CR

SERIES

TECHNICAL MANUAL

VERSION 1.0
December, 1998

RISO INTERNATIONAL GROUP

RISO KAGAKU CORPORATION (JAPAN)
RISO, INC. (U.S.A.)
RISO EUROPE LIMITED (U.K.)
RISO HONG KONG (HONG KONG)
RISO UK (U. K.)
RISO THAILAND LIMITED (THAILAND)
RISO DEUTSCHLAND GMBH (GERMANY)
RISO FRANCE (FRANCE)
RISO IBERICA (SPAIN)
RISO CANADA (CANADA)
RISO CHINA (HONG KONG)
RISO AFRICA (SOUTH AFRICA)

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CHAPTER 1: MAINTENANCE

CONTENTS

1. PREFACE

This manual provides Technical Service Information for the RISOGRAPH **CR Series** duplicators.
This manual is published as a reference guide for use by RISO Group (RISO Kagaku Corp./RISO,INC./RISO EUROPE Ltd.) Certified Technical Representatives experienced in duplicator repair and service.

This manual also provides procedures for removing and installing major components. Following these procedures will minimize machine malfunctions. This information and format will also increase technical representatives' awareness and experience regarding repairs necessary to insure end-user satisfaction.

If assistance is required, please contact one of the following:

[RISO Kagaku Corp.]

Overseas Technical Section, Technical Support Department
2-5-1, Akanehama, Narashino-shi, Chiba 275, JAPAN
TEL: (0474)52-4111 FAX: (0474)52-3106

[RISO EUROPE LTD.]

Solar House, 305 Ballards Lane, North Finchley, London N12 8NP, United Kingdom
TEL: (0181)446-1188 FAX: (0181)446-9547

[RISO, INC.]

~~NOTE~~ : Before attempting to correct machine malfunctions, study the Technical Manual and make sure all questions and/or concerns have been satisfied. If necessary, please use the Technical Hotline:

TECHNICAL HOTLINE

800-578-7476
(Emergency Technical Assistance Only!!!)

REFERENCE	ADDRESSES	FOR
A	RISO, INC. Tech. Support Center 310 Andover Street Danvers, MA 01923	Technical Support Operations Correspondence and Technical Training
B	RISO,INC. REPAIR DEPT. 310 Andover Street Danvers, MA 01923	Repairs and Warranty Claims

CAUTION

[Handling of Lithium Battery]

- **Never fail to follow the following instructions when you discard the used lithium battery.**

1. Never let the battery short-circuited.

If the (+) and (-) terminals contact each other or metal materials, the battery will be short-circuited. If the batteries are collected and stored inorderly or one upon another, the above-mentioned case will occur.

- DANGER -

If the battery is short-circuited, it will heat up and may in some cases explode into fire.

2. Never heat up the battery.

- DANGER -

If you heat the battery up to more than 100¡C or put it into the fire, it may burn dangerously or explode.

3. Never disassemble the battery or press it into deformation.

- DANGER -

If you disassemble the battery, the gas pouring out of the inside may hurt your throat or the negative lithium may heat up into fire.

If the battery is pressed into deformation, the liquid inside may leak out of the sealed part or the battery may be short-circuited inside an explode.

4. Never fail to keep the battery out of reach of children.

If you put the battery within reach of children, they may swallow it down. Should they swallow the battery, immediately consult the doctor.

[Replacement of the Lithium Battery]

1. The lithium battery must be replaced by a trained and authorized service technician.
2. The battery must be replaced only with the same or equivalent type recommended by the manufacturer.
3. Discard used batteries according to the manufacturerÕs instructions.

!! WARNING !!

Important Safety Precautions

1. Always disconnect electrical supply before placing hands in the machine.

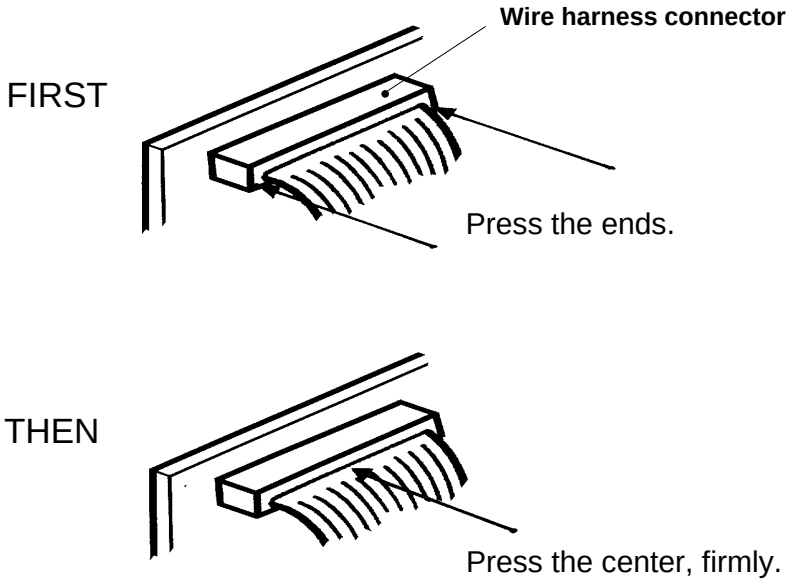
I. To avoid injuries:
Be sure to disconnect the electrical power before disassembling, assembling, or when making adjustments on the machine.

II. Protection of the machine:
Make sure to turn OFF the power to the machine before plugging or unplugging the electrical connectors, or when connecting a Meter.

2. Always connect electrical connectors firmly.

I. To avoid electrical failure:
The connectors must be connected firmly together and onto the PCBs.
Press on the ends of the connectors and then the center to ensure a firm fit.

II. Protection of the electrical components:
The electrical components may be damaged due to short circuits caused by a loose connector.



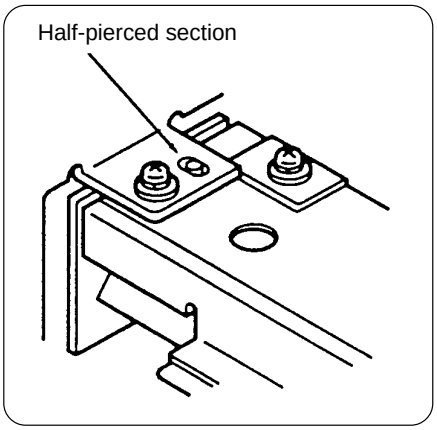
2. Work Precautions

Inspection

If inspection finds a defective or problem part, correct it. Replace parts as necessary.

Removal

(1) Carry out work according to the procedures in the technical manual.
(2) Arrange the removed parts carefully and in order.
(3) Distinguish parts to be replaced and those to be reused.
(4) When replacing screws and the like, use the specified size.

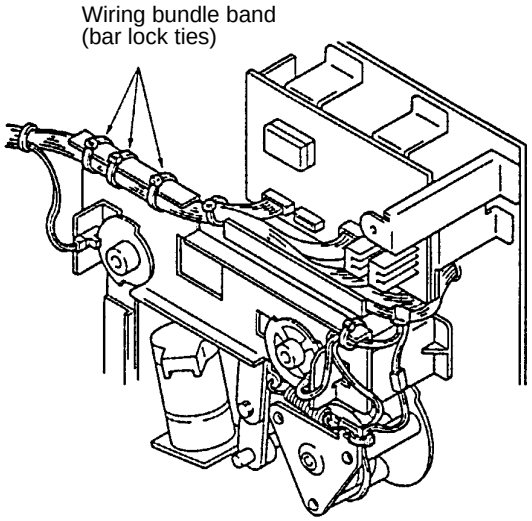


Assembly and installation

Unless otherwise specified, assembly and installation follow the reverse order of removal. When there is a protruding section and a hole for positioning a part, align them correctly before fastening.
(Part positioning protruding section and hole is referred as "half-pierced section" in the manual.)

Electrical system work

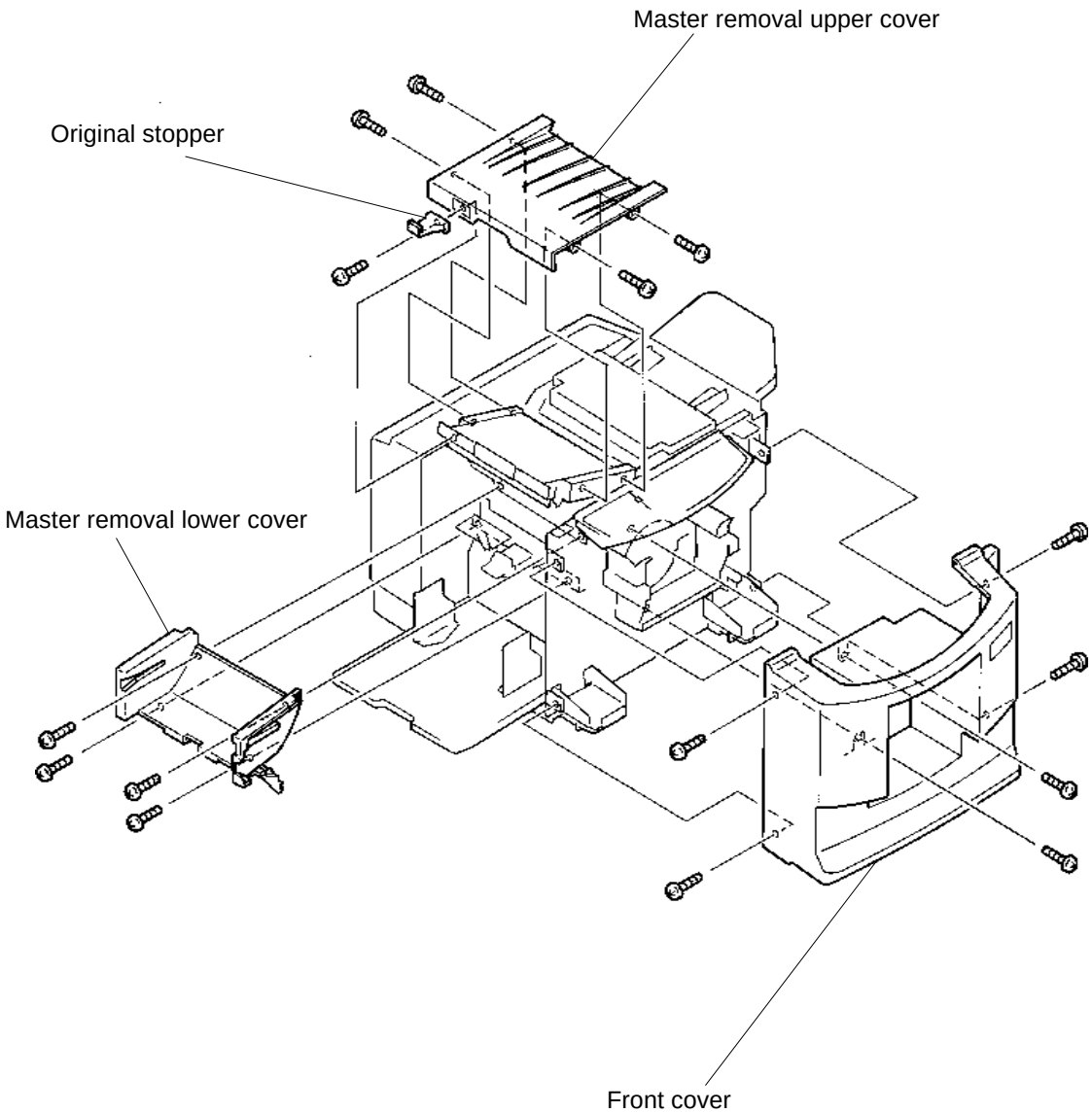
> After removing wiring bundles, fasten them with bands (bar lock ties) so that they do not sag.
> When installing parts, be careful to avoid pinching and damaging wiring bundles.
> If a fuse blows, always replace it with one of the specified capacity.
> Using a larger fuse can not only damage parts, but also cause fires.
> Image scanner, thermal heads, and sensors are extremely vulnerable to shock, so do not drop them.
> Always disconnect the power before plugging or unplugging sensor connectors.



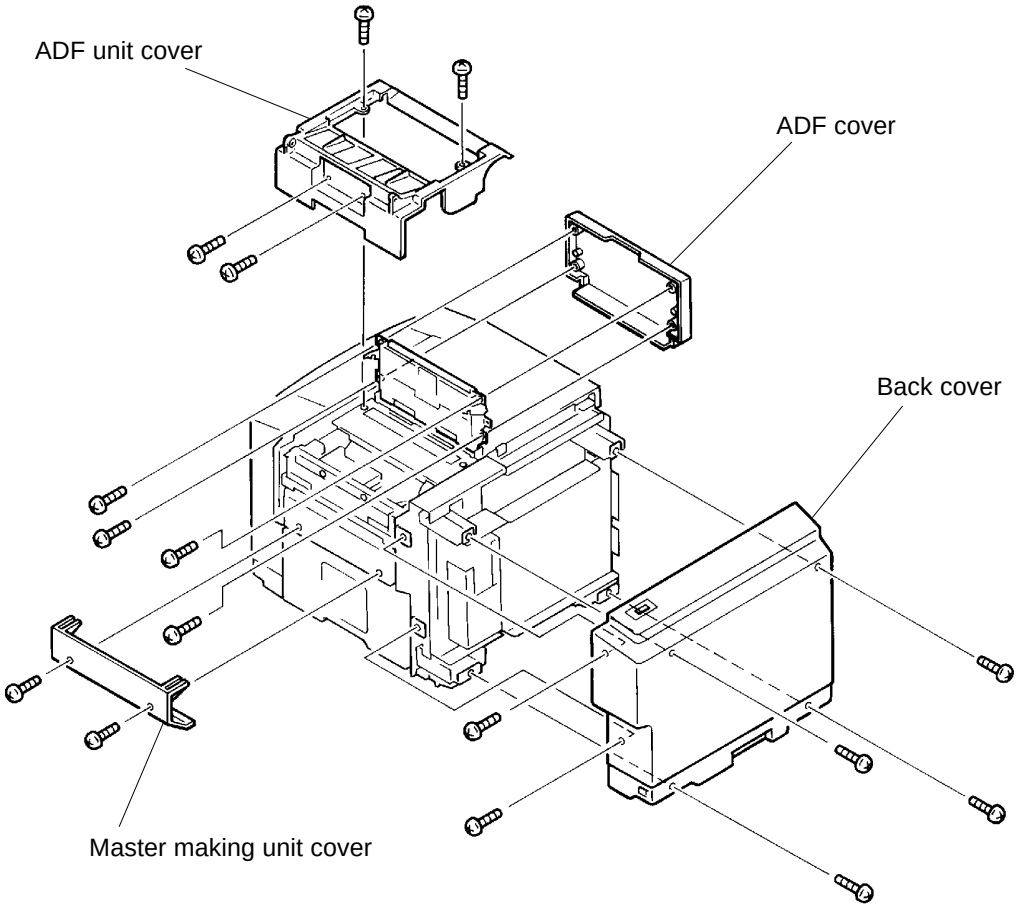
3. Exterior Cover Removal

Disconnect the power supply from the machine and remove the cover.

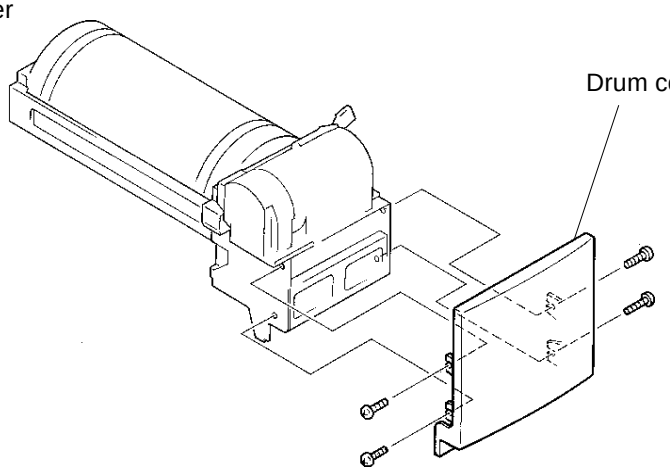
> Front cover: ..... Remove the Drum first.
> Master removal upper cover: ..... Remove the Original stopper first.



> Back cover
> ADF cover: ..... Open the ADF unit first.
> ADF unit cover: ..... Open the ADF unit and remove the ADF cover first.
> Master making unit cover



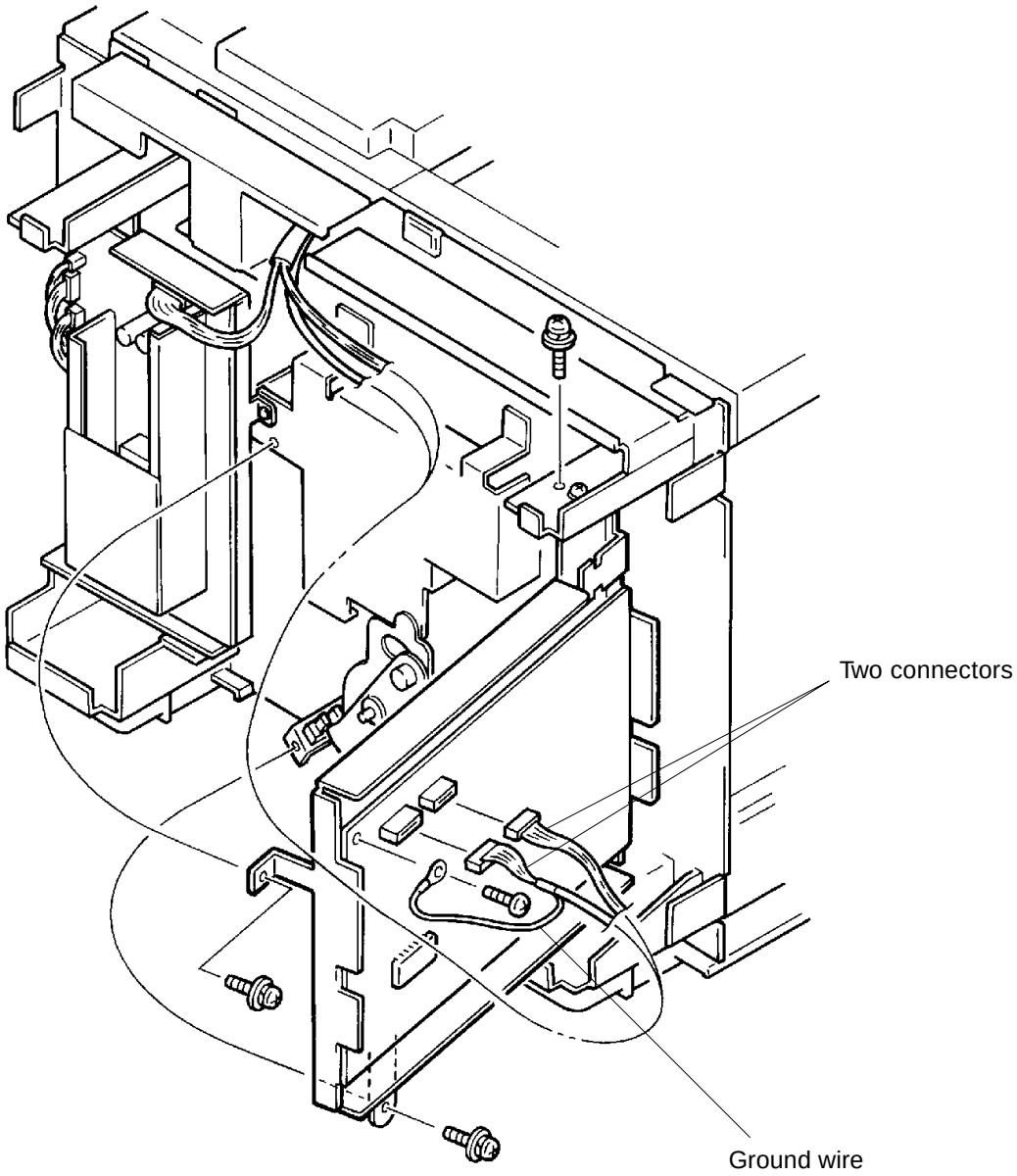
> Drum cover



4. Opening PCB Bracket Frames.

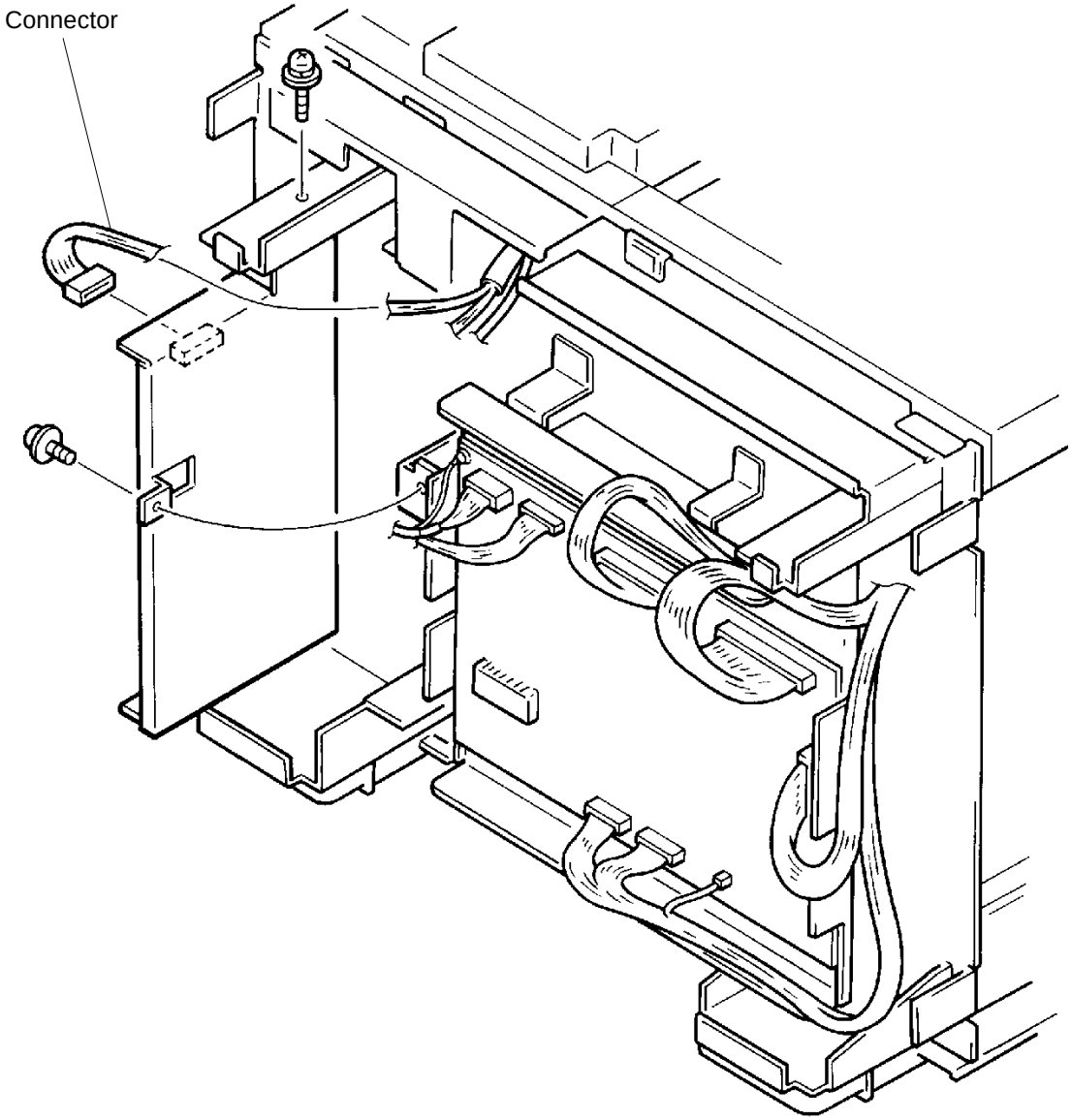
1. Main PCB Bracket Frame

1. Disconnect the power supply from the machine.
2. Remove the Back cover.
3. Disconnect two connectors from the PCB.
4. Disconnect the ground wire.
5. Remove four mounting screws of the PCB bracket frame.
6. Lift the PCB bracket frame lightly and swing open.



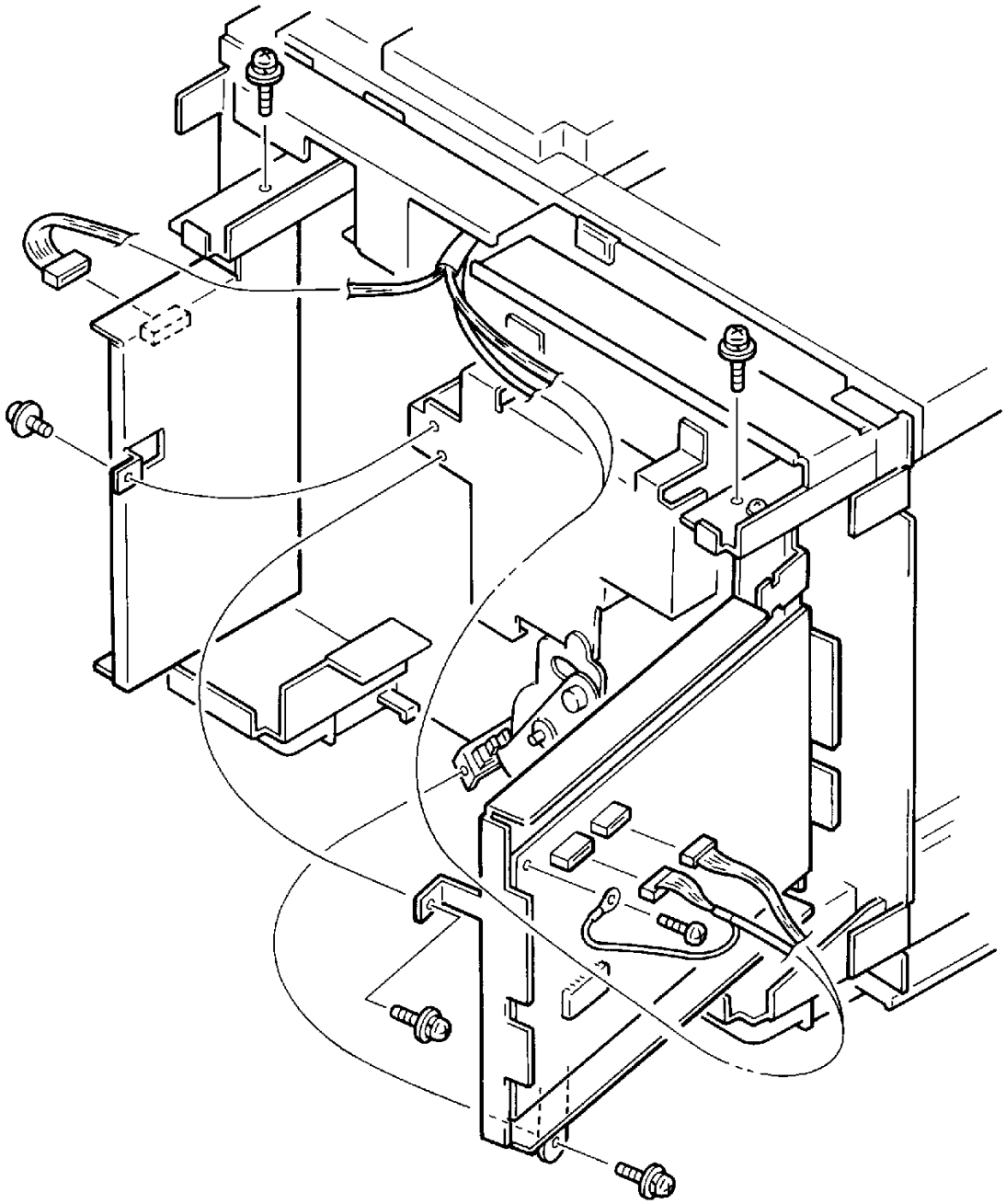
2. Power Supply PCB Bracket Frame

1. Disconnect the power supply from the machine.
2. Remove the Back cover.
3. Disconnect one connector from the PCB.
4. Remove two mounting screws of the PCB bracket frame.
5. Lift the PCB bracket frame lightly and swing open.



3. Main PCB and Power Supply PCB Bracket Frames

Refer to pages **1-7** and **1-8** for the instructions.



CHAPTER 2: MACHINE SUMMARY

CONTENTS

1. Specifications

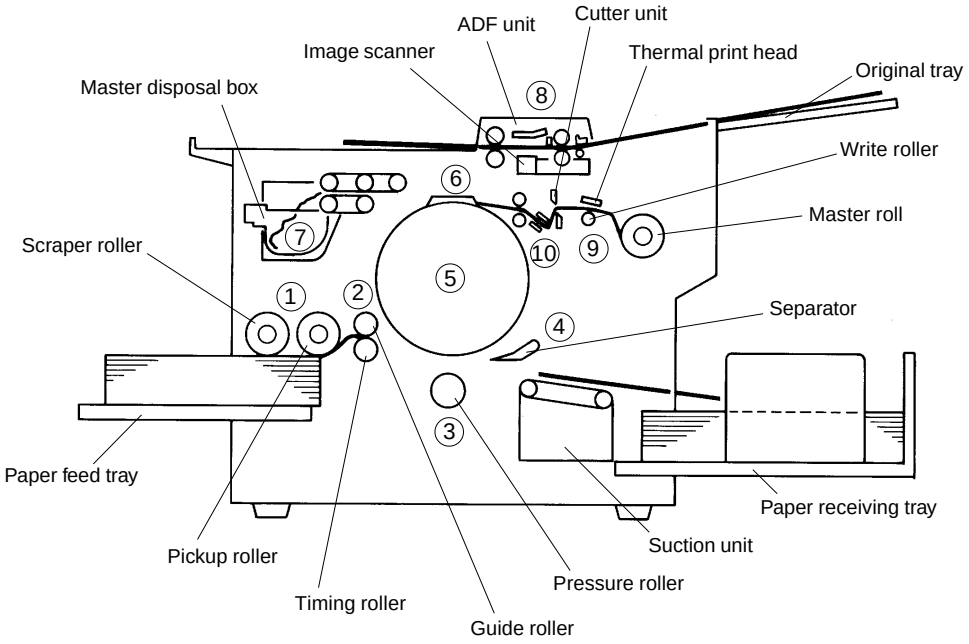
1. CR1610

- **Processing** — High-speed automatic digital scanning
  Fully automatic, thermal screening duplicating system
- **Time to First Copy** — A4 model: Approx. 24 seconds (letter, or A4 original)
  Legal model: Approx. 25 seconds (letter, or A4 original)
- **Print Speed** — 3 selectable print speeds (60, 90, 130 sheets/min.)
- **Scanning Resolution** — 300 x 300 dpi
- **Original Type** — Sheets
- **Original Size** — Max. 274 x 395mm or 10 3/4 x 15 1/2 inch
  Min. 90 x 140mm or 3 1/2 x 5 1/2 inch
- **Paper Size** — Max. 274 x 395mm or 10 3/4 x 15 1/2 inch
  Min. 90 x 140mm or 3 1/2 x 5 1/2 inch
- **Original Weight** — Max./ 107 g/m^2 or 28-lb bond
  Min./ 50 g/m^2 or 15-lb bond
- **Paper Weight** — Max./ 157 g/m^2 or 36-lb bond
  Min./ 50 g/m^2 or 15-lb bond
- **Image Area** — A4 Drum / 210 x 290mm or 8.2 x 11.4 inch
  Legal Drum / 210 x 349mm or 8.2 x 13.7 inch
- **Paper Capacity** — Feed tray - 1,000 sheets (64 g/m^2 or 16-lb bond)
  Receiving tray - 800 sheets (64 g/m^2 or 16-lb bond)
- **ADF Capacity** — 10 originals (64 g/m^2 or 16-lb bond)
- **Machine Weight** — Approx. 64 kg (141 lbs.)
- **Dimensions** [W x D x H] — In use / 1225 x 645 x 546mm
  48.2 x 25.4 x 21.5 inch
  In storage / 635 x 645 x 479mm
  25.0 x 25.4 x 18.9 inch
- **Power Source** <Requirements> — Picture Model: 220 to 240 VAC, 50/60 Hz <2.0A>
  USA Model: 120 VAC, 60 Hz <3.0A>
  Metric Models: 110 VAC, 60 Hz <3.0A> - 110-V model
  220 to 240 VAC, 50/60 Hz <2.0A> - 220-V model
- **Reduction Parameters** — 4 selectable reductions (94%, 87%, 82% and 71%)
  [94%, 77%, 75% and 66% in USA models]
- **Features** — Print speed control, Confidential mode, 2-Up/4-Up printing, Programmed printing, Photo processing mode, Duo processing mode, Interface capabilities, Auto scanning contrast adjustment, Preventive maintenance indication
- **Print Colors** — Black, Blue, Red, Green, Brown, Yellow, Bright red and Silver Grey
- **Optional Accessories** — Color drum unit, Job separator III, Key/Card counter III, and computer interface.

2. CR1630

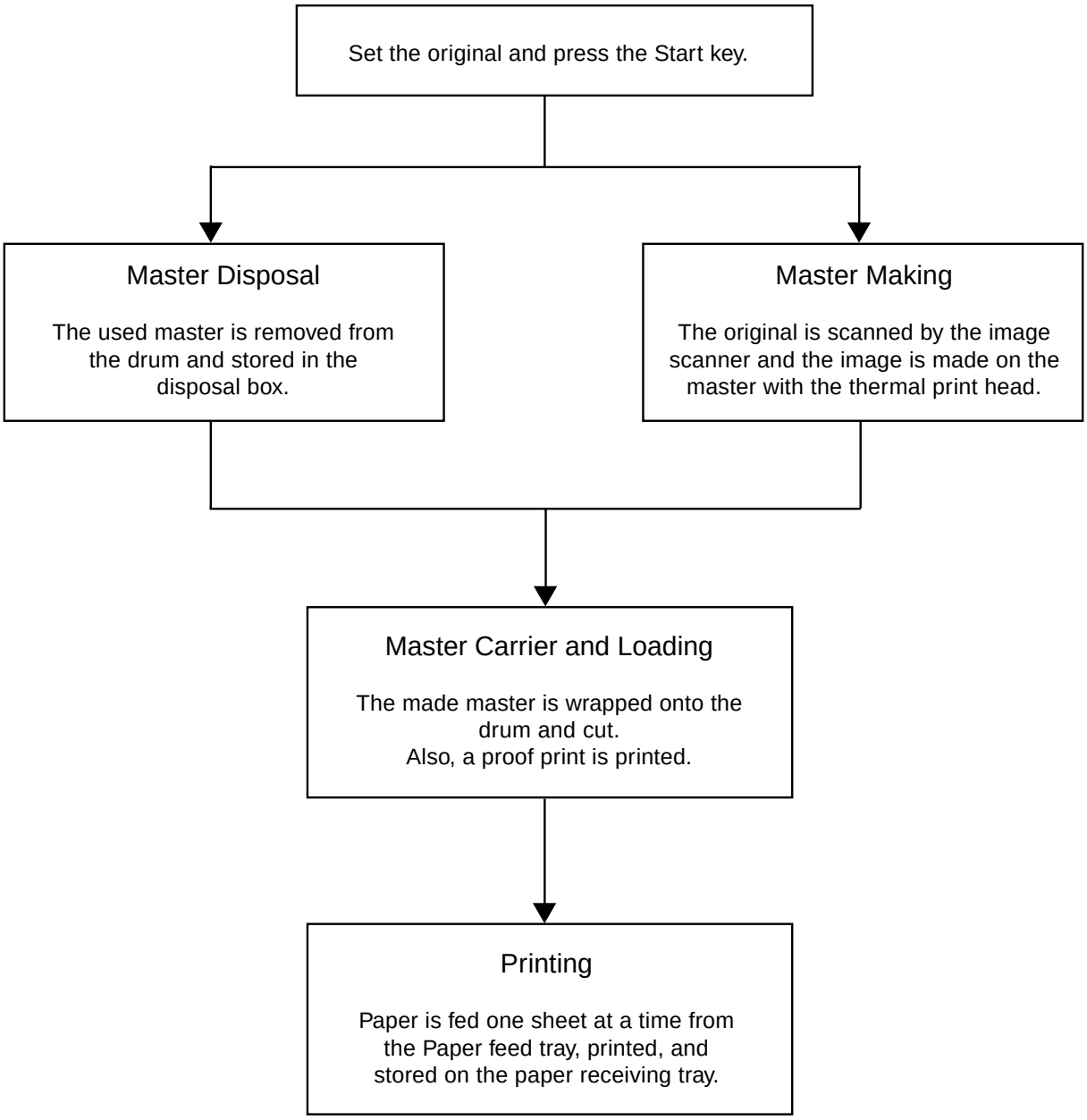
- **Processing** — High-speed automatic digital scanning
  Fully automatic, thermal screening duplicating system
- **Time to First Copy** — Approx. 25 seconds (letter, or A4 original)
- **Print Speed** — 3 selectable print speeds (60, 90, 130 sheets/min.)
- **Scanning Resolution** — 300 x 300dpi
- **Original Type** — Sheets
- **Original Size** — Max. 274 x 395mm or 10 3/4 x 15 1/2 inch
  Min. 90 x 140mm or 3 1/2 x 5 1/2 inch
- **Paper Size** — Max. 274 x 395mm or 10 3/4 x 15 1/2 inch
  Min. 90 x 140mm or 3 1/2 x 5 1/2 inch
- **Original Weight** — Max./ 107 g/m^2 or 28-lb bond
  Min./ 50 g/m^2 or 15-lb bond
- **Paper Weight** — Max./ 157 g/m^2 or 36-lb bond
  Min./ 50 g/m^2 or 15-lb bond
- **Image Area** — B4 Drum / 251 x 357mm or 9.8 x 14.0 inch
- **Paper Capacity** — Feed tray - 1,000 sheets (64 g/m^2 or 16-lb bond)
  Receiving tray - 800 sheets (64 g/m^2 or 16-lb bond)
- **ADF Capacity** — 10 originals (64 g/m^2 or 16-lb bond)
- **Machine Weight** — Approx. 64 kg (141 lbs.)
- **Dimensions** [W x D x H] — In use / 1225 x 645 x 546mm
  48.2 x 25.4 x 21.5 inch
  In storage / 635 x 645 x 479mm
  25.0 x 25.4 x 18.9 inch
- **Power Source** <Requirements> — Picture Model: 220 to 240 VAC, 50/60 Hz <2.0A>
  USA Model: 120 VAC, 60 Hz <3.0A>
  Metric Models: 110 VAC, 60 Hz <3.0A> - 110-V model
  220 to 240 VAC, 50/60 Hz <2.0A> - 220-V model
- **Reduction Parameters** — 4 selectable reductions (94%, 87%, 82% and 71%)
  [94%, 77%, 75% and 66% in USA models]
- **Features** — Print speed control, Confidential mode, 2-Up/4-Up printing, Programmed printing, Photo processing mode, Duo processing mode, Interface capabilities, Auto scanning contrast adjustment, Preventive maintenance indication
- **Print Colors** — Black, Blue, Red, Green, Brown, Yellow, Bright red and Silver Grey
- **Optional Accessories** — Color drum unit, Job separator III, Key/Card counter III, and computer interface.

2. Cross Sectional Diagram

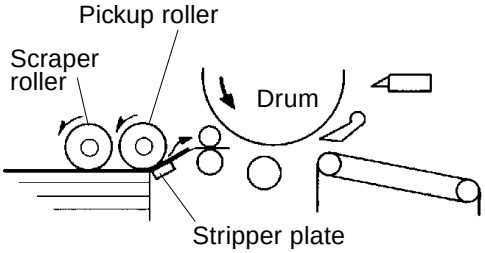


(1) First Paper Feed Area:	Feeds single sheets of paper to the second paper feed area via the Scraper roller, Pickup roller and Stripper plate.
(2) Second Paper Feed Area:	Controls the vertical print position and feeds paper to the print area via the Timing and Guide rollers.
(3) Press (Printing) Area:	Uses the Pressure roller to press paper against the master on the Drum. The Drum rotates with the Pressure roller and prints an image on paper.
(4) Paper Ejection Area:	Separates a printed paper from the Drum, and transports it onto the paper receiving tray.
(5) Drum Area:	Supplies the Drum surface with ink from an Ink cartridge.
(6) Master Clamp Area:	Clamps the leading edge of the master.
(7) Master Disposal Area:	Separates used master from the Drum and disposes it into the Master disposal box.
(8) Image Scanning Area:	Carries an original and scans it with the Image scanner and converts the image information into digital data.
(9) Master Making Area:	Makes a master with the Thermal print head.
(10) Master Loading Area:	Feeds the prepared master material to the Drum and cuts it to an appropriate length.

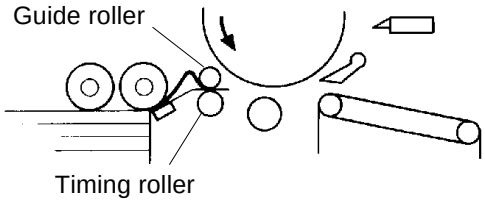
3. Machine Operations



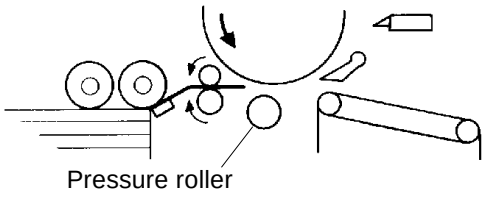
4. Paper Feed and Receiving



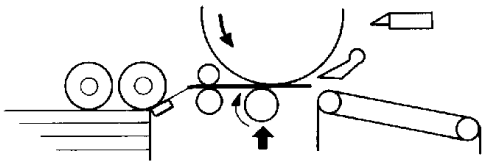
The Drum is rotated and a sheet of paper is fed from the first paper feed area to the second paper feed area by the Scraper and Pickup rollers, and Stripper plate.



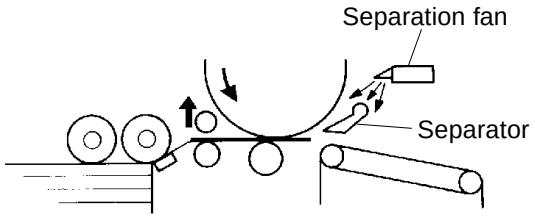
The paper feed to the second paper feed area is stopped by the Guide and Timing rollers to form a buckle. The paper then waits until the rotation of the Guide roller starts.



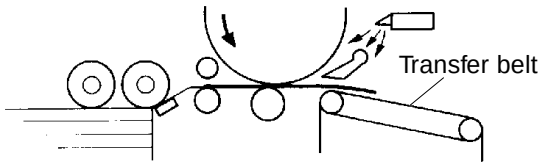
The Guide and Timing rollers in the second paper feed area are rotated and the paper is fed to the printing area.



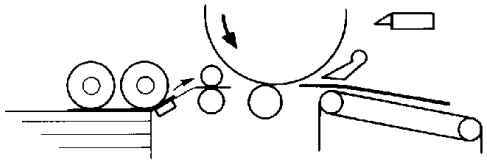
While the paper is being fed from the second paper feed area, the Pressure roller rises and printing starts.
(The Pressure roller contacts the Drum and starts rotating.)



After the Pressure roller contacts the Drum to start printing, the Separator approaches the Drum and the Separation fan starts to blow.
The Guide roller goes up to release the paper.
(The paper is then transferred by the rotation of the Drum.)

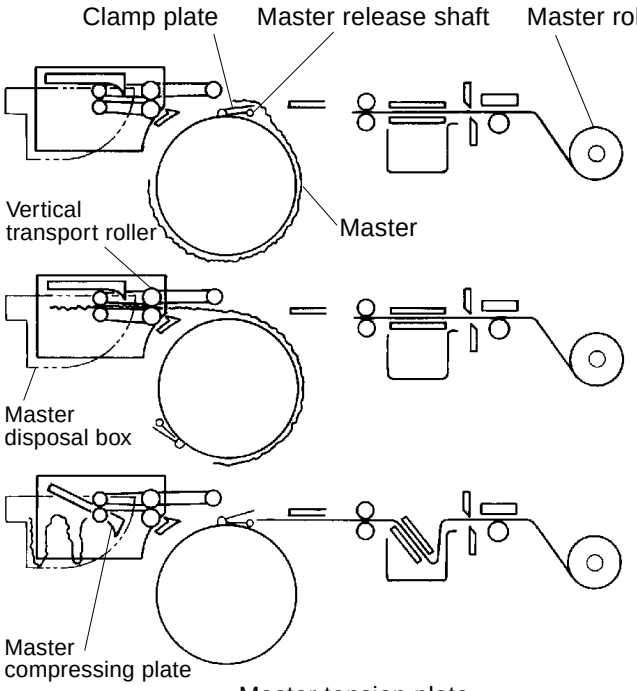


The printed paper is separated from the Drum by the Separator and with a help of the air blow from the Separation fan.
It is then transported onto the Paper receiving tray by the Transfer belts using Suction fan.



The Timing roller contacts the Guide roller to feed the next sheet of paper.

5. Master Removal and Feed

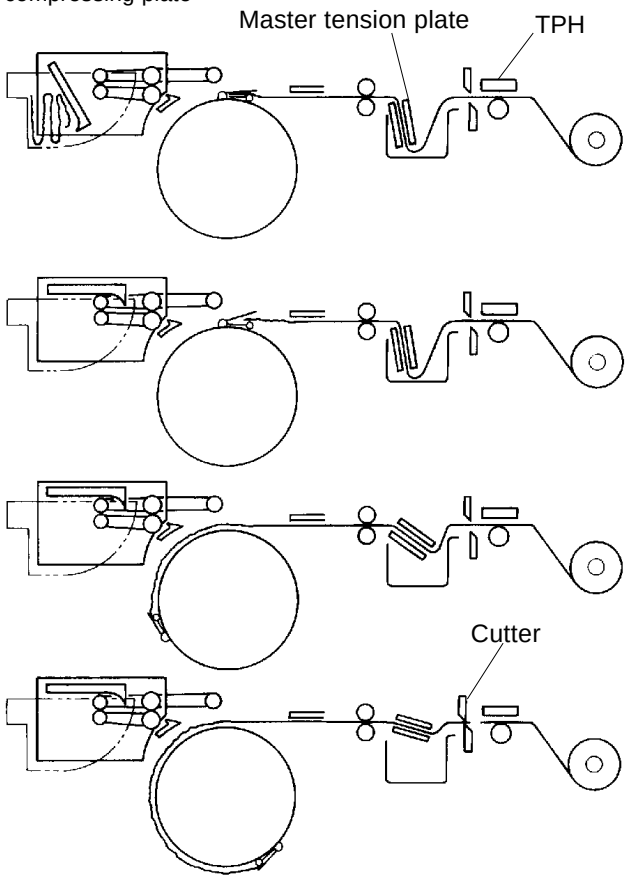


Master Removal

The Clamp plate opens and Master release shaft releases the master from the Clamp plate.

The Drum and Vertical transport rollers starts rotating and removes the master from the Drum and feed it into the Master disposal box.

The Master compressing plate starts compressing the removed master within the Master removal box.



Master Making

The Image scanner scans the image on the original and Thermal print head (TPH) makes the image on the master material. The Master tension plate drops down and applies tension on the master material.

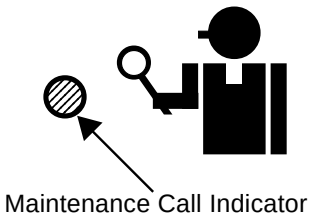
Master Loading

The master is transferred onto the Drum and the leading edge is clamped by the Clamp plate.

The Drum rotates to wrap the master on the Drum.

The Cutter cuts the master.

6. Maintenance Call



Maintenance Call Indicator:

The Maintenance call indicator (Green light) is turned on when copy (or master) count for the Maintenance call is reached to certain count, which is Maintenance call count setting. Maintenance call count setting can be set in Test mode (memory switch) No. 300 and 301.

Note: The machine can run normally even though the Maintenance call indicator (Green light) is turned on.

Setting the count for Maintenace Call:

Test mode No. 300: Setting the Copy count for Maintenance Call count
Test mode No. 301: Setting the Master count for Maintenance Call count

Note: Setting range: 100 - 999,900 copies (or masters)
Input "1" on display = "100" copies (or masters).
Input "0" on display = Never turning on the Indicator light.

Clearing of the memorized count for Maintenance Call count:

Test mode No. 94: Memorized copy and master count for Maintenance call will be cleared. (The memorized count for Maintenance call will not be cleared by using Test mode No. 93 <Memory count clear>, No. 97 <User mode clear> and No. 98 <Memory SW clear>.)

CHAPTER 3: MAIN DRIVE SECTION

CONTENTS

1. Theory of Operation

1. Main Drive

1. Drum rotation

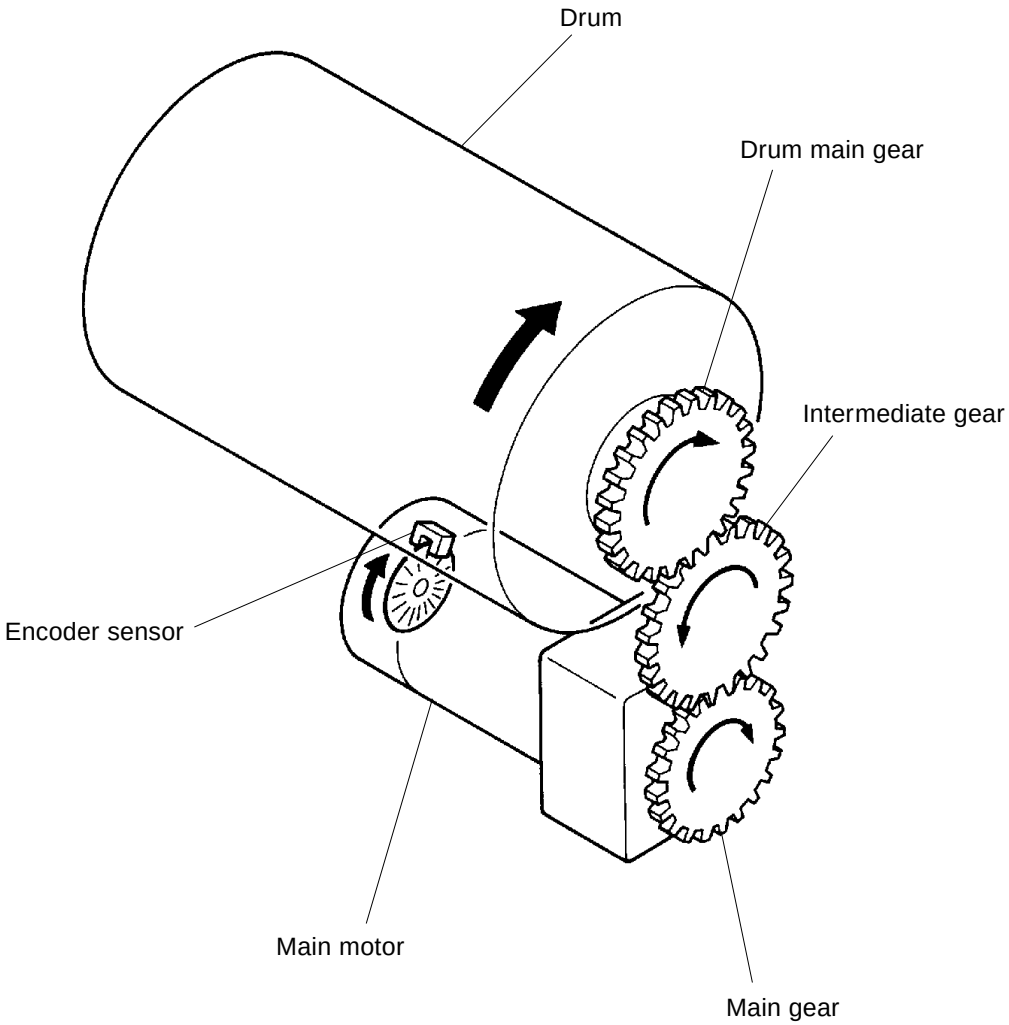
> The Main gear on the Main motor rotates the Intermediate gear.
> The Intermediate gear rotates the Drum main gear.
> The Drum rotates with the Drum main gear.

2. First paper feed area drive

> When the Paper feed clutch is activated, the main drive is transferred to the First paper feed drive via clutch.

3. Main motor encoder sensor

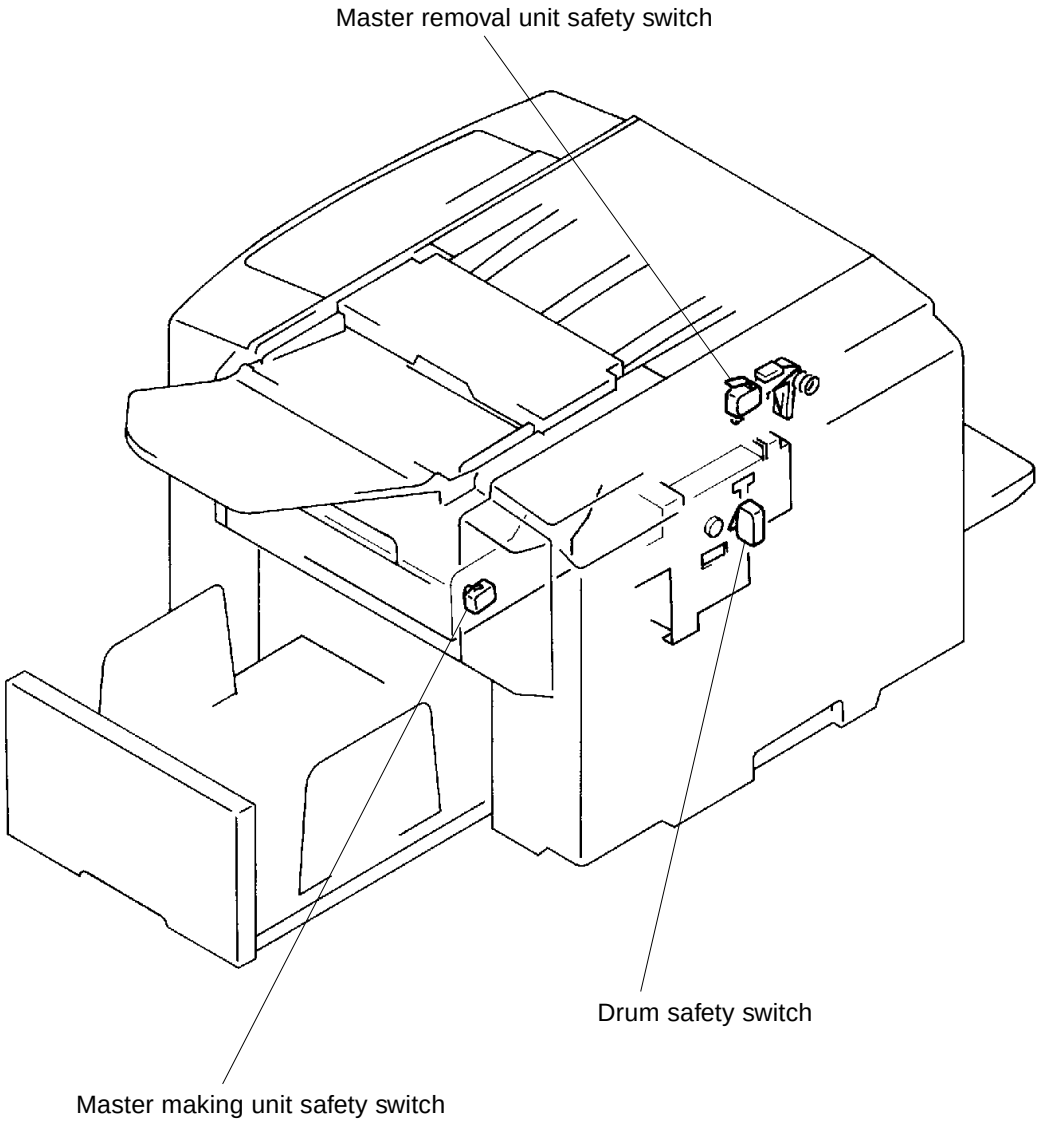
> The Encoder sensor on the Main motor keeps check on the Main motor rotation speed and Drum position.



2. Main Motor Safety Switch

1. Following all three Safety switches must be activated to run the Main motor.
> Master removal unit safety switch
> Master making unit safety switch
> Drum safety switch

The same three switches act also as Safety switches for the Thermal power.



3. Drum Positions

1. Sensors for the Drum positioning

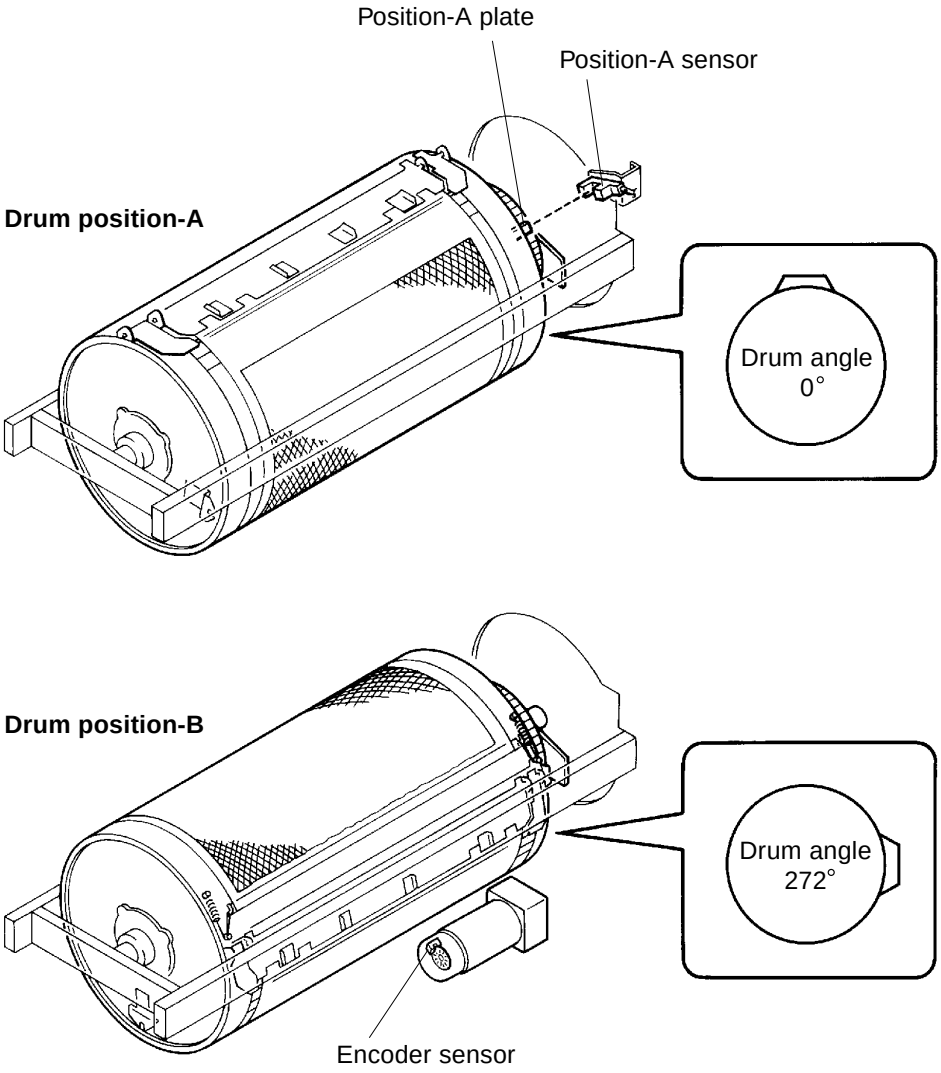
> The position of the Drum is determined by the Position-A sensor and Encoder sensor on the Main motor.

2. Position-A

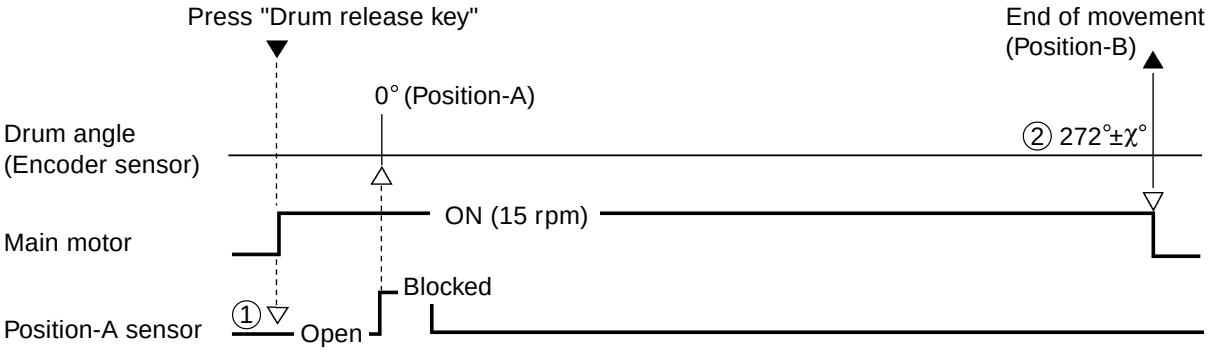
> This is the position where the Clamp plate is at the top of the Drum.
> This position is also referred as the 0° position.
> The Clamp plate opens and closes at this position.
> This is the position where the light path of the Position-A sensor is cut by the Position-A plate on the Drum.

3. Position-B

> Position-B of the Drum is when the Drum rotates 272° from the 0° position (Position A), counted by the Encoder sensor.
This is the position where the Drum is pulled out or put into the machine.



Drum Release Movement (Drum B-Position) Timing Chart



① If the light path of the Position-A sensor is open when the Drum release key is pressed, the Drum is rotated until the sensor is blocked to bring the Drum to the Position-A.
If the light path of the Position-A sensor is already blocked (Drum at **0**°), the above Drum rotation will not be made.

② When the Drum rotates to **272°±χ°**(Position-B), the Main motor turns off and completes the Drum release movement.
The angle "χ" can be adjusted by Memory Switch (Test Mode) **No. 207**.

> If the Encoder sensor does not output the Main motor rotation signal within certain set time, the machine assumes that the Main motor has locked and displays error message **[E 01]**.

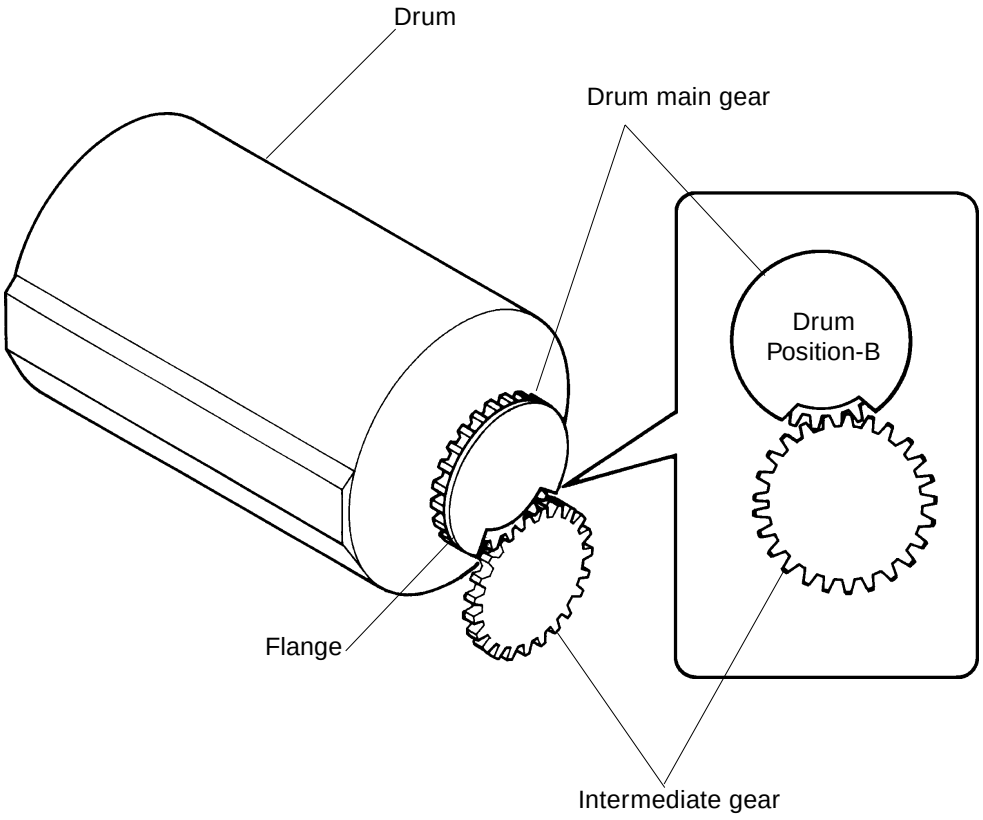
> If over load current is detected for **0.3 seconds** after the Maim motor is activated, the machine assumes that the Main motor has locked and displays error message **[E 01]**.

> If the Position-A detection sensor does not detect the Drum even though the Encoder sensor outputs Main motor rotation signal after the Main motor is activated, the machine assumes that the Position-A sensor is faulty and displays error message **[E 06]**.

4. Drum Locking System

1. The Drum is designed to unlock only when the Drum is at Position-B.

At any other Drum position, the flanges around the Drum main gear locks prevent disengaging from the Intermidiate gear and prevents the Drum from pulled out.
Only at Position-B, the flanges on the Drum main gears are eliminated to free the Drum.

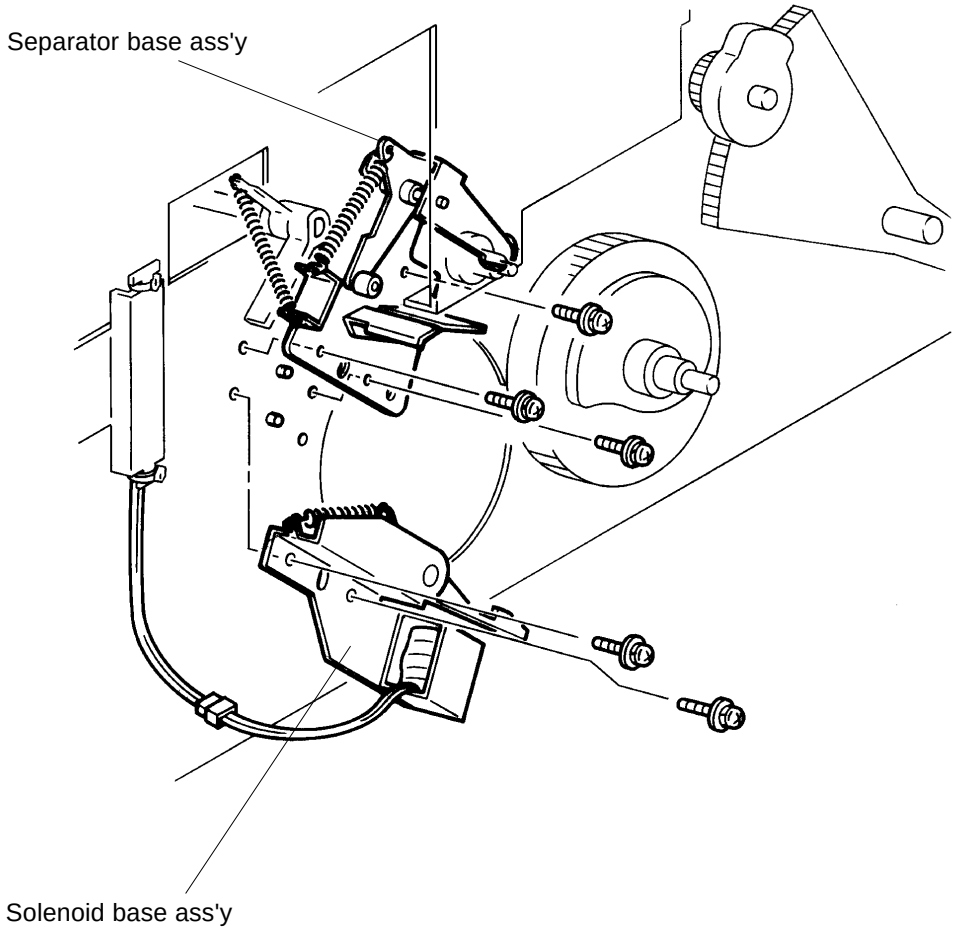


2. Removal and Assembly

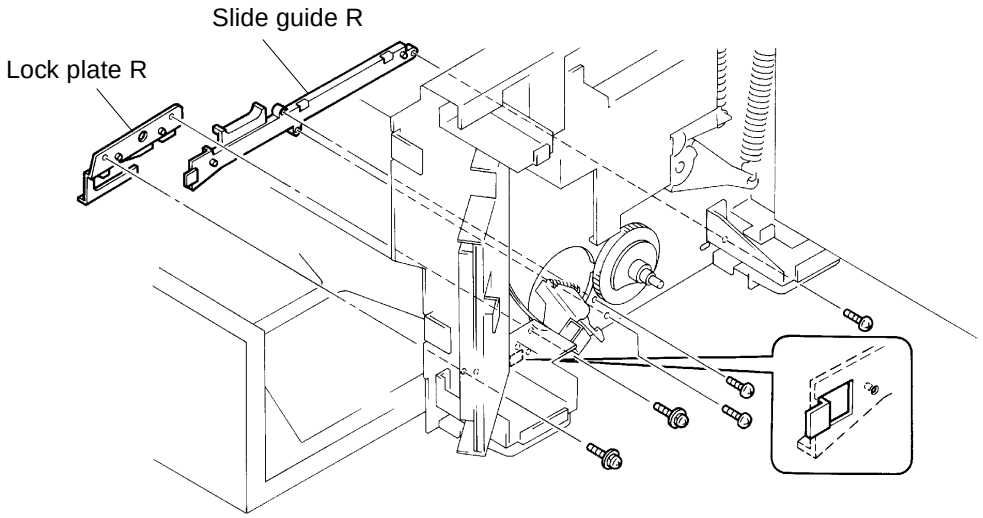
1. Main Motor Unit

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Back cover.
4. Open the Main PCB and Power supply PCB bracket frames.
5. Remove following four parts.
   > Intermediate gear (page 3-9)
   > Print positioning unit (page 5-8)
   > Suction unit (page 7-5)
   > Pressure lever ass'y (page 6-6)
6. Remove two mounting screws of the Solenoid base ass'y and slide the ass'y aside and let it hang.
7. Remove three mounting screws of the Separator base ass'y and remove the ass'y.

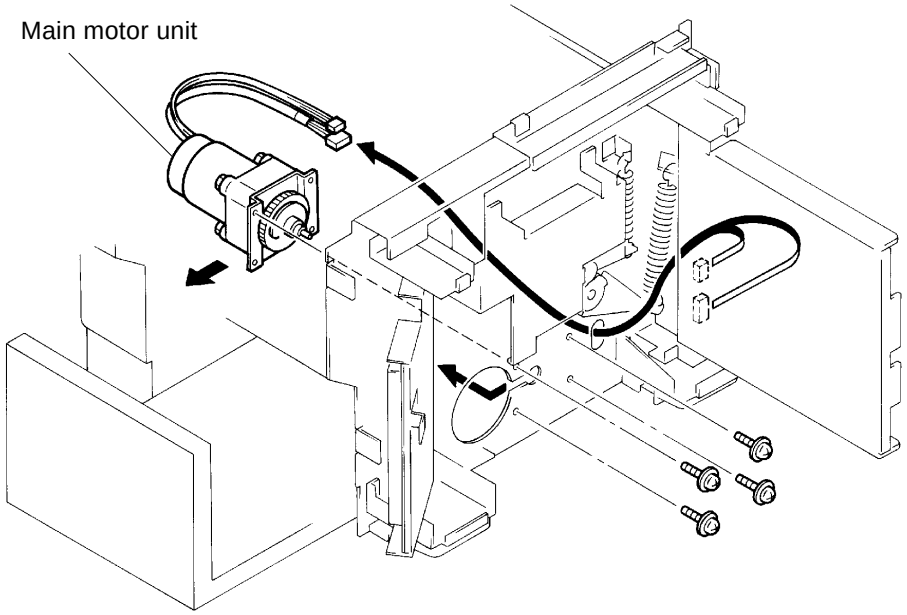
(continues on page 3-8)



8. Remove two mounting screws of the Locking plate R and remove the plate.
9. Remove three mounting screws of the Slide guide R and remove the guide.



10. Disconnect two connectors of the Main motor unit from the System PCB.
11. Remove four mounting screws of the Main motor unit and remove the unit from the machine.



Precautions in Assembly

> Match the half-pierced sections of the Locking plate R and Slide guide R against those on the machine frame.
> Match the half-pierced sections of the Solenoid base ass'y and Separation base ass'y against those on the machine frame.

Adjustment after Assembly

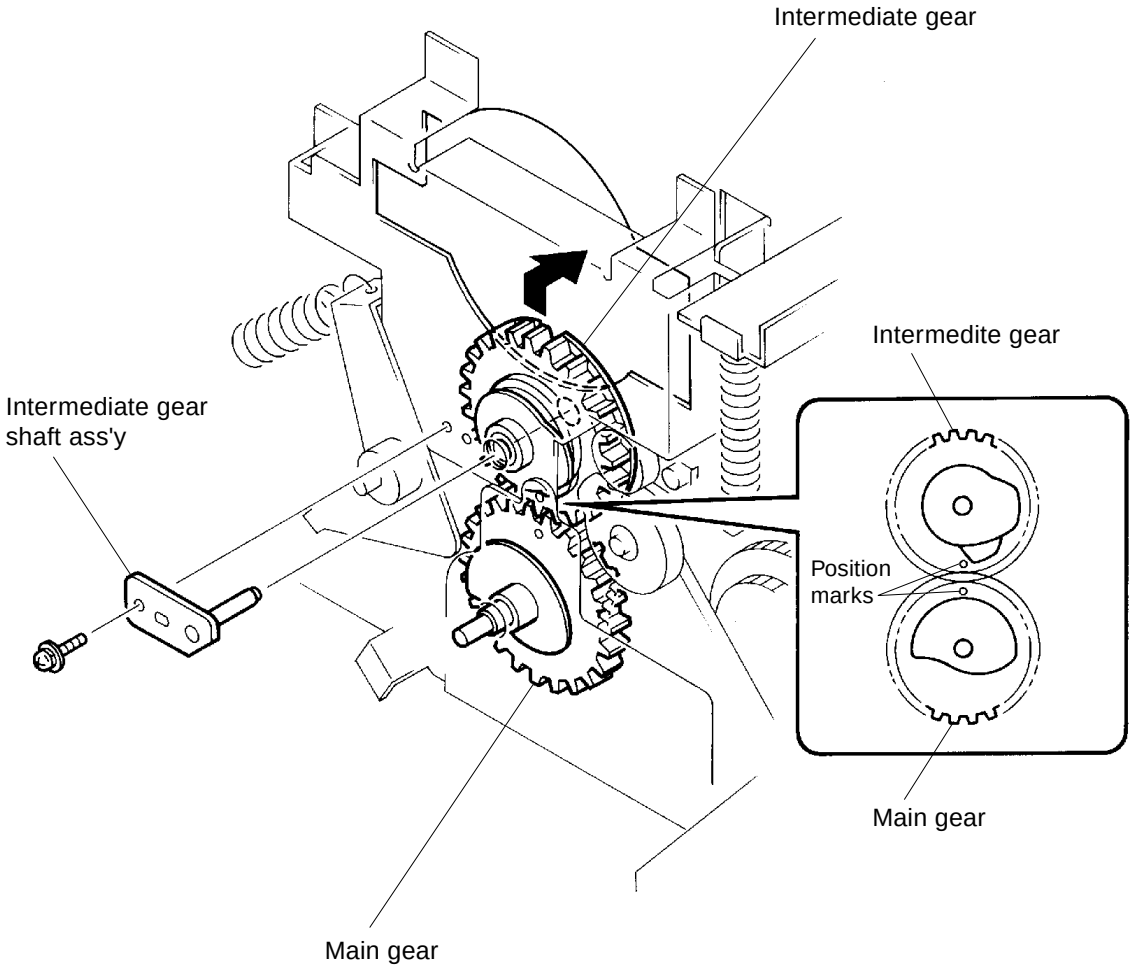
> Adjust the position of the Pressure lever. (page 6-11)

2. Intermediate Gear

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Back cover.
4. Open the Main PCB bracket frame.
5. Remove mounting screw of the Intermediate gear shaft ass'y and remove the ass'y.
6. Remove the Intermediate gear from the operation panel side (drum opening) of the machine.

Precautions in Assembly

> Align the Position mark on the Intermediate gear with that on the Main gear.

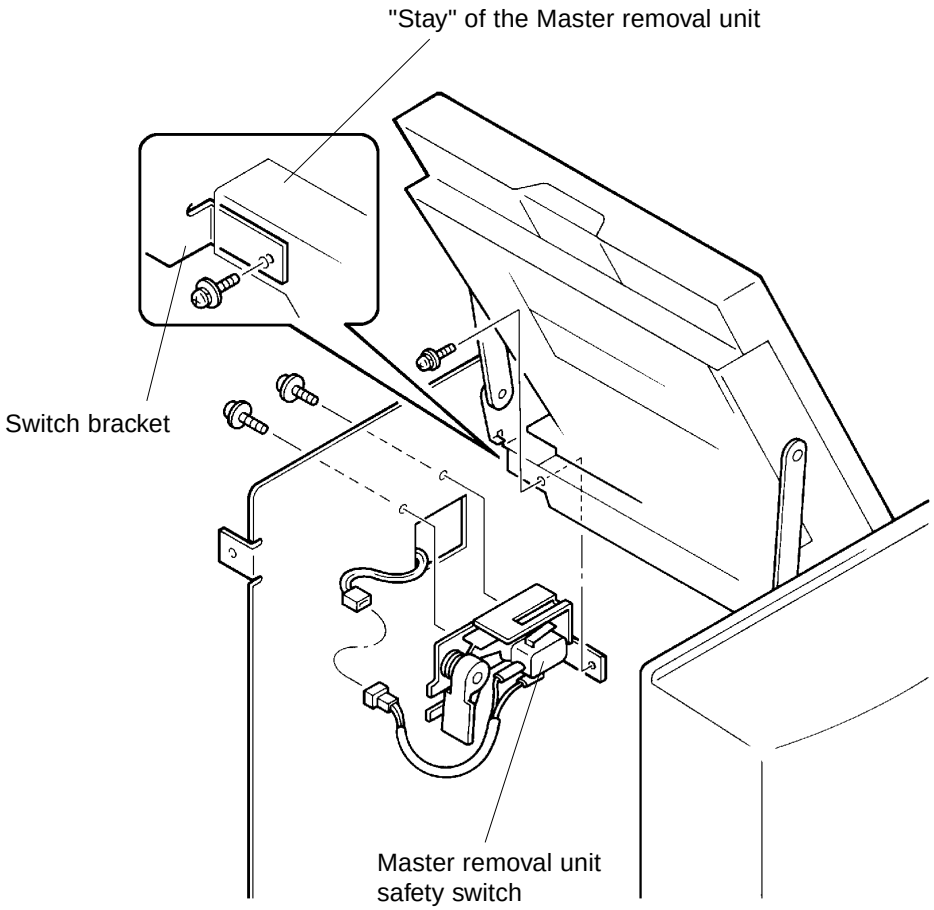


3. Master Removal Unit Safety Switch

1. Lower the Paper feed tray.
2. Disconnect the power supply from the machine.
3. Remove Back cover and Master removal lower cover.
4. Open the Main PCB bracket frame.
5. Open the Master removal unit and disconnect the Connector of the Master removal unit safety switch.
6. Remove three mounting screws of the Switch bracket and remove the bracket with the switch attached.
7. Remove the switch from the bracket.

