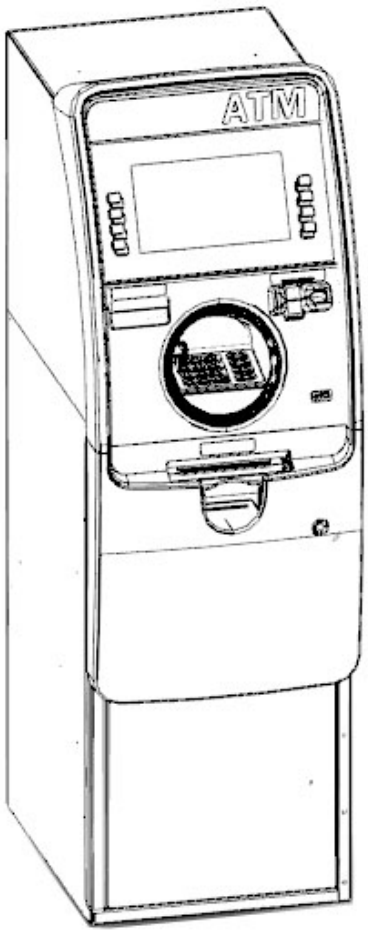
NAUTILUS HYOSUNG

Service Manual

NH2600 System

V01.00.00 (2013.06.13)



Revision History

Service Manual – NH2600 System

No.	Version	Date	Description of Change	Chapter
1	V01.00.00	2013/06/13	New Publication	All

2013. 6.13. 1st Release

Contents

Chapter 1
Preface

Contents

Purpose

▶ This manual is produced to provide the NH2600 maintenance guide for field technician.

Audience

▶ This manual is for persons related to maintain NH2600 in branches of banks, such as field technician and repair center engineer, to work efficiently and conveniently.

Supported Information

▶ If any question or error occurs while maintaining NH2600 in compliance with this manual, please contact maintenance staffs of Nautilus Hyosung.
For the contact of maintenance staffs of Nautilus Hyosung, see the E-mail addresses and telephone numbers provided separately.

What is in This Manual

▶ This manual is designed to provide the maintenance guide for the NH2600 and the detailed description of the following:
- Important Warnings
- Information for service & maintenance

▶ All measurements in this manual are in metric and [ ] is inch scale.

▶ All information described in this manual is a licensed product of Nautilus Hyosung, Inc.

Some of the information in this manual may differ according to the network processor to be connected and may be subsequently updated by the bank's needs or the improvement by Nautilus Hyosung, Inc.

It is the policy of Nautilus Hyosung, Inc to improve products as new technology, components, software, and firmware become available. Therefore Nautilus Hyosung, Inc. reserves the right to change specifications without notice.

Conventions

▶ Terminologies

In this document the terminology listed below is used as follows:

- Customer and consumer refer to any person who transacts business through the ATM.
- Device and unit refer to the standard and optional ATM equipment, such as monitor, card reader, printer and dispenser.
- Fascia refers to the entire front portion of the unit, including the portion where the customer transacts business.
- Module refers to a plug-in device that can be serviced or replaced.
- Note(s) and bill(s) refer to the individual documents loaded into and dispensed from the dispenser.
- Servicing and maintenance refer to the supervisor, operator and technician's tasks performed to keep the ATM operational.
- Screen refers to the text appearing on the customer display.

Abbreviations of ATM

▶ In this document the abbreviations listed below is used as follows:

#	Abbreviations	Description
1	AD board	Analog to Digital conversion Board
2	ADA	The American Disabilities Act
3	AP	Application Program
4	Assy	Assembly
5	BATT S/W	Battery Switch
6	CAM	Camera Unit
7	CDU	Cash Dispenser Unit
8	CE	Control Electronics
9	Earphone Jack	Voice Converter for Visually Disabled Persons (ADA)
10	EMV	Europay, Mastercard, Visa
11	EP	Elementary Program
12	EPP	Encryption PIN Pad
13	H/W	Hardware
14	I/F	Interface
15	ISO	International Standard Organization
16	JPR	Journal Printer
17	LCD	Liquid Crystal Display
18	MCU	Magnetic Card Unit

#	Abbreviations	Description
19	OPL	Operation Panel for Customers to Operate
20	OSD board	On Screen Display Board
21	P/S	Power Supply
22	PIN	Personal Identification Number
23	PNC	Panel Control Board
24	PTR	Printer (mainly Receipt Printer)
25	S/W	Switch
26	SIU	Sensor and Indications Unit
27	SP	Service Provider
28	SPR	Slip Printer (Receipt Printer)
29	TTU	Text Terminal Unit (OPL or SPL)
30	VFD	Vacuum Fluorescent Display

Safety Precautions (English)

▶ Common Safety Precaution

Precautions outlined this manual provide information on safe and proper handling of the product. Non-compliance of the precautions may result in injury or damage to the product.
This precaution symbol with sample term tells you safety warnings during equipment handlings.

▶ Please read the following instructions before operating equipment.

- Operate equipment in the order outlined in this manual.
- Follow precautions indicated in this manual, as well as the equipment itself. Failure to properly address these precautions may lead to injury or damage to the product.
- Avoid operations not addressed in this manual.
- If you cannot remedy system problems using the methods outlined in this manual, please refer to contact information listed in the manual.
- Any change or modifications in construction of this device which are not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

<Note!>
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

▶ Description of Precaution Symbols

Symbol	Description
	**Electrical Shock Warning** ▪ Do not remove cover. Only a maintenance engineer is allowed to open the cover. ▪ Do not touch. You may receive electric shock. ▪ Make sure to turn off the power when servicing the equipment.
	**High Temperature Warning** ▪ Do not touch the equipment when it is running. ▪ The equipment can get extremely hot and may cause a burn. ▪ Make sure to close the cover before running the equipment.

	**Use Precaution when Moving** ▪ The equipment is heavy. Make sure at least 2 people lift or move the equipment. ▪ Do not attempt to move the equipment alone. You may be injured from dropping the heavy equipment.
	**Fire Hazard** ▪ Place the equipment in an area away from any combustible materials. ▪ The equipment may catch on fire from overheating or short circuit of the power supply unit.
	**Disassembly Warnings** ▪ Do not disassemble or modify the equipment unless you are a certified engineer. ▪ Contact the service center for maintenance, adjustments and repairs. ▪ Improper disassembly may cause fire or electrical shock.
	**Collapse Precautions** ▪ Do not place the equipment where the floor cannot sustain the weight of the equipment, or on slanted or unstable surface. ▪ Equipment may fall and cause injury or damage.
	**Unplug the Equipment** ▪ Stop using the equipment immediately if it smokes, emits an unusual smell, makes abnormal sounds, or if liquids or other foreign materials enter the equipment. ▪ If the above-mentioned abnormalities occur, immediately turn off the power, unplug the equipment and contact the service center. ▪ If you ignore these symptoms, the equipment may catch on fire or cause electric shock.

<CAUTION>

1. TO REDUCE THE RISK OF FIRE, USE ONLY No. 26 AWG OR LARGER TELECOMMUNICATION LINE CORD
2. RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSED OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS
3. FOR PLUGGABLE EQUIPMENT, THE SOCKET-OUTLET SHALL BE INSTALLED NEAR THE EQUIPMENT AN SHALL BE EASILY ACCESSIBLE
4. THE EQUIPMENT IS TO BE SECURED TO THE BUILDING STRUCTURE BEFORE OPERATION

Précautions pour la sécurité (French)

► Précaution générale pour la sécurité

Précautions décrits de ce manuel fournissent des informations sur une manipulation sûre et appropriée du produit. Le non-respect des précautions peut causer des blessures ou endommager le produit.
Ce symbole de précaution avec le terme d'example vous indique des consignes de sécurité lors de la manipulation de l'équipement.

► Veuillez lire des instructions suivantes avant d'utiliser l'équipement

- Fonctionner l'équipement dans l'ordre indiqué dans ce manuel.
- Suivre les précautions indiquées dans ce manuel, ainsi que l'équipement lui-même. Le défaut de traiter correctement de ces précautions peut entraîner des blessures ou endommager le produit.
- Évitez des opérations non traitées dans ce manuel.
- Si vous ne pouvez pas résoudre des problèmes du système en utilisant des méthodes décrites dans ce manuel, veuillez se référer aux informations de contact figurant dans le manuel, s'il vous plaît.
- Certain changement ou des modifications dans la construction de ce dispositif qui ne sont pas expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorité de l'utilisateur de faire fonctionner l'équipement.

<REMAQUE!>

Cet équipement a été testé et fondé pour se conformer aux limites pour un équipement numérique de classe A, conformément à la partie 15 des règles FCC. Ces limites sont conçues pour fournir une protection raisonnable contre des interférences nuisibles lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre des fréquences radios et, s'il n'est pas installé et utilisé conformément aux instructions de ce manuel, peut causer des interférences nuisibles aux communications radios.
Le fonctionnement de cet équipement dans une zone résidentielle est susceptible de provoquer des interférences nuisibles dans le cas, l'utilisateur devra corriger ces interférences à ses propres frais.

► Description des symboles de précaution

Symbole	Description
	**Choc électrique** • Ne pas retirer le couvercle. Seul le technicien d'entretien est autorisé à ouvrir le couvercle. • Ne pas toucher. Vous pouvez avoir un choc électrique. • Assurez-vous d'éteindre l'appareil lors de l'entretien de l'équipement.

	**À haute temperature** • Ne pas toucher l'équipement quand il est en marche. • L'équipement peut devenir extrêmement chaud et peut provoquer une brûlure. • Assurez-vous de fermer le couvercle avant de lancer l'équipement.
	**Soyez prudent lors du déplacement** • L'équipement est lourd. Assurez-vous d'au moins 2 personnes pour soulever ou déplacer l'équipement • N'essayez pas de déplacer l'équipement seul. Vous pouvez être blessés par la chute de l'équipement lourd.
	**Risque d'incendie** • Placer l'équipement dans une zone éloignée de tous les matériaux combustibles. • L'équipement peut s'enflammer de surchauffe ou de court-circuit de l'unité d'alimentation.
	**Démontage** • Ne pas démonter ou de modifier l'équipement, sauf si vous êtes ingénieur certifié. • Contacter le centre de service pour l'entretien, le réglage et la réparation. • Le mauvais démontage peut provoquer un incendie ou un choc électrique.
	**Tomber** • Ne pas placer l'équipement dont le sol ne peut pas supporter le poids de l'équipement, ou sur une surface inclinée ou instable. • L'équipement peut tomber et provoquer des blessures ou des dommages.
	**Débrancher l'équipement** • Cessez d'utiliser l'équipement immédiatement si il fume, émet une odeur inhabituelle, fait des bruits anormaux ou si des liquides ou d'autres matériaux étrangers dans l'équipement. • Si les anomalies mentionnées ci-dessus se produisent, éteignez immédiatement la puissance, débranchez l'appareil et contactez le centre de service. • Si vous ignorez ces symptômes, l'équipement peut prendre feu ou provoquer un choc électrique.

AVERTISSEMENT :

1. POUR RÉDUIRE LES RISQUES D'INCENDIE, UTILISEZ UNIQUEMENT AWG n ° 26 OU LA LIGNES DE TELECOMMUNICATION PLUS GROSSE
2. RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACEE PAR UN TYPE INCORRECT. DISPOSER POUR UTILISATION DES BATTRIES SELON LES INSTRUCTIONS
3. POUR LES APPAREILS RACCORDES, LA PRISE DOIT ETRE INSTALLEE PRES D'EQUIPEMENT POUR ÊTRE FACILEMENT ACCESSIBLE

4. L’EQUIPEMENT DOIT ETRE SECURISE A LA STRUCTURE DU BATIMENT AVANT D'UTILISER

Related Documents

▶ The related documents are listed as follows. If needed, please contact staffs of our technical support team and maintenance team.

- Operator Manual
- Installation Manual

Overview

► This manual is designed to provide maintenance guide for the NH2600 ATM and provide detailed description of the following:

- System configuration
- Specification of each unit
- Facility specifications

All information described in this manual is a licensed product of Nautilus Hyosung. It is the policy of Nautilus Hyosung to improve products as new technology, components, software, and firmware become available. Therefore Nautilus Hyosung reserves the right to change specifications without notice.

Basic Features

▶ Major features of NH2600 are highlighted in the following list:

Main Controller			
CPU		S5PC100 834MHz (ARMCortex-A8)	
Memory	SDRAM	256MB	
	Flash Memory	256MB	
Operating System		WinCE 6.0	
Serial Ports		8 Ports	
Communication		MODEM & TCP/IP Selectable	
Customer Display			
Display Type		10.1” TFT Color LCD	1024 X 600
Flicker		EPP Lighting LED Array, MCU Flicker	
Customer Input Method			
PIN Pad		Plastic Key Cap EPP	T-DES, PCI, RKT (Metal Key Cap)
Function Key		4X2	NDC Compatible
Cash Dispenser			
Number of cassettes		1 cassette	2cassette Option
Denomination		US Dollar	
Maximum Dispense		40 Notes/Transaction	
Cassette Capacity		1,000Notes / Capacity	US Dollar Brand New 2K, 4K Option
Reject Type		Note by Note Reject (200 bills Max)	Reject Bin
Card Reader			
Type		DIP Type	EMV option
Receipt Printer			
Printing Type		3” Thermal Line Printing	
Paper Setting Method		Semi-Automatic	
Paper Specification	Type	Thermal Roll Paper	
	Width	Max. 80mm [3.15inch]	
	Outer Diameter	Max. 180Φ	
Journal Printer			
Journal Printer		Electronic Journal	
Safety			
Safety		UL Business-Hour Safety	-

Locking device	Dial Lock	Combo/Cencon Lock Option
Additional Function		
Audio guidance	Support	Speaker
ADA Audio guidance	Support	

<Note!>

Your NH2600 may not contain all the devices described in this section. Some devices are optional and some devices cannot be used in combination with other devices (mutually exclusive combinations).

Chapter 2
System Configuration

Contents

About the NH2600

► Newly designed ATM - The NH2600's totally unique design enhances your customers' ATM experience. Unlike any other retail ATM, the sleek look and halo-like LED lights will attract more users and drive additional transactions thus delivering more revenue to your bottom line.

► Convenience everyone can enjoy - The NH2600 provides unsurpassed convenience to all users with its intuitive user interface presented on a vivid 10.1" color LCD screen, multi color LED indicator for the pin pad and Braille for visually impaired users. The NH2600 combines the best of Nautilus Hyosung's innovative design and engineering capabilities to ensure the speed and convenience your customers will love.

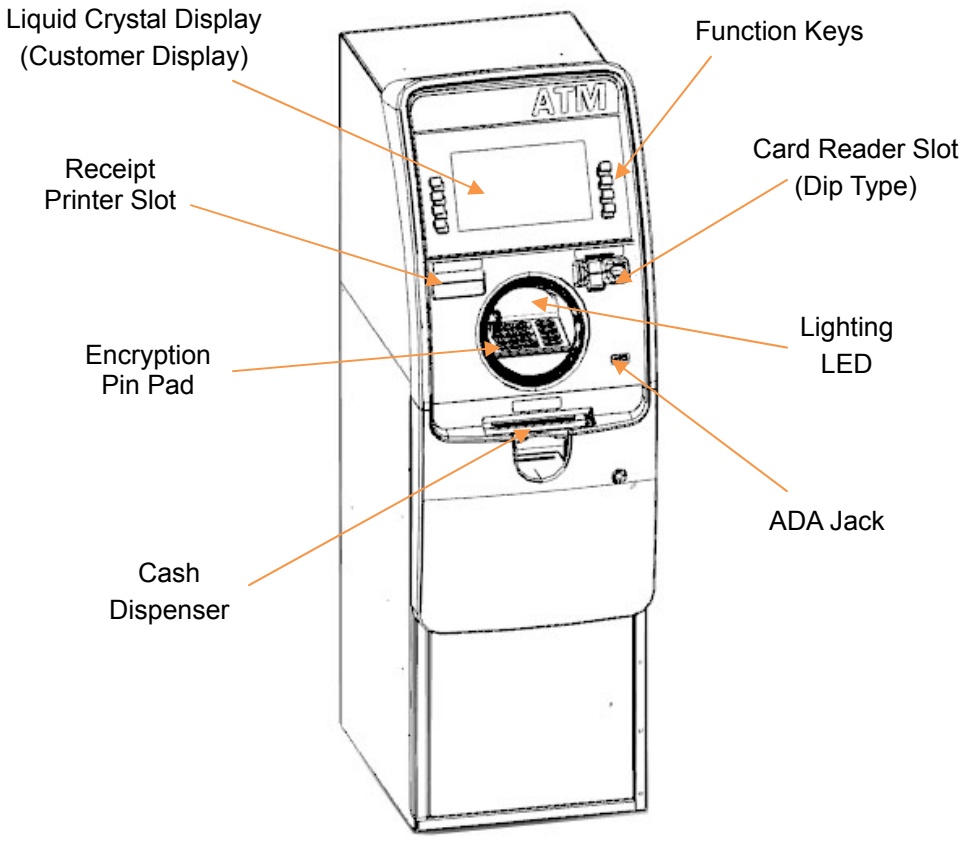
► Maximum Reliability - Leveraging our extensive experience in the Retail ATM industry, Nautilus Hyosung continues its industry-leading reputation for reliability and ease of service. The NH2600 incorporates proven cash dispensing technology widely regarded as the best in the industry. Ease of maintenance and simplified service also ensure maximum availability and uptime with minimal operational intervention.

► Green Technology - With leadership also comes responsibility. The NH2600 is equipped with energy saving features long lasting ATM parts designed to minimize environmental impact. Users can also be presented the choice of no receipt or to display an encoded digital receipt on the screen to minimize paper use.

The Exterior Overview

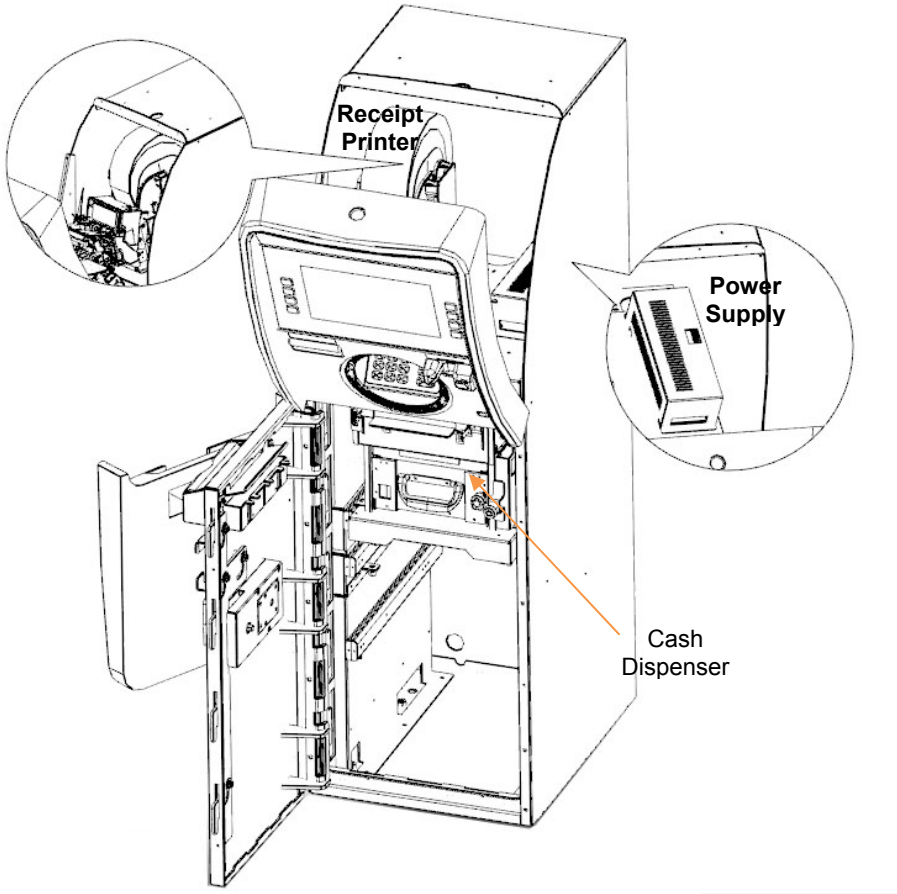
► The following picture shows the front of NH2600 and key units.

The fascia provides the interface between the customer and NH2600.
The customer selects transactions and requests information at the fascia.



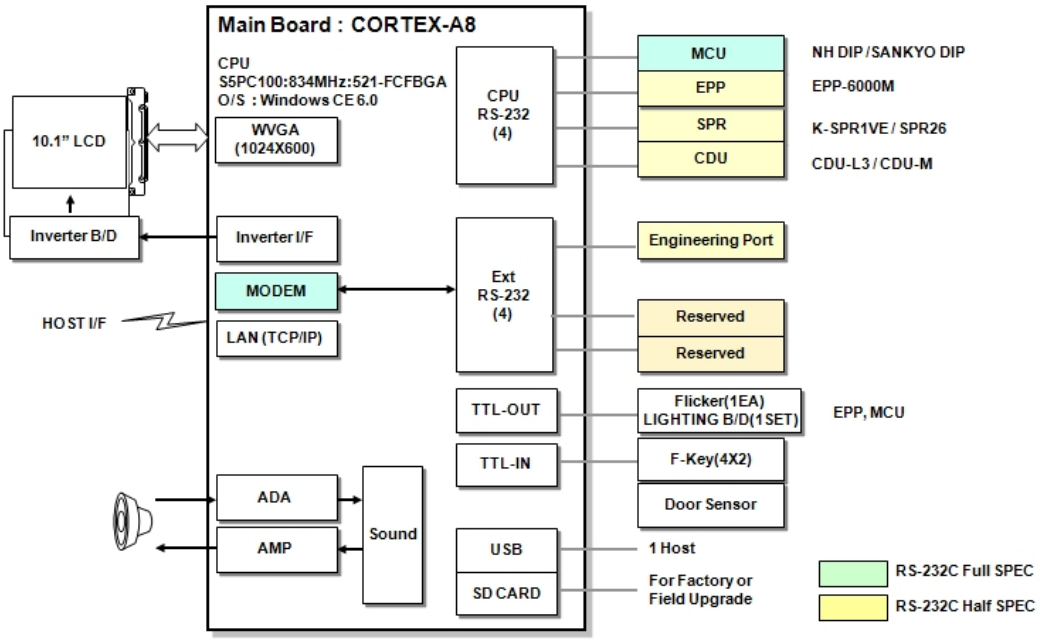
The Interior Overview

► The interior and key units of NH2600 are as follows.



Hardware Configuration

► System Block Diagram



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Chapter 3

User Handling Unit

Contents

Overview

▶ The user handling unit is composed of function key and an encryption PIN pad that the customers use to complete a transaction. It also includes a monitor and associated electronic boards.

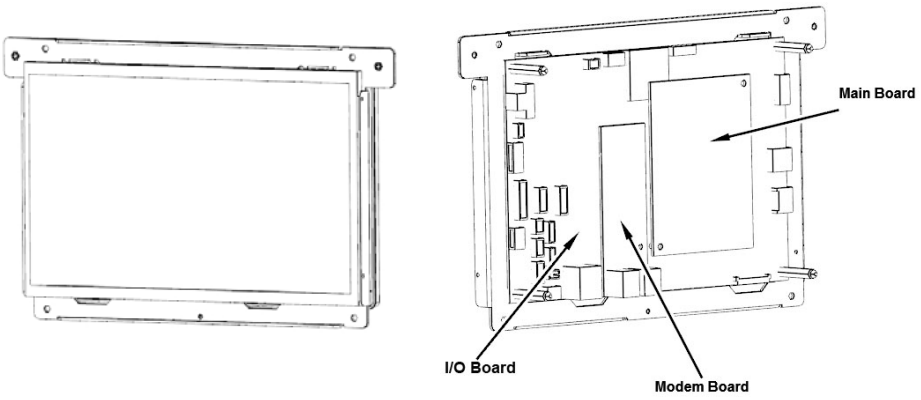
Basic Specification

▶ Basic Specification

Customer Display	Type	10.1 inch TFT color LCD	
	Resolution	1024 * 600	
	Function Key	4 X 2	NDC
Guide Light	Flicker	EPP Lighting Led Array, MCU Flicker	
PIN-Pad		Plastic Key Cap EPP	T-DES, PCI, RKT (Metal Key Cap)

Operation Panel for Customer

► The operation panel includes a LCD, function key and associated electronic boards.



LCD

► This is a 10.1” (10.06” diagonal) TFT Liquid Crystal Display module with LED Backlight unit and 40 pins LVDS interface. This module supports 1024 x 600 Wide-SVGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o’clock direction.

Precautions

► Handling Precautions

1. The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
2. While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
3. Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
4. Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
5. If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
6. Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
7. If the liquid crystal material leaks from the panel, it should be kept away from the

eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

8. Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
9. Do not disassemble the module.
10. Do not pull or fold the LED wire.
11. Pins of I/F connector should not be touched directly with bare hands.

► Storage Precautions

1. High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
2. It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
3. It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of LED will be higher than the room temperature.

► Operation Precautions

1. Do not pull the I/F connector in or out while the module is operating.
2. Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.
3. The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the module or insert anything into the Backlight unit.

General Specifications

► General Specifications

Item	Specification
Screen Size	10.06” diagonal
Driver Element	a-si TFT active matrix
Pixel Number	1024 x R.G.B. x 600 pixel
Pixel Pitch	0.2175 (H) x 0.2088 (V)mm
Pixel Arrangement	RGB vertical stripe
Display Colors	262,144 color
Transmissive Mode	Normally white
Surface Treatment	Hard coating (3H), Anti-Glare
Luminance/ White	200Cd/m2
Power Consumption	Total 2.169 W (Max.) @ cell 0.561 W (Max.), BL 1.608 W (Max.) (1)

<Note!>

1. The specified power consumption (with converter efficiency) is under the conditions at VCCS = 3.3 V, fv = 60 Hz, LED_VCCS = Typ, fPWM = 200 Hz, Duty=100% and Ta = 25 ± 2 ºC, whereas mosaic pattern is displayed.

Electrical Absolute Ratings

► TFT LCD Module

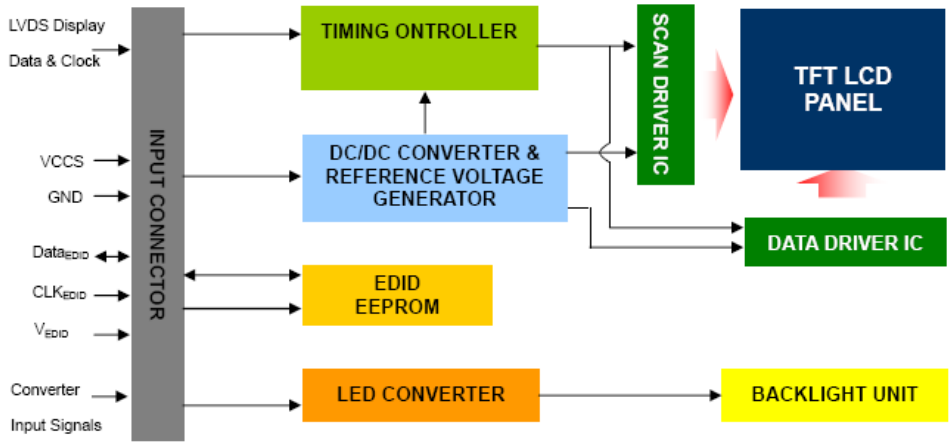
Item	Symbol	Value		Unit
		Min.	Max.	
Power Supply Voltage	VCCS	-0.3	+4.0	V
Logic Input Voltage	V_{IN}	-0.3	VCCS+ 0.3	V
Converter Input Voltage	LED_VCCS	-0.3	25	V
Converter Control Signal Voltage	LED_PWM	-0.3	5.5	V
Converter Control Signal Voltage	LED_EN	-0.3	5.5	V

<Note!>

1. Stresses beyond those listed in above “ELECTRICAL ABSOLUTE RATINGS” may cause permanent damage to the device. Normal operation should be restricted to the conditions described in “ELECTRICAL CHARACTERISTICS”.

