower unit

Denomi	Denomination	Low note sensor
3rd		
4th		
5th		
6th		

(4) Feed / Carry operation

1,Load the test bills to Cassette and insert to BDU or Lower unit.
FTEC recommend 100~200 sheets for each cassette





Check items for feed / carry operation test

	Judgmental standard	Result
error rate	1 or less times	Good / Reject
jam rate	no jams	Good / Reject

NOTE

Recommended parameter value

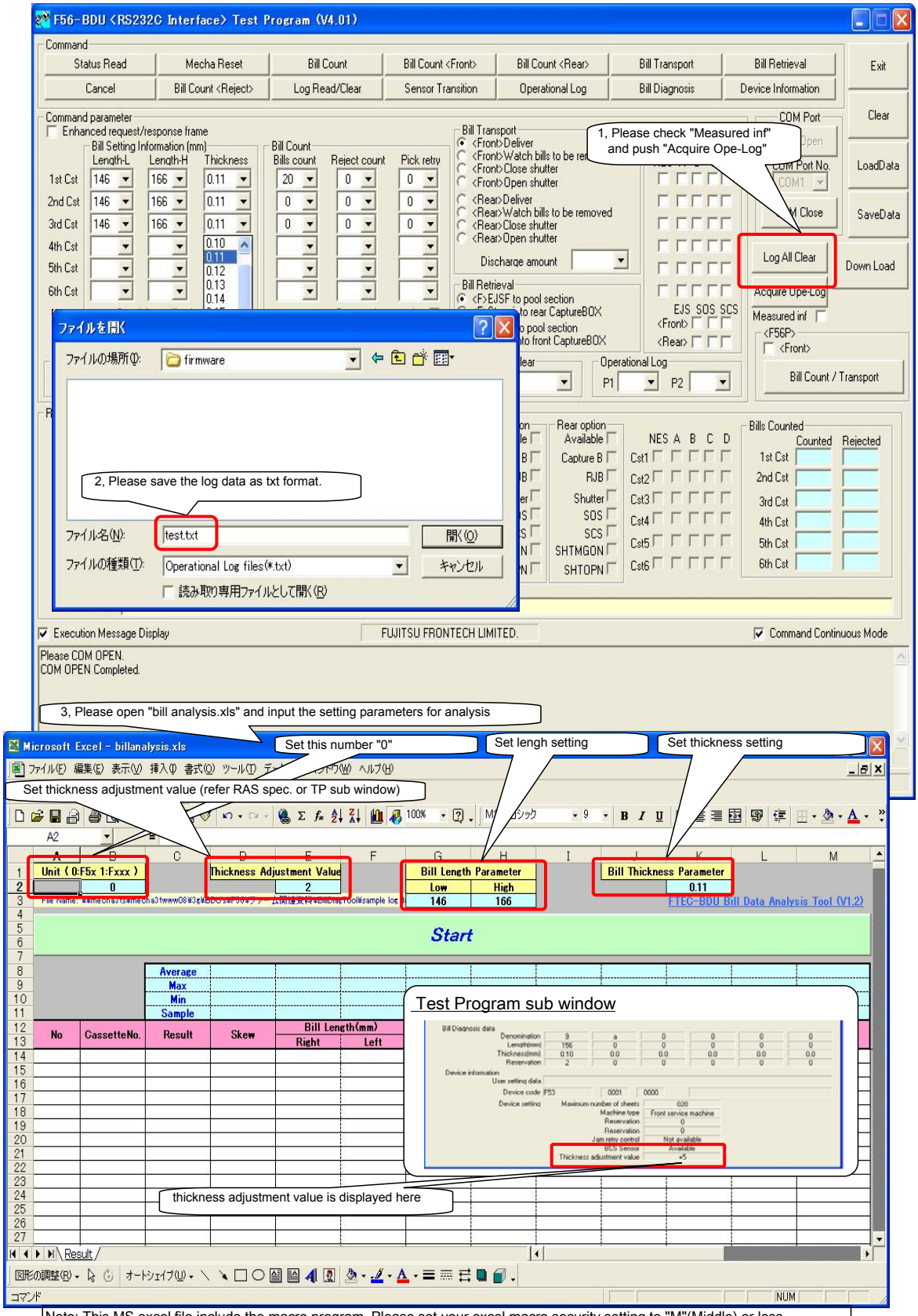
Euro

	lengthL/H	thickness
100	137/157	0.13
050	130/150	0.13
020	123/143	0.13
010	117/137	0.13
005	110/130	0.13