Precautions in Assembly

> The mounting section of the bracket should be positioned behind the stay of the Master removal unit.
> Match the half-pierced section on the Switch bracket with that on the machine.

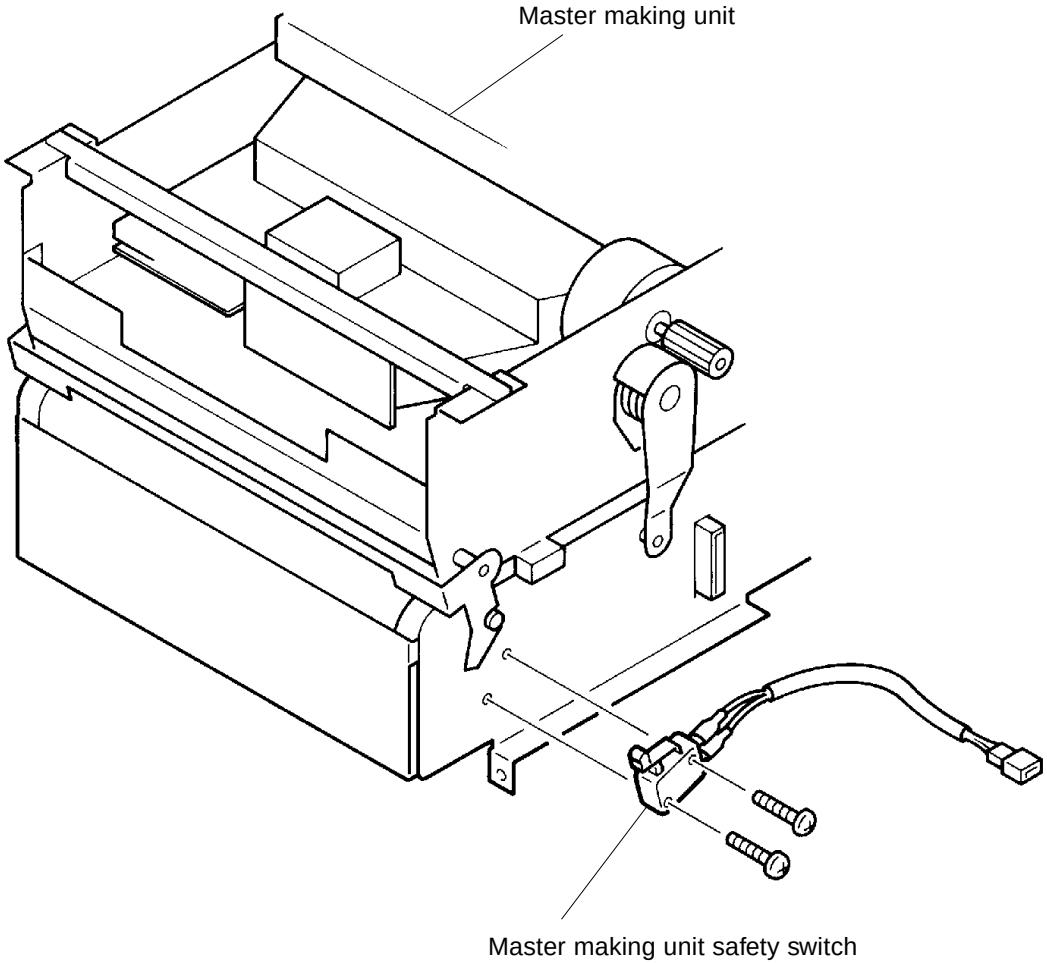


4. Master Making Unit Safety Switch

1. Lower the Paper feed tray.
2. Disconnect the power supply from the machine.
3. Remove following seven covers.
   > Back cover, Front cover, Master removal upper cover, Master removal lower cover, ADF cover, ADF unit cover and Master making unit cover.
4. Remove the Master removal unit. (page 11-13)
5. Remove the Master making unit. (page 15-17)
6. Remove two mounting screws of the Master making unit safety switch located on the Master making unit and remove the switch from the unit.

Precautions in Assembly

> Install the switch in the correct direction.

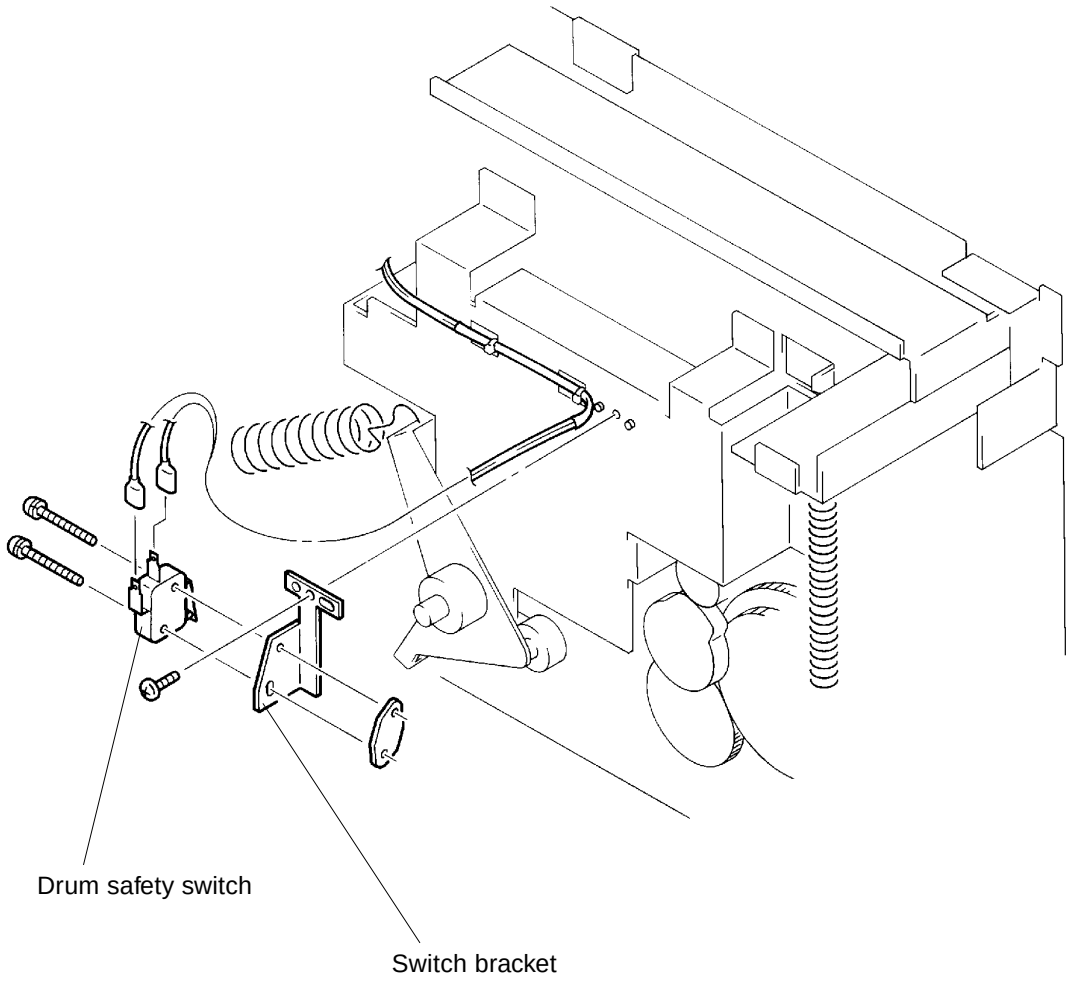


5. Drum Safety Switch

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove the Back cover.
4. Open the Main PCB bracket frame.
5. Disconnect the Connector of the Drum safety switch.
6. Remove the mounting screw of the Switch bracket and remove the bracket with the switch attached.
7. Remove the switch from the bracket.

Precautions in Assembly

> Do not bend the Switch bracket, as it acts as a spring plate to press against the actuator of the switch when the Drum is inserted in the machine.



CHAPTER 4: FIRST PAPER FEED SECTION

CONTENTS

1. Theory of Operation

1. Paper Feed Tray Elevation (Up / Down)

1. Paper Detection Sensor

> The Paper detection sensor checks for the presence of paper on the Paper feed tray.
> The Paper feed tray elevates only when the sensor is detecting the papers.
> The Paper feed tray descends when the sensor no longer detects paper on the tray.

2. Upper Limit Sensor

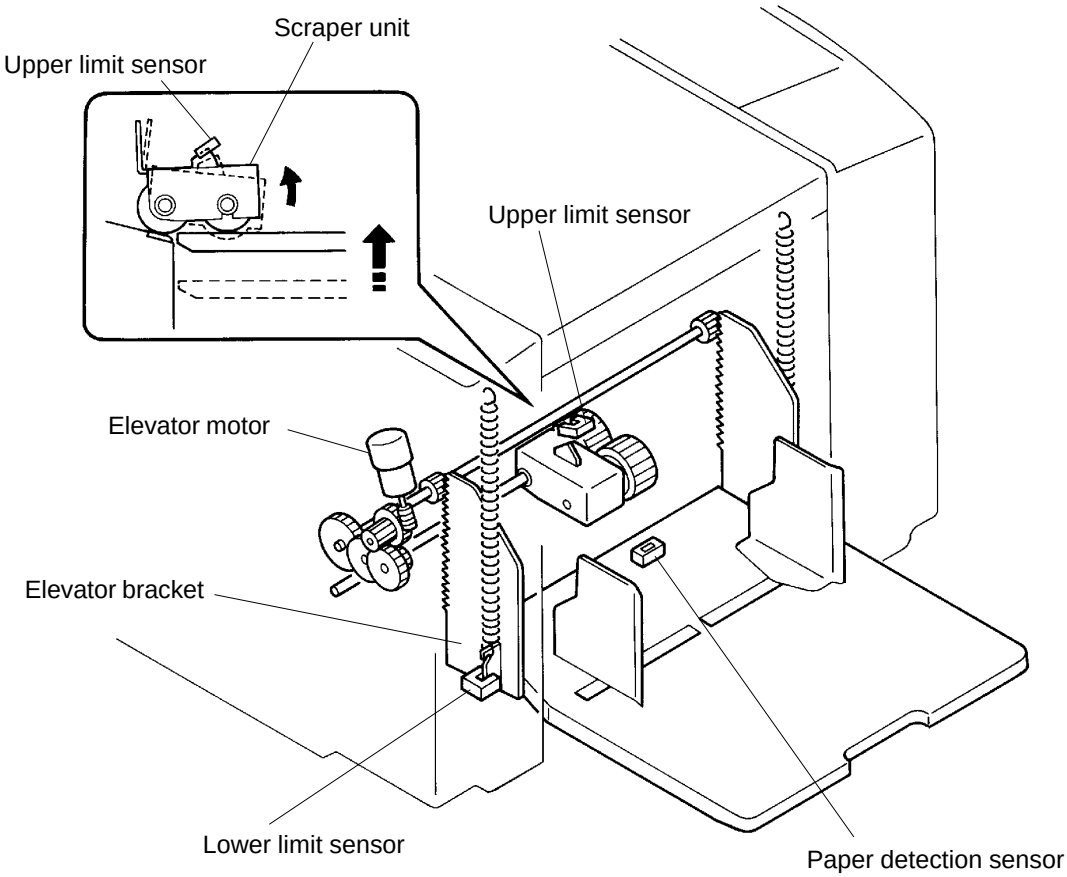
> When the print START button is pressed, the Elevator motor is activated and elevates the Paper feed tray until the light path of the Elevator upper limit sensor is blocked by an actuator plate on the Scraper unit.
> The Elevator motor is activated every time the sensor is unblocked to elevate the Paper feed tray during printing to keep the sensor blocked.

3. Lower Limit Sensor

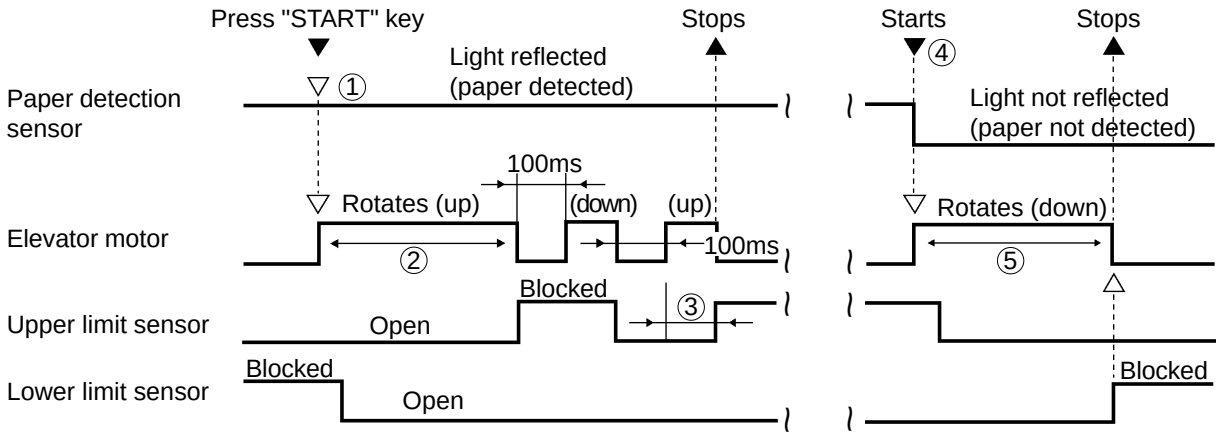
> When the Paper detection sensor no longer detects paper on the tray, the Paper feed tray comes all the way down until the light path of the Elevator lower limit sensor is blocked by an actuator plate on the Elevator bracket.

4. Feed-tray Down Button

> Pressing the Feed-tray down button, while the machine is in stand by, lowers the Paper feed tray the duration the button is pressed.



Paper Feed Tray Elevation (Up / Down) Timing Chart



① Add paper message **[C 44]** is displayed if the Paper detection sensor does not detect paper on the Paper feed tray (sensor light not reflected).

② If the light path of the Upper limit sensor is not blocked within **10 seconds** after the Elevator motor is activated, the machine assume that the Elevator motor has locked and displays error message **[E 02]**.

③ If the light path of the Upper limit sensor is not blocked within **2 seconds** after the Elevator motor is activated, the machine assumes that the Elevator motor has locked and displays error message **[E 02]**. (Only at the last elevation movement in initial tray elevation.)

④ During printing if the Paper detection sensor no longer detects paper on the Paper feed tray (sensor light not reflected), add paper message **[C 44]** is displayed and the elevator motor activates to lower the Paper feed tray.

⑤ If the light path of the Lower limit sensor is not blocked within **10 seconds** after the Elevator motor is activated, the machine assumes that the Elevator motor has locked and displays error message **[E 02]**.

> If the light paths of the Upper and Lower limit sensors are blocked both at the same time, the machine assumes that the Elevator motor has locked and displays error message **[E 02]**.

> If over load current is detected for **0.3 seconds** after the Elevator motor is activated, the machine assumes that the Elevator motor has locked and displays error message **[E 02]**.

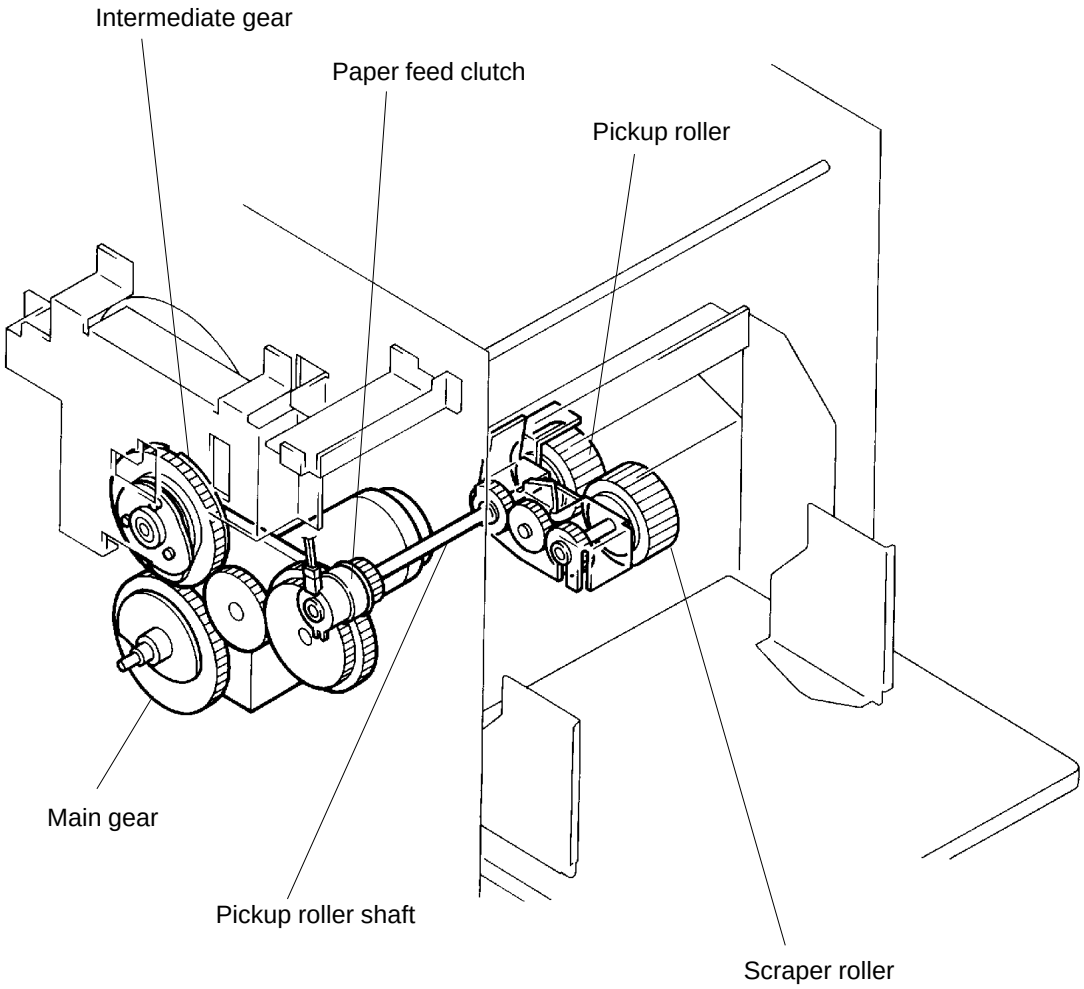
2. First Paper Feed Drive Mechanism

1. Paper Feed Clutch

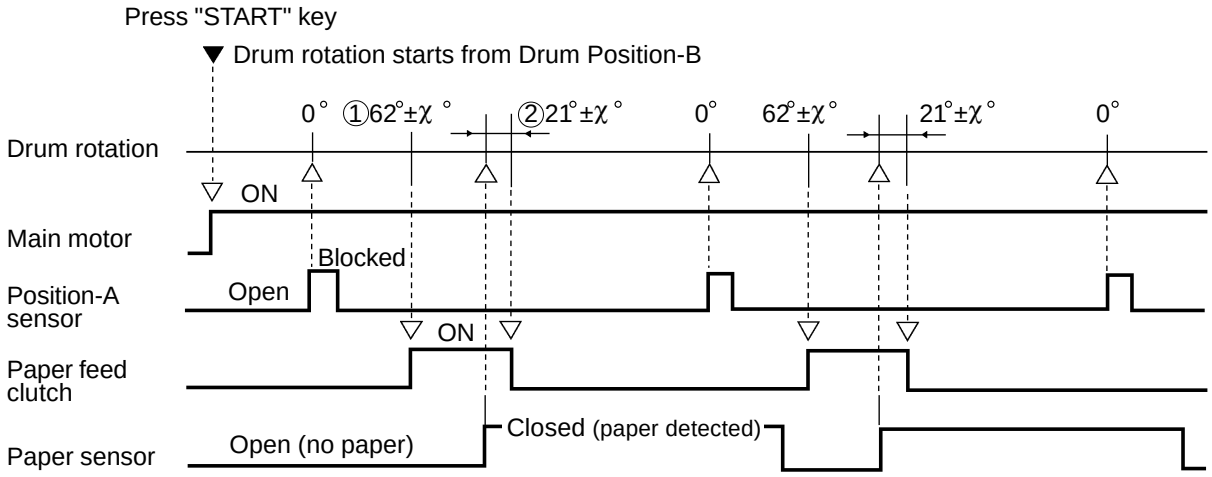
> When the Main motor activates, the Drum rotates in the clockwise direction (looking from back of the machine).
> The Paper feed clutch activates at a certain Drum angle from the Position-A. This Drum angle is determined by the count signal from the motor encoder sensor.
> The clutch is released as the Drum rotates for a certain set degrees after the Paper sensor detects incoming paper.

2. End of First Paper Feed

> The First paper feed ends when the Paper feed clutch is released.
> The leading edge of the paper rests against the Guide roller and Timing roller.
> The Scraper roller and Pickup roller rotates free in the direction of paper feed by one-way clutch to avoid applying brake on the paper when the Second paper feed takes over the paper feed.

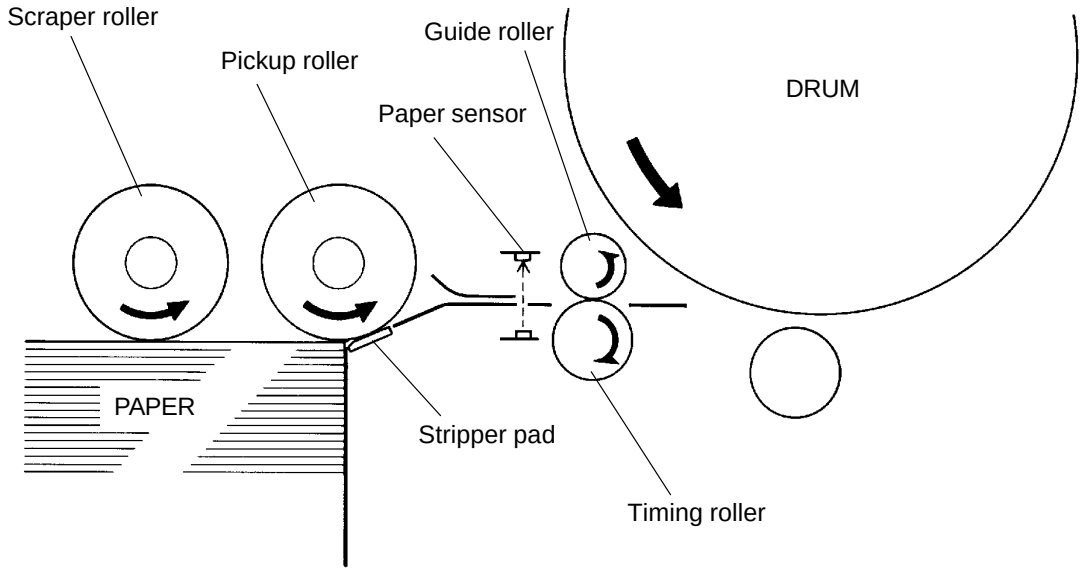


First Paper Feed Timing Chart



① The Paper feed clutch activates each time the Drum rotates 62°±χ° from the 0¡ position.
The angle "χ" can be adjusted by Memory Switch (Test Mode) **No. 204**, which adjusts the ON timing of the Paper feed clutch.

② The Paper feed clutch is deactivated when the Drum rotates 21°±χ° from the moment the light path of the Paper sensor is blocked (paper detected).
The angle "χ" can be adjusted by Memory Switch (Test Mode) **No. 210**, which adjusts the paper buckle amount.



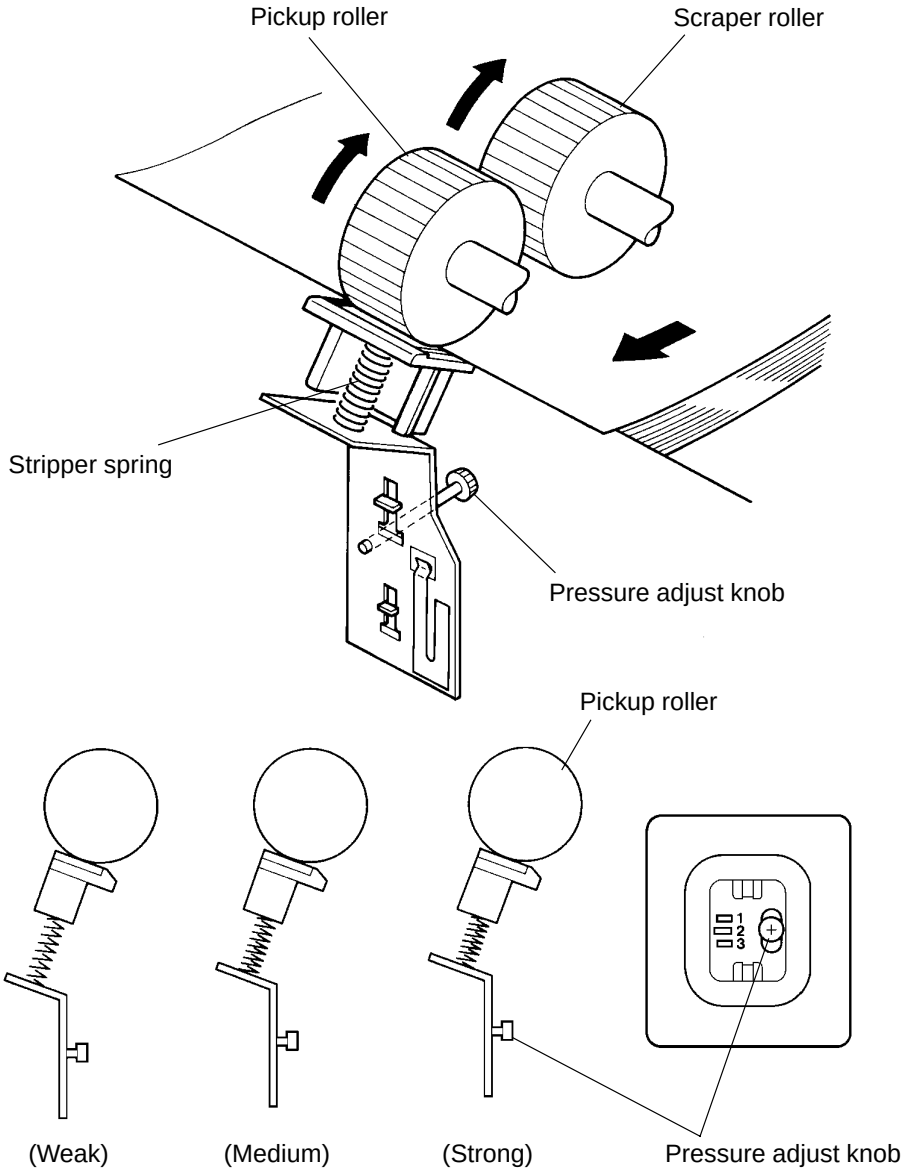
3. Paper Pickup System

1. Feeding

> The papers on the Paper feed tray are fed by the Scraper roller, in several layers, in between the Pickup roller and Stripper plate.

2. Pick-up

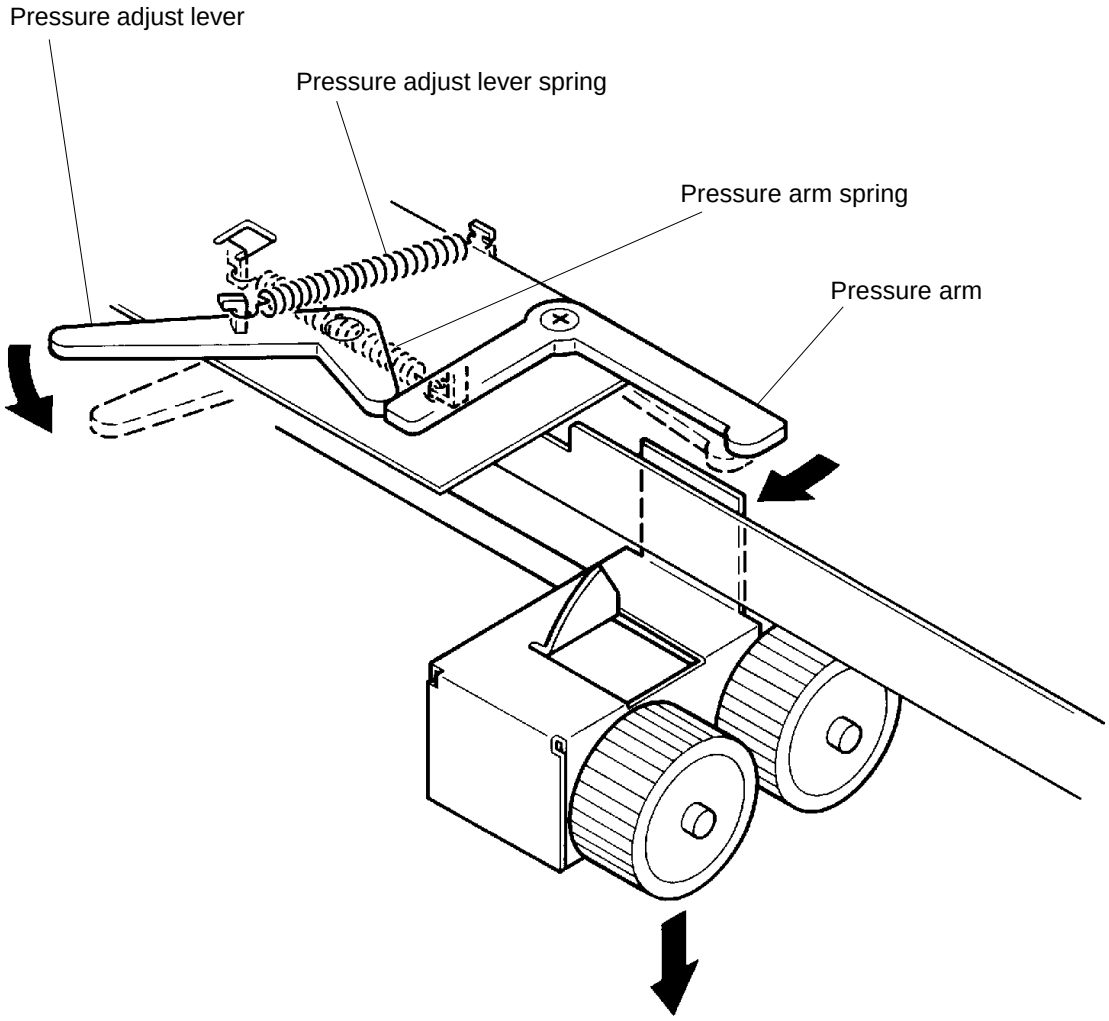
> The top sheet is separated from the rest by the Pickup roller and Stripper plate.
> The Stripper plate is pushed against the Pickup roller by the Stripper spring to provide resistance against paper feed, by which only a single sheet of paper is fed from the paper stack.
> The Stripper unit has Pressure adjust knob which by moving up or down changes the pressure of the Stripper spring in three steps.



4. Paper Feed Pressure Select System

1. Paper Feed Pressure Adjust Lever

> The Paper feed pressure adjust lever is located on the left side of the Scraper unit, and it changes the pressure of the Scraper unit applied against the papers on the Paper feed tray.
> NORMAL position is for less pressure to feed thin papers.
> CARD position is for more pressure to feed thicker papers.
> Move the lever to the left for NORMAL and right for CARD.



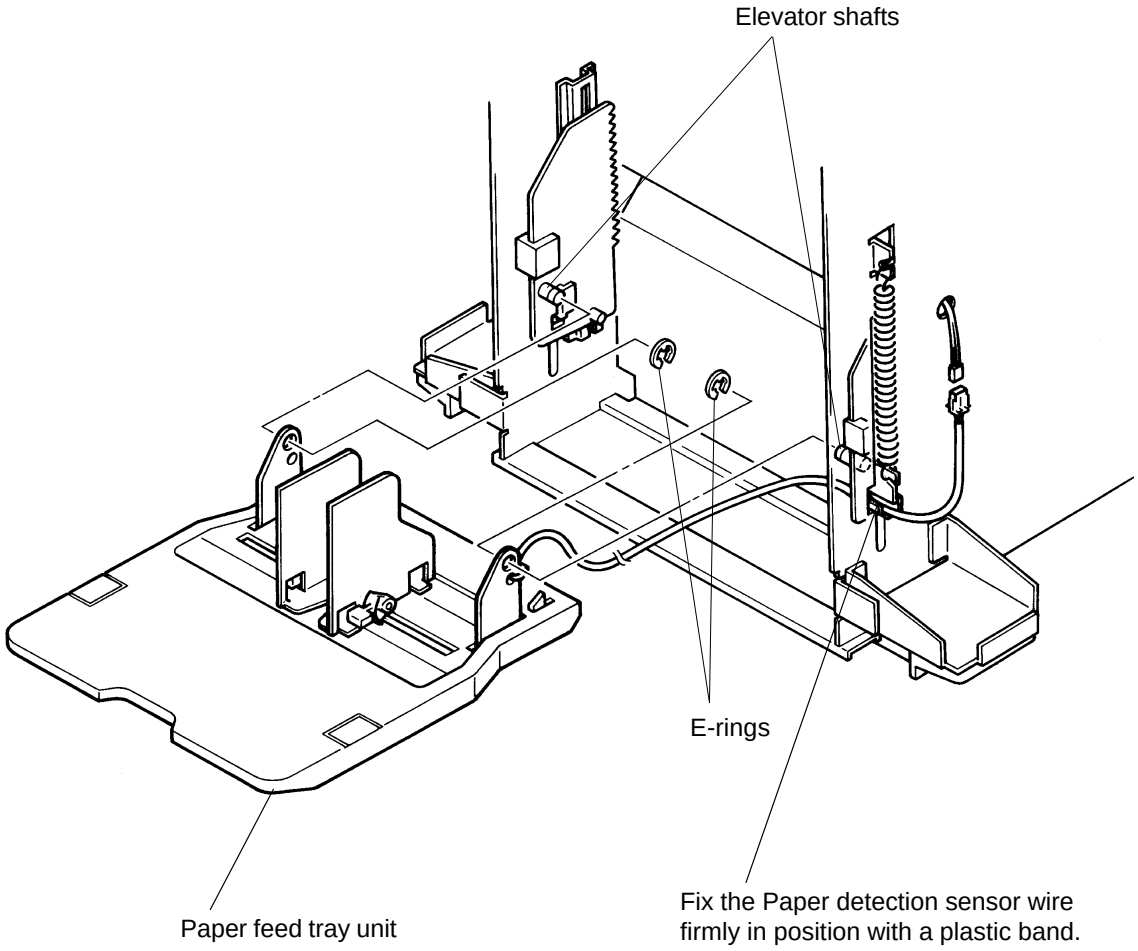
2. Removal and Assembly

1. Paper Feed Tray Unit

1. Lower the Paper feed tray.
2. Remove the Drum from the machine.
3. Disconnect the power supply from the machine.
4. Remove Front cover from the machine.
5. Disconnect the Connector of the Paper detection sensor and pull the wire harness towards the Paper feed tray.
6. Remove two E-rings from the ends of the Elevator shafts and remove the tray unit from the shafts.

Precaution in Assembly

> Make sure to tie the wire harness of the Paper detection sensor firmly in position with a plastic band.

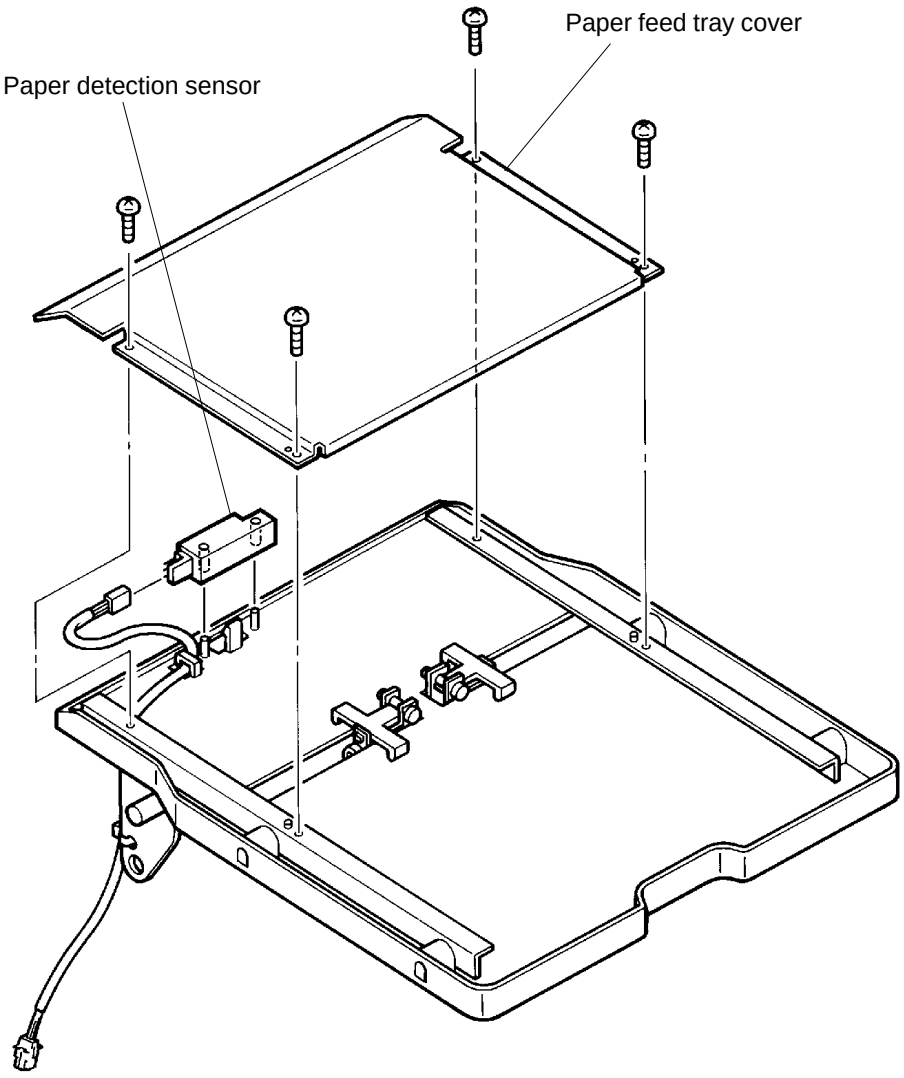


2. Paper Detection Sensor

1. Lower the Paper feed tray.
2. Remove the Drum from the machine.
3. Disconnect the power supply from the machine.
4. Remove Front cover.
5. Remove the Paper feed tray unit (page 4-7)
6. Remove four mounting screws of the Paper feed tray cover and remove the cover.
7. Remove the Paper detection sensor from the Paper feed tray unit and disconnect the Connector to free the sensor.

Precautions in Assembly

> Match the half-pierced section of the Paper detection sensor with its counter part.
> Match the half-pierced section of the Paper feed tray cover with its counter part.

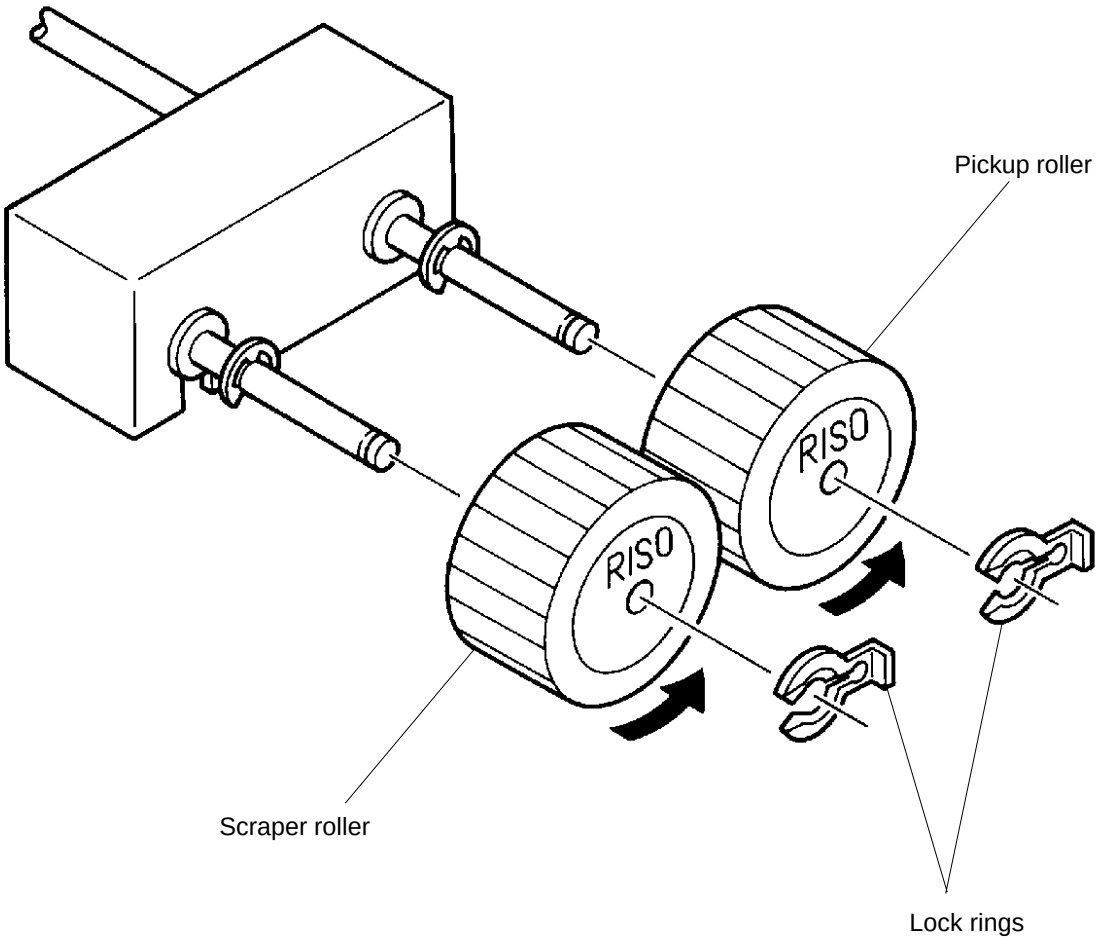


3. Scraper and Pickup Rollers

1. Lower the Paper feed tray all the way down.
2. Disconnect the power supply from the machine.
3. Remove Lock rings from the Scraper roller and Pickup roller shafts.
4. Slide the Scraper roller and Pickup roller out from the shafts.

Precautions in Assembly

> Both rollers have built-in one-way clutch.
If the rollers are put back on the shaft the opposite way (turned around), the one-way clutches prevent the rollers from rotating.
Placed correctly on the shafts, the rollers should rotate freely by hand in the direction shown on the illustration below.

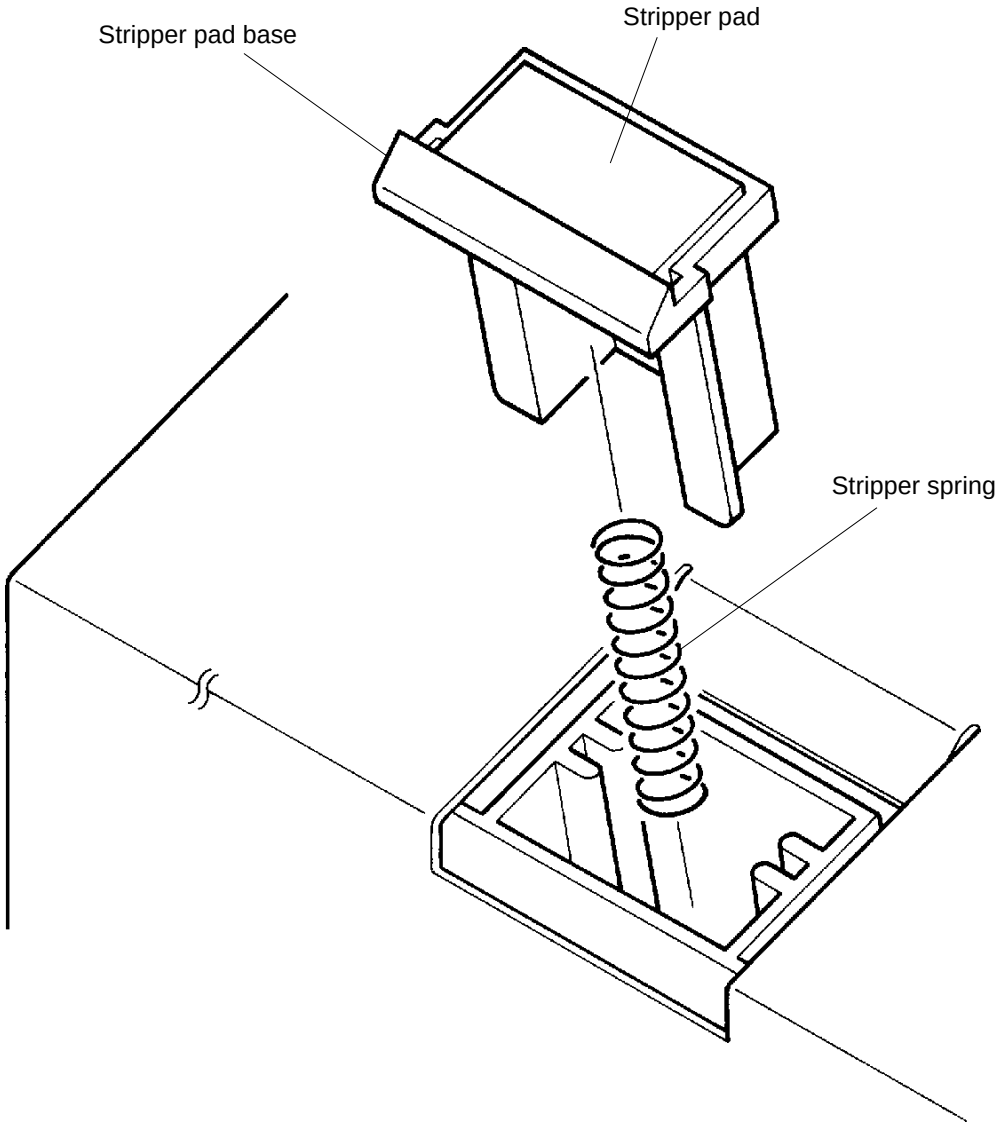


4. Stripper Pad

1. Lower the Paper feed tray all the way down.
2. Disconnect the power supply from the machine.
3. Remove the Scraper and Pickup Rollers. (page 4-9)
4. Remove the Stripper pad base carefully, not to damage the Stripper spring.
5. Remove the Stripper Pad from the Stripper pad base.

Precaution in Assembly

> Set the Stripper spring correctly in the machine before setting the Stripper pad base back in place.



5. Upper Limit Sensor

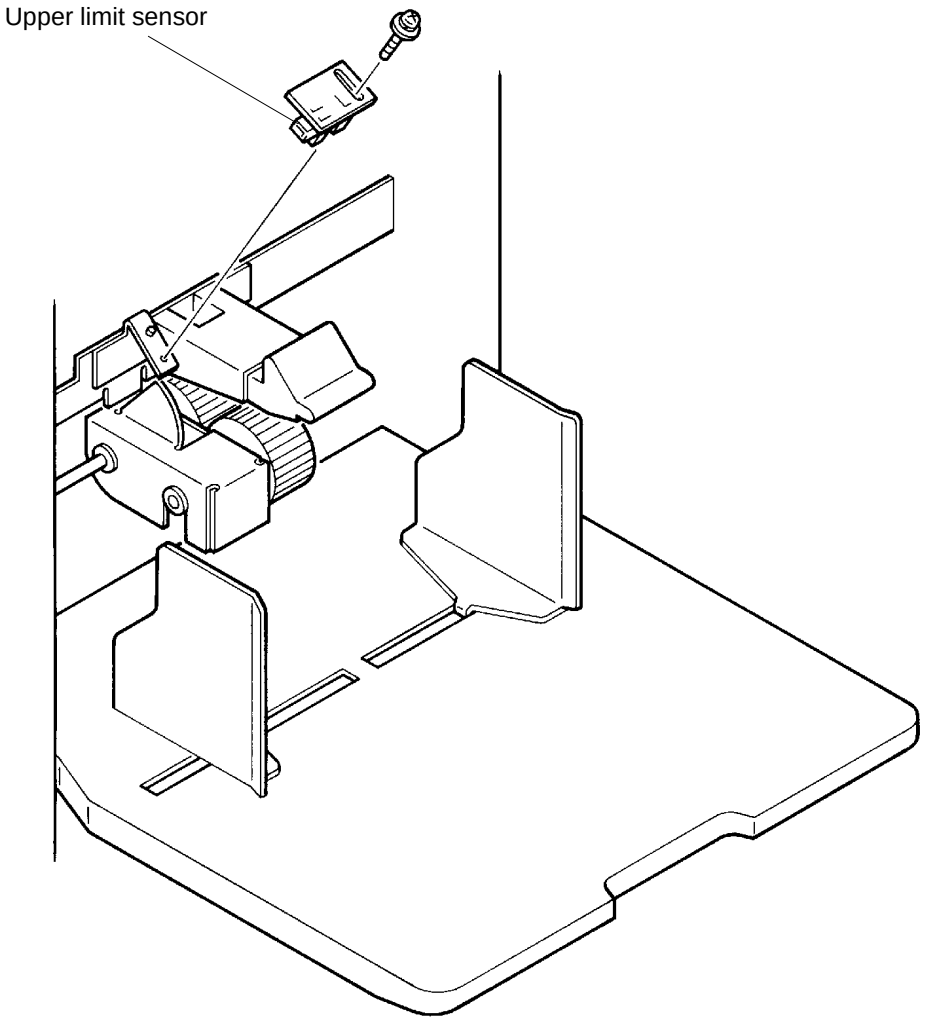
1. Lower the Paper feed tray.
2. Disconnect the power supply from the machine.
3. Remove the Master removal lower cover.
4. Remove the mounting screw of the Upper limit sensor bracket and remove the bracket with the sensor attached.
5. Disconnect the connector of the sensor, and remove the sensor from the bracket.

Precaution in Assembly

> Match the half-pierced section of the sensor bracket with its counter part.

Adjustment after Assembly

> Adjust the position of the sensor.

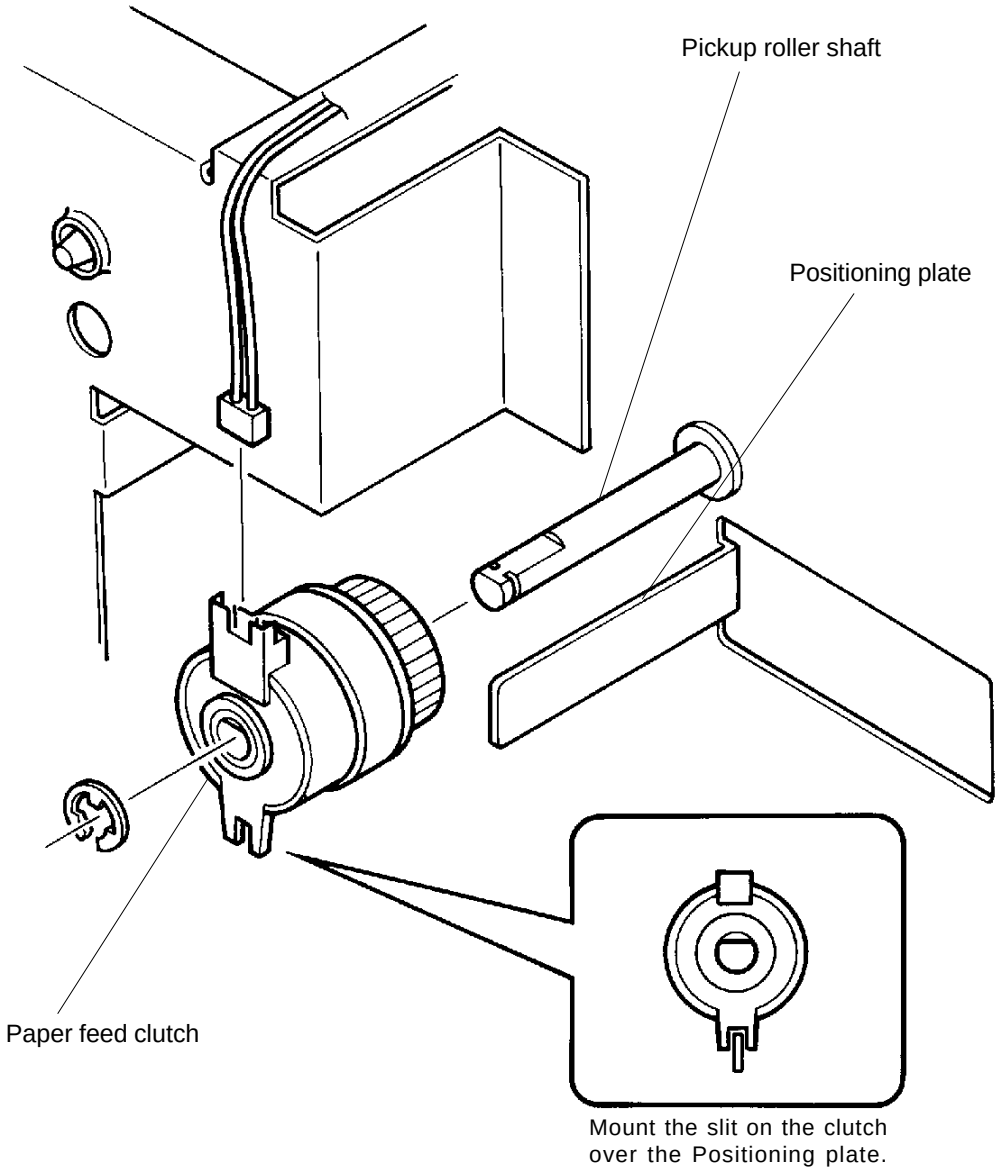


6. Paper Feed Clutch

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame
4. Disconnect the Connector of the Paper feed clutch.
5. Remove E-ring from the Pickup roller shaft and remove the Paper feed clutch from the shaft.

Precautions in Assembly

> Match the position of the flat cut portion of the Pickup roller shaft with that of the clutch.
> Mount the slit on the clutch over the Positioning plate on the machine to prevent the clutch from rotating.

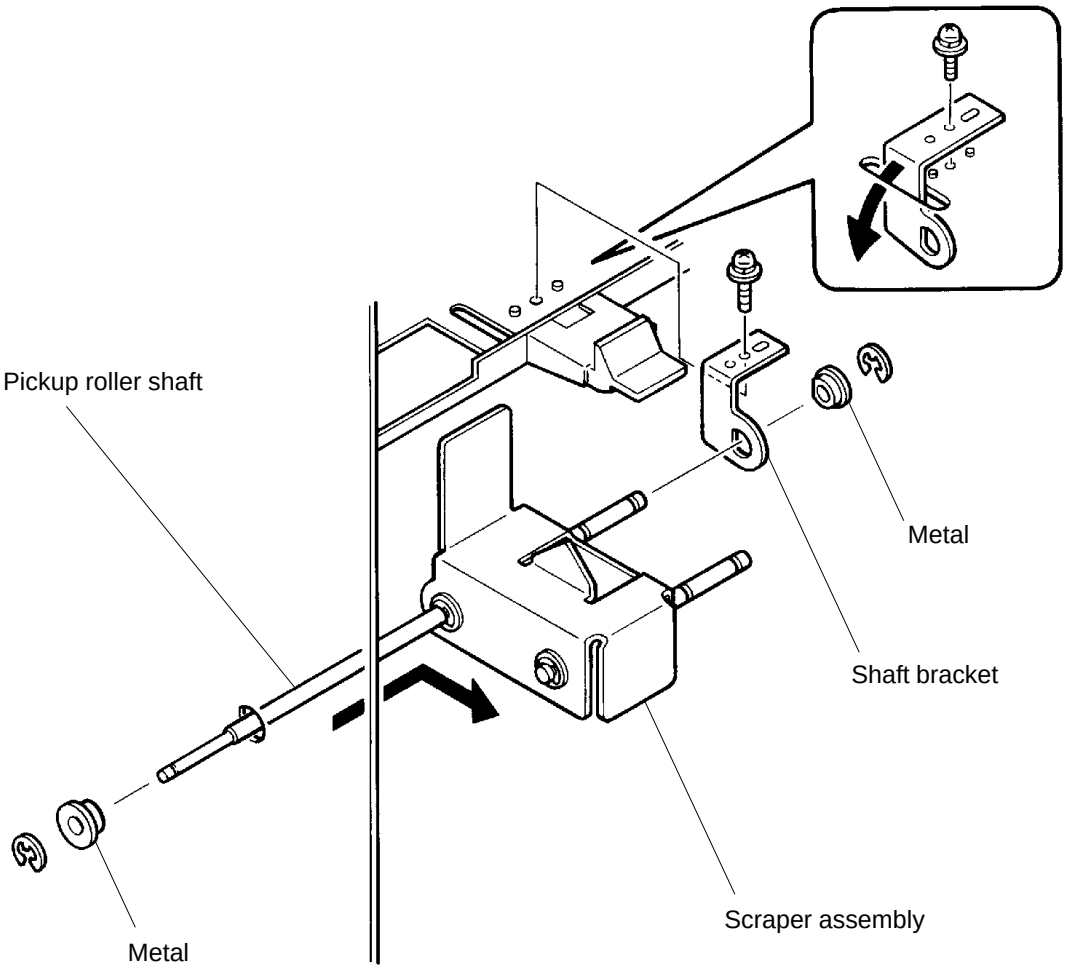


7. Scraper Assembly

1. Lower the Paper feed tray.
2. Disconnect the power supply from the machine.
3. Remove Back cover and Master removal lower cover.
4. Remove following three parts from the machine.
   > Pickup roller and Scraper roller (page 4-9)
   > Elevator upper limit sensor (page 4-11)
   > Paper feed clutch (page 4-12)
5. Remove E-rings from the both ends of the Pickup roller shaft and remove the Metals.
6. Remove the mounting screw of the Shaft bracket.
7. Slide the Pickup shaft to the drive side of the machine and remove the Shaft bracket.
8. Remove the Scraper assembly from the machine.

Adjustment after Assembly

> Adjust the position of the Elevator upper limit sensor. (page 4-15)

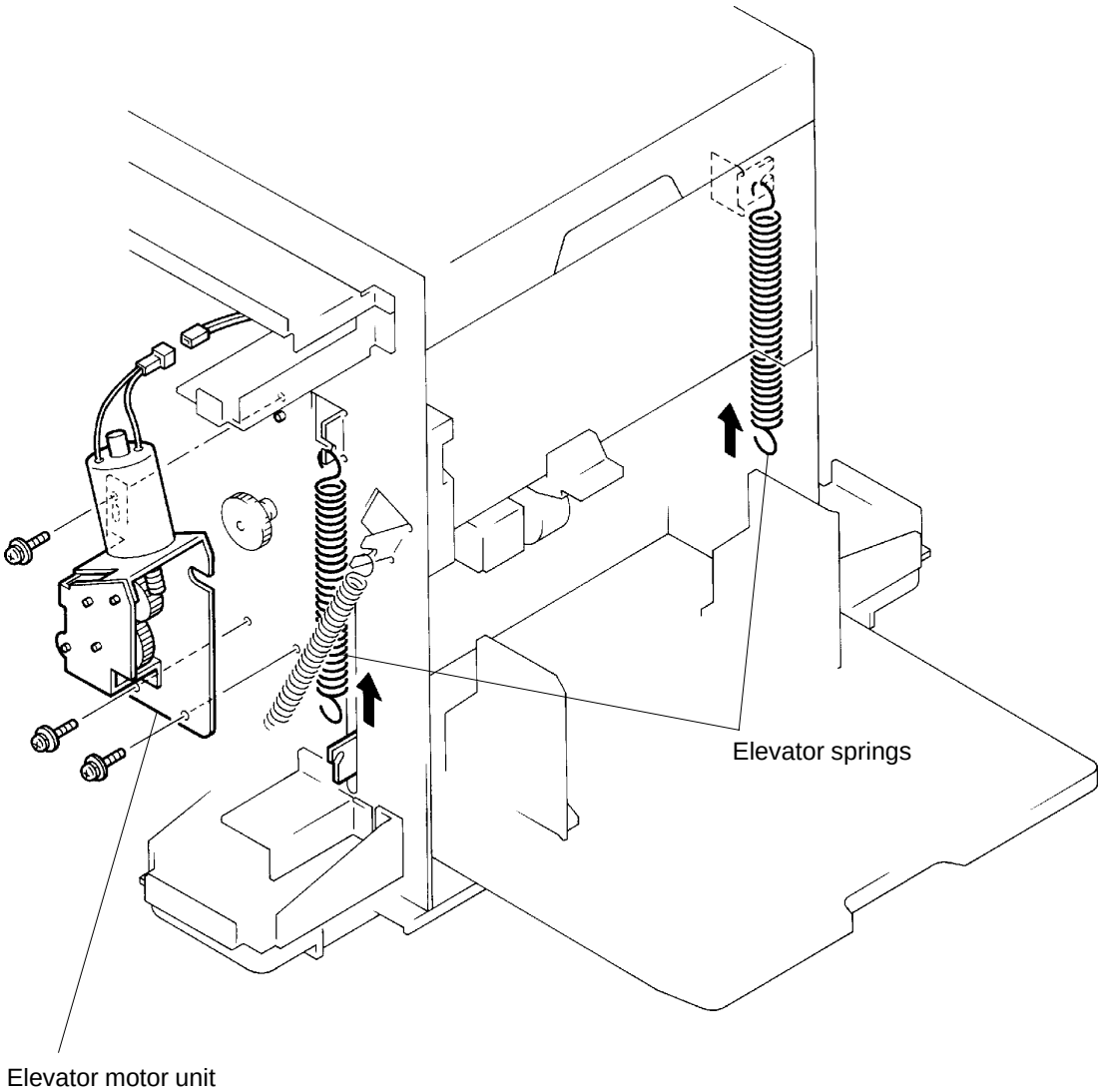


8. Elevator Motor Unit

1. Lower the Paper feed tray.
2. Remove the Drum from the machine.
3. Disconnect the power supply from the machine.
4. Remove the Front and Back covers.
5. Open the Main PCB bracket frame.
6. Remove the two Elevator springs from the machine.
7. Disconnect the Connector of the Elevator motor.
8. Remove three mounting screws of the Elevator motor unit and remove the unit from the machine.

Precautions in Assembly

> Match the half-pierced section of the Elevator motor unit with its counter part.



3. Adjustment

1. Upper Limit Sensor Position

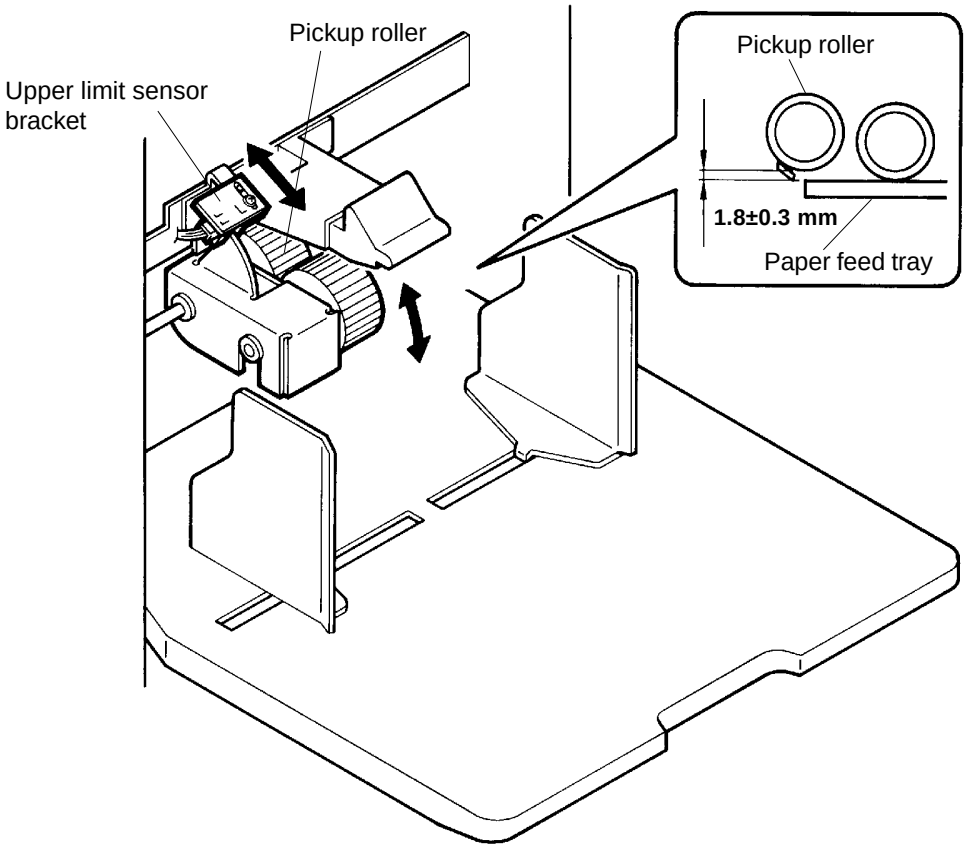
1. Remove paper from the Paper feed tray.
2. Select Test mode **No.102** and press START button to raise the Paper feed tray.
   Press the START button until the tray is all the way up, and then release the button.
3. Measure by the eye the space between the Pickup roller and Paper feed tray.
   Confirm that the space is **1.8 ± 0.3 mm**.
4. If the space is too little or too much, remove the Master disposal box and Master removal lower cover.
5. Loosen the mounting screw of the Upper limit sensor bracket and slide the bracket up or down to adjust the sensor position.
6. Repeat above steps 2, 3 and 5 until correct spacing of **1.8 ± 0.3 mm** is obtained.

Precaution in Adjustment

> Do not confuse the Pickup roller with the Scraper roller when measuring the space.
The Pickup roller is the one behind the Scraper roller.

Results of Incorrect Adjustment

> If the Upper limit sensor is too high;
the paper feed pressure becomes strong and multiple sheet feeding will occur.
> If the Upper limit sensor is set too low;
the paper feed pressure becomes weak and paper will skip or not feed.



2. First Paper Feed Distance (OFF Timing of Paper Feed Clutch)

If the paper jams or does not feed smoothly due to incorrect amount of paper buckle at the finish of the First paper feed, use Memory SW **No.210** (Test Mode No.210) to adjust the timing of the Paper feed clutch deactivation.

Results of Incorrect Adjustment

> If too much or too little paper buckle is made, the paper does not transfer correctly into the Second paper feed section and may result in paper jamming.

The Drum rotation angle from the time the Paper sensor detects incoming paper until the Paper feed clutch deactivates.

INCREASE →

Memory SW	0	1	2	3	4	5	6	7
Drum Angle (°)	21	22	23	24	25	26	27	28
	8	9	A	B	C	D	E	F
	13	14	15	16	17	18	19	20

← DECREASE

CHAPTER 5: SECOND PAPER FEED SECTION

CONTENTS

1. Theory of Operation

1. Second Paper Feed Drive Mechanism

1. Drive

> Main cam makes clockwise rotation (looking from the rear) with the turn of the main motor.
> The Main cam rotation moves Sector gear back and forth via Cam follower arm.
> The Sector gear rotates Timing roller via Timing cam.
> The Timing roller rotates Guide roller.

2. Timing Cam

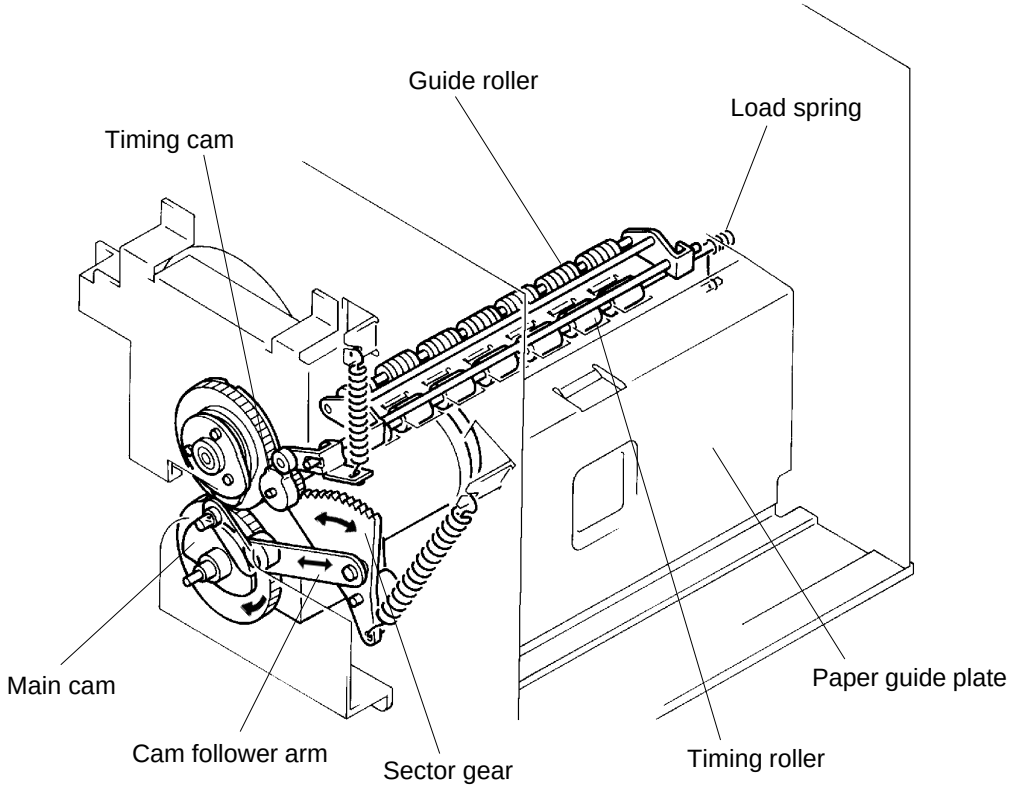
> The Timing cam contains one-way clutch.
> The rotation of the Timing cam is transferred to the Timing roller only when the Timing cam makes counter-clockwise rotation.

3. Timing Roller

> The Timing roller contains Load spring which applies brake on the roller at all times. It stops the rotation of the roller as soon as the Timing cam stops its counter-clockwise rotation.
> The Timing roller stays still while the Timing cam makes clockwise rotation.

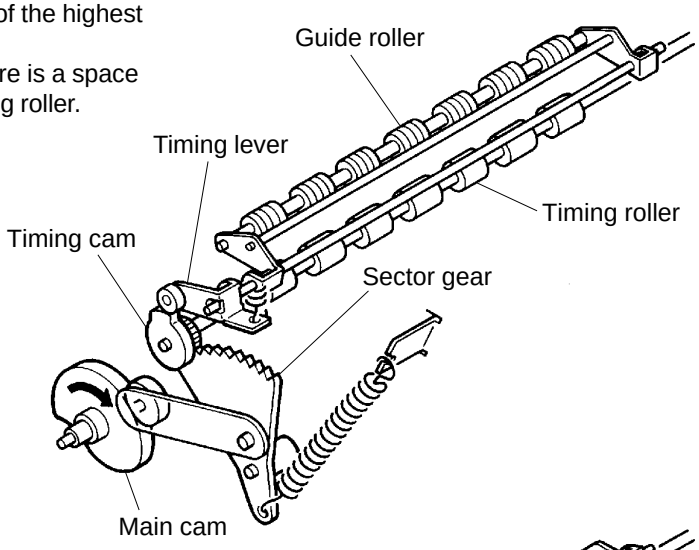
4. Guide Roller

> The Guide roller is a free rotating roller.
> It rotates when coming in contact with a rotating Timing roller.
> The vertical movement of the Guide roller is controlled by the rotation of the Timing roller.
> The Guide roller comes down and contacts against the Timing roller while the First paper feed section is still in motion.
> The Guide roller lifts and releases from the Timing roller the same time the Timing roller stops its rotation.



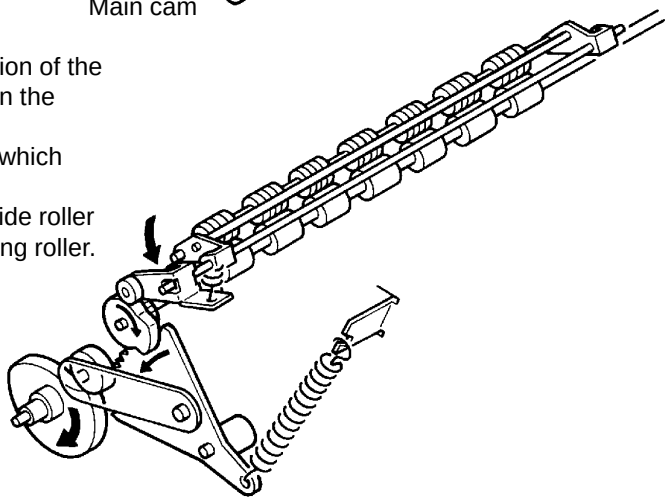
Drum Position-B

> At Position-B, the Timing lever on top of the highest position of the Timing cam.
> Thus the Guide roller is raised and there is a space between the Guide roller and the Timing roller.



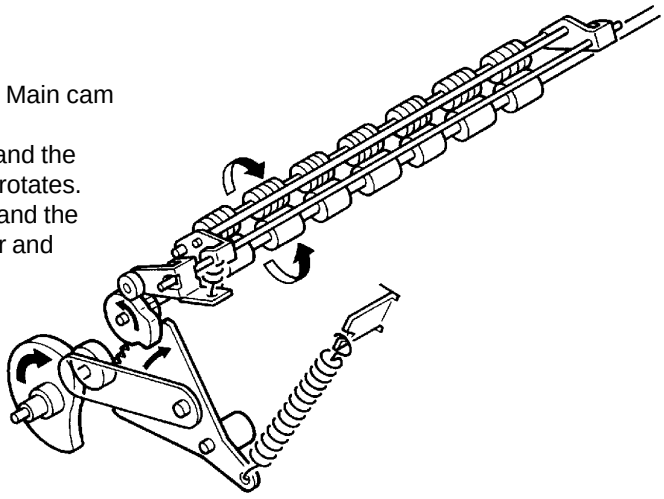
First Paper Feed

> With the start of 1st paper feed, the rotation of the Main cam brings the Sector gear down, in the direction shown by arrow mark.
> The Sector gear rotates the Timing cam which brings the Timing lever down.
> As the Timing lever comes down, the Guide roller goes down, making contact with the Timing roller.



Second Paper Feed

> After the 1st paper feed is completed, the Main cam rotation brings the Sector gear up.
> The Sector gear rotates the Timing cam, and the Timing roller attached on the Timing cam rotates.
> The Timing roller rotates the Guide roller, and the paper pinched in between the Timing roller and Guide roller is fed towards the Drum.



2. Vertical Printing Position

1. Print Positioning Motor

> The Print positioning motor activates when the Print position adjustment keys, ◁ or ▷, is pressed.

> When one of above keys is pressed, the Print positioning motor activates and rotates the Vertical print position cam.

2. Print positioning Cam

> The Print positioning cam on the inner surface has a groove cut in a whirl shape.

> As the cam is rotated by the Print positioning motor, it pulls or pushes the Print positioning plate with its whirl groove.
The pivot of the plate is on the Main cam shaft and a pin on the plate is engaged in the whirl groove of the cam.

3. Print Positioning Lever

> Print positioning lever attached at the top of the Print positioning plate is pulled up or pushed down as the plate moves the either way.

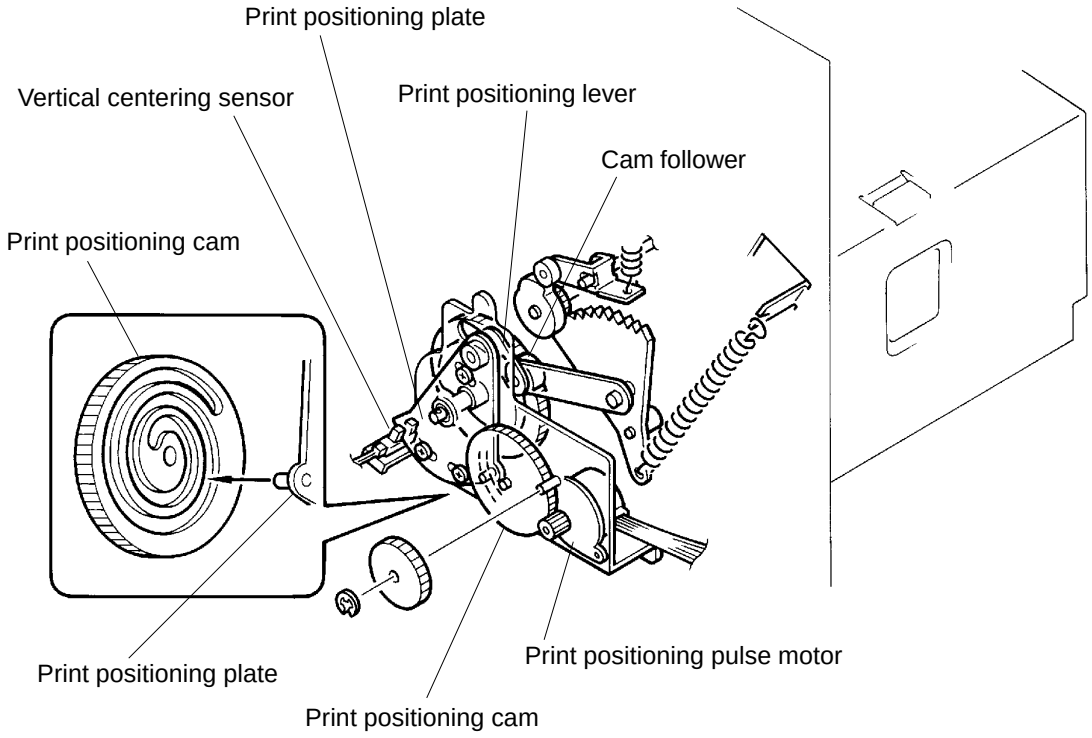
> When the lever is pushed down, the Cam follower moves down with it and it causes the Cam follower to contact the Main cam at a lower position.

> When the lever is pulled up, the Cam follower comes up with it and it causes the Can follower to contact the Main cam at a higher position.