Electrical Specifications

► Functional Block Diagram

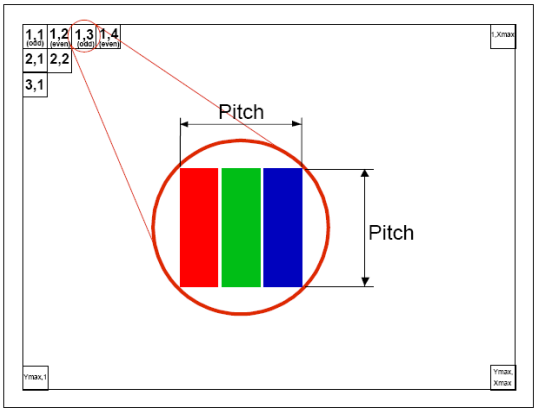


► Interface Connections – PIN Assignment

Pin	Symbol	Description	Remark
1	NC	No Connection (Reserve)	
2	VCCS	Power Supply (3.3V typ.)	
3	VCCS	Power Supply (3.3V typ.)	
4	VEDID	DDC 3.3V power	
5	NC	No Connection (Reserved for CMI test)	

6	CLKEDID	DDC clock	
7	DATAEDID	DDC data	
8	Rxin0-	LVDS differential data input	R0-R5, G0
9	Rxin0+	LVDS differential data input	
10	VSS	Ground	
11	Rxin1-	LVDS differential data input	G1~G5, B0, B1
12	Rxin1+	LVDS differential data input	
13	VSS	Ground	
14	Rxin2-	LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	LVDS Differential Data Input	
16	VSS	Ground	
17	RxCLK-	LVDS differential clock input	LVDS CLK
18	RxCLK+	LVDS differential clock input	
19	VSS	Ground	
20	NC	No Connection (Reserve)	
21	NC	No Connection (Reserve)	
22	VSS	Ground	
23	NC	No Connection (Reserve)	
24	NC	No Connection (Reserve)	
25	VSS	Ground	
26 NC	No Connection (Reserve)		
27	NC	No Connection (Reserve)	
28	VSS	Ground	
29	NC	No Connection (Reserve)	
30	NC	No Connection (Reserve)	
31	LED_GND	LED Ground	
32	LED_GND	LED Ground	
33	LED_GND	LED Ground	
34	NC	No Connection (Reserve)	
35	LED_PWM	PWM Control Signal of LED Converter	
36	LED_EN	Enable Control Signal of LED Converter	
37	NC	No Connection (Reserve)	
38	LED_VCCS	LED Power Supply	
39	LED_VCCS	LED Power Supply	
40	LED_VCCS	LED Power Supply	

<Note!> The first pixel is odd as shown in the following figure.



► Electrical Characteristics

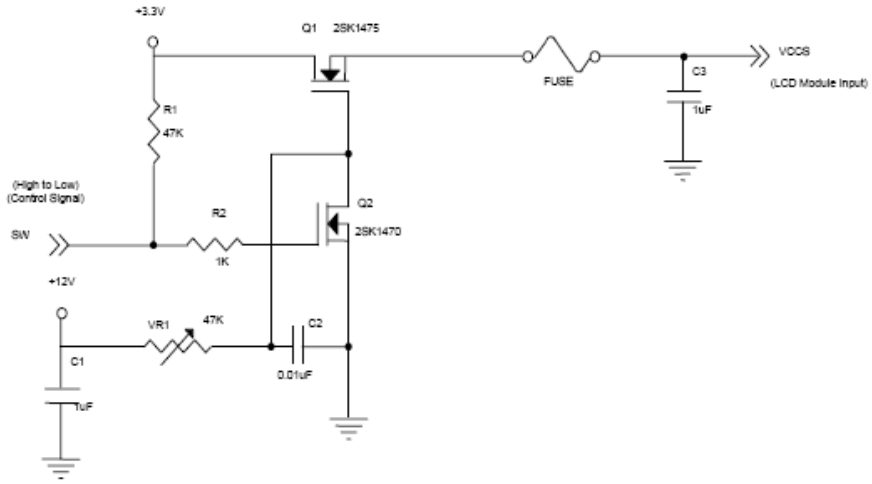
1. LCD Electronics Specification

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	VCCS	3.0	3.3	3.6	V	-
Ripple Voltage	V_{RP}	-	50	-	mV	-
Inrush Current	I_{RUSH}	-	-	1.5	A	(2)
Power Supply Current	Mosaic	-	150	170	mA	(3)a
	Black	-	160	180	mA	(3)b

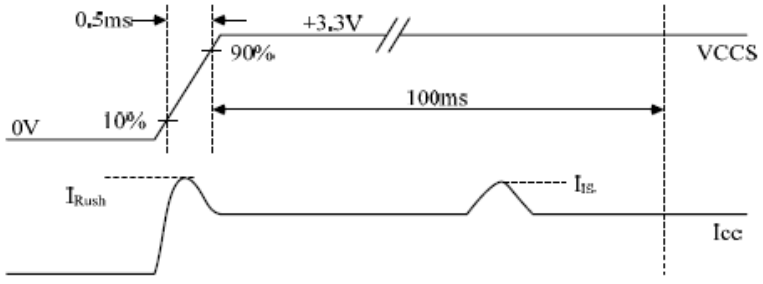
<Note!>

1) The ambient temperature is Ta = 25 ± 2 ºC.

2) IRUSH: the maximum current when VCCS is rising
IIS: the maximum current of the first 100ms after power-on
Measurement Conditions: Shown as the following figure. Test pattern: black.

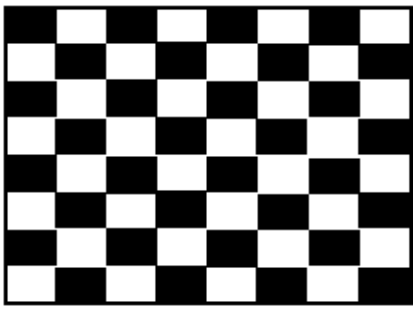


VCCS rising time is 0.5ms



3) The specified power supply current is under the conditions at VCCS = 3.3 V, Ta = 25 ± 2 ºC, DC Current and fv = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. Mosaic Pattern



<Active Area>

b. Black Pattern

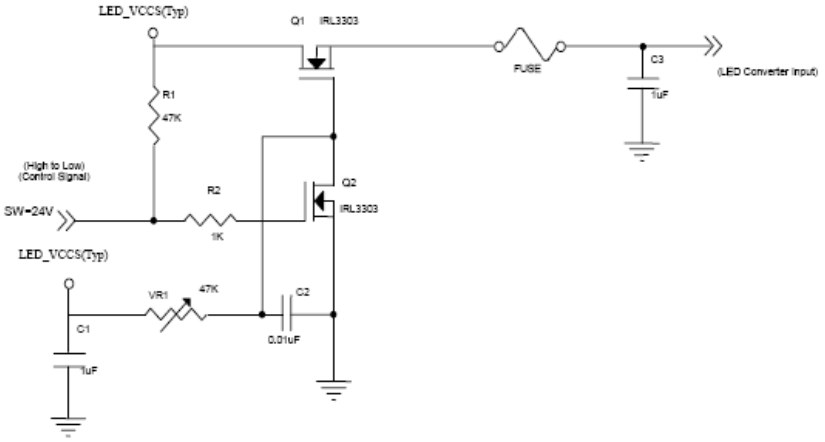
<Active Area>

2. LED Converter Specification

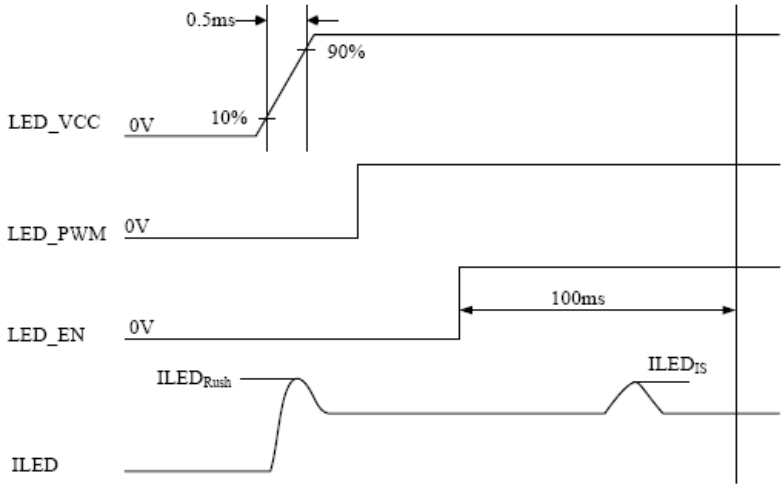
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		LED_Vccs	5.0	12.0	21.0	V	
Converter Inrush Current		$I_{LED_{RUSH}}$	-	-	1.5	A	(1)
EN Control Level	Backlight On		2.3	-	5	V	
	Backlight Off		0	-	0.8	V	
PWM Control Level	PWM High Level		2.3	-	5	V	
	PWM Low Level		0	-	0.15	V	
PWM Control Duty Ratio			10	-	100	%	
			5	-	100	%	(2)
PWM Control Permissive Ripple Voltage		V_{PWM_pp}	-	-	100	mV	
PWM Control Frequency		f_{PWM}	190	-	2K	Hz	(3)
LED Power Current	LED_VCCS =Typ.	ILED	92	113	134	mA	(4)

<Note!>

1) $I_{LED_{RUSH}}$: the maximum current when LED_VCCS is rising, $I_{LED_{IS}}$: the maximum current of the first 100ms after power-on, Measurement Conditions: Shown as the following figure. LED_VCCS = Typ, Ta = 25 ± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.



VLED rising time is 0.5ms



2) If the PWM control duty ratio is less than 10%, there is some possibility that acoustic noise or backlight flash can be found. And it is also difficult to control the brightness linearity.
3) If PWM control frequency is applied in the range less than 1KHz, the “waterfall” phenomenon on the screen may be found. To avoid the issue, it’s a suggestion that PWM control frequency should follow the criterion as below.

PWM control frequency f_{PWM} should be in the range

$$(N + 0.33) * f \leq f_{PWM} \leq (N + 0.66) * f$$

N : Integer ($N \geq 3$)

f : Frame rate

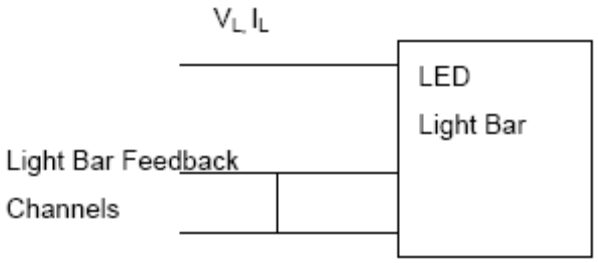
4) The specified LED power supply current is under the conditions at “LED_VCCS = Typ.”, Ta = 25± 2 ºC, f_{PWM} = 200 Hz, Duty=100%.

3. Backlight Unit

Parameter	Symbol	Value			Unit	Note
		Min.	Typl	Max.		
LED Light Bar Power Supply Voltage	V_L	25.2	27.9	30.6	V	
LED Light Bar Power Supply Current	I_L	38	40	42	mA	
Power Consumption	P_L	0.96	1.12	1.29	W	
LED Life Time	L_{BL}	15000	-	-	Hrs	

<Note!>

1) LED current is measured by utilizing a high frequency current meter as shown below :



2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.
3) $P_L = I_L \times V_L$ (Without LED converter transfer efficiency)
4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2°C and I_L = 20 mA(Per EA) until the brightness becomes 50% of its $\leqq$ s original value.

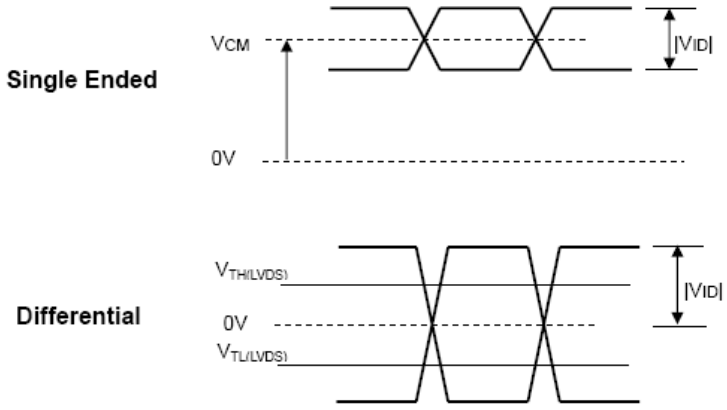
► LVDS Input Signal Timing Specifications

1. LVDS DC Specifications

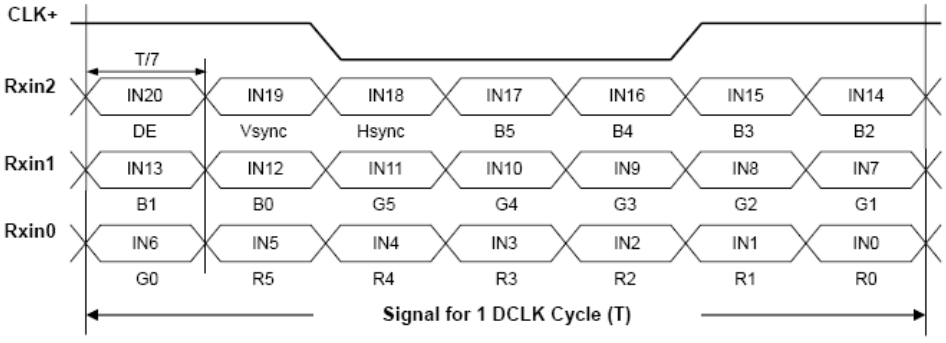
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LVDS Differential Input High Threshold	$V_{TH(LVDS)}$	-	-	+100	mV	(1) V_{CM}=1.2V
LVDS Differential Input Low Threshold	$V_{TL(LVDS)}$	-100	-	-	mV	(1) V_{CM}=1.2V
LVDS Common Mode Voltage	V_{CM}	1.125	-	1.375	V	(1)
LVDS Differential Input Voltage	$\|V_{ID}\|$	100	-	600	mV	(1)
LVDS Terminating Resistor	R_T	-	100	-	Ohm	-

<Note!>

1) The parameters of LVDS signals are defined as the following figures.



2. LVDS Data Format



3. Color Data Input Assignment

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

<Note!>

1) 0: Low Level Voltage, 1: High Level Voltage

► Optical Characteristics

1. Test Conditions

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	Vcc	3.3	V
Input Signal	According to typical value in " ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current	I_L	40	mA

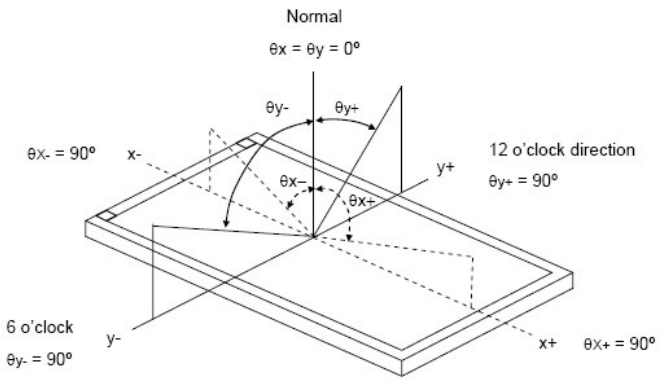
The measurement methods of optical characteristics are shown in next table. The following items should be measured under the test conditions described in above table and stable environment shown in Note 5).

2. Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	400	500	-	-	(2), (5),(7)
Response Time		T_R		-	3	8	ms	(3),(7)
		T_F		-	7	12	ms	
Average Luminance of White		L_{AVE}		160	200	-	cd/m^2	(4), (6),(7)
Color Chromaticity	Red	Rx		Typ – 0.03	0.570	Typ + 0.03	-	(1),(7)
		Ry			0.352		-	
	Green	Gx			0.338		-	
		Gy			0.568		-	
	Blue	Bx			0.155		-	
		By			0.125		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Viewing Angle	Horizontal	θ_x+	CR≥10	40	45		Deg.	(1),(5),(7)
		θ_x-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		
White Variation		δWφ	θ_x=0°, θ_Y =0°	-	1.25	1.4	-	(5),(6) , (7)
		δWφ	θ_x=0°, θ_Y =0°	-	1.4	1.6	-	

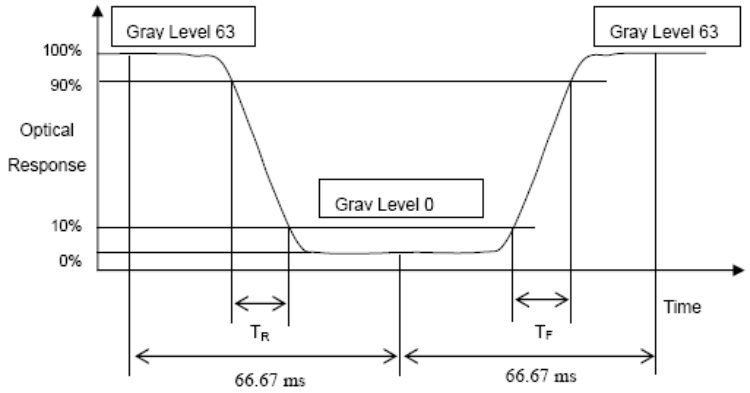
<Note!>

1) Definition of Viewing Angle (Θx, Θy):



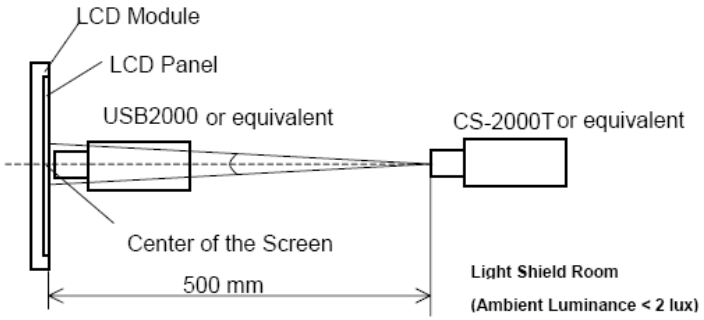
2) Definition of Contrast Ratio (CR):
The contrast ratio can be calculated by the following expression.
Contrast Ratio (CR) = L63 / L0
L63: Luminance of gray level 63
L 0: Luminance of gray level 0
CR = CR (1)
CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

3) Definition of Response Time (T_R, T_F):

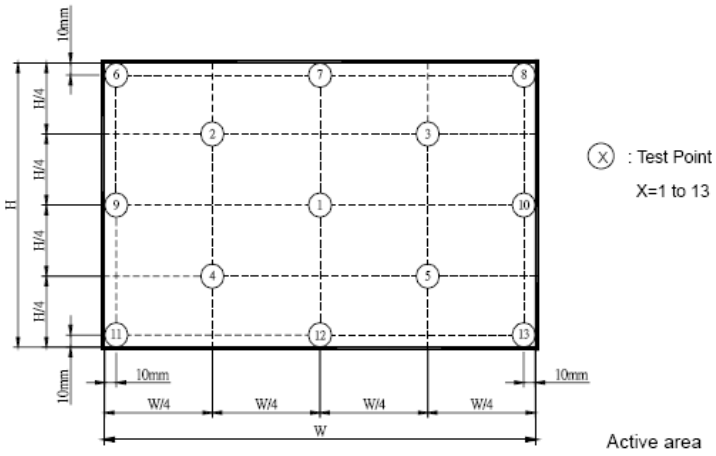


4) Definition of Average Luminance of White (LAVE):
Measure the luminance of gray level 63 at 5 points
LAVE = [L (1)+ L (2)+ L (3)+ L (4)+ L (5)] / 5
L (x) is corresponding to the luminance of the point X at Figure in Note (6)

5) Measurement Setup:
The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



6) Definition of White Variation (δW):
Measure the luminance of gray level 63 at 5 points
δW5p = Maximum [L(1) ~ L(5)] / Minimum [L(1) ~ L(5)]
δW13p = Maximum [L(1) ~ L(13)] / Minimum [L(1) ~ L(13)]



7) The listed optical specifications refer to the initial value of manufacture, but the condition ofthe specifications after long-term operation will not be warranted.

► Reliability Test Item

Test Item	Test Condition
High Temperature Storage Test	60ºC, 240 hours
Low Temperature Storage Test	-20ºC, 240 hours
Thermal Shock Storage Test	-20ºC, 0.5hour←→60℃, 0.5hour; 100cycles, 1hour/cycle
High Temperature Operation Test	50ºC, 240 hours
Low Temperature Operation Test	0ºC, 240 hours
High Temperature & High Humidity Operation Test	50ºC, RH 80%, 240hours
ESD Test (Operation)	150pF, 330Ω, 1sec/cycle Condition 1 : Contact Discharge, ±8KV Condition 2 : Air Discharge, ±15KV
Shock (Non-Operating)	220G, 2ms, half sine wave,1 time for each direction of ±X,±Y,±Z
Vibration (Non-Operating)	1.5G / 10-500 Hz, Sine wave, 30 min/cycle, 1cycle for each X, Y, Z

<Note!>
1) criteria : Normal display image with no obvious non-uniformity and no line defect.
2) Evaluation should be tested after storage at room temperature for more than two hour
3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

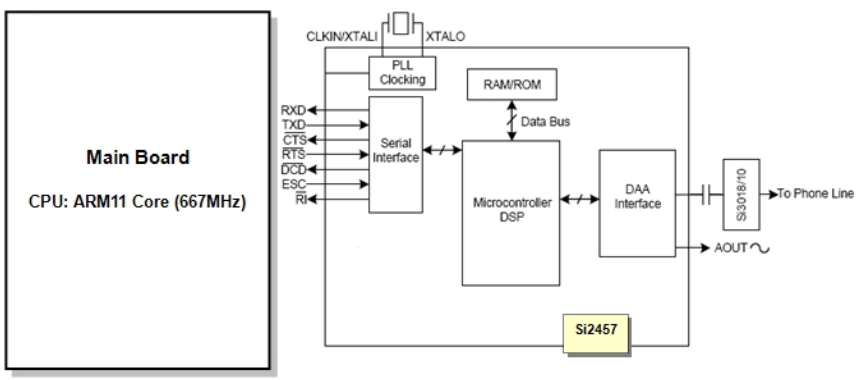
Modem Board

► This board is composed of Silicon Laboratories' ISOmodem and Integrated DAA. The ISOmodem® family of products is a complete modem ranging in speed from 56,000 bps to 2400 bps. Offered as a chipset with the Si2457 system-side device and the Si3018 line-side device, the ISOmodem utilizes Silicon Laboratories' patented direct access arrangement (DAA) technology to provide a programmable telephone line interface with an unparalleled level of integration. These compact solutions eliminate the need for a separate DSP, modem controller, codec, transformer, relay, opto-isolators, clocking crystal, and 2-4 wire hybrid. The device is ideal for embedded modem applications due to their flexibility, small footprint, and minimal external component count.

► Features

1. Data modem formats
2. ITU-T, Bell
3. 300 bps up to 56 kbps
4. V.21,V.22, V.29 Fast Connect
5. V.42, V.42bis, MNP2-5
6. Automatic rate negotiation
7. Type I and II caller ID decode
8. UART interface
9. AT command set support
10. SMS / MMS support
11. Integrated DAA
    - Over 6000 V Capacitive isolation
    - Parallel phone detect
    - Globally-compliant line interface
12. 27 MHz clock input
13. Single 3.3 V power supply
14. Firmware upgradeable
15. EEPROM interface
16. Pb-free, RoHS Compliant

► Block Diagram



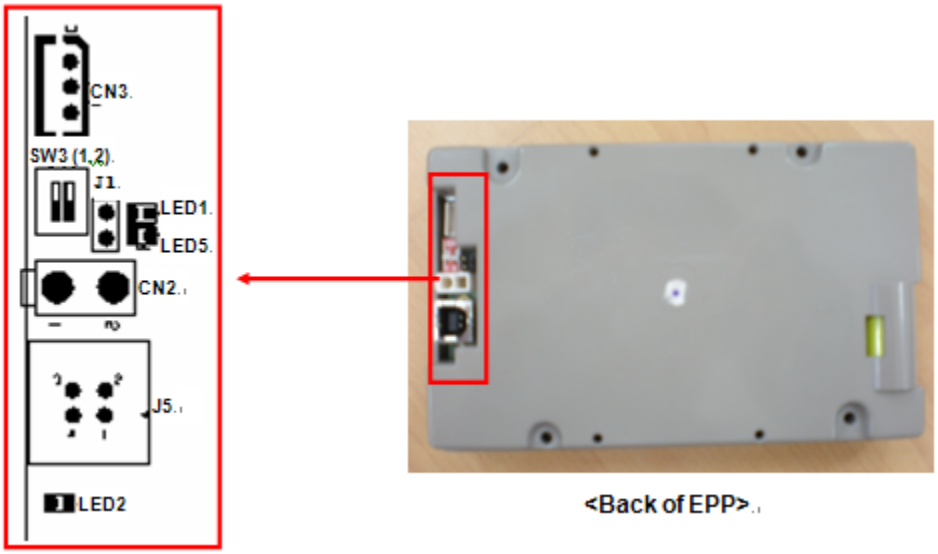
► Pin Assign

CN24	1	+3V3
	2	+3V3
	3	GND
	4	GND
	5	LnRESET
	6	MODEM_nCD
	7	MODEM_nDSR
	8	M_SPKO(Sound Out)
CN25	1	MODEM_nRTS
	2	MODEM_RXD
	3	MODEM_TXD
	4	MODEM_nRI
	5	MODEM_nDTR
	6	MODEM_nCTS
	7	GND

Encryption PIN Pad

▶ EPP(Encrypted PIN Pad) is a device that encrypts sensitive data such as customers' card information and passwords, which requires the highest level of security, and transmits it to the Host. Therefore, if EPP problem occurs in the field, verify the problem and replace the entire unit. You cannot disassemble the internal components or replace them individually.

The following figure is the back of the EPP. The functions and roles of each part are summarized as below.



<Back of EPP>

#	Labeling	Default Setting		Description	Remark
1	CN2	-		Power connector(5V)	
2	CN3	-		Firmware downloading connector	Due to security issues, no repair is possible in the field
3	SW3(1,2)	1	OFF	NV-RAM is clear when No.1 switch is turned ON	
		2	OFF	Serial communication	
			On	USB communication.	
4	J1	Open		Used for downloading the Firmware or turning off the fuse for security reason.	
5	J5	-		USB communication connector	

Common Occurred Problem List

▶ Common Occurred Problem List

1. In case the EPP cover is detached-- to whatever extent-- due to a mistake made by an operator or the maintenance personnel
2. In case there is a damage caused by any external shock or static electricity
3. In case the EPP is not connected with an earth cable, which makes it vulnerable to static electricity
4. In case the battery is discharged

LED Operation Check

▶ There are 3 LEDs at the back of the EPP. With the status of these 3 LEDs, the EPP operation condition can be easily checked.

#	LED	Description	Remark
1	LED1 (Power LED)	Whether the power supply is in "normal" status (If it is normal, red light will be turned on LED)	
2	LED2 (Status LED)	Whether the EPP is in "normal" operation (If it is normal, LED will blink)	
3	LED5 (NV-RAM LED)	Whether the NV-RAM is properly cleared. (If it is normal, red light will turned on LED)	

Troubleshooting

▶ Since the problem in this unit involves a security issue, you should replace the entire unit when encountering a problem.
If a problem is confirmed, turn off the power, remove the power cable and bracket, and then replace the unit with a new one. For the assembly of the unit, follow the reverse order.

1. If LED1 is off, check the cable connection to see if the power supply is okay.
2. If LED1 is on and LED2 is off, it means EPP is in abnormal operation. Therefore, replace the EPP

Chapter 4

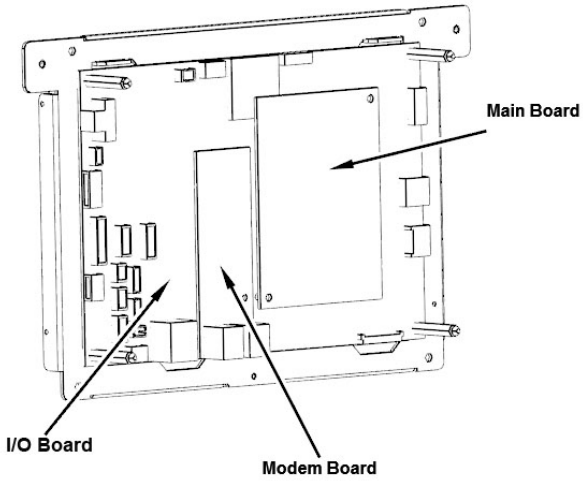
Main Control Board

Contents

Overview

► This motherboard is applied to NH2600 based on Window CE.