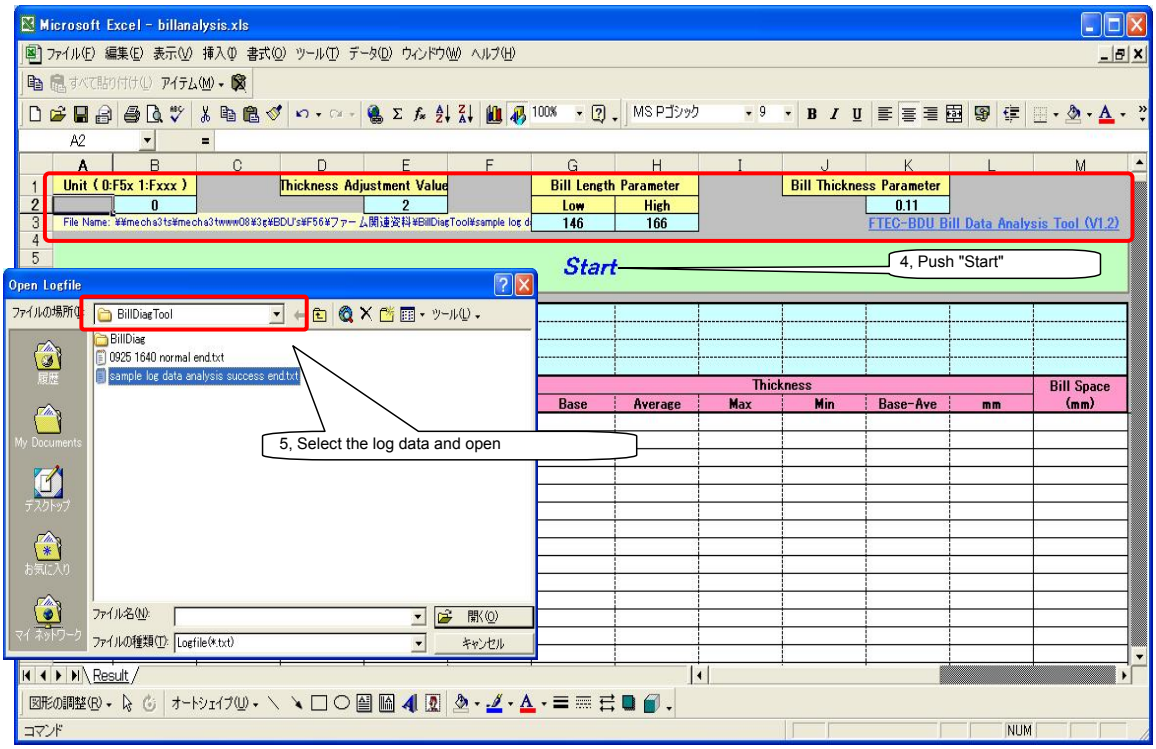
7 Field Support

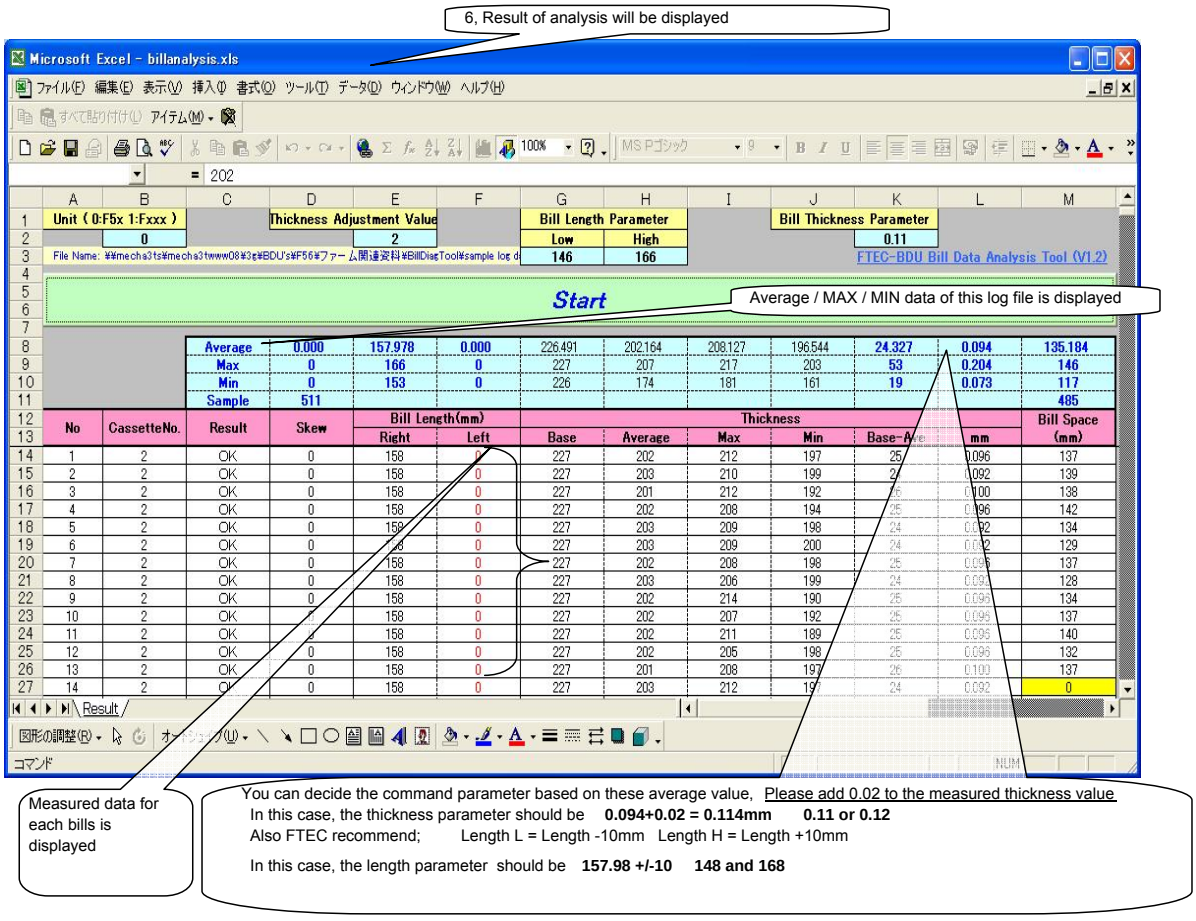
7-1 Acquire / analysis method of measured data of bills.

F56/F53 BDU have the measured data for each dispensed bills. And this menu can be downloaded the data to PC as a log file and can analyze the average of length and thickness of the bills.



Note; This MS excel file include the macro program. Please set your excel macro security setting to "M"(Middle) or less.
You can change the setting ; "tool" ⇒ "macro" ⇒ "Security" ⇒ choice "M" and restart the MS excel program.





Measured data for each bills is displayed

You can decide the command parameter based on these average value, Please add 0.02 to the measured thickness value
In this case, the thickness parameter should be **0.094+0.02 = 0.114mm** **0.11 or 0.12**
Also FTEC recommend; Length L = Length -10mm Length H = Length +10mm

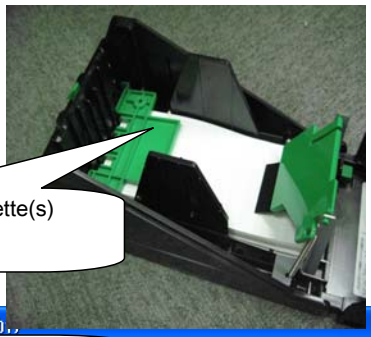
In this case, the length parameter should be **157.98 +/-10** **148 and 168**

These recommended parameter value should be re-set if many reject are occurred in the field.

7-2 Bill Diagnosis

This command calculates the average of the length and the thickness of the bill of each denomination automatically, and save the calculated deta is saved on PCB. (sampling number , 20 sheets)

This command is useful to decide the parameter to be suitable for various field bill conditions all over the world.



1,Load the 20 or more bills to Cassette(s) and insert to BDU or Lower unit.

4, Select bill length H and L setting to "diag" and issue machanical reset command.BDU will judge the dispensed bills by the calcurated length and thickness value.

3, Issue bill diagnosis command, and BDU start to dispense the bills and calculate length and thickness automatically.
And the calcurated value will be saved to PCB

2, Select the denomination that you want to diagnosis.

5, You can confirm the diagnosis result in the sub window of Test Program (Device Information)

You can decide the command parameter based on these diagnosis data,
Please add 0.02 to the measured thickness value.
In this case, the thickness parameter should be
0.10+0.02 = 0.12mm
Also FTEC recommend;
Length L = Length -10mm
Length H = Length +10mm
In this case, the length parameter should be
156 +/-10 = 146 and 166

These recommended parameter value should be re-set if many reject are occurred in the field.