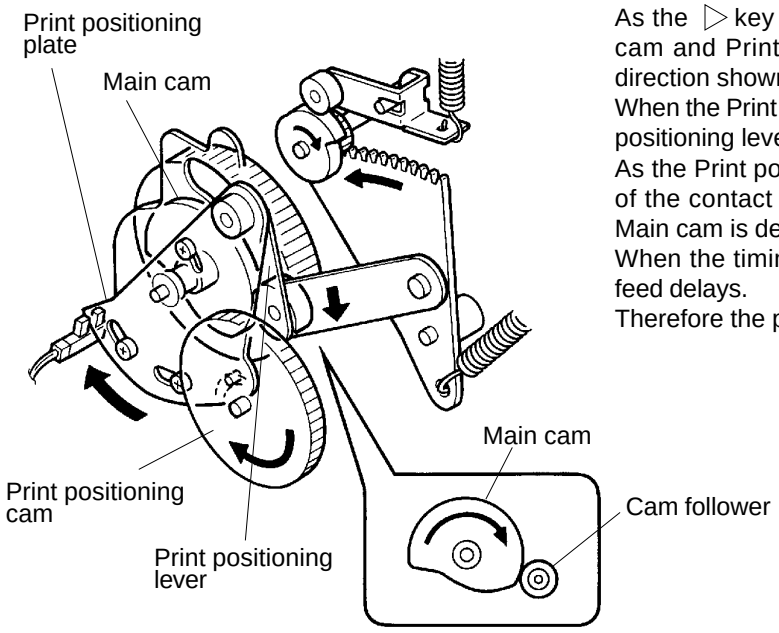
4. Print Position

> When the ▷ key is pressed, the Print positioning lever is pushed down and the print position moves up.

> When the ◁ key is pressed, the Pint position lever is pressed up and the print position moves down.

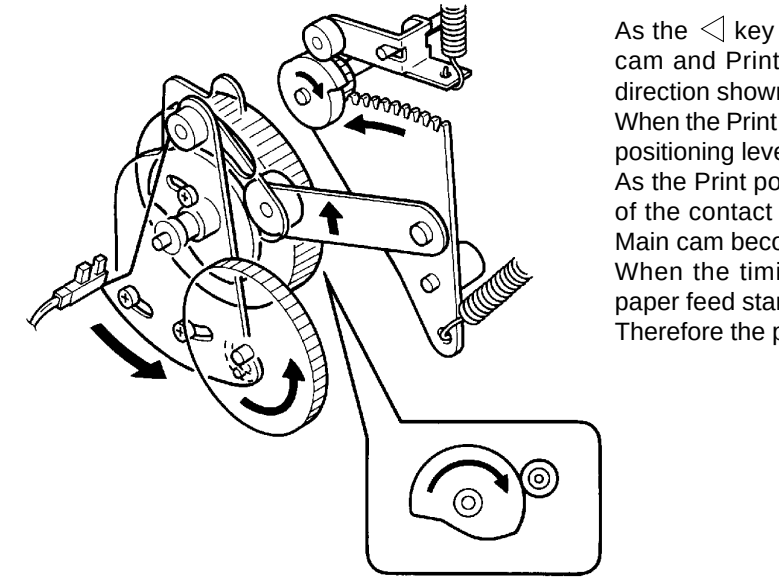


▷ Key moves the print position up.



As the ▷ key is pressed, the Print positioning cam and Print positioning plate moves in the direction shown by the arrow marks.
When the Print positioning plate moves, the Print positioning lever moves with it.
As the Print positioning lever moves, the timing of the contact of the Cam follower against the Main cam is delayed.
When the timing is delayed, the second paper feed delays.
Therefore the print position moves up.

◁ Key moves the print position down.



As the ◁ key is pressed, the Print positioning cam and Print positioning plate moves in the direction shown by the arrow marks.
When the Print positioning plate moves, the Print positioning lever moves with it.
As the Print positioning lever moves, the timing of the contact of the Cam follower against the Main cam becomes earlier.
When the timing becomes early, the second paper feed starts early.
Therefore the print position moves down.

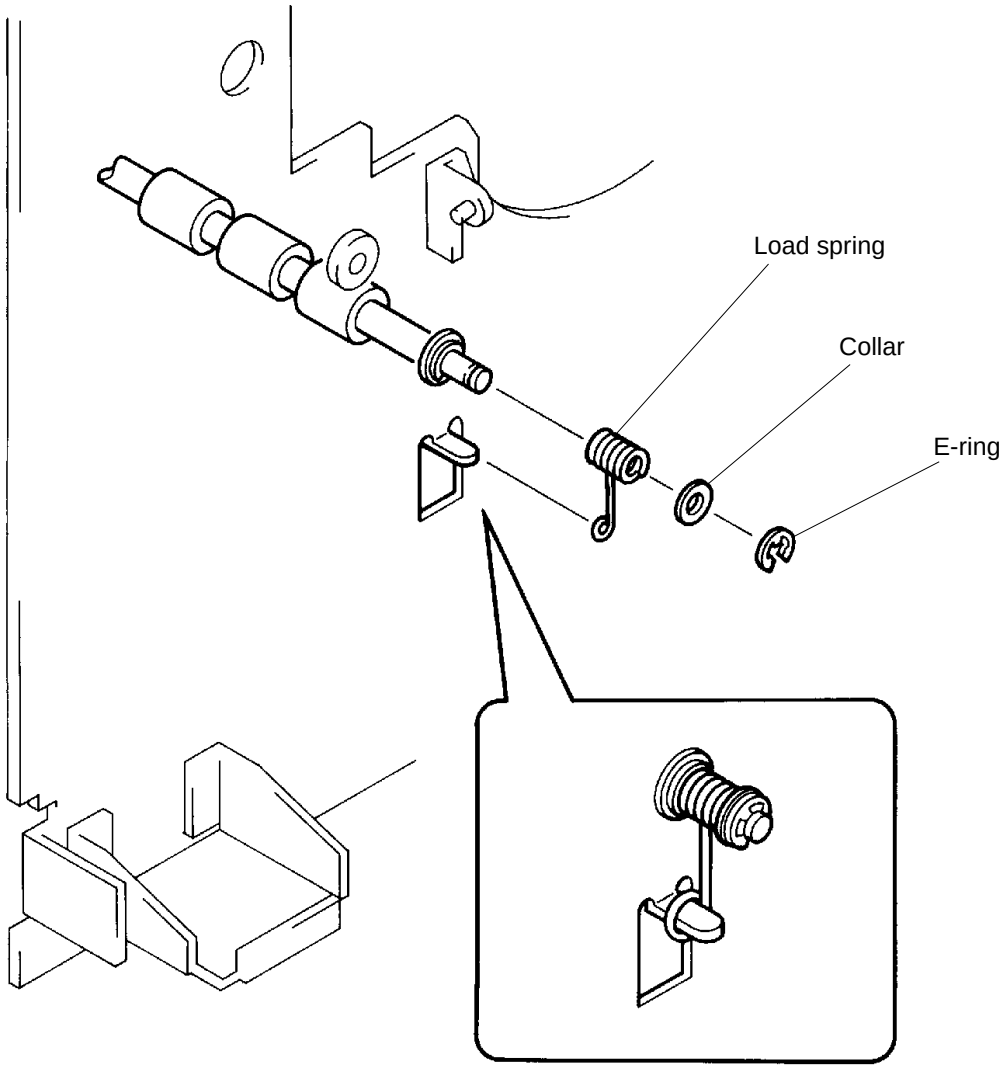
2. Removal and Assembly

1. Load Spring

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Front cover.
4. Remove E-ring and Collar from the Timing roller shaft.
6. Remove the Load spring from the shaft.

Precaution before Assembly

> Install the Load spring in the correct direction.

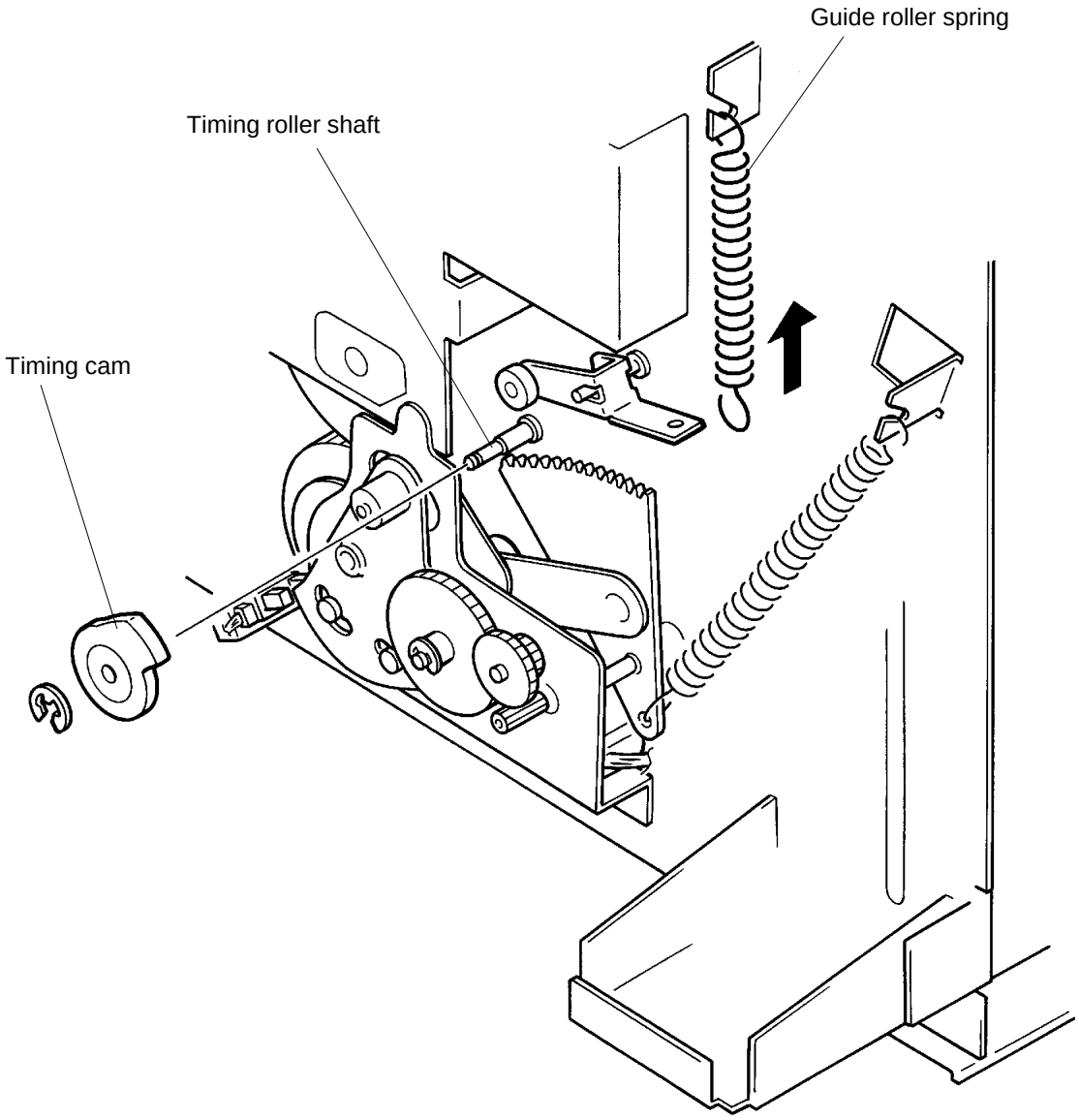


2. Timing Cam

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame.
4. Remove the Guide roller spring.
5. Remove E-ring from the Timing roller shaft and remove the Timing cam.

Adjustment after Assembly

> Adjust the position of the Timing cam.

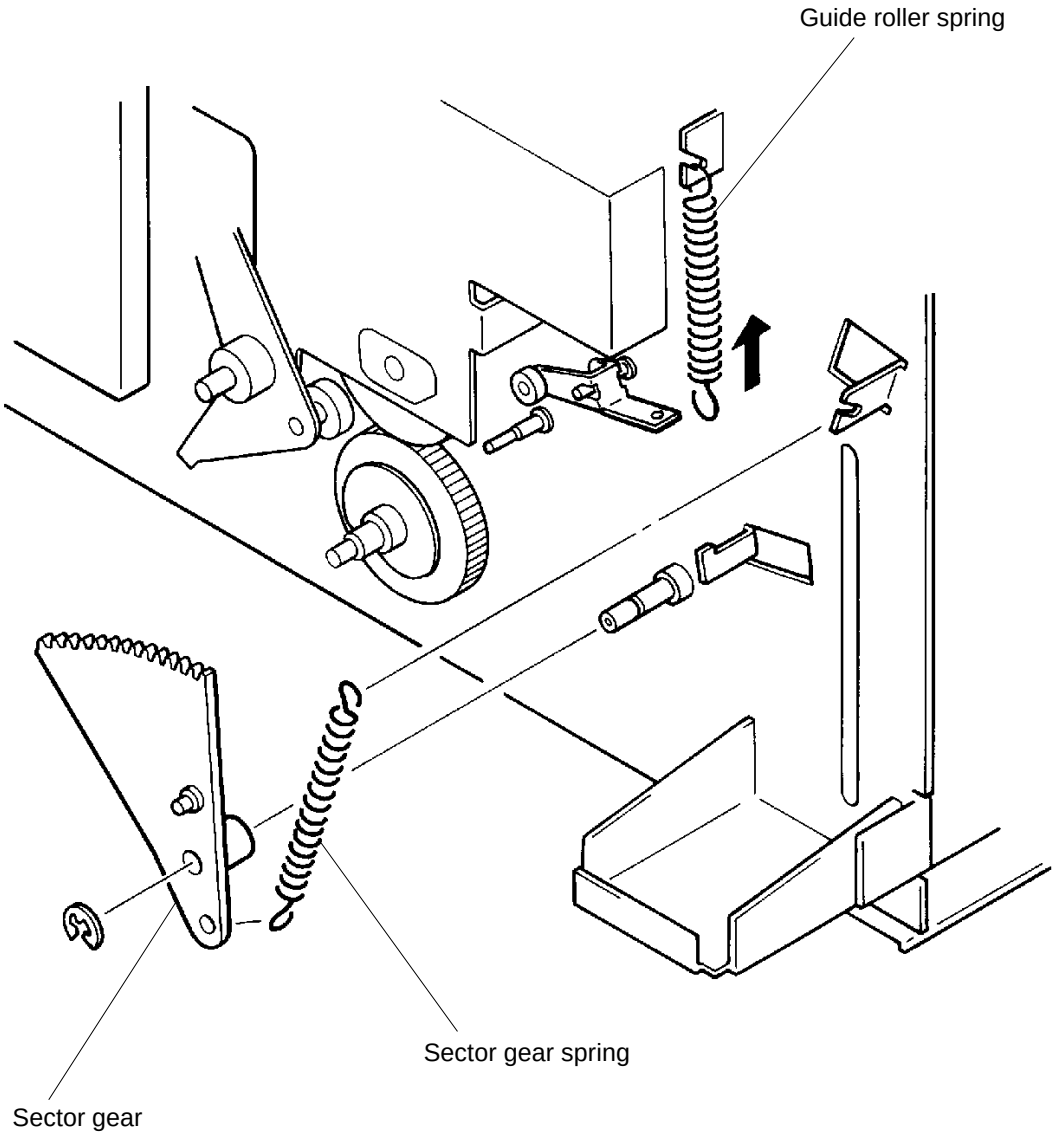


3. Sector Gear

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame.
4. Remove following two parts from the machine.
   > Print positioning unit (page 5-8)
   > Timing cam (page 5-6)
5. Remove E-ring from the Sector gear shaft and remove the gear.

Adjustment after Assembly

> Adjust the position of the Timing cam. (page 5-15)

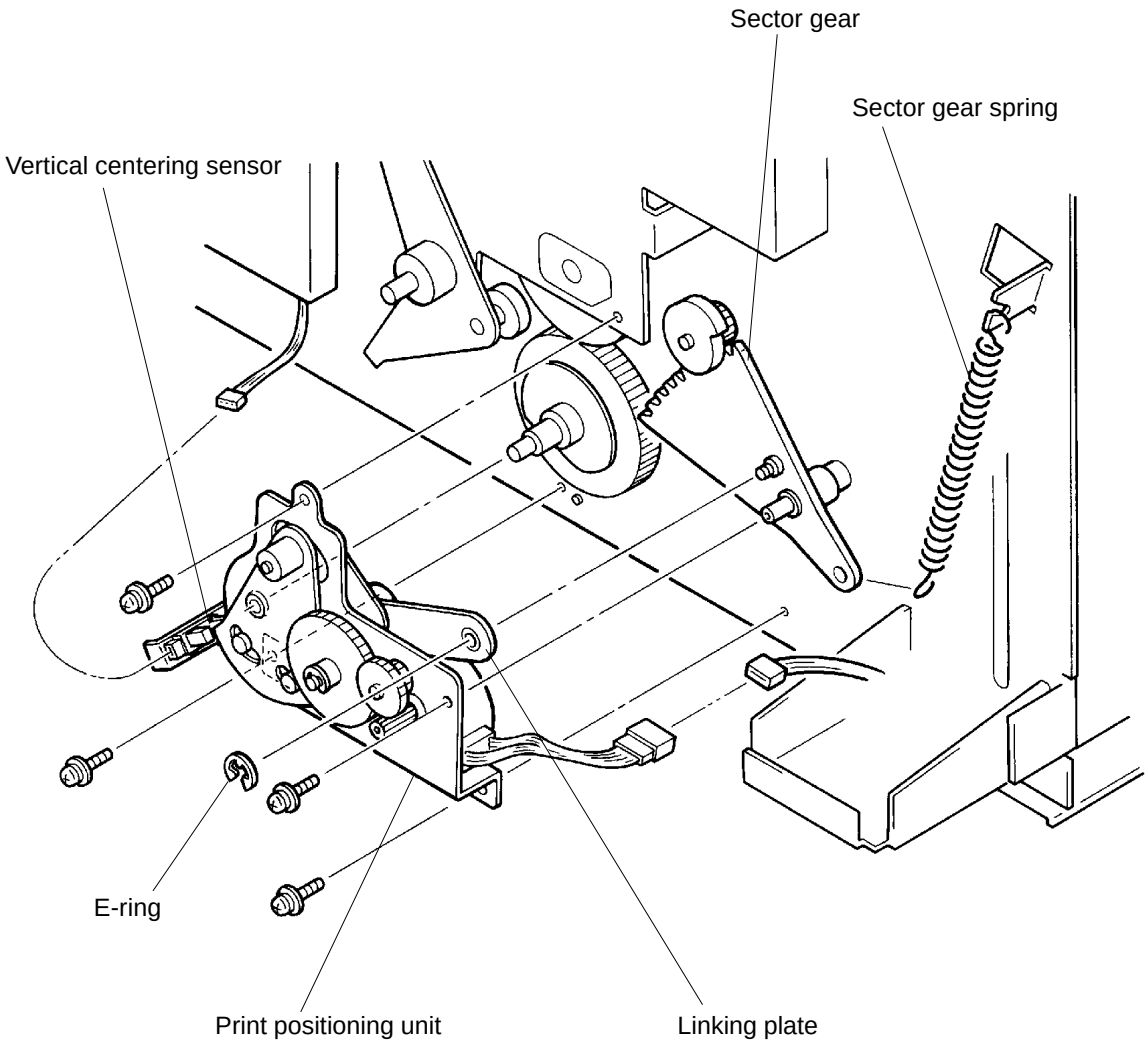


4. Print Positioning Unit

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame.
4. Remove the Sector gear spring.
5. Disconnect the Connectors from following two electrical components.
   > Vertical centering sensor
   > Print positioning pulse motor
6. Remove E-ring from the Linking plate and remove the Linking plate.
7. Remove four mounting screws of the Print positioning unit and remove the unit.

Adjustment after Assembly

> Adjust the position of the Timing cam.

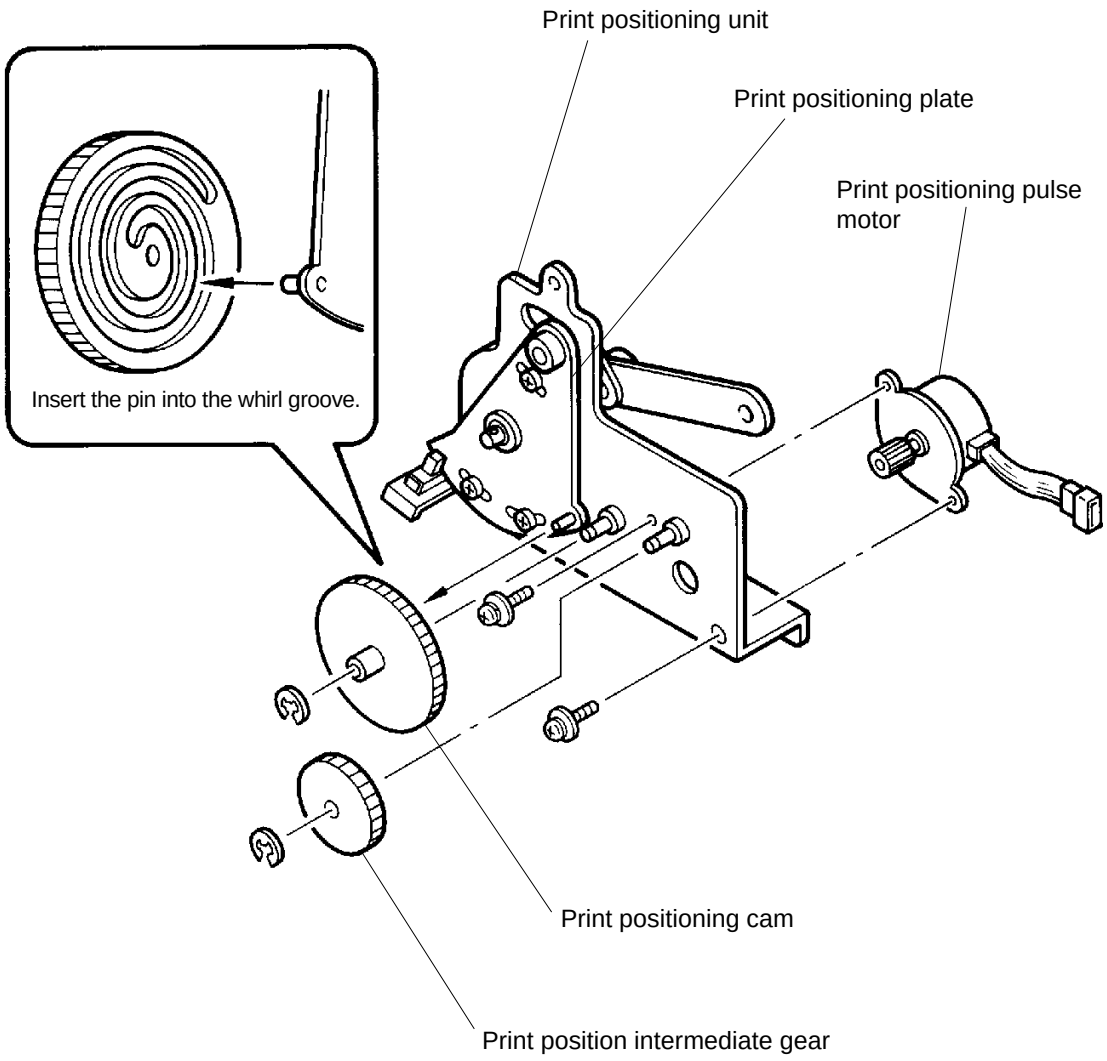


5. Print Positioning Pulse Motor

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame.
4. Remove the Print positioning unit. (page 5-8)
5. Remove two E-rings from the Print positioning unit and remove the Print positioning cam and Print position intermediate gear.
6. Remove two mounting screws of the Print positioning motor and remove the motor.

Precautions before Assembly

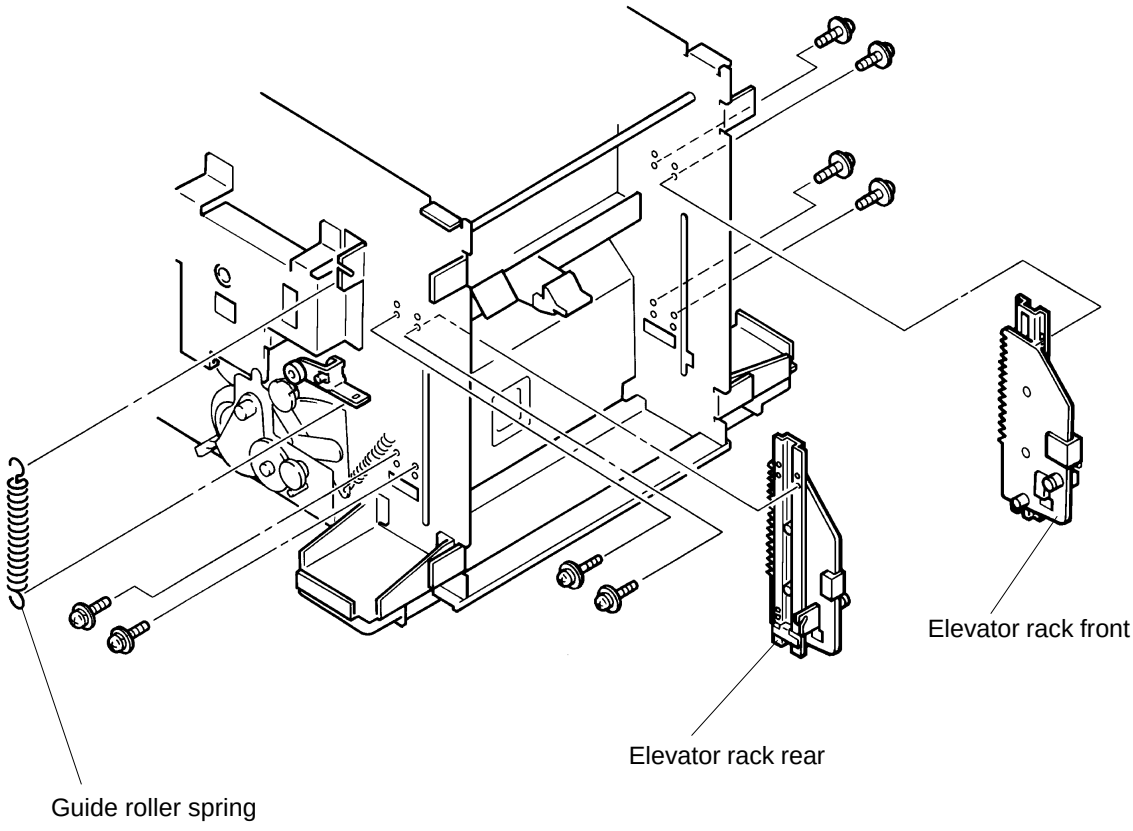
> Insert the pin on the Print positioning plate into the whirl groove of the Print positioning cam.



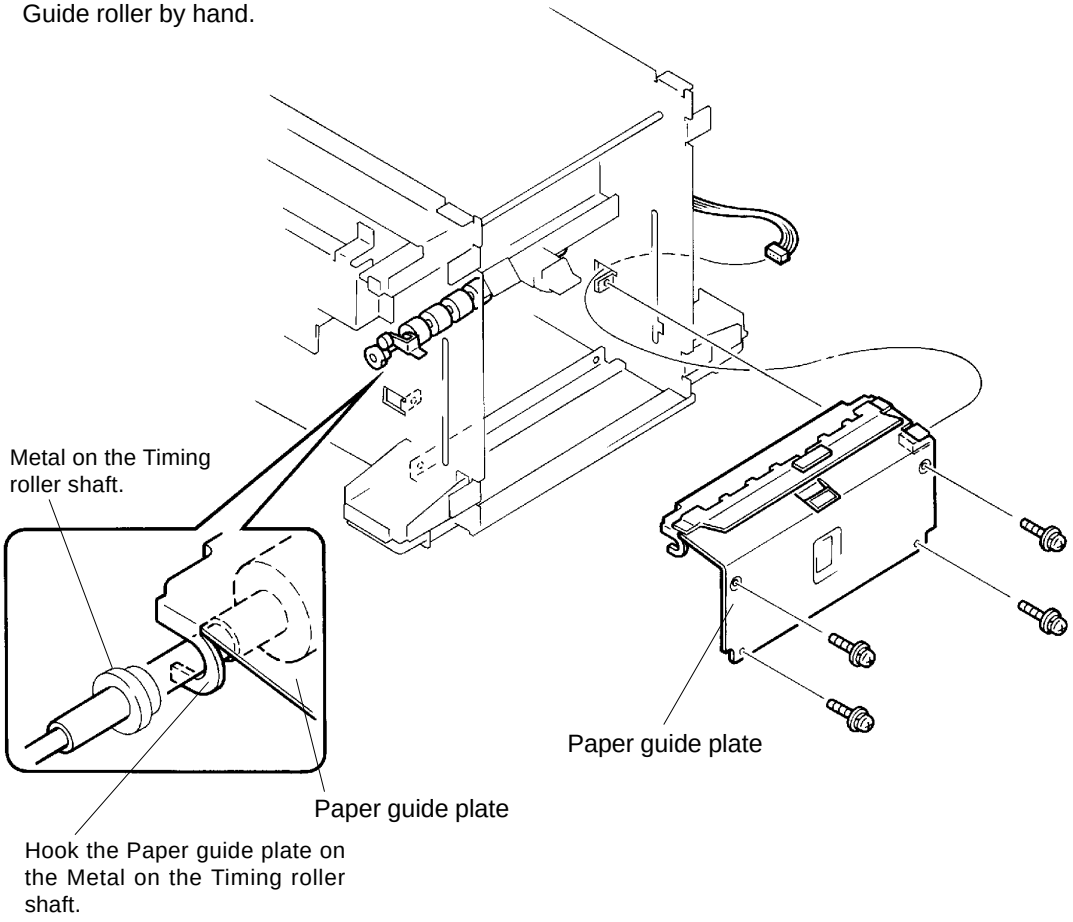
6. Paper Guide Plate

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following parts from the machine.
   > Back cover, Front cover, and Master removal lower cover
   > Paper feed tray unit (page 4-7)
   > Paper feed clutch (page 4-12)
   > Scraper ass'y (page 4-13)
   > Elevator motor unit
4. Remove four screws each from Elevator rack front and rear.
5. Remove the Guide roller spring.

(continues on page 5-11)

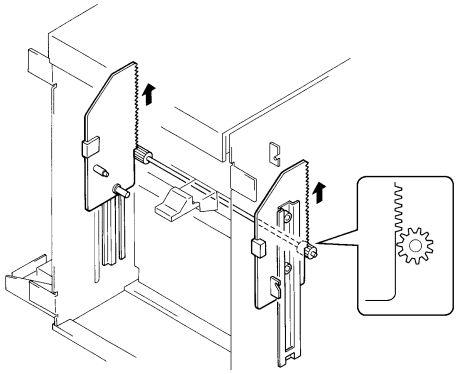


6. Remove the connector from the Paper guide plate.
7. Remove four mounting screws of the Paper guide plate and remove the plate while lifting the Guide roller by hand.



Precautions before Assembly

> Hook the Paper guide plate on the Metal of the Timing roller shaft.
> Match the half-pierced sections when installing the Elevator rack front and rear.
> Match the height of the gears against the Elevator rack front and rear.



>Lift the Elevator racks Front and Rear all the way up to disengage the gears.
>Then match the height of the Front and Rear racks and let both slide down to keep the two level to each other.
>This must be done before attaching the Elevator motor unit.

Adjustment after Assembly

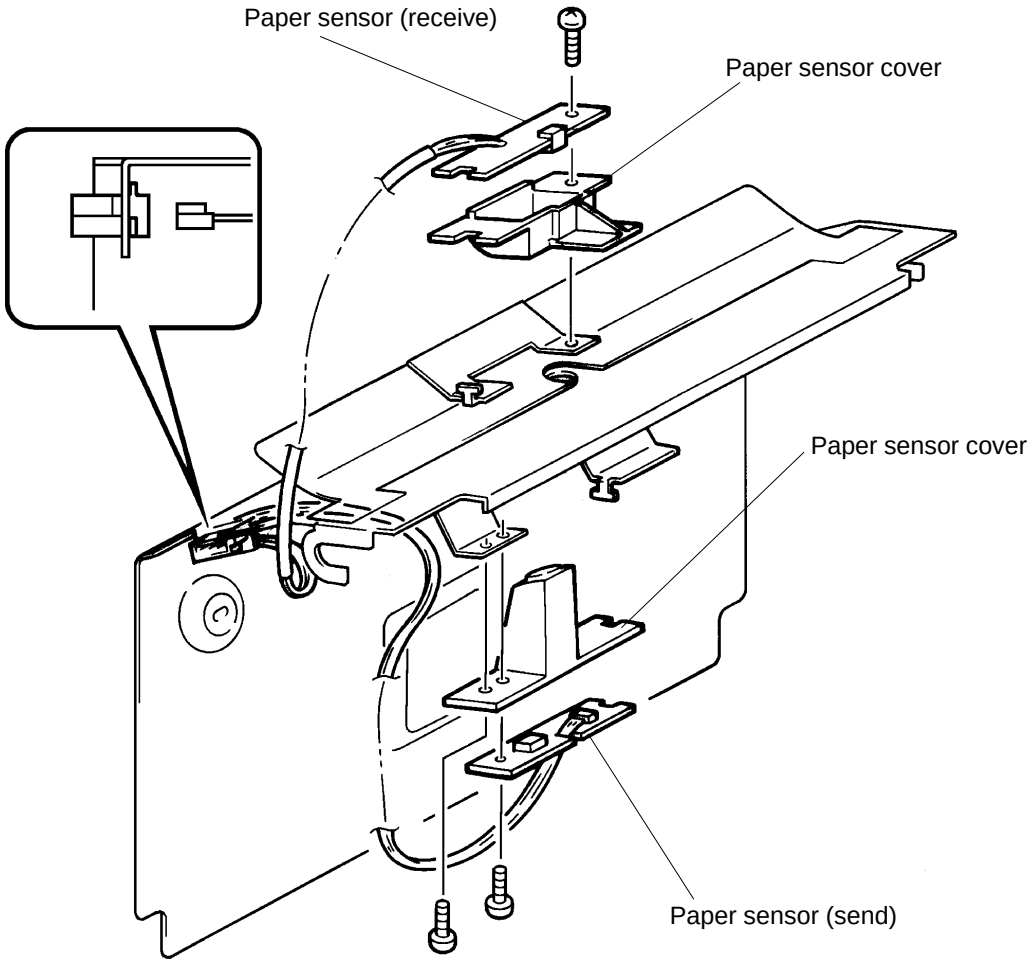
> Adjust the position of the Elevator upper limit sensor. (page 4-15)

7. Paper Sensor

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following parts from the machine.
   > Back cover, Front cover and Master removal lower cover
   > Paper feed tray unit (page 4-7)
   > Scraper ass'y (page 4-13)
   > Elevator motor unit (page 4-14)
   > Paper guide plate (page 5-10)
4. Disconnect the connector of the Paper sensor from the Paper guide plate.
5. Remove the mounting screws of both the Paper sensor (send) and (receive), and remove the sensors from the Paper guide plate.

Precautions before Assembly

> Hook the Paper sensor (send) and (receive) on the Paper guide plate and then screwing them on.

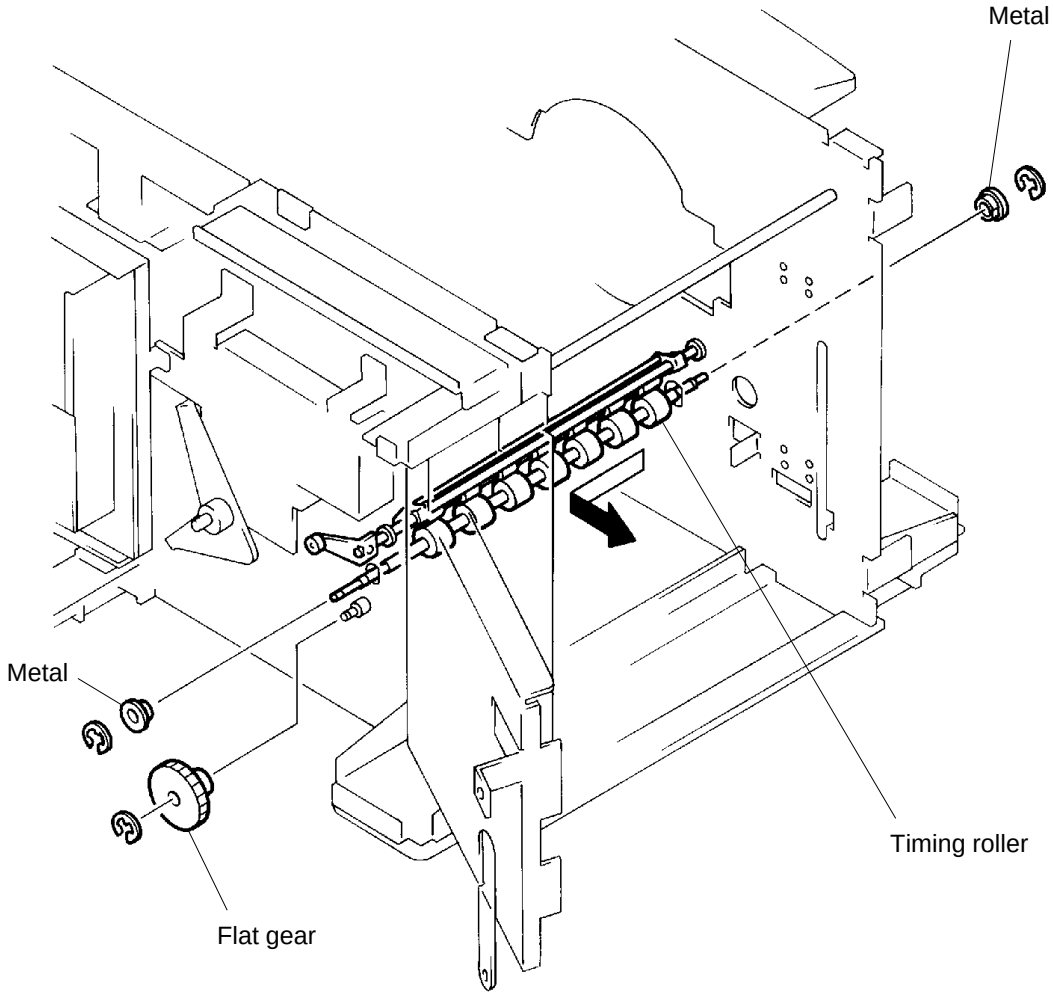


8. Timing Roller

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following parts from the machine.
   > Back cover and Front cover
   > Load spring (page 5-5)
   > Timing cam (page 5-6)
   > Print positioning unit (page 5-8)
   > Paper guide plate (page 5-10)
4. Remove E-ring and slide out the Flat gear from the shaft.
5. Remove E-rings from both ends of the Timing roller shaft and remove the Metals.
6. Slide the Timing roller once to the drive side of the machine and then remove it out through the opening at the paper feed area.

Adjustment after Assembly

> Adjust the mounting position of the Timing cam. (page 5-15)



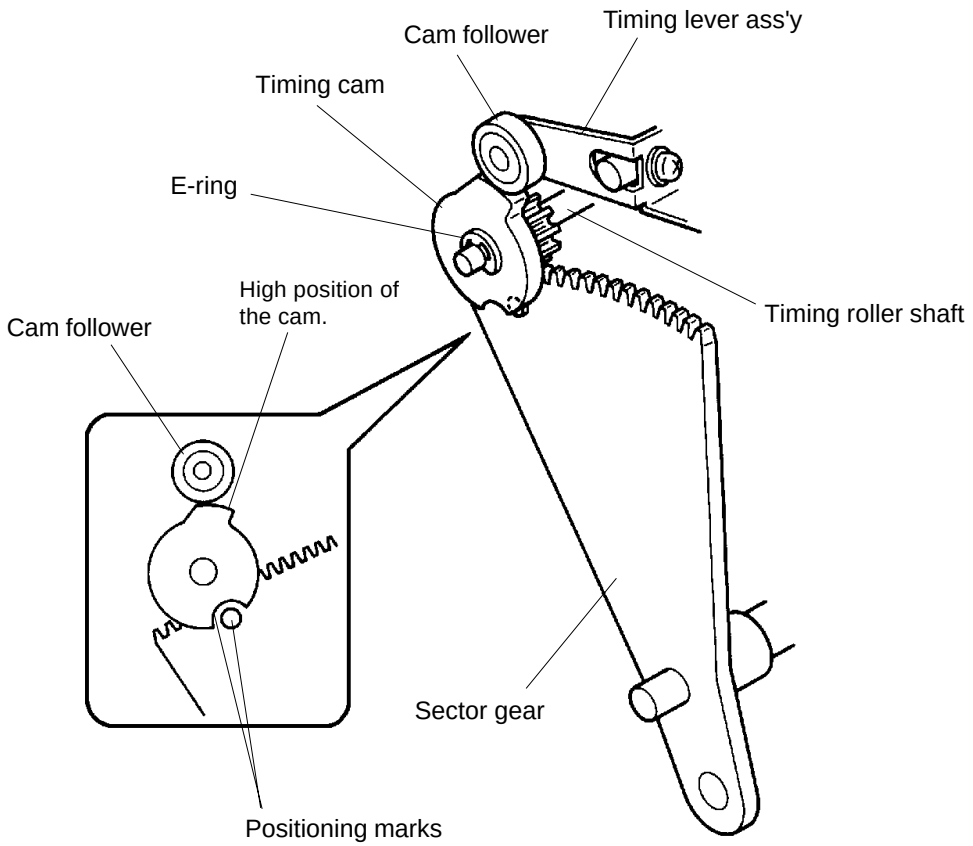
3. Adjustment

1. Timing Cam Mounting Position

1. Rotate the Drum to the Position-B.
2. Disconnect the power supply from the machine.
3. Remove the Back cover from the machine.
4. Check whether the positioning marks on the Sector gear and Timing cam are aligned.
5. If they are not, remove an E-ring and take the Timing cam off from the Timing roller shaft.
6. Lift the Timing lever assembly and mount the Timing cam back on the Timing roller shaft, aligning the positioning mark on the cam with that on the Sector gear.
7. Mount the E-ring back on the Timing roller shaft.

Result of Incorrect Adjustment

> If the position of the Timing cam against the Sector gear is not correct, the timing of the Guide roller (vertical movement) goes off and paper jamming, print registration problems or blurred prints may occur.



CHAPTER 6: PRESS SECTION

CONTENTS

1. Theory of Operation

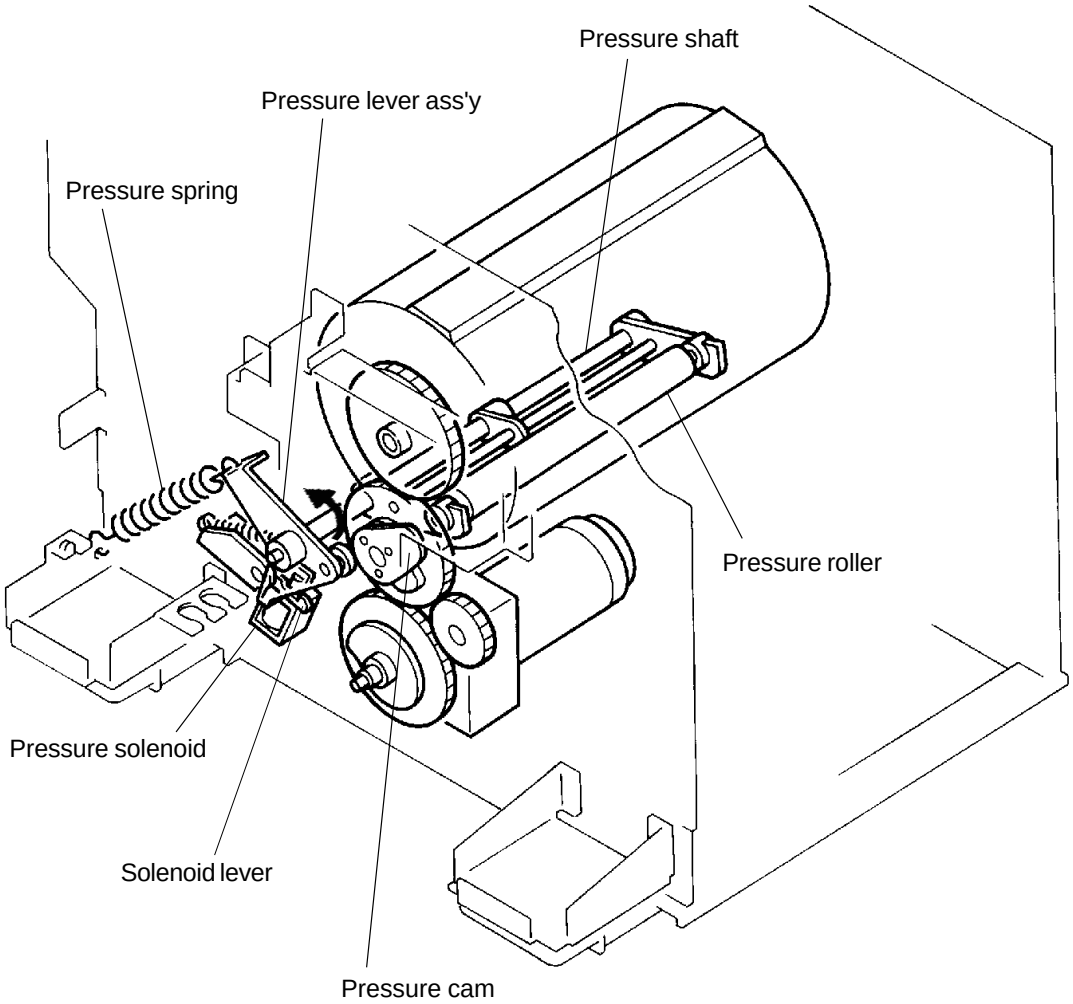
1. Press Mechanism

1. Pressure Solenoid

> The Pressure solenoid activates when the Drum rotates 40° from the first Position-A after the Start button is pressed for printing.
> At this Drum position, the Solenoid lever and Pressure lever ass'y are still engaged.

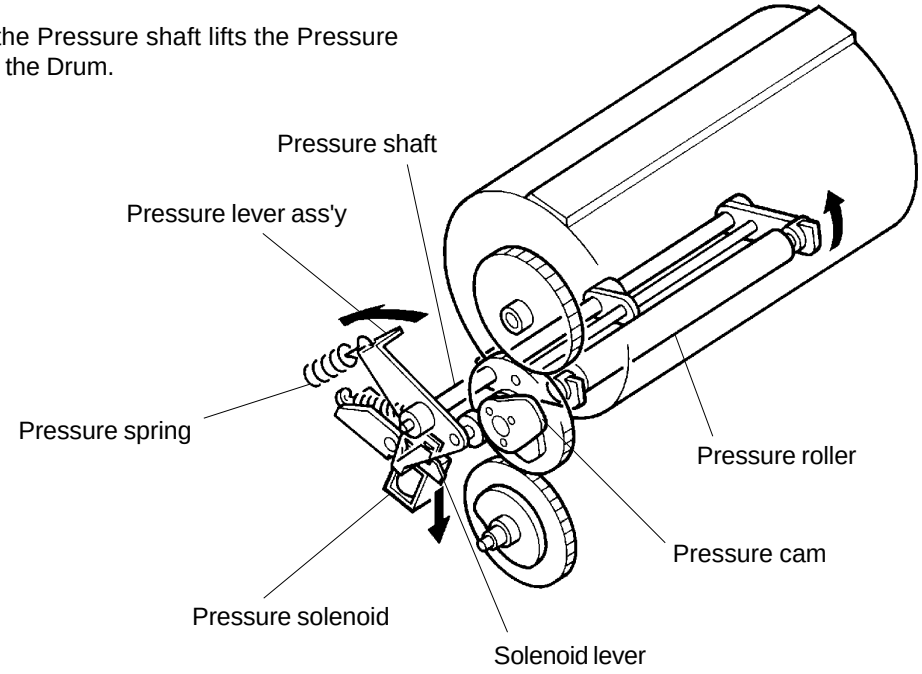
2. Pressure Roller

> The Solenoid lever disengages from the Pressure lever ass'y as the Drum rotates and the Clamp plate on the Drum comes near the Pressure roller.
> The Pressure lever ass'y is then pulled back by the Pressure spring and turns the Pressure shaft in the direction shown by the arrow mark.
> The Pressure lever ass'y rotating in the direction of the arrow mark lifts the Pressure roller up against the Drum.
> To prevent the Pressure roller from hitting against the Clamp plate of the Drum during printing, the Pressure cam pushes against the Pressure lever ass'y to rotate it in the direction opposite to the arrow mark and lowers the Pressure roller clear from the Drum.
> The Pressure solenoid is activated "ON" throughout the printing process.



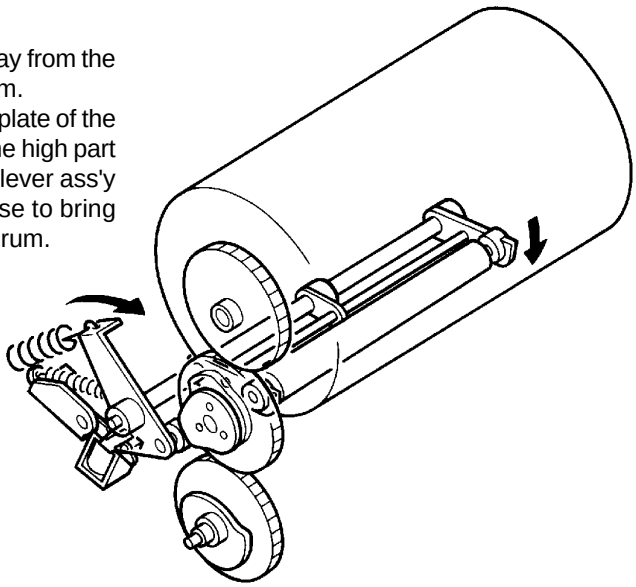
Lifting the Pressure Roller

The Pressure solenoid is activated throughout the printing.
The solenoid pulls the Solenoid lever down and disengages Pressure lever ass'y from the Solenoid lever.
The Pressure spring pulls back the Pressure lever ass'y and rotates the Pressure shaft which is acting as a pivot.
The rotation of the Pressure shaft lifts the Pressure roller up against the Drum.

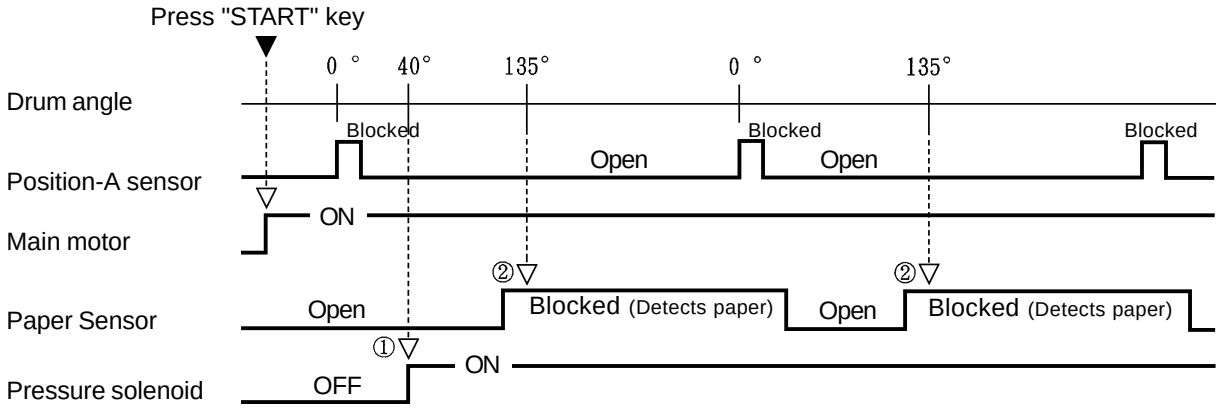


Lowering the Pressure Roller

The Pressure roller is lowered by force, away from the Drum, by the high part of the Pressure cam.
During the Drum rotation, when the Clamp plate of the Drum comes close to the Pressure roller, the high part of the Pressure cam pushes the Pressure lever ass'y down, rotating the Pressure shaft clockwise to bring the Pressure roller down, away from the Drum.



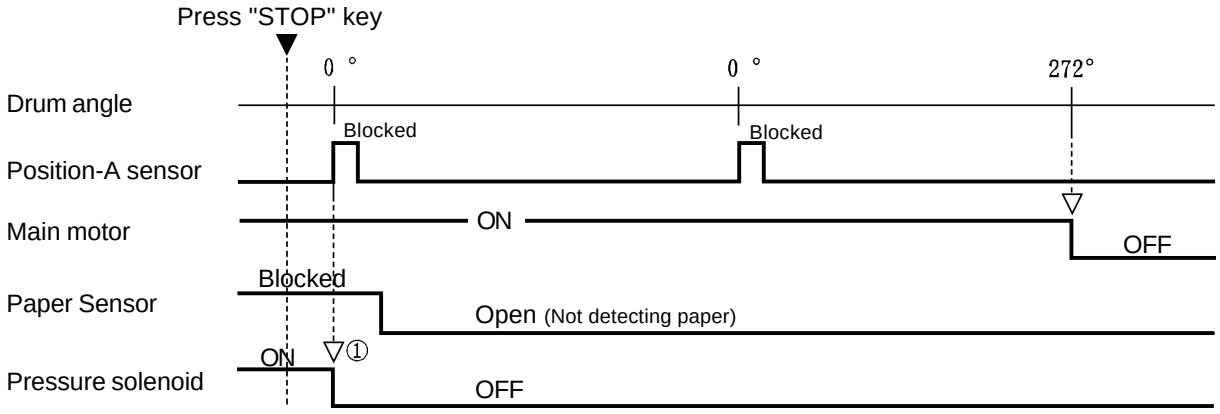
Pressure Solenoid "ON" Timing Chart



① The Pressure solenoid is turned ON when the Drum rotates to 40 degrees during printing operation.

② The Pressure solenoid is turned OFF if the light path of the Paper sensor is open (not detecting paper) when the Drum is at 135 degrees.

Pressure Solenoid "OFF" Timing Chart

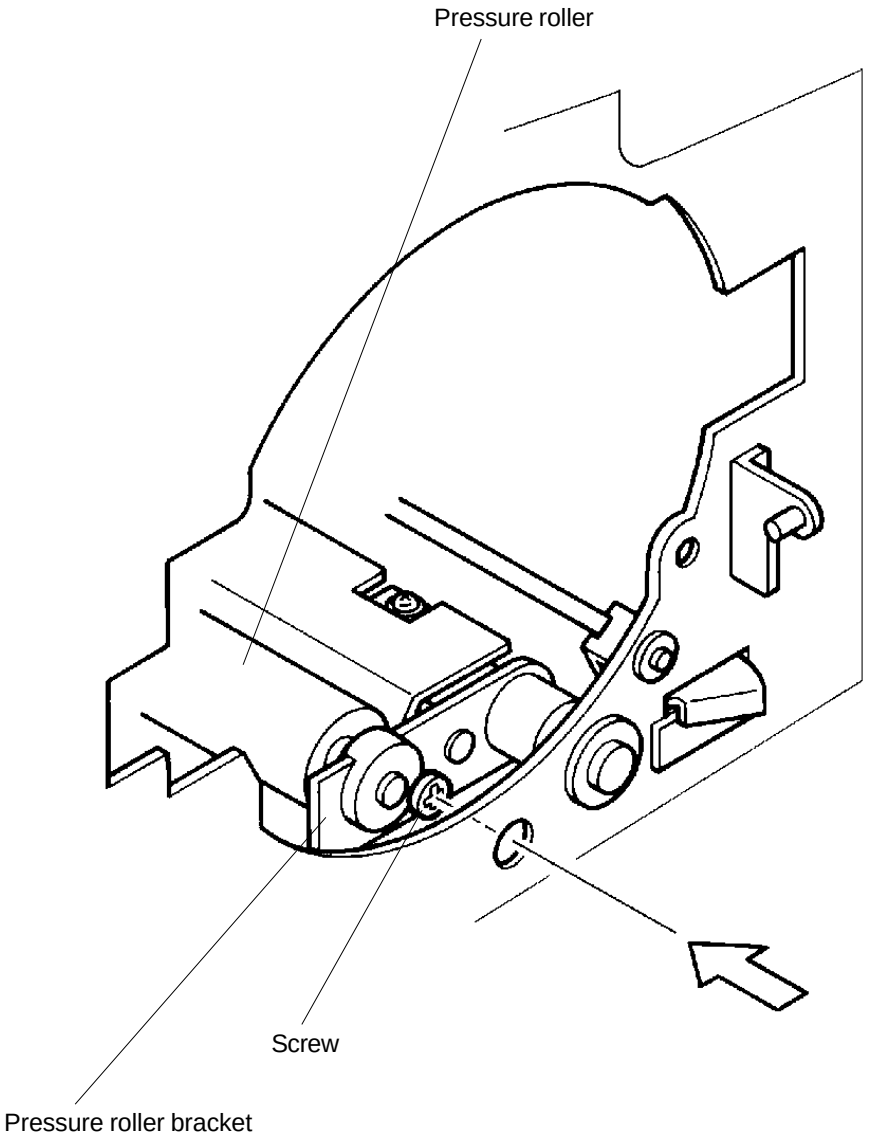


① The Pressure solenoid is turned OFF at the first Drum position-A after the "Stop" key is pressed.

2. Removal and Assembly

1. Pressure Roller

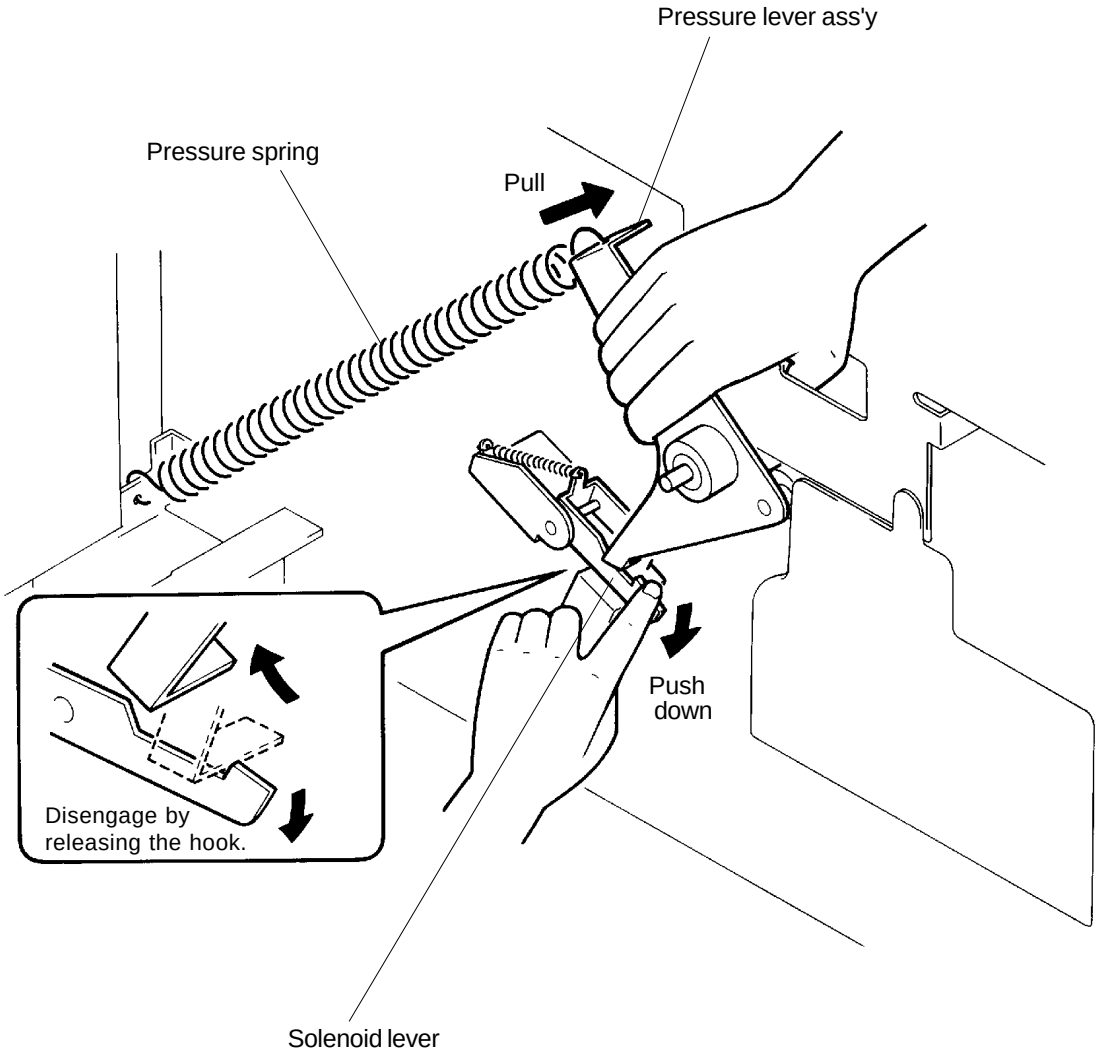
1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove mounting screw of the Pressure roller from the Pressure roller bracket through a hole on the machine frame under the Drum opening on the operator side of the machine.
4. Slide the Pressure roller towards the operator side of the machine to disengage the bearing from the bracket and then lift and remove the Pressure roller from the machine.



2. Pressure Lever Ass'y

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Back cover.
4. Open the Main PCB and Power supply PCB bracket frames.
5. Using hand, holding the Pressure lever ass'y tightly, disengage the Pressure lever from the Solenoid lever by pushing down the Solenoid lever while pulling the Pressure lever.
   To avoid injuries, return the Pressure lever ass'y slowly towards the pull of the Pressure spring.

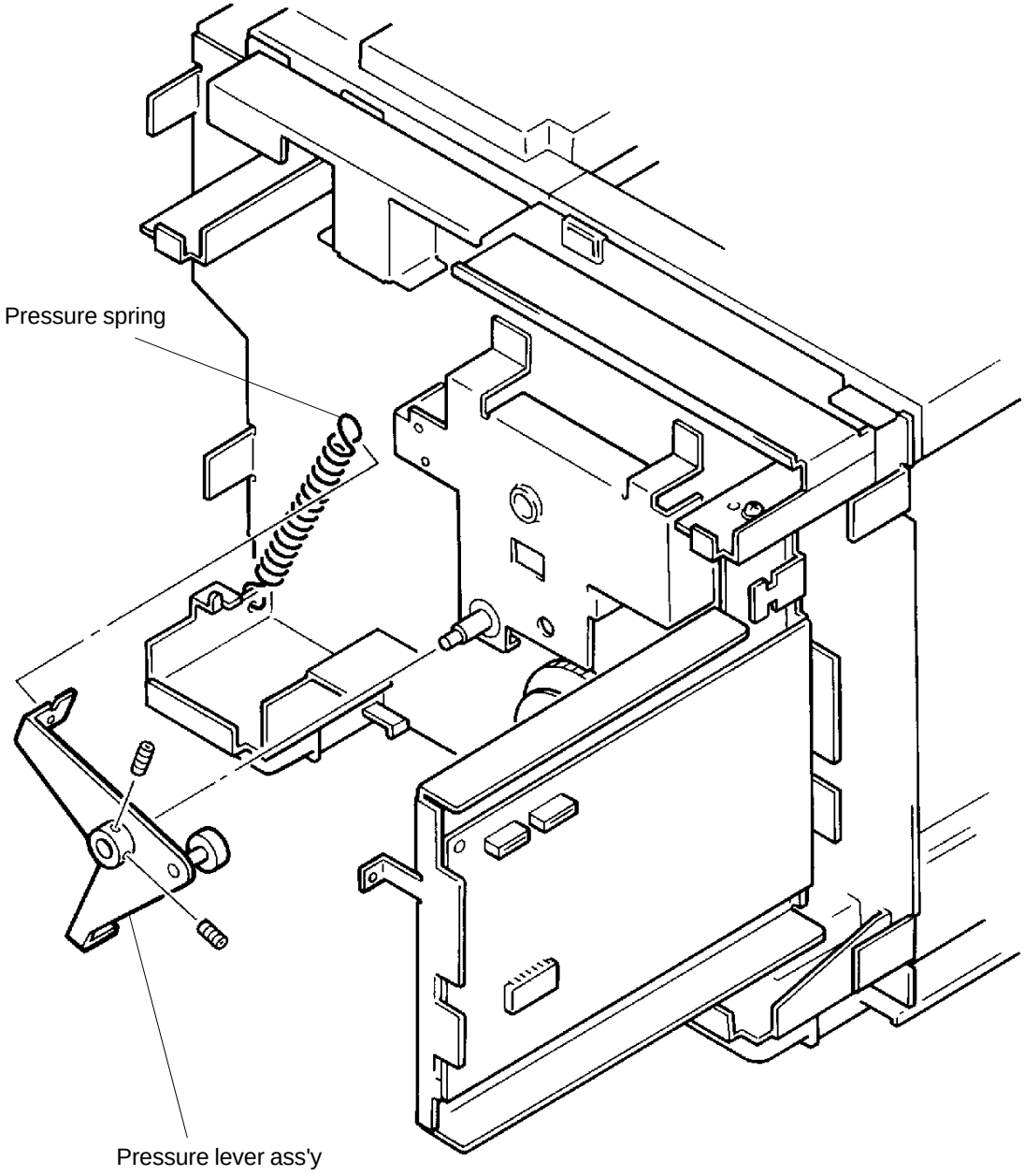
(continues on page 6-7)



6. Carefully, remove the Pressure spring.
   CAUTION: Remove the spring carefully to prevent injuries.
7. Loosen the two set screws of the Pressure lever ass'y and remove the lever ass'y.

Adjustment after the Assembly

> Adjust the position of the Pressure lever ass'y. (page 6-11)

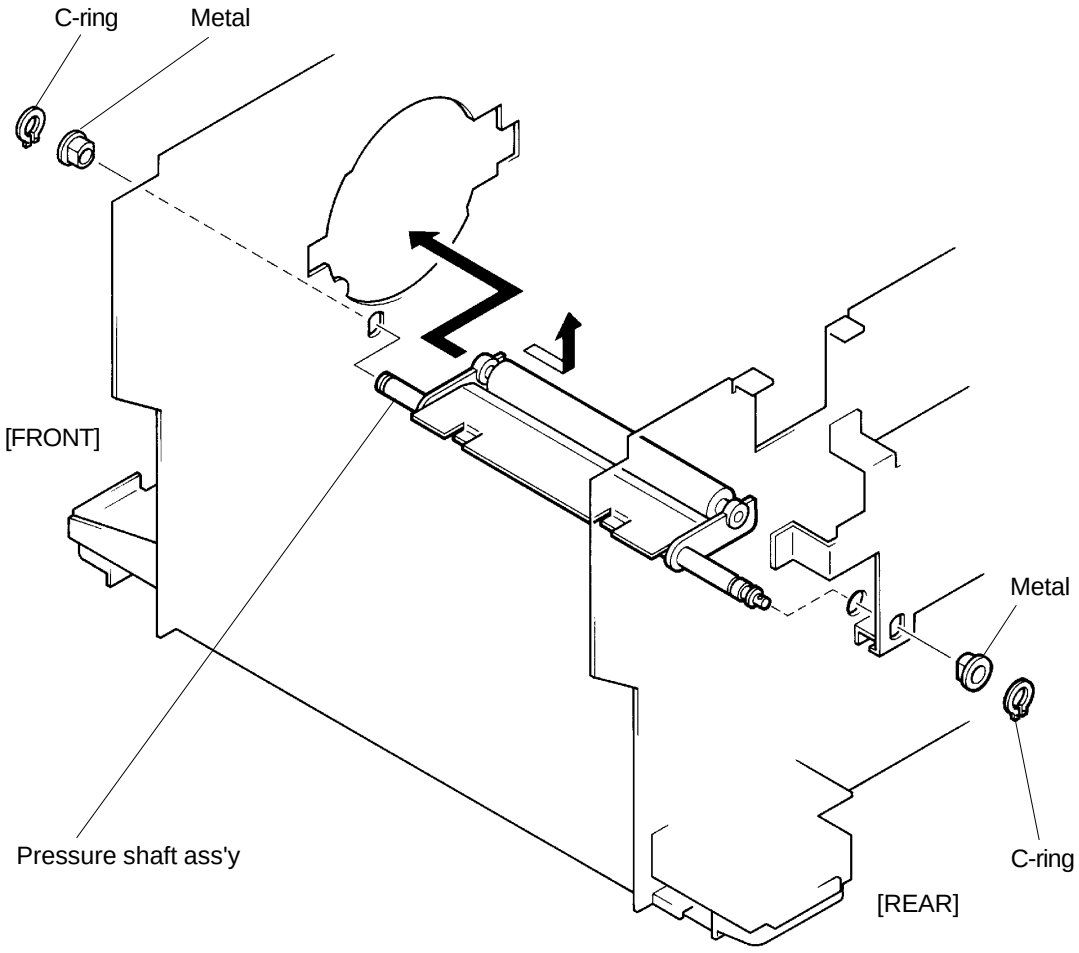


3. Pressure Shaft Ass'y

1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Back cover and Front cover.
4. Remove Pressure lever ass'y. (page 6-6)
5. Remove C-rings from both ends of the Pressure shaft ass'y and remove the Metals.
6. Slide the shaft towards the rear (drive side) of the machine once, and then remove it out through the operator side of the machine by lifting and pulling it out .

Adjustment after the Assembly

> Adjust the position of the Pressure lever ass'y. (page 6-11)

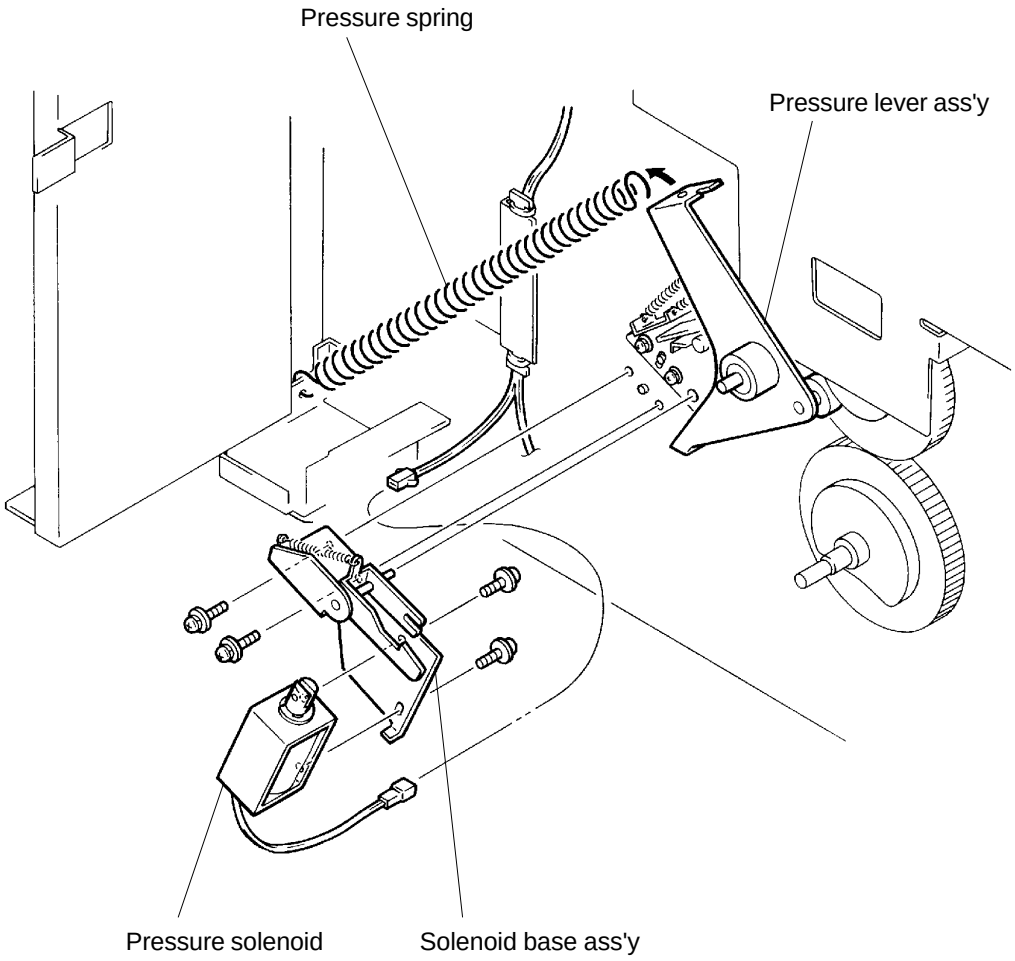


4. Pressure Solenoid

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB and Power supply PCB bracket frames.
4. Using hand, disengage the Pressure lever ass'y from the Solenoid lever by pushing down the Solenoid lever while pulling the Pressure lever ass'y.
5. Carefully, remove the Pressure spring.
   CAUTION: Remove the spring carefully to prevent injuries.
6. Disconnect the Connector of the Pressure solenoid.
7. Remove two mounting screws of the Solenoid base ass'y and remove the base ass'y.
8. Remove Solenoid spring from the Solenoid base ass'y.
9. Remove two mounting screws of the Press solenoid and remove the solenoid from the base ass'y.

Precaution in Assembly

> Match the half-pierced section of the Solenoid base ass'y with its counter part.



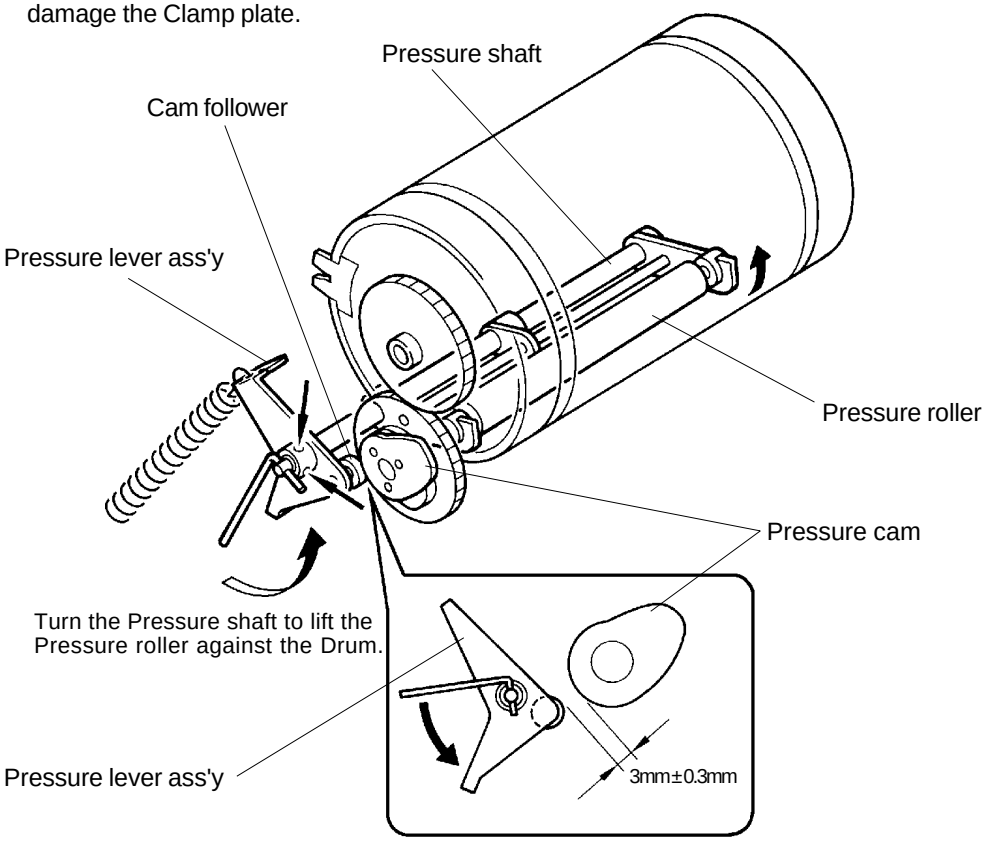
3. Adjustment

1. Pressure Lever Ass'y Position

1. Make confidential master on the Drum.
2. Bring the Drum to the Position-B.
3. Disconnect the power supply from the machine.
4. Remove Back cover.
5. Open the Main PCB and Power supply PCB bracket frames.
6. Using hand, disengage the Pressure lever ass'y from the Solenoid lever by pushing down the Solenoid lever while pulling the Pressure lever ass'y.
7. Confirm that the gap between the Pressure cam and Cam follower on the Pressure lever ass'y is 3 mm ± 0.3 mm.
8. If the gap is too small or big, loosen the two set screws on the Pressure lever ass'y.
9. Place 5 mm Allen wrench or 5 mm thick plate between the Pressure cam and Cam follower and hook a thinner Allen wrench in the hole on the end of the Pressure shaft to rotate the shaft.
10. Rotate the Pressure shaft in the direction shown to lift the Pressure roller up against the Drum.
11. While lifting the Pressure roller against the Drum, tighten the two set screws on the Pressure lever ass'y. The Pressure lever ass'y should be pushed all the way in when tightening the two set screws.

Results of Incorrect Adjustment

> If the gap is smaller than 3 mm ± 0.3 mm, the printing pressure may become too weak and print density problem may occur.
> If the gap is too big, the Pressure roller may hit the Clamp plate of the Drum during printing and damage the Clamp plate.



Adjust the gap between the Pressure cam and Cam follower to 3 mm ± 0.3 mm by inserting 5 mm Allen wrench between the Cam and Cam follower.

CHAPTER 7: PAPER EJECTION SECTION

CONTENTS

1. Theory of Operation

1. Paper Ejection Mechanism

1. Paper Separation from the Drum

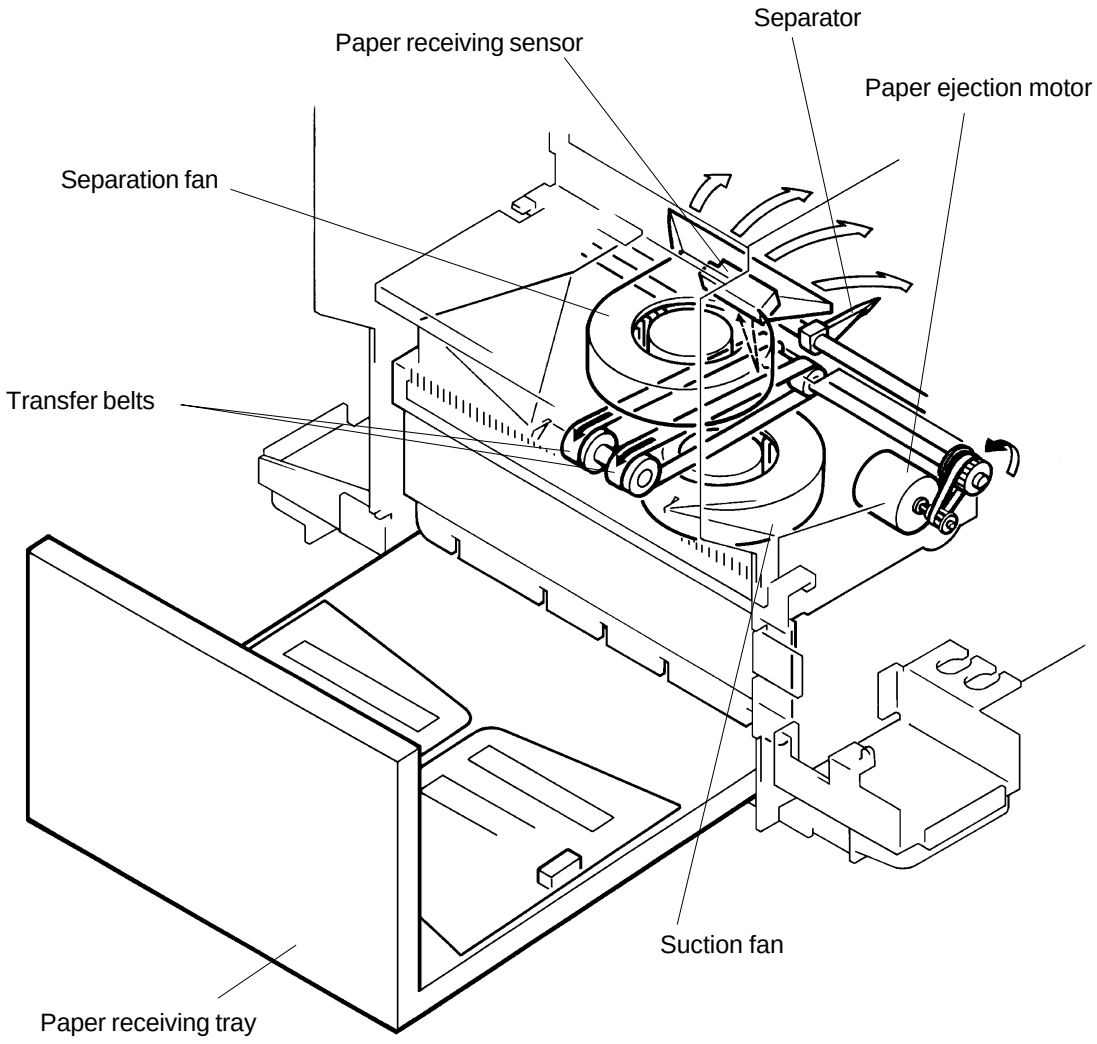
> The paper is separated from the Drum by the Paper separation fan and Separator.