- S5PC100 834 MHz (ARM Cortex-A8) CPU
- SDRAM (256MB), Flash Memory (256 MB)
- Operating system : Windows CE 6.0
- Serial ports : 8 Ports
- Communication : Modem & TCP/IP Selectable

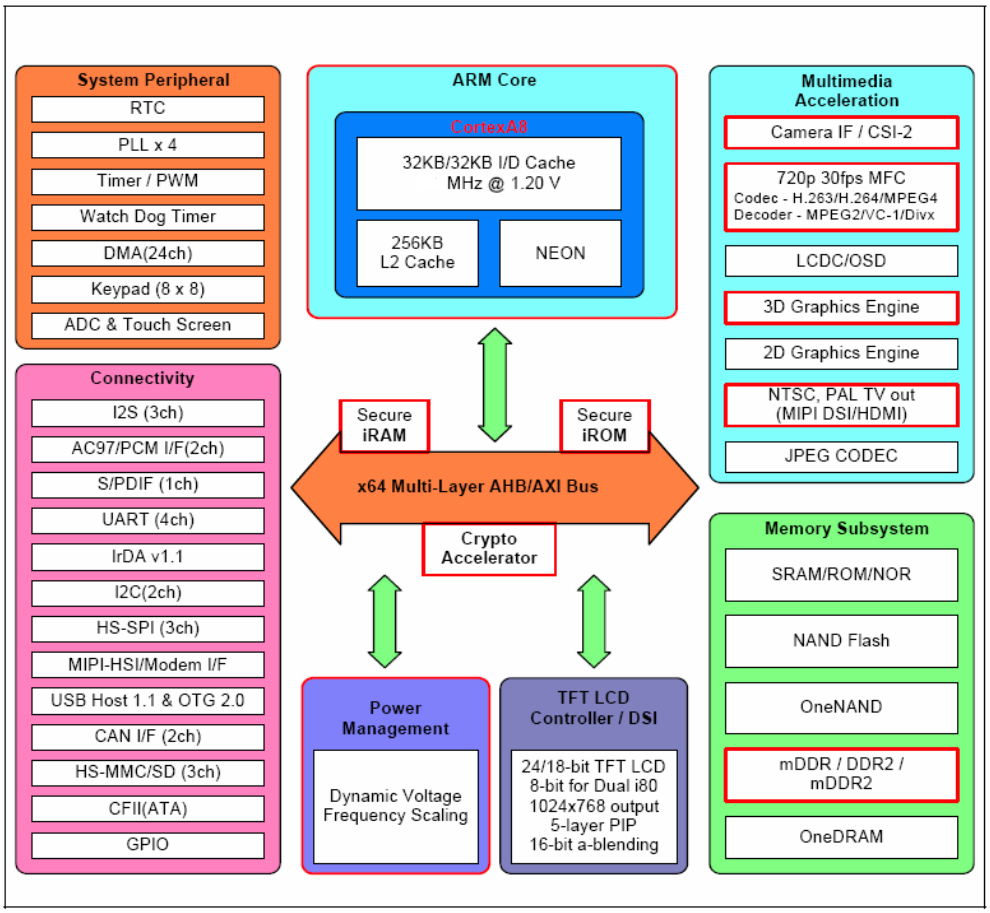


Basic Specification

Item		Specification		Remarks (Option)
Main Controller	CPU	Samsung S5PC100		833MHz
	Operating System	Windows CE 6.0		
Memory	DDR2	256MB		128MB X 2EA(32Bit Interface)
	NAND Flash	256MB		8bit Interface
Clock	PLL, MPLL, EPLL	12MHz		
	USB	12MHz		
	DAC/HDMI	27MHz		
	RTC	32.768kHz		
JTAG	JTAG	1 EA		
Security	Security	One-IO EEPROM		
RESET	Reset IC	XC6107-E029MR		2.9V monitoring / 200ms
POWER	Input	3.3V		
	Output	1.8V	XC6210-B182MR	For DDR2
		1.35V	EN5311QI	For ARM
		1.3V	EN5311QI	For ARM, CAM, ETC
		1.2V	XC6209-F122MR	For PLL
		1.2V	XC6209-F122MR	For Alive and HDMI
Jumper	Jumper	4 bit		Boot mode select
Battery	Coin Battery	CR2032 Type		For RTC
Interface (supported through I/O Board)	Serial Ports	4 Ports		Onchip considered only.
	USB Ports	2 Ports		1.1 Host 2.0 Device
	MMC	1 Port		SD Card
	MODEM	1 Port		
	SPI	1 Port		
	LCD	RGB		RGB 16bit
		HDMI		LVDS
	AC97	1 EA		
	GPIO	4 bit		
	PWM	1 Port		
	I2C I/F	1EA		Vibration motor
	Camera I/F	ITU R BT-656		
Dimension	Dimension	100 X 75		mm

CPU Block Diagram

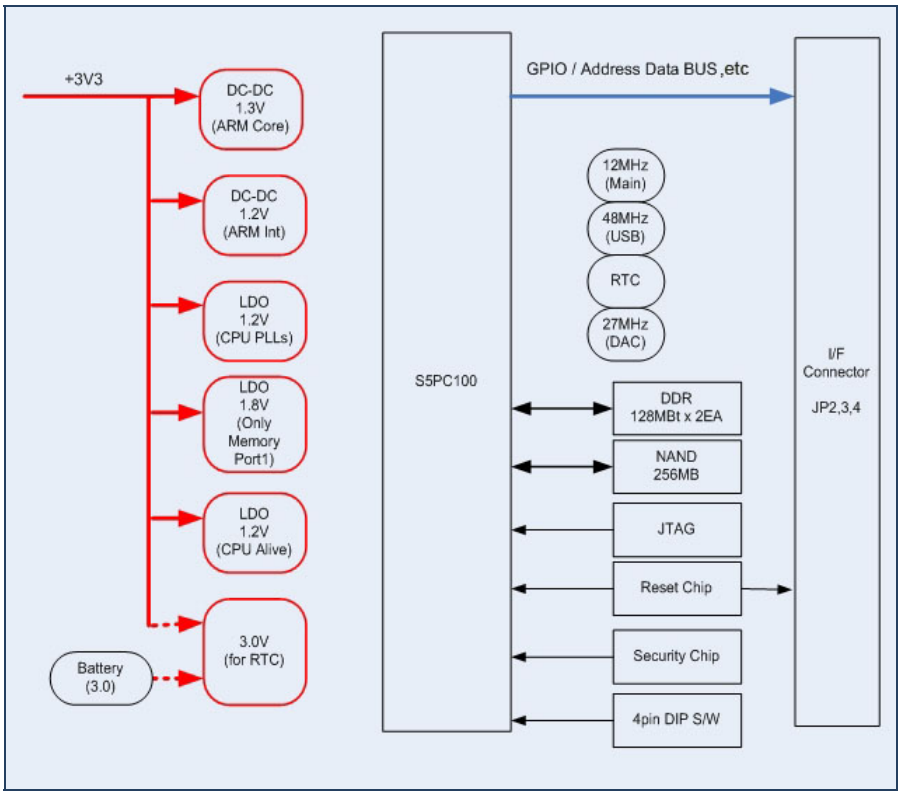
► CPU Block Diagram



S5PC100 Block Diagram

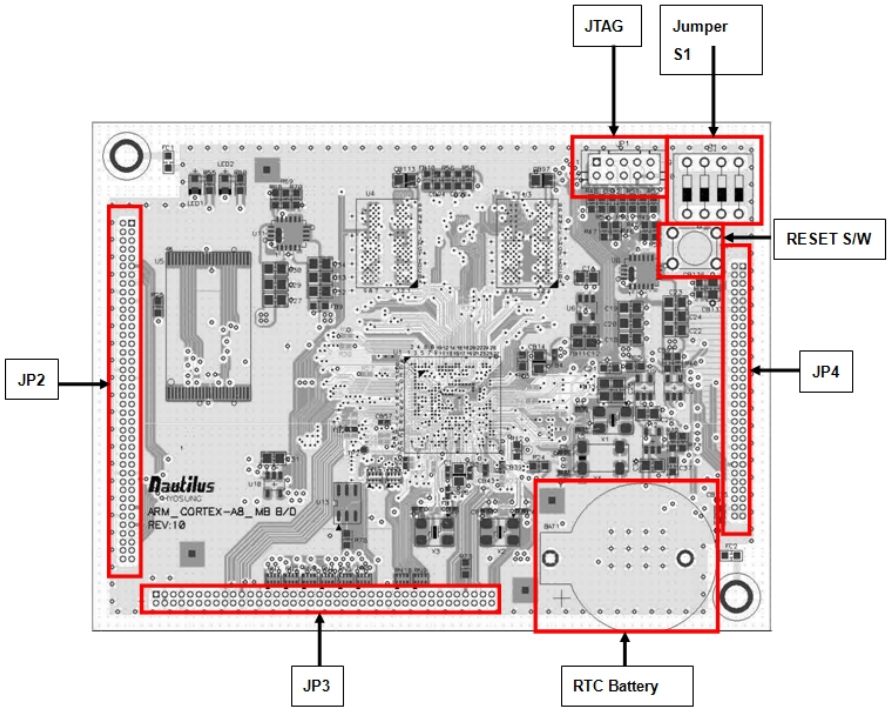
Board Block Diagram

► Board Block Diagram



Cortex-A8 M/B Layout

► Cortex-A8 M/B Layout

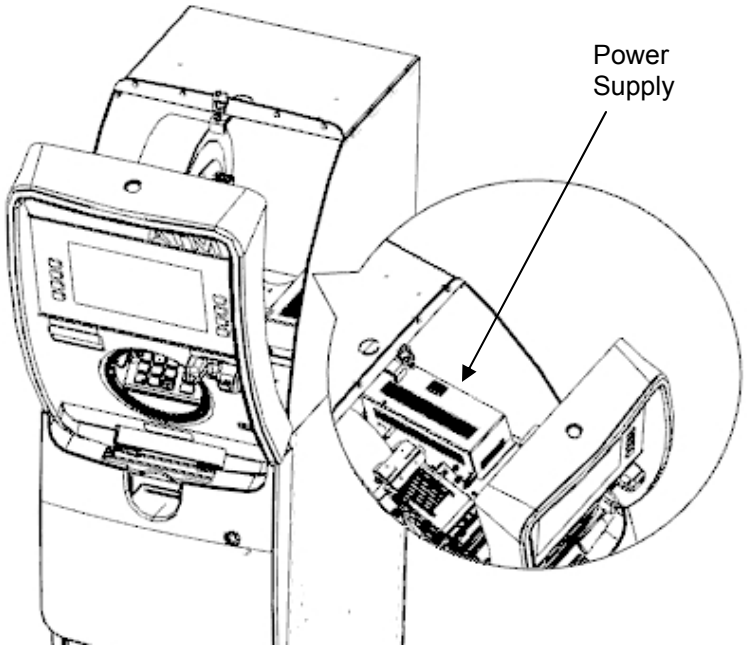


Chapter 5
Power Supply

Contents

Overview

► The power supply unit provides that voltage to various modules within the system. The power supply unit allows the user to turn on/off the system and perform other sequences.



Switching Power On/Off

Switching Power On

▶ The power supply unit allows the user to turn on/off the system, enter power-failure mode, and perform other sequences.

1. The system turning-on process is as follows
2. Open the upper front door
3. Press the power switch (“I”).
4. The system will be turn on automatically

Switching Power Off

▶ The system turning-off process is as follows

1. Open the upper front door
2. Press the power switch (“O”)
3. The system will be shut down automatically
4. The operating system will shut down then power will turn off.

Basic Specification

► Environmental Condition

Condition	Operating	Storage	Condition	Operating	Movement
Temperature	-5 ~ 55℃ (23 ~ 131°F)	-20 ~ 75℃ (-4 ~ 167°F)	Vibration	0.5G	2.0G
Humidity	20 ~ 90%	20 ~ 90%	Impact	5.0G	10.0G

► Withstanding Voltage & Insulation Resistance

Division	Test Point	Test Input Voltage	Test Condition
Withstanding Voltage	PRI – SEC	AC 3000V	During of Test: 1 minute CUTOFF Current: 10mA
	PRI - F.G	AC 1800V	
Insulation Resistance	PRI – SEC	DC 500V	During of Test: 1 minute Insulation RES: ≥10Mohm
	PRI - F.G	DC 500V	

► Input Specification

Division	Specification
Input Connection	AC INLET(250Vac 10A)
Input Voltage/ Current	Free Voltage 100~240Vac ±10% / 3.2A MAX
Frequency	47~63Hz (Normal:50/60Hz)
POWR Factor	-
Efficiency	AC 110V 80% typ. / AC 220V 82% typ.
Hold-Up Time	16.7ms MIN
Inrush Current	70A MAX
Leakage Current	3.5mA MAX

► Output Specification

Division	Specification			Unit
Channel	+5	+12	+24	Vdc
Wattage	15.0	18.0	72.0	W
Voltage	4.75 ~ 5.25	11.4 ~ 12.6	21.6 ~ 26.4	Vdc
Current	0.5 ~ 3.0 (Peak 3.5A)	0.1 ~ 1.5	0 ~ 3.0 (Peak 15A)	A
Method	DC/DC	Switching	Switching	-
Ripple	50	120	240	mVp-p
Noise	0.1	0.3	0.5	Vp-p
Shoot	±3	±3	±5	%
OVP	5.6 ~ 7.5	13.3 ~ 15.6	26.5 ~ 31.2	Vdc
OCP	S.C	S.C	S.C	A

<Note!>

1. RIPPLE & NOISE test condition: 20MHz, 10uF(ELEC)/0.1uF(CER)

2. S.C: SHORT CIRCUIT
3. +5V, +12V total output cannot exceed 23.5W

►Connector Configuration

1. AC INPUT

Division	PIN No.	Configuration	Size	Color
AC IN	1	L	18AWG/UL1015	Black
	2	F.G	18AWG/UL1015	GRN/YEL
	3	N	18AWG/UL1015	White

2. AC OUTPUT

Division	PIN No.	Configuration	Size	Color
AC OUT	1	N	18AWG/UL1015	White
	2	F.G	18AWG/UL1015	GRN/YEL
	3	L	18AWG/UL1015	Black

3. MBD

Division	PIN No.	Configuration	Size	Color
CN3	1	S.G	18AWG/UL1007	Black
	2	+5V	18AWG/UL1007	Red
	3	S.G	18AWG/UL1007	Black
	4	N.C	-	-
	5	+5V	18AWG/UL1007	Red
	6	+12V	18AWG/UL1007	Yellow

4. SPR

Division	PIN No.	Configuration	Size	Color
CN4	1	+5V	18AWG/UL1007	Red
	2	+5V	18AWG/UL1007	Red
	3	S.G	18AWG/UL1007	Black
	4	S.G	18AWG/UL1007	Black
	5	S.G	18AWG/UL1007	Black
	6	N.C	-	-
	7	+24V	18AWG/UL1007	White
	8	+24V	18AWG/UL1007	White

5. CDU

Division	PIN No.	Configuration	Size	Color
CN5	1	+5V	18AWG/UL1007	Red
	2	+5V	18AWG/UL1007	Red
	3	S.G	18AWG/UL1007	Black
	4	+12V	18AWG/UL1007	Yellow
	5	N.C	-	-
	6	S.G	18AWG/UL1007	Black
	7	S.G	18AWG/UL1007	Black
	8	+24V	18AWG/UL1007	White
	9	+24V	18AWG/UL1007	White
	10	S.G	18AWG/UL1007	Black

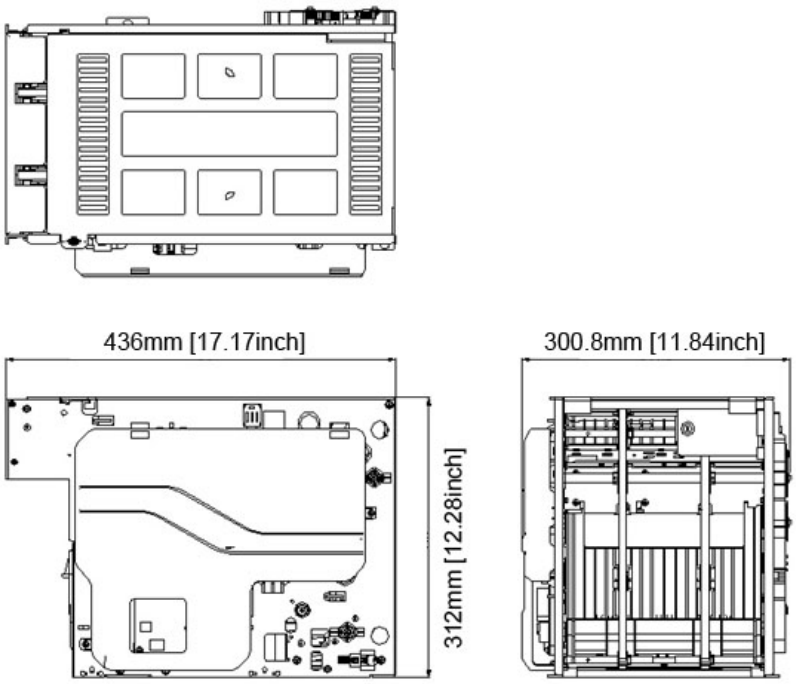
NAUTILUS HYOSUNG

Chapter 6
Cash Dispenser Unit

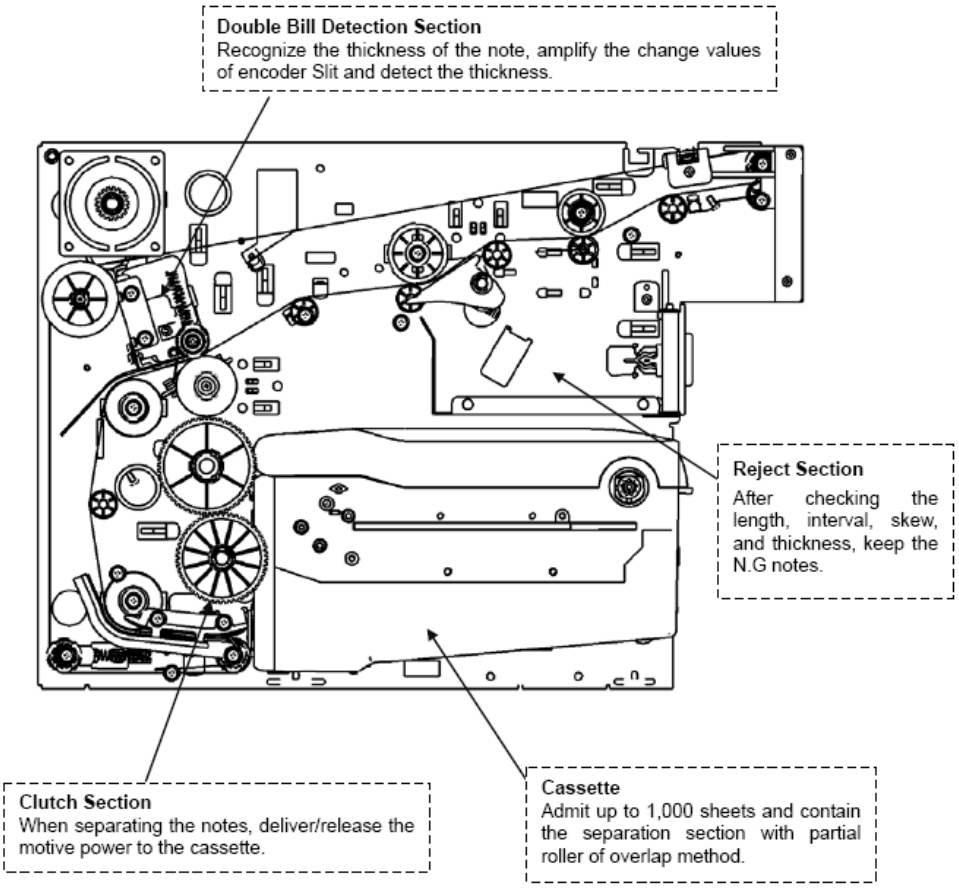
Contents

Overview

► Appearance & Dimension



► Device Configuration



► Device Configuration Module

Module	Description
Clutch Section	When dispensing the notes, deliver the motive power to the cassette to separate the notes. Then after separation, release the motive power.
Double Bill Detection Section	Detect the thickness of the separated note and if it is more than 2 sheets, obtain the data to make the notes rejected.
Cassette Section	Admit up to 1,000 sheets and contain the separation section (partial roller structure of overlap method).
Reject Section	After checking the length, interval, skew, and thickness of the separated notes, keep the N.G notes.

► Specification

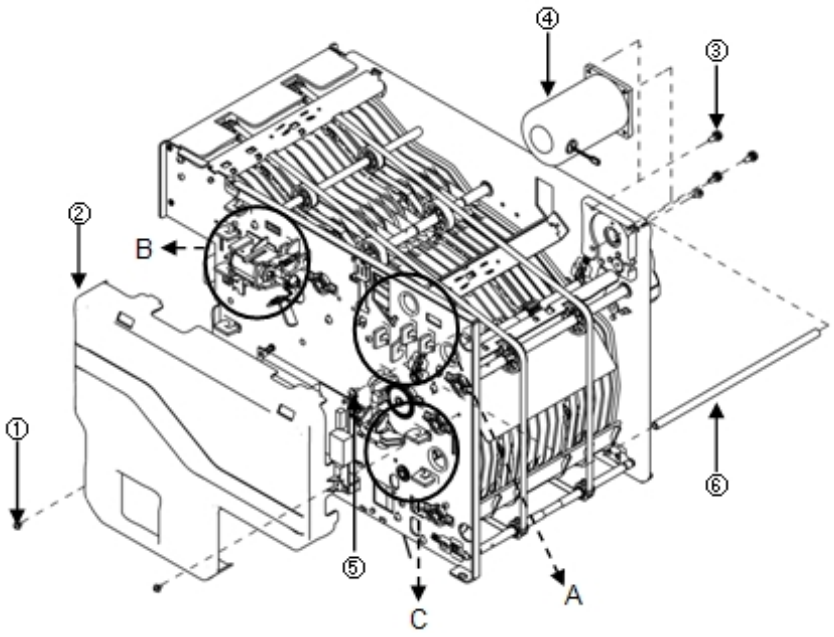
Item		Specification	Remarks
External Appearance	Dimension (mm)	300.8(W)x312(H)x436(D)mm (11.84x12.28x17.17inch)	
Weight	Weight of the main body	10Kg (22.05lb)	
	Weight of the cassette	Empty(2.37Kg (5.22lb)) / Full(1,000sheets) status (3.3Kg (7.28lb))	
Media	Denomination	USA/Canadian Dollar	
	Media Size (LxH)	USA (156x66mm (6.14x2.6inch)) / Canada (152.4x70mm (6x2.76inch))	
	Thickness	0.09 ~ 0.11mm (0.0035~0.0043inch)	
Dispensing	Shutter Yes/No	No	Tray outside the main body
	Dispensing Speed	4 sheets/sec	
	Maximum number	40 sheets/transaction	
Separation	Separation Type	Friction Type	
Reject	Capacity	200sheets	Based on new notes
	Security	No Key	
	Quantity Detection	No	Software Count
Cassette	Capacity	1,000sheets	Based on new notes
	Loading Direction	Front Access	Front Access Type
	Detecting Remnants	No	

Disassembly & Reassembly

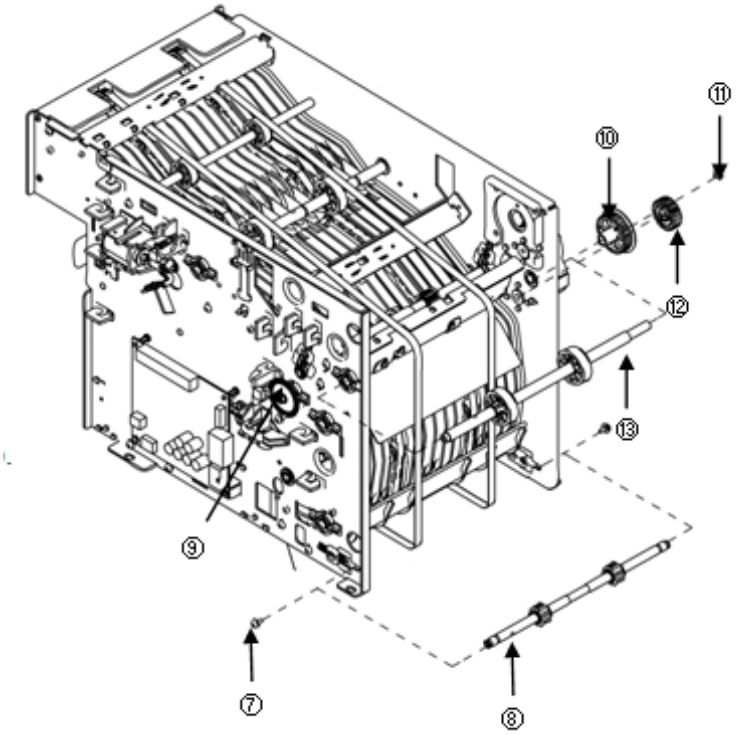
Module Disassembly

► Disassembly of Double Bill Detection Section (7310000682)

1. Remove 2 screws (44651302,①) and disassemble Main Cover (4310000240,②).
2. Disassemble cable connector CS5/M1.
3. Remove 3 screws (44656302,③) and disassemble ASSY MOTOR (7310000670,④).
4. Remove 2 screws (44654303,⑤) and disassemble Shaft Reinforce (45131201,⑥).

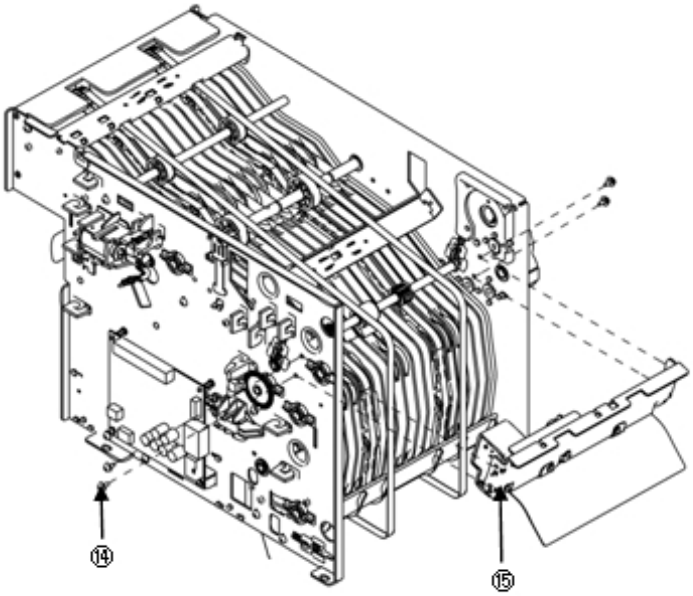


5. Remove 2 screws (44654303, ⑦) and disassemble ASSY PULLEY_ID (7310000671, ⑧).
6. Remove 2 screws (44654303,⑨) and disassemble ASSY PULLEY_DR (7310000683, ⑩).
7. Remove 1 screw (4650000132, ⑪) and disassemble GEAR Z36W08M10_DR (⑫).
8. Disassemble ASSY GEAR Z28W09M10_ID (⑬).



9. Remove 4 screws (44654303,⑭) and disassemble Double Bill Detection Section (7310000682, ⑮).
10. To assemble again, use the reverse order of disassembling.

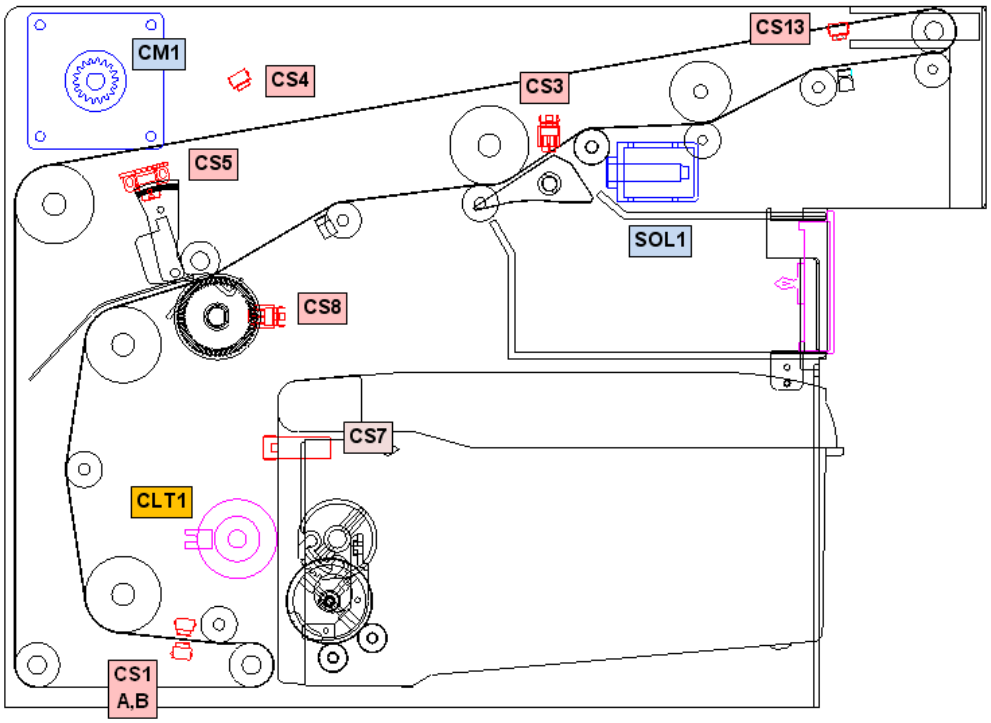
<Note!> Be sure to insert the belt during assembling ASSY PULLEY and Double Bill Detection Section.