2. Paper Ejection

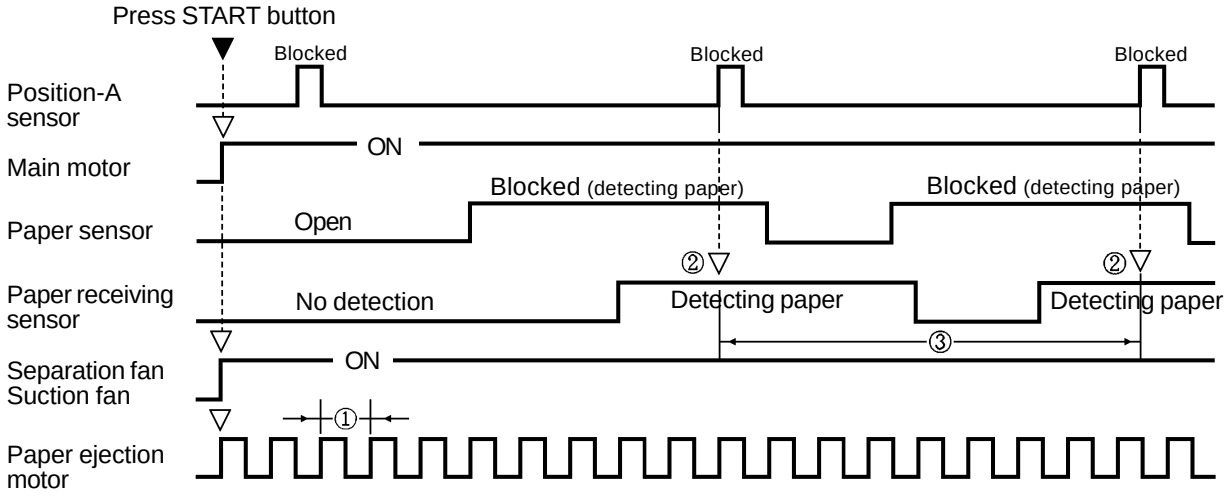
> Suction fan pulls the paper, separated from the Drum, on to the Suction unit.
> The Transfer belts on the Suction unit, driven by Paper ejection motor, ejects the paper onto the Paper receiving tray.

3. Paper Receiving Sensor

> Paper receiving sensor checks whether the paper is separated from the Drum and ejected correctly or jammed.



Paper Ejection Timing Chart



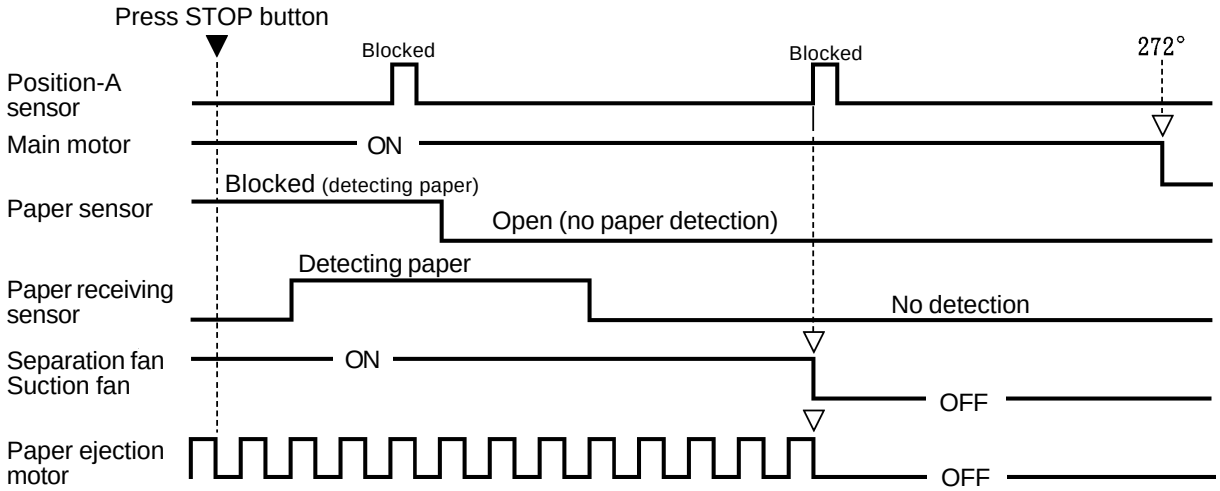
① The Paper ejection motor is turned ON and OFF repeatedly throughout the printing process.
The ON and OFF intervals change in accordance with the printing speed.
As a result, the change in the interval of the intermittent rotation of the Paper ejection motor changes the speed of the Transfer belts on the Suction unit. The belts run faster at faster printing speed.

Main motor speed (Printing Speed)	60 rpm	90 rpm	130 rpm
Paper ejection motor ON interval	20 ms	10 ms	20 ms
Paper ejection motor OFF interval	30 ms	10 ms	10 ms

② The Paper receiving sensor is checked to see whether it is detecting a paper at every Drum position-A.

③ From one Drum position-A to the next, the machine checks to see whether the paper is ejected out of the light path of the Paper ejection sensor.

Paper Ejection Timing Chart



Note: If overload current is detected for **0.3 seconds** on the Paper ejection motor, Paper ejection motor lock message **[E 20]** is indicated.

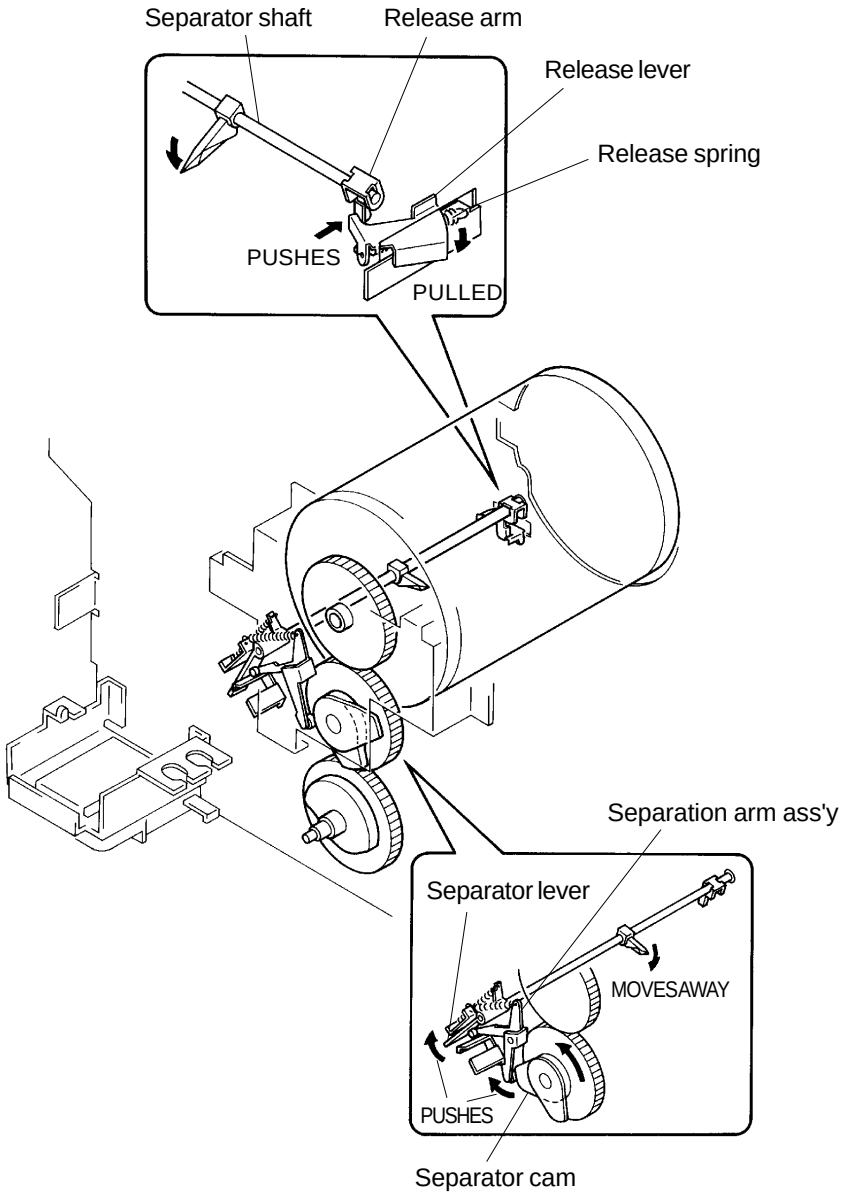
2. Paper Separation Mechanism

1. Separator

> The tip of the Separator is close to the Drum when it separates a paper from the Drum. When the Clamp plate on the Drum comes close to the Separator, the Separator cam which is attached on the Intermediate cam pushes the Separator away from the Drum.

2. Separator Release Lever

> When the Drum is being pulled out, the Release lever becomes free and the Release spring pulls the Release lever.
> The Release lever then pushes against the Release arm and rotates the Separator shaft down.
> The rotation of the Separator shaft moves the tip of the Separator away from the Drum.



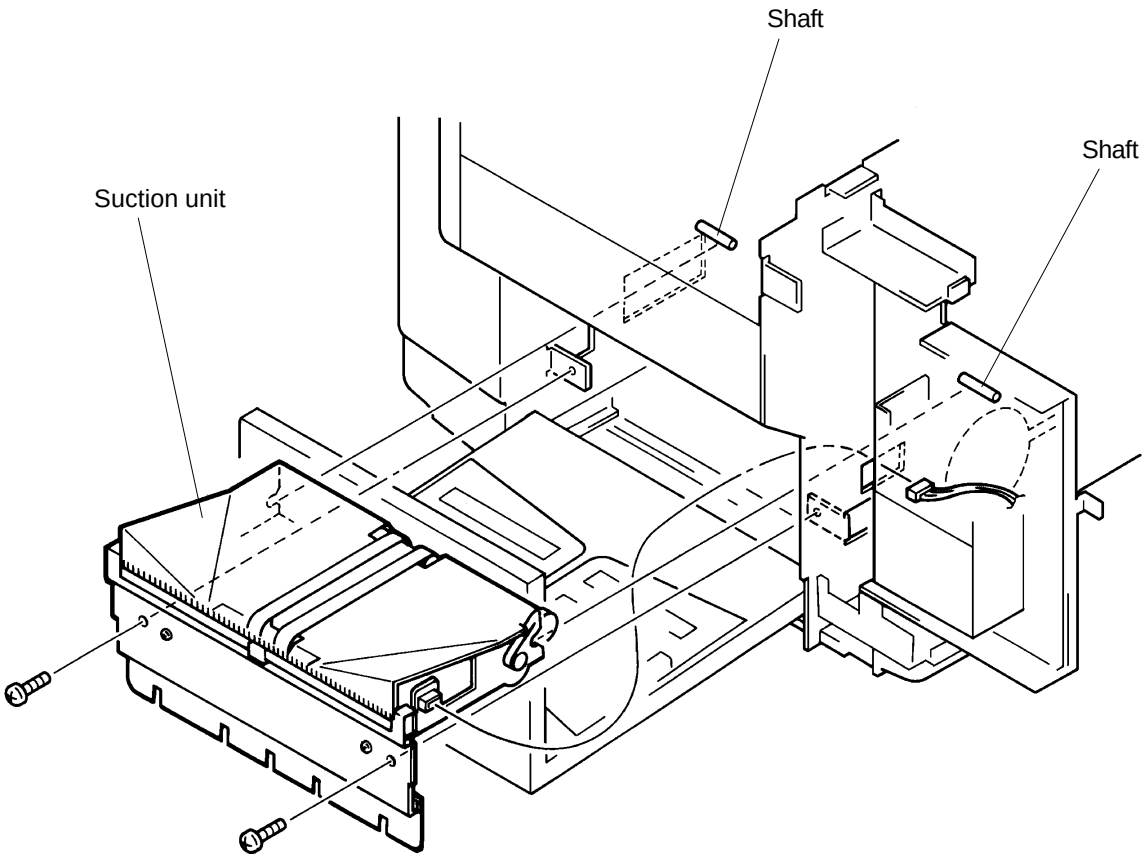
2. Removal and Assembly

1. Suction Unit

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Power supply PCB bracket frame.
4. Disconnect the Connector of the Suction unit.
5. Remove two mounting screws of the Suction unit and remove the unit by sliding it out through the Paper receiving tray opening.

Precaution in Assembly

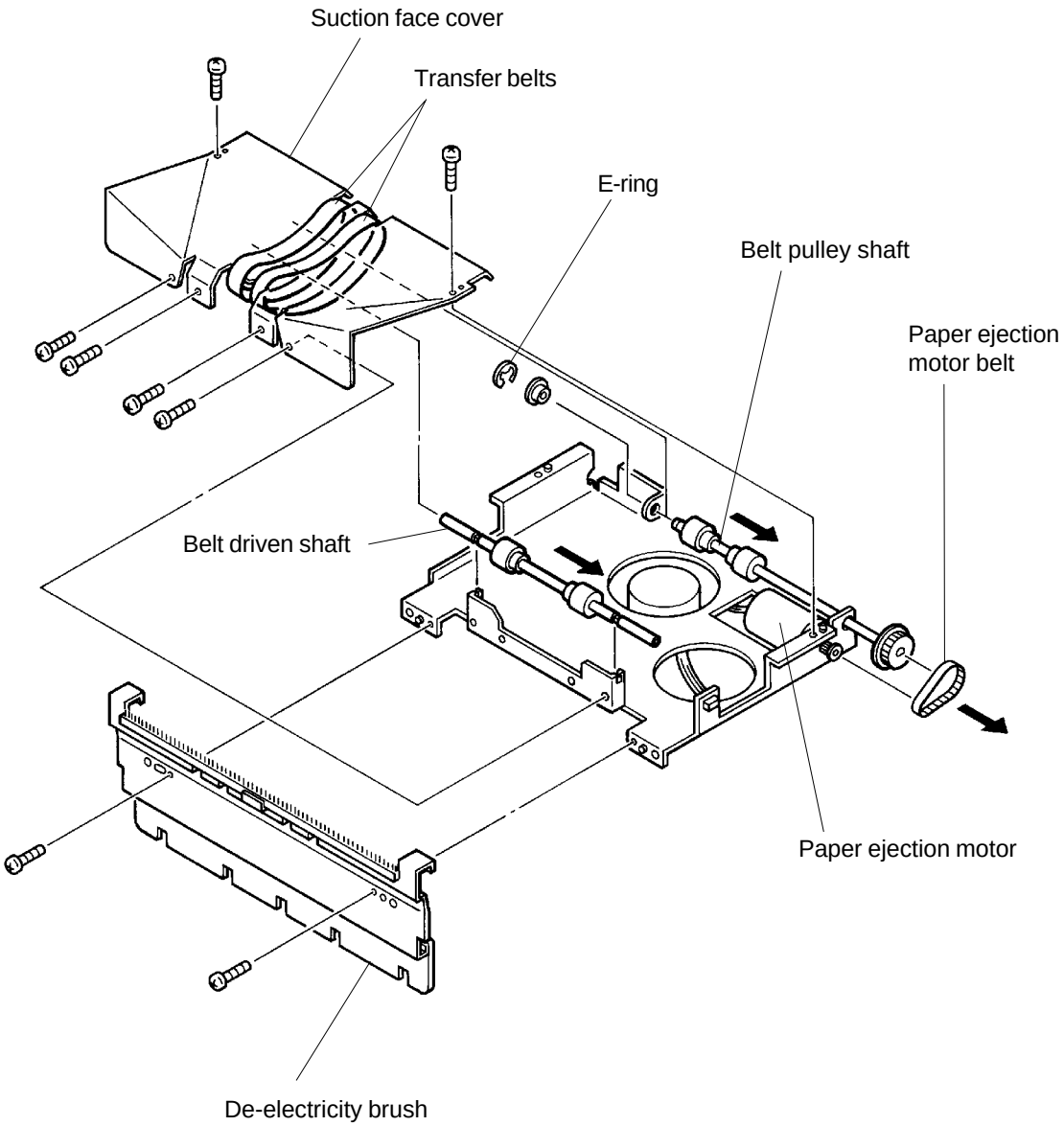
> Hook the Suction unit on the Shafts on the machine frame.



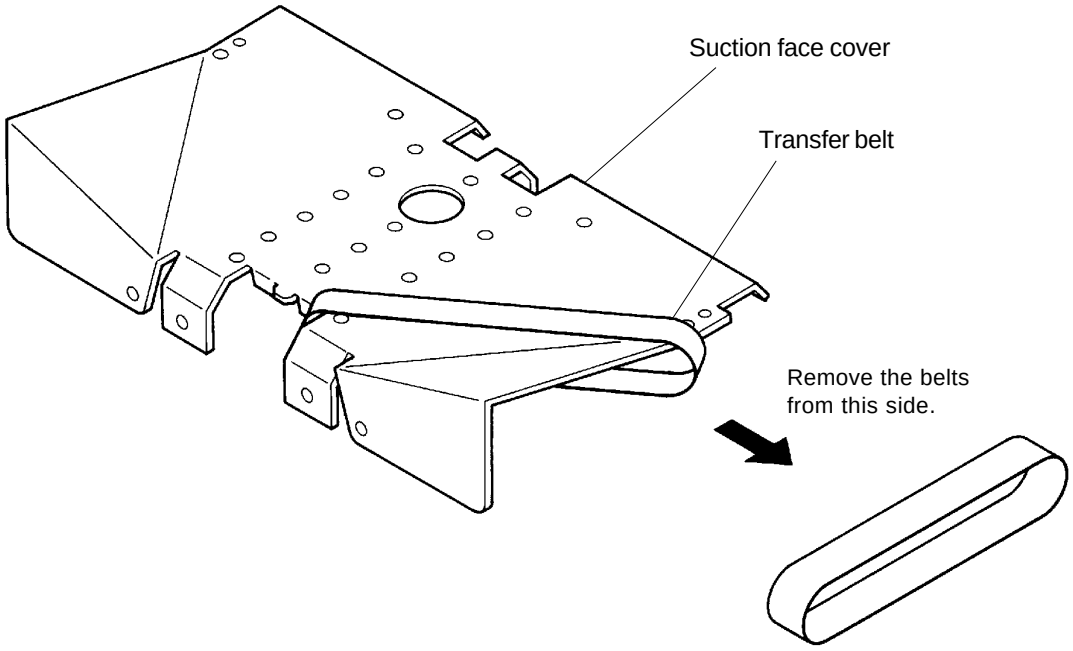
2. Transfer Belt

1. Disconnect the power supply from the machine.
2. Remove Back cover
3. Remove Suction unit. (page 7-5)
4. Remove two mounting screws of the De-electricity brush and remove the brush.
5. Remove six mounting screws of the Suction face cover.
6. Lift the face cover and remove the Belt driven shaft by unhooking the Transfer belts.
7. Remove the Paper ejection motor belt from the Paper ejection motor.
8. Remove E-ring from the Operation panel side of the Belt pulley shaft.
9. Slide the Belt pulley shaft towards the drive side of the machine and remove the Transfer belts from the shaft.

(continues on page 7-7)



10. Remove the Transfer belts from the Suction face cover.



Precautions in Assembly

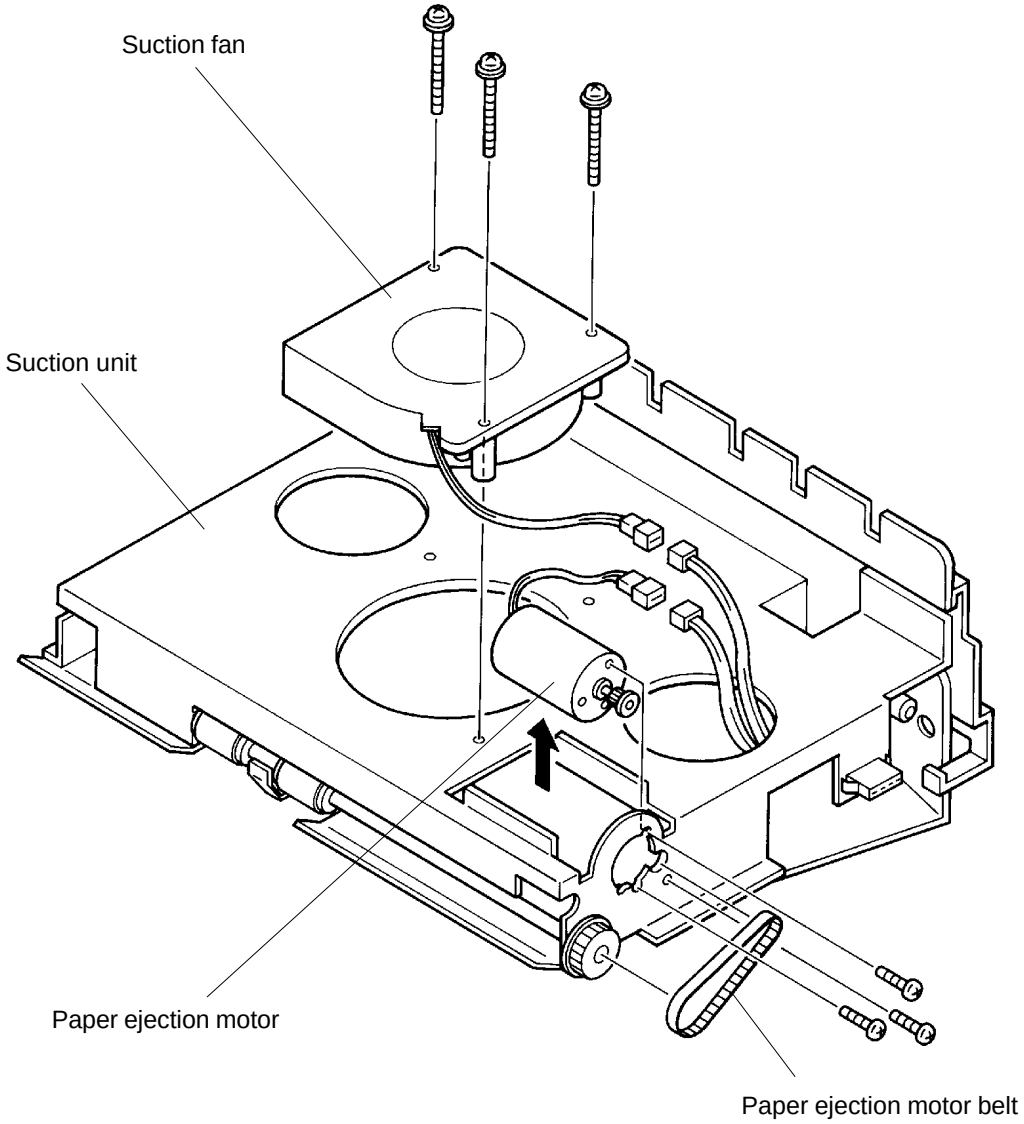
> Match the half-pierced section on the Suction face cover with its counter part.
> Match the half-pierced section on the De-electricity brush with its counter part.

3. Suction Fan

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Remove Suction unit. (page 7-5)
4. Turn over the Suction unit and disconnect the Connector of the Suction fan.
5. Remove three mounting screws of the Suction fan and remove the fan.

4. Paper Ejection Motor

1. Remove the Suction unit referring to the above instruction.
2. Turn over the Suction unit and remove the Paper ejection motor belt from the Paper ejection motor.
3. Disconnect the Connector of the Paper ejection motor.
4. Remove three mounting screws of the Paper ejection motor and remove the motor.

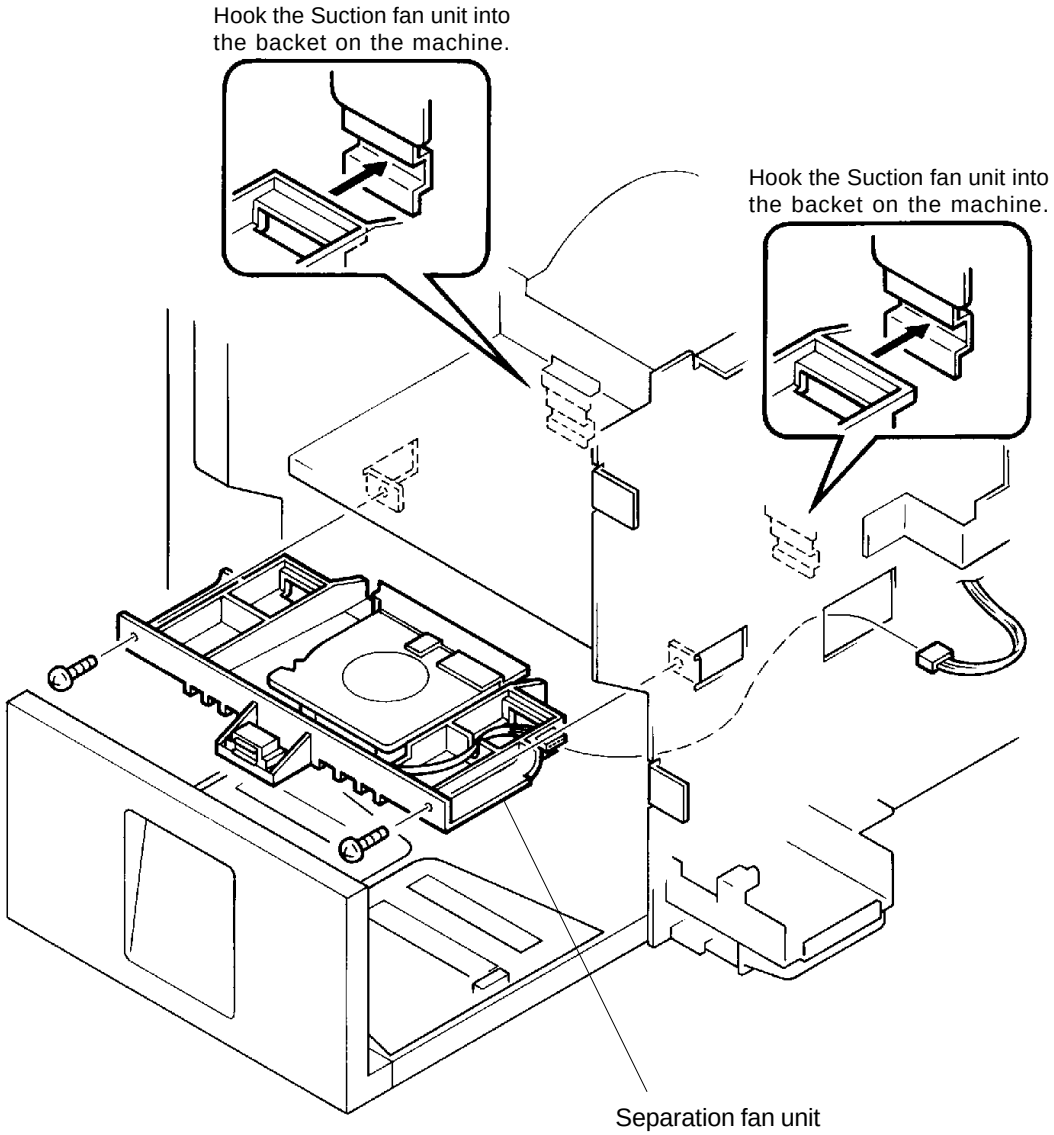


5. Separation Fan Unit

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Power supply PCB bracket frame.
4. Disconnect the Connector of the Separation fan unit.
5. Remove two mounting screws of the Separation fan unit and remove the unit by sliding it out from the Paper receiving tray opening.

Precaution in Assembly

> Hook the Suction fan unit into the brackets on the machine, as shown on the illustration below.

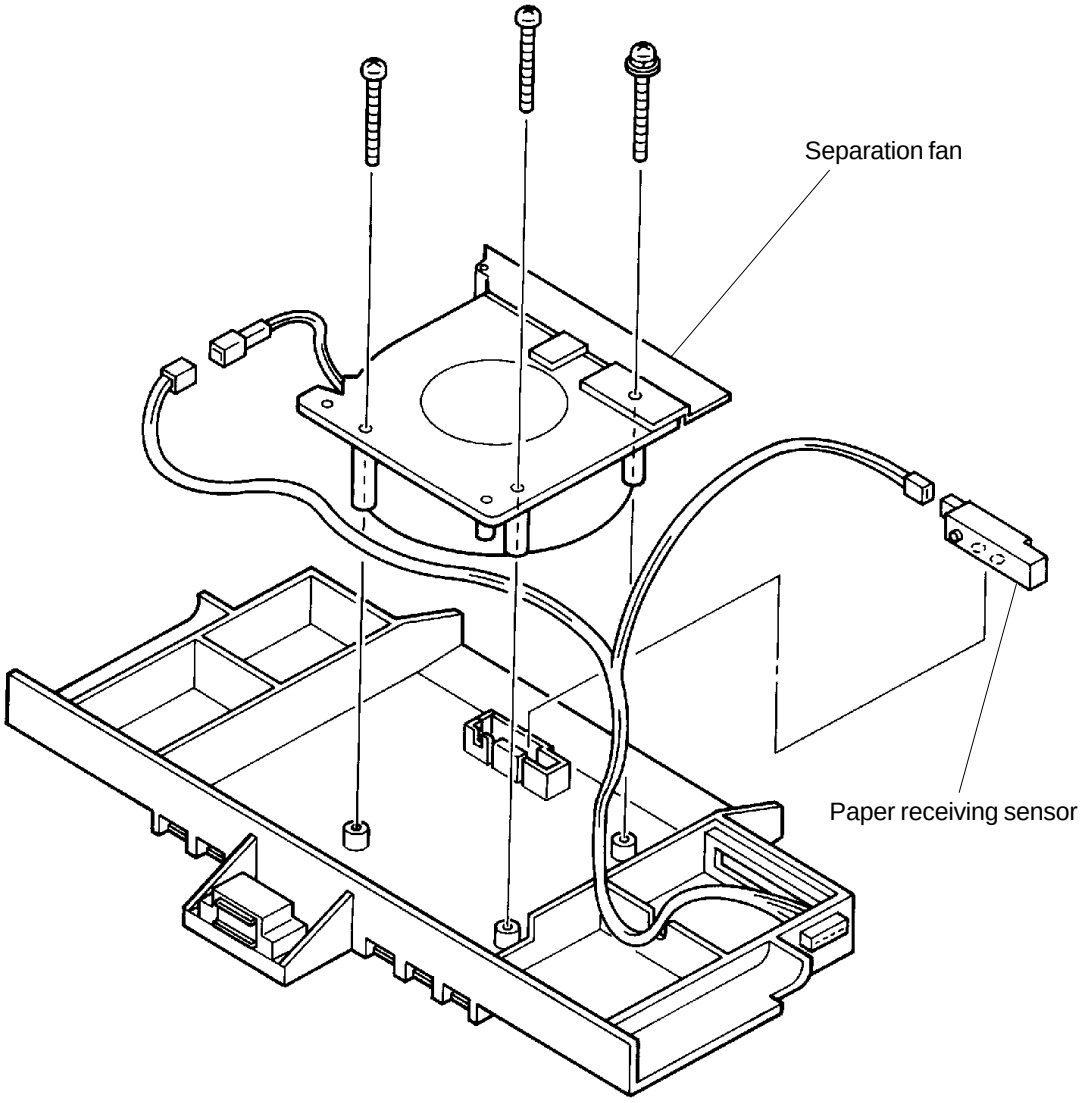


6. Separation Fan

1. Remove the Separation fan unit. (page 7-9)
2. Disconnect the Connector of the Separation fan.
3. Remove three mounting screws of the Separation fan and remove the fan.

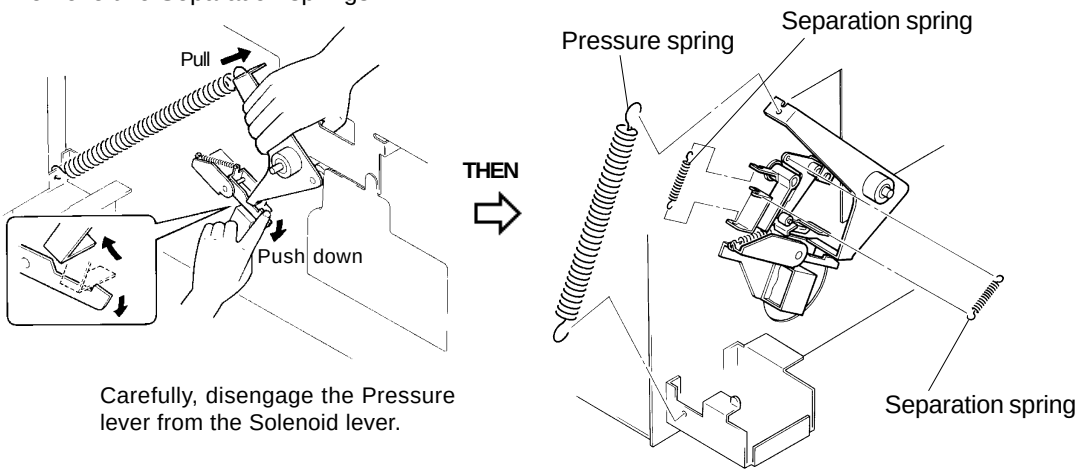
7. Paper Receiving Sensor

1. Remove the Separation fan unit. (page 7-9)
2. Disconnect 3 mounting screws of the Separation fan.
3. Lift the fan and disconnect the Connector of the Paper receiving sensor.
4. Press the center hook of the Paper receiving sensor socket and lift the sensor out.



8. Separator

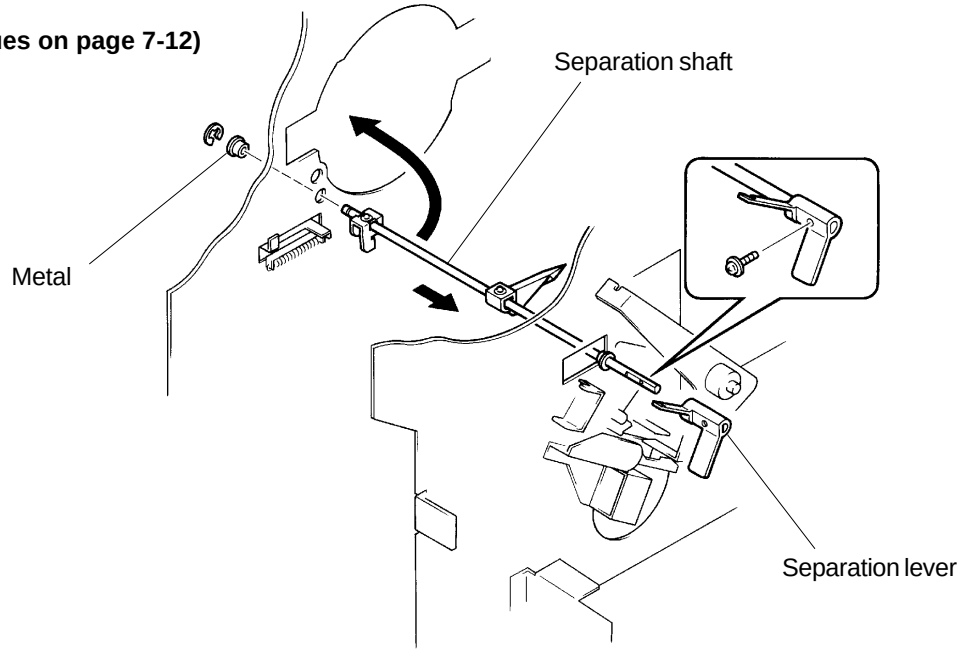
1. Remove the Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove the Back cover and Front cover.
4. Open the Main PCB and Power supply PCB bracket frames.
5. Using hand, disengage the Pressure lever from the Solenoid lever by pushing down the Solenoid lever while pulling the Pressure lever.
6. Carefully, remove the Pressure spring.
   CAUTION: Remove the Pressure spring carefully to prevent injuries.
7. Remove two Separation springs.



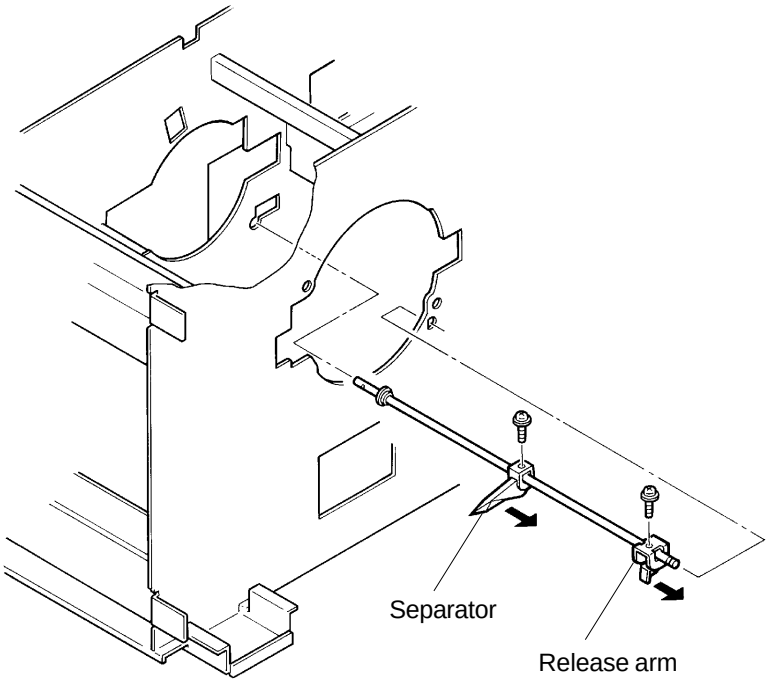
Carefully, disengage the Pressure lever from the Solenoid lever.

8. Remove E-ring from the operator side of the Separator shaft and remove the Metal.
9. Slide the Separation shaft towards the rear (machine drive side) and remove the mounting screw of the Separation lever.
10. Remove the Separation lever.
11. Remove the Separation shaft out from the machine, through the Drum opening on the operator side of the machine.

(continues on page 7-12)

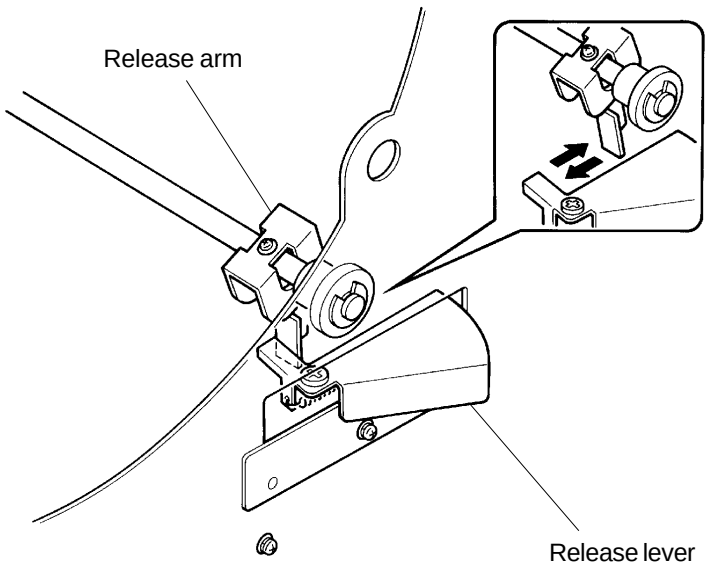


12. Remove the mounting screw of the Release arm and remove the arm from the shaft.
13. Remove the mounting screw of the Separator and remove the Separator from the shaft.



Precaution in Assembly

> Mount the Release arm touching against the Release lever as shown on the illustration below.



Adjustment after Assembly

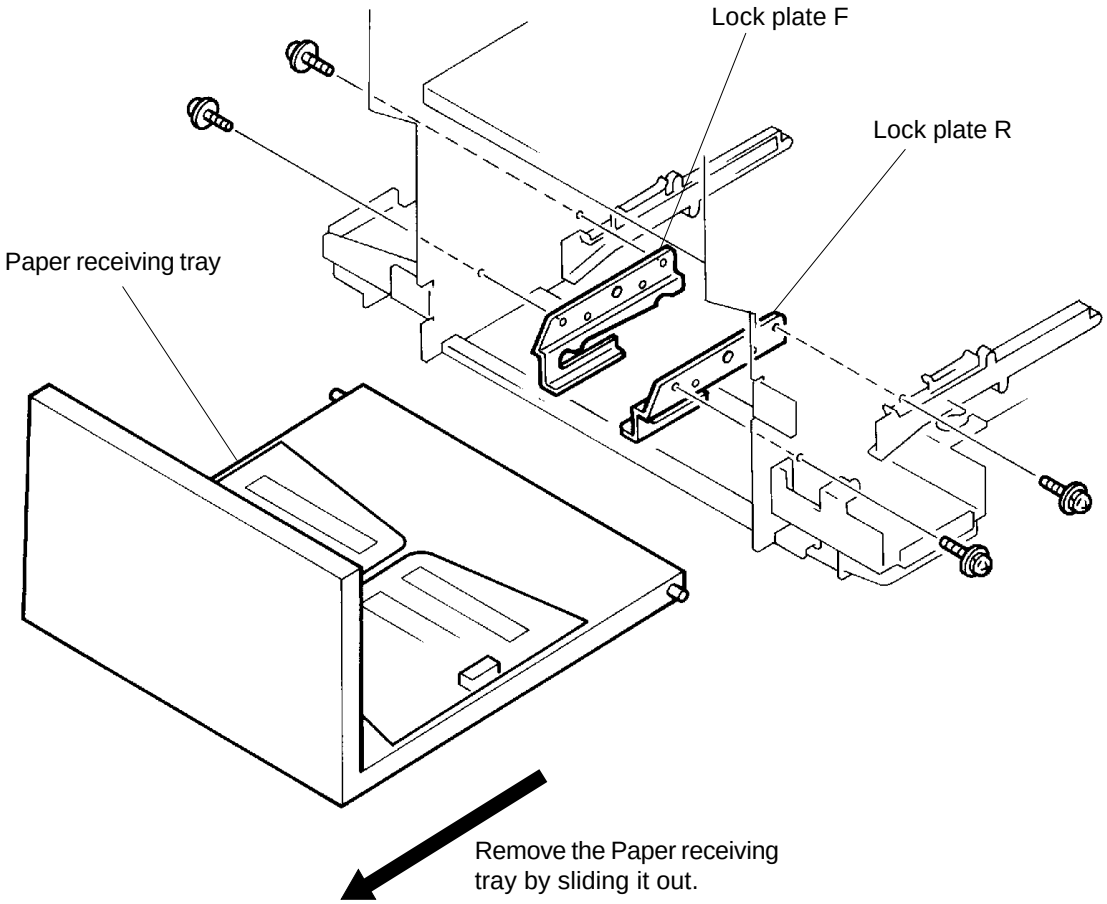
> Make adjustment on the Separator position. (page 7-15)

9. Paper Receiving Tray

1. Disconnect the power supply from the machine.
2. Remove Back cover and Front cover.
3. Remove Suction unit. (page 7-5)
4. Remove two mounting screws each from the Lock plate F and Lock plate R, and remove the two plates.
5. Remove the Paper receiving tray by sliding it out.

Precaution in Assembly

> Match the half-pierced sections on the Lock plates F and R with their counter parts.



3. Adjustment

1. Separator Position

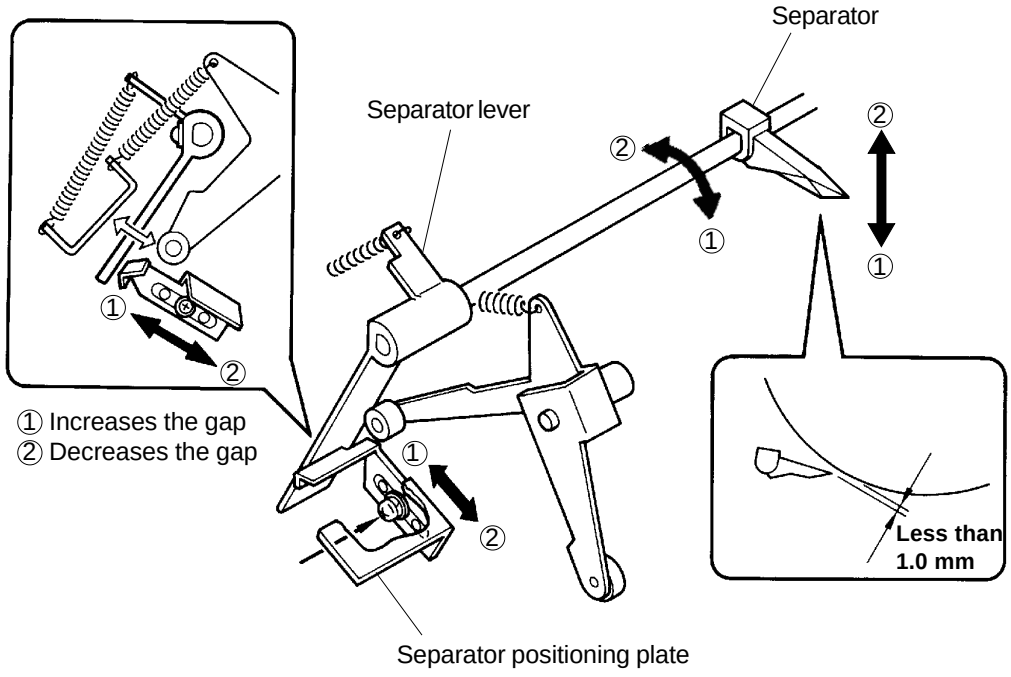
1. Using Test Chart No.8, make a master and prints.
2. Adjust the printing position by the Print position button on the Operation panel, so that there is 5 mm white margin on the top of the prints.
3. Confirm that the paper separates from the Drum and there is no black line on the center of the prints.
4. If the paper does not separate from the Drum, or there is a black line on the center of the prints, an adjustment on the Separator position is necessary.
5. For the adjustment, disconnect the power supply from the machine and remove the Back cover.
6. Open the Main PCB and Power supply PCB bracket frames.
7. Loosen the mounting screw of the Separator positioning plate and slide the plate.
8. Tighten the mounting screw of the plate when the space between the tip of the Separator is **within 1.0 mm** from the Drum but not touching it.

Precaution in Adjustment

> Printed papers using Test Chart No.8 original should separate from the Drum when the top white margin on the prints are adjusted to 5 mm by the Print position button.

Results of Incorrect Adjustment

> If the tip of the Separator is in contact with the Drum, the Separator will scratch the surface of the master on the Drum, creating a black line in the center of the printed copies and may damage the screens.
> If the tip of the Separator is placed too far off the Drum, printed copies will not separate from the Drum, causing paper jams.



CHAPTER 8: DRUM SECTION

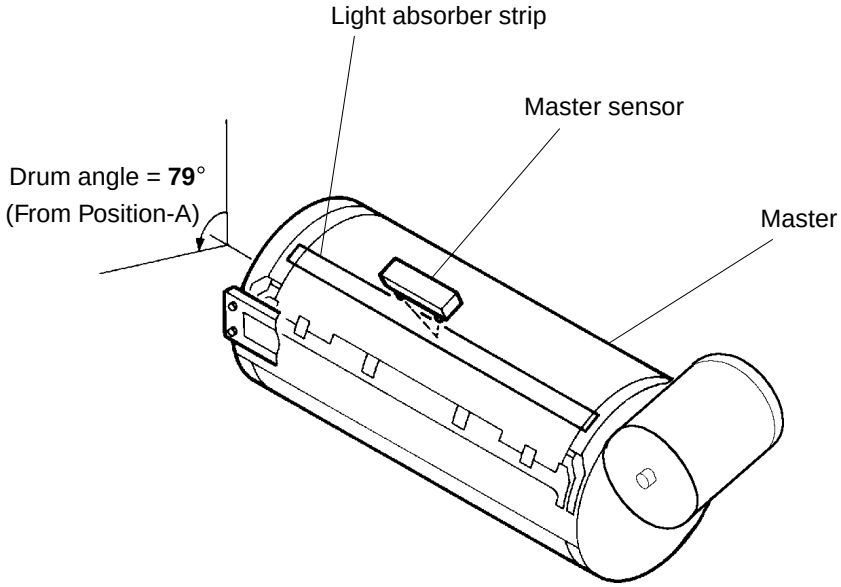
CONTENTS

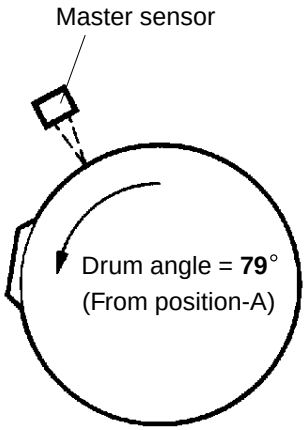
1. Theory of Operation

1. Master on Drum (in printing) Check Mechanism

1. Master Sensor

> Master Sensor checks the presence of master on the Drum before the start of printing.
> 79° Drum rotation after the first Position-A, the Master Sensor looks for the master on the Drum.
> The result (whether the master is found or not) is memorized until the Drum is pulled out of the machine or the power is turned off.
> If no master is detected on the Drum, **[C27]** is indicated on the Operation panel and stops the printing operation.

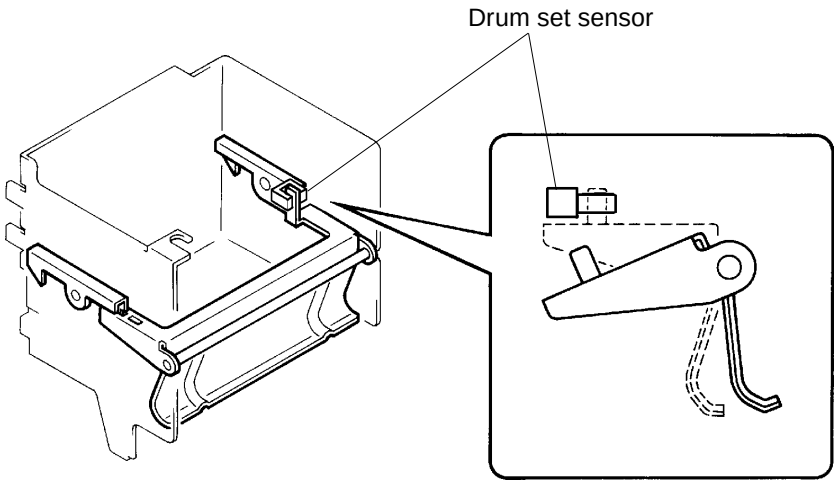




2. Drum Set Check Mechanism

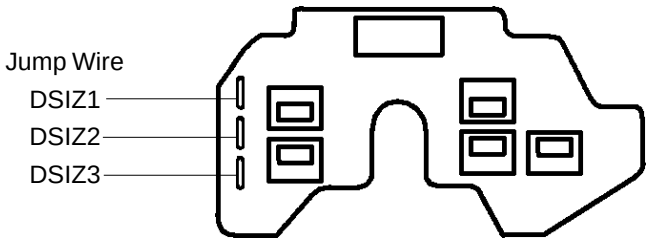
1. Drum Set Sensor

> Drum set sensor checks the presence of the Drum in the machine.



2. Drum Size/ Color Setting

> Drum Size/ Color has to be set on each drum.
> Drum Size/ Color has to be set on the Cartridge Set SW PCB.
> Depending on the cutting combination of the jump wires, as shown on below figure, the Drum Size/ Color can be set.
Setting of the Drum Size/ Color is shown on below table.



Drum Size/ Color Setting (Cartridge Set SW PCB)

	B4/ Black	B4/ Color	A4/ Black	A4/ Color	Legal/ Black	Legal/ Color
DSIZ1	——	——	Cut	Cut	——	——
DSIZ2	——	——	——	——	Cut	Cut
DSIZ3	——	Cut	——	Cut	——	Cut

3. Ink Cartridge Set Check Mechanism

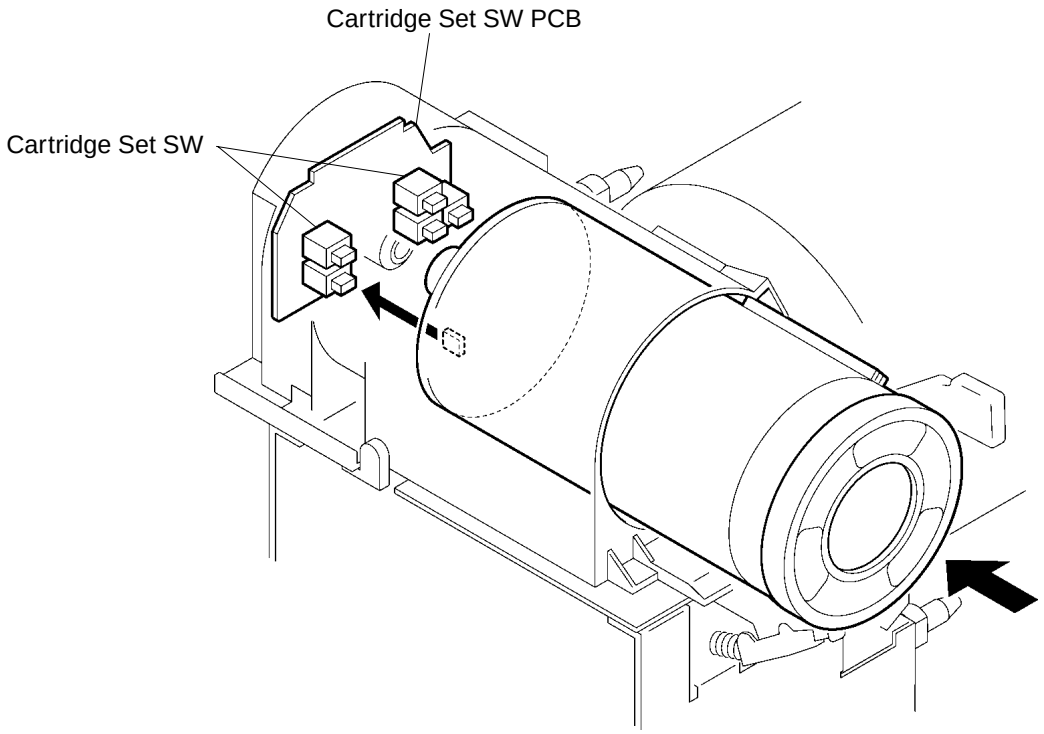
1. Ink Cartridge Set SW

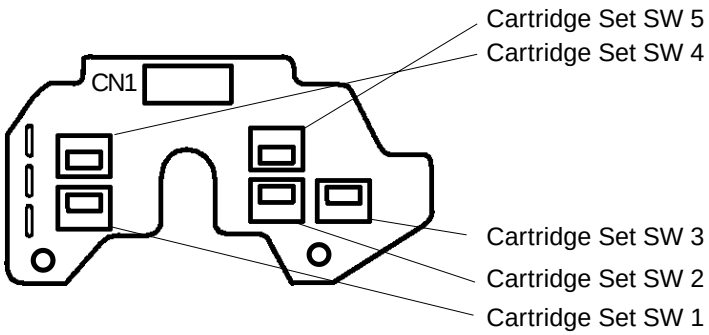
> Ink Cartridge set SW checks the presence of the Ink Cartridge in the Ink Cartridge holder.
> There are five switches on Cartridge set SW PCB as shown on below figure.
> The machine will judge by the combination of these detecting Set Switches, whether the color ink or the right type of black ink cartirdge are installed.
Depending on the region of the user, deferent type of CR Black ink will be distributed.

[Ink Cartridge type]

- ▶ CR Color Ink
- ▶ CR Black Ink 'type U' --------- U. S. region
- ▶ CR Black Ink 'type E' --------- Europe region
- ▶ CR Black Ink 'type C' --------- China region
- ▶ CR Black Ink 'type A' --------- Asia region

If the deferent Ink Cartridge type is installed, the machine will indecate "Set Ink Cartrige in Place"(Advice display No. 'C53').





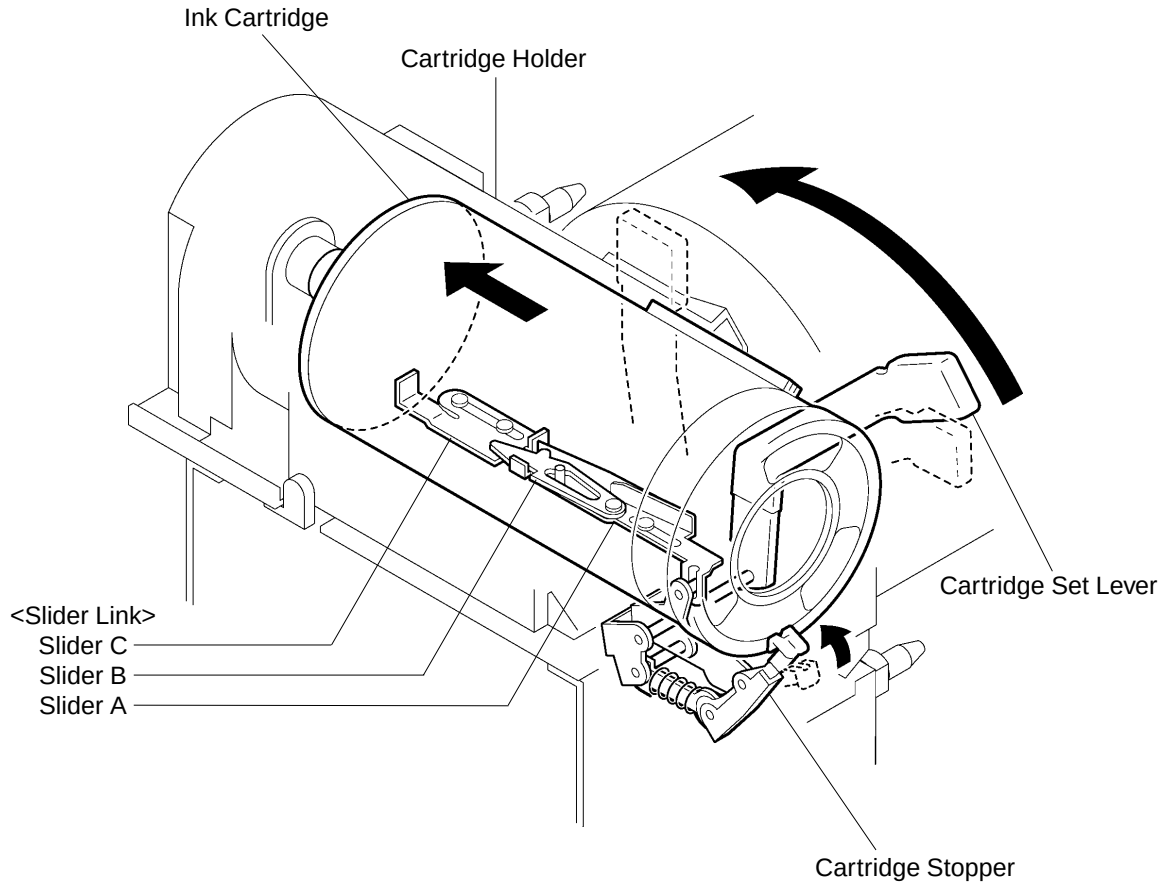
4. Ink Cartridge Setting Mechanism

1. Ink Cartridge Setting

When the Cartridge set lever is turned to the lock positon, the Ink Cartridge is pushed into the Cartridge holder by the Cartridge stopper arm and automatically set in the holder.

2. Ink Cartridge Releasing

When the Cartridge set lever is turned to the releasing position, the Slider Links slides, and the hook of the Slider C pulls the Ink Cartrige out from the Ink nozzle. The user then can easily replace the Ink Cartridge.

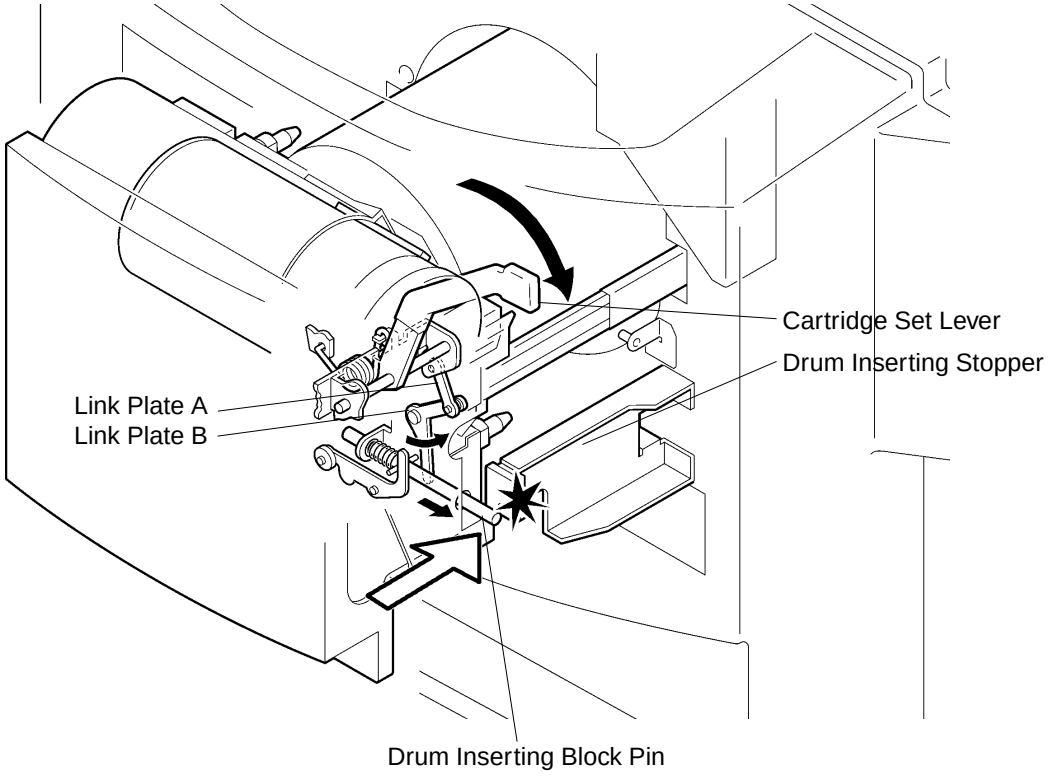


5. Drum inserting Block Pin Mechanism

1. Prevention of the Drum inserting without locking the Ink Cartridge

When the User tris to insert the Drum without locking the Ink Cartridge (with the Cartridge set lever at the releasing position), the Drum inserting block pin will prevent from inserting the Drum.

When the Cartridge set lever is turned to the releaseing position, the Drum inserting block pin will stick out from the frame as shown on below figure, and the block pin will hit against the Drum inserting stopper.
When the Cartridge set lever is flipped to the lock position, the block pin is pulled back inside the frame.



6. Ink Supply Mechanism

1. Ink Sensor PCB

> Ink sensor on the Ink sensor PCB checks the presence of ink in the Drum.
> Overflow sensor checks the ink overflow in the Drum.

2. Inking Motor

> Inking motor activates the Ink pump to supply the ink into the Drum when ink is not detected by the Ink sensor.
> Ink from the Ink Cartridge is pumped through a hose into the Drum, on top of the Squeegee roller, through Ink distributor.
> The Inking motor stops when the Ink sensor detects ink.

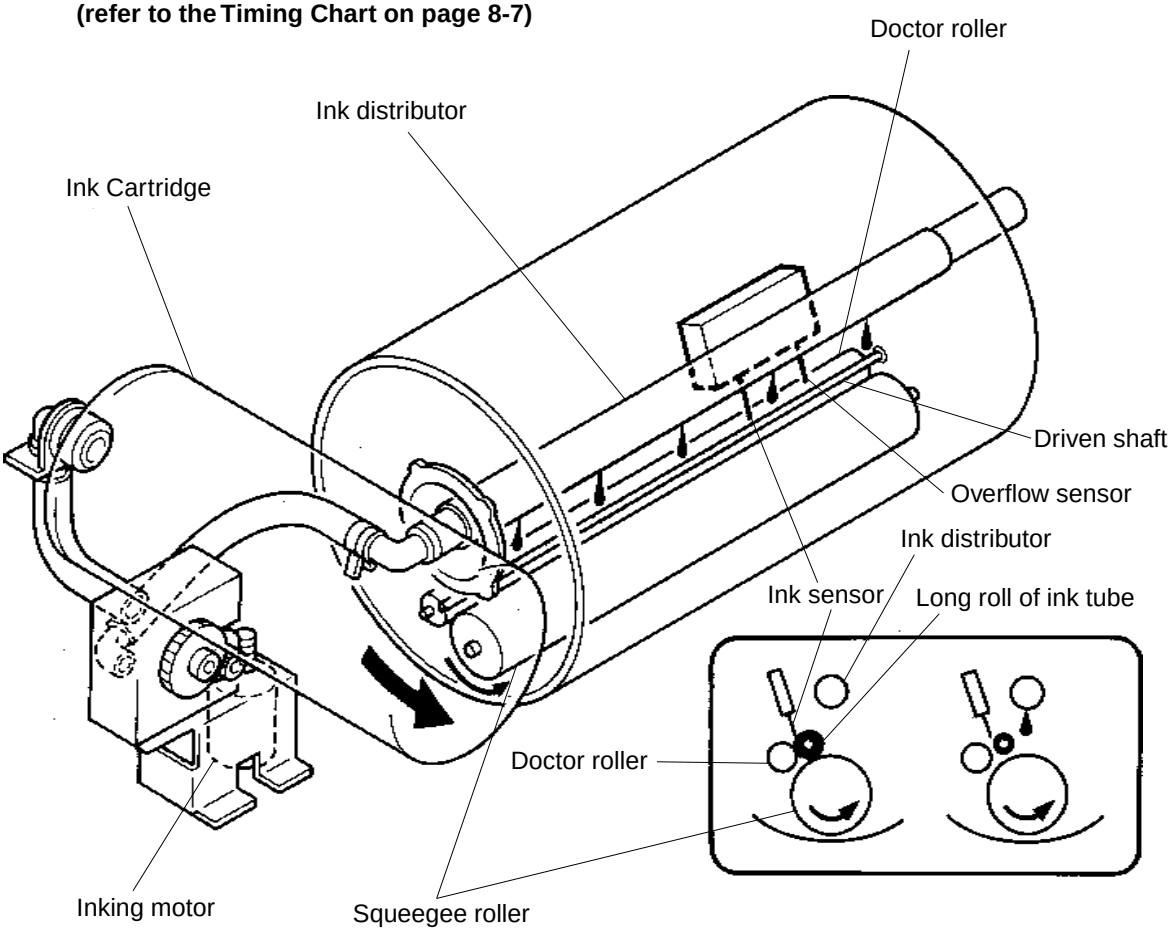
3. Ink Supply to the Inner Surface of the Drum

> The ink supplied on the Squeegee roller is transferred onto the Drum inner surface by the rotation of both the Squeegee roller and Drum.
> Excess ink is then made into a long roll of ink tube around a thin Driven shaft located between the Squeegee roller and Doctor roller, and this excess roll of ink tube is checked by the Ink sensor and Overflow sensor.

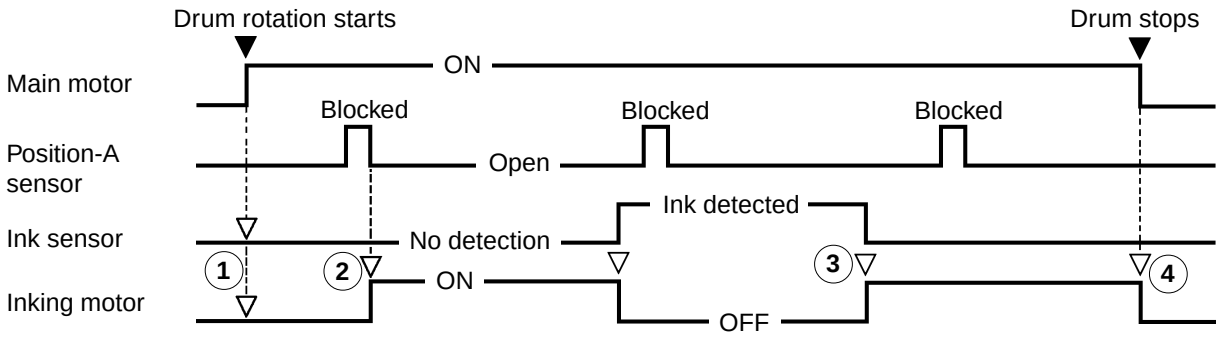
4. Ink Overflow

> If an excess amount of ink is supplied in the Drum and Overflow sensor detects the ink, the machine stops with **[E04]** indication on the Operation panel.

(refer to the Timing Chart on page 8-7)



Inking Timing Chart



① The Inking motor does not activate at the start of Main motor even though the Ink sensor is not detecting the ink.

② The Inking motor activates when the light path of the Position-A sensor changes from "blocked" to "open" with the rotation of the Drum if the Ink sensor is not detecting the ink.

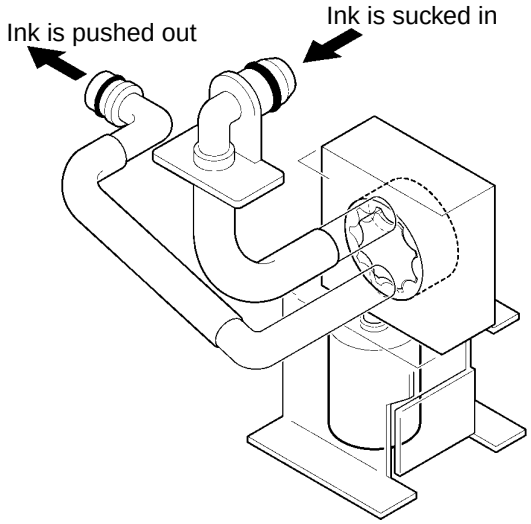
③ The Inking motor activates when the Ink sensor no longer detects the ink during printing.

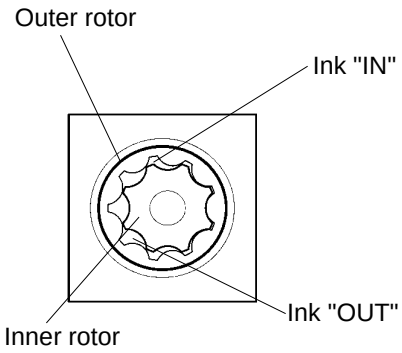
④ The Inking motor turns off when the Main motor is turned off.

> If Ink sensor does not detect ink within **20 seconds** after the Inking motor is activated, the machine assumes that the Ink Cartridge is empty and **"Replace Ink Cartridge"** LED on Operation Panel is lit. If the machine power is turned OFF before the 20 second count, the counting continues from that point when the machine is turned ON again.

> If Overflow sensor detects ink for more than 0.5 seconds, the machine assumes that the ink has over flown within the Drum and displays error message **[E 04]**.

> If excess current is detected for more than 0.3 seconds after the Inking motor is activated, the machine assumes that the Inking motor has locked and indicates error message **[E 16]**.





The ink sucked in is carried between the Outer and Inner rotors of the Ink pump and as the gap between the rotors becomes small, the ink is pushed out.

7. Drum Idling Mechanism

1. Drum Idling

During printing, if the Ink sensor does not detect ink, the Inking motor activates to pump the ink from the ink cartridge into the Drum.
But if the Ink sensor does not detect the ink within 15 seconds after the Inking motor activates, the Drum goes into idling.

2. Paper feed stops during the Drum Idling movement

When the Drum idling starts, the paper feed stops and a group of dots ▬ ▬ ▬ ▬ rotates within the Display window of the Operation panel to indicate that the Drum idling mode is in progress.
The machine returns to normal operating condition when the Ink sensor detects the ink.

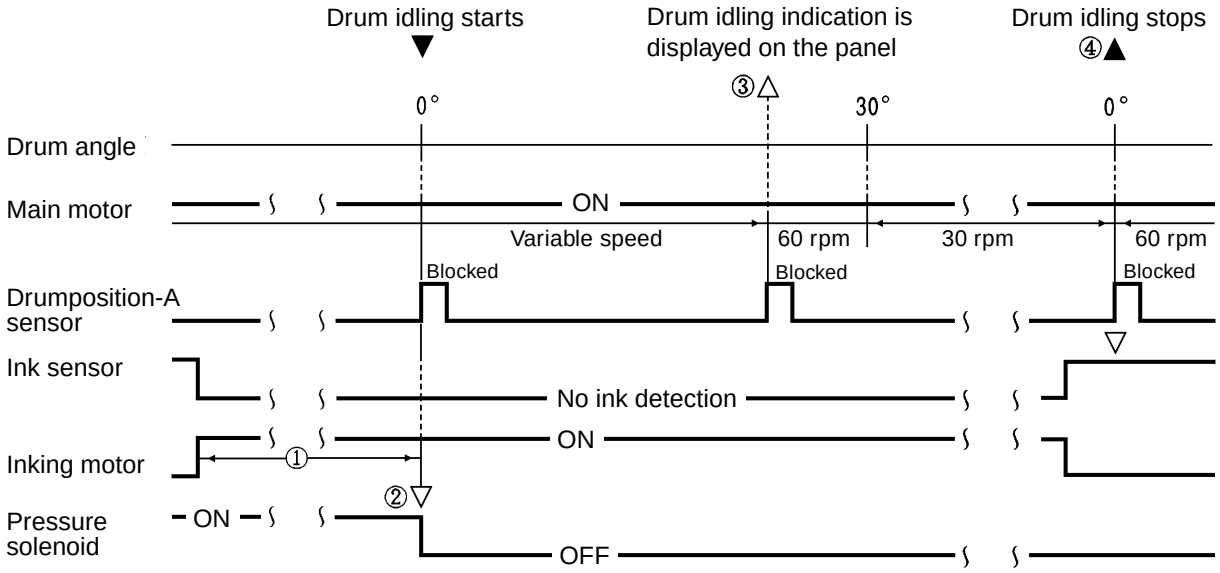
3. The condition for the Drum Idling to take place

The Drum idling takes place if the total of inkless time adds to less than 60 seconds and machine meets one of the following three conditions.

a. First machine operation after the power is connected to the machine.
b. First machine operation after pulling out and returning the Drum back into the machine.
c. First machine operation after machine was left idle for more than 24 hours.

(refer to the Timing Chart on page 8-9)

Drum Idling Timing Chart



① If the Ink sensor does not detect any ink within **15 seconds** after the Inking motor is activated, the machine goes into Drum idling from next Drum position-A.
But if the Ink sensor detects the ink before the Drum comes to position A, the Drum idling movement is cancelled, and the printing starts.

② The Drum idling movement starts from the Drum position-A, which is equal to Drum at 0°, and deactivates the Pressure solenoid.

③ At the second Drum position-A, the Panel on the machine indicates the Drum idling display.

④ During the Drum idling movement, the Ink sensor is checked at every Drum position-A for any ink detection.
If ink is detected, the Drum idling movement ends and the printing starts.

- If the Ink sensor does not detect any ink within **80 seconds** after the Drum idling started, the machine assumes that the Ink Cartridge is empty and lights the **"Replace Ink Cartridge"** LED on the panel and indicates the message **[C 41]** on the display.

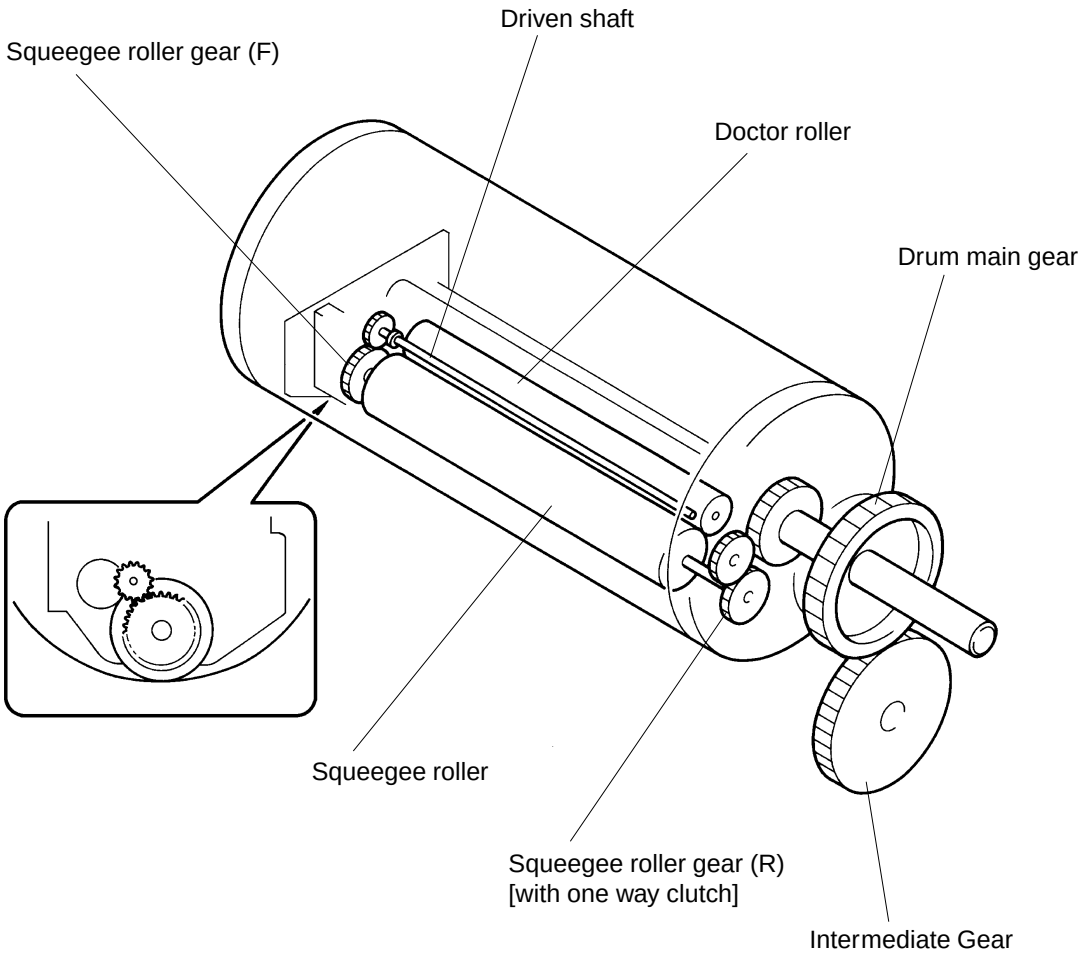
8. Squeegee Roller Rotation Mechanism

1. Rotation of the Squeegee Roller

Through the gears, the drive of the main motor is transferred to the Squeegee roller gear (R) and rotates the Squeegee roller.
The Squeegee roller gear (R) has one way clutch which prevents the Squeegee roller from rotating when the Drum is accidentally rotated in the opposite way by hand.

2. Rotation of the Driven Shaft

With the rotation of the Squeegee roller, the Squeegee roller gear (F) transfers the rotation to the gear on the Driven shaft and rotates the shaft.



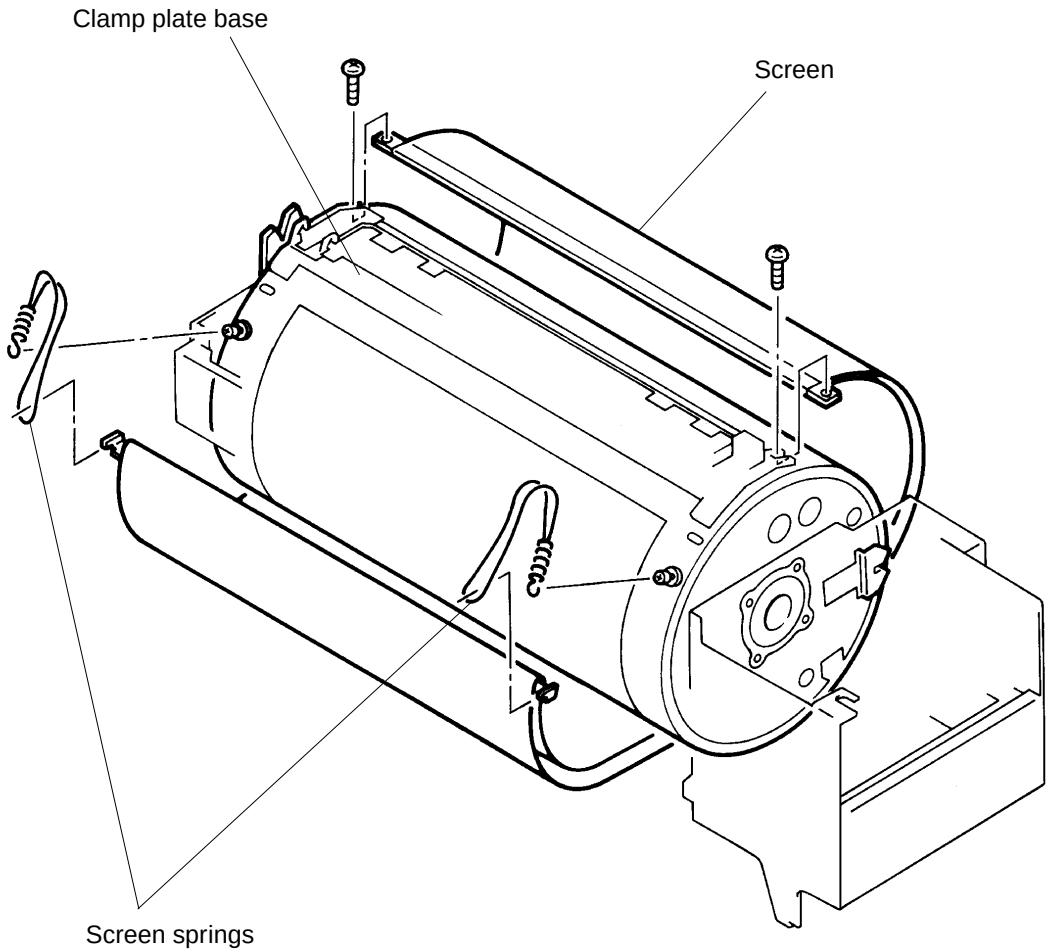
2. Removal and Assembly

1. Screen

1. Make a confidential master on the Drum.
2. Remove the Drum from the machine.
3. Remove the two Screen springs.
4. Remove two mounting screws (regular screws) of the Clamp plate base which are also holding down the Screen to the Drum.
   If neccessary loosen two Special screws which are also on the Clamp plate base.
5. Pull out the Screen from under the Clamp plate base, and remove the Screen.

Precaution in Assembly

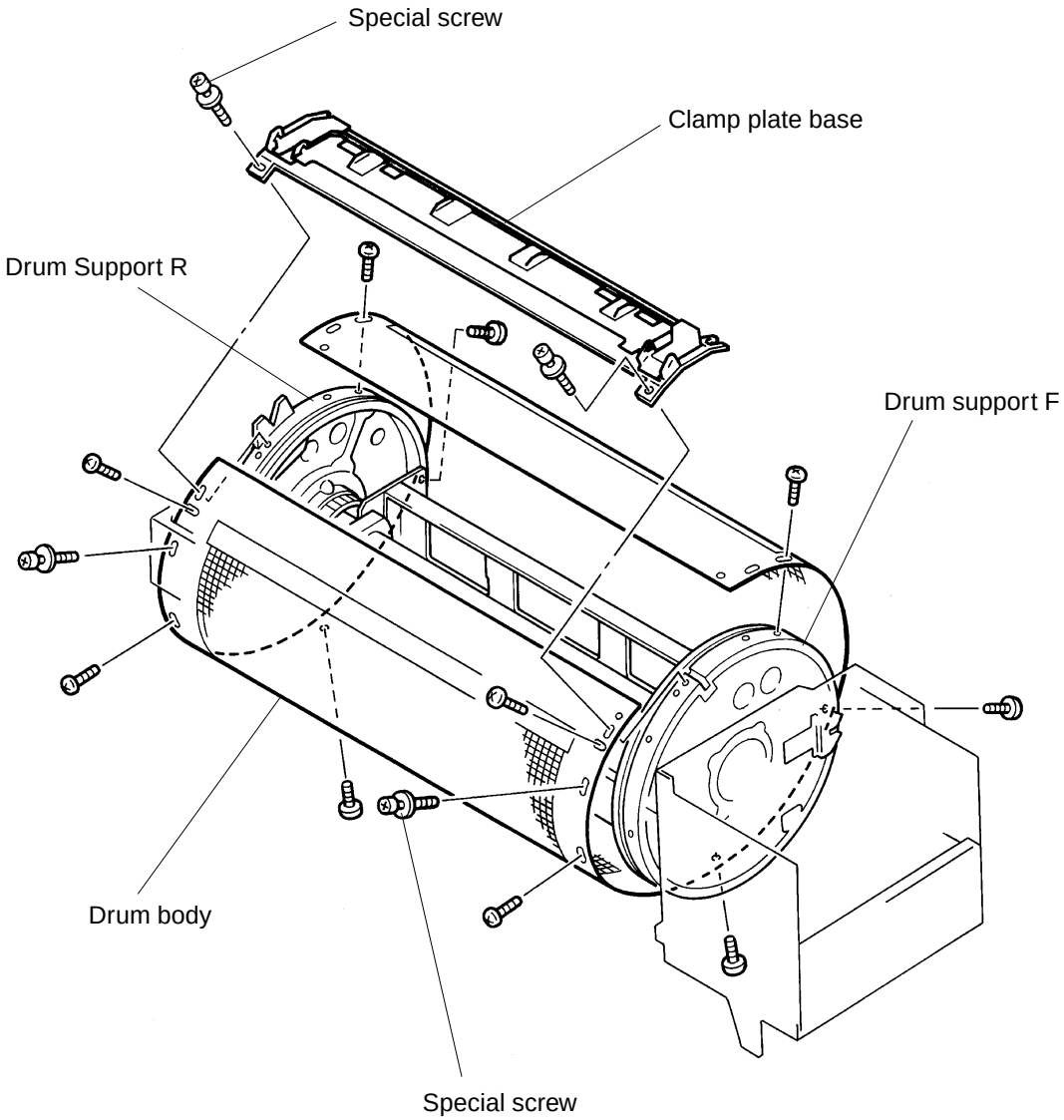
> Do not bend, wrinkle or damage the Screen.



2. Drum Body

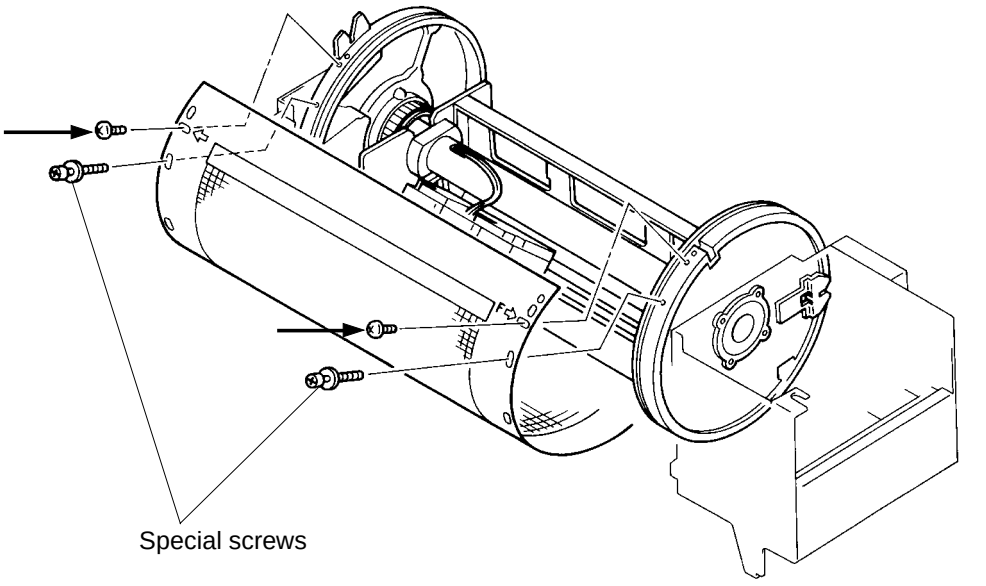
1. Make a confidential master on the Drum.
2. Remove the Drum from the machine.
3. Remove the Screen from the Drum. (page 8-11)
4. Remove two Special screws from the Clamp plate base and remove the base.
5. Remove remaining ten regular mounting screws and two more Special screws holding the Drum body to the Drum body support F and R.
6. Separate the Drum body from the Drum body supports, carefully to avoid damaging the Drum body.

(refer to page 8-13 for the "Precaution in Assembly")

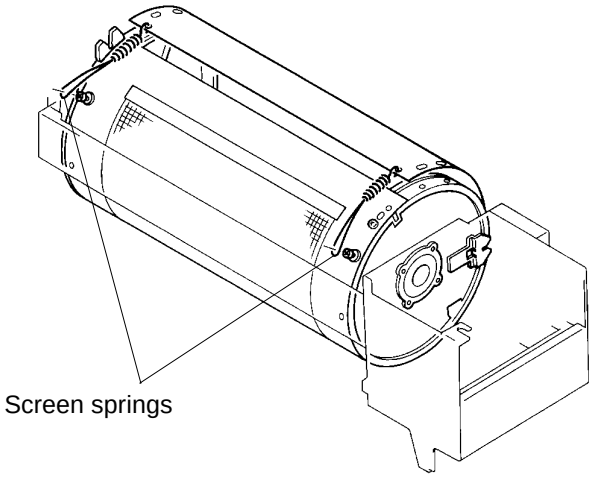


Precaution in Assembly

> Do not bend or damage the Drum body.
> The Drum body has ⇦ and ⇨ marks with **F** engraved next to one of the two arrow marks.
The **F** mark indicates the "front" (Operation panel side).
> Mount the screws on the two holes marked ⇦ and ⇨ first.
Then mount the two Special screws next to the first two screws.



> After the first and second set of the screws are in, temporary hook the Drum body springs in the manner shown by the illustration below.
This is to pull and fit the Screen evenly on the Drum supports F and R.



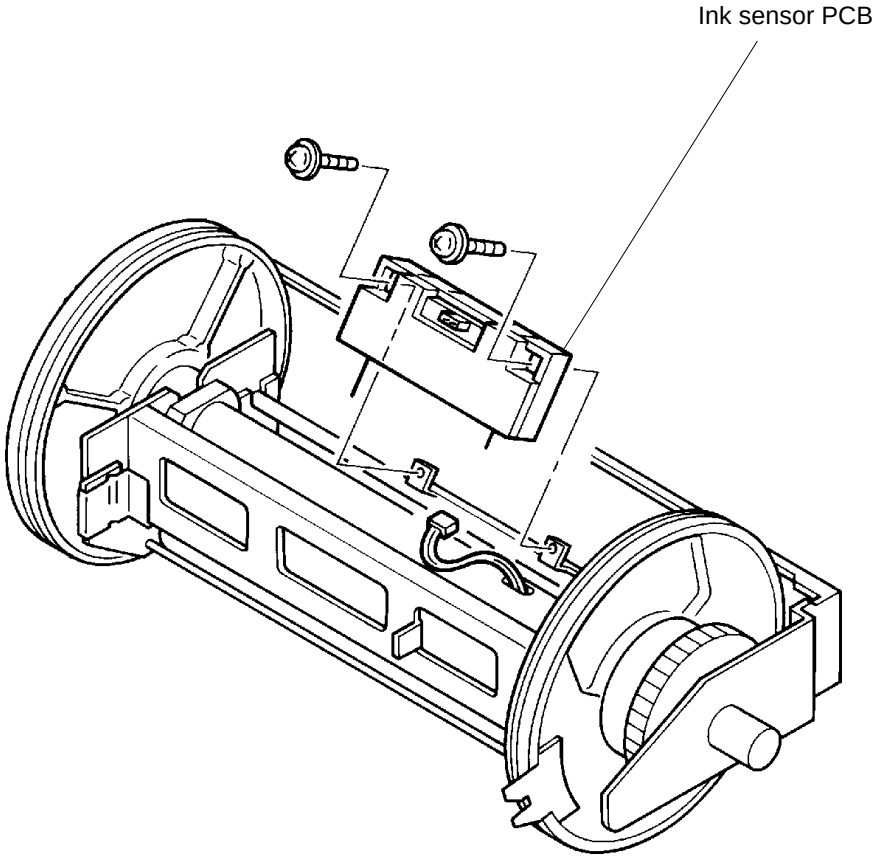
> Mount the remaining screws and remove the two temporary mounted Screen springs.
> Mount the last two remaining screws and hook the Screen springs to complete the assembly.
If necessary, refer to page 8-11 to check how the springs were hooked on the Drum.

3. Ink Sensor PCB

1. Make a confidential master on the Drum.
2. Remove the Drum from the machine.
3. Remove the Screen. (page 8-11)
4. Remove the Drum body. (page 8-12)
5. Disconnect the Connector of the Ink sensor PCB.
6. Remove two mounting screws of the Ink sensor cover and remove the cover with the PCB in it.
7. Remove Ink sensor PCB from the Ink sensor cover.
   CAUTION:
   Use special caution not to break or bend the two sensor antennas.
   If they are bent, straighten them out with fingers.

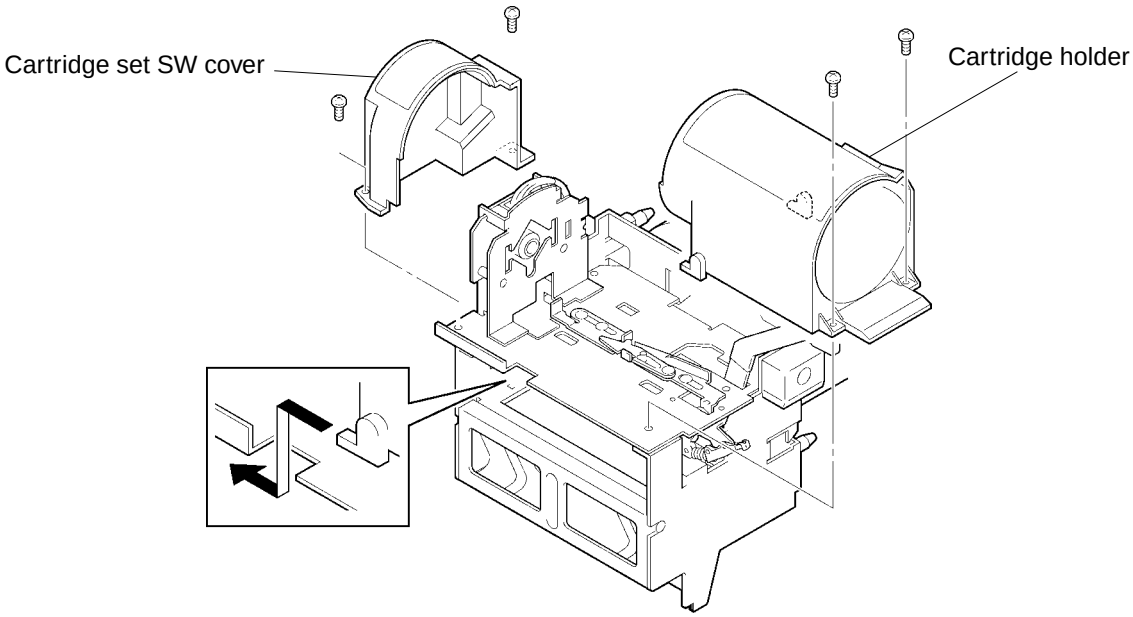
Precaution in Assembly

> The Ink sensor and Overflow sensor antennas should both be standing at a right angle (90°) to the PCB.
> The two antennas must not be touching the Doctor roller or Driven roller.



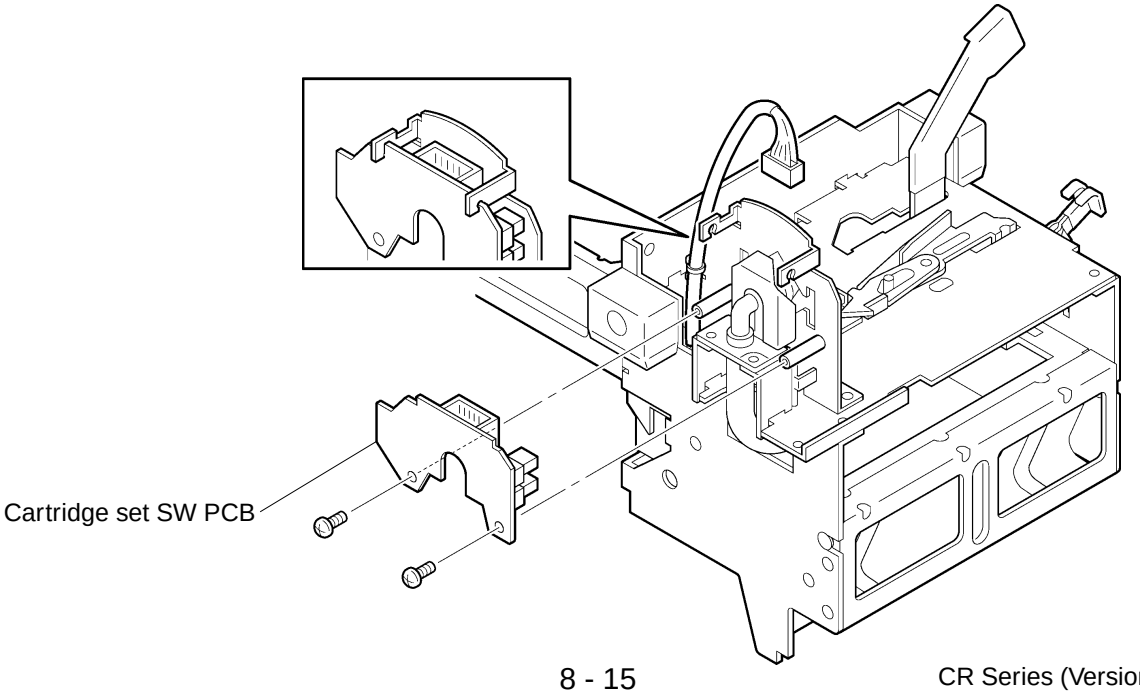
4. Cartridge holder and Cartridge set SW cover

1. Remove the Drum cover.
2. Remove two mounting screws of the Cartridge holder and remove the Cartridge holder.
3. Remove two mounting screws of the Cartridge set SW cover and remove the Cartridge set SW cover.



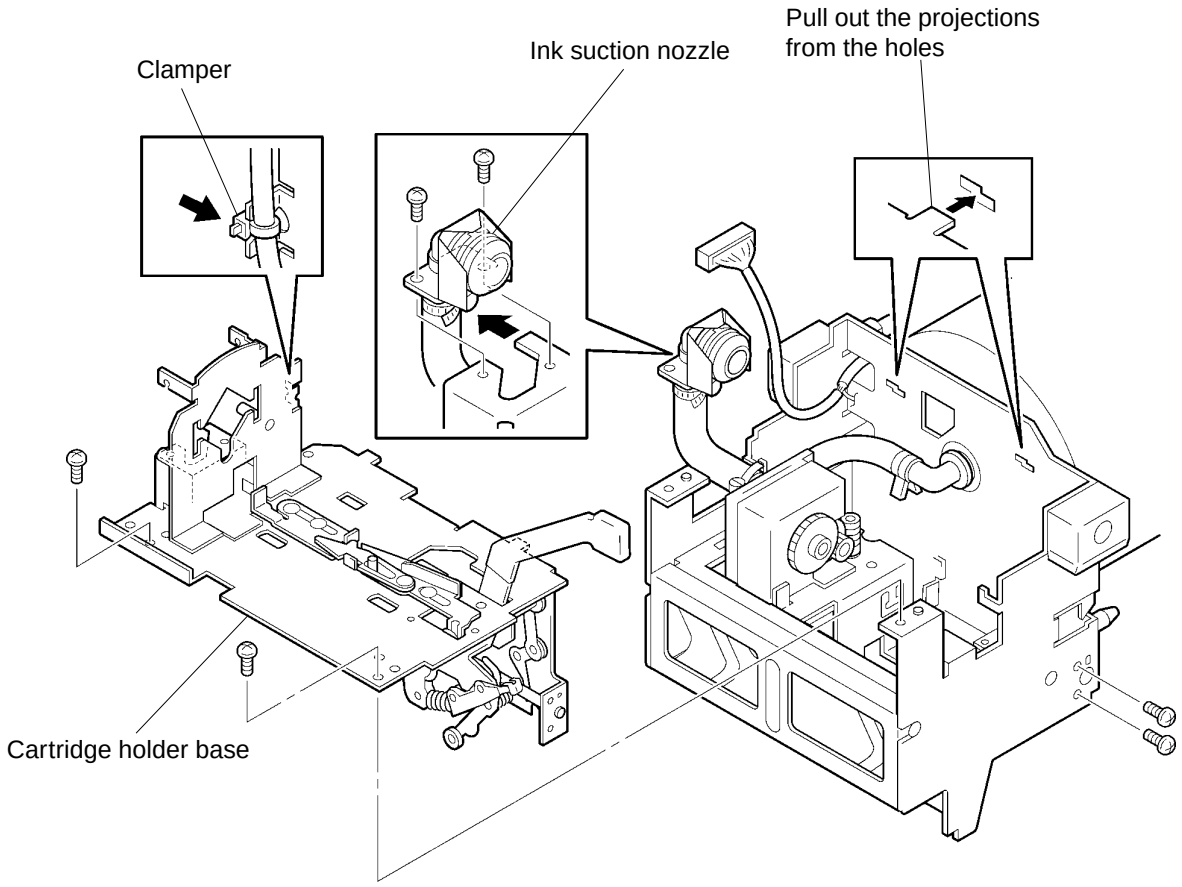
5. Cartridge Set SW PCB

1. Remove the Drum cover, Cartridge holder and Cartridge set SW cover.
2. Disconnect the connector of Cartridge set SW PCB.
3. Remove two mounting screws of the Cartridge set SW PCB.
4. Unhook the Cartridge set SW PCB and remove this PCB.



6. Cartridge holder base

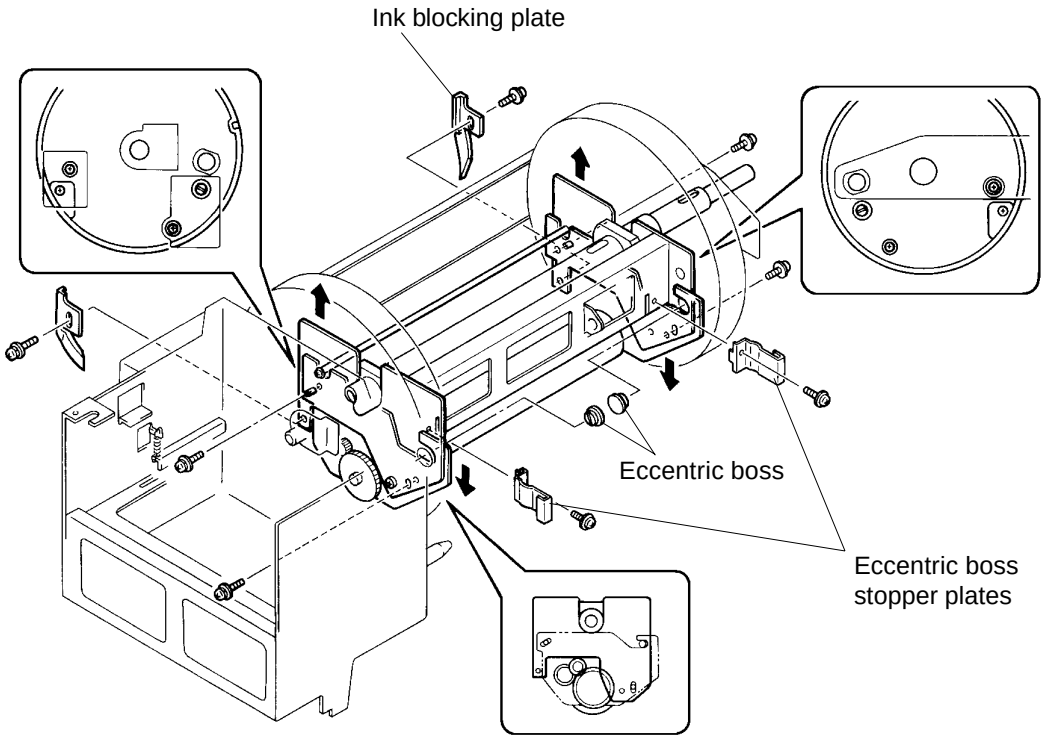
1. Remove the Drum from the machine, and remove Ink Cartridge from the Drum.
2. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover (page 8-15)
   > Cartridge set SW PCB (page 8-15)
3. Remove two mounting screws of the Ink suction nozzle, and slide the nozzle out from the bracket.
4. Cut the clamper of the wire harness of the Cartridge set SW PCB.
5. Remove four mounting scerws of the Cartridge holder base. (Two screws from the top, and the other two screws from the right side of the frame as shown on below figure.)
6. Pull out the projections of the holder base from the holes and pull upward the Cartridge holder base, and remove it.



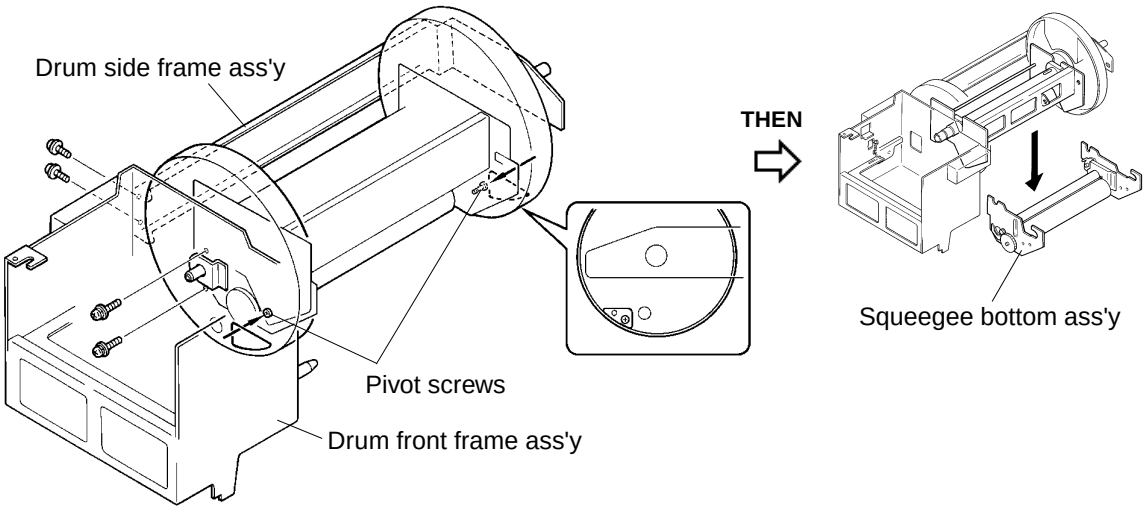
7. Squeegee Roller

1. Make a confidential master on the Drum.
2. Remove the Drum from the machine, and remove Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover and Cartridge set SW PCB (page 8-15)
   > Cartridge holder base (page 8-16)
   > Ink pump unit (page 8-20)
   > Screen (page 8-11)
   > Drum body (page 8-12)
   > Ink sensor PCB (page 8-14)
4. Lock the Drum at Position-B.
5. From the holes on the Drum supports F and R, remove two mounting screws each from the Squeegee frames on both ends.
6. From the holes on the Drum supports F and R, remove mounting screws of the two Eccentric boss stopper plates and remove the plates.
7. Remove the two Eccentric boss.
8. From the holes on the Drum supports F and R, remove mounting screws of the two Ink blocking plates, and remove the blocking plates.

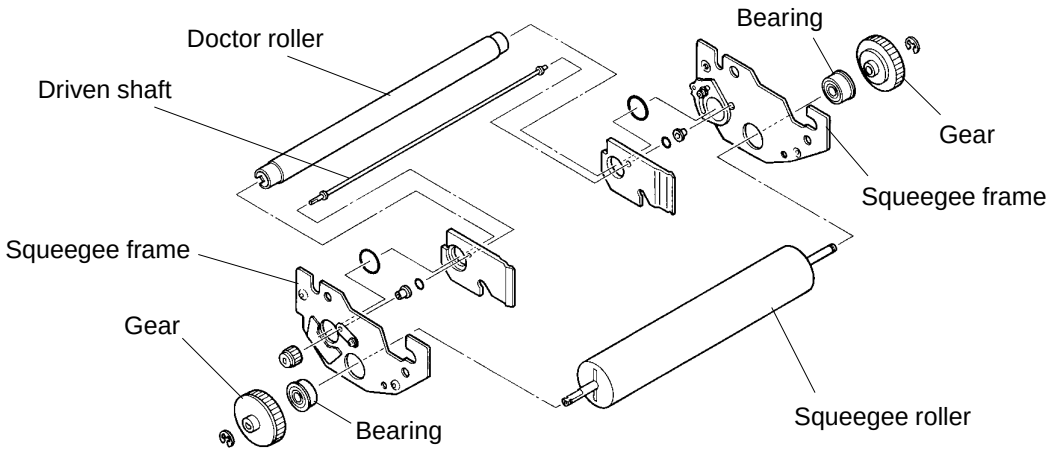
(continues on page 8 - 18)



9. Remove two screws from the Drum side frame ass'y and two screws from the Drum front frame ass'y.
10. From the holes on the Drum supports F and R, remove two Pivot screws.
11. Remove the Squeegee bottom assembly from the Squeegee unit.



12. Remove two E-rings from the ends of the Squeegee roller and remove the gears and bearings.
13. Slowly take out the Squeegee roller.
    The Doctor roller and Driven shaft will also come apart from the Squeegee frames.
    CAUTION:
    Four O-rings, of which two are very small, may fall off from the Squeegee bottom assembly when the Squeegee roller is removed. Do not lose these O-rings.



Precaution in Assembly

> Do not forget to return the four O-rings in their original positions.

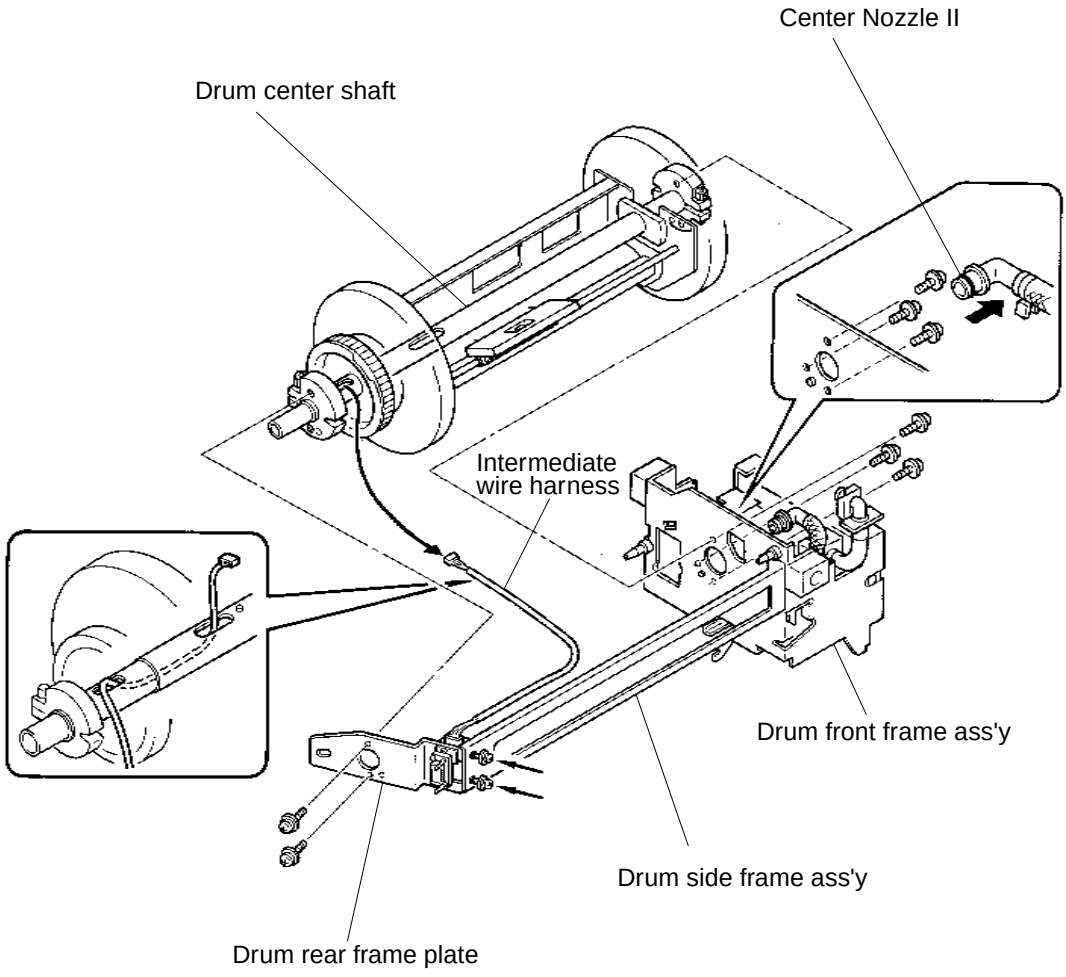
Adjustments after Assembly

> Squeegee gap adjustment. (page 8-26)
> Squeegee pressure Balance. (page 8-27)
> Ink blocking plate position. (page 8-28)

8. Drum Support F & Drum Support R

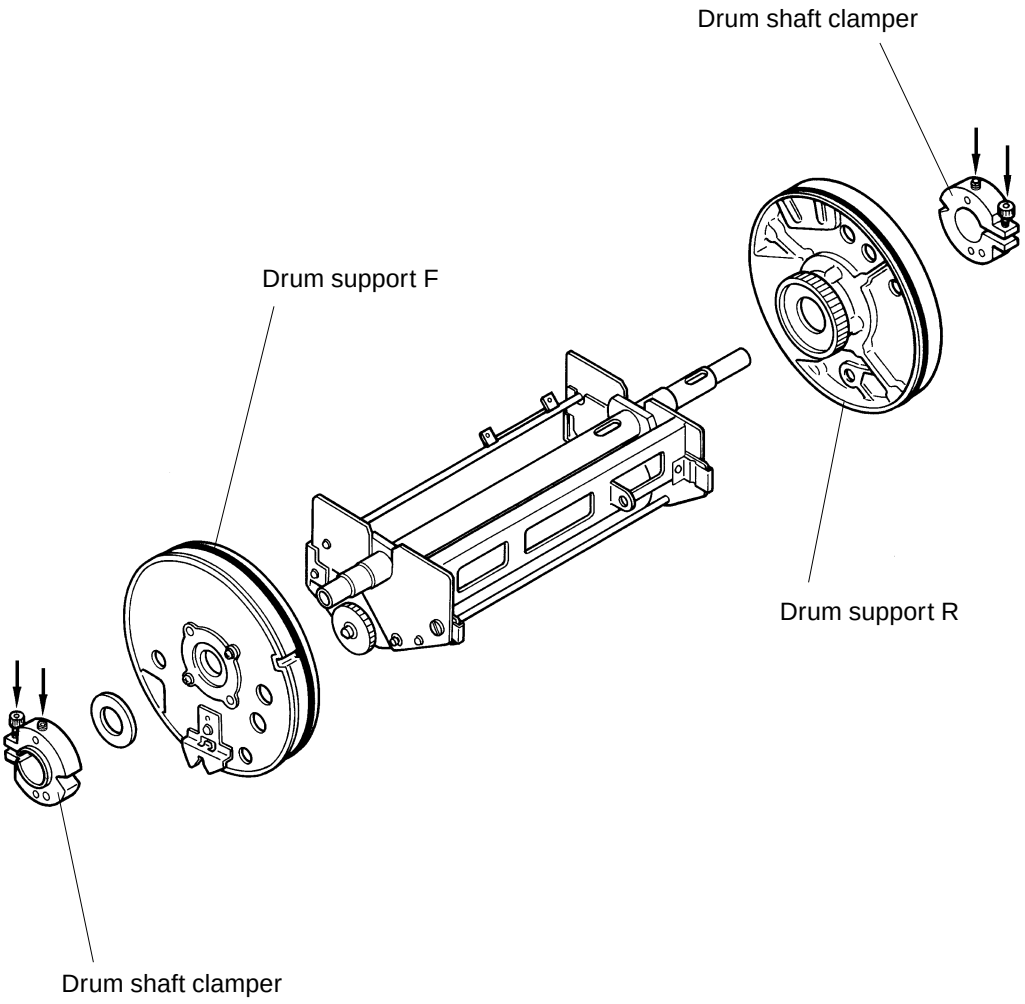
1. Make a confidential master on the Drum.
2. Remove the Drum from the machine, and remove Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover and Cartridge set SW PCB (page 8-15)
   > Cartridge holder base (page 8-16)
   > Screen (page 8-11)
   > Drum body (page 8-12)
4. Disconnect the Connector of the Ink sensor PCB, and pull out the Intermediate wire harness from the Drum center shaft.
5. Pull out the Center NozzleII from the Drum center shaft.
6. Remove three mounting screws of the Drum front frame ass'y.
7. Loosen the two screws on the Drum side frame ass'y.
8. Remove two mounting screws from the Drum rear frame plate, and remove both the Drum rear frame plate and Drum front frame ass'y from the Drum center shaft.

(continues on page 8 - 20)



9. Loosen two set screws on each Drum shaft clampers, and remove the clampers from the Drum center shaft.
10. Remove the Drum support F and Drum support R from the Drum center shaft.

(continues on page 8 - 21)

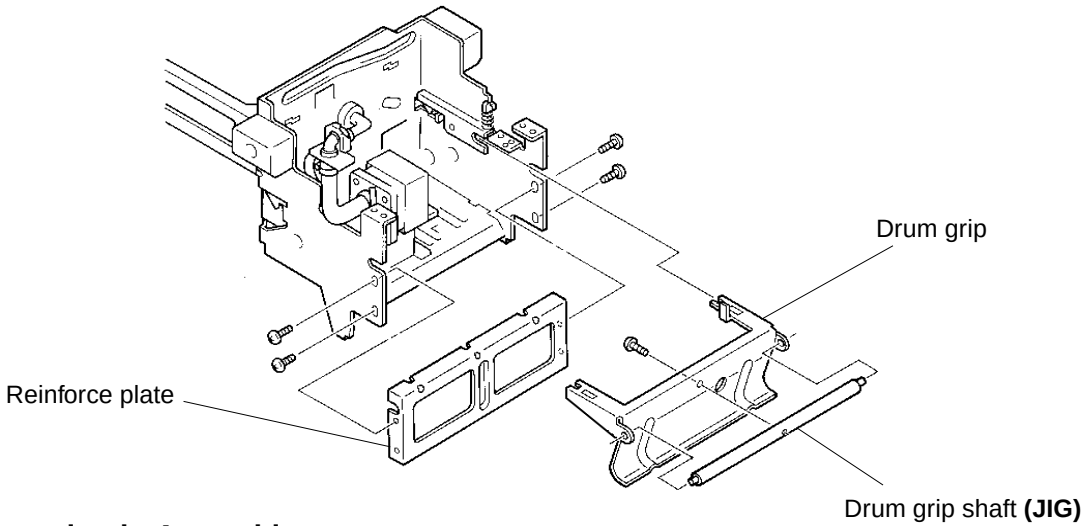


Precaution in Assembly

> When tightening the Drum shaft clampers, use the Drum grip shaft as a **JIG** to set the position.

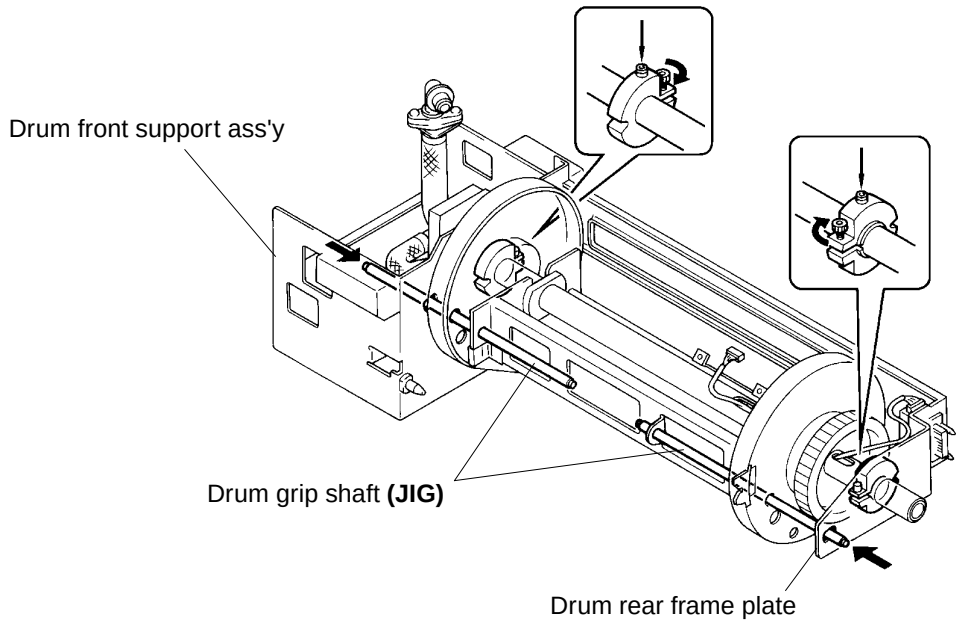
Removing the Drum grip shaft

1) Remove four mounting screws of the Reinforce plate and remove the plate.
2) Remove the Drum grip.
3) Remove mounting screw of the Drum grip shaft and separate the shaft from the Grip.



Precaution in Assembly **(continued from above)**

> Bring the Drum to the Position-B.
Tighten the Drum shaft clamper on the rear of the Drum with two set screws after placing the **JIG** through the holes on the Drum rear frame plate, Drum support R, and Drum side frame ass'y.
Then place the JIG through the holes on the Drum front support ass'y and Drum support F, and tighten the Drum shaft clamper on the front of the Drum with two set screws.

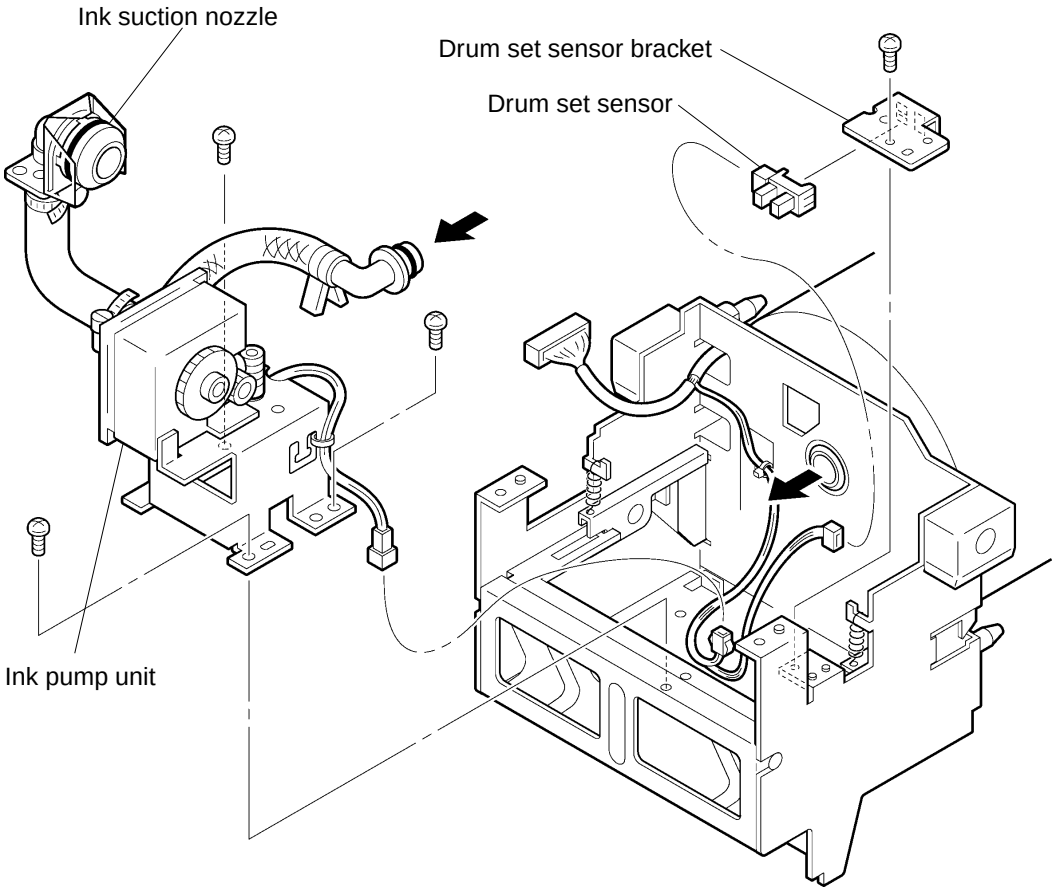


9. Ink Pump Unit / Drum set sensor

1. Remove the Drum from the machine.
2. Remove the Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover and Cartridge set SW PCB (page 8-15)
   > Cartridge holder base (page 8-16)
4. Pull out the other Ink hose from the Ink distributor nozzle.
5. Disconnect the Connector of the Inking motor.
6. Remove two mounting screws of the Ink pump unit and remove the pump unit.
7. Disconnect the connector of Drum set sensor.
8. Remove a mounting screw of the Drum sensor bracket, and remove the Drum set sensor with its bracket.
9. Remove the Drum set sensor from its bracket.

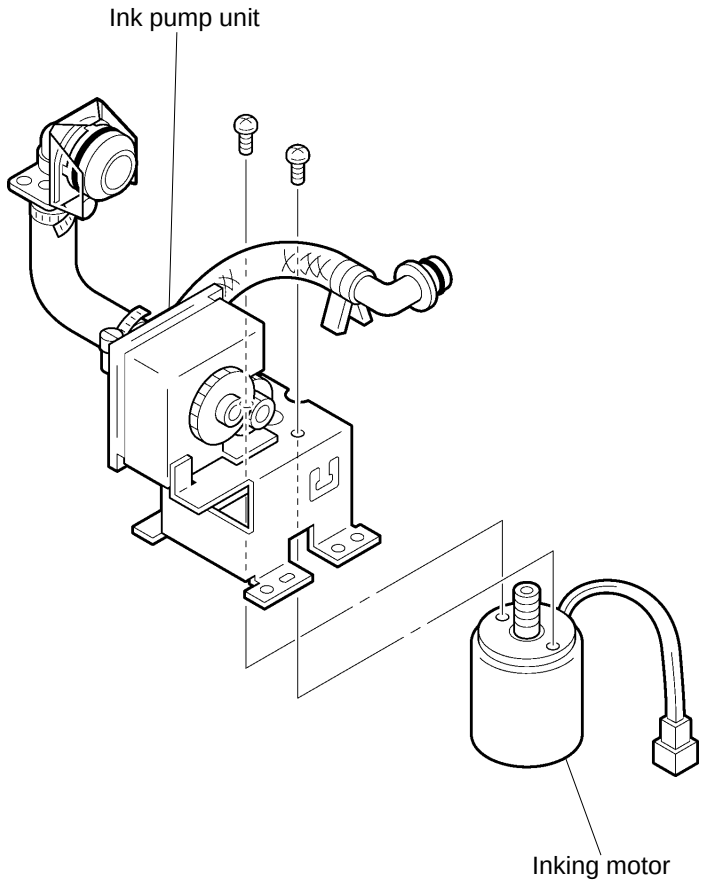
Precautions in Assembly

> Match the half-pierced section of the Ink pump unit with its counter part.
> Match the half-pierced section of the Drum set sensor bracket with its counter part.



10. Inking Motor

1. Remove the Drum from the machine.
2. Remove the Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover and Cartridge set SW PCB (page 8-15)
   > Cartridge holder base (page 8-16)
   > Ink pump unit (page 8-22)
4. Remove two mounting screws of the Inking motor and remove the motor.

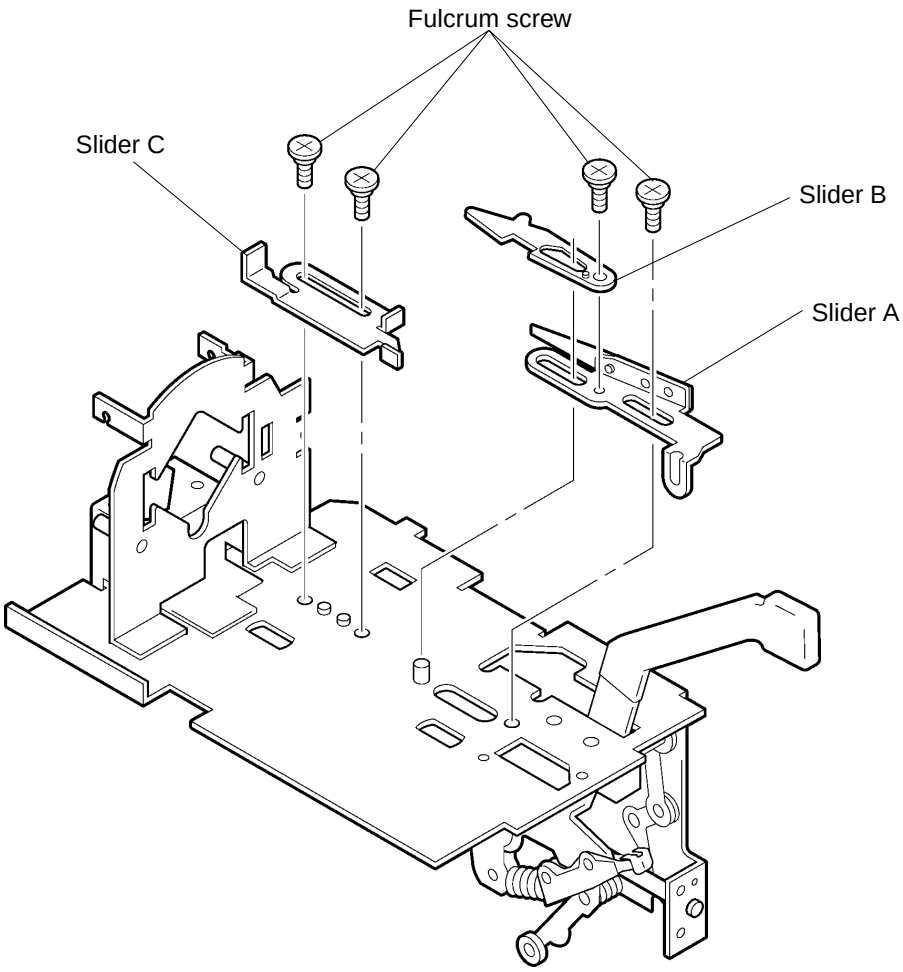


11. Slider Link

1. Remove the Drum from the machine.
2. Remove the Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover (page 8-15)
4. Remove a fulcrum screw of Slider B and remove the Slider B.
5. Remove a fulcrum screw of Slider A and remove the Slider A.
6. Remove two fulcrum screws of Slider C and remove the Slider C.

Precautions in Assembly

> Do not make mistake in the placing order of this parts when these parts are assembled.
> Grease up on Slider A, B and C to move these link plates smoothly.

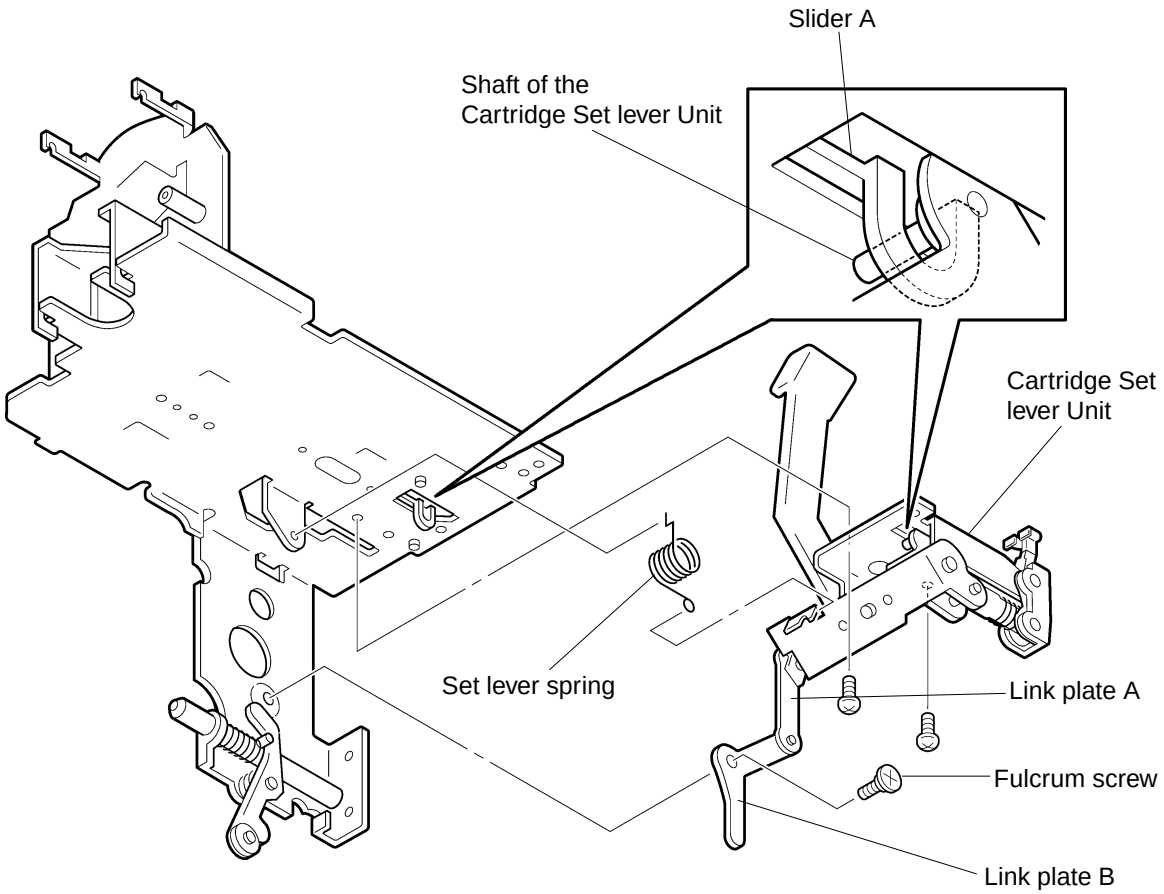


12. Cartrige Set Lever Unit

1. Remove the Drum from the machine.
2. Remove the Ink Cartridge from the Drum.
3. Remove following parts from the Drum.
   > Drum cover
   > Cartridge holder (page 8-15)
   > Cartridge set SW cover and Cartridge set SW PCB (page 8-15)
   > Cartridge holder base (page 8-16)
4. Remove the Set lever spring.
5. Remove two monting screws of Cartridge set lever and a fulcrum screw of Link plate B.
6. Unhook the shaft of Cartridge set lever unit as shown on below figure, and remove the Cartridge set lever unit togather with Link plate A and Link plate B.

Precautions in Assembly

> Be sure that the shaft of Cartridge set lever unit is engaged to the hole of Slider A as shown on below figure.
> Grease friction parts on the Link plates and other parts to move these link plates smoothly.



3. Adjustment

1. Squeegee Gap

1. Make a confidential master on the Drum.
2. Remove the Drum from the machine.
3. Remove the Screen. (page 8-11)
4. Remove the Drum body. (page 8-12)
5. Clean out the ink from the Squeegee unit.
6. Using feeler gauge, measure the gap between the Squeegee roller and Doctor roller.
   The gap should be 0.08 mm ± 0.02 mm.
   If not, the gap should be adjusted.
7. To adjust, loosen the securing screw of the Doctor roller adjust plate located at both ends of the Squeegee unit.
8. Move the adjust plate by inserting a rod, such as 2.5mm Allen wrench, in the hole on the plate to change the Squeegee gap.
9. Tighten the securing screw of the two Doctor roller adjust plates after the adjustment is done.

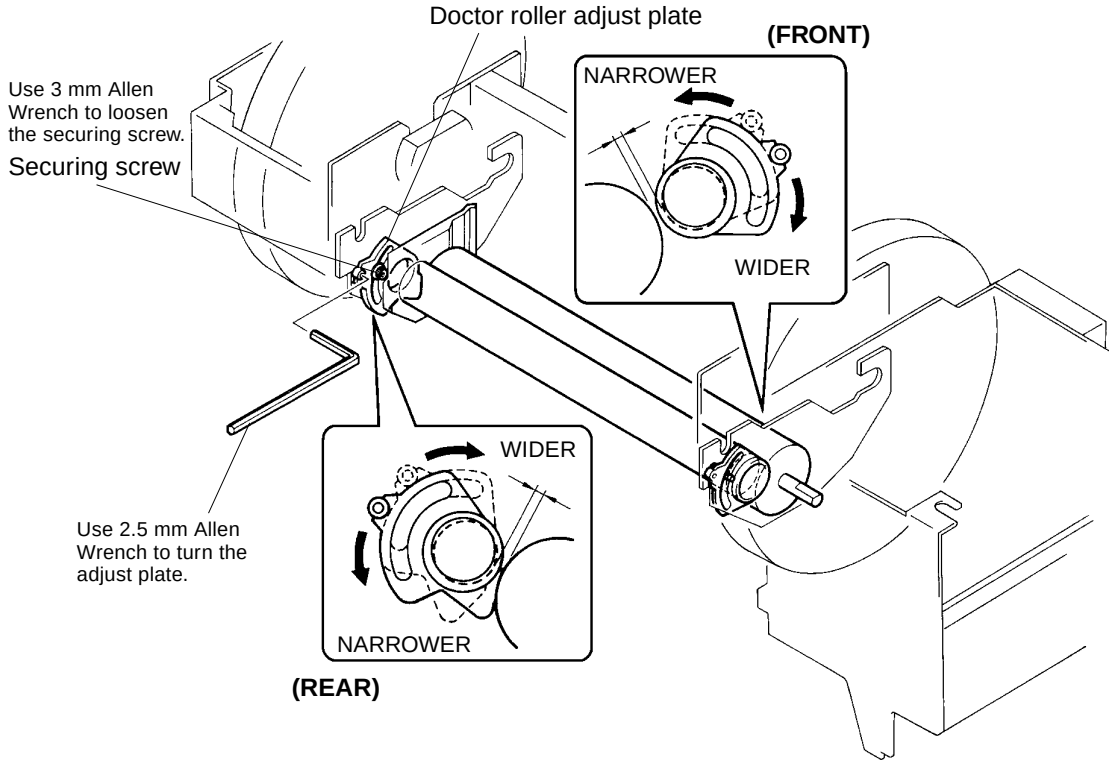
Caution in Adjustment

> The Squeegee gap between the Squeegee roller and Doctor roller should be equal throughout the length of the two rollers.

Results of Incorrect Adjustment

> If the gap is too big:
Too much gap will allow excess amount of ink to get on the inner surface of the Drum and results in ink leakage from the Drum.

> If the gap is too small:
Not enough ink transfers on the inner surface of the Drum and the prints may come out with uneven print density.



2. Squeegee Pressure Balance

Make a master and print with Test Chart No.8 and check the print density on the left and right of the prints. If the print density is uneven, do the following adjustment.

(FRONT)

1) Remove the Drum from the machine, and Ink Cartridge from the Drum.
2) Remove Drum cover.
3) Remove Cartrige holder, Cartridge set SW cover and Cartridge set SW PCB. (page 8-15)
4) Remove Cartridge holder base. (page 8-16)
5) Remove Ink pump unit. (page 8-22)
6) Loosen two mounting screws of the Squeegee frame through the holes on the Drum support F.
7) Use a screw driver to turn the Eccentric boss to adjust the Squeegee pressure.
   The gap between the Squeegee roller and the Drum body should be between **0.5 to 1.0 mm**.
8) Tighten the two mounting screws of the Squeegee frame.

(REAR)

1) Remove the Drum from the machine.
2) Loosen two mounting screws of the Squeegee frame through the holes on the Drum support R.
3) Use a screw driver to turn the Eccentric boss to adjust the Squeegee pressure.
   The gap between the Squeegee roller and the Drum body should be between **0.5 to 1.0 mm**.
4) Tighten the two mounting screws of the Squeegee frame.

Checks after the Adjustment

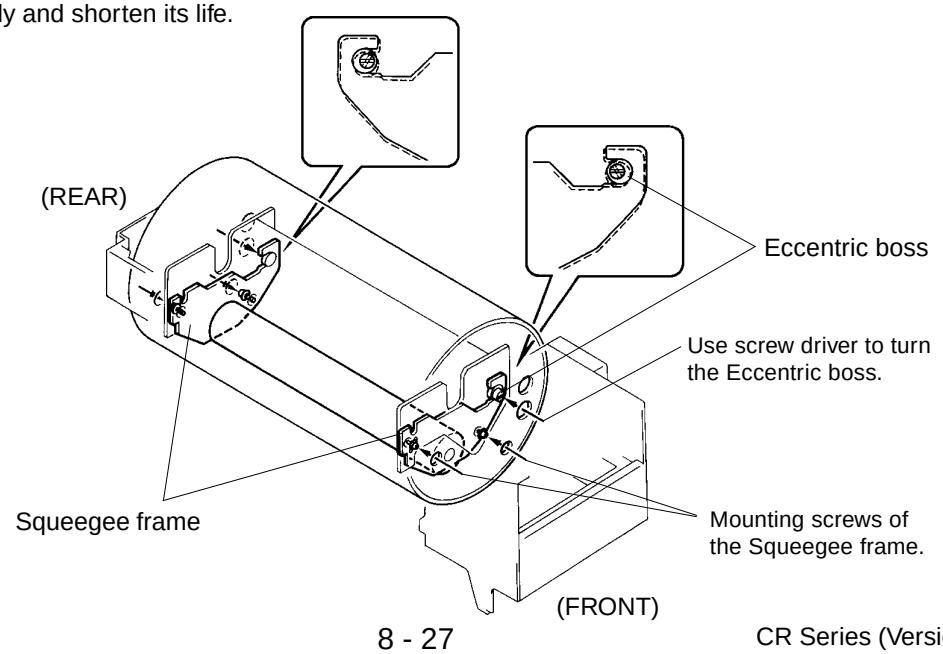
> The gap between the Squeegee roller and the Drum body should equal between the front and rear.
> With a confidential master on the Drum, run the papers through the machine in quantity and check for any ink leakage from the Drum.
If the ink starts to leak, the Squeegee pressure needs to be readjusted.

Results of Incorrect Adjustment

> If the Squeegee pressure differs between the left and right:
The print density may become uneven between the left and right of the prints.

> If the Squeegee pressure is too strong:
Excess amount of ink will get on the inner surface of the Drum and may result in ink leakage from the Drum.

> If the Squeegee pressure is too weak:
The print density may become uneven or too light, and too much stress is applied on the Drum body and shorten its life.



3. Ink Blocking Plate Position

(FRONT)

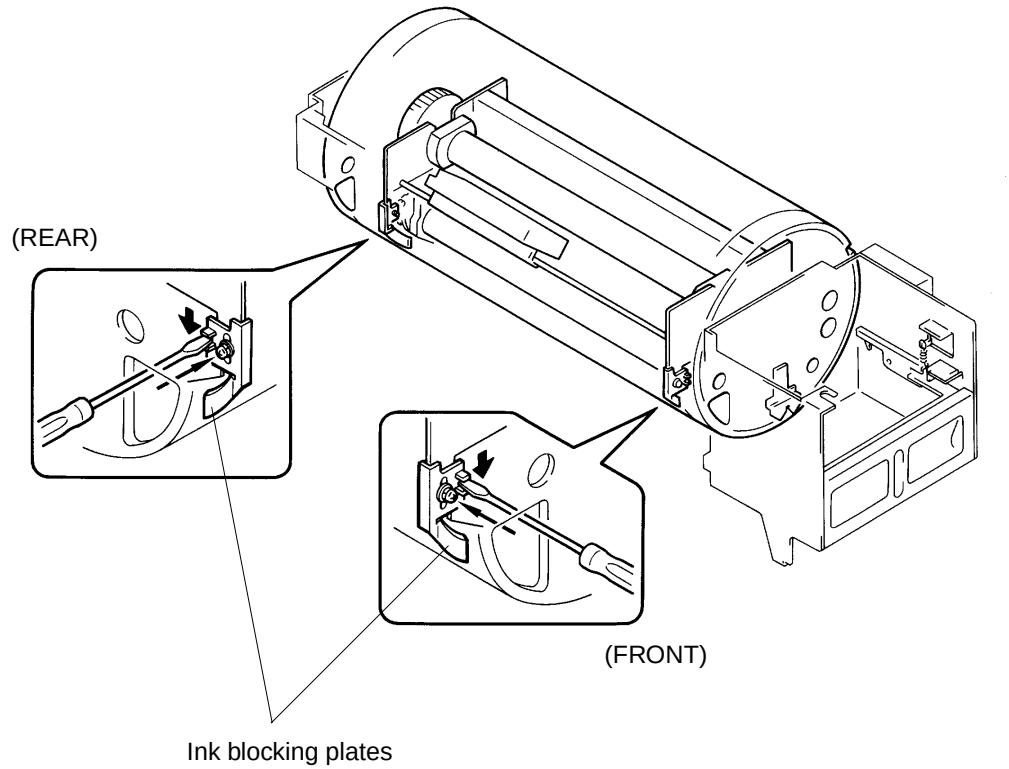
1) Remove the Drum from the machine, and Ink Cartridge from the Drum.
2) Remove Drum cover.
3) Remove Cartrige holder, Cartridge set SW cover and Cartridge set SW PCB. (page 8-15)
4) Remove Cartridge holder base. (page 8-16)
5) Remove Ink pump unit. (page 8-22)
6) Loosen mounting screw of the Ink blocking plate through the hole on the Drum support F.
7) Use a screw driver to push the Ink blocking plate against the Drum inner surface.
8) Tighten the mounting screw of the Ink blocking plate while pushing the Ink blocking plate against the Drum.

(REAR)

1) Remove the Drum from the machine.
2) Loosen the mounting screw of the Ink blocking plate through the hole on the Drum support R.
3) Use a screw driver to push the Ink blocking plate firmly against the Drum inner surface.
4) Tighten the mounting screw of the Ink blocking plate while pushing the Ink blocking plate against the Drum.

Results of Incorrect Adjustment

> If the Ink blocking plates are not flat against the Drum inner surface, the Ink will start leaking out of the Drum.



CHAPTER 9: PAPER JAM

CONTENTS

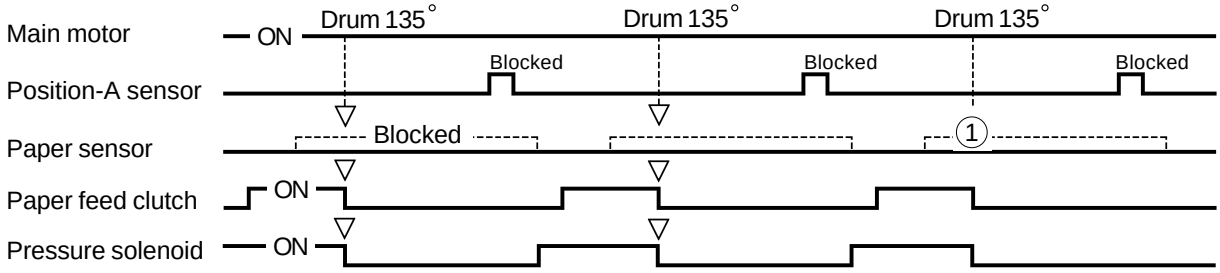
1. Theory of Operation

1. Paper Jam at First Paper Feed Area

1. Paper Sensor

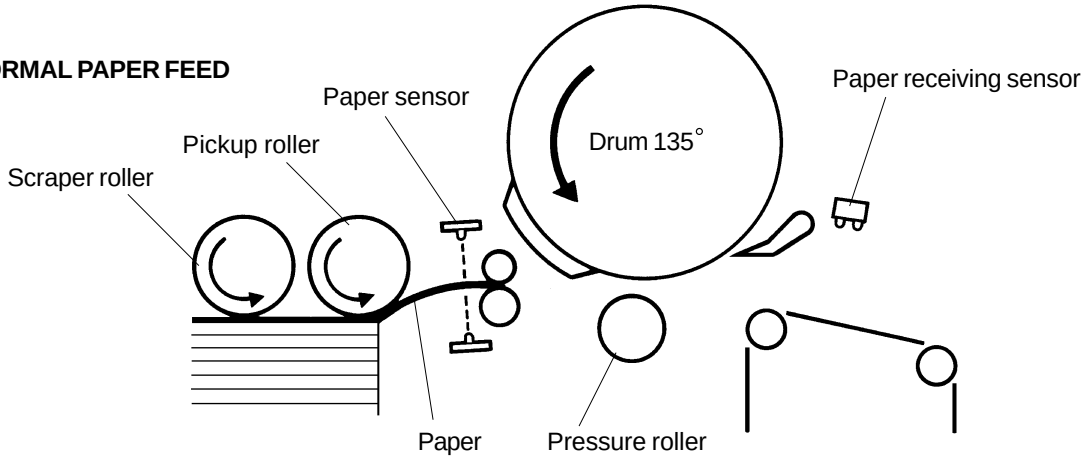
> Paper sensor checks for paper every time the Drum makes 135°turn from the Position-A during printing.

> If the Paper sensor does not detect paper within the third Drum rotation, the machine assumes paper has jammed at the Fist paper feed area and displays message **[C 33]**.

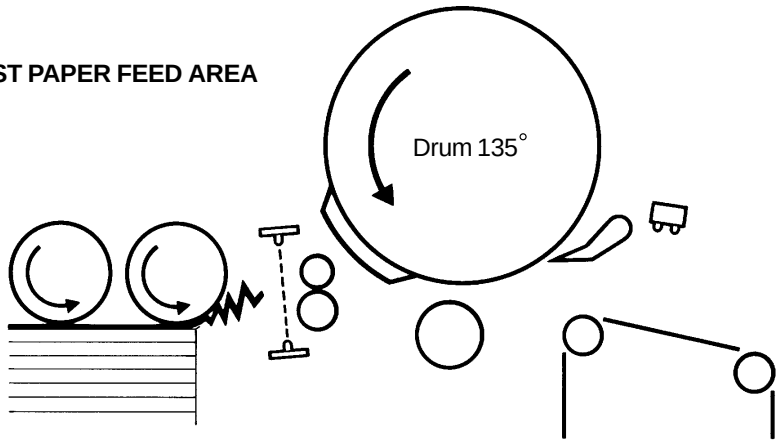


① The Paper sensor does not detect any paper within the third Drum rotation and displays **[C 33]**.

NORMAL PAPER FEED



PAPER JAM AT 1ST PAPER FEED AREA

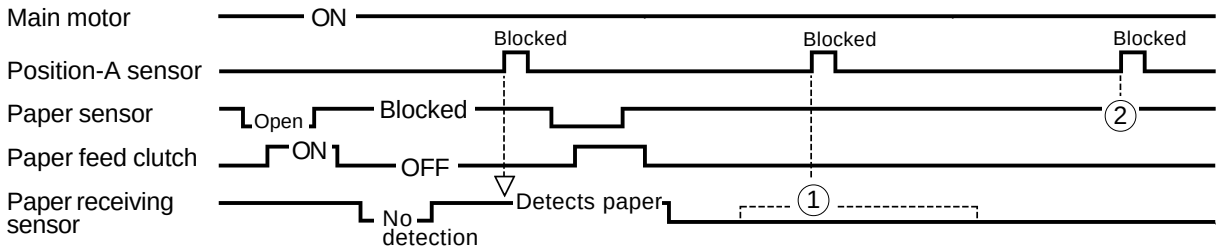


2. Paper Jam at Second Paper Feed Area

1. Paper Sensor and Paper Receiving Sensor

> Paper receiving sensor checks for paper during printing the operation.

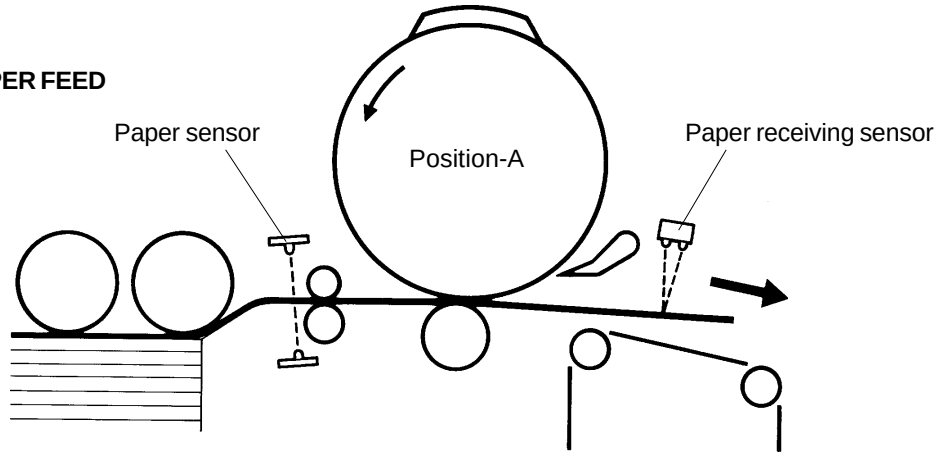
> If Paper receiving sensor does not detect any paper, the machine immediately stops the next paper feed, and if the Paper sensor is still detecting a paper at next Drum position-A, the machine assumes paper has jammed at the Second paper feed area and displays the message **[C 31]**.



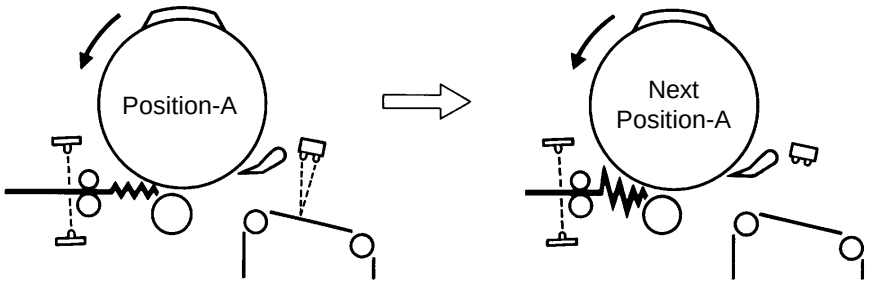
① The Paper receiving sensor does not detect paper.

② The Paper sensor is detecting paper, therefore the machine assumes paper has jammed at the Second paper feed area and displays the message **[C 31]**.

NORMAL PAPER FEED



PAPER JAM AT 2ND PAPER FEED AREA



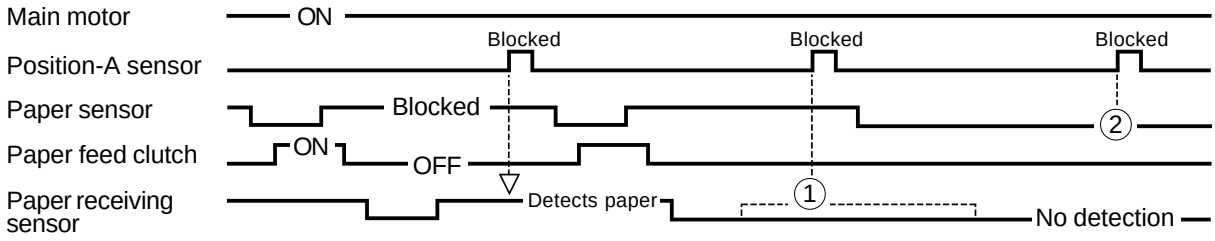
Paper receiving sensor does not detect paper at Drum position-A.

Paper sensor is detecting paper at next Drum position-A.

3. Paper Jam on the Drum

1. Paper Sensor and Paper Receiving Sensor

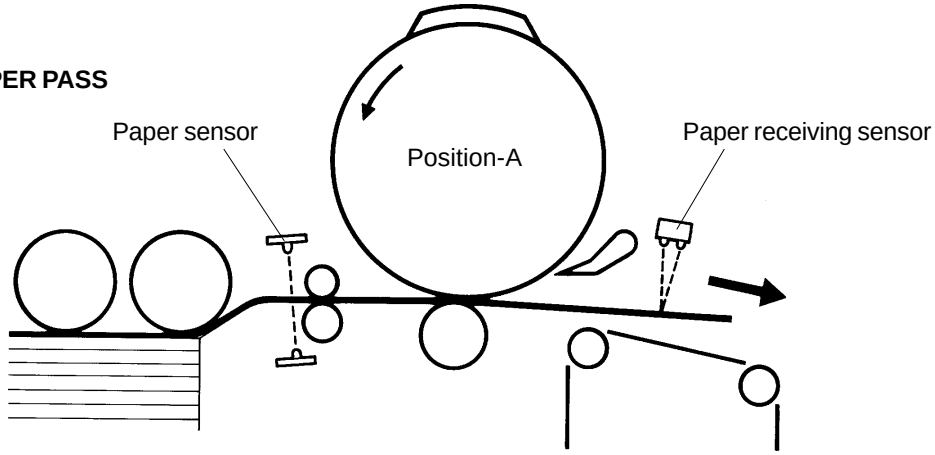
> Paper receiving sensor checks for paper during printing the operation.
> If Paper receiving sensor does not detect any paper, the machine immediately stops the next paper feed, and if the Paper sensor is not detecting a paper at next Drum position-A, the machine assumes paper has jammed on the Drum and displays the message **[C 34]**.