Electronic Parts Disassembly

Sensor Disassembly

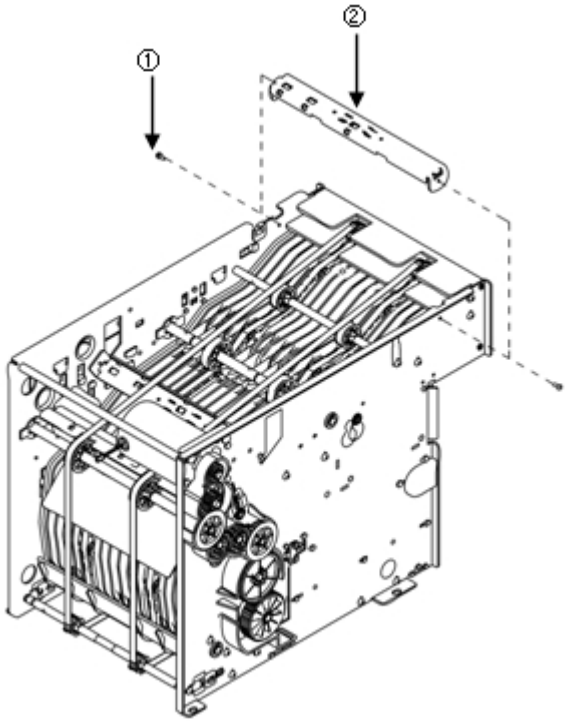
► Location Map of Sensor



► Disassembly of Integrated Sensor

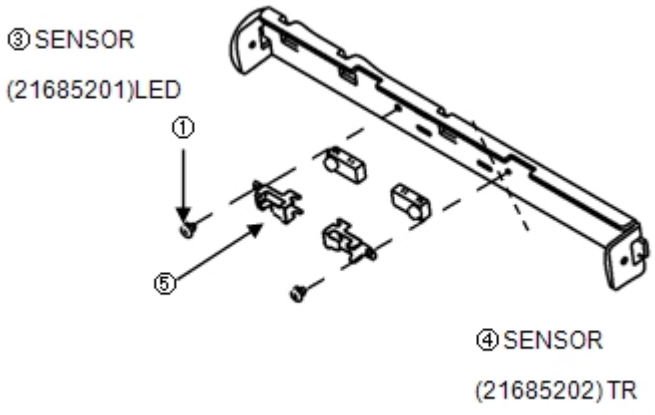
1) CS13 (21685202/21685201)

1. Disassemble main cover (4310000240). (Refer to No.1 of “Disassembly of Double Bill Detection Section”)
2. Disassemble CABLE (CS13) (Section B on figure of “Disassembly of Double Bill Detection Section”)
3. Remove 2 screws (44654303, ①) and disassemble Sensor ASSY (7310000689, ②).



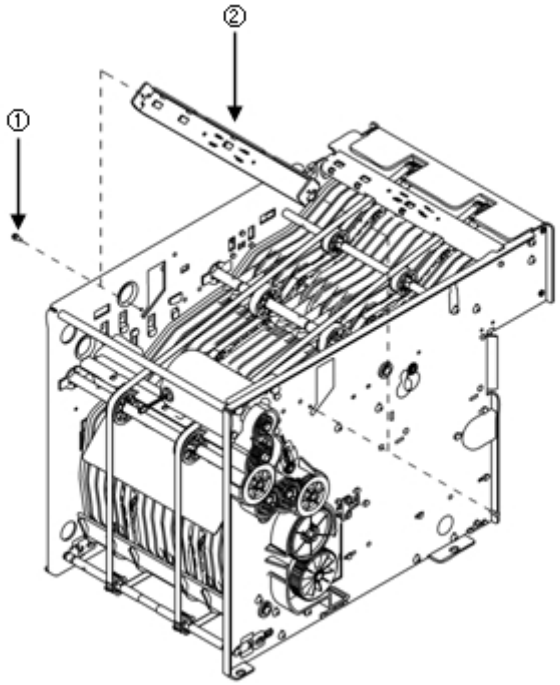
4. Remove 2 screws (44654303, ①) and disassemble holder (⑤) / sensor (21685201, ③) /sensor (21685202, ④).
5. To assemble again, use the reverse order of disassembling.

<Note!> Be sure to check the position of sensor and assemble it. (Refer to figure below)

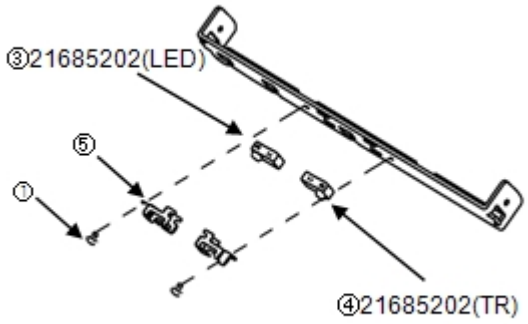


2) CS4 (21685201/21685202)

1. Disassemble main cover (4310000240). (Refer to 1 of “Disassembly of Double Bil l Detection Section”)
2. Disassemble cable (CS4). (Section A on figure of “Disassembly of Double Bill Detection Section”)
3. Remove 2 screws (44654303, ①) and disassemble Sensor Assy (7310000689, ②).



4. Remove 2 screws (44654303,①) and disassemble holder (⑤) to disassemble sensor (21685201, ③) and sensor (21685202,④)

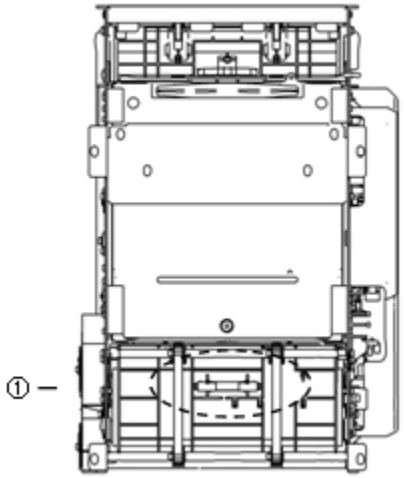


5. To assemble again, use the reverse order of disassembling.

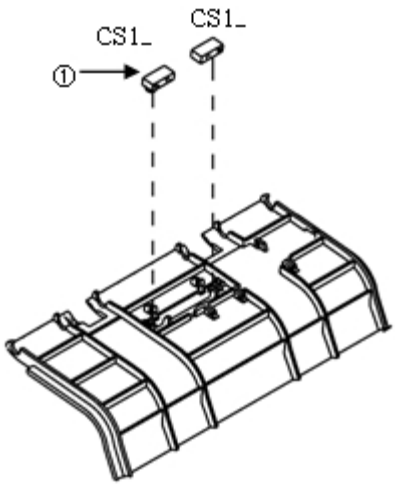
<Note!> Be sure to check the position of sensor and assemble it. (Refer to [Fig. 6.5])

3) CS1_LED (21685201)

1. Separate cassette (7430002494) and and place the unit as shown in figure below.
2. Disassemble sensor (21685201, 2ea, ①) of ASSY MOLD LOWER DOWN (7310000678).
3. Disassemble cable connector (CS1_A,CS1_B) of SENSOR (21685201).

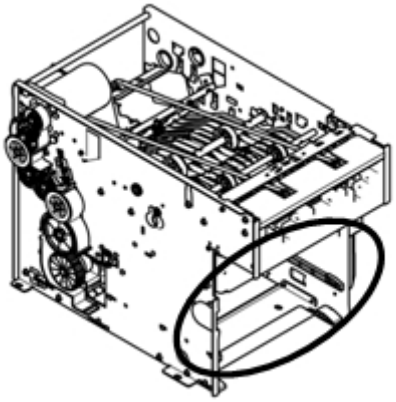


4. To assemble again, use the reverse order of disassembling.
   <Note!> Be careful for the direction of cable (CS1_A,CS1_B).

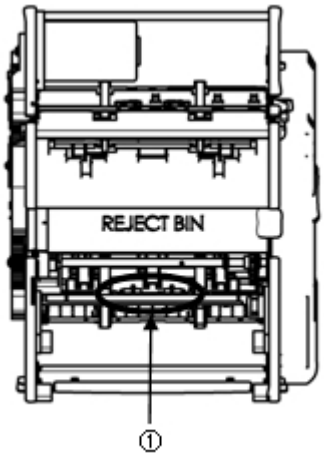


4) CS1_TR (21685202)

1. Separate the cassette (7430002494).

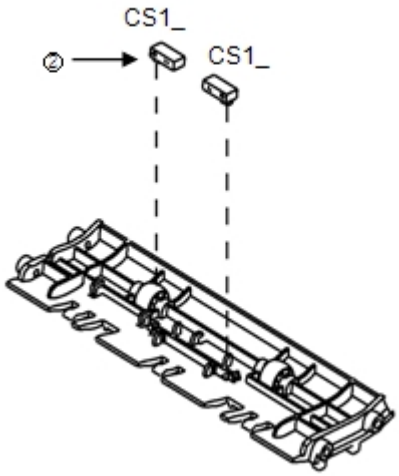


2. If the cassette is separated, the sensor (21685202) inside ASSY MOLD LOWER FEED UP (7310000679) will be shown.



3. Disassemble sensor (21685202, 2ea, ②) as shown in figure.
4. Disassemble the cable connector (CS1_A,CS1_B) of sensor (21685201).
5. To assemble again, use the reverse order of disassembling.

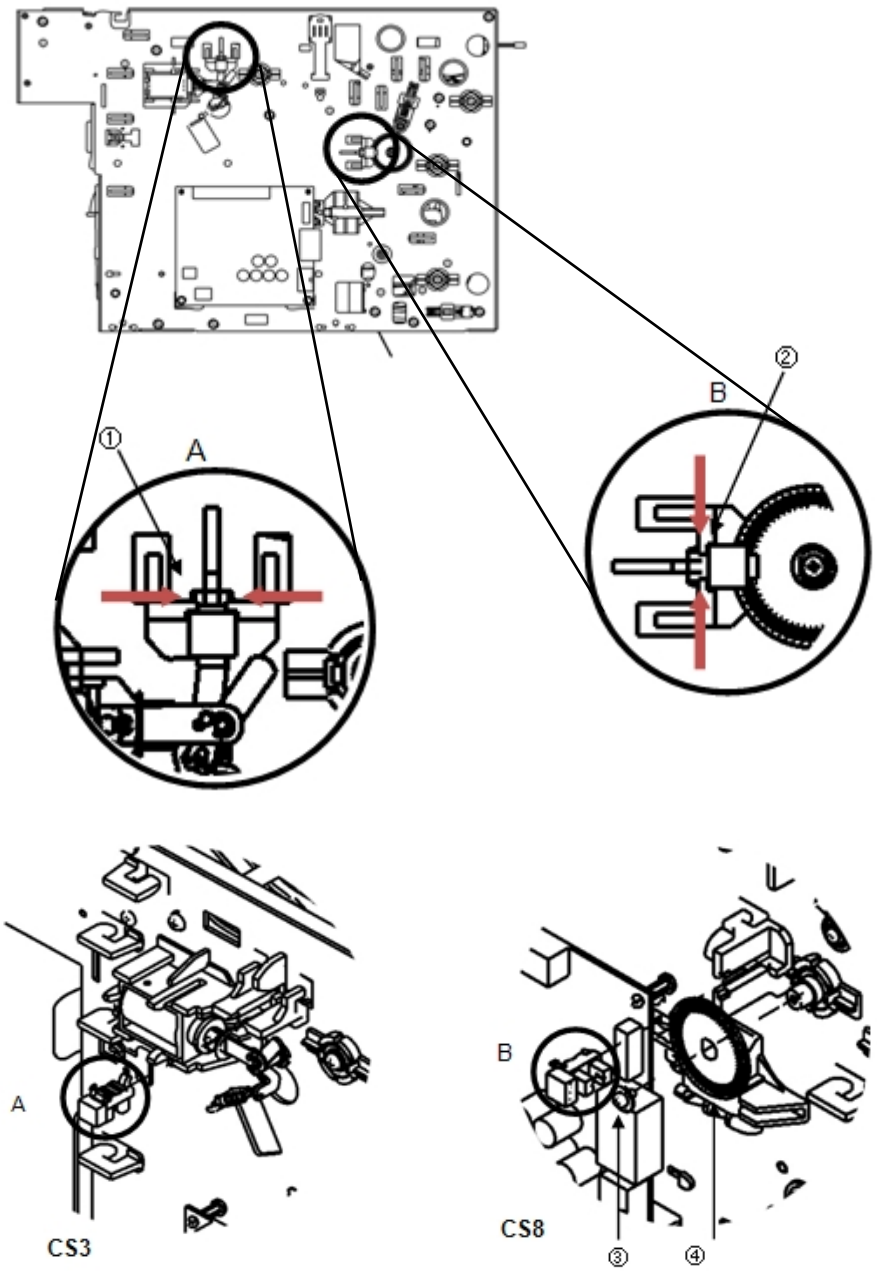
<Note!> Be careful for the direction of the cable (CS1_A, CS1_B).



► Disassembly of Separated Type Sensor

1) CS3, CS8 (72335201)

1. Disassemble the main cover (4310000240). (Refer to 1 of “Disassembly of Double Bill Detection Section”)
2. Disassemble CABLE CS3/CS8.
3. Disassemble sensor (72335201, ①) on CS3: Section A pressing it in the direction of arrow.
4. Remove a screw (4650000132, CS8: ③) and disassemble encoder (44135304). Then disassemble the sensor (72335201, (②)) on section B pressing it in the direction of arrow.

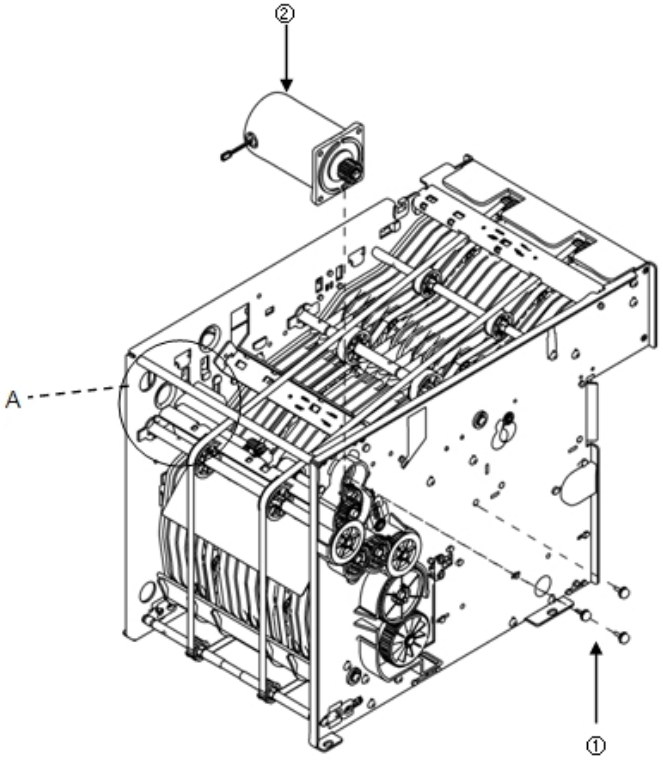


5. To assemble again, use the reverse order of disassembling.

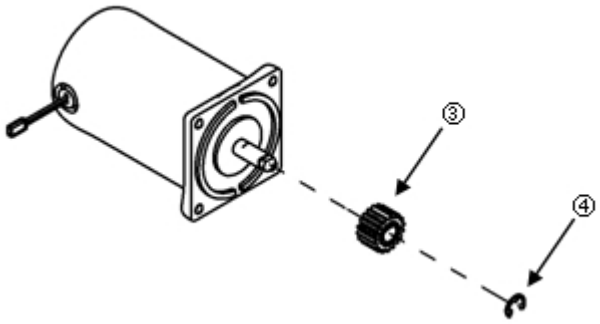
Motor Disassembly (7310000670)

► Motor Disassembly

1. After disassembling cable (M1) on section A, remove 3 screws (44656302, ①) and disassemble Assy Motor (7310000670,②)



2. Disassemble GEAR (4350000431, ③) and E-RING(44950408,④) from Assy Motor (7310000670).

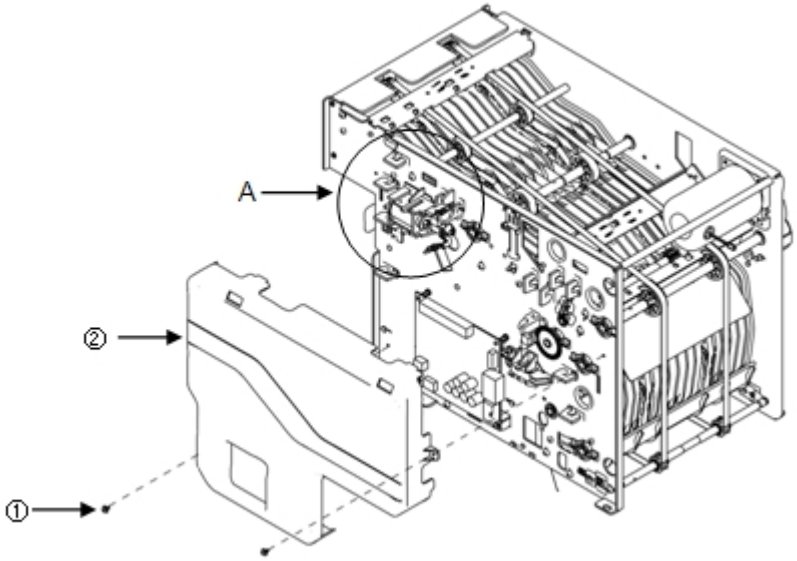


3. To assemble again, use the reverse order of disassembly.

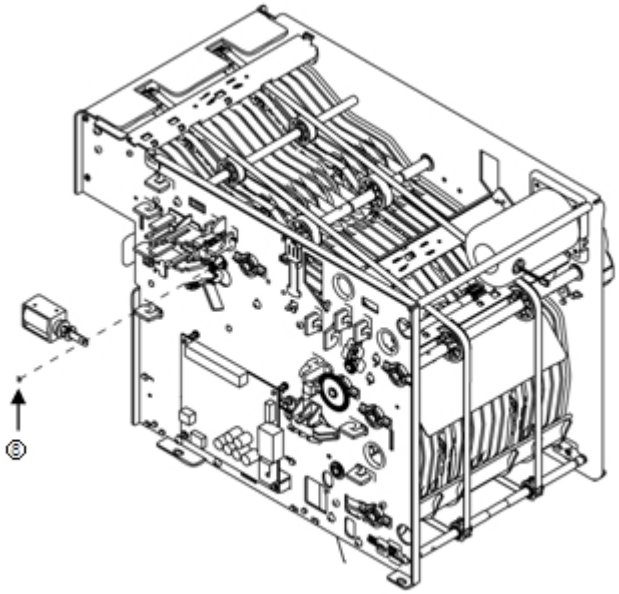
Solenoid Disassembly (32121901)

► Solenoid Disassembly

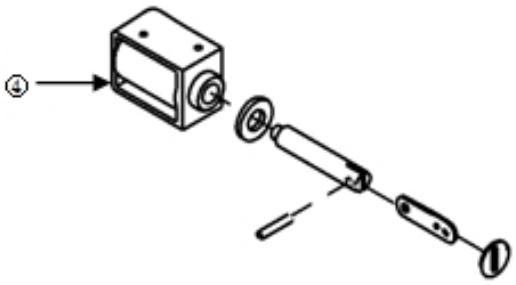
1. Remove 2 screws (44651302, ①) and disassemble the main cover (4310000240, ②)
2. Disassemble the cable (SOL1) on section A.



3. Disassemble e-ring (4495404, ③) connected to solenoid and bracket. Then disassemble Assy Solenoid (7310000686).



4. Disassemble the solenoid (32121901) from Solenoid Assy (7310000686).

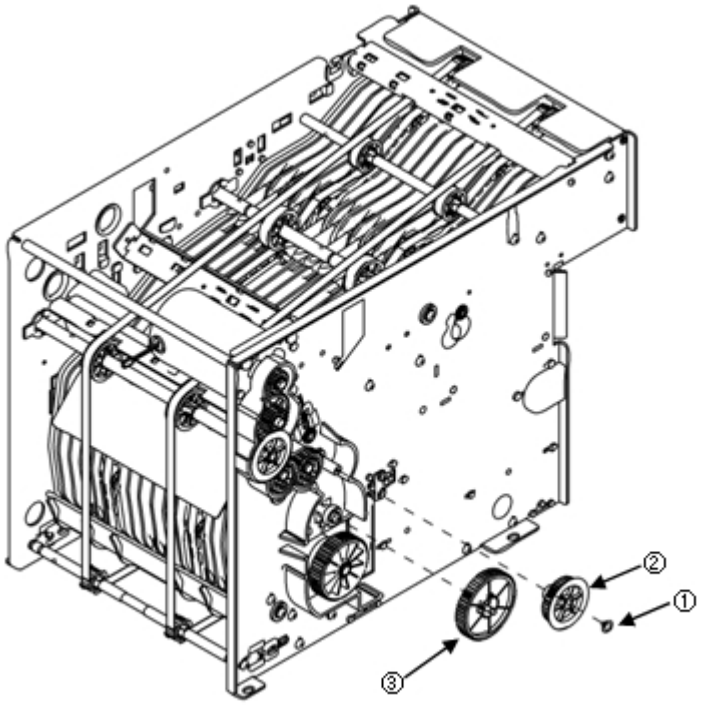


5. To assemble again, use the reverse order of disassembly.
<Note!> Be careful not to miss the rubber damper (33630701).

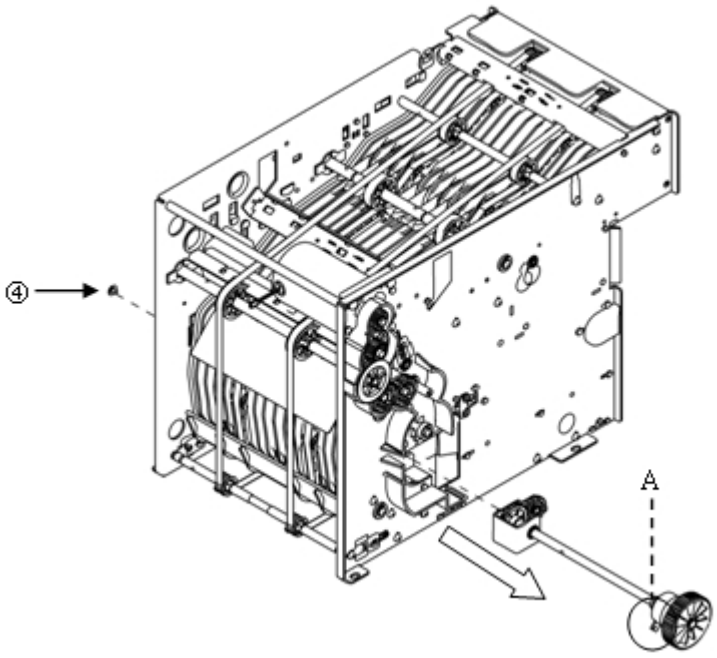
Clutch Disassembly (5637000013)

► Clutch Disassembly

1. Disassemble the main cover (4310000240). (Refer to 1 of “Disassembly of Double Bill Detection Section”)
2. Separate the cassette (7430002494) and disassemble the cable on the inside.
3. Remove a screw (4650000132, ①) and disassemble the gear (②)
4. Disassemble ASSY GEAR (③).

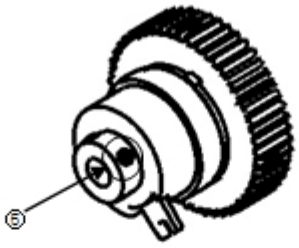


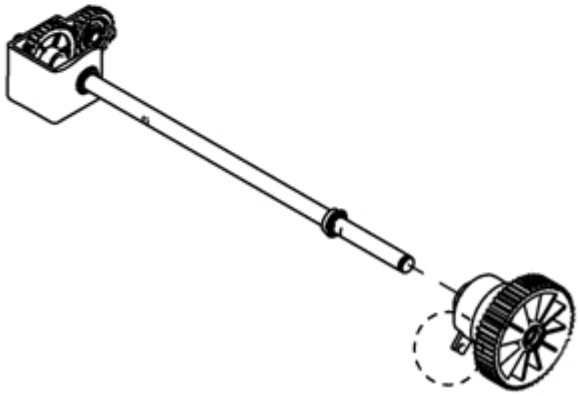
5. Remove a screw (4650000132, ④) and disassemble Assy Clutch (7310000687) in the direction of arrow.



<Note!> Be careful not to damage section A of above figure during disassembling.

6. Unfasten the Set Screw as shown in figure (⑤) and disassemble the clutch (5637000013). (Please use the hexagon wrench during disassembling.)





7. To assemble again, use the reverse order of disassembling.

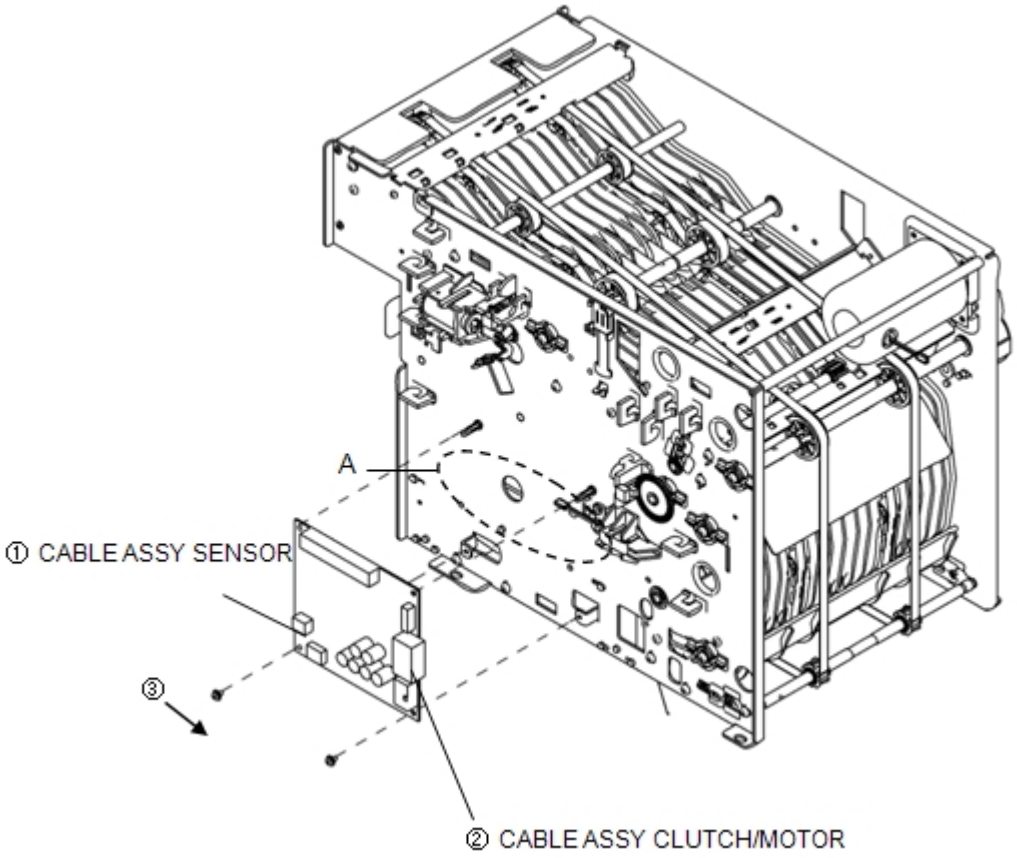
<Note!> Apply the Loctite 242 on the screw thread before assembling Set Screw.

PCBA Disassembly (7670000055)

► PCBA Disassembly

1. Disassemble the main cover (4310000240). (Refer to 1 of “Disassembly of Double Bill Detection Section)
2. Disassemble CABLE ASSY [① SENSOR (320500143) / ② CLUTCH MOTOR (3205000142)]
3. Remove 2 screws (44651302, ③) and disassemble PCBA (7670000055).

<Note!> Be careful not to damage Section A on the upper part when detaching PCBA.



4. To assemble again, use the reverse order of disassembly.

Preventive Maintenance

Lubrication

Lubrication Standard

► General Information of Lubrication Standard

1. Lubricate the part instructed in the drawing and follow the lubrication standard for lubrication type of each part and its amount.
2. Description of symbol for lubrication amount

Symbol	Description	Remark
G	Lubricate slightly with grease using the brush below number 10. (Remove an unnecessary piece of oil.)	

<Note!> Grease 0.1g is equivalent to about 1.2mm squeezed by grease gun whose inlet is 7mm in diameter.