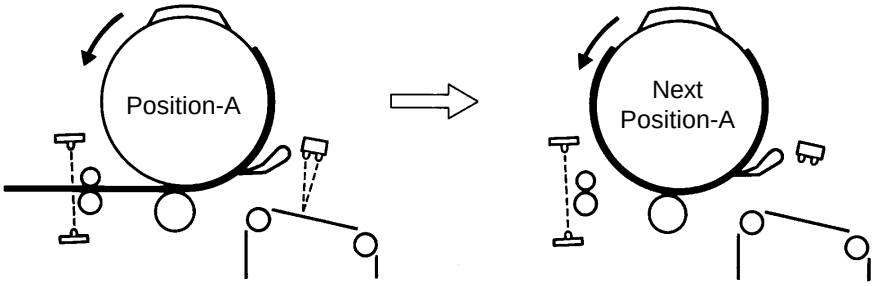
① The Paper receiving sensor does not detect paper.

② The Paper sensor is not detecting paper, therefore the machine assumes paper has jammed on the Drum and displays the message **[C 34]**.

NORMAL PAPER PASS



PAPER JAM ON THE DURM



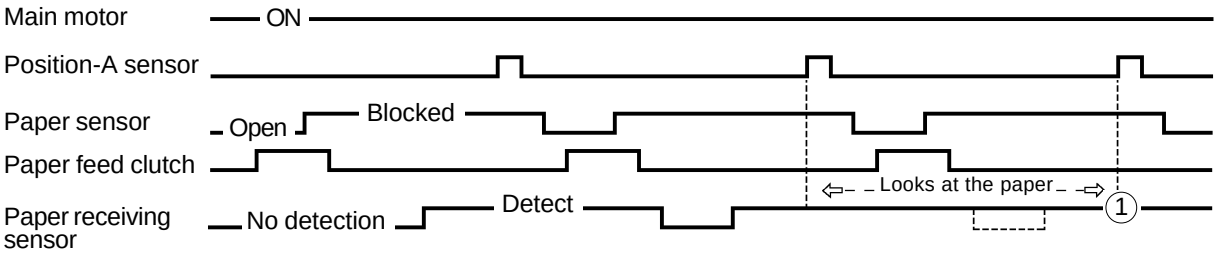
Paper receiving sensor does not detect paper at Drum position-A.

Paper sensor is not detecting paper at next Drum position-A.

4. Paper Jam at Paper Receiving Area

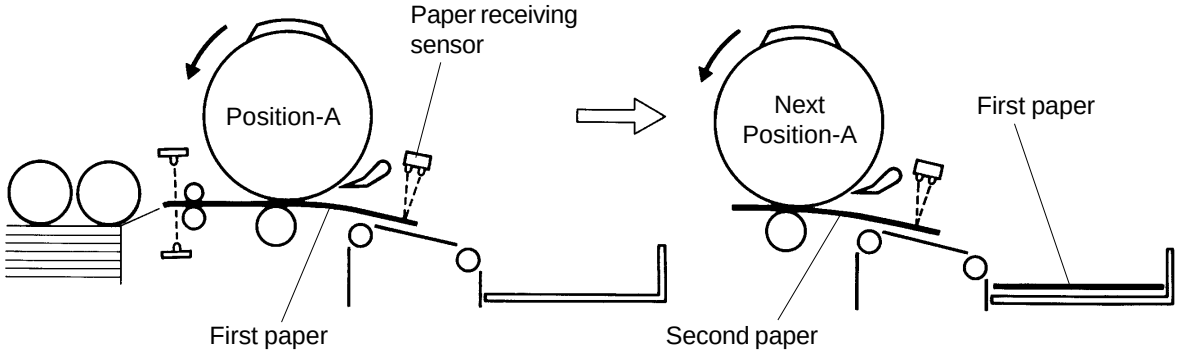
1. Paper Receiving Sensor

> Paper receiving sensor checks for paper during the printing operation.
> If paper detection by Paper receiving sensor does not change from detecting to not detecting within one rotation of the Drum from one Drum position-A to the next, the machine assumes paper has jammed at the Paper receiving area and displays message **[C 32]**.

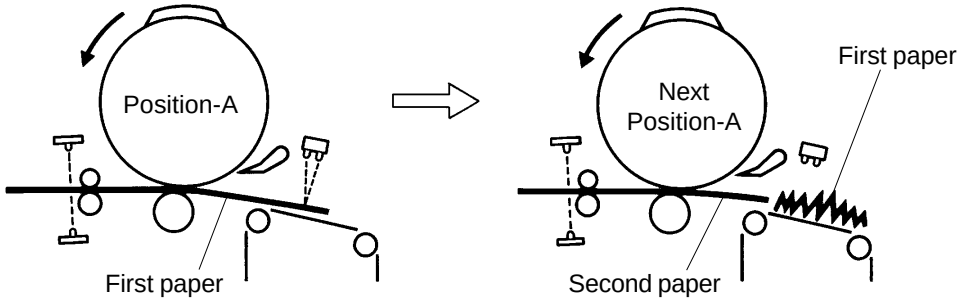


① Paper receiving sensor does not change from detect to no detect within one rotation of the Drum from one Drum position-A to the next. The machine assumes paper has jammed at the Paper receiving area and displays message **[C 32]**.

NORMAL PAPER DISCHARGE

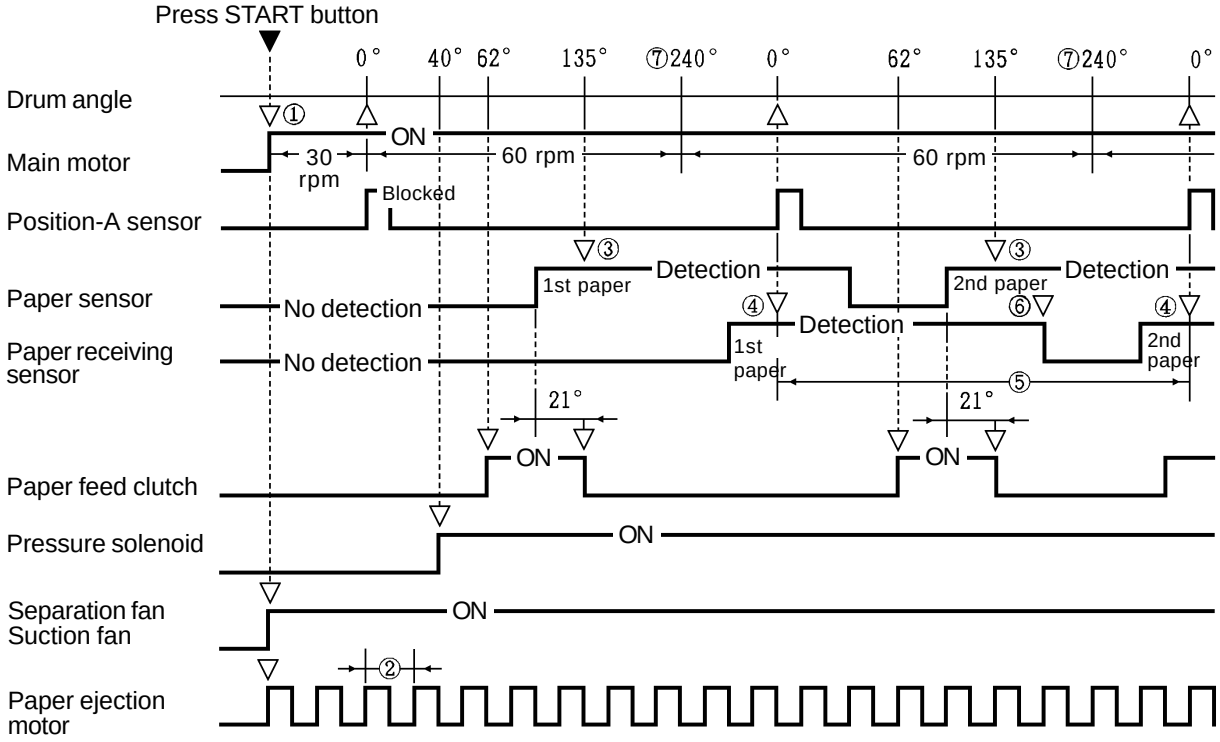


PAPER JAM AT PAPER RECEIVING AREA



Paper does not escape from Paper receiving sensor from one Drum position-A to the next.

5. Printing Start Timing Chart



① If presence of master on the Drum is not checked, the "Master on Drum (in printing) Check" is done before the machine starts printing.
If the actuator of the elevator Upper limit sensor is not pressed, the Paper feed tray is elevated before the printing starts.

② The ON and OFF intervals of the Paper ejection motor change in accordance with the printing speed, which in turn determines the speed of the Transfer belts on the Suction unit.

Main motor speed (Printing Speed)	60 rpm	90 rpm	130 rpm
Paper ejection motor ON interval	20 ms	10 ms	20 ms
Paper ejection motor OFF interval	30 ms	10 ms	10 ms

③ If the light path of the Paper sensor is not blocked (no paper detected) at Drum angle 135°, the Pressure solenoid and Paper feed clutch is turned OFF.
If the light path of the Paper sensor is not blocked within 3 rotations of the Drum, the machine assumes paper has jammed at first paper feed area and indicates the message **[C 33]**.

④ If the Paper receiving sensor does not detect paper when the Drum is at position-A, the machine assumes paper has jammed at second paper feed area or on the Drum and indicates the message **[C 31]** when paper is jammed at 2nd paper feed area, or **[C 34]** when paper is jammed on the Drum.

⑤ If the Paper receiving sensor keeps detecting a paper from one Drum position-A to the next, the machine assumes paper has jammed at paper receiving area and indicates the message **[C 32]**.

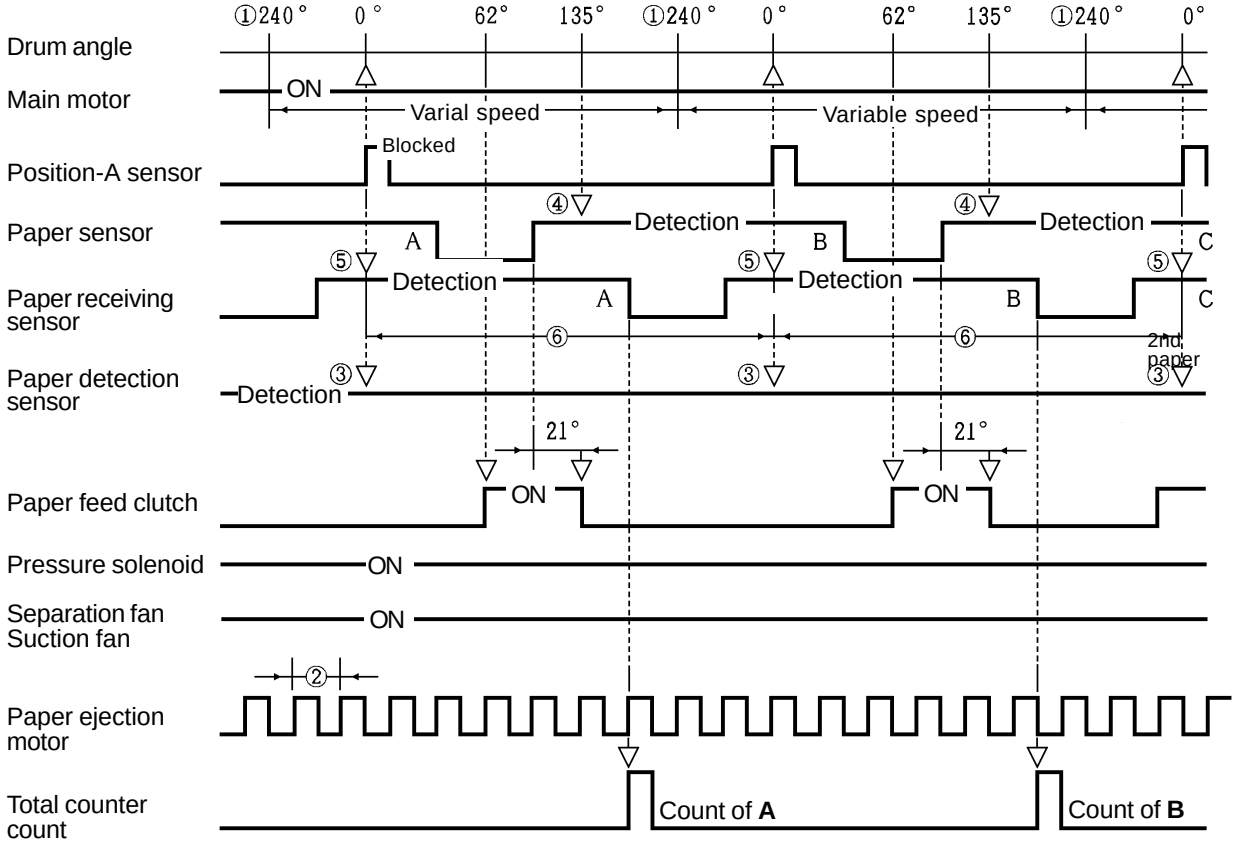
⑥ The "Total Counter" advances one count when the Paper receiving sensor changes from detecting to non-detecting.

⑦ The printing speed increases gradually in following manner at each Drum 240° position after the START button is pressed.

First 240°	Second 240°	Third 240°	Fourth 240°	Fifth 240°
60 rpm	60 rpm	90 rpm	110 rpm	130 rpm

This is a sample when printing speed is selected to 130 rpm.

6. During the Printing Timing Chart



① The printing speed is changed when the Drum angle is 240°.
The possible speed selections are: 60 rpm, 90 rpm, or 130 rpm.

② The ON and OFF intervals of the Paper ejection motor change in accordance with the printing speed, which in turn determines the speed of the Transfer belts on the Suction unit.

Main motor speed (Printing Speed)	60 rpm	90 rpm	130 rpm
Paper ejection motor ON interval	20 ms	10 ms	20 ms
Paper ejection motor OFF interval	30 ms	10 ms	10 ms

③ If the Paper detection sensor does not detect paper at Drum position-A, the machine assumes paper is not on the Paper feed tray and indicates the message **[C 44]**.

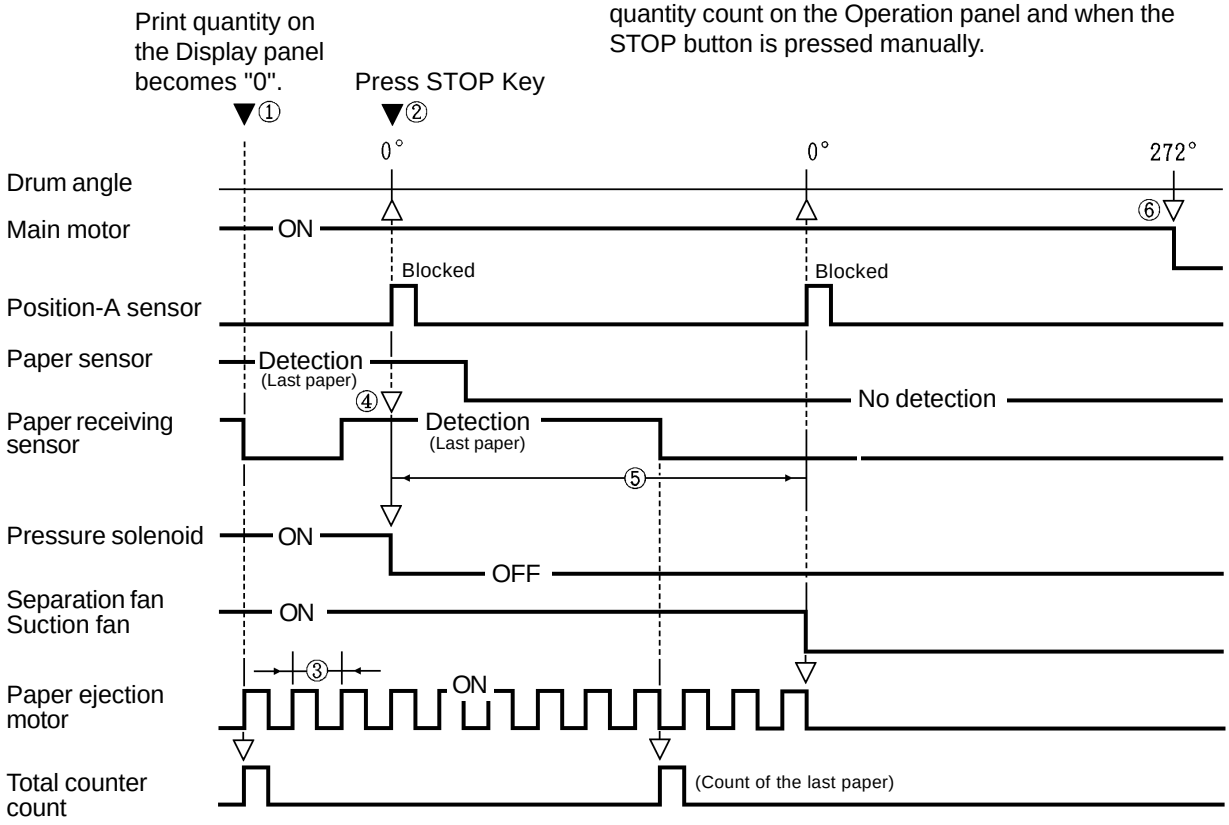
④ If the light path of the Paper sensor is not blocked (no paper detected) at Drum angle 135°, the Pressure solenoid and Paper feed clutch is turned OFF.
If the light path of the Paper sensor is not blocked within 3 rotations of the Drum, the machine assumes paper has jammed at first paper feed area and indicates the message **[C 33]**.

⑤ If the Paper receiving sensor does not detect paper when the Drum is at position-A, the machine assumes paper has jammed at second paper feed area or on the Drum and indicates the message **[C 31]** when paper is jammed at 2nd paper feed area, or **[C 34]** when paper is jammed on the Drum.

⑥ If the Paper receiving sensor keeps detecting a paper from one Drum position-A to the next, the machine assumes paper has jammed at paper receiving area and indicates the message **[C 32]**.

7. Print Stop Timing Chart

The TIMING CHART below is identical for both when the printing movement stops automatically by the print quantity count on the Operation panel and when the STOP button is pressed manually.



① When the Paper receiving sensor changes from "detecting" to "not detecting", the count signal is activated and the print quantity display on the Panel is decreased by one count and the Total counter count goes up one count.
If at this time the print quantity display on the Panel becomes zero "0", the print stop movement starts from the next Drum position-A.

② If the STOP key is pressed before the Position-A sensor is blocked, the print stop movement starts when the Position-A sensor is blocked. If the STOP key is pressed just after the Position-A sensor is opened, the Drum rotates one turn until the next Drum position-A before the print stop movement starts.

③ The ON and OFF intervals of the Paper ejection motor change in accordance with the printing speed, which in turn determines the speed of the Transfer belts on the Suction unit.

Main motor speed (Printing Speed)	60 rpm	90 rpm	130 rpm
Paper ejection motor ON interval	20 ms	10 ms	20 ms
Paper ejection motor OFF interval	30 ms	10 ms	10 ms

④ If the Paper receiving sensor does not detect paper when the Drum is at position-A, the machine assumes paper has jammed at second paper feed area or on the Drum and indicates the message **[C 31]** when paper is jammed at 2nd paper feed area, or **[C 34]** when paper is jammed on the Drum.

⑤ If the Paper receiving sensor keeps detecting a paper from one Drum position-A to the next, the machine assumes paper has jammed at paper receiving area and indicates the message **[C 32]**.

⑥ The Main motor stops at Drum angle 272°which equals to the Drum position-B.

CHAPTER 10: MASTER CLAMP SECTION

CONTENTS

1. Theory of Operation

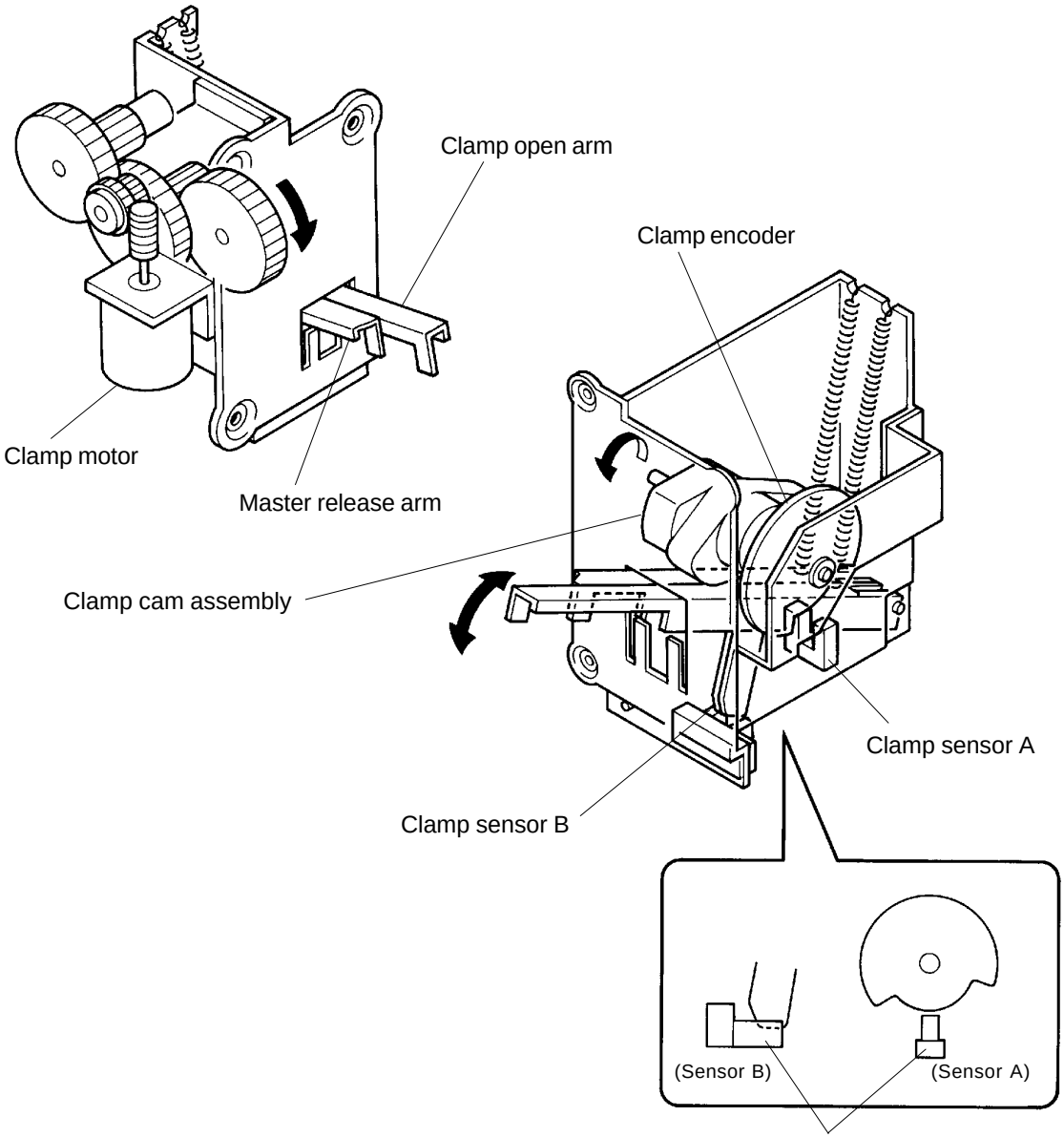
1. Clamp Unit Home Positioning Mechanism

1. Clamp Sensors A and B

> Clamp open arm and Master release arm of the Clamp unit are checked by the Clamp sensors A and B to see if they are in home position every time the machine power is turned ON or the START button is pressed for confidential or normal master making.

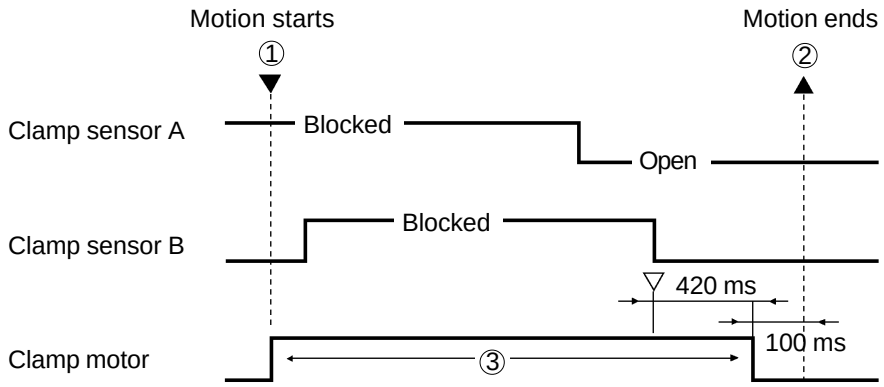
> The Clamp unit is at its home position when the light paths of Clamp sensor A and Clamp sensor B are both opened.

> If the light path of either one or both sensors are cut, the Clamp motor is activated to move the arm(s) until the light paths of both sensors are opened.



The light paths of the Clamp sensors A and B are both opened at Home position.

Clamp Unit Home Positioning Timing Chart



① When the machine power is turned ON or START button is pressed for master making, the machine checks whether the Clamp unit is in home position where the light paths of Clamp sensors A and B are both open.
If the light paths are not open, the Clamp motor activates to bring the Clamp unit to the home position.

✱ If Clamp sensor B is blocked when the machine power is turned ON or START button is pressed for master making, the machine indicates error display **[E 03]** and stops the machine.
Press "**All Reset**" button to clear the **[E 03]** display. Then the machine automatically continues the home positioning movement.

② The home position movement is completed when the light paths of the Clamp sensors A and B both become open.

③ If the light paths of the Clamp sensors A and B do not become open within **13 seconds** after the Clamp motor activates, the machine assumes that the Clamp motor has locked and displays error message **[E 03]**.

2. Clamp Plate Master Release Mechanism

1. Master on the Drum check

> When the START button is pressed for confidential or regular master making, the Drum rotates and presence of the master on the Drum is checked.

> If a master is found on the Drum, the master release movement is made after the Drum returns to Position-A.

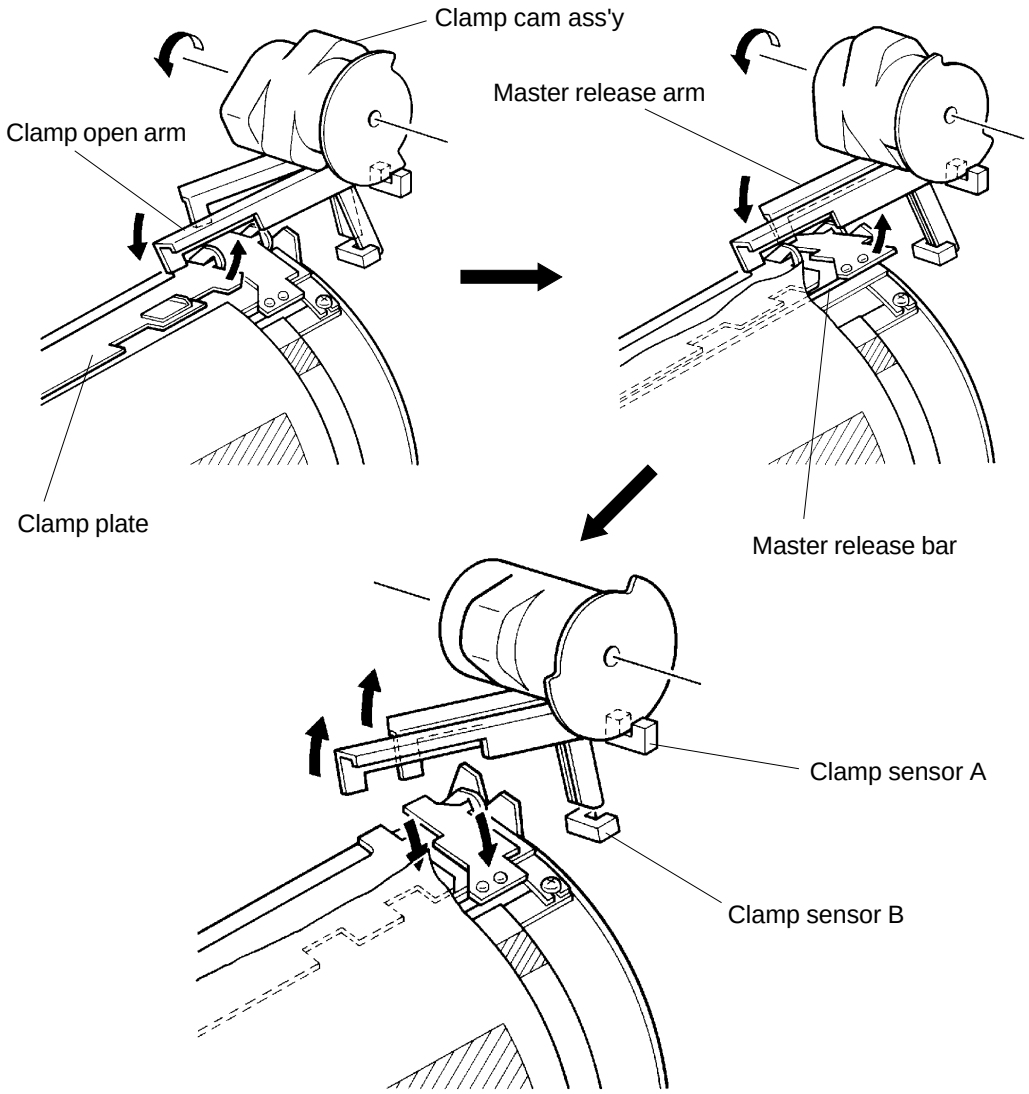
2. Clamp open arm & Master release arm

> The Clamp open arm comes down first and opens the Clamp plate to free the leading edge of the master.

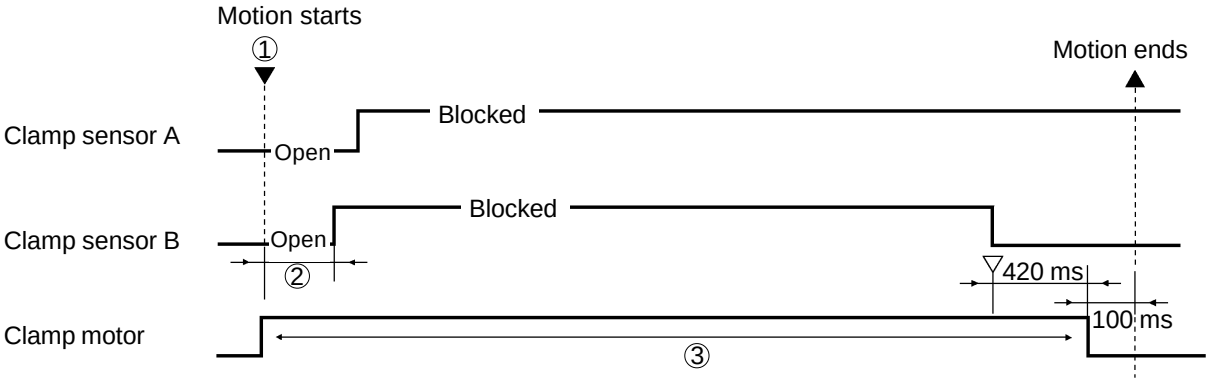
> Next, the Master release arm comes down and raises the Master release bar to push the leading edge of the master out of the Clamp plate.

> The Clamp motor continues to rotate the Clamp cam ass'y until both the Clamp open arm and Master release arm are lifted to closes the Clamp plate and the Master release bar.

> The master release movement is completed when the light path of the Clamp sensor B becomes open and the Clamp motor stops.



Clamp Plate Master Release Timing Chart



① When START button is pressed for master making, if the light paths of Clamp sensors A and B are not both open, the Clamp motor turns to bring the Clamp unit to the home position before making the movement to release the clamped master.

② If the light path of Clamp sensor B is not blocked within **3 seconds** after the Clamp motor activates, the machine assumes that the Clamp motor has locked and displays error message **[E 03]**.

③ If the light path of Clamp sensor A does not become blocked and that of Clamp sensor B does not become open within **12 seconds** after the Clamp motor activates, the machine assumes that the Clamp motor has locked and displays error message **[E 03]**.

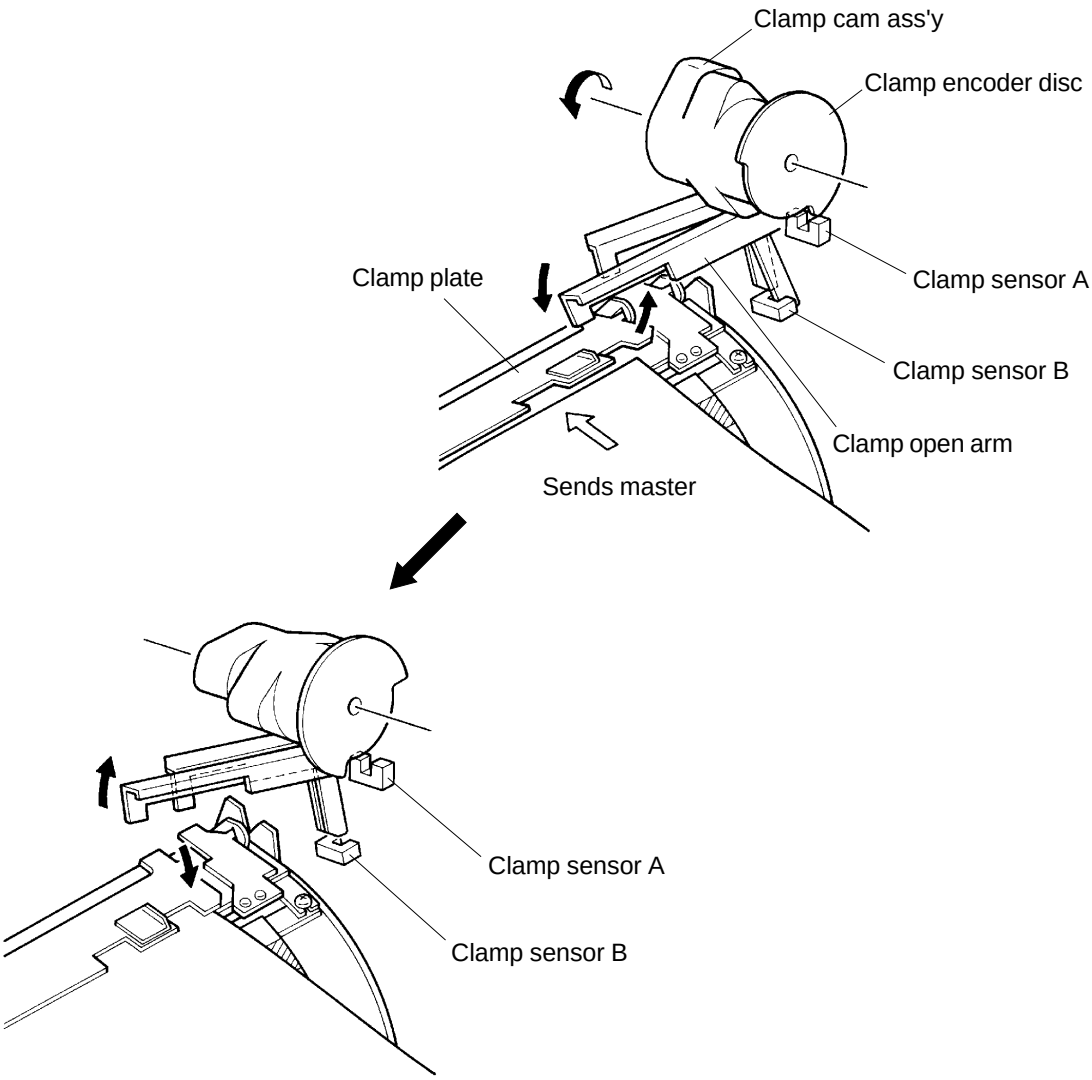
3. Clamp Plate Master Clamp Mechanism

1. Master removal

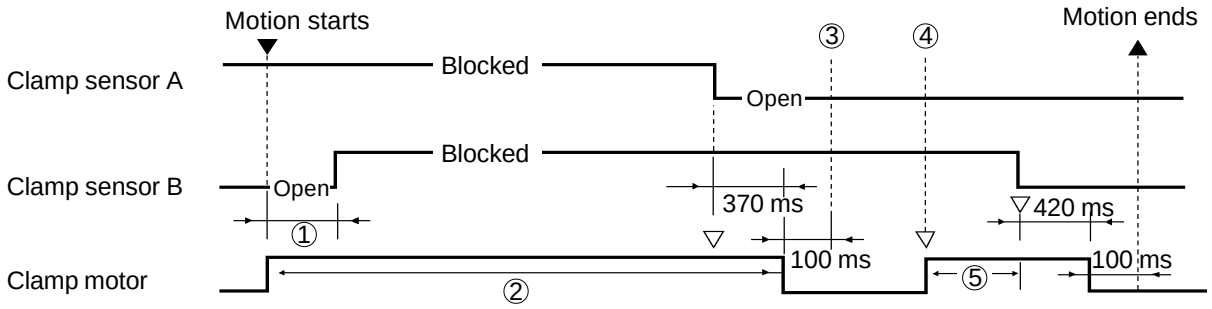
> The master clamp movement is made after the master is removed from the Drum.

2. Master clamping

> With the activation of the Clamp motor, the Clamp open arm is pushed down to open the Clamp plate.
> The Clamp motor stops when the light path of Clamp sensor A becomes open and keeps the Clamp plate raised open.
> When the Write pulse motor sends certain set amount of master onto the Drum, the Clamp motor activates to raise the Clamp open arm and close the Clamp plate.
> The Clamp motor turns off when the light paths of both the Clamp sensors A and B becomes open.
The Clamp plate is closed and the Clamp unit is returned to the Home position.



Master Clamping Timing Chart



① If the light path of the Clamp sensor B is not blocked within **3 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

② If the light path of the Clamp sensor A is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

③ The Drum waits for the master with the Clamp plate opened.

④ The Clamp motor activates to clamp the master with the Clamp plate when the master loading to the drum is completed.

⑤ If the light path of the Clamp sensor B is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

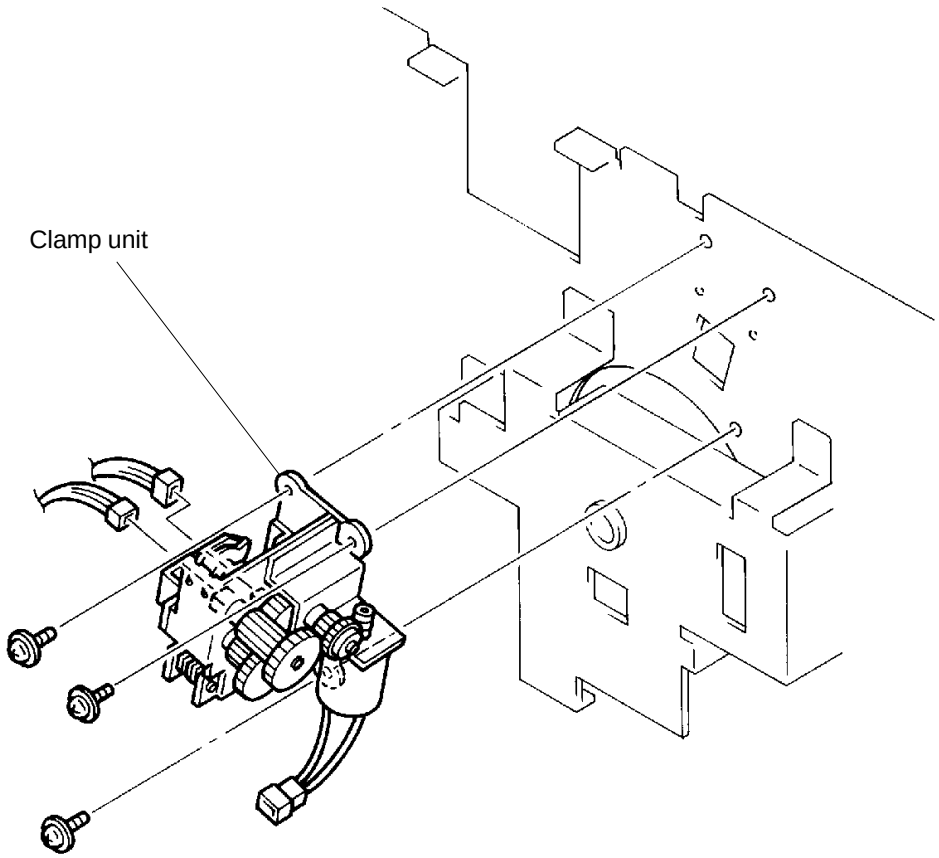
2. Removal and Assembly

1. Clamp Unit

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Open the Main PCB bracket frame.
4. Disconnect the Connectors of the following three electrical parts.
   > Clamp motor
   > Clamp sensor A
   > Clamp sensor B
5. Remove three mounting screws of the Clamp unit and remove the unit.

Precaution in Assembly

> Match the half-pierced section on the Clamp unit with its counter part.



2. Clamp Motor

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Remove Clamp unit.
4. Remove E-ring on the Clamp intermediate gear and remove the gear.
5. Remove two mounting screws of the Clamp motor and remove the motor.

3. Clamp Sensor A

1. Disconnect the power supply from the machine.
2. Remove Back cover.
3. Remove Clamp unit. (page 10-7)
4. Remove the mounting screw of the Clamp sensor A bracket with the sensor attached.
5. Remove the sensor from the bracket.

Precaution in Assembly

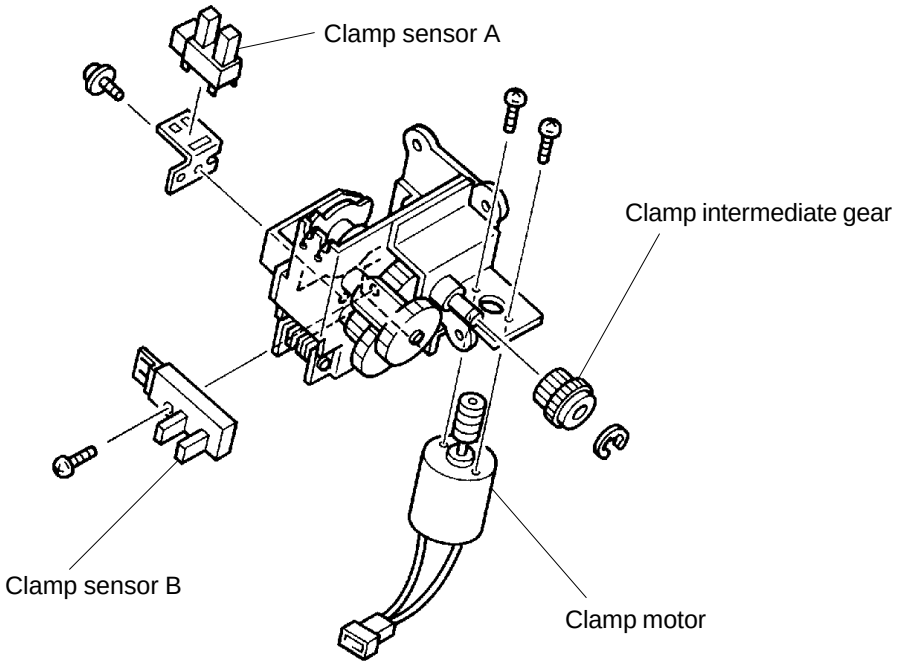
> Match the half-pierced section of the Clamp sensor bracket with its counter part.

4. Clamp Sensor B

1. Disconnect the power supply from the machine.
2. Remove the Back cover.
3. Open the Main PCB bracket frame.
4. Disconnect the Connector of the Clamp sensor B.
5. Remove the mounting screw of the Clamp sensor B and remove the sensor.

Precaution in Assembly

> Match the half-pierced section of the sensor with its counter part.



CHAPTER 11: MASTER REMOVAL SECTION

CONTENTS

1. Theory of Operation

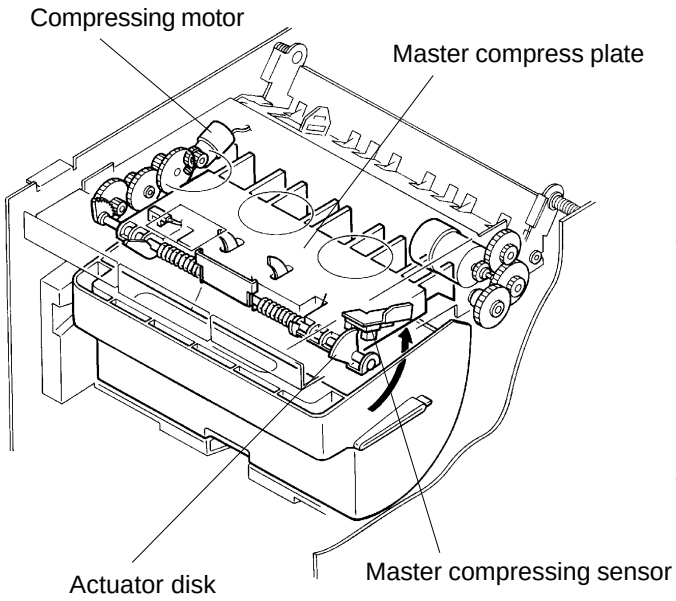
1. Master Removal Unit Home Positioning Mechanism

The Master removal unit returns to its home position each time the power is turned ON, All Reset Button is pressed, or Master removal cover is opened and closed.

1. When Master compress plate is already at home position.
> Compressing motor is activated to rotate the Master compress plate down until the actuator disk on the Master compress plate blocks the light path of the Master compressing sensor, and then stops.
> Then the motor rotates in the opposite direction to raise the Master compress plate to the horizontal position until the actuator disk on the Master compress plate escapes from the light path of the Master compressing sensor.

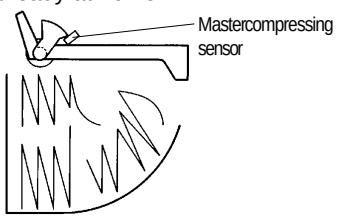
2. When the Master compress plate is all the way down.
> The motor rotates the Master compress plate down, but since the actuator disk is already past the Master compressing sensor from the start, the light path of the sensor cannot be blocked by the disk.
> The motor stops and then rotates in the opposite direction to raise the Master compress plate to the horizontal position.
> The motor stops and completes the home positioning movement when the actuator disk escapes from the light path of the Master Compressing sensor.

3. When the Master compress plate is at a halfway position.
> The disk is already blocking the Master compressing sensor.
> The motor moves the Master compress plate all the way down until the disk escapes from the light path of the Master compressing sensor.
> The motor stops and then rotates in the opposite direction to raise the Master compress plate to the horizontal position until the actuator disk escapes from the light path of the Master compressing sensor.

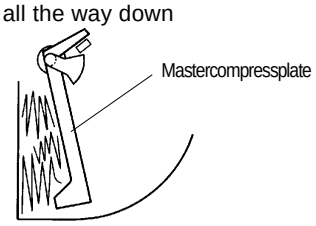


Master compress plate position

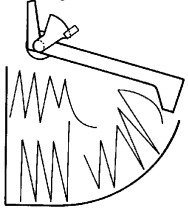
1. When already at home position



2. When all the way down

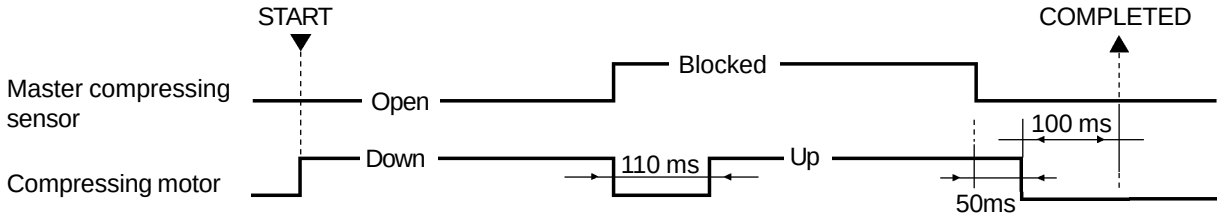


3. When halfway down

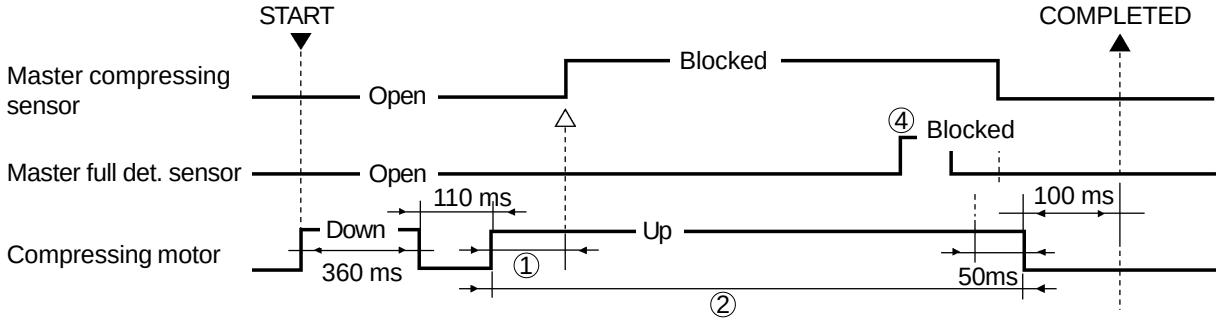


Master Removal Unit Home Positioning Timing Chart

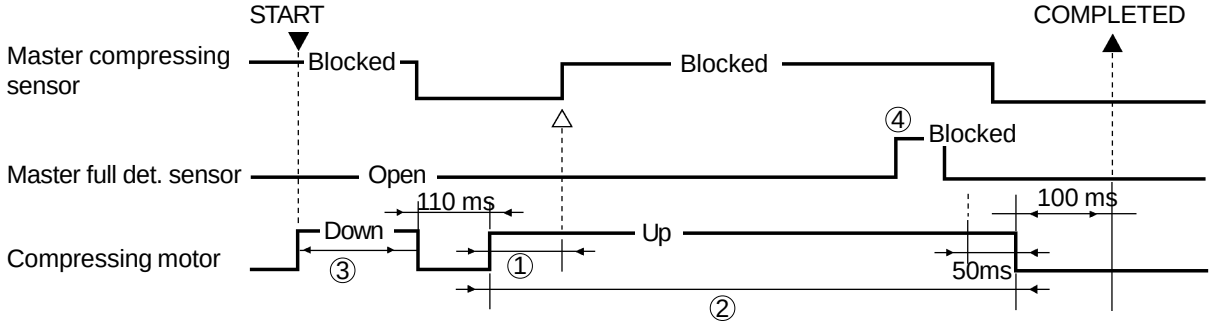
1. When Master compress plate is already at Home Position.



2. When Master compress plate is all the way down.



3. When Master compress plate is halfway down.



① If the light path of Master compressing sensor is not blocked within **1 second** after the Compressing motor rotates in the **"Up"** direction, the machine assumes Compressing motor is locked and displays error message **[E 07]**.

② If the light path of Master compressing sensor is not opened within **10 seconds** after the Compressing motor rotates in the **"Up"** direction, the machine assumes Compressing motor is locked and displays error message **[E 07]**.

③ If the light path of Master compressing sensor is not opened within **10 seconds** after the Compressing Motor rotates in the **"Down"** direction, the machine assumes Compressing motor is locked and displays error message **[E 07]**.

④ If the light path of Master full detection sensor is not blocked at all from the time the Compressing motor rotates in the **"Up"** direction and stops, the machine assumes the Master disposal box is full, and displays the message **[C 43]**.

2. Master on the Drum (before master removal) Check Mechanism

1. Master Sensor

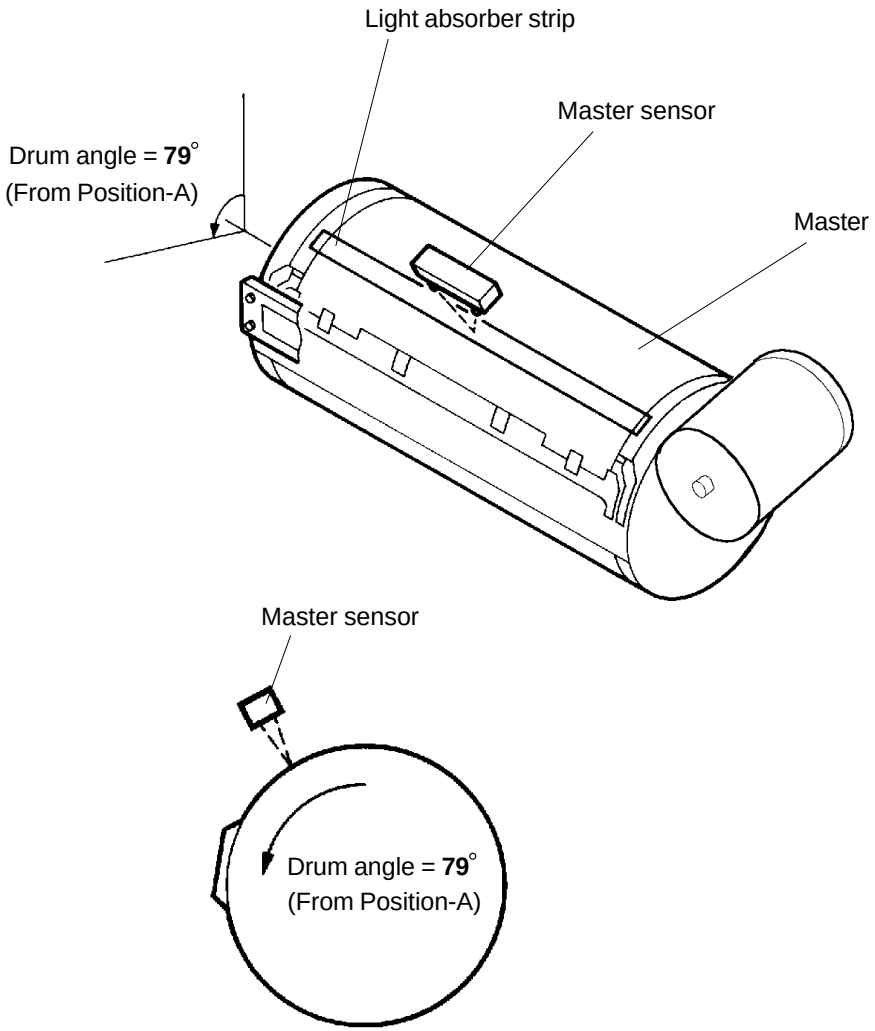
> Master sensor checks the presence of the master on the Drum when the Start button is pressed for confidential master making or normal master making.
> The sensor looks for the master on the Drum when the Drum rotates 79° from the Position-A.
> If the machine already knows the presence of the master on the Drum from the earlier machine operations, this master check movement is skipped.

2. When master is detected on the Drum

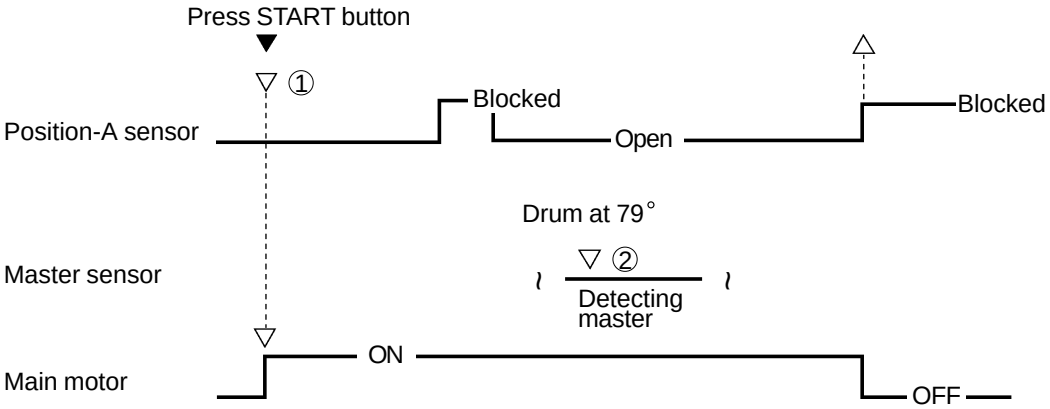
> The machine goes into master removal and Master removal sensor becomes active.

3. When master is not detected on the Drum

> The machine skips the master removal movement and goes directly into master making.



Master on the Drum Check Timing Chart (before master removal)



① The Drum is at Position-B when the START button is pressed.

② If the light of the Master sensor is reflected back (detecting master) at Drum 79°, the Master removal sensor becomes active and checks the master during the master removal.
If the light of the Master sensor is not reflected back (master not detected) at Drum 79°, master removal movement will be skipped.

* If the machine knows the presence of master on the Drum from earlier machine movements, this master on the Drum check movement is skipped.

3. Clamp Plate Master Release Mechanism

1. Master on the Drum check

> When the START button is pressed for confidential or regular master making, the Drum rotates and presence of the master on the Drum is checked.

> If a master is found on the Drum, the master release movement is made after the Drum returns to Position-A.

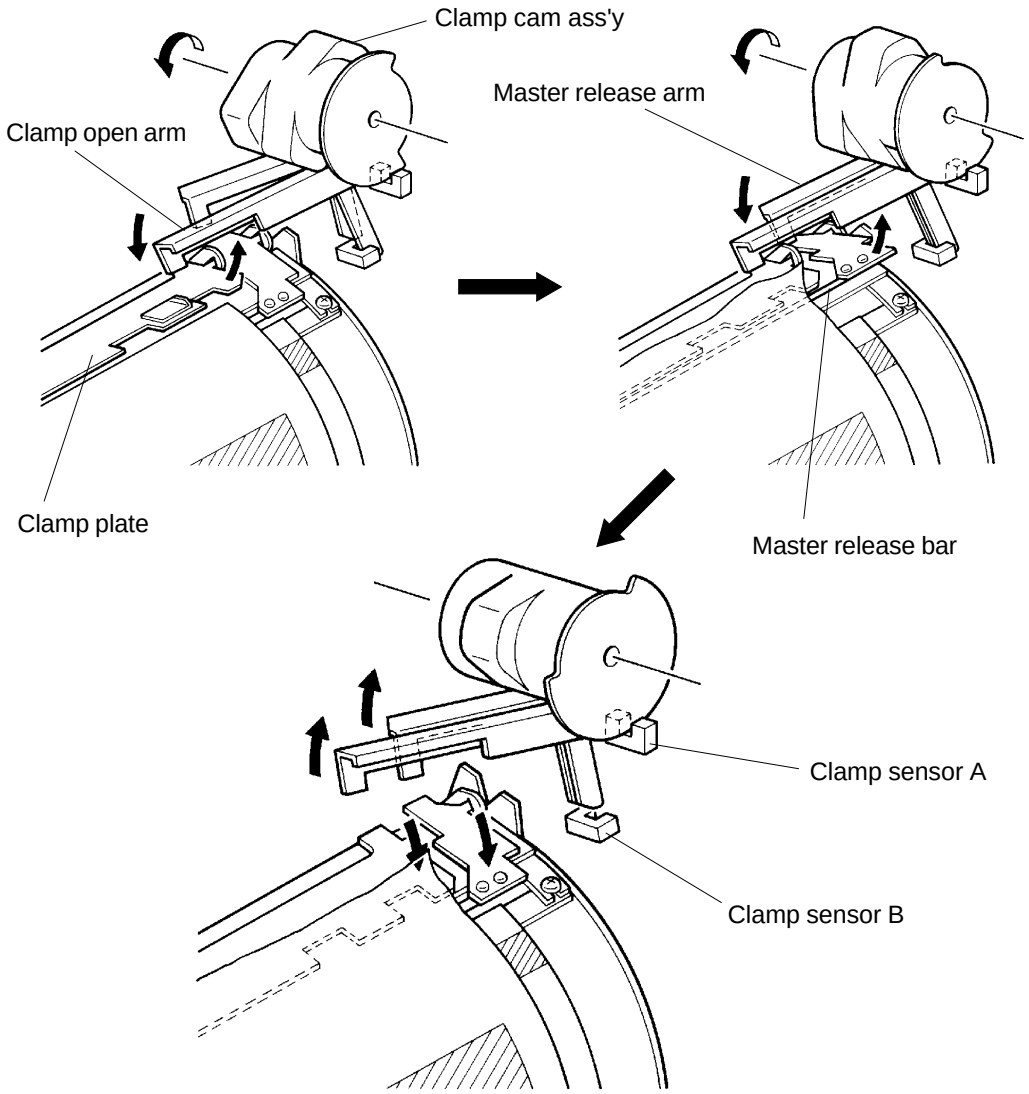
2. Clamp open arm & Master release arm

> The Clamp open arm comes down first and opens the Clamp plate to free the leading edge of the master.

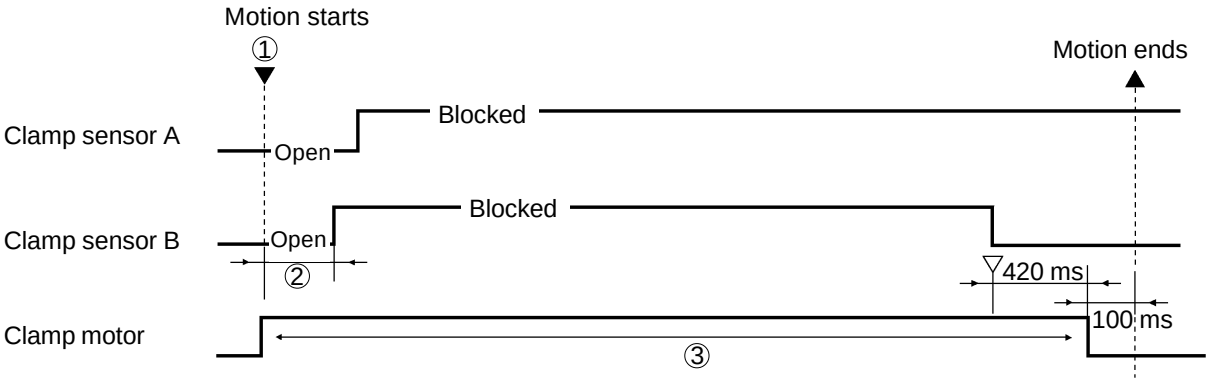
> Next, the Master release arm comes down and raises the Master release bar to push the leading edge of the master out of the Clamp plate.

> The Clamp motor continues to rotate the Clamp cam ass'y until both the Clamp open arm and Master release arm are lifted to closes the Clamp plate and the Master release bar.

> The master release movement is completed when the light path of the Clamp sensor B becomes open and the Clamp motor stops.



Clamp Plate Master Release Timing Chart



① When START button is pressed for master making, if the light paths of Clamp sensors A and B are not both open, the Clamp motor turns to bring the Clamp unit to the home position before making the movement to release the clamped master.

② If the light path of Clamp sensor B is not blocked within **3 seconds** after the Clamp motor activates, the machine assumes that the Clamp motor has locked and displays error message **[E 03]**.

③ If the light path of Clamp sensor A does not become blocked and that of Clamp sensor B does not become open within **12 seconds** after the Clamp motor activates, the machine assumes that the Clamp motor has locked and displays error message **[E 03]**.

4. Master Removal Mechanism

1. Master Removal Vertical Transport Motor

> After the leading edge of the master is released from the Clamp plate, the Vertical transport motor activates to rotates the Vertical transport roller (up), Vertical transport roller (Down), Pulley shaft and G-Belts.

2. Main Motor

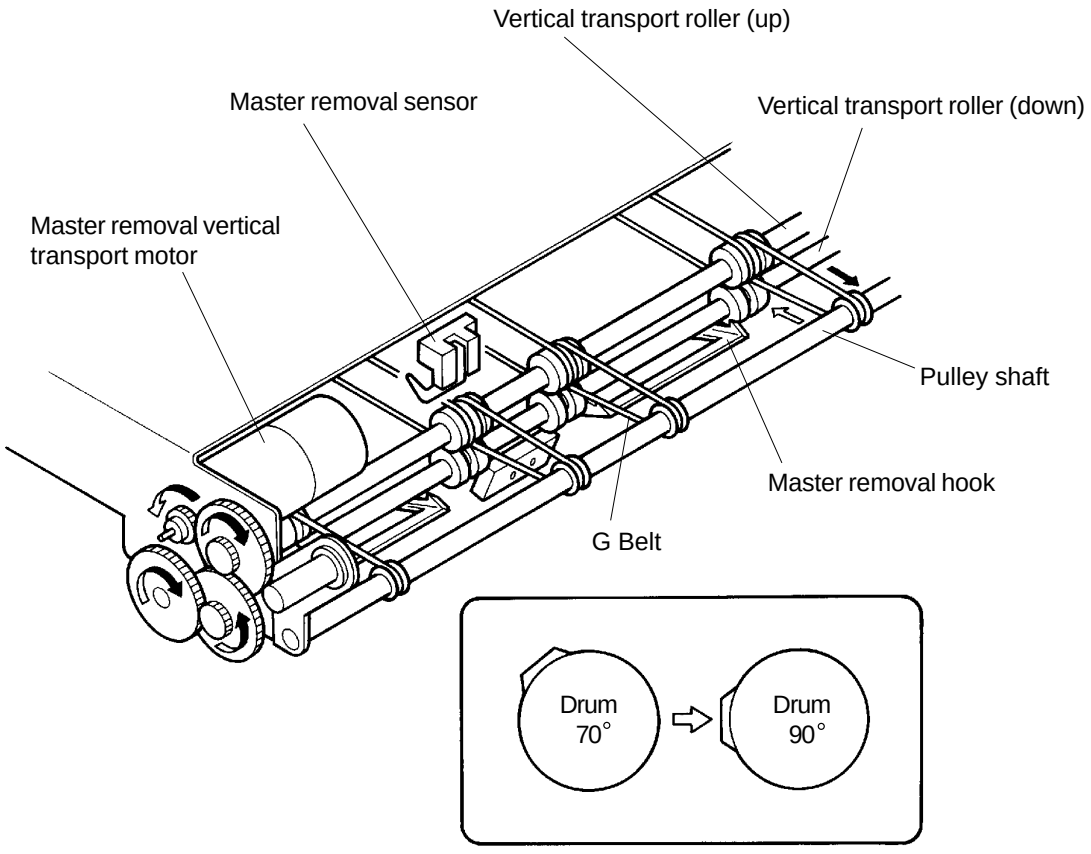
> The Main motor rotates the Drum the same time the Vertical transport motor activates.
> By the rotation of the Drum, the leading edge of the master comes in contact with the G-Belts and the separation of the master from the Drum starts.
> The Main motor and Master removal motor stops to complete the master removal movement when the Drum comes back to the Position-A after making one rotation to remove the master.

3. Master Removal Hooks and G-Belts

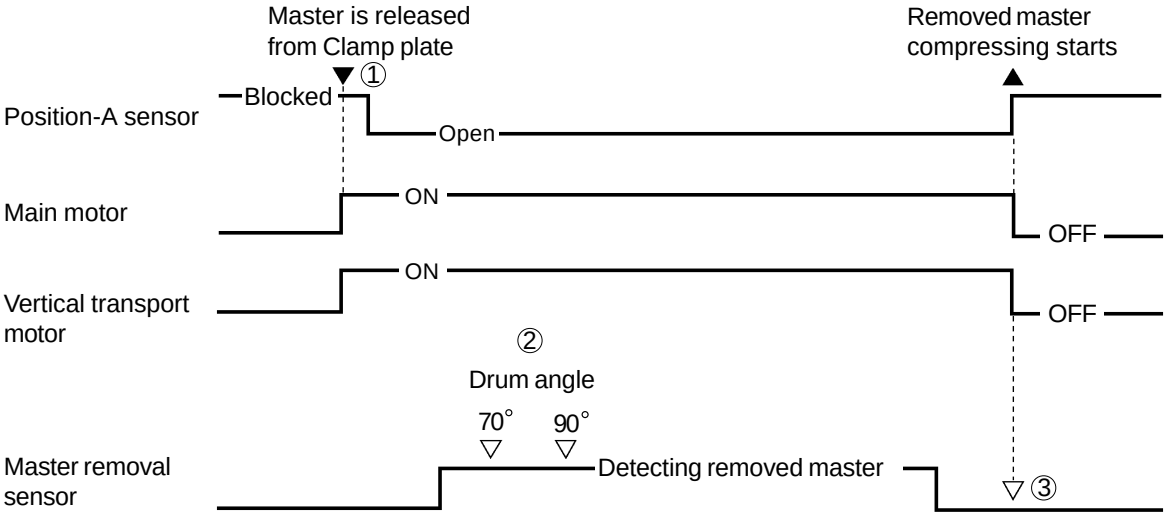
> The master removed from the Drum is guided in between the Vertical transport rollers (Up) and (Down) by the Master removal hooks and G-Belts.

4. Master Removal Sensor

> Master removal sensor checks the presence of the removed master in front of the Master disposal box to check for master removal jams.
> The Master removal sensor looks for presence of removed master twice,
The first time is at 70° Drum rotation from Position-A and the second time is at 90° Drum rotation from Position-A.



Master Removal Timing Chart



① If the master was not found on the Drum before going into the master removal movement, the master removal movement is skipped after the Clamp plate does the "Clamp plate master release" movement.

② During the master removal, if removed master is not detected by Master removal sensor at Drum angle **70**°, the Master removal sensor looks for the removed master for the second time at Drum **90**°.
If removed master is still not detected by the Master removal sensor at Drum **90**°, the machine assumes master removal error has occurred and displays the message **[C 25]**, and stops the Main motor at next Drum Position-B.

③ When the Drum returns to Position-A and Master removal sensor confirms the removed master has cleared through the sensor, the machine starts compressing the removed master.
If the Master removal sensor still detects removed master, the machine assumes removed master has jammed at master removal area and displays message **[C 26]**.

* If Master removal sensor detects removed master while the machine in idle, the removed master jam message **[C 26]** is displayed.

* If over load current is detected for **0.3 seconds** after the Master removal vertical transport motor is activated, the machine assumes the motor has locked and displays error message **[E 14]**.

5. Disposed Master Compressing Mechanism

1. Compressing Motor

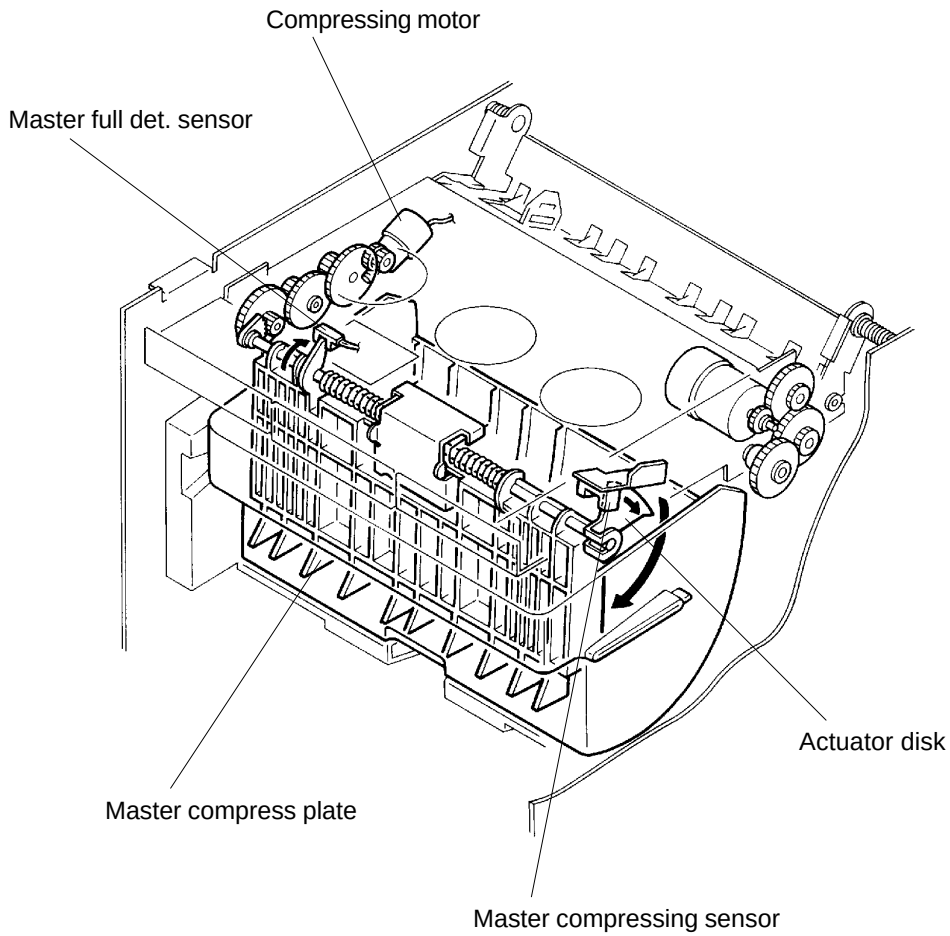
> As the master is removed from the Drum and transferred into the Master disposal box, the Compressing motor activates and rotates the Master compress plate down to compress the disposed master in the Master disposal box.

> The Compressing motor stops when the Actuator disk on the Master compress plate escapes from the light path of the Master compressing sensor.

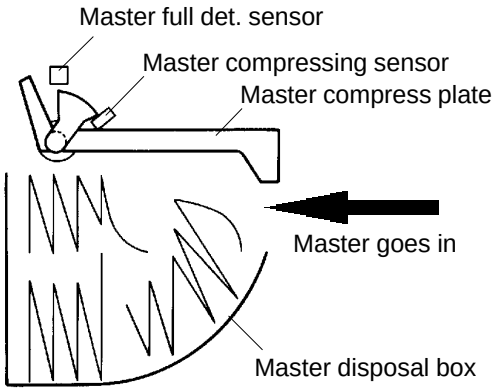
> The Compressing motor then rotates in the opposite direction and lifts the Master compress plate back to the home position.

2. Master Full Detection Sensor

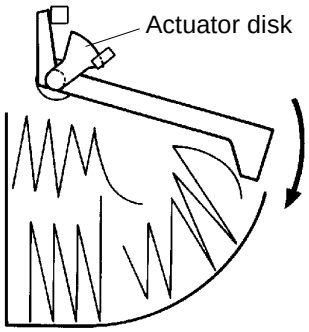
> If the Master full detection sensor does not detect Master compress plate at all during the disposed master compressing movement, the machine assumes that the Master disposal box is full.



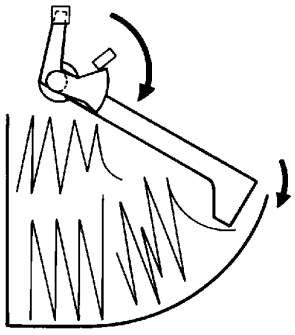
Disposed Master Compressing



① The Master compress plate is at Home position.
Removed master from the Drum is transferred into the Master disposal box.

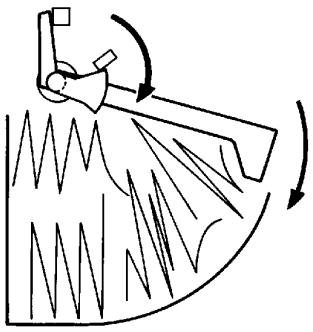


② After the removed master transfers into the Master disposal box, the Master compress plate starts down to compress the removed master inside the Master disposal box.
With the downward movement of the Master compress plate, the Actuator disk blocks the light path of the Master compressing sensor.



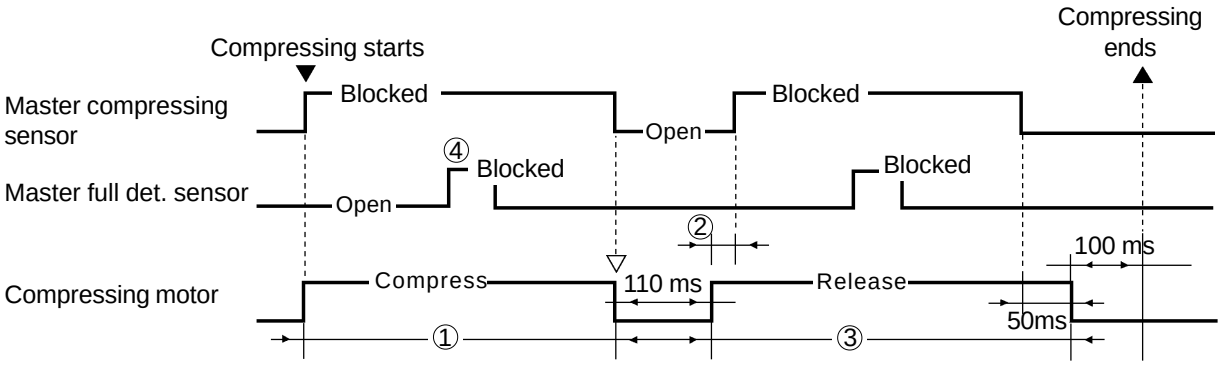
③ As the Master compress plate comes all the way down and the Actuator disk clears from the light path of the Master compressing sensor, the Compressing motor stops for a certain set time and then rotates in the other way to raise the Master compress plate back to the Home position.

Master Full Detection



* When the Master disposal box becomes full with disposed masters, the disposed masters prevent the Master compress plate from compressing down any further and the actuator on the extension of the Master compress plate can no longer block the light path of the Master full det. sensor.
The light path of the Master compressing sensor is blocked before that of Master full det. sensor is blocked.
This is the moment the machine determines the Master disposal box to be full.

Disposed Master Compressing Timing Chart



① If the light path of the Master compressing sensor does not become open within **10 seconds** after the Compressing motor rotates to compress, the machine assumes Compressing motor has locked and displays error message **[E 07]**.

② If the light path of the Master compressing sensor is not blocked within **1 second** after the Compressing motor rotates to relieve the pressure, the machine assumes Compressing motor has locked and displays error message **[E 07]**.

③ If the light path of the Master compressing sensor does not become open within **10 seconds** after the Compressing motor rotates relieve the pressure, the machine assumes Compressing motor has locked and displays error message **[E 07]**.

④ If the light path of the Master full det. sensor is not blocked at all before the light path of the Master compressing sensor becomes open after the Compressing motor rotates to compress, the machine assumes the Master disposal box to be full and displays the message **[C 43]**.

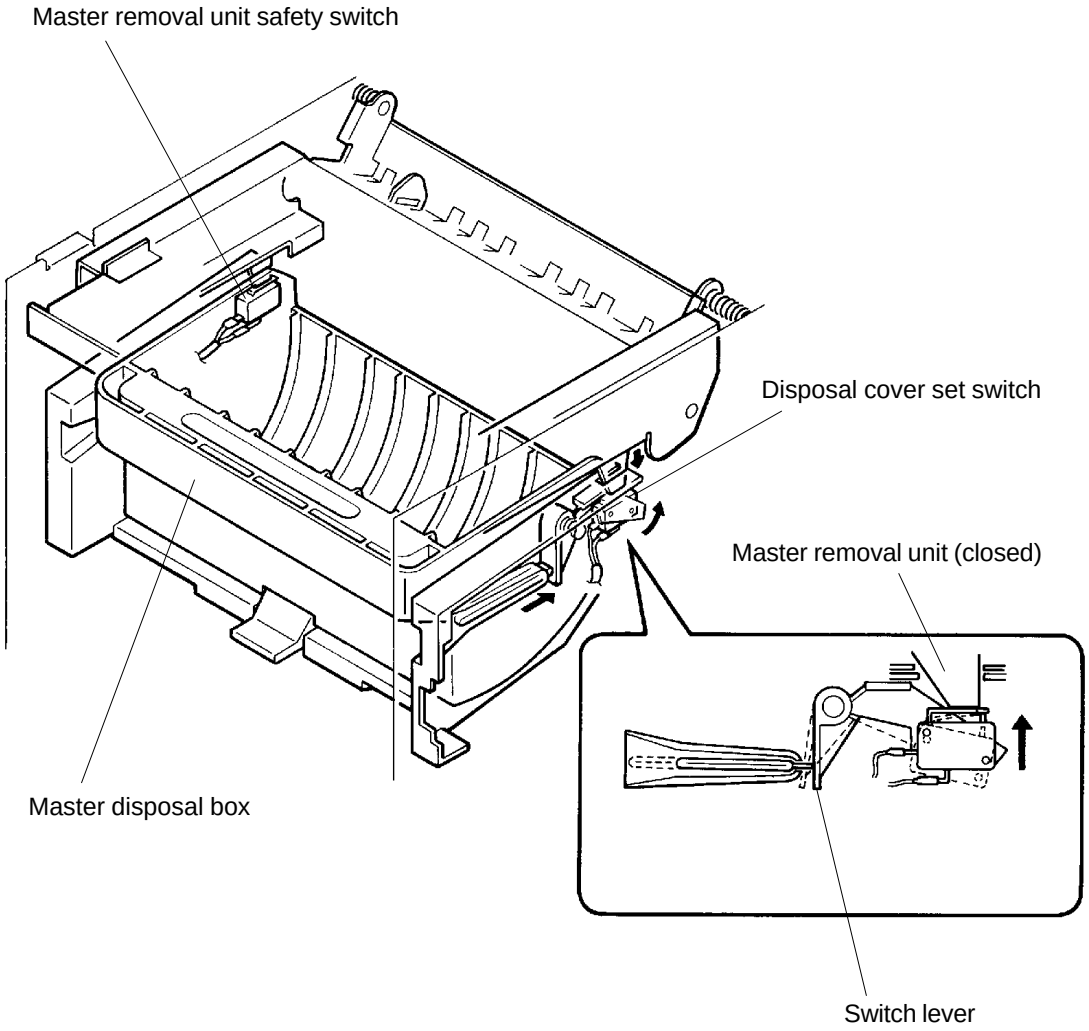
6. Master Disposal Box Set Mechanism

1. Disposal Cover Set Switch

> Disposal cover set switch checks the presence of the Master disposal box and whether the Master disposal upper cover is opened or closed.
> When the Master disposal box is set in the machine, it pushes the Switch lever and lifts the Disposal cover set switch.
> The lifted Disposal cover set switch can then be pressed when the Master removal unit is closed.

2. Master Removal Unit Safety Switch

> As with the Disposal cover set switch, the Master removal unit safety switch is lifted when the Master disposal box is set in the machine.
> The lifted Master removal unit safety switch can then be pressed when the Master removal unit is closed.

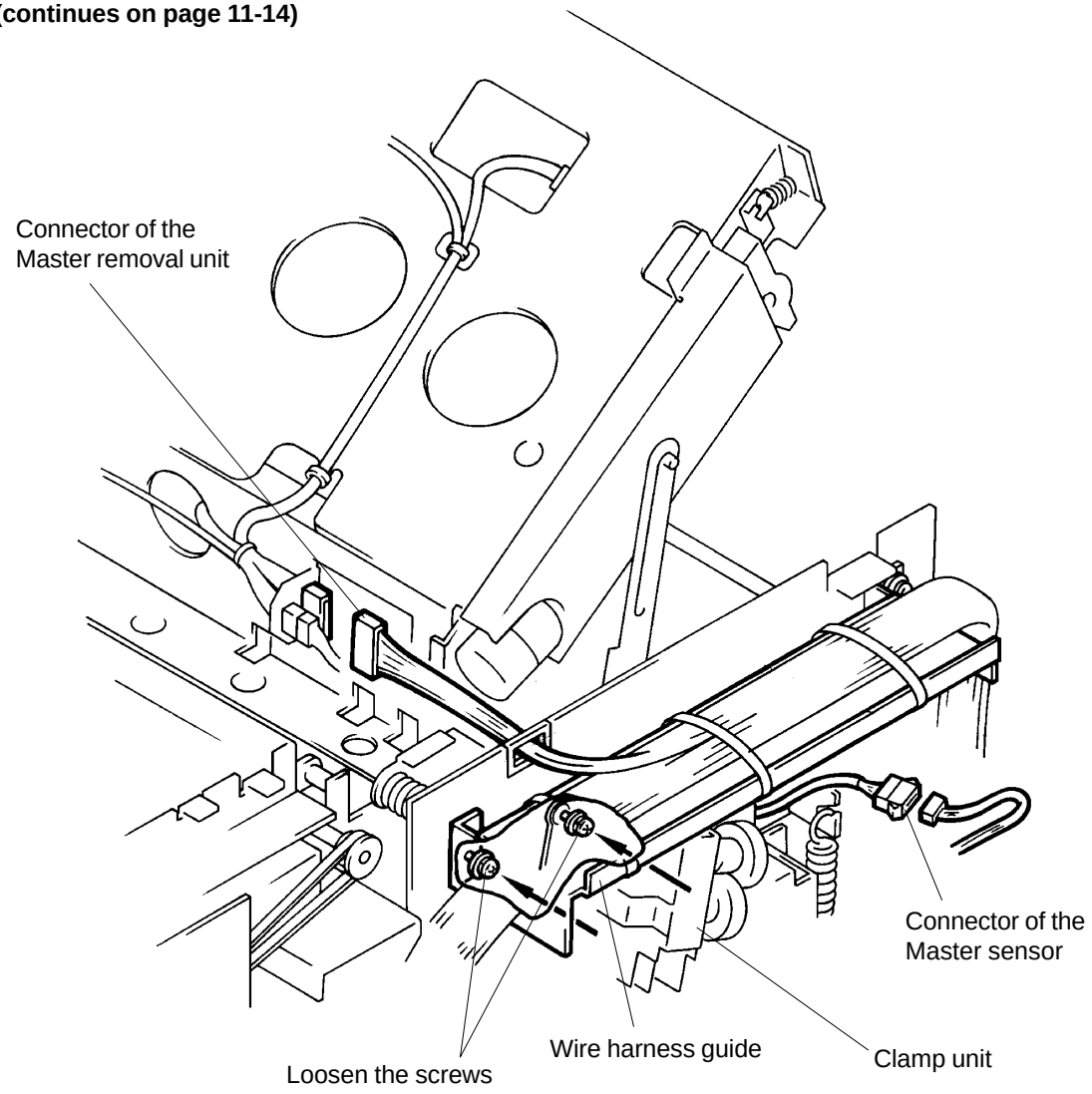


2. Removal and Assembly

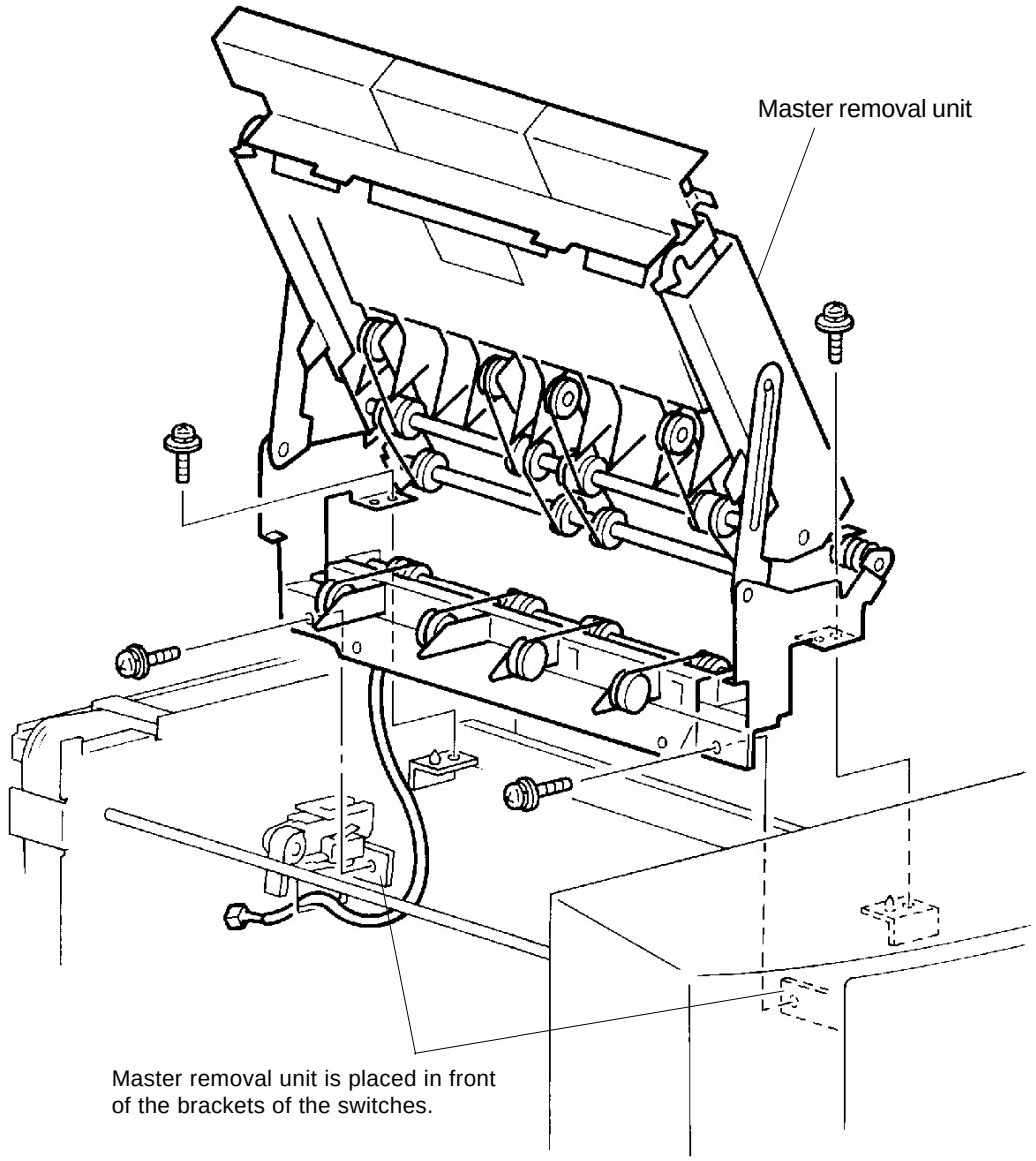
1. Master Removal Unit

1. Lower the Paper feed table.
2. Disconnect the power supply from the machine.
3. Remove following five covers from the machine.
   > Back cover
   > Master removal upper cover
   > Master removal lower cover
   > ADF unit cover
   > ADF cover
4. Open the Main PCB bracket frame.
5. Loosen two mounting screws, one on the left far end of the Wire harness guide and another on the top left corner of the Clamp unit, to prevent the Master removal unit from jamming on these screws during the removal.
6. Disconnect the Connectors of the Master removal unit and Master sensor.

(continues on page 11-14)



7. Remove four mounting screws of the Master removal unit.
8. Remove the Master removal unit by lifting it up.
   CAUTION: Be careful not to damage the Master sensor wire harness.



Precaution in Assembly

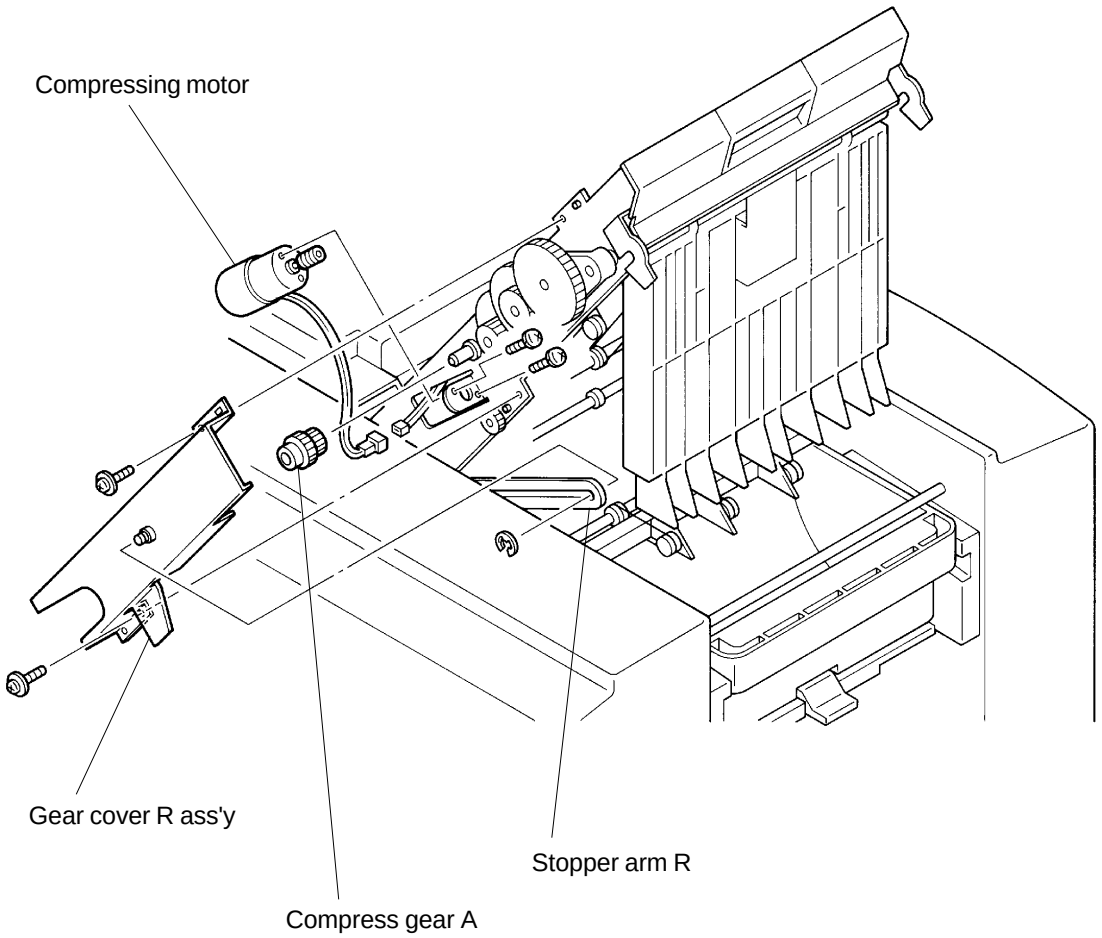
> The Master removal unit should be placed in front of the brackets of the Master removal unit safety switch and Disposal cover set switch. (refer to above illustration)
> Match the half-pierced sections on the master removal unit with their counter parts.

2. Compressing Motor

1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove E-ring from the Stopper arm R and remove the arm from the shaft.
4. Remove two mounting screws of the Gear cover R ass'y and remove the ass'y.
5. Remove Compress gear A.
6. Disconnect the Connector of the Compressing motor.
7. Remove two mounting screws of the Compressing motor and remove the motor.

Precaution in Assembly

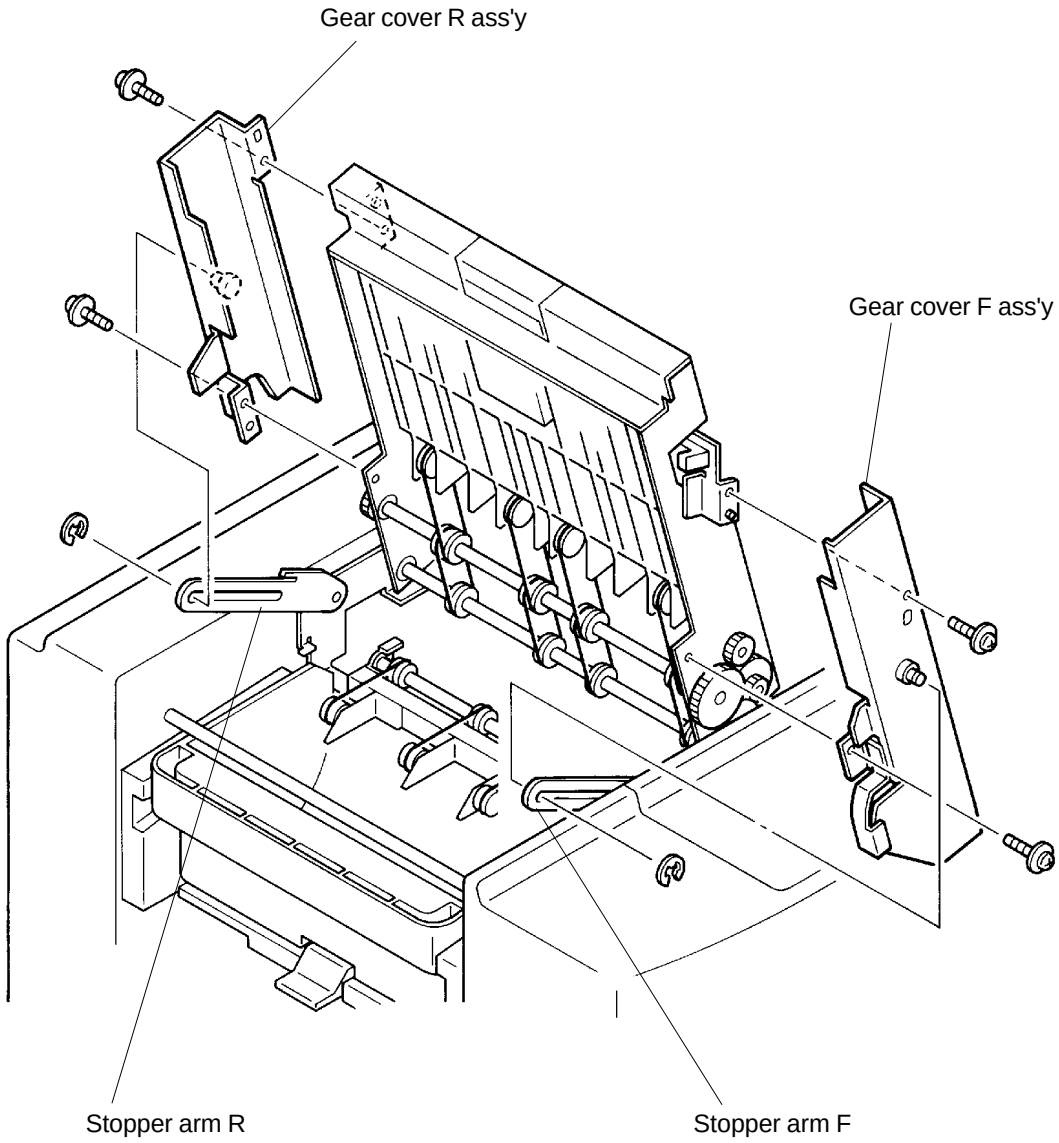
> Match the half-pierced section of Gear cover R ass'y with its counter part.



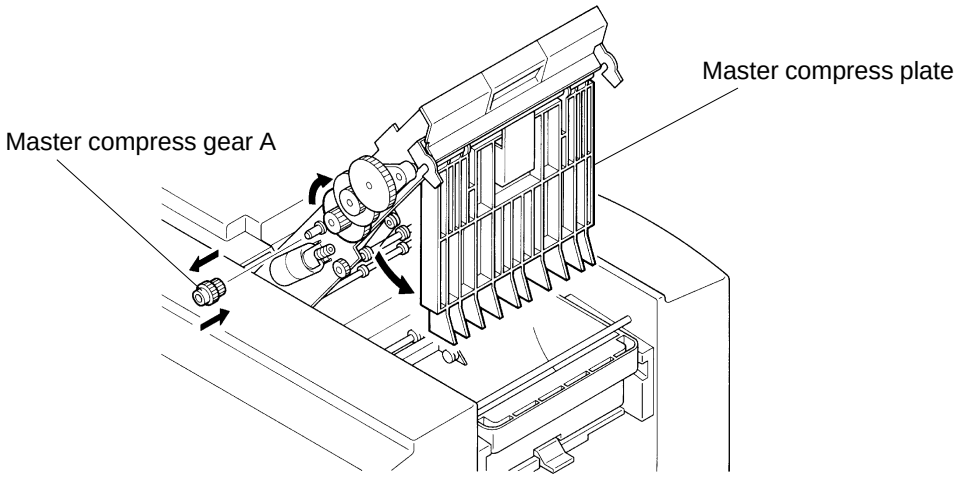
3. Master Removal Motor

1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove E-rings from Stopper arms F and R, and disengage both arms.
4. Remove mounting screws of Gear cover F and R ass'y, and remove both cover ass'y.

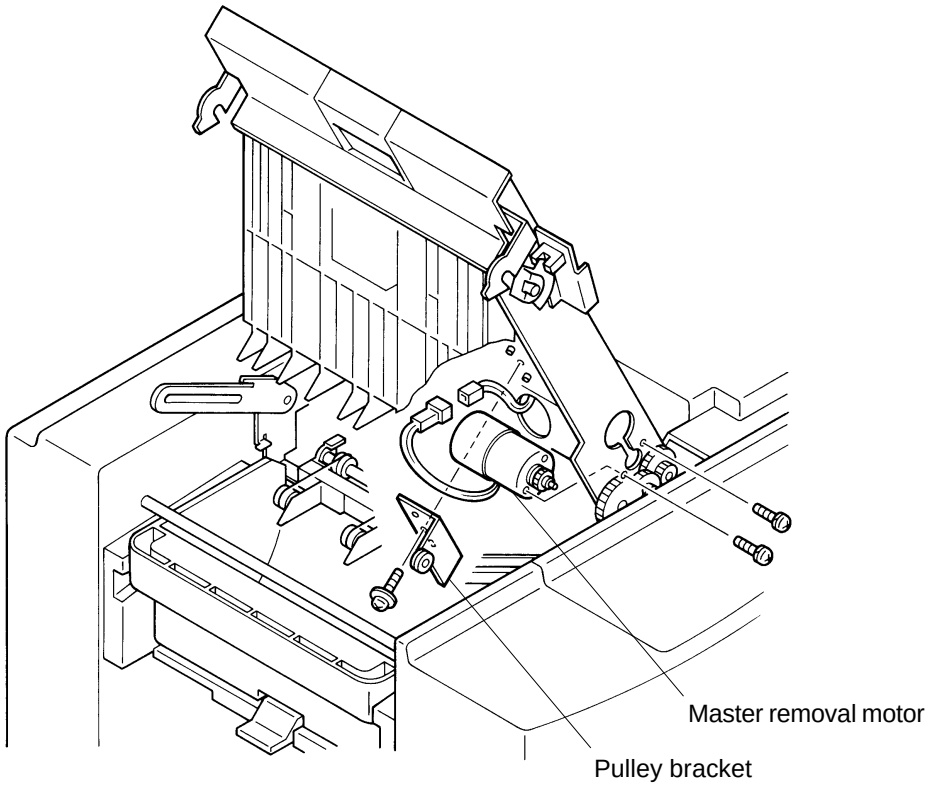
(continues on page 11-17)



5. Remove Master compress gear A.
6. Let the Master compress plate hang down, and install the Master compress gear A back.



7. Remove the mounting screw of the Pulley bracket on the Operation panel side and remove the bracket.
8. Disconnect the Connector of the Master removal motor.
9. Remove two mounting screws of the Master removal motor and remove the motor.



Precaution in Assembly

> Match the half-pierced section of the Pulley bracket with its counter part.
> Match the half-pierced sections of the Gear cover F and R ass'y with their counter parts.

4. Master Removal Sensor

1. Disconnect the power supply from the machine, and remove Master removal upper cover.
2. Remove E-rings from the Stopper arm F and R and disengage the two arms.
3. Disconnect the Connector of the Master removal sensor.
4. Remove the mounting screw of the Master removal sensor bracket and remove the bracket.
5. Remove the sensor from the bracket.

Precaution in Assembly

> Match the half-pierced section of the Master removal sensor bracket with its counter part.

5. Master Full Det. Sensor

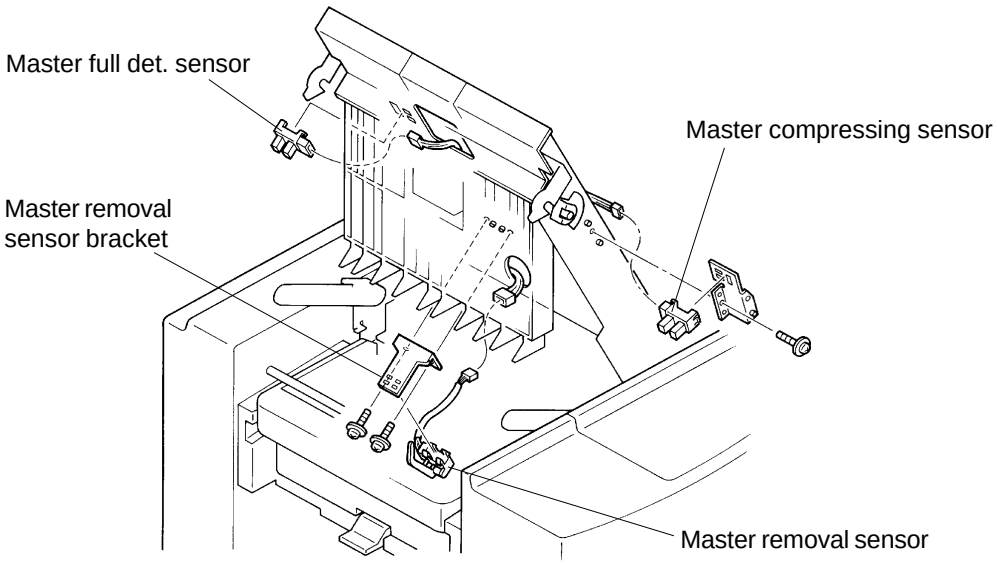
1. Disconnect the power supply from the machine, and remove Master removal upper cover.
2. Remove E-rings from the Stopper arm F and R and disengage the two arms.
3. Remove mounting screws from the Gear cover F and R ass'y and remove the two ass'y.
4. Remove Master compress gear A.
5. Let the Master compress plate hang down, and install the Master compress gear A back. (**Ref.: page 11-17**)
6. Disconnect the Connector of the Master full det. sensor and remove the sensor.

6. Master Compressing Sensor

1. Disconnect the power supply from the machine, and remove Master removal upper cover.
2. Remove E-rings from the Stopper arm F and R and disengage the two arms.
3. Remove two mounting screws of Gear cover F ass'y and remove the cover ass'y.
4. Disconnect the Connector of the Master compressing sensor.
5. Remove the mounting screw of the Master compressing sensor bracket and remove the bracket.
6. Remove the sensor from the bracket.

Precaution in Assembly

> Match the half-pierced section of the Master compressing sensor bracket with its counter part.



7. Pulley Shaft

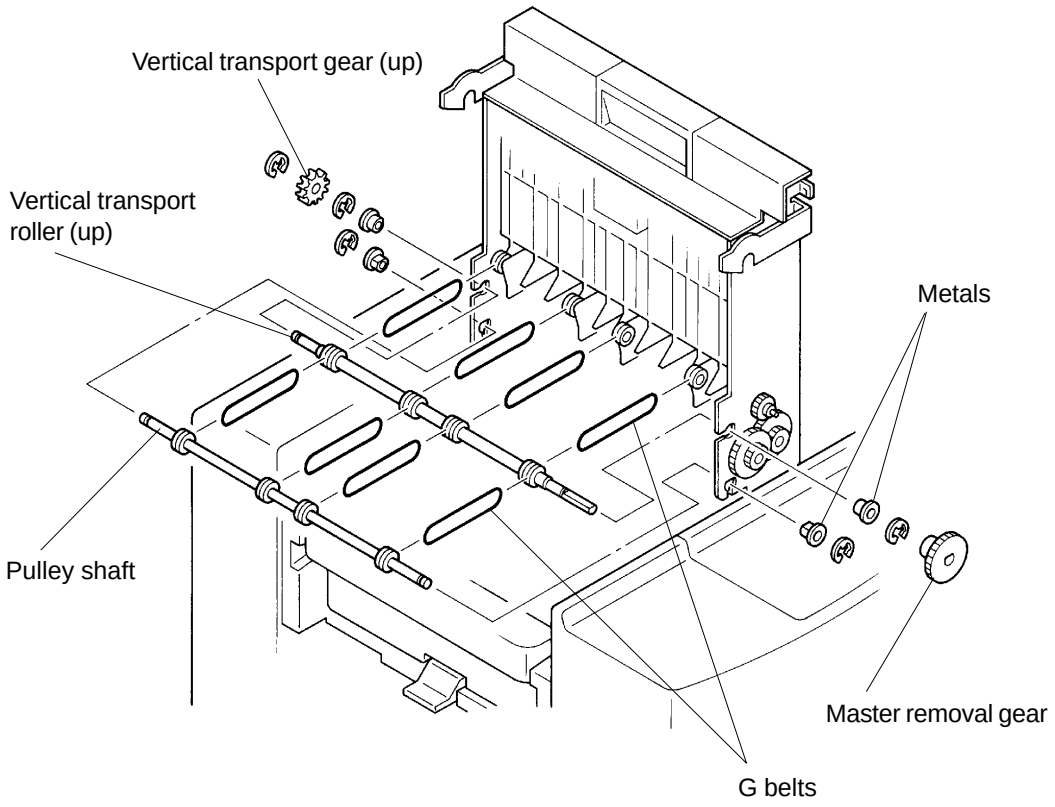
1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove Gear cover F ass'y and R ass'y. (page 11-16)
4. Remove E-rings from both ends of the Pulley shaft and remove the Metals.
5. Remove the Pulley shaft by disengaging it out through the G-Belts.

8. Vertical Transport Roller (up)

1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove Gear cover F ass'y and R ass'y. (pag 11-16)
4. Remove E-ring from the Vertical transport gear (up) and remove the gear.
5. Remove Master removal gear.
6. Remove E-rings from both ends of the Vertical transport roller (Up) and remove the Metals.
7. Remove the Vertical transport roller (up) by disengaging it out through the G-Belts.

9. G-Belts on Vertical Transport Roller (up)

1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove Gear cover F ass'y and R ass'y. (page 11-16)
4. Remove Pulley shaft.
5. Remove Vertical transport roller (up).
6. Remove the G-Belts form the machine.



10. Master Removal Hook

1. Remove Master removal unit. (page 11-13)
2. Remove mounting screws of the Master removal hooks and remove the hooks from the Master removal unit.

Precaution in Assembly

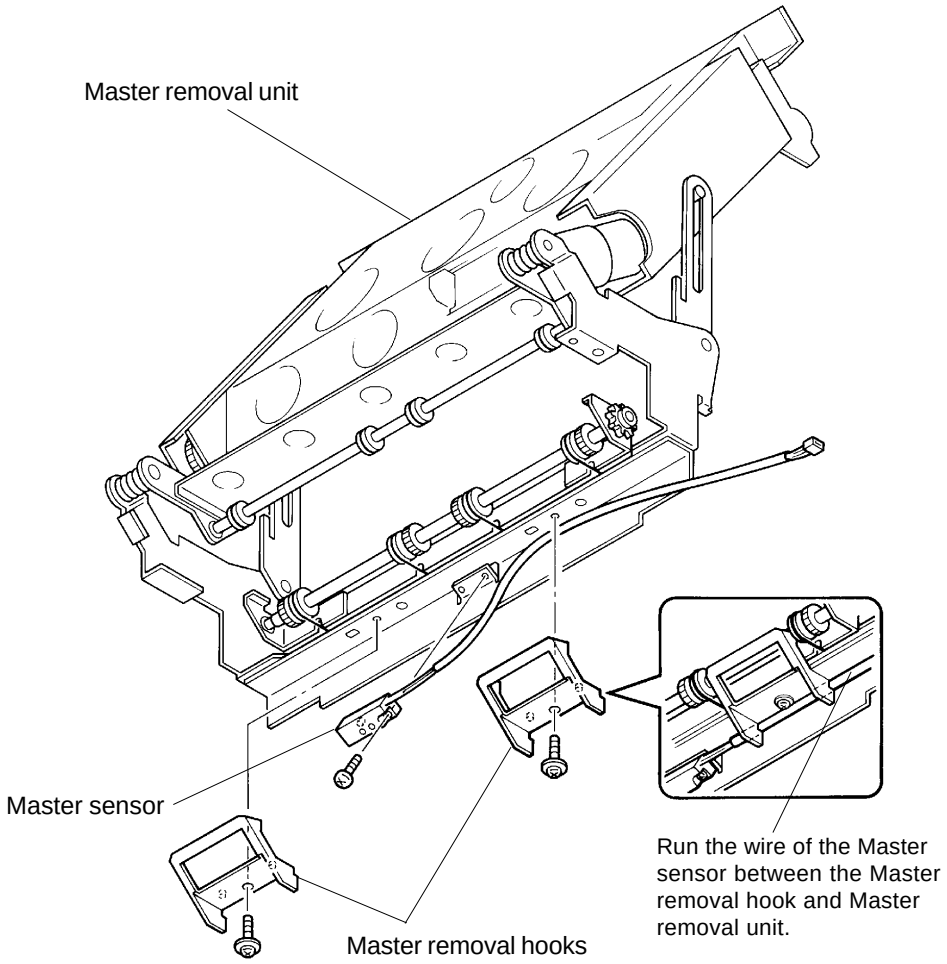
> Run the wires of the Master sensor as shown on the illustration.
> Match the half-pierced section of the Master removal hooks with the counter parts.

11. Master Sensor

1. Remove Master removal unit. (page 11-13)
2. Remove Master removal hooks. (page 11-20)
3. Remove the mounting screw of the Master sensor and remove the sensor.

Precaution in Assembly

> Run the wires of the Master sensor as explained and shown on the illustration below.
> Match the half-pierced section of the Master sensor with its counter part.

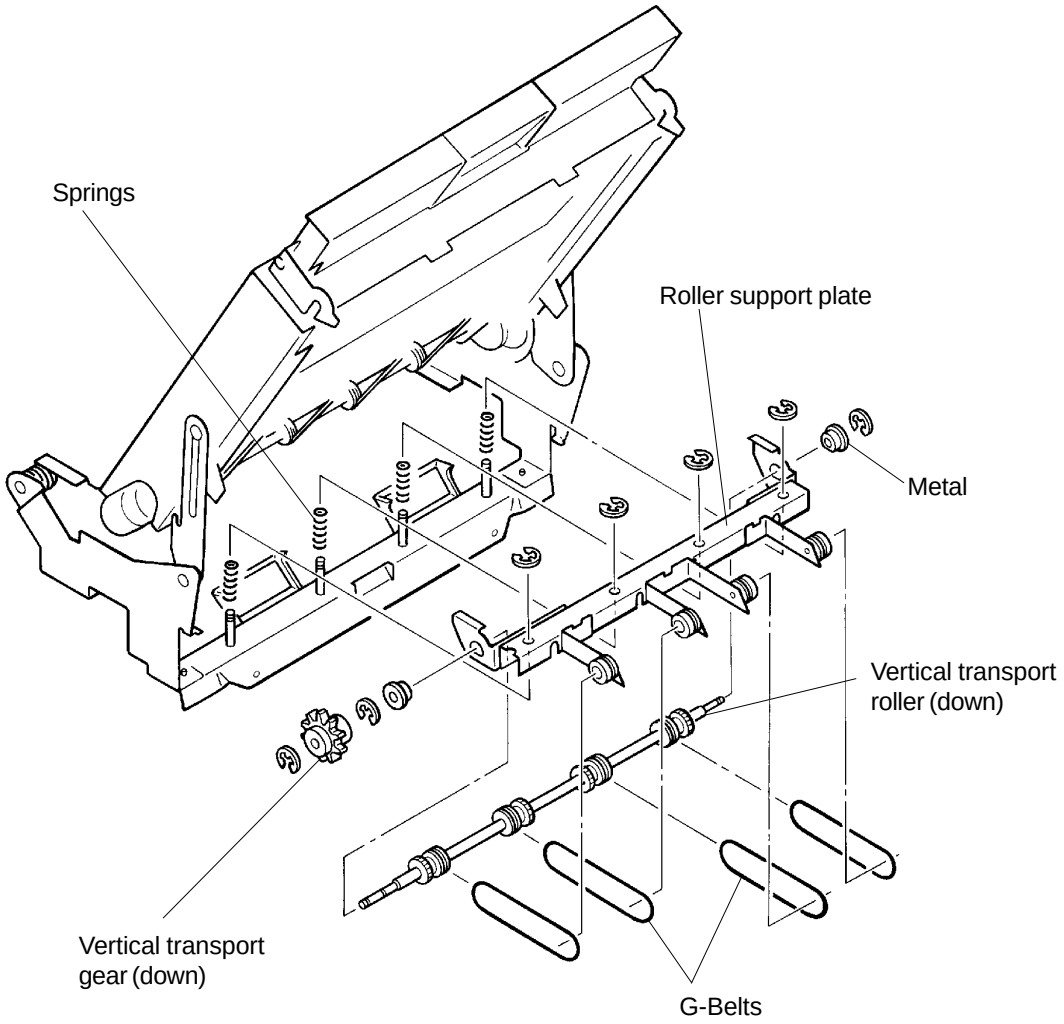


12. Vertical Transport Roller (down)

1. Remove Master removal unit. (page 11-13)
2. Remove E-ring from the gear on the Vertical transport roller (down) and remove the gear.
3. Remove E-rings from both ends of the Vertical transport roller (down) and remove the Metals.
4. Remove Vertical transport roller (down) by disengaging it out through the G-belts.

13. G-Belts on Vertical Transport Roller (down)

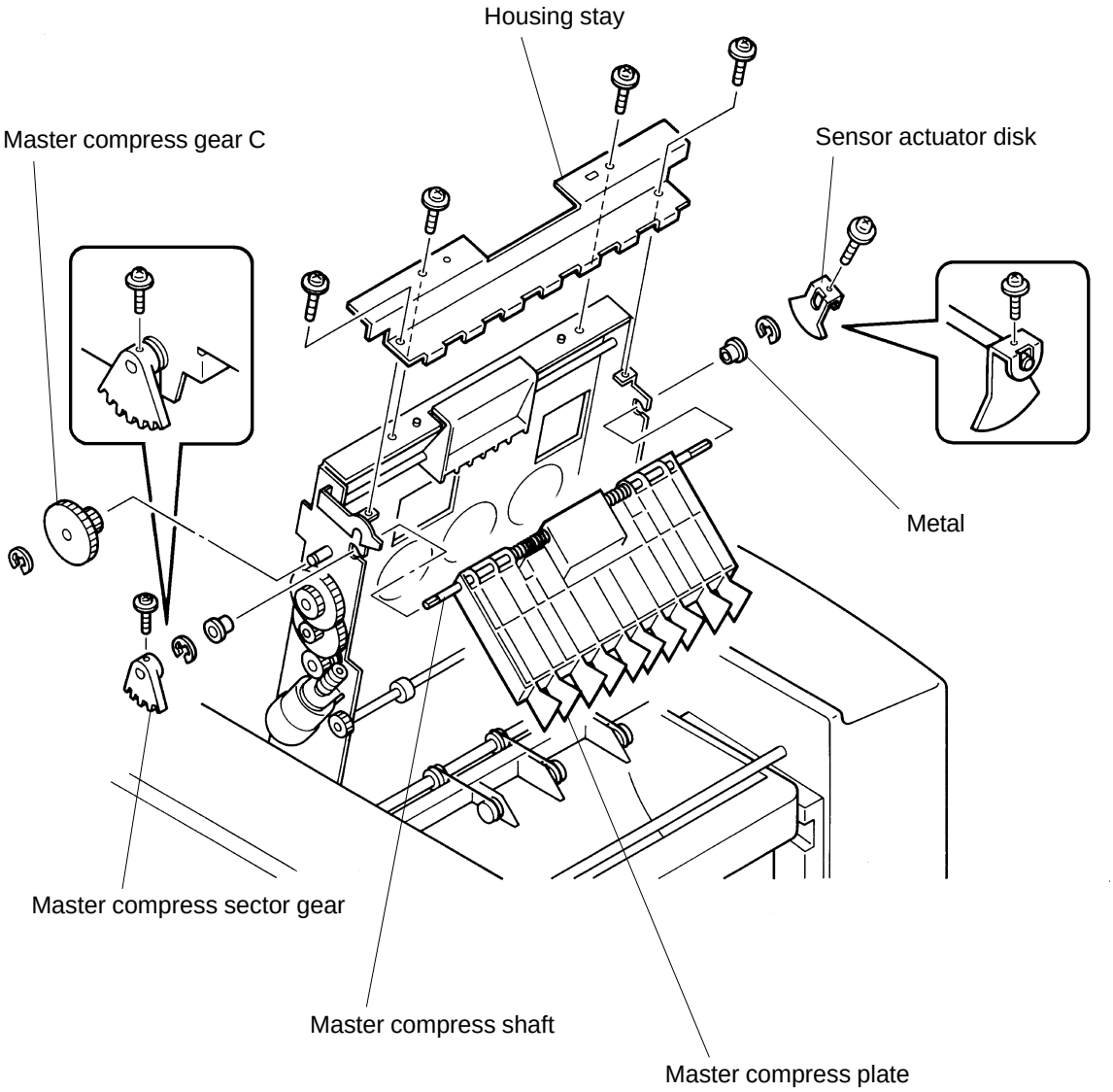
1. Remove Master removal unit. (pate 11-13)
2. Remove Vertical Transport Roller (down).
3. Remove four E-rings from the Roller support plate and remove the plate.
   CAUTION: Do not lose the four Springs.
4. Remove the G-Belts.



14. Master Compress Plate

1. Disconnect the power supply from the machine.
2. Remove Master removal upper cover.
3. Remove Gear cover F ass'y and R ass'y. (page 11-16)
4. Remove mounting screws of the Housing stay and remove the stay.
5. Remove the Master compress gear C and Master compress sector gear.
6. Remove the mounting screw of the Sensor actuator disk and remove the disk.
7. Remove E-rings from both ends of the Master compress shaft and remove the Metals.
8. Remove the Master compress shaft with the Master compress plate attached.

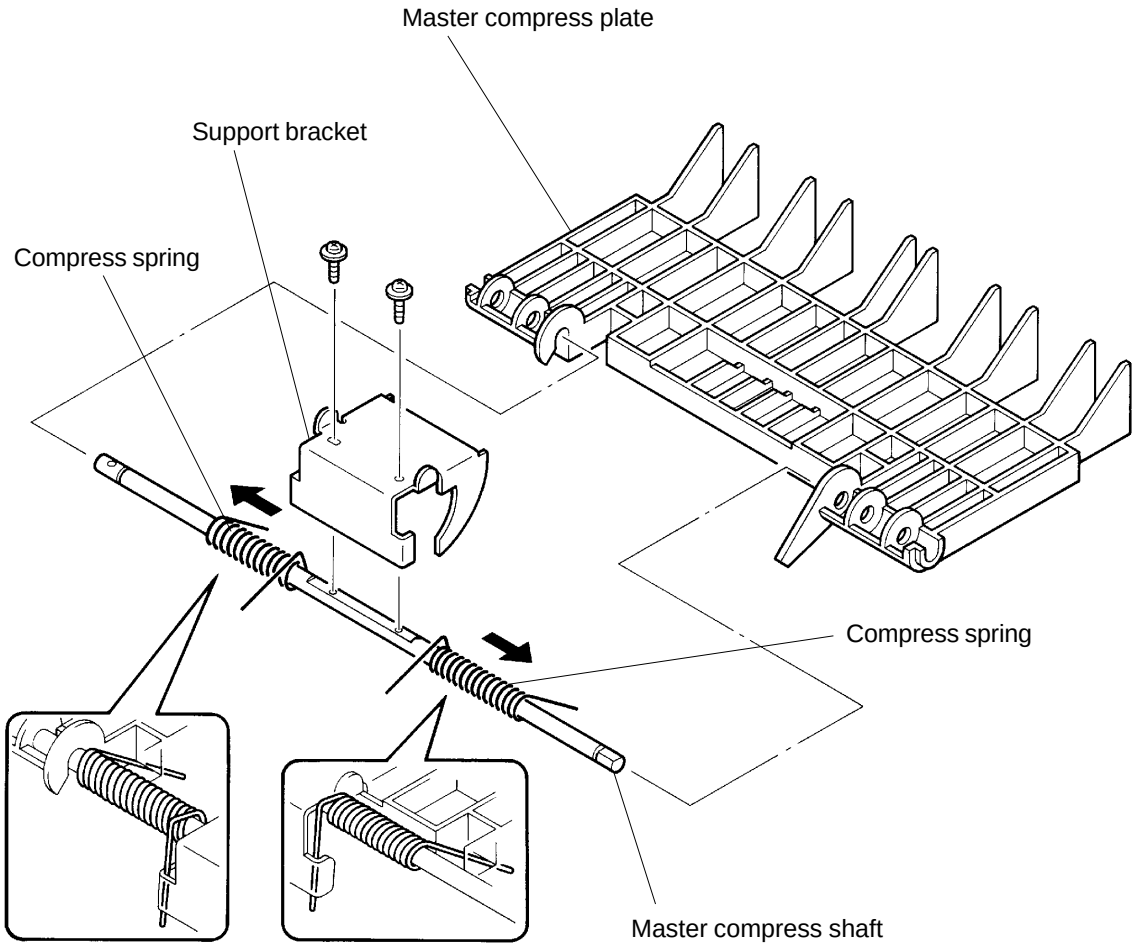
(continues on page 11-23)



9. Unlock Compress springs from the Support bracket.
   > Be careful with the handling of the Compress springs to avoid injuries.
10. Remove two mounting screws holding the Support bracket to the Master compress shaft, and separate the Support bracket from the shaft.
11. Remove Master compress shaft and Compress springs from the Master compress plate.

Precaution in Assembly

> Be careful with the handling of the Compress springs to avoid injuries.
> Install the Master compress shaft in the correct direction.
> Hook the Compress springs in the correct direction and position.



Hook the Compress springs in the correct direction and position.

CHAPTER 12: IMAGE SCANNING SECTION

CONTENTS

1. Theory of Operation

1. Original Loading Mechanism

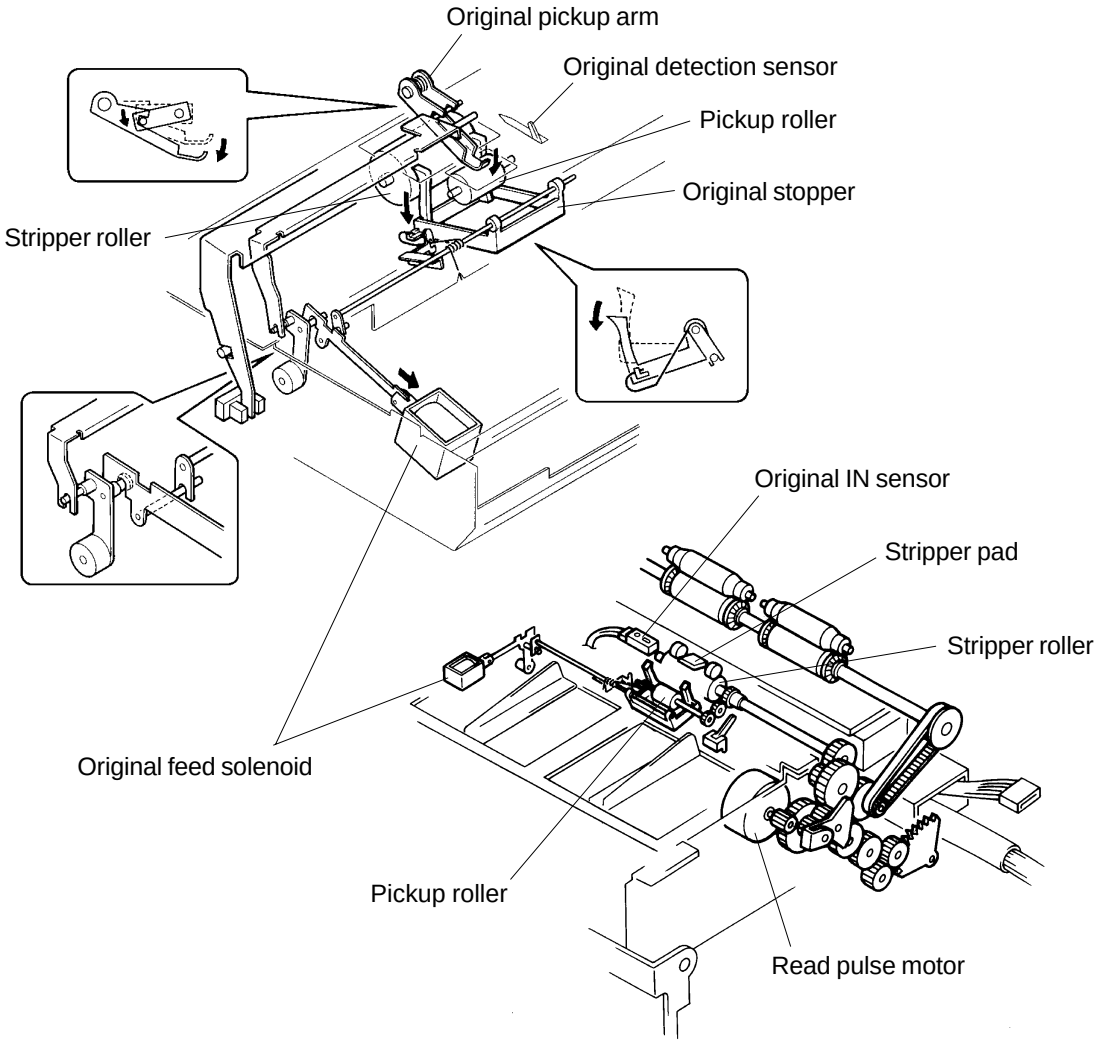
An original placed on the original tray is automatically fed and set in the ADF unit.

1. Shading Compensation

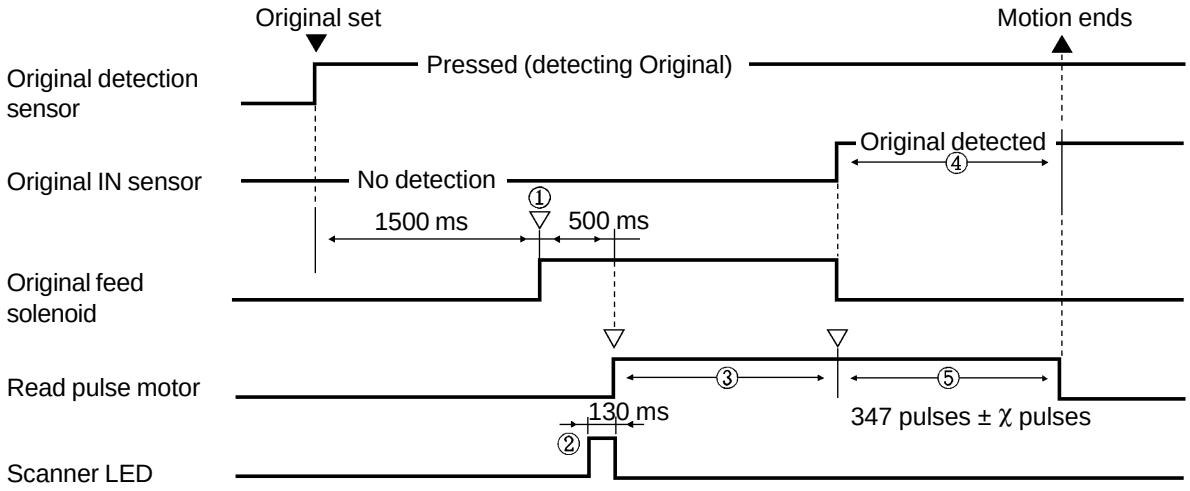
> The leading edge of the original placed on the Original tray activates the actuator of the Original detection sensor.
> When the Original detection sensor detects the original, the LED of the Image scanner turns ON and the shading compensation takes place.
> At the same time, the Original feed solenoid activates and pulls the Original stopper down to clear the way for the original.
The original is now held in position by Original pickup arm which comes down when the solenoid is activated.

2. Original Loading in ADF

> After the shading compensation is done, the Read pulse motor activates to start feeding the original by rotating the Original pickup roller and Original stripper roller.
> The originals stacked on the Original tray are fed sheet by sheet into the ADF unit by the Stripper pad and Stripper roller.



Original Loading Timing Chart



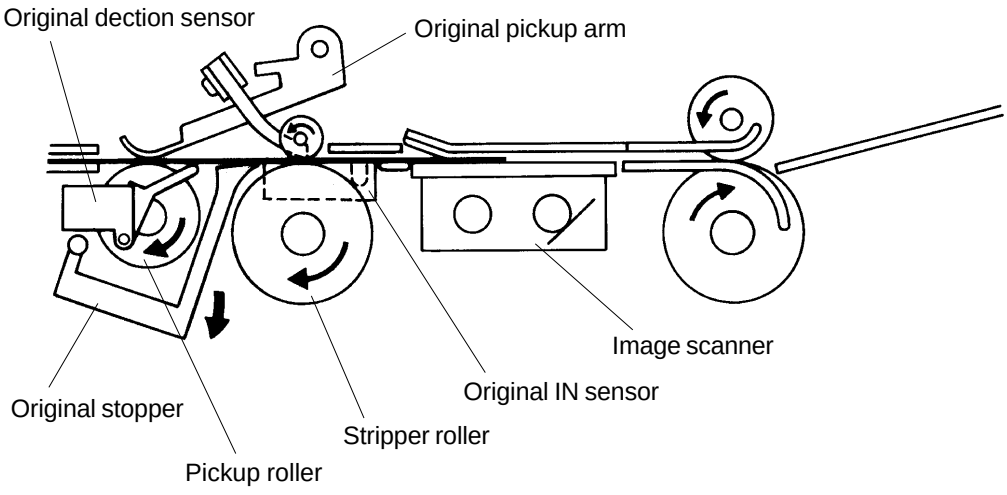
① Original feed solenoid activates with a small buzzer sound.

② The Scanner LED activates for shading compensation.

③ If the original IN sensor does not detect an Original within **1712 pulses** after the Read pulse motor activates, the machine assumes Original has jammed and indicates the message **[C 37]**, and turns off the Original feed solenoid and Read pulse motor.

④ If the Original IN senor detects the Original once, but then no longer detects the Original before the Read pulse motor turns OFF, the machine assumes Original has jammed and indicates the message **[C37]** and turns off the Read pulse motor.

⑤ The "χ" pulses can be adjusted by Memory Switch **No. 206** (Test Mode No. 206).



2. Original Scanning Mechanism

After the Original loading movement is completed, and START button is pressed, the Drum rotates to remove the master from the Drum.
50 ms after the Drum 100° during the master removal movement, the Read pulse motor turns ON to feed the original through the ADF unit.

1. Read pulse motor

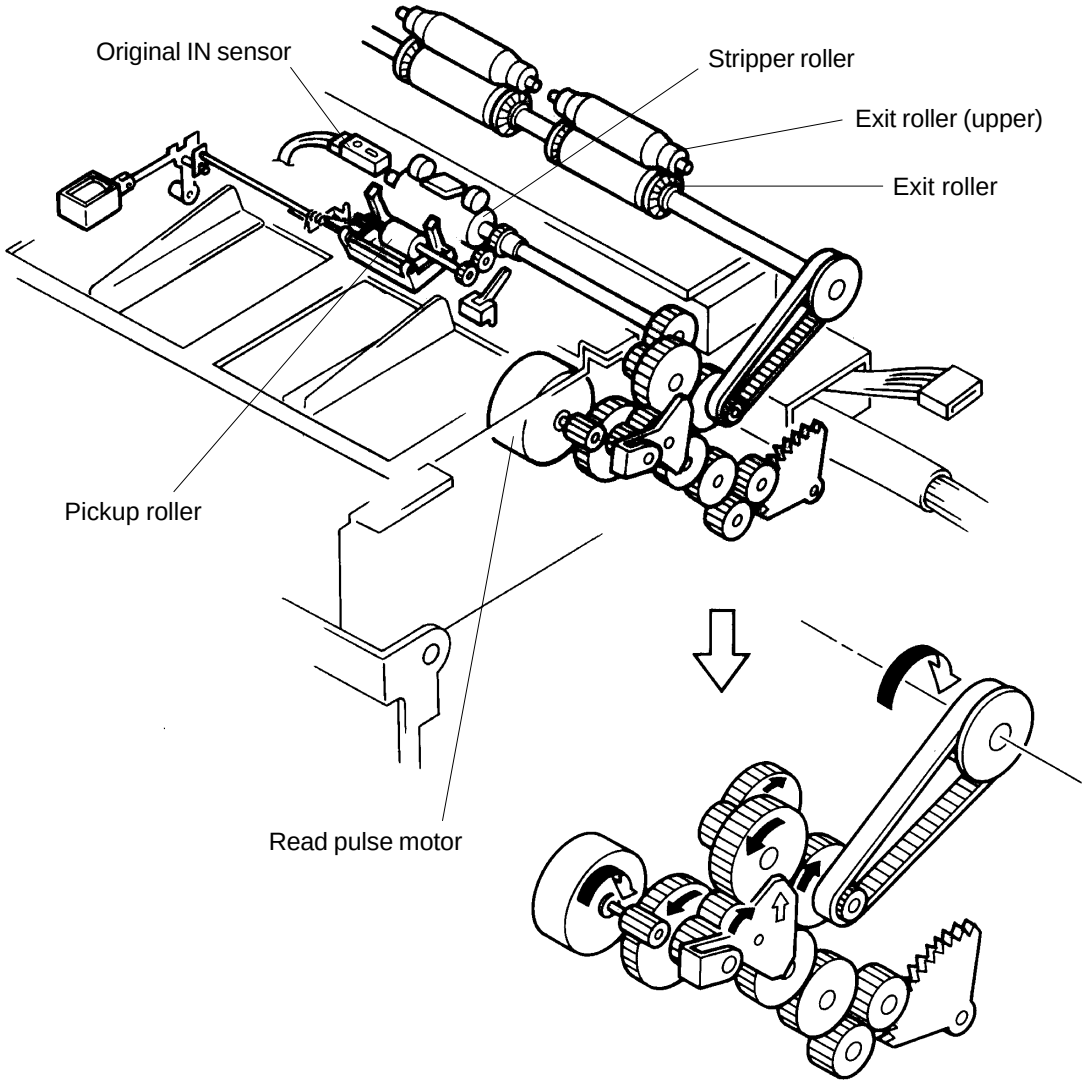
> 50 ms after the Drum 100° during tthe master removal movement, the Read pulse motor activates to rotate the Pickup roller, Stripper roller and Exit roller to feed the Original in and out through the ADF unit.

> 59 pulses (5 mm) after the Read pulse motor is activated, the Read/Write start signal turns ON and the image scanning is started by the Image scanner.

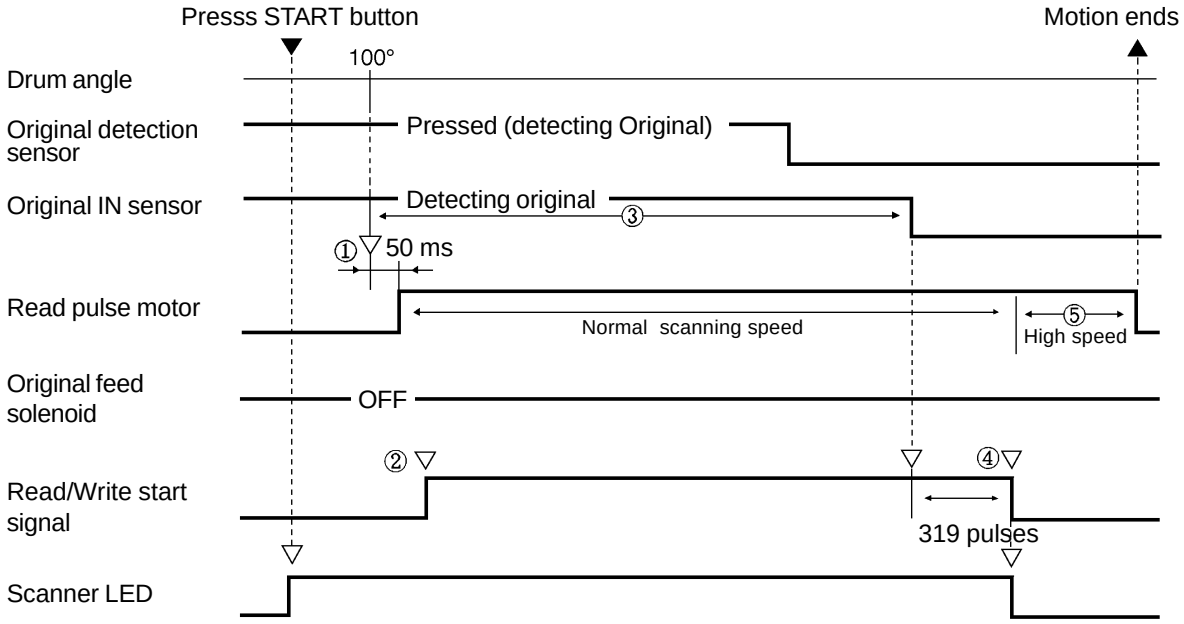
2. Original IN sensor

> When the tailing edge of the Original clears out from the Original IN sensor, the Read/Write start signal is turned OFF after a set time and turns OFF the Image scanner LED to stop the image scanning.

> The Read pulse motor stops after a set time to end the original scanning movement.



Original Scanning Timing Chart



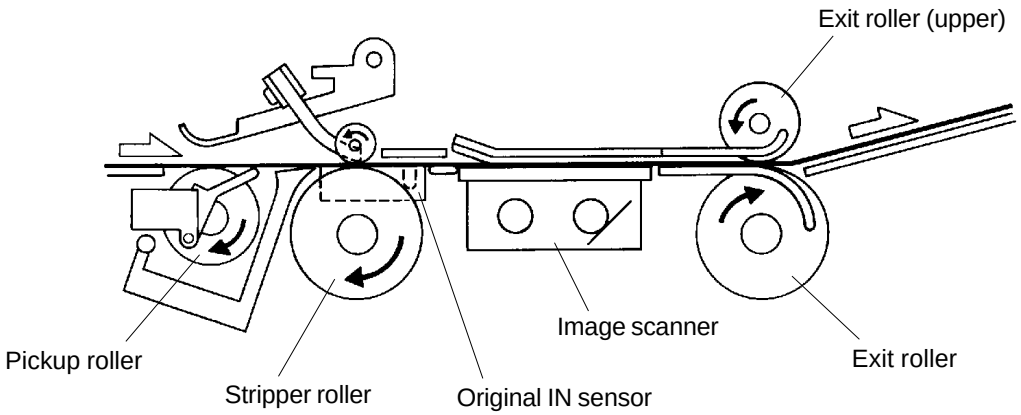
① **50 ms** after the Drum 100˚of the master removal movement, the Read pulse motor activates to feed the Original. (At the same time, the Write pulse motor activates to feed the master material.)

② **59 pulses** (5 mm) after the Read pulse motor activates, the Read/Write start signal turns ON and the image scanning starts.

③ If the Original IN sensor still detects the Original (the sensor light is reflected back) even though the Read pulse motor has activated for **4945 pulses**, the machine assumes the Original is oversized and indicates **[C 38]** on the display.

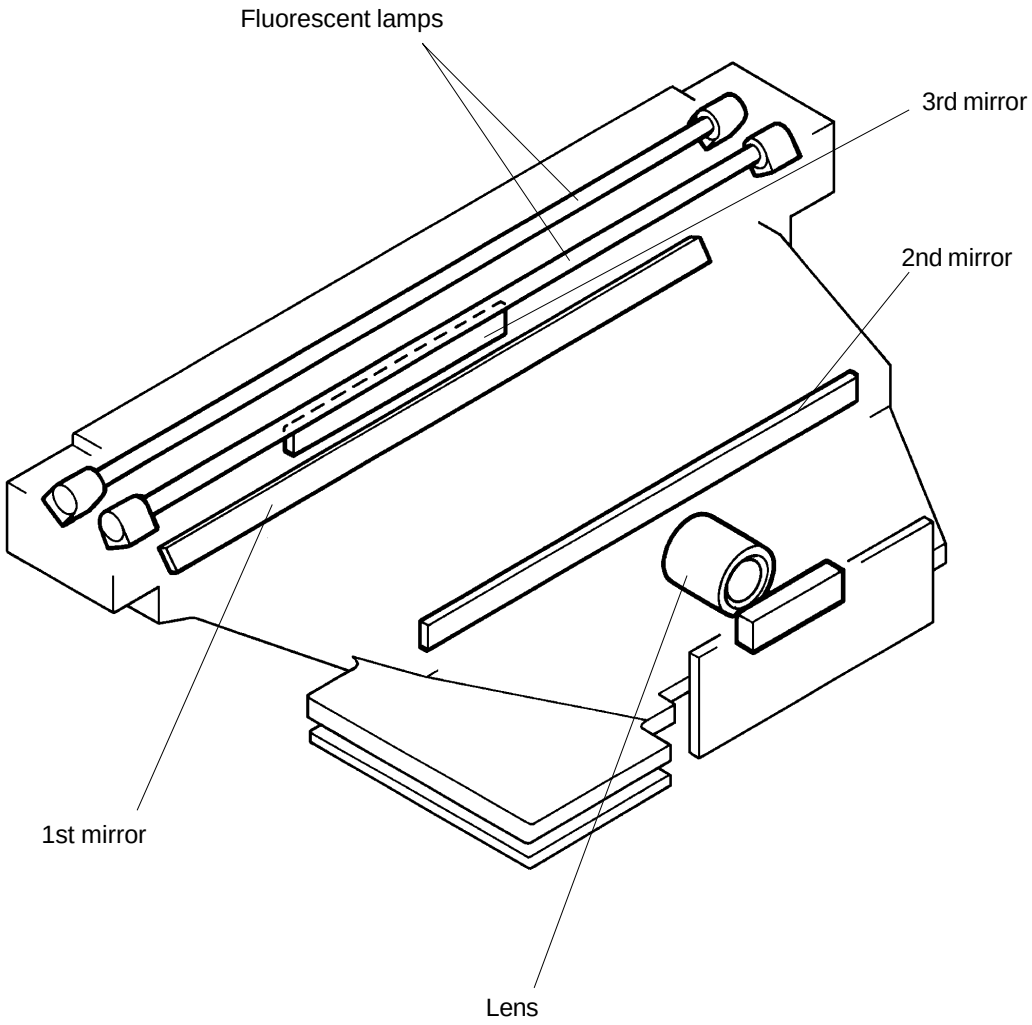
④ Image scanning ends.

⑤ The Read pulse motor rotates at high speed to discharge the Original.

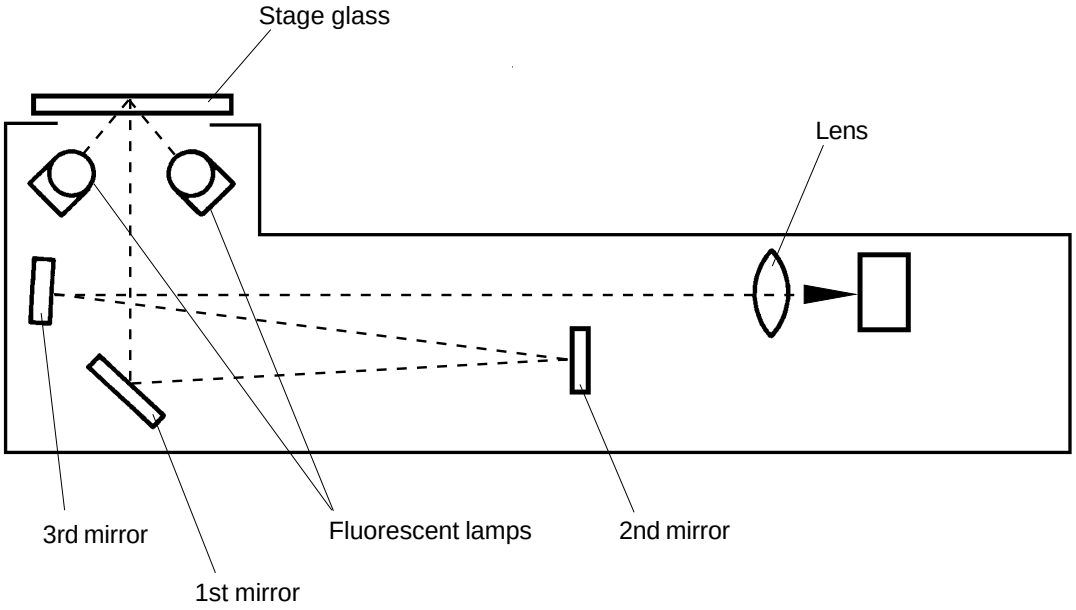


3. Image Scanner

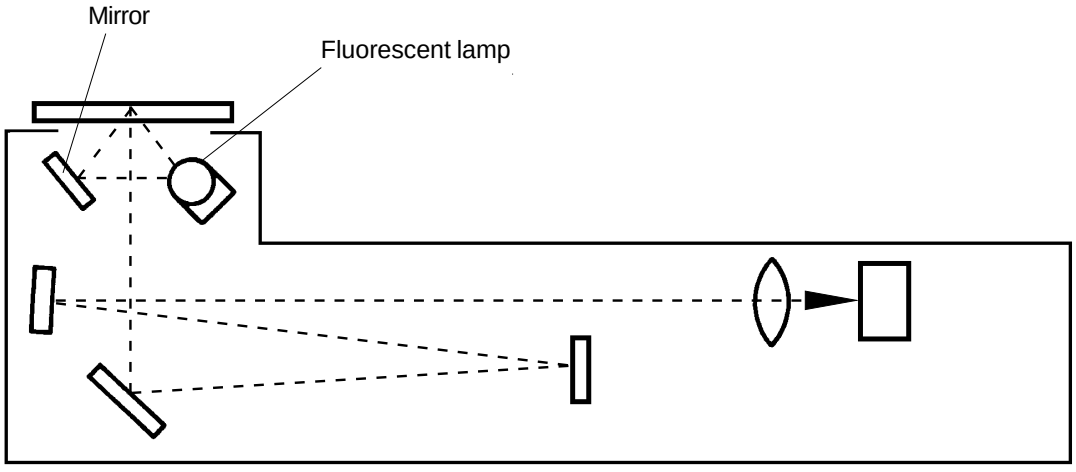
The image scanning is done by an optical type Image scanner which emits greenish-yellow light from fluorescent lamp against an original and catches the image after it is reflected and reduced in size by three mirrors and a lens.
TR1510 has one fluorescent lamp and TR1530 has two fluorescent lamps.



Sectional view of TR1530 Image Scanner



Sectional view of TR1510 Image Scanner



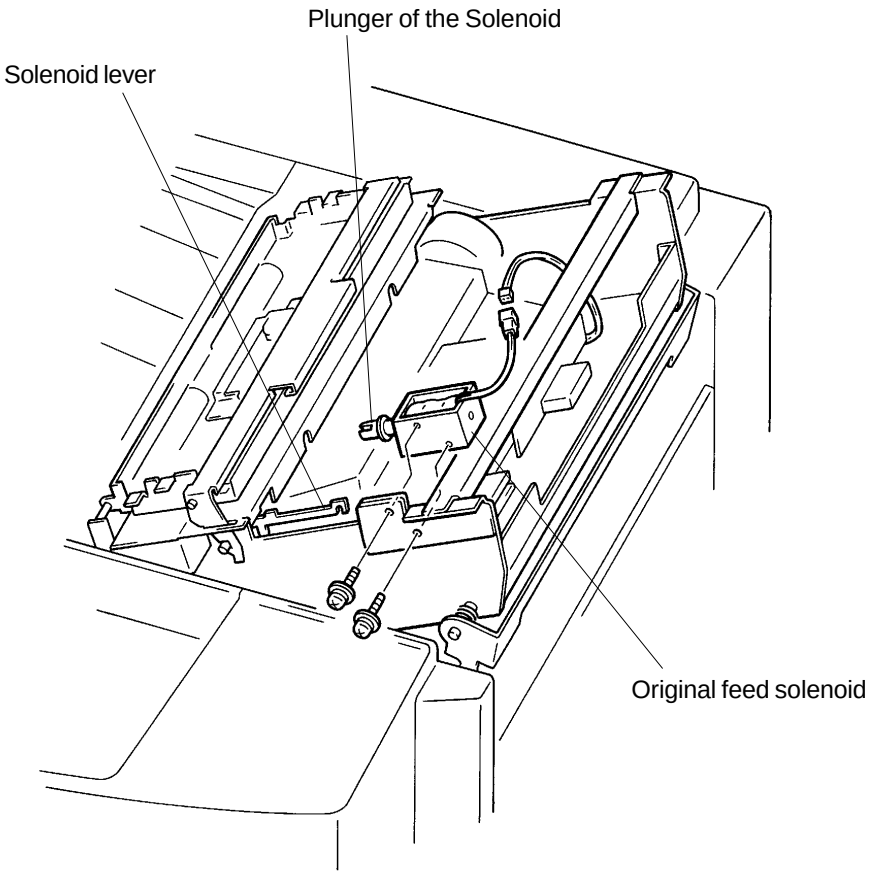
2. Removal and Assembly

1. Original Feed Solenoid

1. Disconnect the power supply from the machine.
2. Remove following two covers from the machine.
   > ADF frame cover
   > ADF unit cover
3. Disconnect the connector of the Original feed solenoid.
4. Open the Master making unit .
5. Remove two mounting screws of the Original feed solenoid and remove the solenoid.

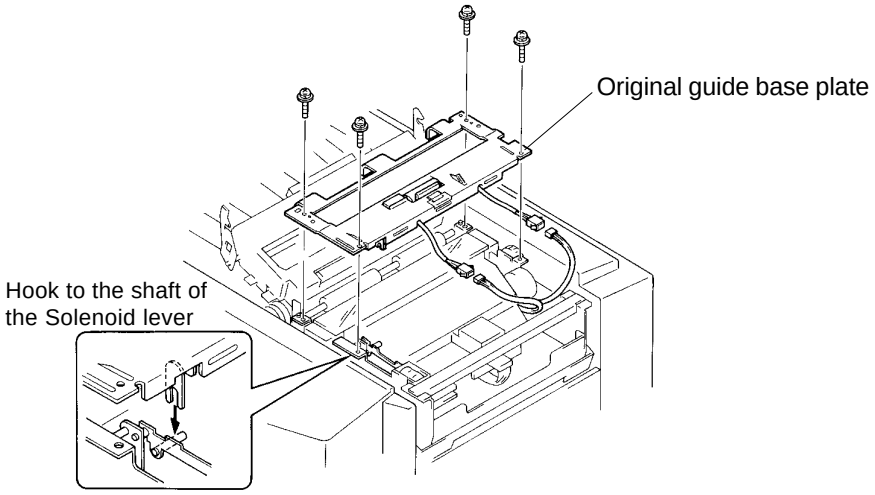
Precaution before Assembly

> Insert the Solenoid lever on the plunger of the solenoid.

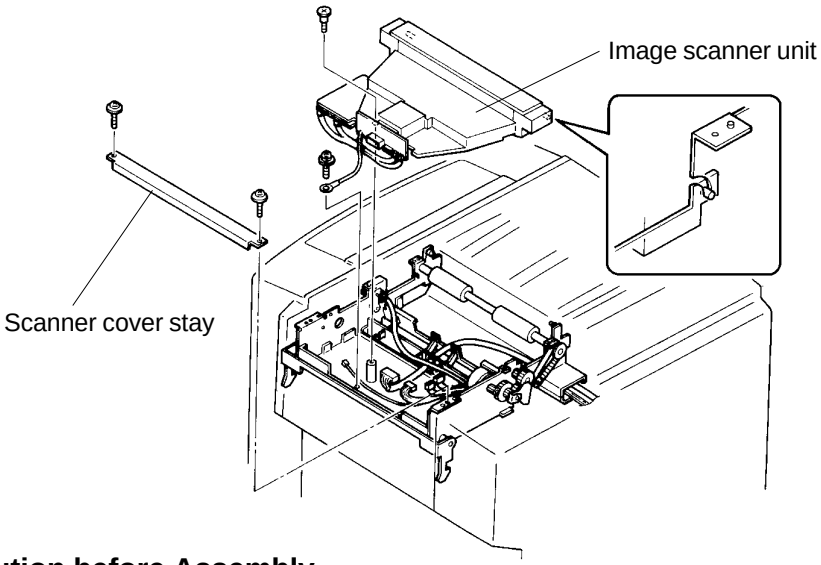


2. Image Scanner Unit

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Remove Original feed solenoid. (page 12-7)
4. Open the ADF unit and remove the mounting screw of the Original guide base plate, disconnect Connectors of Original IN sensor and Original detection sensor, and then remove the Original guide base plate from the ADF unit.
5. Disconnect the Connector of the ADF set sensor.



6. Remove two mounting screws of the Scanner cover stay and remove the stay.
7. Disconnect two Connectors of the Image scanner and remove the ground wire.
8. Remove the mounting screw of the Image scanner and remove the scanner.