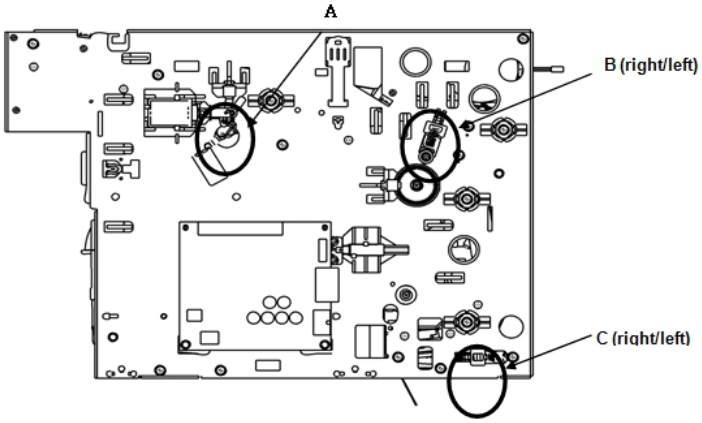
3. The type of lubricant

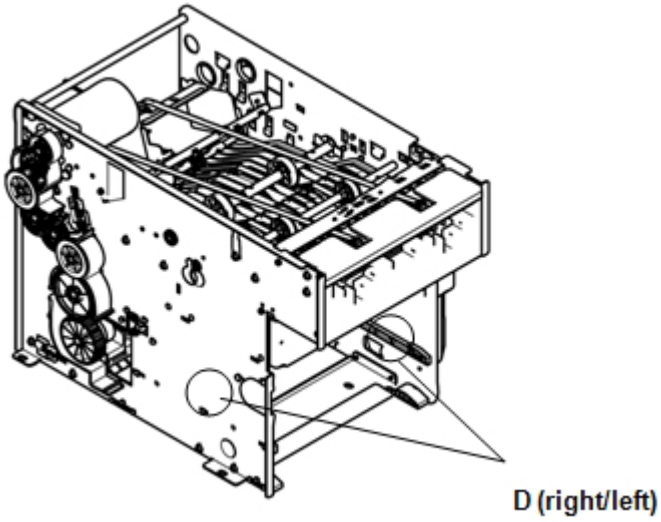
Type	Name	Remark
Grease(G1)	G-501 (White)	
Grease(G2)	ALVANIA EP#1 (Yellow)	

Lubrication Standard for each part

► Lubrication Standard for each part

Part	P/N	Description	Point	Type
A	4590000977	SPRING:GATE_SOLENOID	1 place	G1
B	4590000886	SPRING:CO-OD35ID45N15	4 places	G1
C				
D	4140002186	K-ASSY:FRAME_L	1 place	G2
	4140002187	K-ASSY:FRAME_R	1 place	G2





Cleaning (Inspection)

Overview of Cleaning Standard

► This standard expresses the item for regular cleaning (Inspection)

Cleaning Cycle

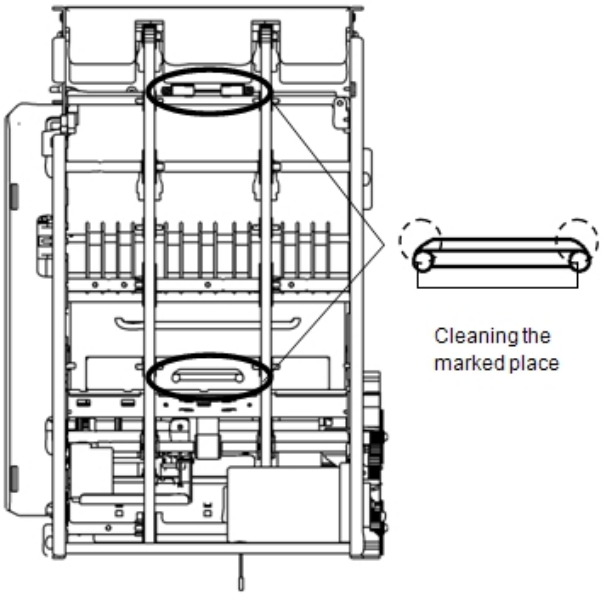
► Cycle of regular cleaning (Inspection)

Symbol	Description
M6	Inspection once a six months
Y1	Inspection once a year (Including M6)

Cleaning Point and Method

► Sensor (Prism)

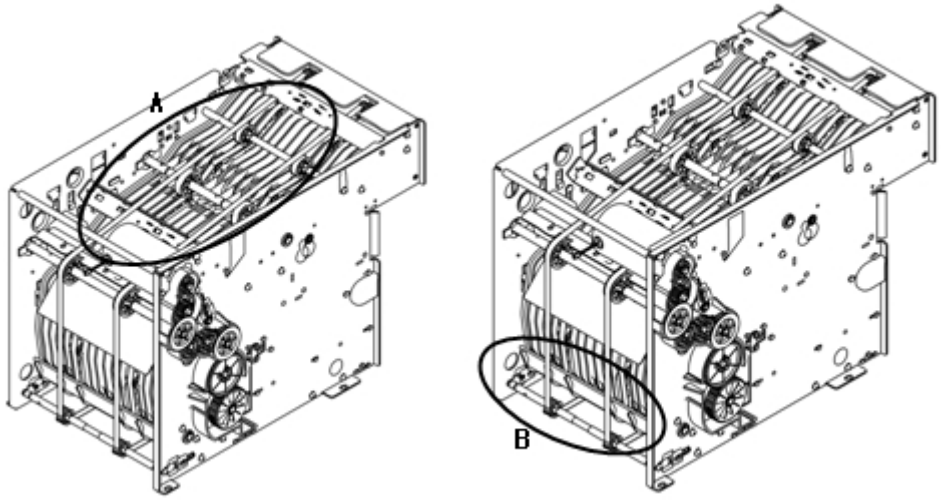
1. Remove the foreign substance from the integral transmissive sensor (CS3, CS8) with a small brush for cleaning sensor. (4~6 times a round-trip of brush)
2. Remove the foreign substance from the prism surface of separated transmissive sensor (CS1,CS13,CS4) with a cotton swab.



No	Cleaning Point	P/N	Cleaning Cycle	Cleaning Method	Remark
1	Prism	4500000436	M6	Cotton Swab	

► Transport Path

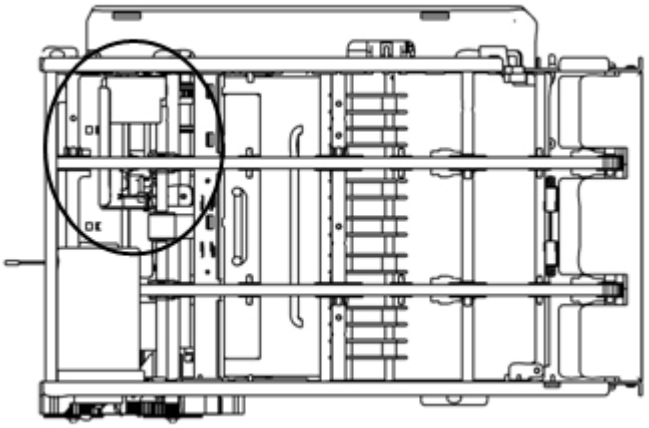
Remove the foreign substances form the transport path with an air brush.



No	Cleaning Point	P/N	Cleaning Cycle	Cleaning Method	Remark
1	MAIN FEED (A)	4500000586	M6	AIR BRUSH	
2	LOWER FEED (B)	4360000532	M6	AIR BRUSH	

► Double Bill Detection Lever

1. Remove the foreign substances from the double bill detection lever with a air brush.

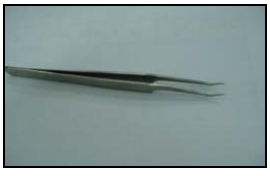


No	Cleaning Point	P/N	Cleaning Cycle	Cleaning Method	Remark
1	Double Bill Detection Section of the Transport Path	7310000682	M6	AIR BRUSH	

Parts Replacement

Required Tools for Replacement

► Required Tools

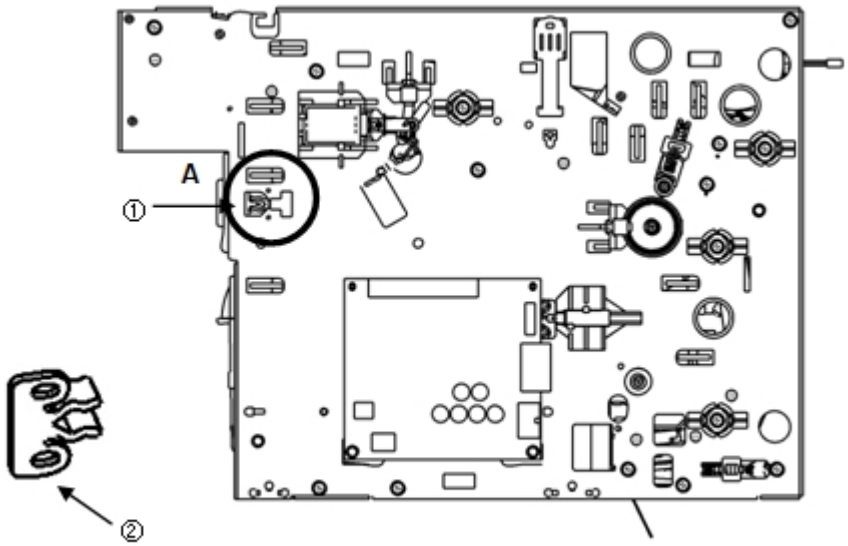
NO	Name of Tool	Picture
1	+ Driver	
2	- Driver	
3	Number 1.5 + Driver	
4	E-LING CLIP	
5	LONG NOSE	
6	Spring Hook or Pincette	
7	Hexagon Wrench	

How to Replace

► Mounting Catch [Section A] in case of RJ Catch Damage

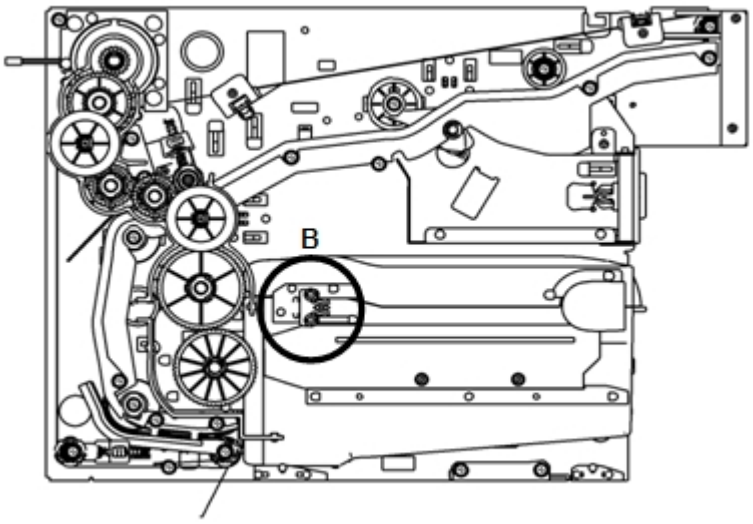
1. Mount the cassette catch. After removing damaged RJ Catch Section (①), mount a Catch (45353401, ②).

<Note!> Assemble 2 screws (M2.5X8 44650701).



► Mounting Catch [Section B] in case of Cassette Catch Damage

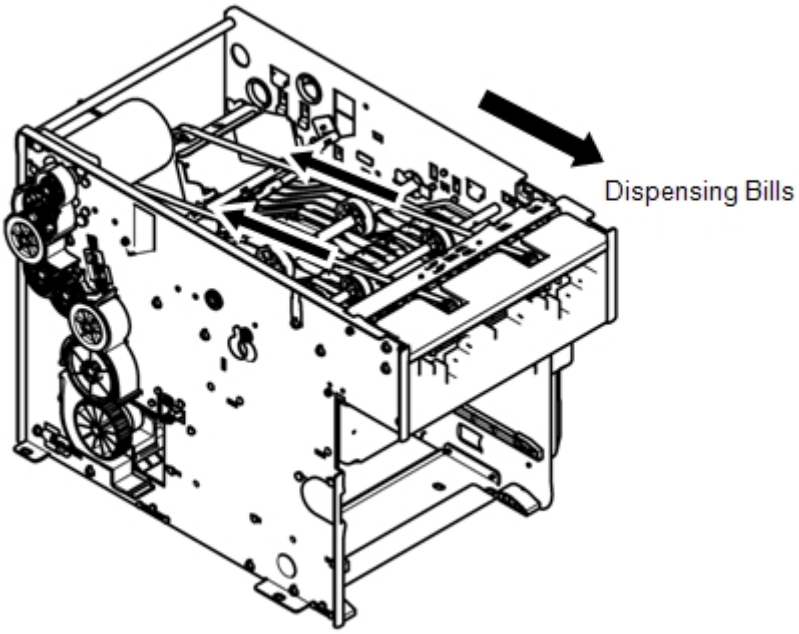
1. Unfasten a screw (M2.5X8 44650701) in case of damage and remove the damaged Catch. Then replace it with new one (45353401).



.Troubleshooting

► How to remove a jam

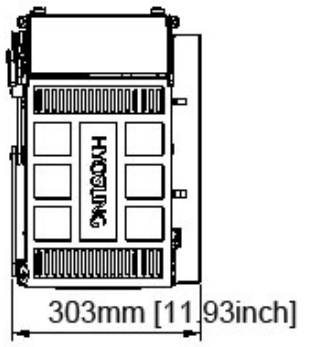
Take out the jammed note pulling the belt as shown in below picture.



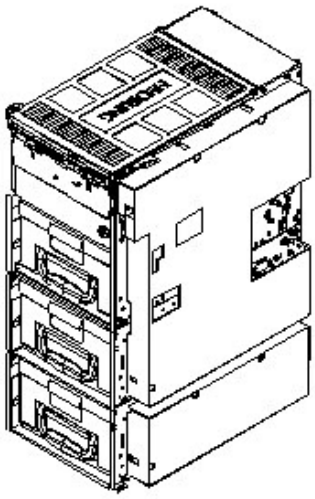
Optional Cash Dispenser Unit: CDU-M

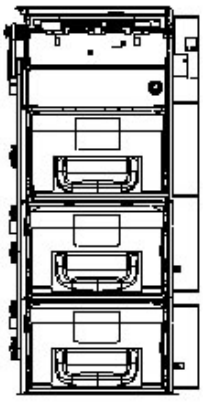
Appearance/Functional Diagram

► The following figures show the three sectional diagrams of the CDU. CDU is 623.00mm (24.53inch) high and 303.00 mm (11.93inch) wide.

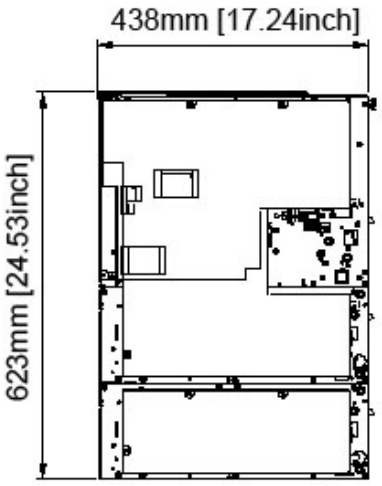


Plane View





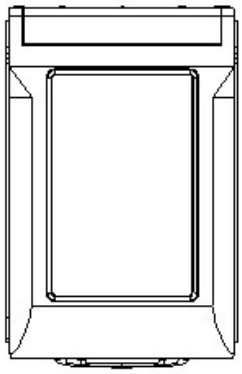
Front View



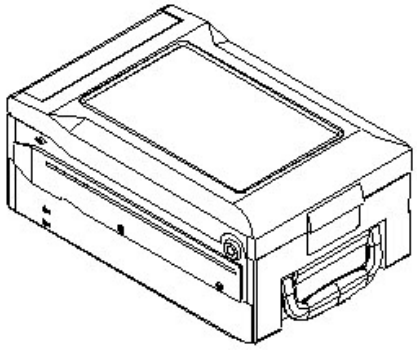
Side View (Right)

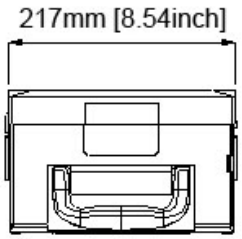
Cassette

► The following figures show three sectional diagrams of the cassette. Cassette is 137.50mm (5.41inch) high, 217.00mm (8.54inch) wide and 342mm (13.46inch) long.

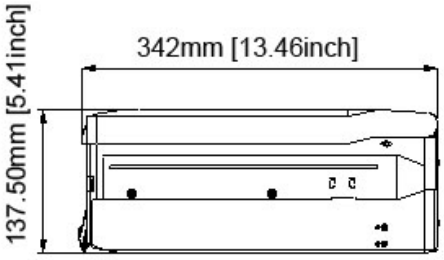


Plane View





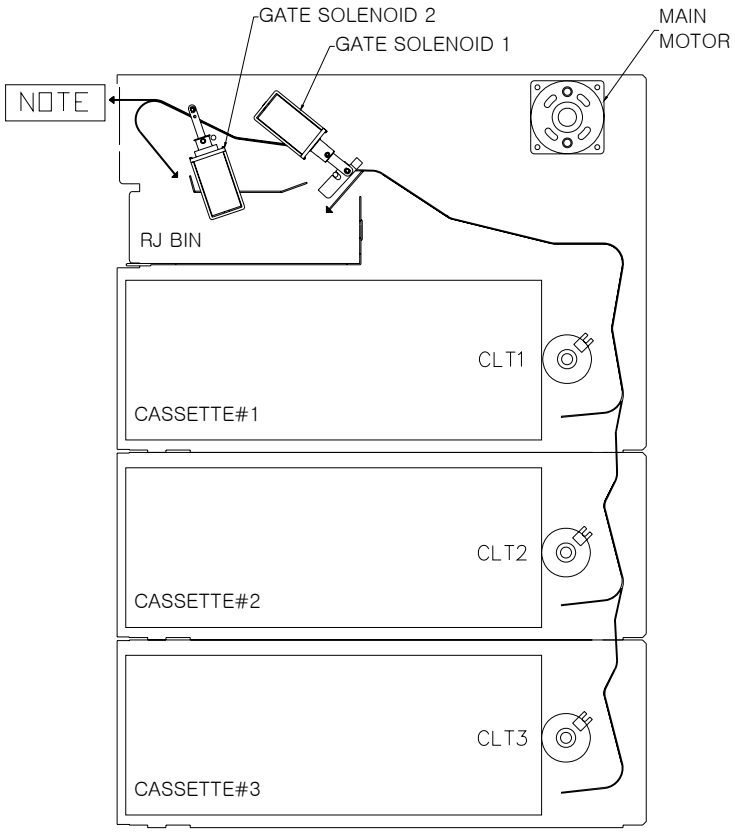
Front View



Side View (Right)

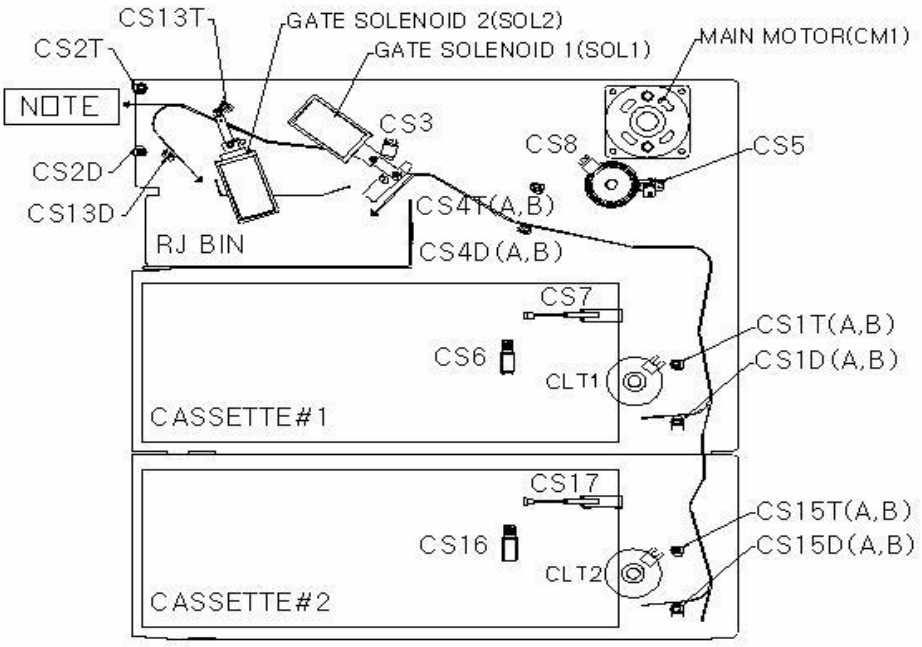
Actuator Diagram

► Six actuators are used. The following figure shows their location.

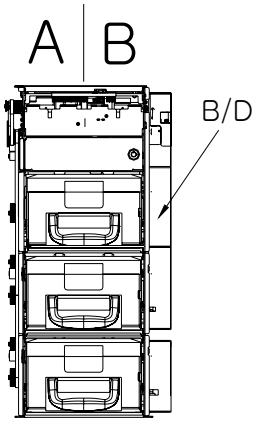


Sensor Diagram

► The following figure shows the location of 29 sensors in this system.



<Note!> A = Sensor far from the board.
B = Sensor close to the board.

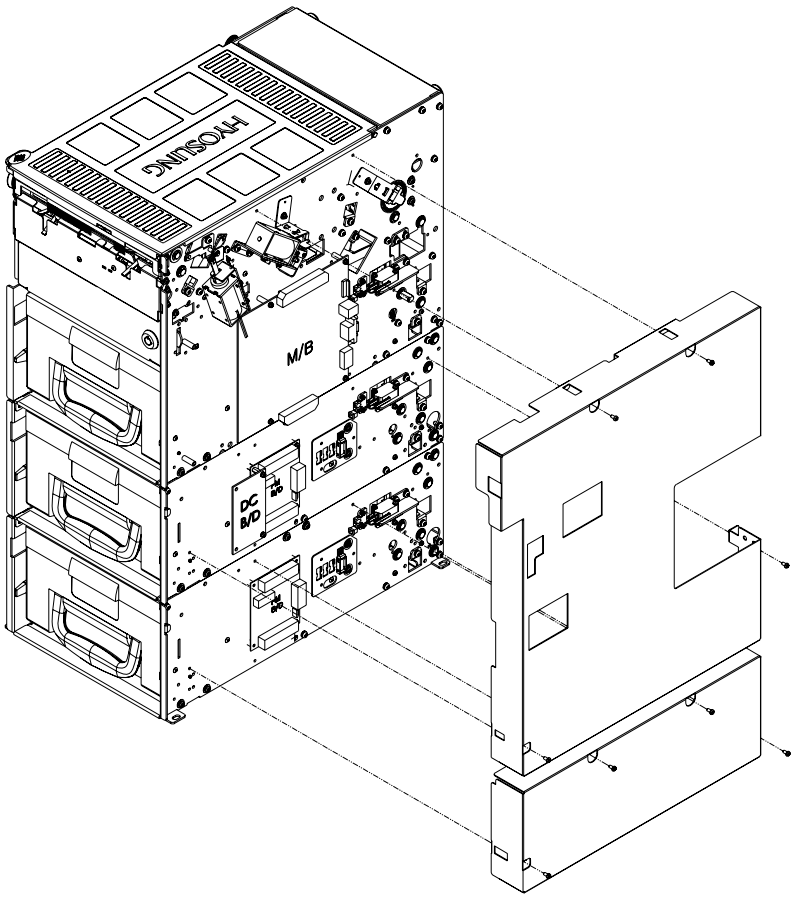


Front View

Module and Sensor Replacement

Sensor Replacement

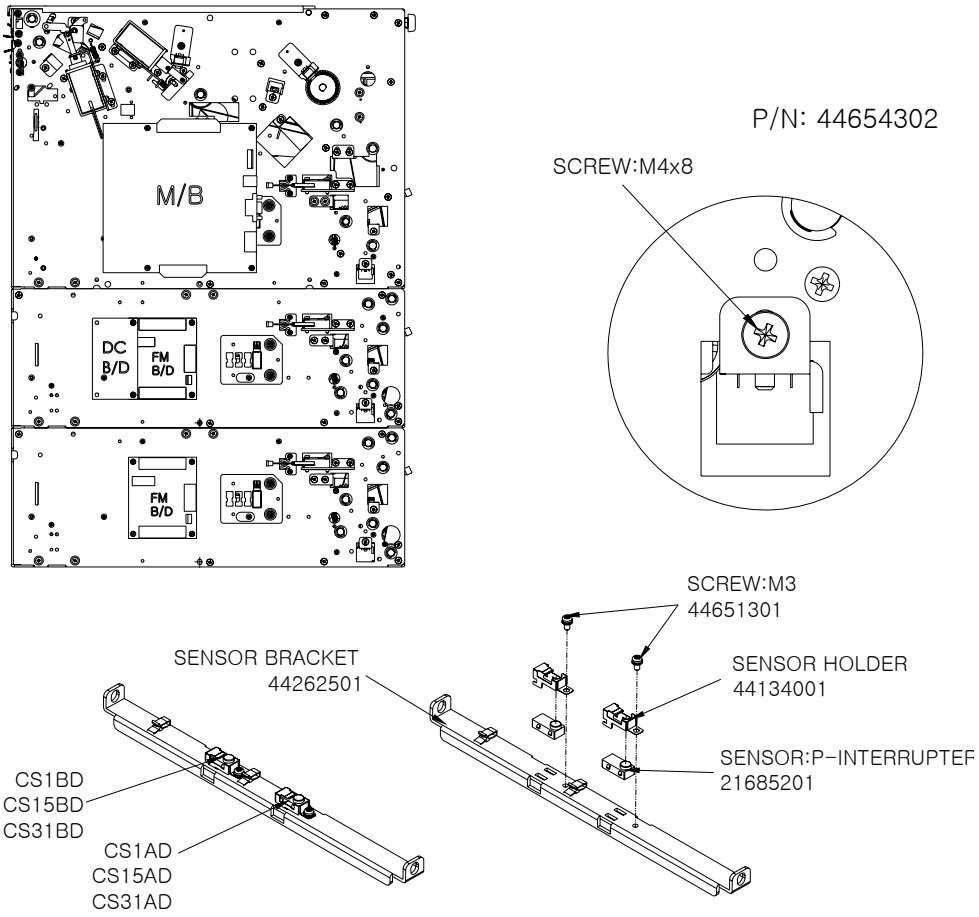
► Turn the power off and remove the CDU cover as shown in the figure to replace sensors and modules. The CDU contains a total of 28 sensors including 20 returning path sensors, 1 gate operation detection sensor, 3 cassette position detection sensors, 3 remaining note detection sensors and 1 encoder sensor.



► Returning Path Sensor

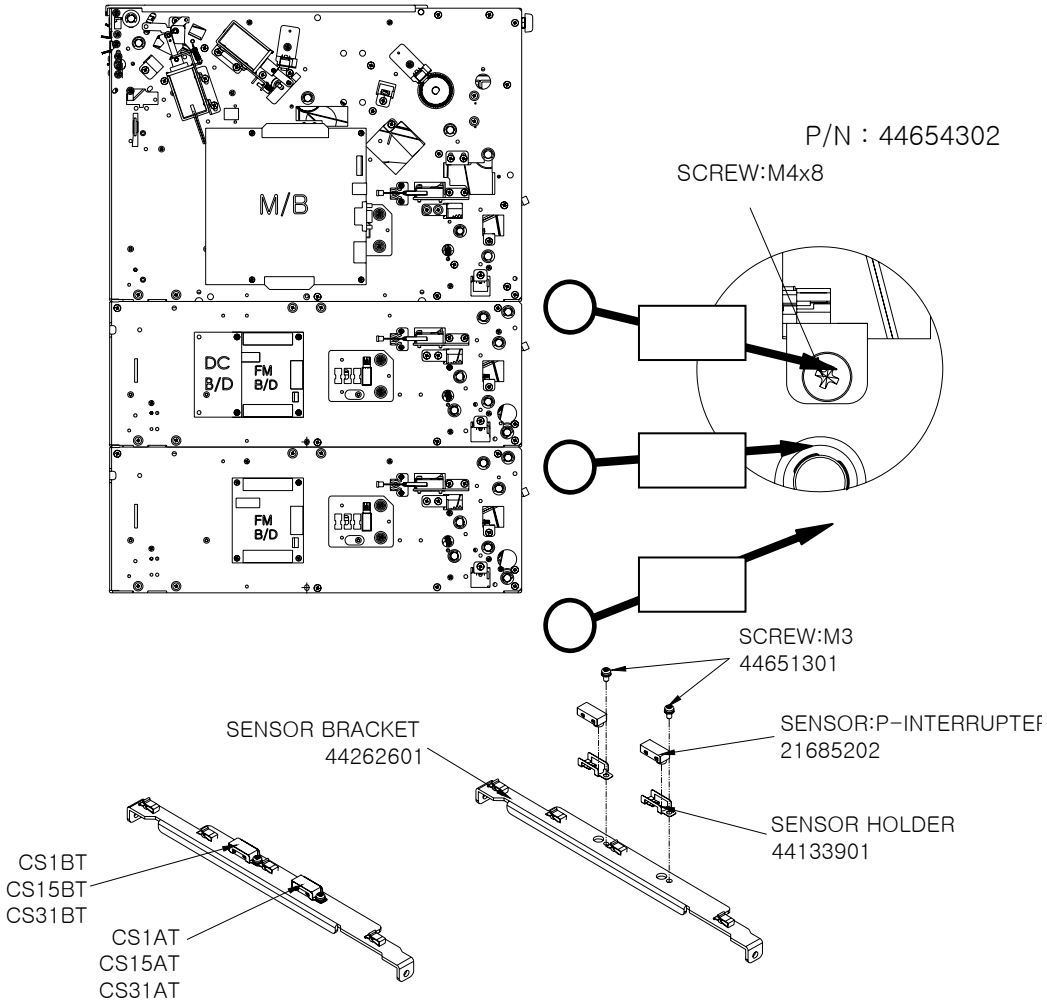
1) CS1D(A,B), CS15D(A,B), CS31D(A,B)

1. Remove the sensor bracket M4 screws (2 places each) as shown in the figure below.
2. Remove the connector and the cable tie to remove the sensor bracket. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. From the removed sensor bracket, remove the M3 sensor screws (1 place each) of the sensor which will be replaced.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1.



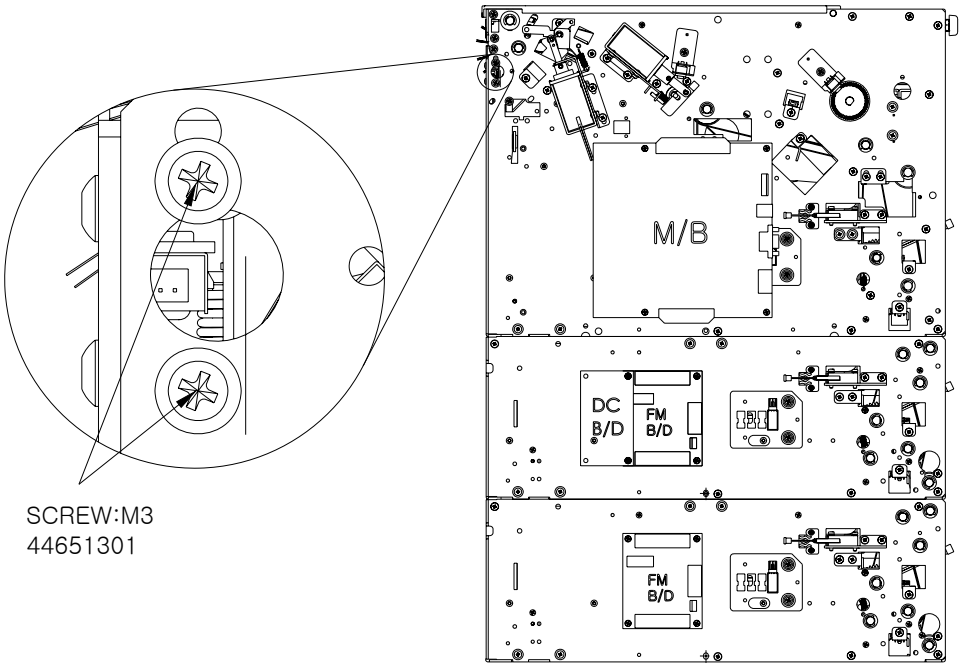
2) CS1T(A,B), CS15T(A,B), CS31T(A,B)

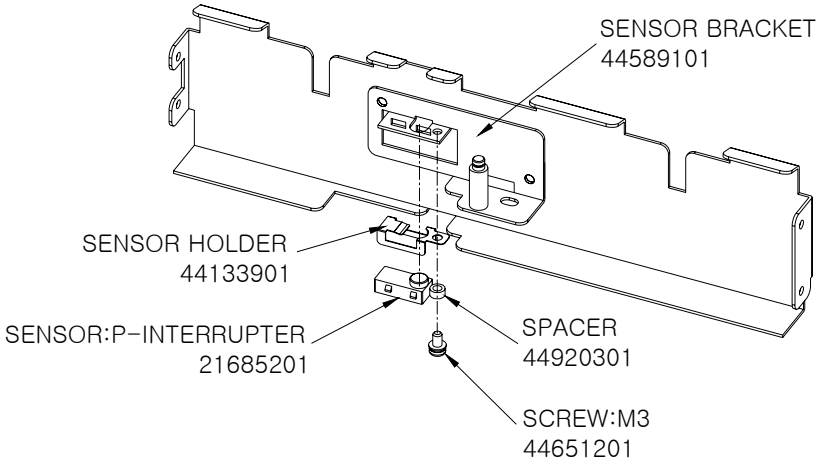
1. Remove the sensor bracket M4 screws (2 places each) from the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor bracket. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. From the removed sensor bracket, remove the M3 sensor screws (1 place each) of the sensor which will be replaced.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~2.



3) CS2D

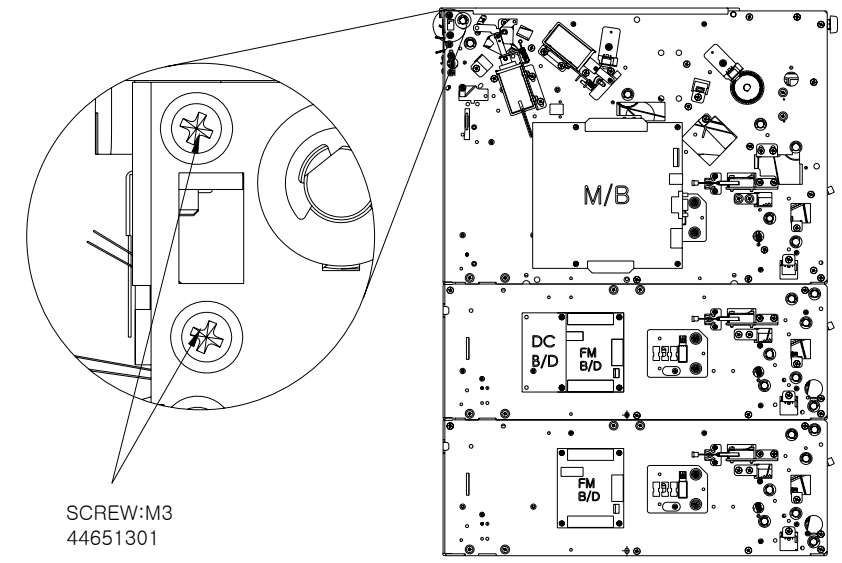
1. Remove the M3 screws (4 places) of the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the M3 sensor screw (1 place).
4. Remove the M3 sensor fastening screws from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - ④~①. Make sure to fasten the spacer and the screw end is not protruding out to the other side of the bracket.

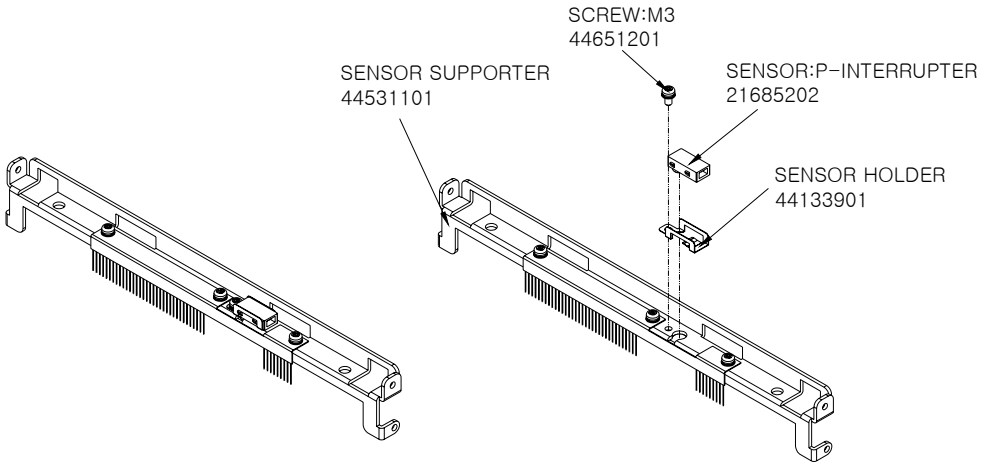




4) CS2T

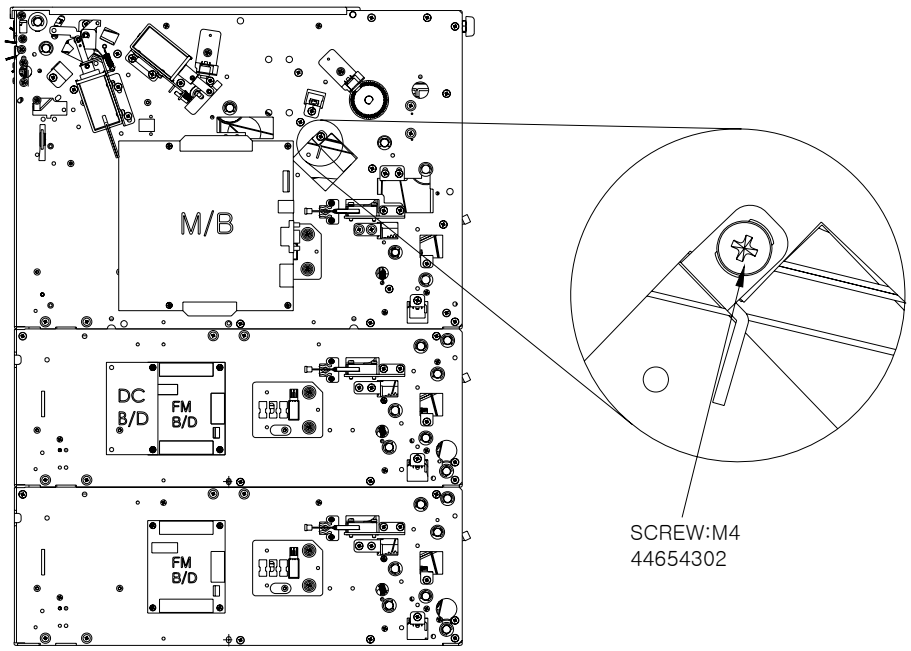
1. Remove the M3 screws (4 places) of the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the M3 sensor fastening screws from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1.

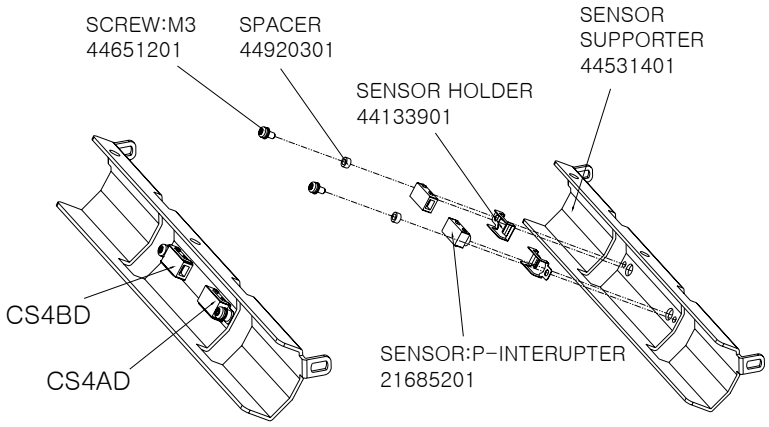




5) CS4D (A, B)

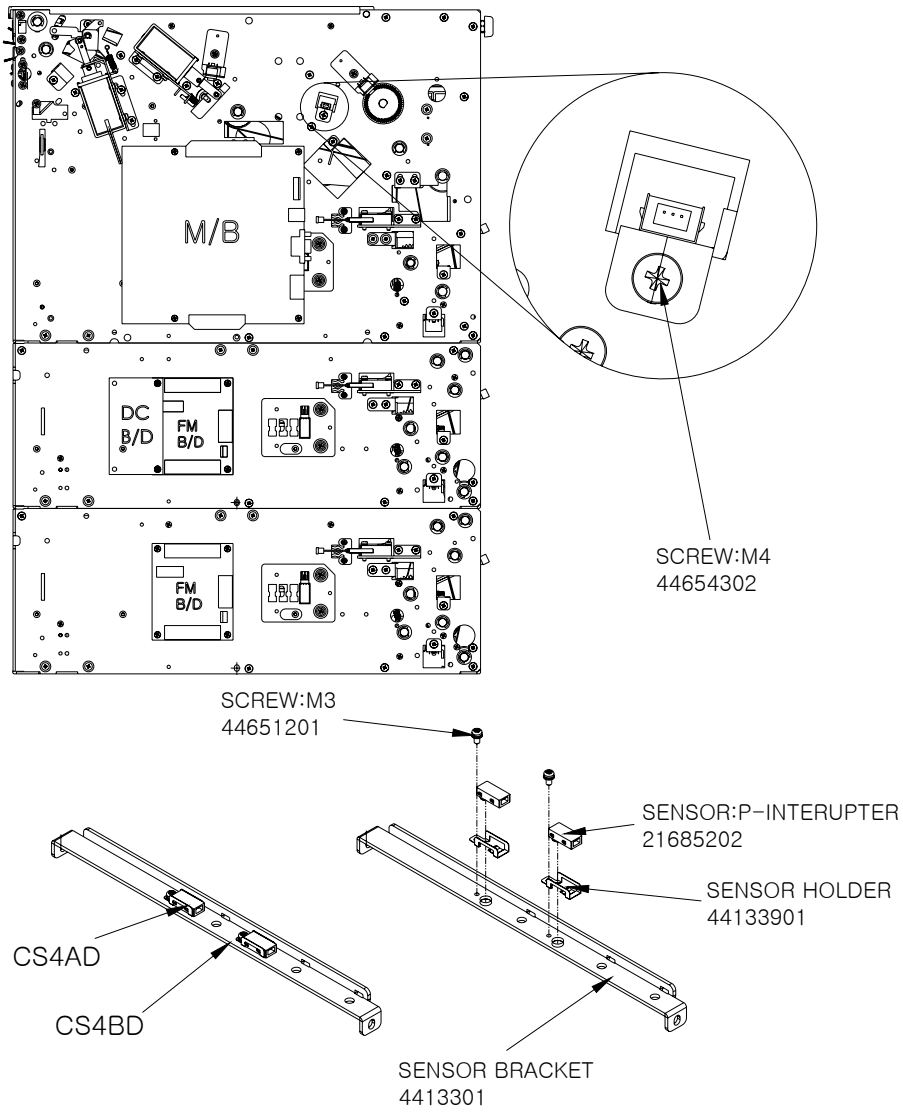
1. Remove the M3 screws (2 places) of the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the M3 sensor fastening screws to replace from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1. Make sure to fasten the spacer and the screw end is not protruding out to the other side of the bracket.





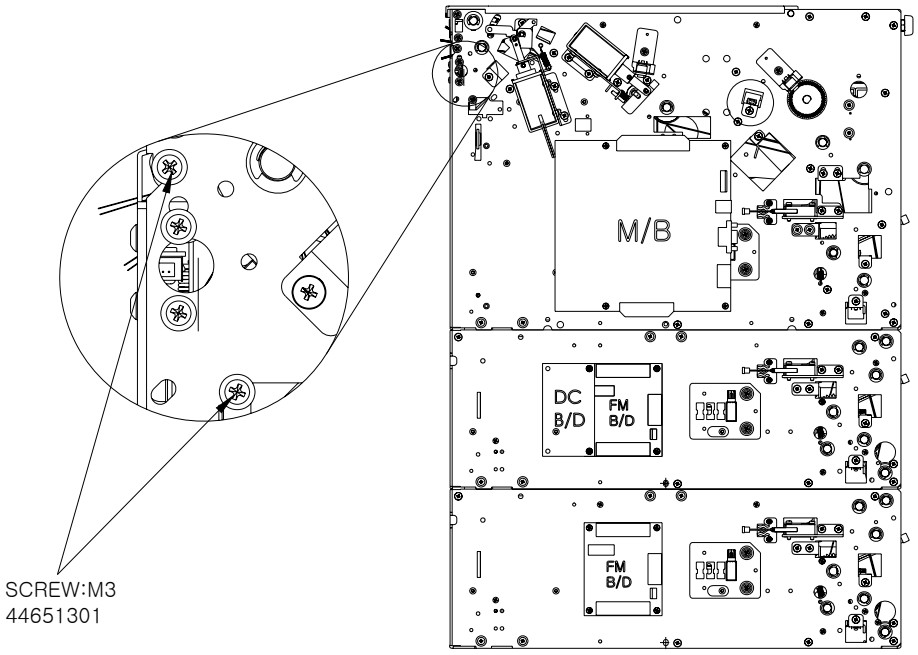
6) CS4T (A, B)

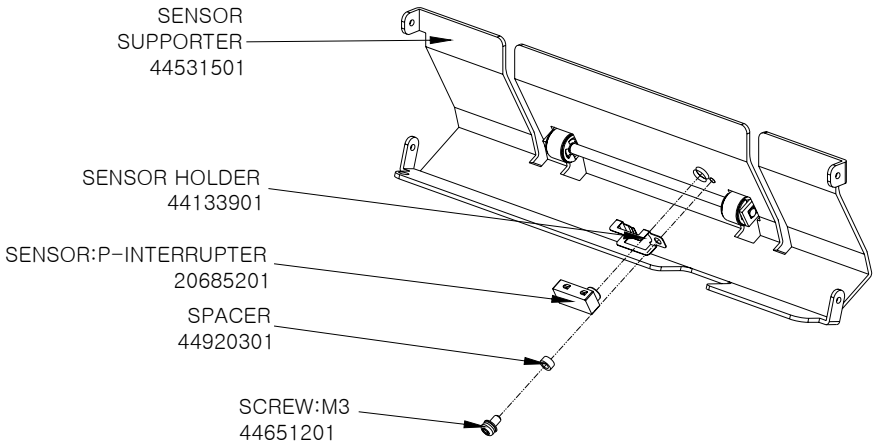
1. Remove the M3 screws (2 places) of the sensor bracket at the left and right sides.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the M3 sensor fastening screws of the sensor to replace from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1.



7) CS13D

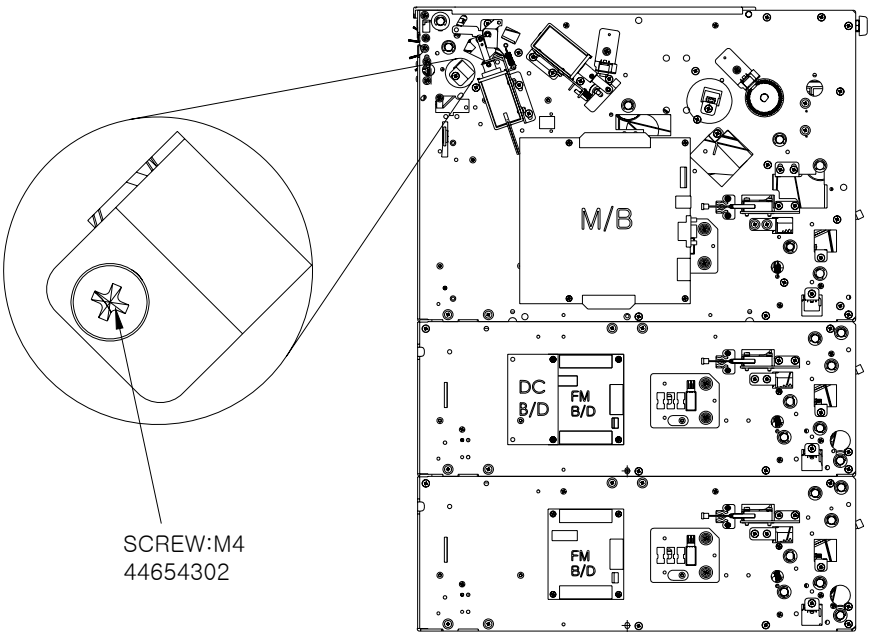
1. Remove the M3 screws (4 places) of the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the M3 sensor fastening screws to replace from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1. Make sure to fasten the spacer and the screw end is not protruding out to the other side of the bracket.

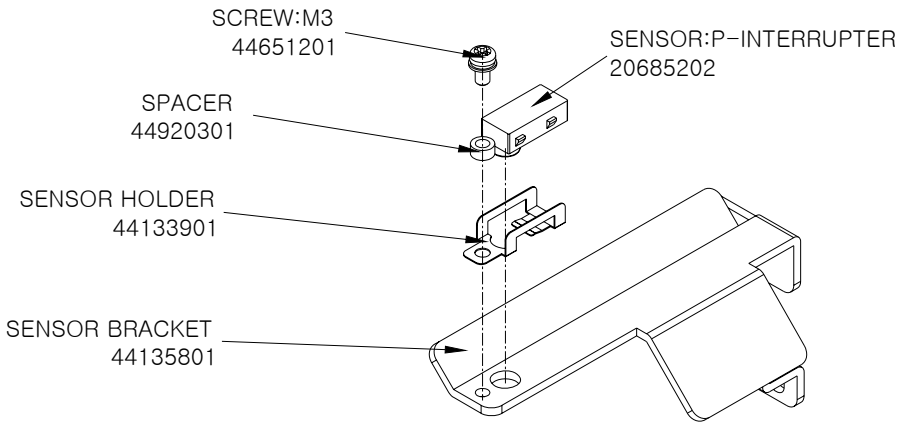




8) CS13T

1. Remove the M3 screws (1 place) of the sensor bracket.
2. Remove the connector and the cable tie to remove the sensor supporter. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the M3 sensor fastening screws from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1. Make sure to fasten the spacer and the screw end is not protruding out to the other side of the bracket.



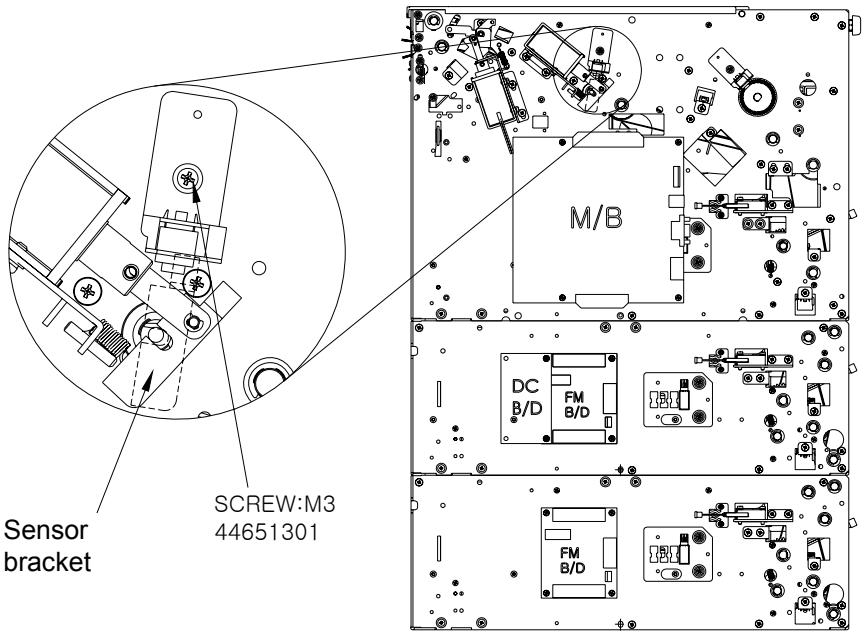


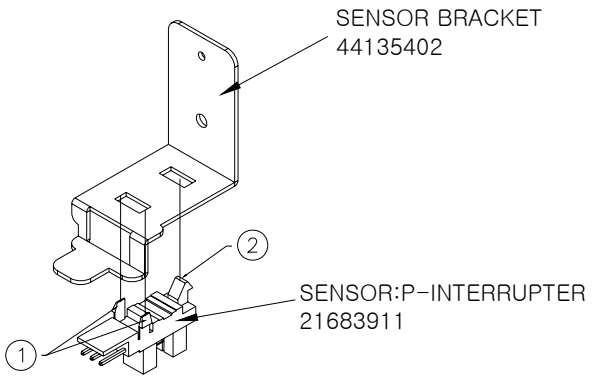
2) Gate Operation Detection Sensor & Encoder Sensor

(1) CS3

1. Remove the M3 screw of the CS3 sensor bracket (1 place).
2. Remove the connector and the cable tie to remove the sensor bracket. Be careful not to break the connector pin when removing.
3. Press the part ② of the sensor gently as shown in the figure below to remove the lock and the sensor.
4. To insert the sensor, insert the part ① first, then press part ② to lock.
5. Assemble in the reverse order - 3~1.

<Note!> When reassembling the CS3, pull the solenoid and adjust the detection bracket to the center of the sensor while the screw is still loose. Then, tighten the screw.

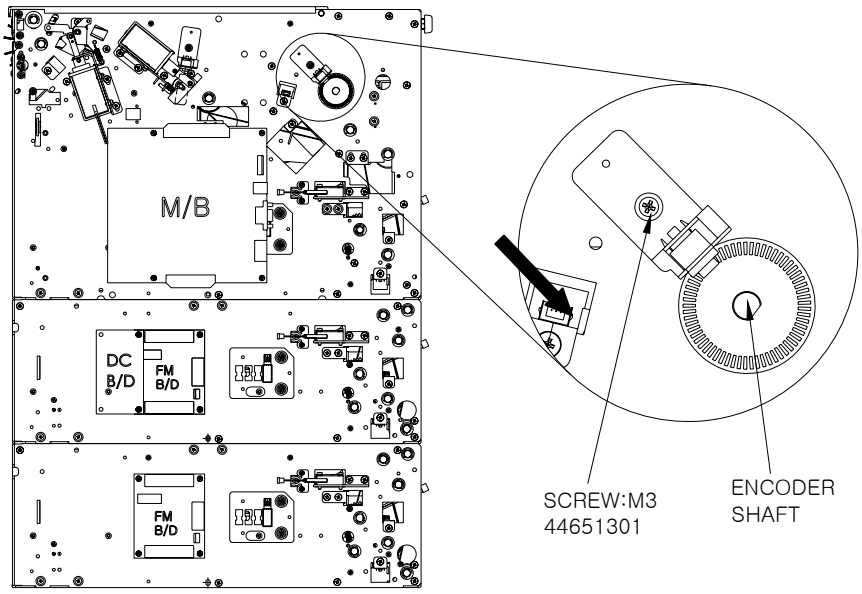


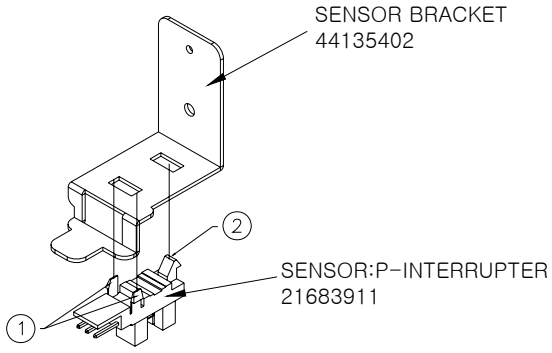


(2) CS8 (Encoder sensor)

1. Remove the M3 screw of the CS8 sensor bracket (1 place).
2. Remove the connector and the cable toe to remove the sensor bracket. Be careful not to break the connector pin when removing.
3. Press part ② of the sensor gently as shown in the figure below to remove the lock and the sensor.
4. To insert the sensor, insert the part ① first, then press part ② to lock.
5. Assemble in the reverse order - 3~1.

<Note!> Make sure that the sensor always faces towards the center of the encoder shaft as shown in the following figure.

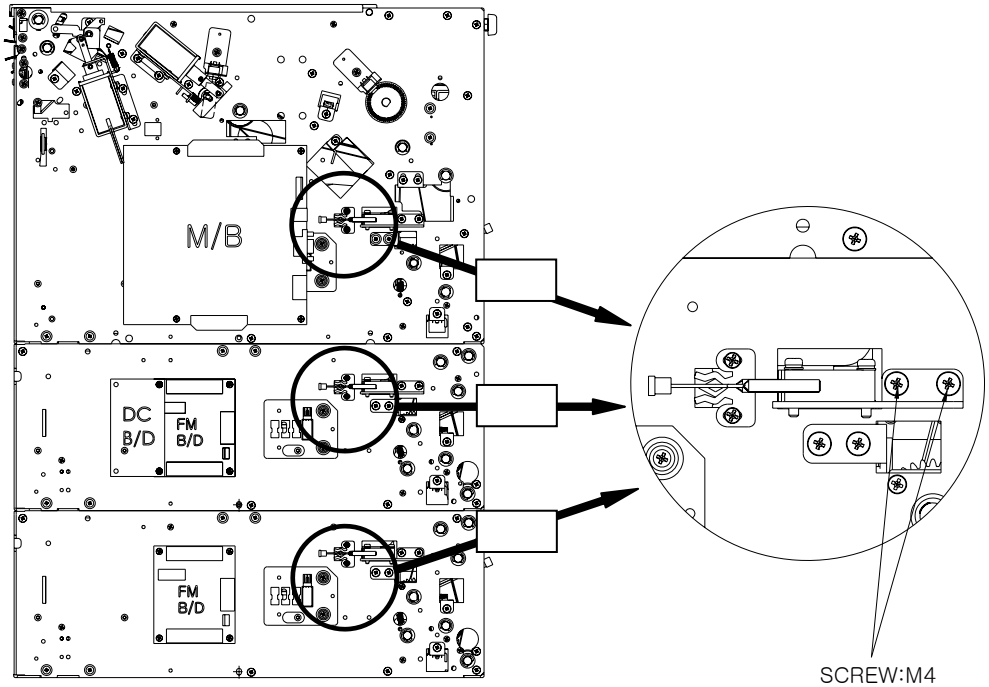


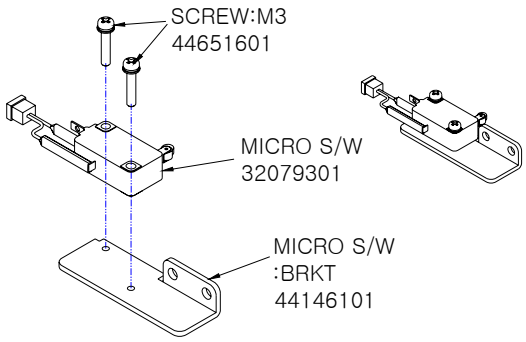


3) Regular Position Sensor

(1) CS7, CS17, CS27

1. Remove the sensor bracket M4 screws (2 places each).
2. Remove the connector and the cable tie to remove the sensor bracket. Be careful not to break the connector pin when removing.
3. Remove the sensor bracket.
4. Remove the MP3 sensor screws (2 places each) from the removed sensor bracket.
5. Replace the sensor.
6. Assemble the unit in the reverse order - 4~1.





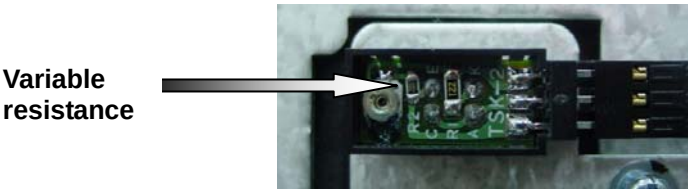
<Note!> Adjust the cassette position when mounting it until a click sound is heard.

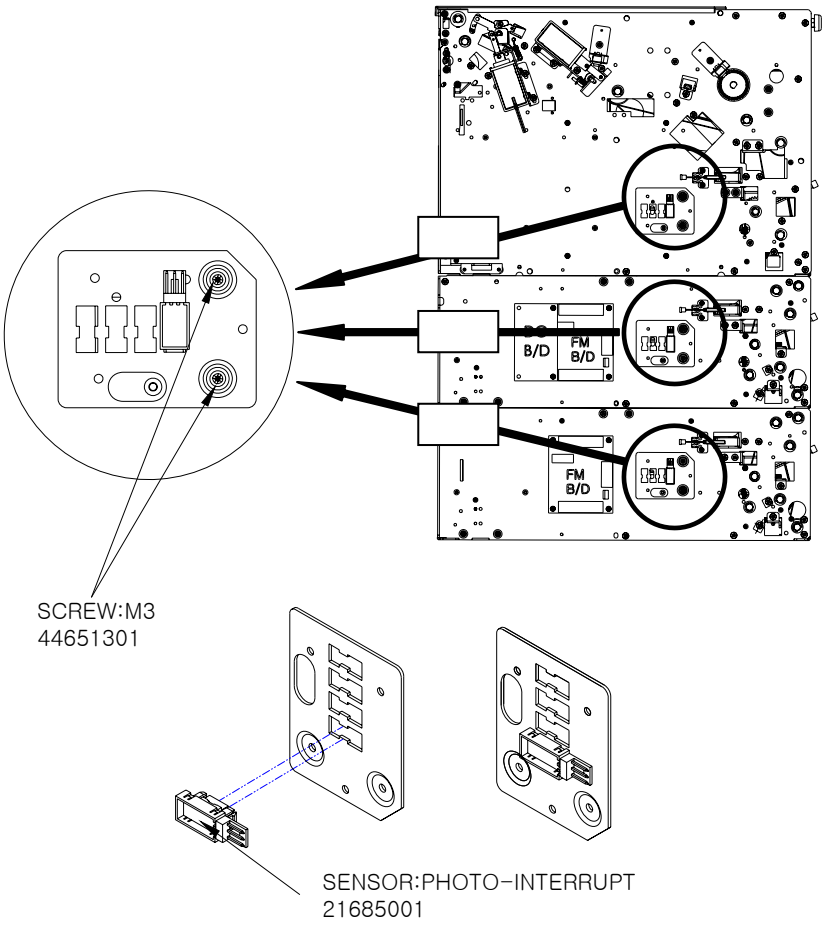
4) Remaining Note Sensor

(1) CS6, CS16, CS26

1. Remove the CS6 sensor from the main B/D to replace it. (See the main B/D replacement section)
2. Remove the sensor bracket M3 screws (2 places each).
3. Press the snap lock in the rear of the sensor bracket with your hand and, then remove the sensor
4. Remove the connector. Be careful not to break the connector pin when removing.
5. Replace the sensor.
6. Connect the connector.
7. To assemble the sensor in the bracket, lock it from the front side and press the rear side to fix it.

<Note!> Adjust the sensor by running the variable resistance so that it generates a current below 1.0V if there is cash available and above 3.0V if no cash is available.

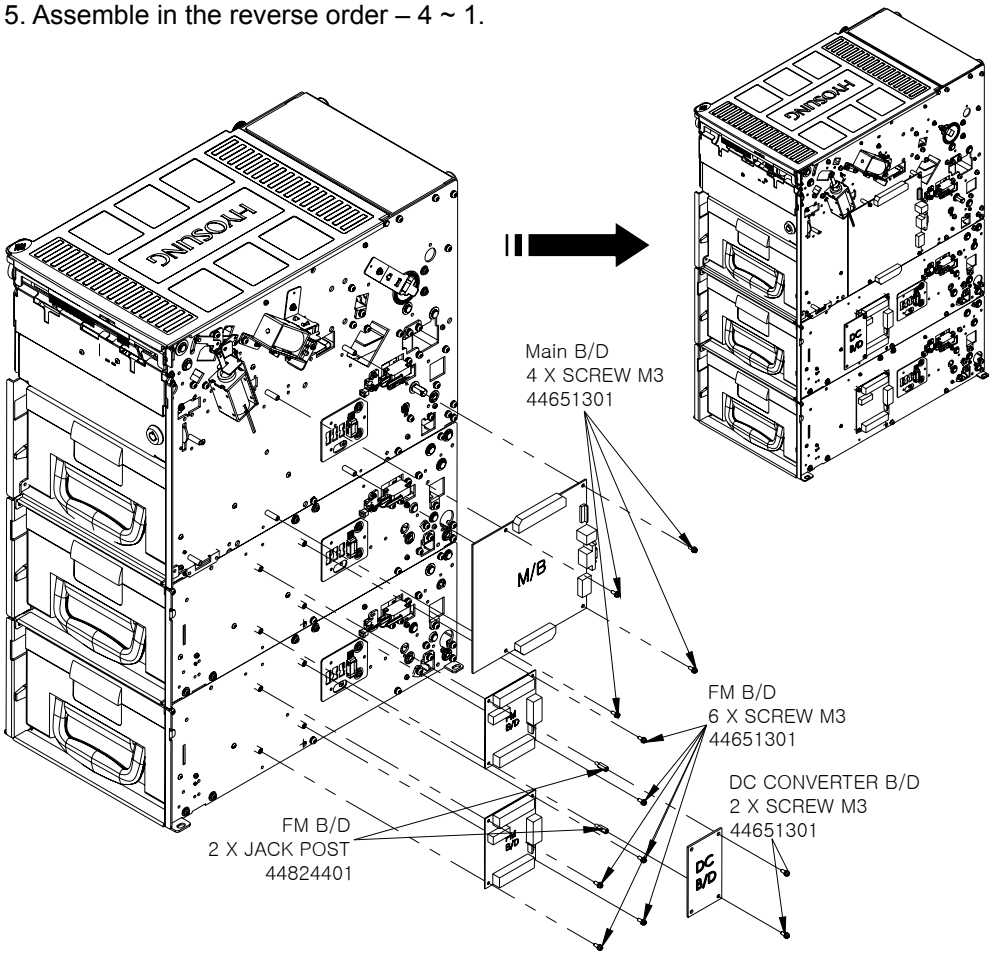




Module Replacement

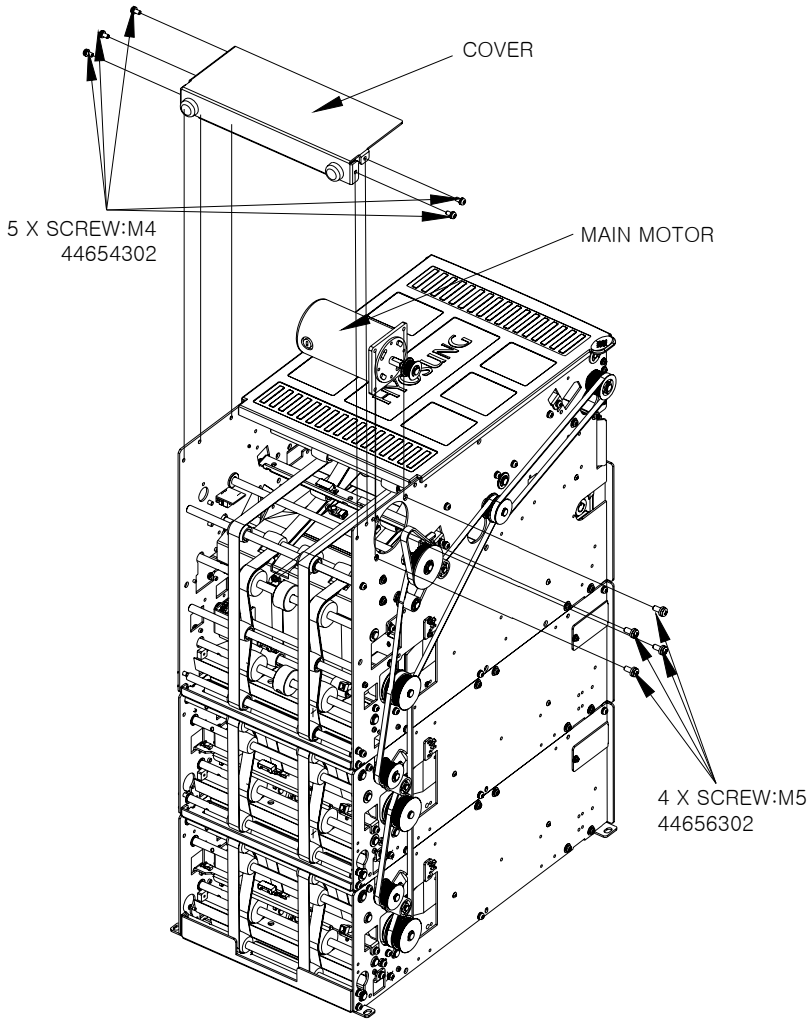
► B/D assembly

1. The board assembly is composed of the main board and the DC converter board as shown in the following figure.
2. Remove the connector from the board. Be careful not to break the connector pin.
3. Remove the board M3 screws (4 places in the main board, 8 places in the FM board (6 screws, 2 jack posts) and 2 places in the DC board).
4. Replace the board.
5. Assemble in the reverse order – 4 ~ 1.



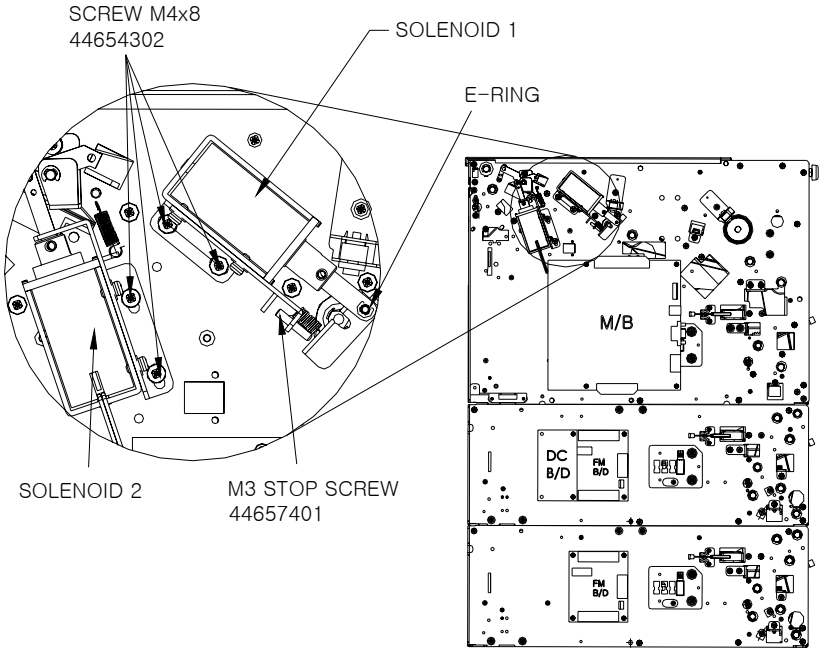
► Main Motor Assembly

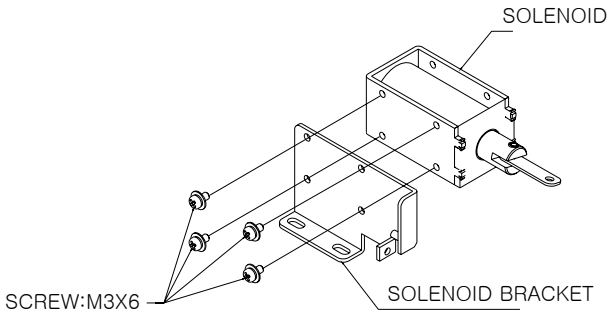
1. Remove the main motor cover as shown in the following figure.
2. Remove the power cable from the main motor.
3. Unscrew the main motor fixing screws (M5, 4 places).
4. Remove the main motor assembly and replace it.
5. Assemble in the reverse order – 4 ~ 1.



► Gate Solenoid Assembly

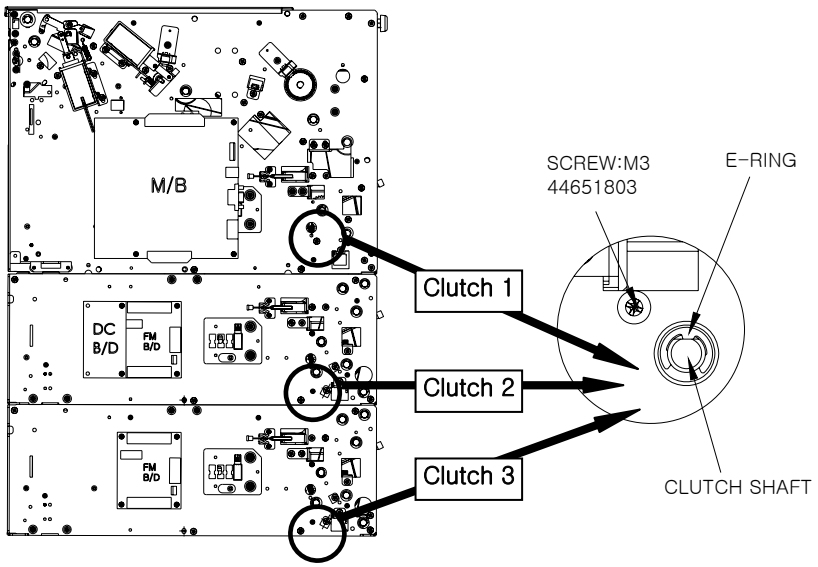
1. Remove the solenoid power cable.
2. Remove the φ 2 E-ring.
3. Unscrew the solenoid bracket screws (M4, 2 places).
4. Unscrew the solenoid fixing screws (M4, 4 places).
5. Assemble in the reverse order – 4 ~1 after replacing a solenoid assembly. Adjust the gate according to the standard.



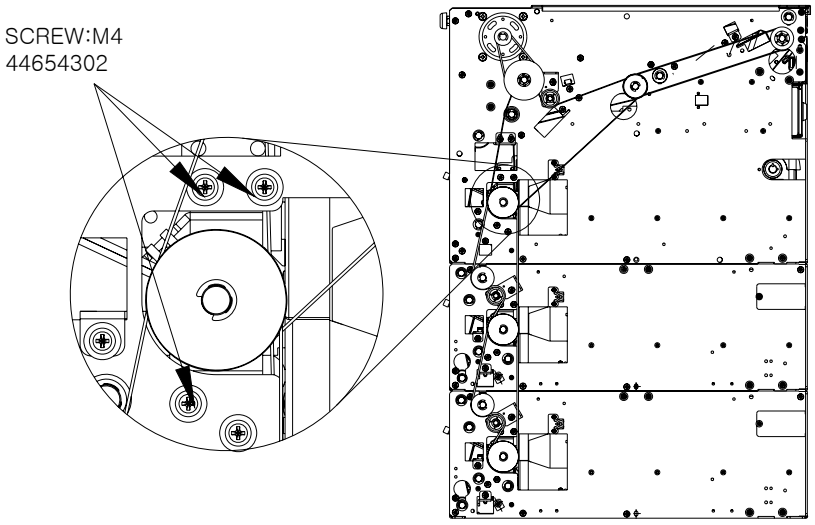


► Clutch Assembly

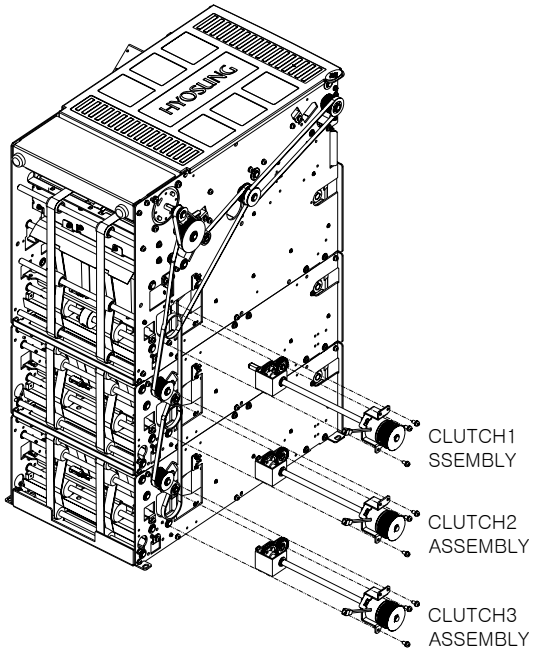
1. The clutch assembly is composed of three clutches as shown in the figure below.



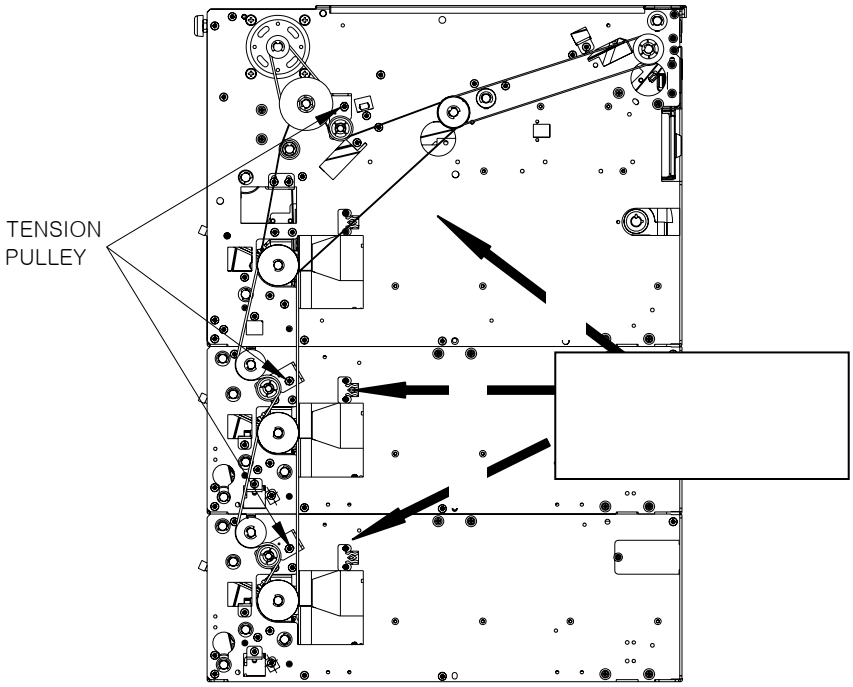
2. Remove the M4 screw (1 pace) and E-Ring to remove the clutch as shown in the above figure. Then, remove the M4 screws (3 places) as shown in the figure below.



3. Remove the clutch assembly.



4. Replace the clutch assembly and assemble in the reverse order - 4 ~ 1.



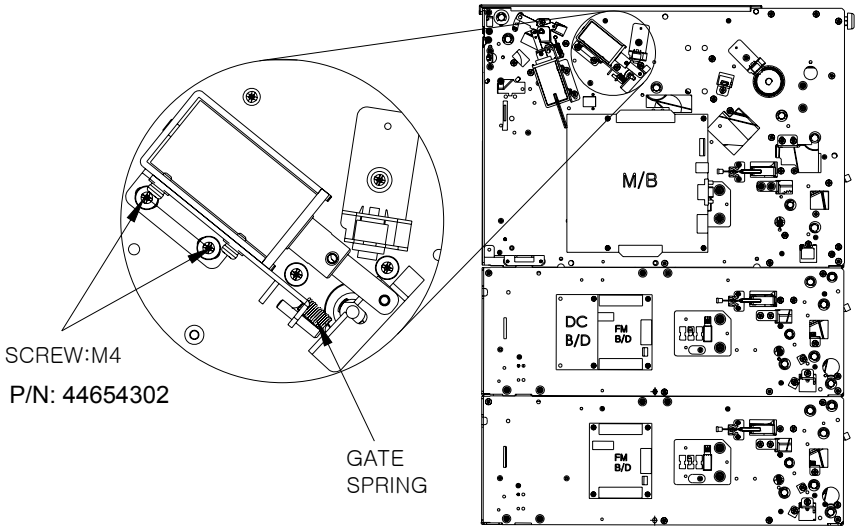
<Note!>

When replacing the clutch assembly, adjust the tension pulley so that belt tension is about 100g to the direction and about 200g ~ 300g to the direction when the timing belt is pressed by about 3mm (use the tension gauge).

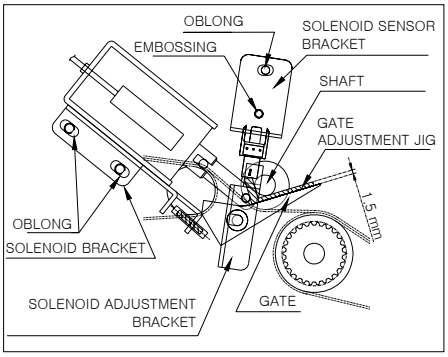
Adjustment Standard

► Gate Adjustment

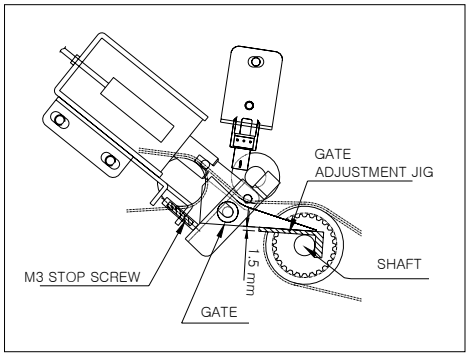
1. Loosen the solenoid M4 screw (2 places) as much as possible.



2. Adjust the solenoid position so that the gate is at least 1.5mm away from the shaft when you pull the gate as shown in the below right figure.
3. Adjust the solenoid position so that the gate is 1.5mm away from the shaft, when pulling the gate as shown in the right below figure.



When the gate is pulled



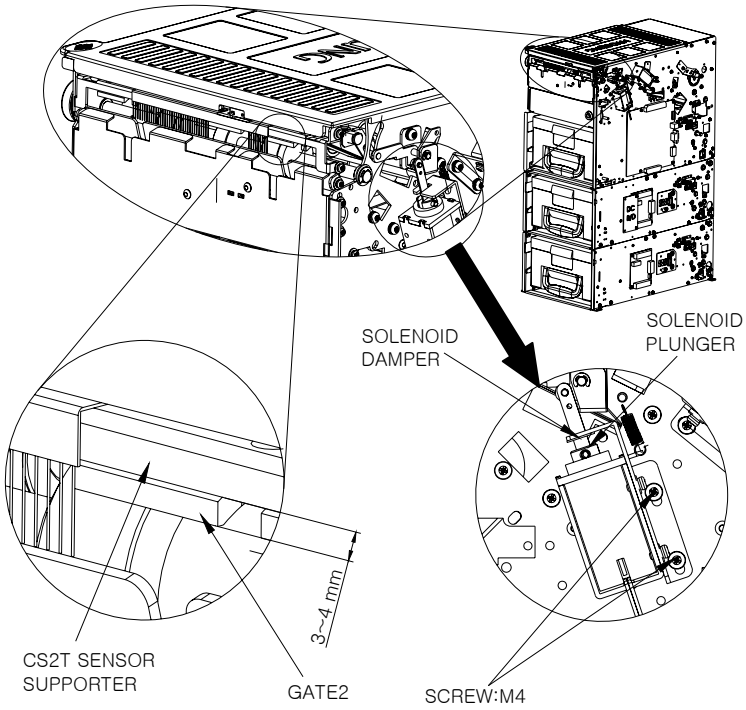
When the gate is released

4. Fix the solenoid M4 screws (2 places).

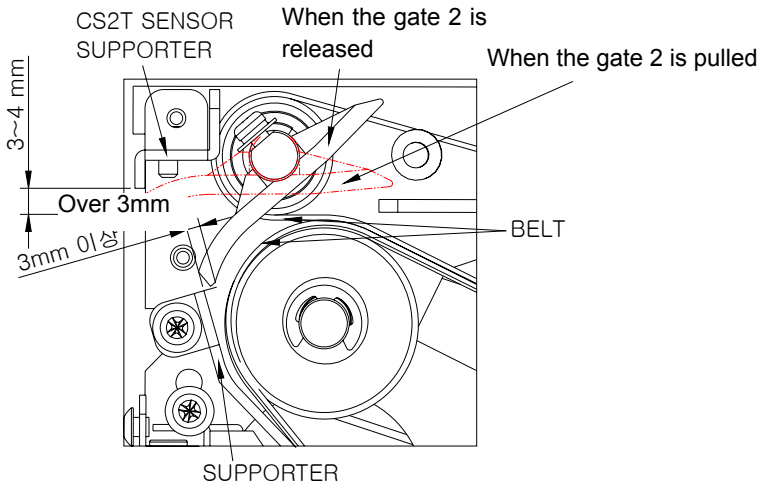
►Adjusting Gate2

1. Unscrew the solenoid bracket fixing M4 screws (2 places) by half.
2. Adjust the solenoid position so that the Gate2 is 3-4mm away from the CS3 sensor supporter when you pull the gate as shown in the figure below. Then, fasten the solenoid bracket fixing screws completely.

<Note!> Adjust distance between the supporter and Gate2 more than 3mm when the solenoid is released, as shown in the figure below.



<When Solenoid is Pulled>

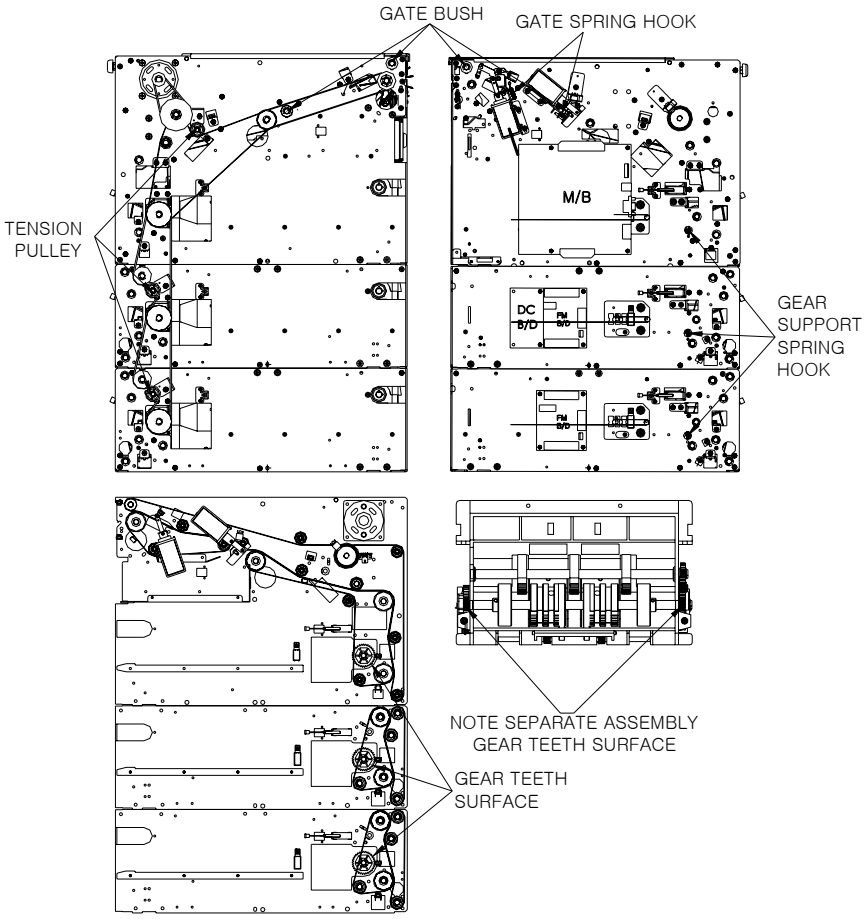


< When Solenoid is Released>

Oiling Standard

► Y1: Once a year, Warning: Be careful not to contaminate the belt with lubricant

Location	Lubricants	Interval	Remark
Tension Pulley	Mobil (1)	Y1	Lubricate the friction part between the shaft and the pulley
Gate bush	Mobil (1)	Y1	Lubricate the friction part between the bush and the gate shaft (2 places)
Gear support gear teeth surface	Albania Grease EP1	Initial Oiling	-
Gate spring hook	Albania Grease EP1	Initial Oiling	-
Gear support spring hook	Albania Grease EP1	Initial Oiling	-
Note separate assembly gear teeth surface	Albania Grease EP1	Initial Oiling	-



Cleaning Standard

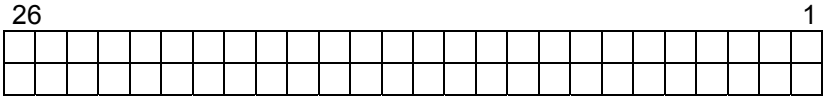
► M6: Once every 6 months, M3: Once every 3 months.

Location		Int.	Remark
CDU Main Body	CS1(A,B)D,T / CS15(A,B)D,T CS31(A,B)D,T / CS4(A,B)D,T CS2D,T / CS13D,T CS3 / CS8 CS7 / CS7 / CS17 CS6 / CS16 / CS26 Guide entrance	M6	Remove the foreign objects and dust using a soft brush
Note separate ASS'Y	Roller	M3	Remove the foreign objects and dust using a soft brush

Setting Specifications

► Dip S/W Specifications

1. CN7 (Refer to the cable connection diagram)

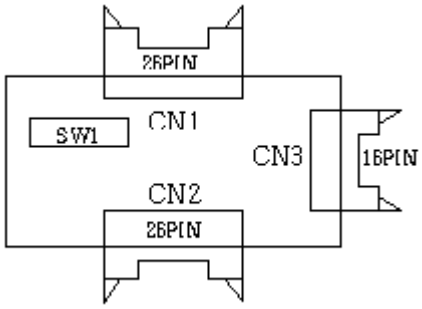


S1	Setting	Comments
#1, #2, #12	Short	Forced EP Download, Test mode
#1, #2	Short	Test mode
#1~#26	Open	AP mode

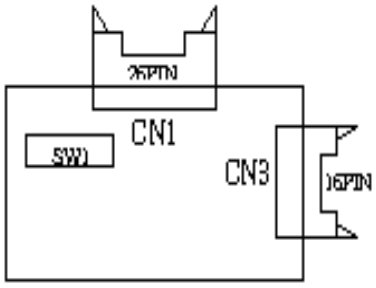
2. CN7 Default setting
   #1~#26 Open

3. FM B/D DIP S/W Specifications

FM B/D	DIP S/W	Remark
2 CASSETTE	#1, #6, #7 : ON	Default
3 CASSETTE	#2, #4, #6 : ON	Default



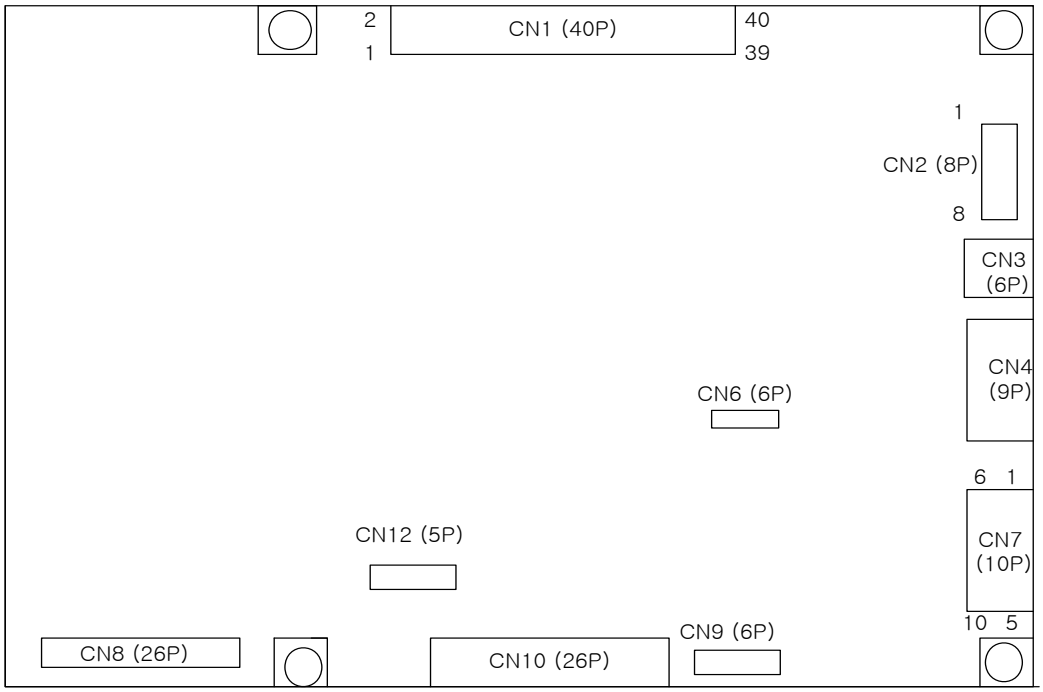
(Mounting 2 Cassettes)



(Mounting 3 Cassettes)

Cable Connection Diagram

► Main Board



Seq	Connector Name	No. of Pins	Use
1	CN1	40	Sensor Unit
2	CN2	8	Motor, Clutch, Solenoid
3	CN3	6	Additional Sensor Unit
4	CN4	9	RS-232C Comm.
5	CN6	6	PLD Download
6	CN7	10	POWER (VCC, +12V, +24V, GND)
7	CN8	26	DIP S/W signal
8	CN9	6	DC/DC Power Unit
9	CN10	26	FM B/D Connection Unit
10	CN12	5	2 Sheet I/F

NAUTILUS HYOSUNG

Chapter 7
Receipt Printer

Contents

Overview

General Precautions

► General Precautions

1. This manual is written on the premise that an expert performs maintenance, who knows the principle of operation, disassembling/assembling method and the standard of lubricant very well.
2. When performing the regular inspection or regular replacement, be sure to understand the order well and perform what you can do in a short time.
3. Be sure to find the broken area exactly and perform disassembling minimally during repairing. If the faults occur at several places or it may effect on the other places, you should understand the operation principle of the machine, decide the order of repair in advance and perform skillfully.
4. If removing the screws during adjustment, be sure to check the appointed fastening torque once again before terminating the adjustment.
5. Perform the lubrication according to the standard and avoid lubricating undesignated place or lubricating excessively. Be sure to mop the oil flowed by the over-lubrication.
6. If the lubricating oil is enough or there isn't discoloration by the dust, reduce the lubrication.
7. The item is included in the lubrication standard even if it isn't included in the items of the regular inspection and you judge that the lubrication is necessary, lubricate it.
8. If the lubrication or adjustment is necessary during ECO, perform them.
9. Be careful not to stain the sensor, micro switch, PCB connector and so on with the oil.
10. Be careful for the assembling location not to touch the moving part when installing machine or replacing. (Refer to the assembly diagram and adjustment standard.)
11. Do not operation or function test under the strong light to avoid the malfunction of sensor or abnormal operation of machine.

Preventive Maintenance

Regular Inspection & Cycle

► Symbol of Regular Inspection Cycle

Symbol	Description
M6	Once per six months
Y1	Once a year (including the item of M6)

► Regular Maintenance (Regular Replacement) Parts & Cycle

Regular Maintenance (Regular Replacement) Parts	Part Number	Replacement Cycle	Remarks
TPH Ass'y (TPH included)	5677000018	Y5	70Km (43.5mile)

<Note!>

1. Decide the maintenance & replacement cycle by adding the maintenance & replacement cycle of above table to the production date marked on the label.
2. For the part without label, make it a rule to perform maintenance or replacement based on the maintenance & replacement cycle of above table.

Regular Inspection Item & Cycle

► Regular Inspection Item & Cycle

Regular Inspection Item	Cleaning	Checking	Adjustment	Lubrication	Inspection Cycle
Sensor Inspection, Cleaning		O	O		M6
Transport Path Cleaning	O	O			M6
Outlet Motor Gear Inspection & Lubrication		O		O	M6
TPH & Platen Cleaning	O	O			M6

Cleaning

► Cleaning Transport Path

1. Turn power off.
2. Clean the parts (Roller, Cutter and so on) on the transport path by moving fine brush for cleaning back and forth several times.
3. Be careful not to occur static electricity on the printing side of TPH and not to touch with hand.

► Cleaning TPH & Platen

1. Turn power off and open the Platen Open Lever (Green).
2. Clean the Heat Element and Platen using cotton with ethanol, methanol and IPA.
3. After the alcohol ingredient completely goes away, place the Platen to its position.

► Precaution

1. Precaution during moving receipt printer
   - Move the receipt printer supporting it from below with both hands.
   - Do not hold the outlet of the printer during moving.
2. Posture during maintenance
   - If the receipt printer needs to be disassembled, be sure to put it on the flat surface without the salience after disassembling. Also, there aren't swing or interference of other object.
   - Do not lean or overturn the receipt printer.

Lubrication

General Oiling Criteria

► General Oiling Criteria

Lubricate the parts indicated on the drawing. Use the lubricant type and amount according to the oiling criteria.

► Oil amount symbol

1. OF: Dip the writing brush type 2 in the oil and squeeze it so that no oil drips from the brush. Then, lubricate the object surface with as little oil as possible.
2. O: Dip the writing brush type 2 and apply it all over the target thinly.
3. O1: Lubricate with one drop of oil (Oil amount: 15mg)
4. G: Apply the grease thinly using under the writing brush type #10. (Remove unnecessary oil lump)

<Note!>

a. Oil amount of 15mg corresponds to the amount that is applied in a drop with an oil feeder attached with a tube with 0.8~1.2mm diameter and 30mm.

b. 0.1g of Grease corresponds to the amount that is squeezed 1.2mm with the grease gun having the 7mm feeder entry.

► Type of lubricants

1. Grease(G1): Shell Albania Grease EP1
2. Tellus: Shell Tellus #100

Oiling Criteria

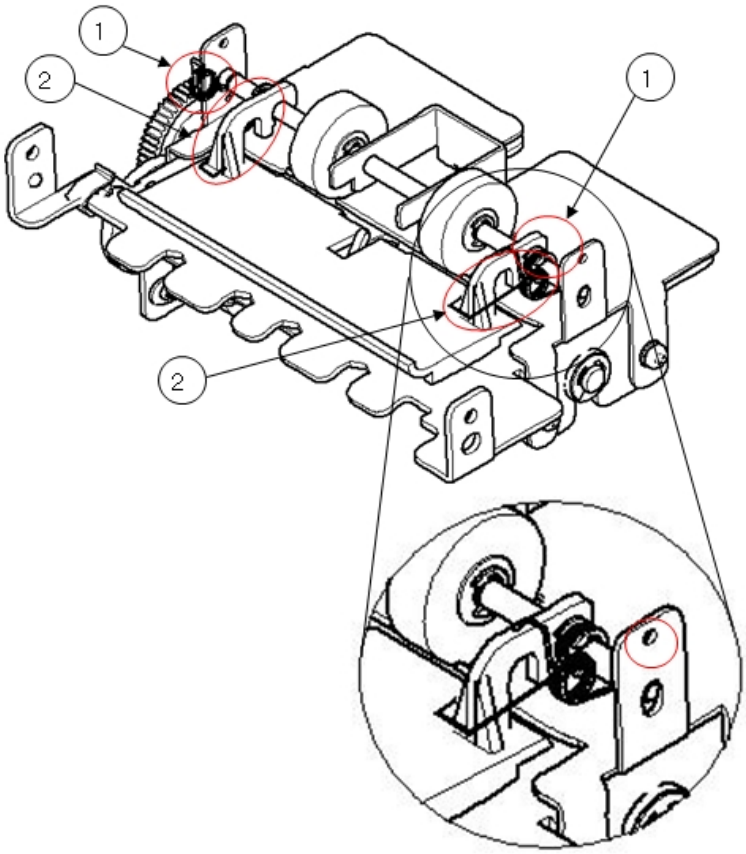
► Initial Lubricant: Initial Lubricant Only
6M: Once every six months
1Y: Once a year

1. Oiling rules
- Check the lubrication before starting or storing printers or MSCRW. If any part is insufficiently lubricated, lubricate it according to the oiling criteria.
- Lubricate the part only when it is necessary during field regular inspection. If lubrication is sufficient, no additional oiling is required. If the oil is dirty, remove it and lubricate again.
- Make sure to lubricate all pivot points and friction parts.
-Lubricating parts: All equipment operation parts excluding printing head, package, micro switch contact point, drive roller, timing pulley and timing belt.
-As a general rule, apply oil by dropping the oil onto the part. If the edge of oil feeder has to touch the surface of the object, do not have the oil feeder touch the part for more than a second.

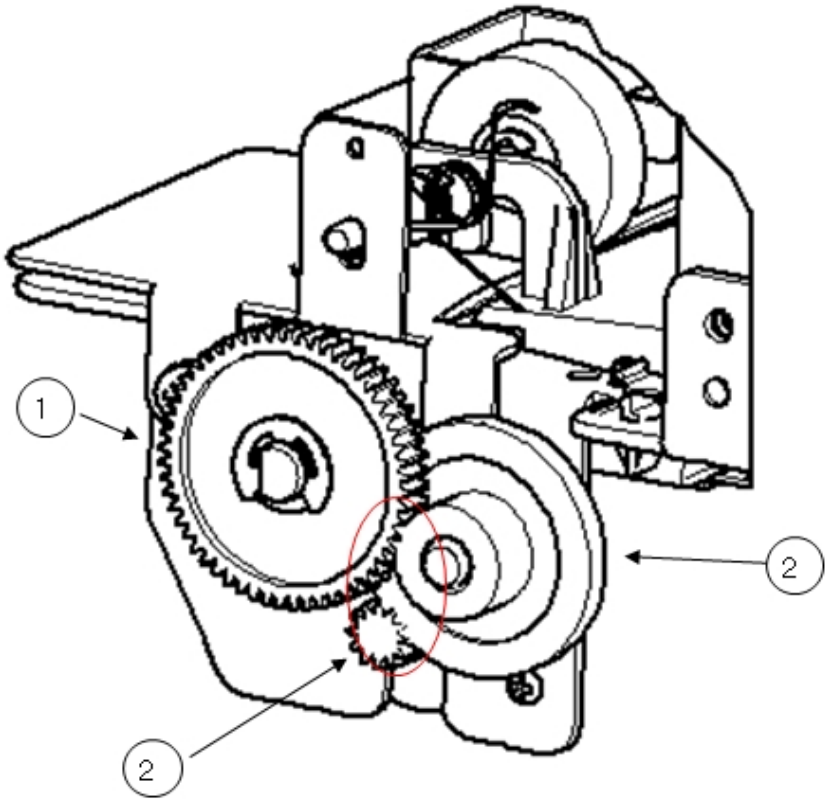
2. Warnings
-Do not apply oil if it oozes out from the designated place. Do not over-lubricate since it can contaminate other parts, or flow into other parts or splash.
-Be sure that lubricant does not contaminate micro switch, sensor, timing pulley, timing belt, package, printing head.
-Do not scrub the plastic parts or protection parts with alcoholic substance or other solvent.
-Use a piece of soft and dry cloth when removing dust, oil or grease, or cleaning the part or the assembly parts.
-Be careful that the paper contact side in the paper return path is not wet with oil.

Oiling Criteria for each module

► Spring Hook



►Gear



Part Replacement

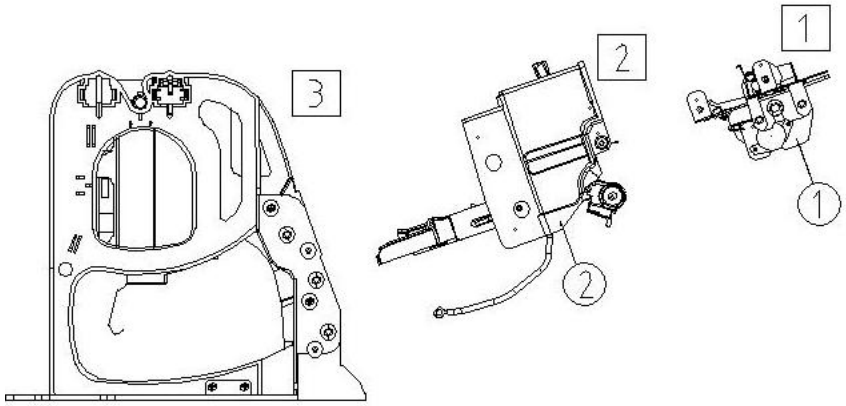
List of Replacement Part

► The table below shows the list of replacement part

Replacement Part	Part Number	Remarks
AM_TPH82	5677000018	
SENSOR:P-INTERRUPTER:SG-405CD:CM-SHU	21685601	2 places
SPRING:SUPPORT_UPPER_GUIDE	43252801	2 places
SPRING:ROLLER	44949002	2 places
GUIDE:SPR_UPPER	45424101	
MOTOR:20P020S0-08002	5640000172	
PCBA:K-SPR1VE_SERIAL	7680000009	

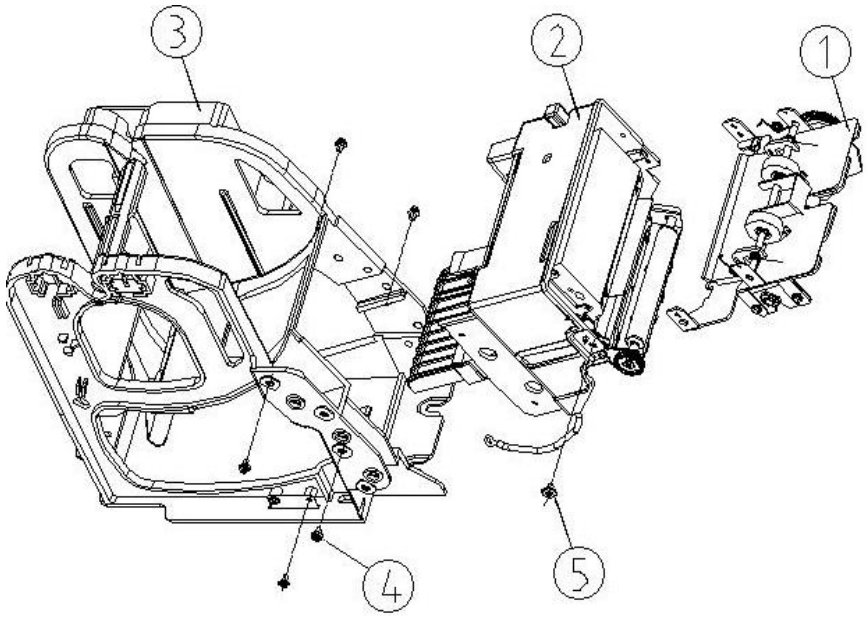
How to disassemble receipt printer to three sections

► To replace the part, disassemble the receipt printer to three sections as the picture below,



①	ASSY:OUTLET
②	ASSY:TPH_SUPPORT
③	ASSY:MAIN_FRAME

► How to disassemble,

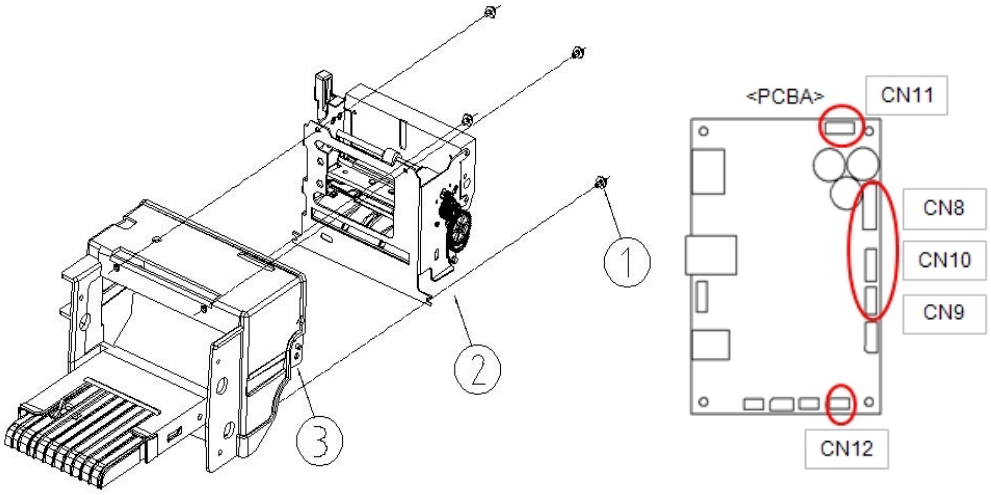


④	SCR:PH_M3X10 x3ea
⑤	SCR:M3X6 (S)

1. Remove the screw (④) and disassemble ASSY:TPH_SUPPORT (②) from ASSY:MAIN_FRAME (③)
2. Remove the screw (⑤). Then disassemble ASSY:OUTLET (①) and ASSY:TPH_SUPPORT (②)

How to disassemble TPH

► Disassembling TPH

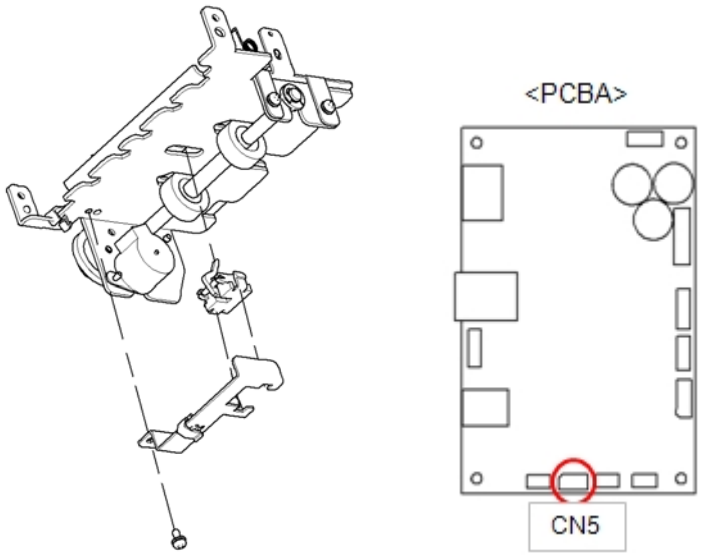


①	SCR:PH_M3x8 x4ea
②	TPH:AM_ATP82_SPR(5677000018)
③	ASSY:TPH_OUTLET

1. Remove the screws (①, SCR: PH_M3x8 x4ea) and disassemble TPH.

How to disassemble Jam Sensor (MS3)

► Disassembling TPH

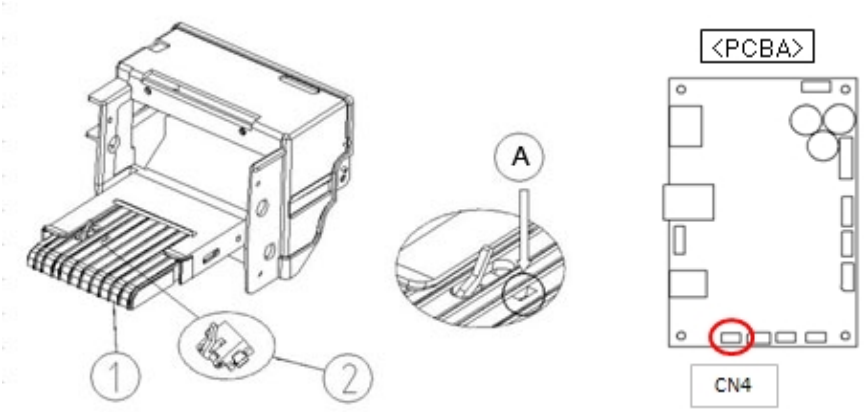


①	SENSOR:P-INTERRUPTER (21685601)
②	BRACKET:JAM_SENSOR
③	SCR:PH_M3X6

1. Remove the screw (③) and disassemble BRACKET:JAM_SENSOR (②)

How to disassemble END Detection Sensor (MS1)

► Disassembling END Detection Sensor (MS1)

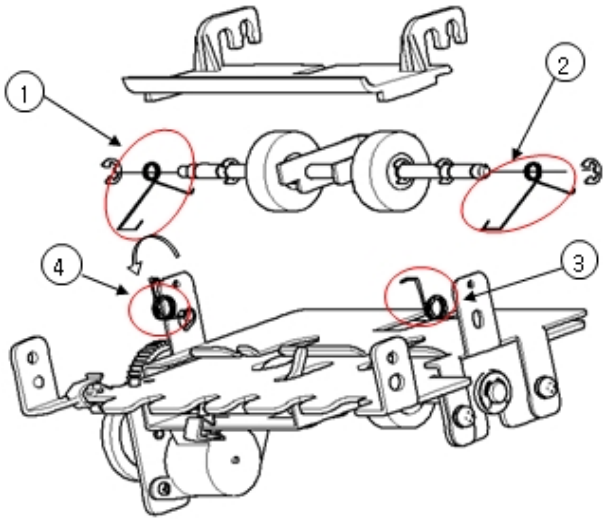


①	GUIDE_LOWER
②	END_SENSOR:SPR26(3200002774)

1. Disassemble the sensor using “-“ driver (Hole of A).
2. Disconnect the connector from PCBA of Main_Frame.

How to disassemble Spring

► Disassembling Spring

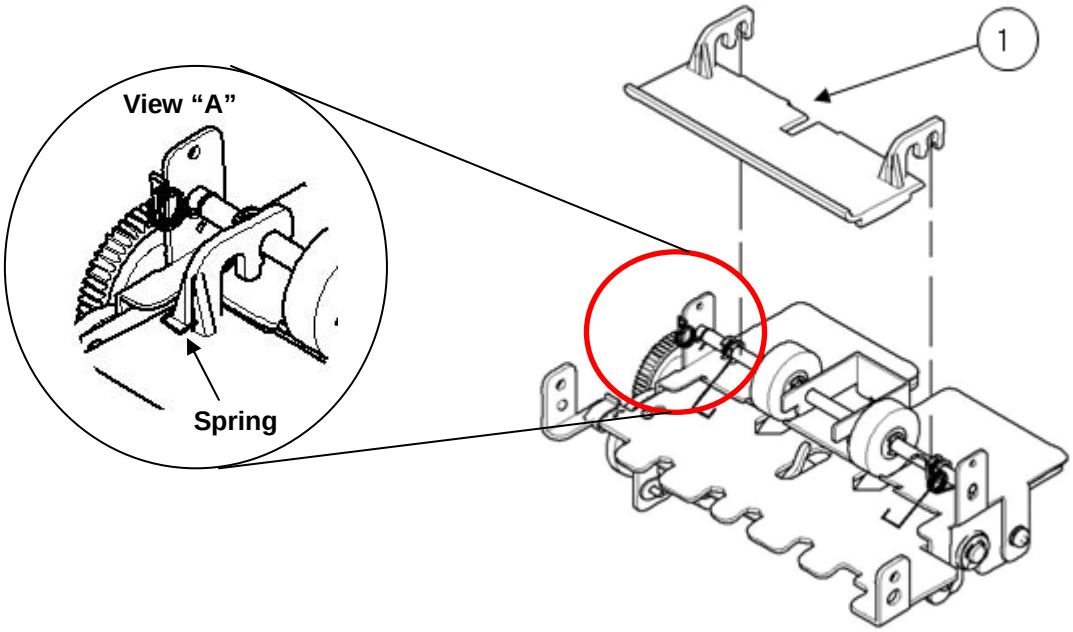


①	SPRING:ROLLER_LEFT(44949001)
②	SPRING:ROLLER_RIGHT(44949002)
③	SPRING:SUPPORT_UPPER_GUIDE_RIGHT (43252801)
④	SPRING:SUPPORT_UPPER_GUIDE_LEFT (43252802)

1. Disassemble the springs (4ea) from ASSY:OUTLET.
2. After replacing spring, be sure to lubricate.

How to disassemble Guide

► Disassembling Guide

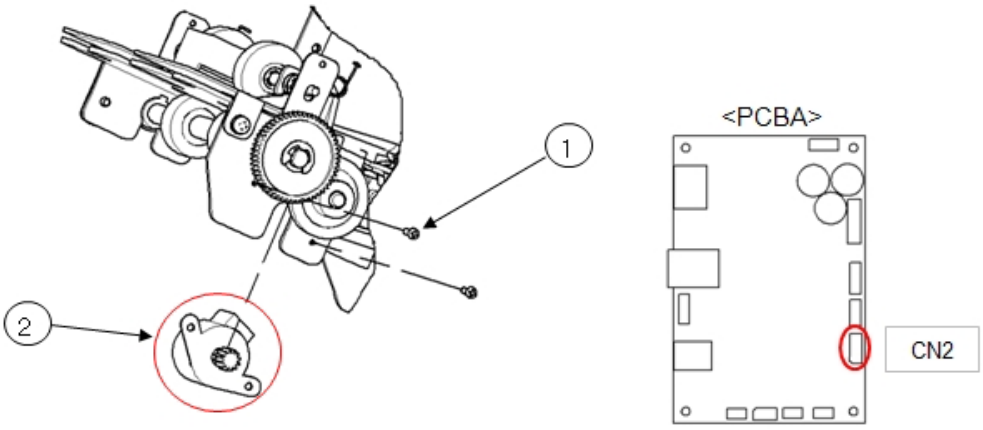


①	GUIDE:SPR_UPPER(45424101)

1. Lift up the spring and disassemble the guide. (Refer to View “A”)

How to disassemble Motor

► Disassembling Motor

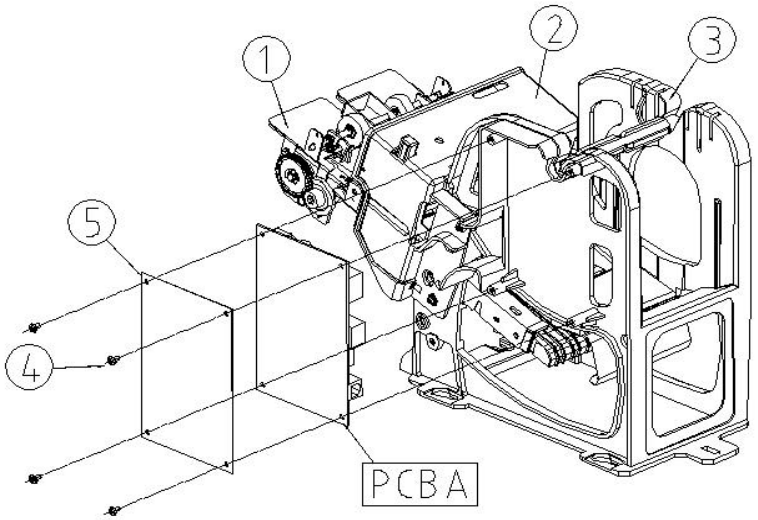


①	SCR:PH_M2X6 x2ea
②	STEP_MOTOR:20P020S0-08002 (5640000172)

1. Remove the screws (2ea, ①) and disassemble the motor (②).

How to disassemble PCBA

► Disassembling PCBA



①②	ASSY:OUTLET, TPH
③	ASSY:MAIN_FRAME
④	SCR:M3X6 TAP x 4ea
⑤	COVER:PCBA

1. Unfasten the screw (④) and disassemble PCBA (⑤) from ASSY:MAIN_FRAME (③)

Index

Memo