Precaution before Assembly

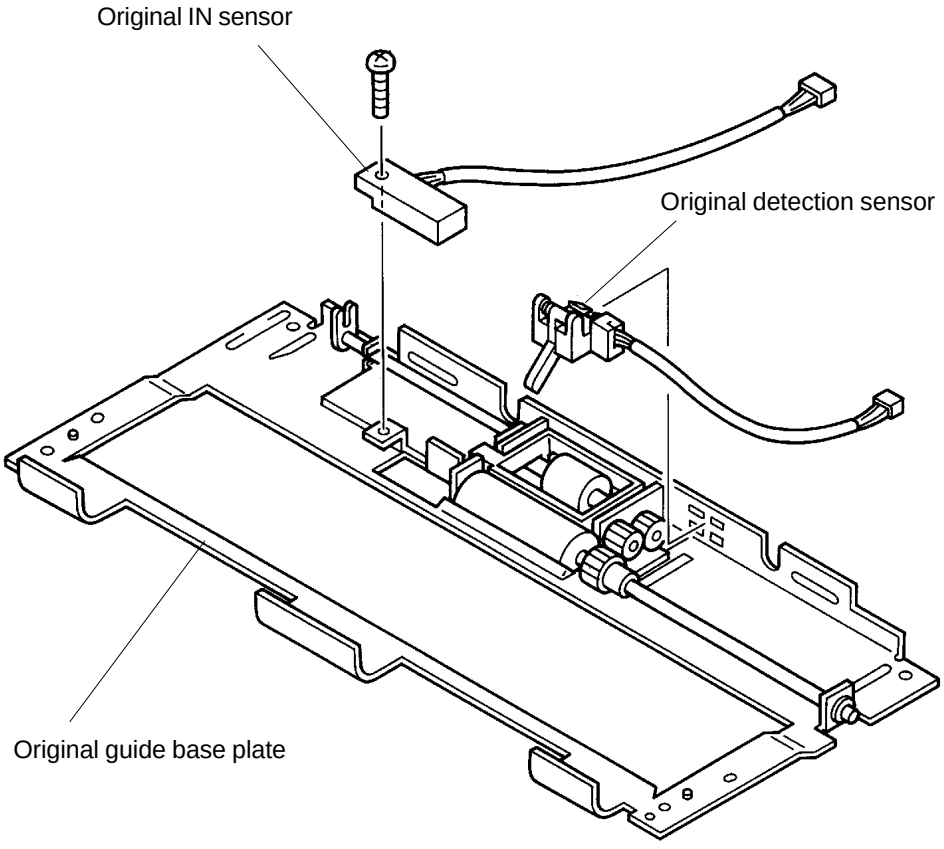
> Install the Image scanner by matching the positioning pins on the scanner with the positioning holes on the machine frame.
> Match the half-pierced section on the Original guide base plate with that of the counter part and hook the forked portion of the Original guide base plate on the shaft of the Solenoid lever.

3. Original Detection Sensor

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Open the ADF unit.
4. Remove the mounting screw of the Original guide base plate, disconnect Connectors of Original IN sensor and Original detection sensor, and then remove the Original guide base plate.
5. Remove the Original detection sensor from the Original guide base plate.

4. Original IN Sensor

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Open the ADF unit.
4. Remove the mounting screw of the Original guide base plate, disconnect Connectors of Original IN sensor and Original detection sensor, and then remove the Original guide base plate.
5. Remove the mounting screw of the Original IN sensor and remove the sensor from the Original guide base plate.

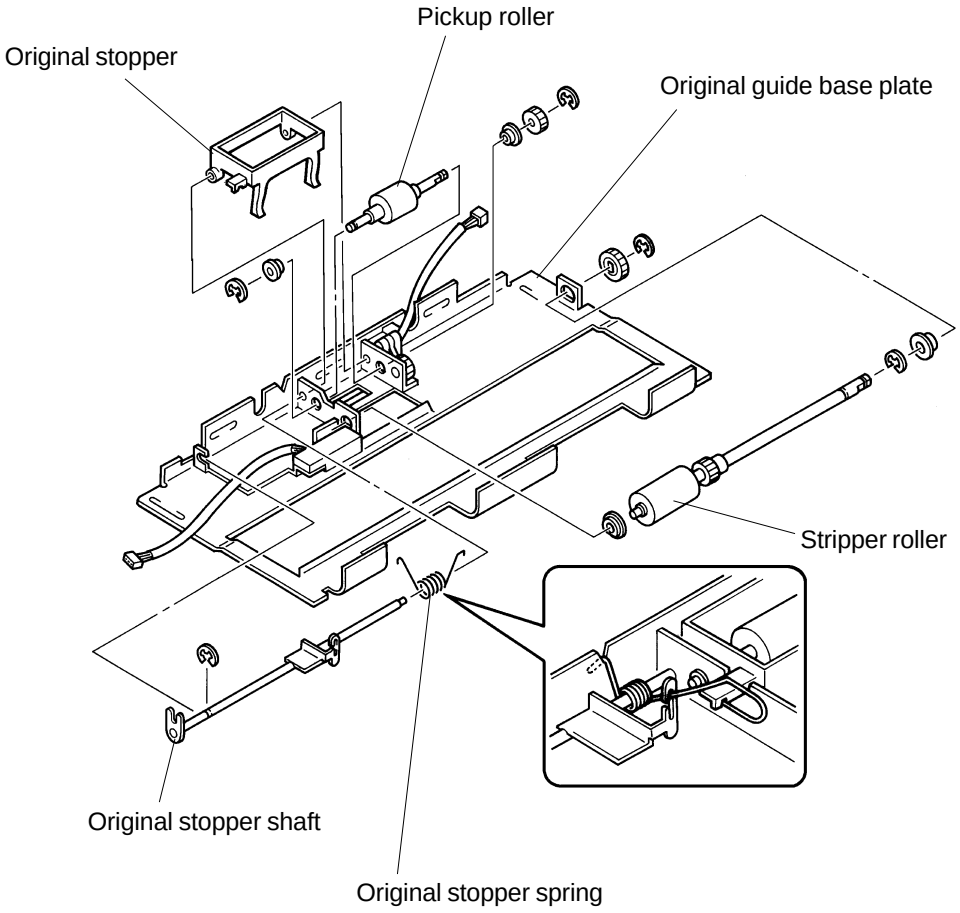


5. Stripper Roller

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Remove Original guide base plate. (page 12-8)
4. Remove E-ring from the shaft of the Stripper roller, and remove the Gear.
5. Remove E-ring from the shaft of the Stripper roller on the other end and slide out the Stripper roller.

6. Pickup Roller

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Remove Original guide base plate. (page 12-8)
4. Remove E-ring from the Original stopper shaft and remove the shaft after unlocking the Original stopper spring.
5. Remove the Original stopper.
6. Remove E-rings from both ends of the Pickup roller shaft.
7. Remove the Gear on the drive side and the Metal, and then remove the Pickup roller.

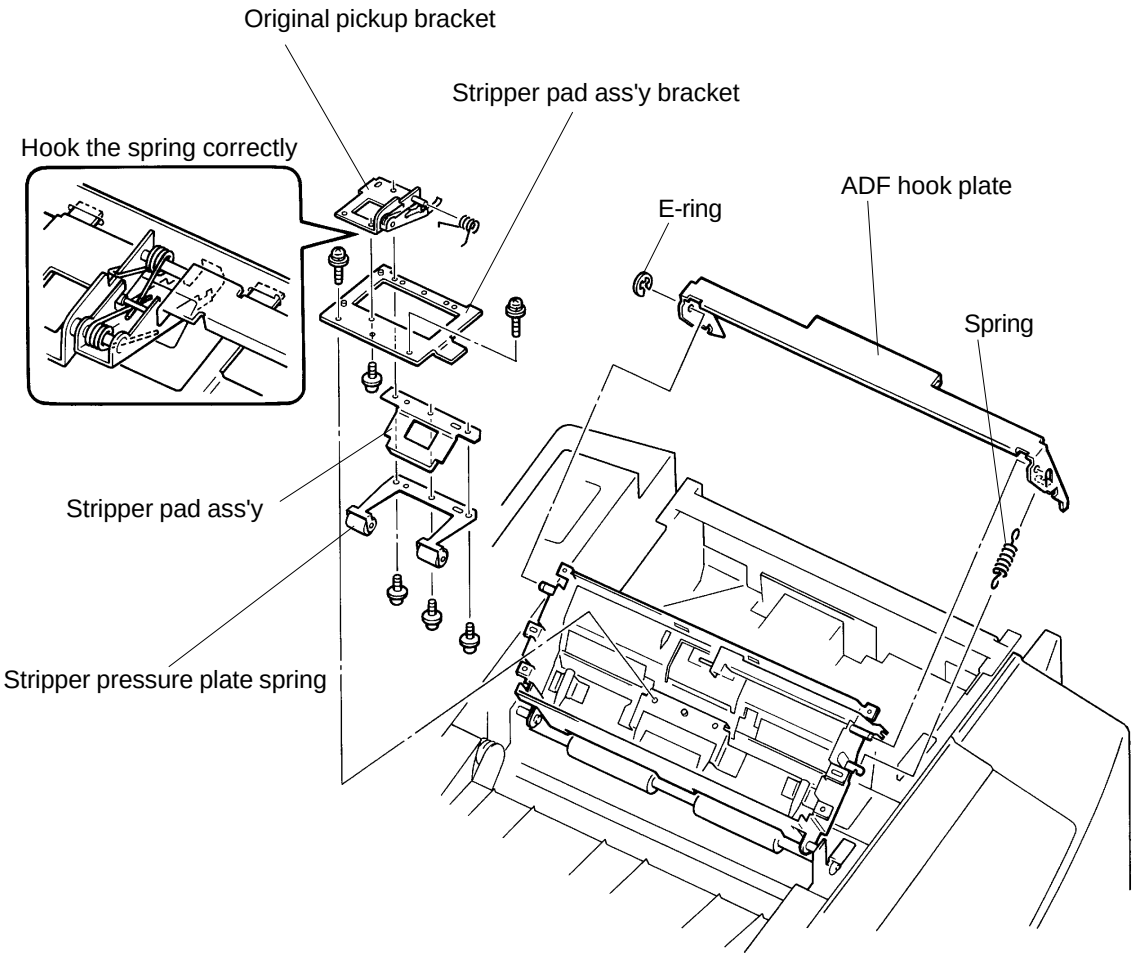


7. Stripper Pad Ass'y.

1. Disconnect the power supply from the machine.
2. Remove the ADF frame cover.
3. Remove the Spring and E-ring from the ADF hook plate and remove the plate.
4. Remove two mounting screws from the Stripper pad ass'y bracket and remove the bracket, carefully not to lose the spring.
5. Remove mounting screw from the Original pickup bracket and remove the bracket.
6. Remove three mounting screws from the Stripper pad ass'y bracket and remove Stripper pressure plate spring and the Stripper pad ass'y,

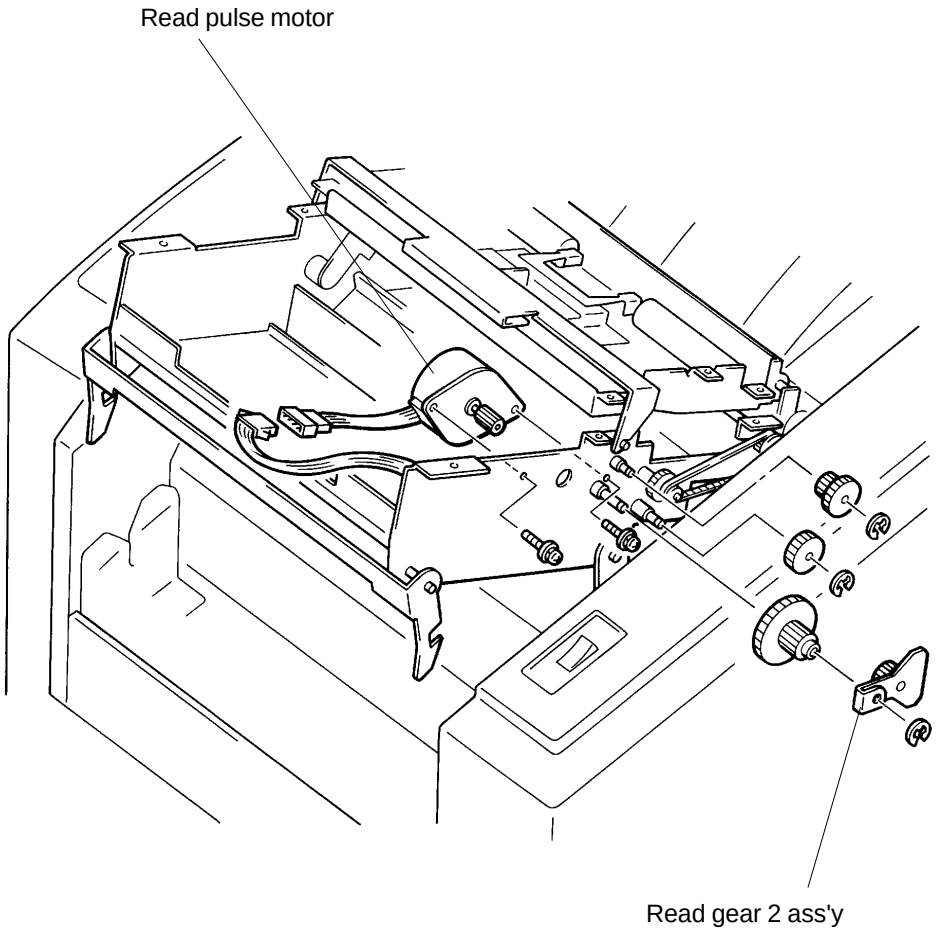
Precaution in Assembly

> Hook the spring correctly when installing the Stripper pad ass'y bracket (see the enlarged sketch below).



8. Read Pulse Motor

1. Disconnect the power supply from the machine.
2. Remove ADF frame cover and ADF cover.
3. Remove Original guide base plate and Image scanner unit. (page 12-8)
4. Remove E-rings from Read gear 2 ass'y and 2 other Gears and remove all four gears.
5. Disconnect the Connector of the Read pulse motor.
6. Remove two mounting screw of the Read pulse motor and remove the motor.



CHAPTER 13: CUTTER SECTION

CONTENTS

1. Theory of Operation

1. Cutter Home Positioning Mechanism

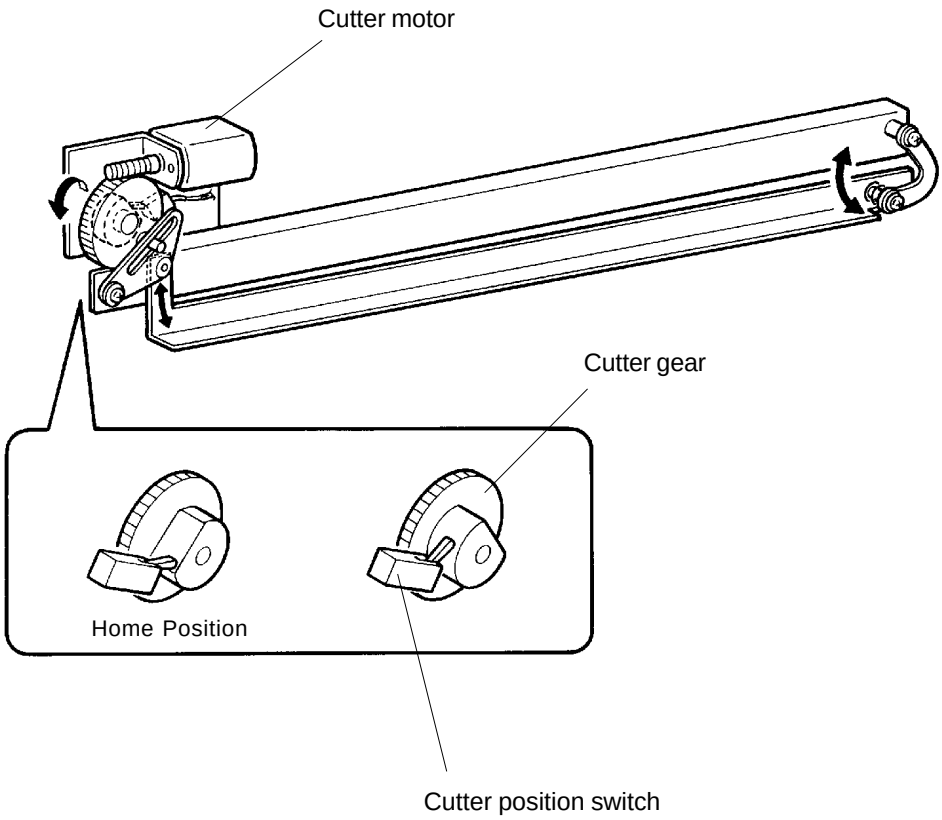
1. Cutter Position Switch

> Each time the machine power is turned ON or All Reset Button is pressed, the Cutter switch checks the Cutter.

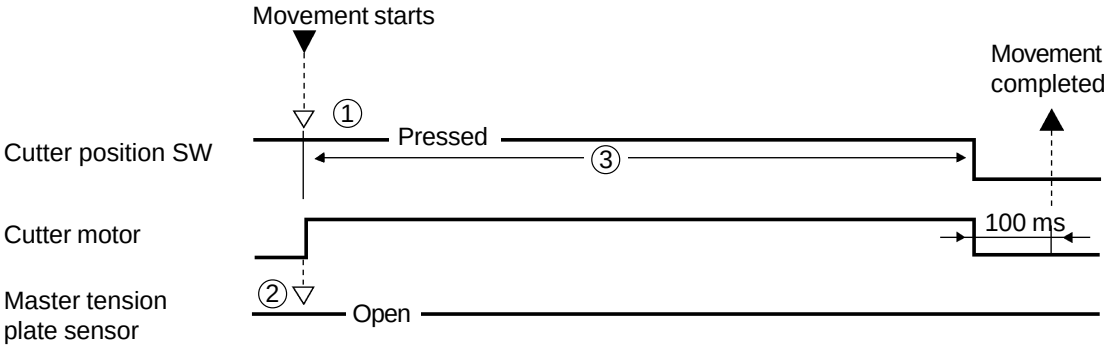
2. Home Position

> The home position of the Cutter is when the actuator of the Cutter switch is not pressed by the cam on the Cutter gear.

> If the actuator of the switch is pressed, the Cutter motor activates and rotates the Cutter gear until the actuator is released from the cam.



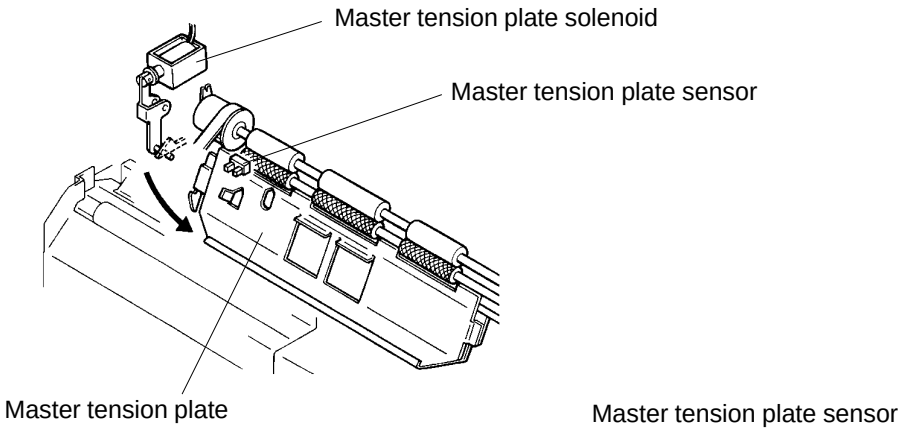
Cutter Home Positioning Timing Chart



① If the Cutter position SW is released from the beginning (Cutter already at Home position), the Cutter home positioning movement is skipped.

② If the light path of the Master tension plate sensor is closed (Master tension plate is up) when the Cutter home position movement starts, the Master tension plate solenoid is activated to drop the Master tension plate and then Cutter home position movement takes place.
If the light path of the Master tension plate sensor does not open (Master tension plate does not drop down), the machine indicates Cutter motor lock error message **[E 13]**.

③ If the Cutter position switch is pressed (cutter not at Home position) even though **450 ms** has passed after the Cutter motor activated, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.



2. Cutting Mechanism

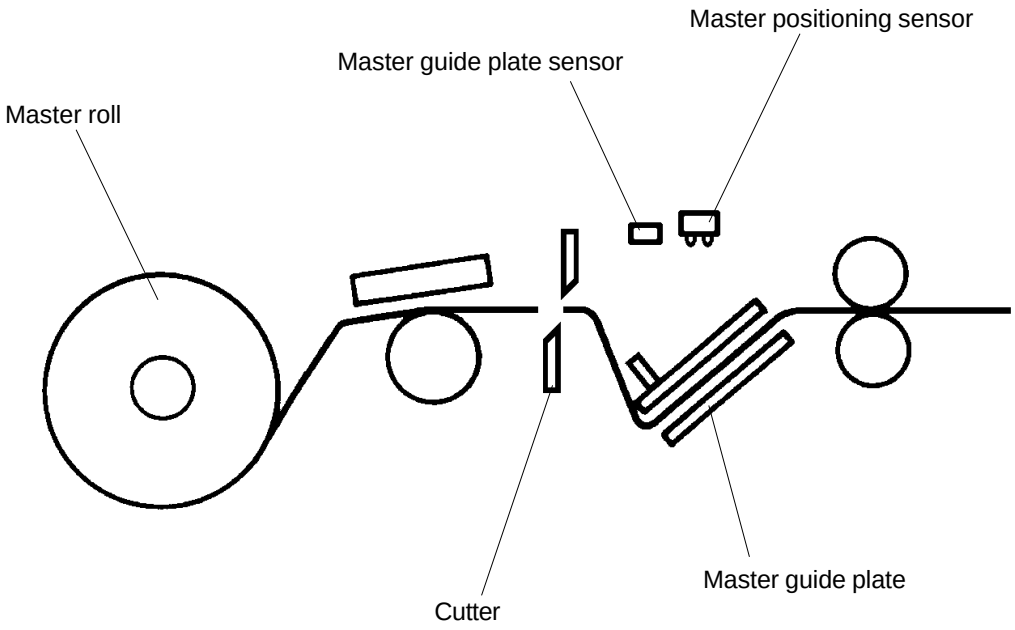
1. Master Cutting

> Cutter motor activates and cuts the master each time the master loading is made on the Drum.

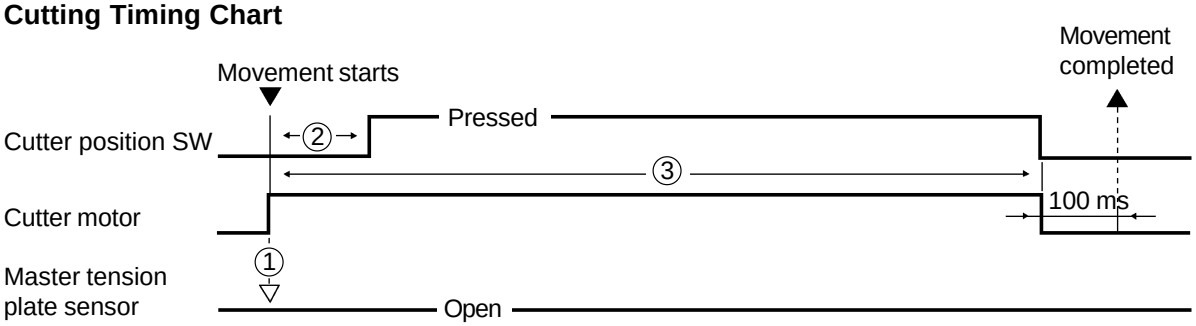
2. Cutter Motor

> As the Cutter motor activates, it rotates the Cutter gear, and the high part of the cam on the Cutter gear presses against the actuator of the Cutter switch.
The Cutter motor continues to rotate until the low cut portion of the cam releases the actuator.
The Cutter motor then stops and the cutting motion ends.

> The Cutter motor does not activate unless the Master tension plate is down (light path of the Master tension plate sensor is open).



Cutting Timing Chart



① If the light path of the Master tension plate sensor is blocked (Master tension plate up) at the start of the master cut movement, the Cutter motor will not activate.
The light path of the Master tension plate sensor must be open (Master tension plate must be down) for the normal Cutter operation.
[C 23] is indicated after the master loading on the Drum movement is completed to indicate master cut malfunction.

② If the Cutter position switch is not pressed within **75 ms** after the Cutter motor activates (the Cutter does not move from the Home position), the machine assumes the Cutter motor has locked and indicates error message **[E 13]**.

③ If the Cutter position switch is pressed (cutter not at Home position) even though **450 ms** has passed after the Cutter motor activated, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.

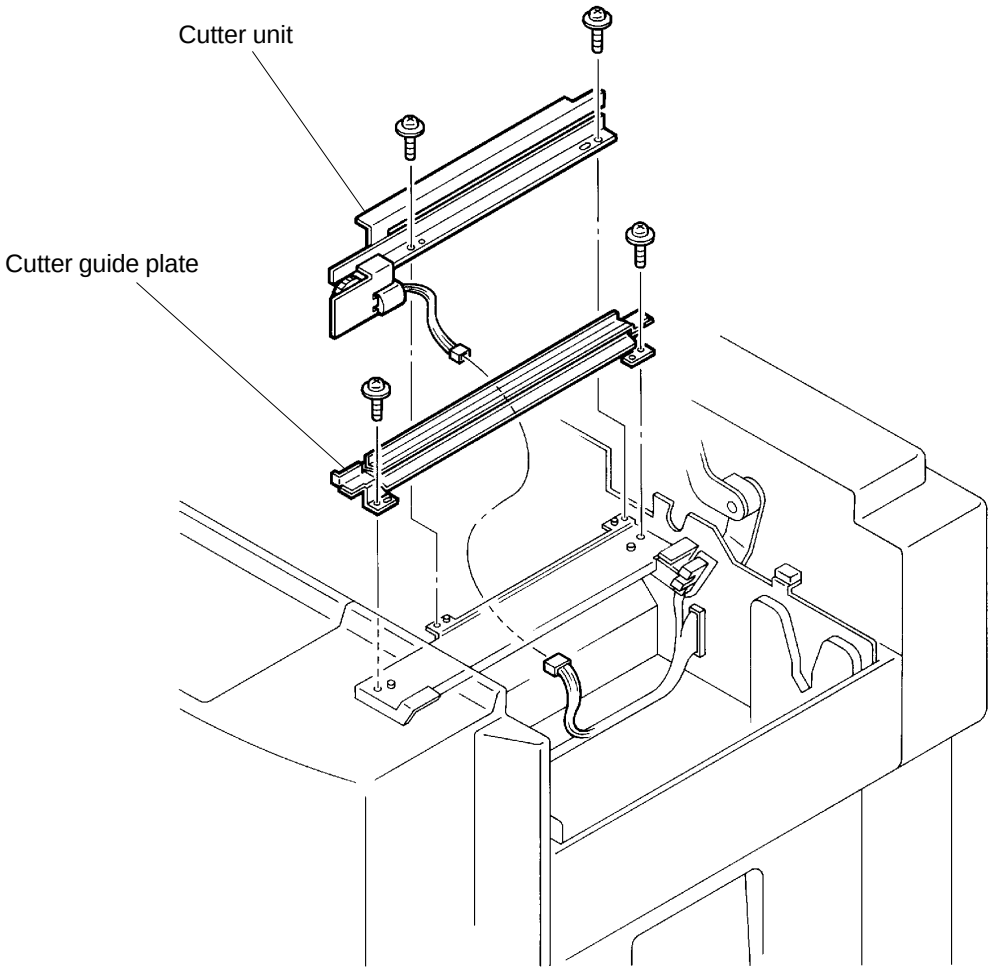
2. Removal and Assembly

1. Cutter Unit

1. Disconnect the power supply from the machine.
2. Remove Master guide plate. (page 14-5)
3. Remove Write roller ass'y. (page 14-5)
4. Remove two mounting screws of the Cutter guide plate and remove the plate.
5. Disconnect the Connector of the Cutter unit.
6. Remove two mounting screws of the Cutter unit and remove the unit.

Precaution in Assembly

> Match the half-pierced sections of the Cutter unit with its counter part.
> Match the half-pierced section of the Cutter guide plate with its counter part.



CHAPTER 14: MASTER MAKING SECTION

CONTENTS

1. Theory of Operation

1. Master Making

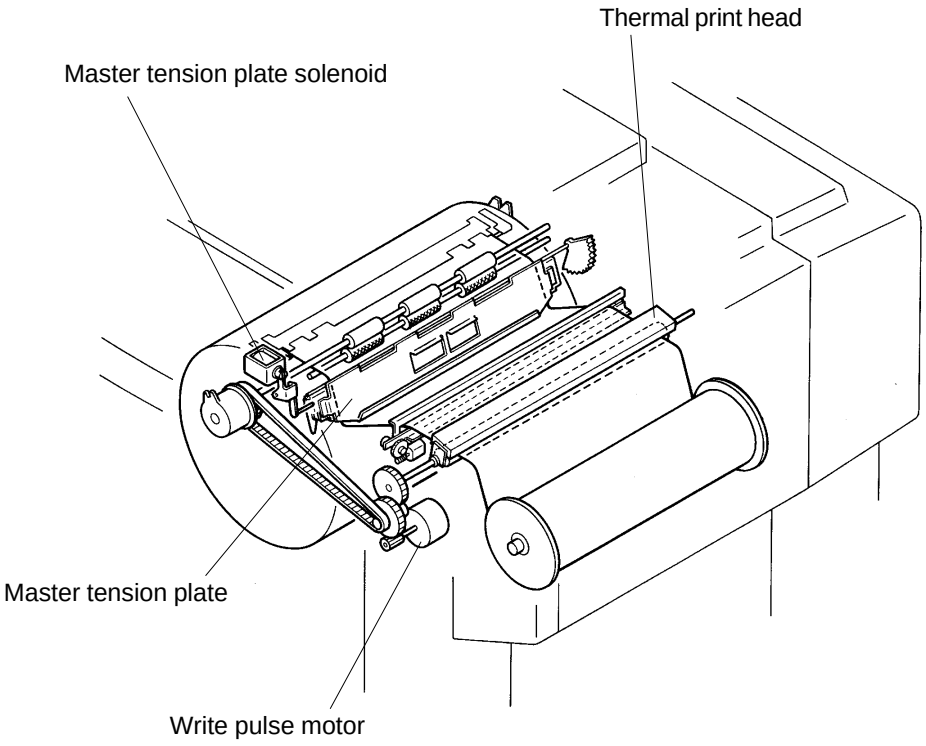
When the START key is pressed for master making, the Drum rotates to remove the master on the Drum.
At the same time the TPH-CTL signal is turned ON to supply heating power to the Thermal print head.

1. Start of the Master Making

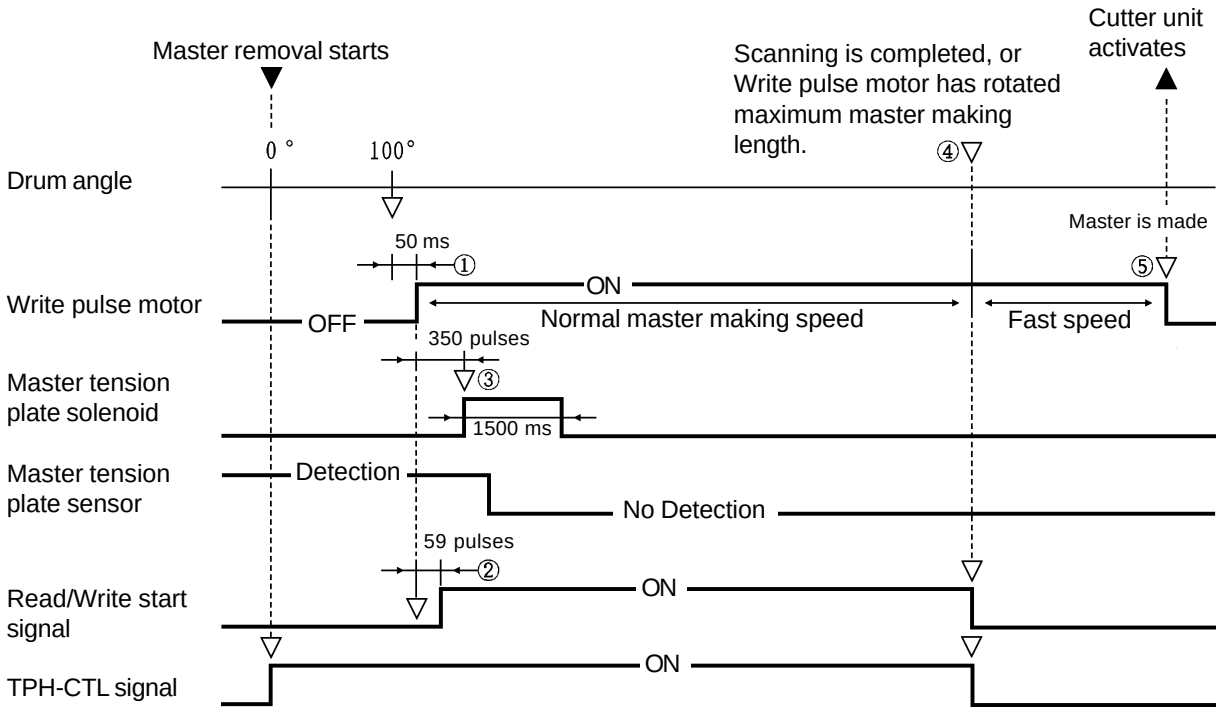
> While the Drum is rotates to remove the master on the Drum, the Write pulse motor activates and starts feeding the master material from the master roll 50 ms after the Drum rotates 100° from the first Drum Position-A.
> At the same time the original starts feeding through the ADF unit for scanning.
> As the Write pulse motor activates and feeds the master for 5mm, the Read & Write start signal is turned ON and the Thermal print head begins making image on the master material.

2. End of the Master Making

> After a certain set time, the Master tension plate solenoid activates and swings down the Master tension plate.
> The master runs through the Master tension plate and as the Master tension plate swings down, it gives tension on the master while the master is loaded on the Drum.
> Either the original scanning ends or if the Write pulse motor activates for the maximum master making length, both the TPH-CTL signal and Read & Write start signal turn OFF.
> The Write pulse motor is still activated until full length of master material is transferred. The Write pulse motor then stops and completes the master making process.



1. Master Making Timing Chart



① During the master removal Drum movement, **50 ms after the Drum angle 100°**, the Write pulse motor activates and transfers the master material.

② After the master material advances **59 pulses** (5 mm), the Read/Write start signal turns ON and master making starts. The original scanning starts at the same time.

③ **350 pulses** after the Write pulse motor turns ON, the Master tension plate solenoid activates and drops the Master tension plate down.

④ After the Scanning is completed or Write pulse motor has rotated maximum master making length, both the Read/Write start signal and TPH-CTL signal are turned OFF to end the master making.
The maximum master making length of the Write pulse motor is given on the chart below.
The value of χ can be adjusted by Memory switch (Test mode) **No. 205**.

A4/Legal	3514 pulses ± χ pulses (297.5 mm ± χ mm)
B4	4305 pulses ± χ pulses (364.5 mm ± χ mm)

⑤ After the Read/Write start signal and TPH-CTL signal are turned off, the Write pulse motor keeps turning until one full size master length of master material is moved forward.
The Write pulse motor then turns OFF and the Cutter unit cuts the master material.
One full master length is given on the chart below.

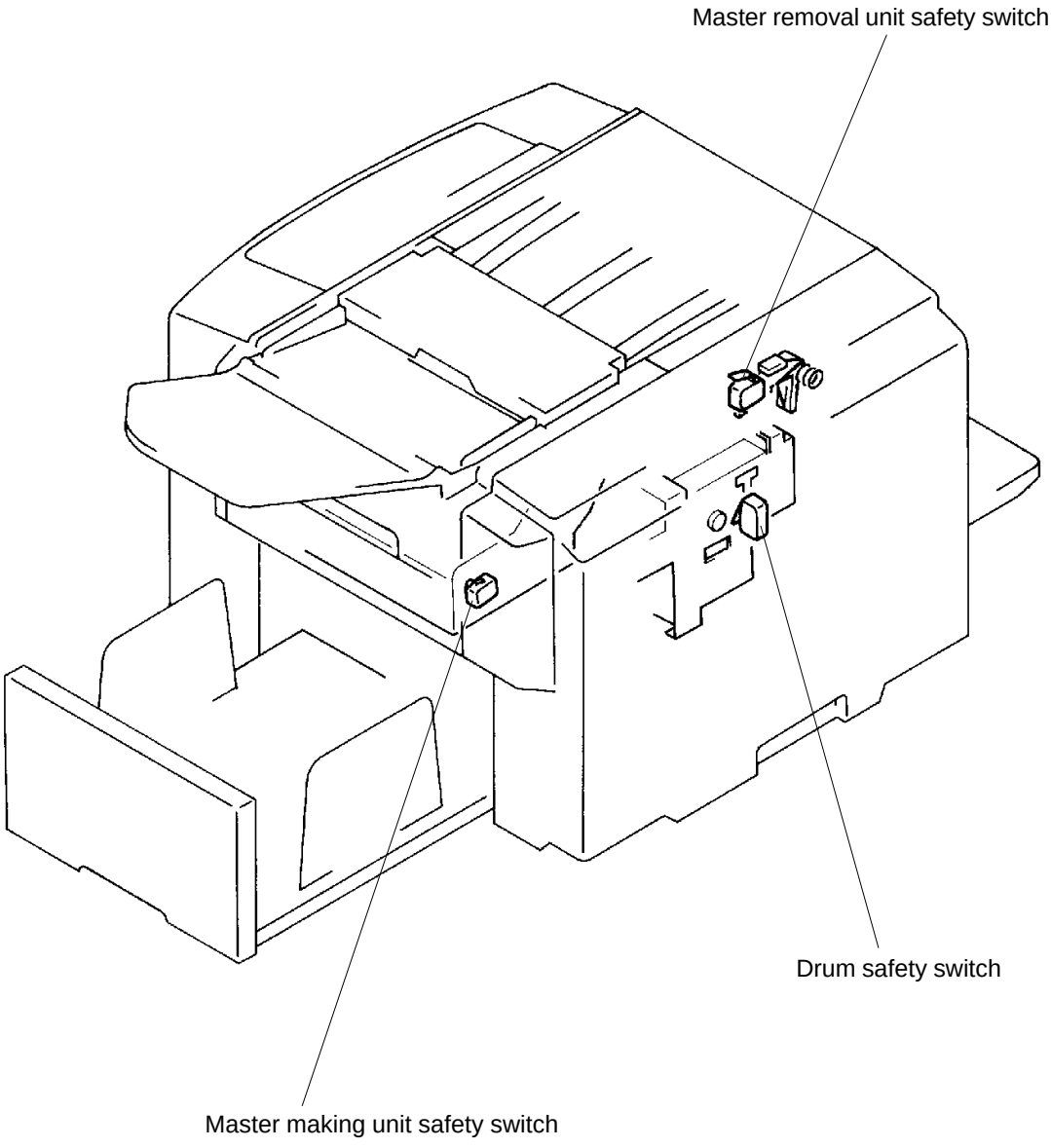
A4/Legal	4160 pulses (358.91 mm)
B4	4951 pulses (419.08 mm)

2. Thermal Power Safety Switches

1. Safety Switches

> The actuators of all three safety switches must be pressed in order to feed electrical power to the TPH unit.

> These three switches also acts as Main motor safety switches.



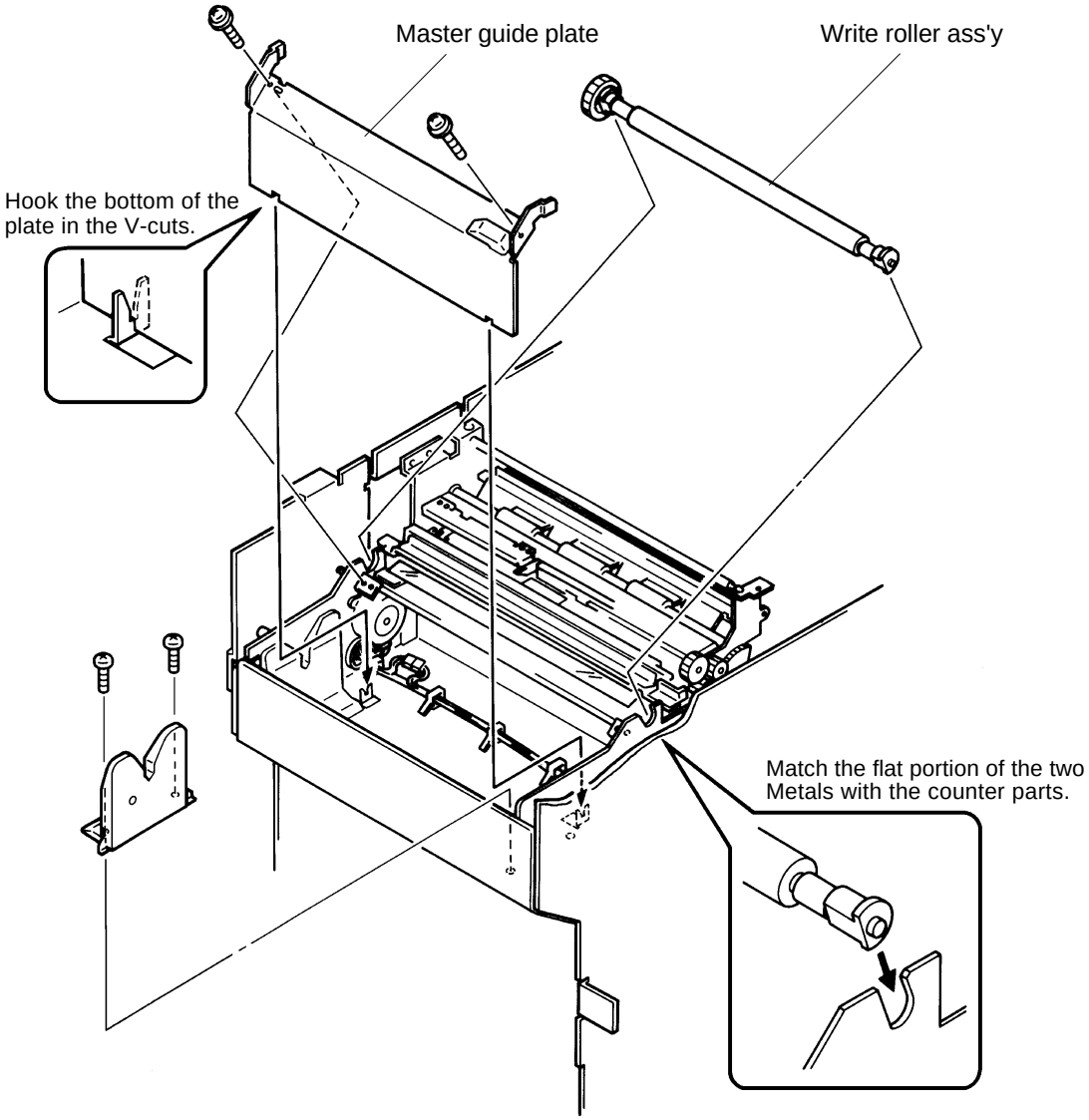
2. Removal and Assembly

1. Write Roller

1. Disconnect the power supply from the machine.
2. Open the Master making unit and remove the Master roll.
3. Remove two mounting screws of either one of the Master roll holder and remove the holder.
4. Remove two mounting screws of the Master guide plate and remove the plate.
5. Remove the Write roller ass'y by lifting the ass'y from the machine.

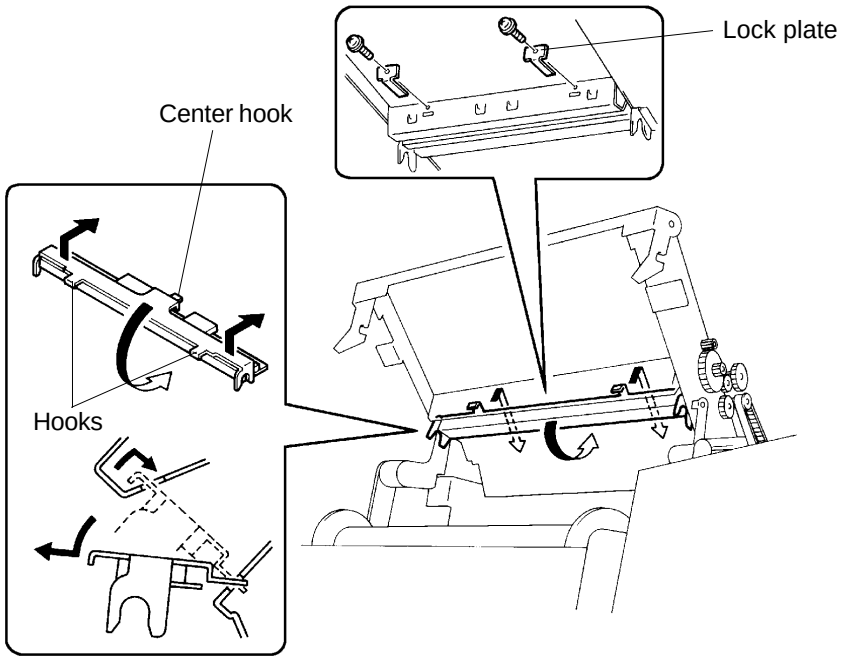
Precaution in Assembly

> Match the flat portion of the two Metals on the Write roller ass'y shaft with that of the counter part.
> Hook the bottom of the Master guide plate in the V-cut plates and match the half-pierced sections of the plate with the counter parts.

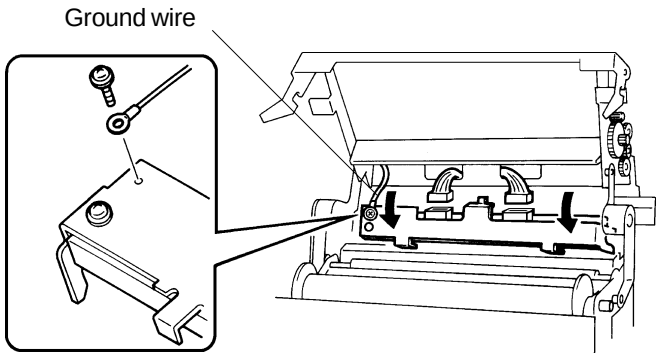


2. Thermal Print Head (TPH)

1. Disconnect the power supply from the machine.
2. Open the Master making unit.
3. Remove mounting screws of the two Lock plates and remove the plates.
4. Push the TPH away from you and slide it down to release the two hooks from the Master making unit.
5. Let the TPH fall toward you and pull the TPH out from the machine by releasing the center hook from the machine.



6. Disconnect two Connectors and one ground wire from the TPH, and remove the TPH.



Precautions in Removal

> Do not touch the Connector pins on the TPH, as static electricity may damage the TPH.
> Do not contact the heat emitting portion of the TPH against hard surfaces.

Adjustment after Assembly

> Thermal power adjustment of the TPH.

3. Adjustment

1. Thermal Power of Thermal Print Head

Thermal power must be adjusted each time the Thermal print head is replaced.

1. Using Memory switch **No.201** (Test mode No.201), and make the switch selection to **"0"** by using the Print Position button. [refer to page APX(2)-1]
2. Disconnect the power supply from the machine.
3. Connect a Voltmeter to **No.1** and **No.3** pins of the connector **CN5** of the Power supply PCB.
4. Connect the power supply to the machine and turn ON the power by starting up Test mode **No.77** (TPH control signal).
5. Check to see that the Voltage reading on the Voltmeter equals to the voltage setting on the chart below for the new Thermal print head on the machine with the new resistance (**Ω**) setting. The resistance (**Ω**) of the new TPH is found printed on a seal attached on the TPH itself.
6. If the voltage on the Voltmeter does not match with the voltage on the chart below, turn the Volume adjust knob (**220 volt machine = VR41**) & (**110 volt machine = VR3**) until the correct voltage reading is obtained on the Voltmeter.
7. After the adjustment is done, exit from the Test mode.

Caution in Adjustment

> The new Thermal print head must be installed before making above adjustment.
> All three Thermal power safety switches (page 14-3) must be pressed to get the correct voltage reading on the Voltmeter.

Results of Incorrect Adjustment

> **If the voltage is too High:**
The solid print image will be deformed and the heating elements of the Thermal print head will be damaged from overheat.
> **If the voltage is too Low:**
The heat from the Thermal print head becomes too weak and the thin lines cannot be reproduced clearly.

All CR Models

Resistance (Ω)	Voltage (V)
2380 ~ 2402	21.7
2403 ~ 2446	21.9
2447 ~ 2491	22.1
2492 ~ 2536	22.3
2537 ~ 2582	22.5
2583 ~ 2628	22.7
2629 ~ 2674	22.9
2675 ~ 2721	23.1
2722 ~ 2768	23.3
2769 ~ 2816	23.5
2817 ~ 2864	23.7
2865 ~ 2913	23.9
2914 ~ 2961	24.1
2962 ~ 3011	24.3
3012 ~ 3060	24.5
3061 ~ 3110	24.7
3111 ~ 3161	24.9
3162 ~ 3212	25.1
3213 ~ 3220	25.3

CHAPTER 15: MASTER CLAMP/LOADING SECTION

CONTENTS

1. Theory of Operation

1. Master Making Unit Set Mechanism

1. Master Making Unit Set Switch

> The Master making unit set switch checks whether the Master making unit is opened or closed.

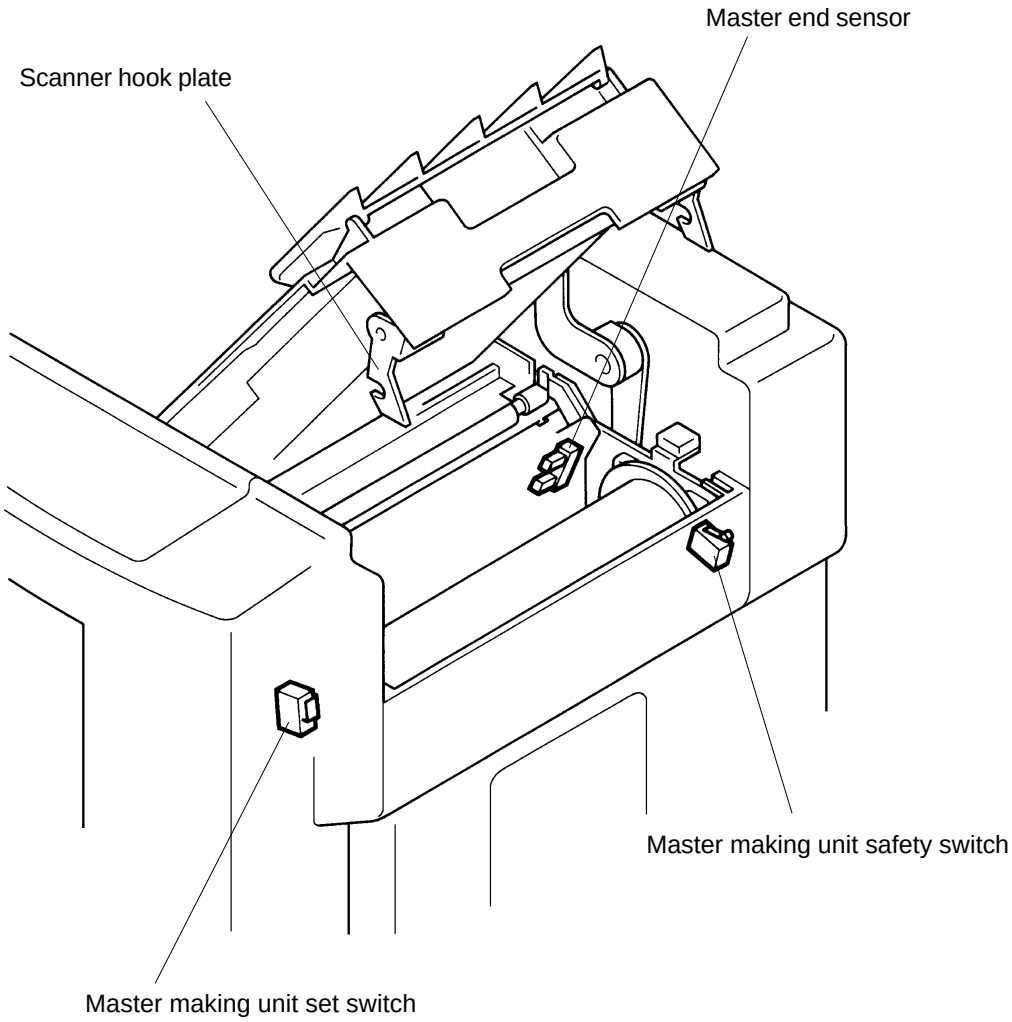
> The Scanner hook plate pushes against the actuator of the Master making unit set switch when the Master making unit is closed.
When the switch is not pressed, the "Close Master making unit" message, **[C 58]** is indicated .

2. Master Making Unit Safety Switch

> When the Master making unit is closed, the Master making unit safety switch is also pressed by the Scanner hook plate the same time the Master making unit set switch is pressed.
When the switch is not pressed, the power to the Main motor and TPH is terminated.

3. Master End Sensor

> The Master end sensor detects the black strip on the master material at the very end of the master roll and indicates the "Replace master roll" message, **[C 42]**.



2. Master Tension Plate Home Positioning Mechanism

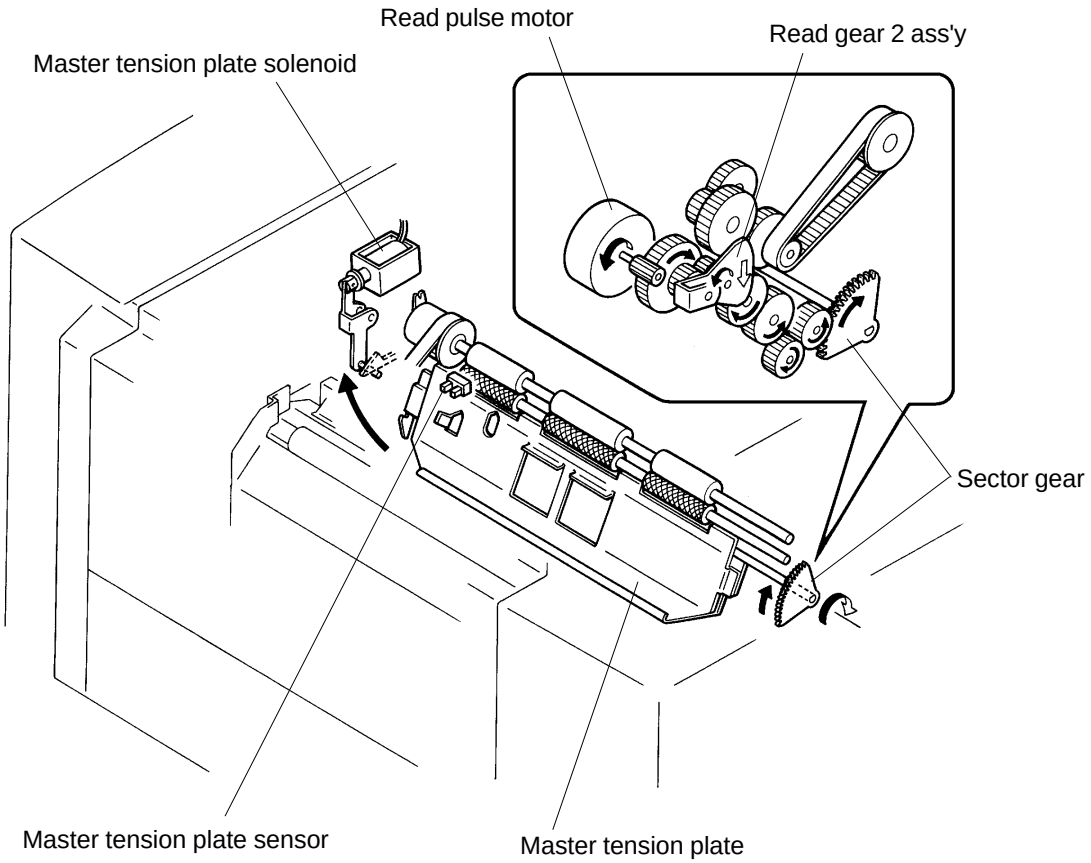
The Home position of the Master tension plate is when the plate is raised.
Master tension plate home positioning movement is made when the machine power is turned ON, All Reset button is pressed, master making Start button is pressed, or Master making unit is closed. The Master making unit must be closed (the Master making unit set switch is pressed) in order for this initializing movement to take place.

1. Master Tension Plate Sensor

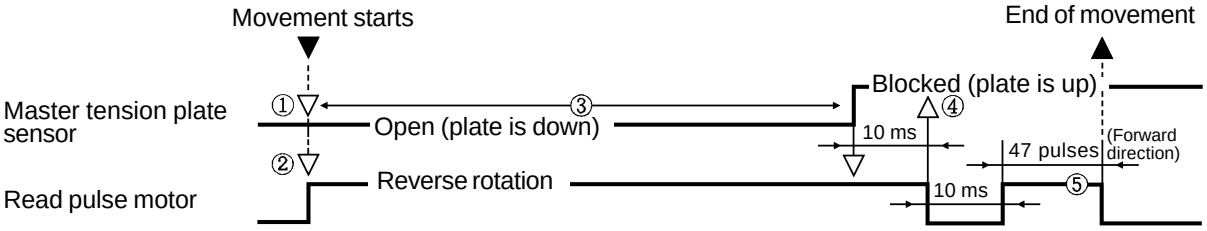
> The sensor checks whether the plate is up at the home position when any of the above four actions are taken.
If the light path of the sensor is free (the plate is down), the Master tension plate home positioning movement is made to raise the plate.

2. Read pulse motor

> First, the Read pulse motor rotates in the opposite direction to the normal Original feeding and moves the Read gear 2 ass'y down.
> The Read gear 2 ass'y transfers the Read pulse motor drive to the Sector gear via four gears in between.
> With the rotation of the Sector gear, the Master tension plate lifts up.
> When the Master tension plate blocks the light path of the Master tension plate sensor, the Read pulse motor stops, and then 10 ms later the motor rotates in the normal Original feeding direction for 47 pulses to return the Read gear 2 ass'y to the up position and completes the Master tension plate home positioning movement.



Master Tension Plate Home Positioning Timing Chart



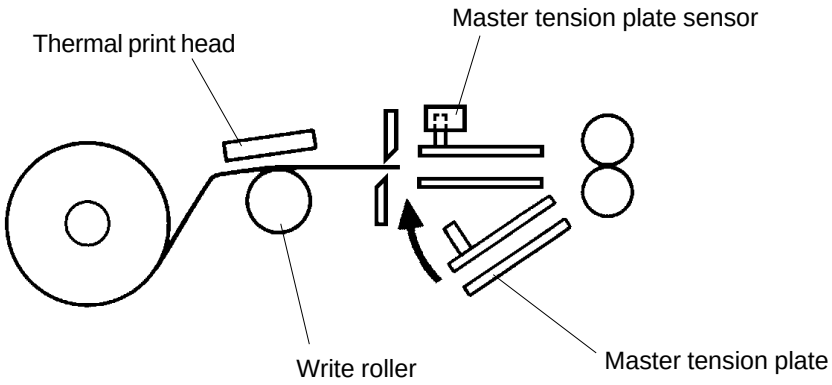
① If the Master tension plate sensor is already in "Blocked" condition (plate is up), this home positioning movement is skipped.

② The Read pulse motor rotates in the reverse direction (reverse to the normal original feeding direction) and lifts the Master tension plate up.

③ If the Master tension plate sensor is not blocked within 384 pulses after the Read pulse motor is activated, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

④ If the Master tension plate sensor is still in "Open" condition after the Read Pulse motor stops, the machine repeats the home positioning movements and checks the condition of the Master tension plate sensor again.
If the Master tension plate sensor is still found to be in "Open" condition, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

⑤ The Read pulse motor rotates in the forward direction (original feeding direction) to engage the Read gear 2 ass'y to the gears which feeds the original.



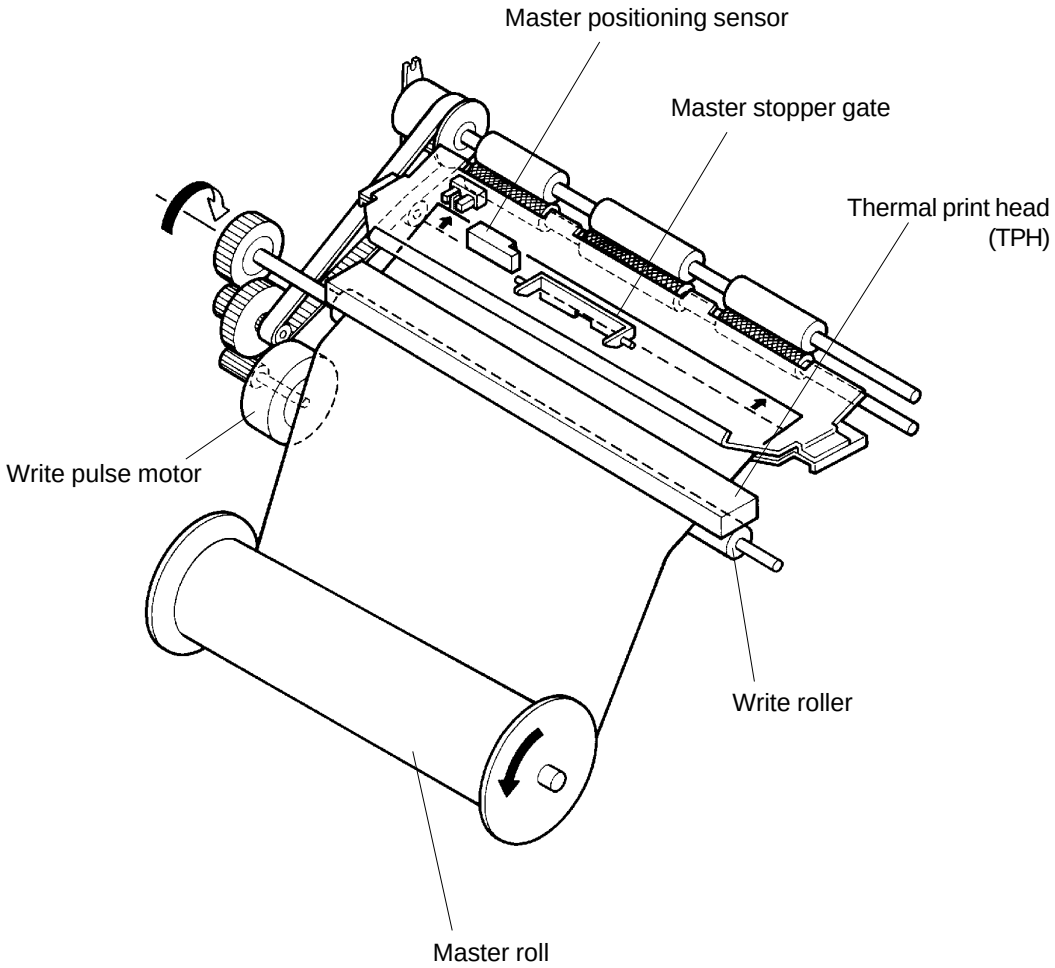
3. Master Positioning Mechanism

1. Master Positioning

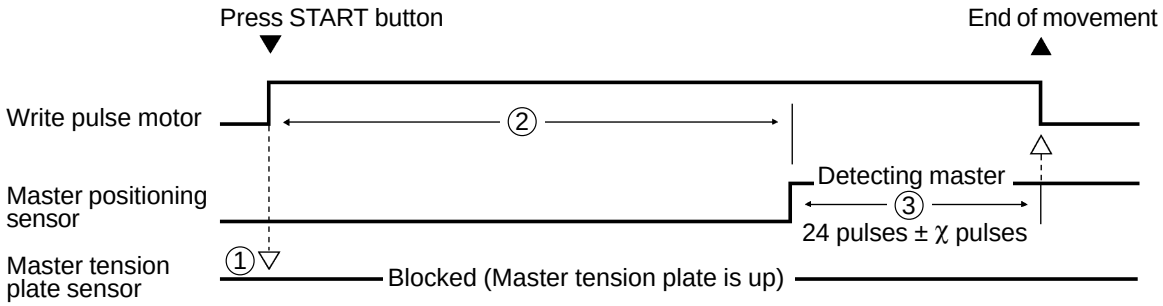
> The leading edge of the master material rests against the Master stopper gate just after the master loading.
When the Master making unit is closed the Master stopper gate is moved out of the way.

> As the START button is pressed for normal master making or confidential master making, the Write pulse motor activates and rotates the Write roller to feed the master material.

> When the Master positioning sensor detects the leading edge of the master, the Write pulse motor turns OFF and completes the master positioning movement.



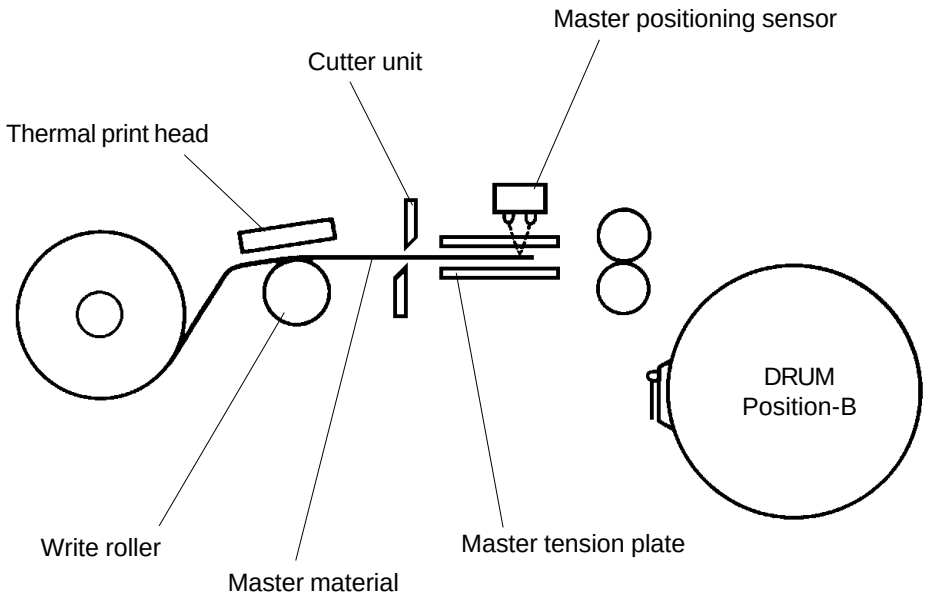
Master Positioning Timing Chart



① Checks the position of the Master tension plate when the START button is pressed.
If the Master tension plate is still down, the machine indicates Master Mis-Feed message **[C 22]**.

② If the light of Master positioning sensor is not reflected back (no master detection) within 944 pulses after the activation of the Write pulse motor, the machine assumes master mis-feed has occurred and indicates the message **[C 22]**.

③ By using Memory switch **No. 213** (Test mode No. 213), the "χ" pulses can be adjusted.
> When this "χ" is adjusted, the amount of master material moved to the Drum is also changed automatically to keep the amount of the master clamped under the Clamp plate constant.



4. Master Feeding Mechanism

1. Start of Master Feeding

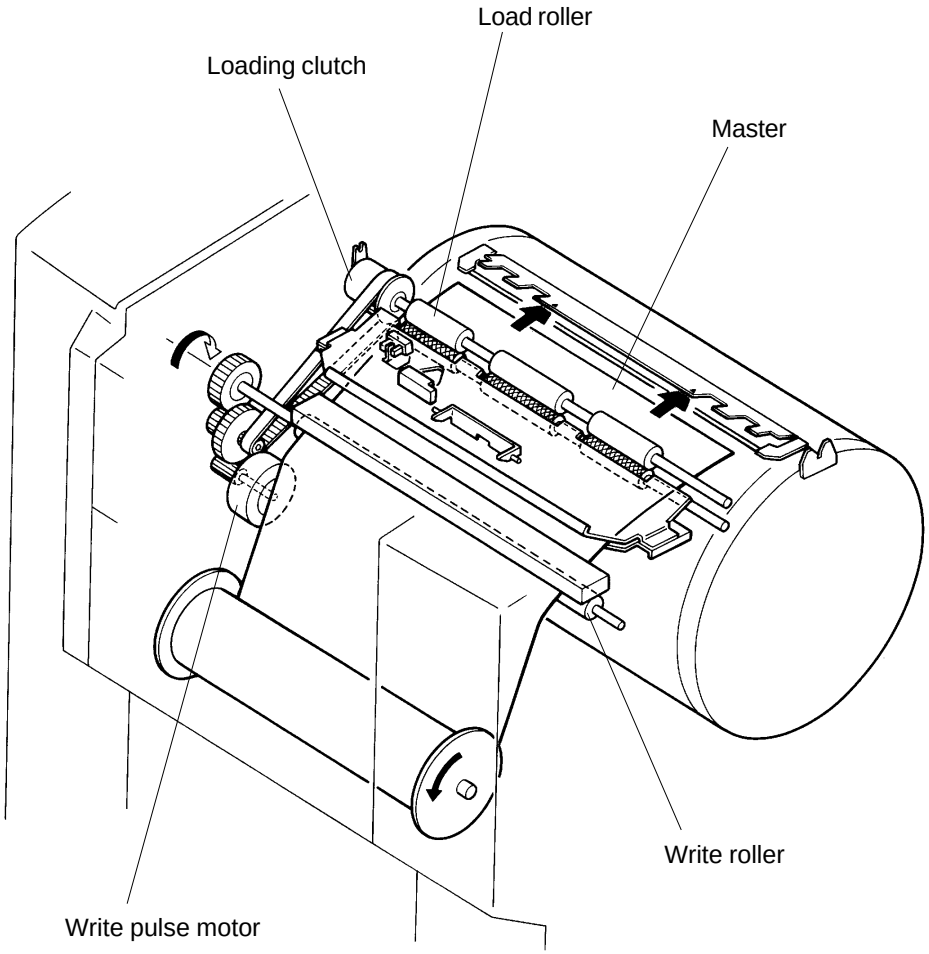
> The Loading clutch activates when the Drum rotates 100°from the Position-A during the master removal movement.

> 50 ms after the Loading clutch activates, the Write pulse motor activates to rotates the Write roller and Load roller to feed the master material.

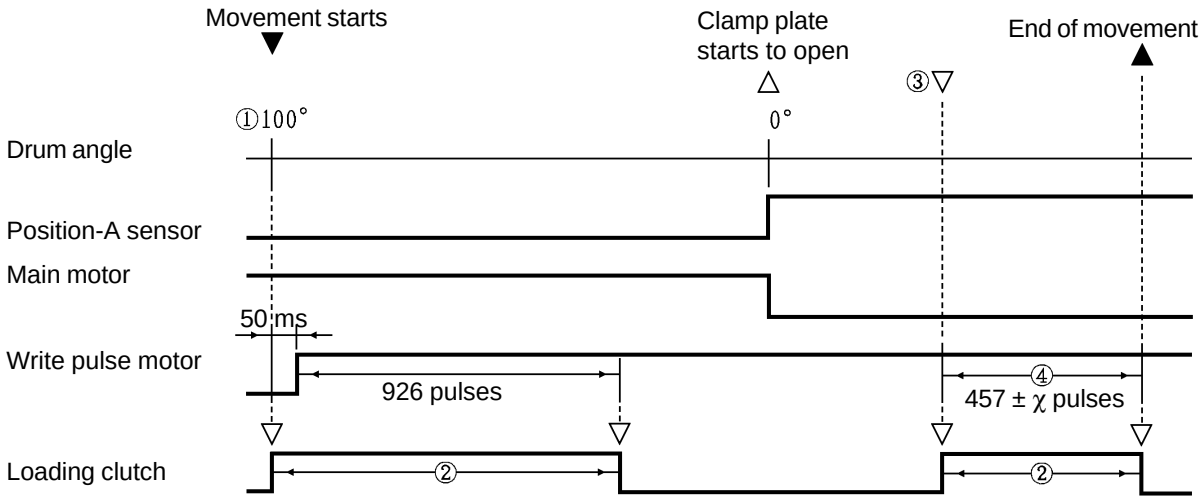
> The Load roller rotates only when the Loading clutch is activated to transfer the drive of the Write pulse motor.

2. End of Master Feeding

> The Loading clutch turns OFF after the Write pulse motor rotates for a given amount and completes the master feeding operation.
The leading edge of the master rests under the Clamp plate.
The Write pulse motor keeps rotating to continue the master making.



Master Feeding Timing Chart

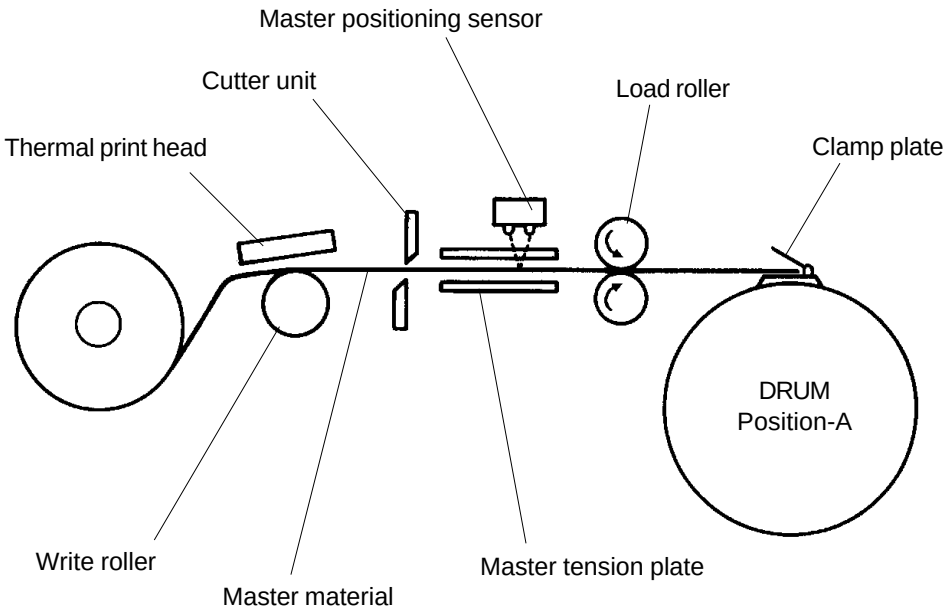


① The Loading clutch activates at Drum angle **100** °during master from Drum removal movement, and **50 ms** later, the Write pulse motor activates to send the master material towards the Drum.

② The Master is fed to the Drum by the Load roller driven by the Write pulse motor while the Loading clutch is activated.

③ The Loading clutch is activated again when the Clamp plate opens and the Clamp motor stops. The master is then carried to the Drum, until the leading edge of the master is under the Clamp plate.

④ By using Memory switch **No. 214** (Test mode No. 214), the **"χ" pulses** can be adjusted to change the amount of the master material clamped under the Clamp plate.
Memory switch **No. 213** (Test mode No.213) changes the value of **457 pulses** itself.



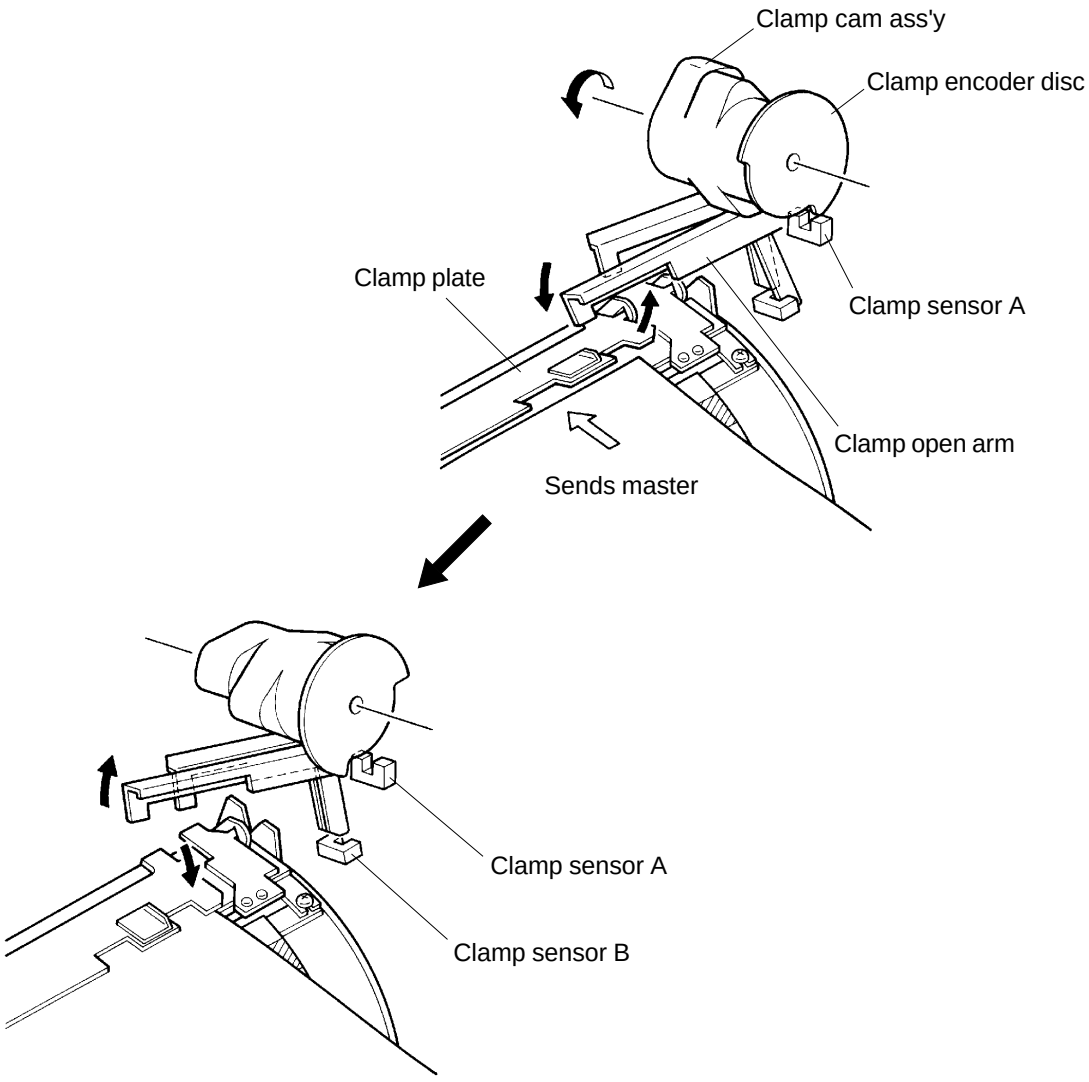
5. Clamp Plate Master Clamp Mechanism

1. Master removal

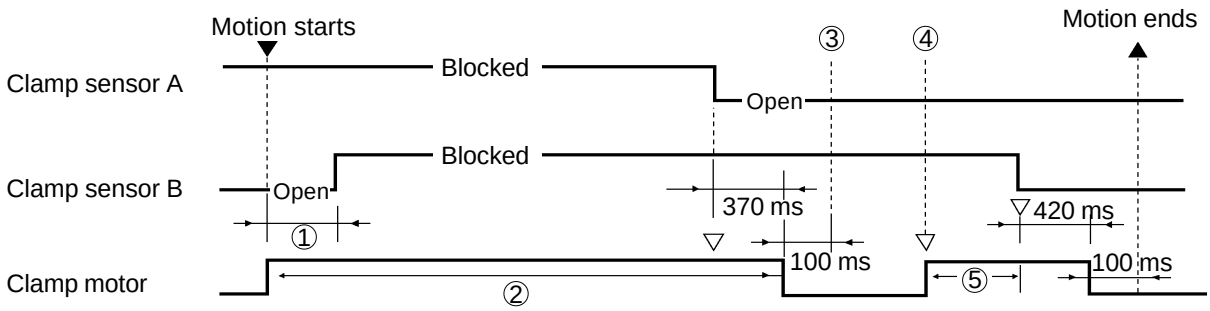
> During the master removal movement, when the Drum comes back to position-A, the leading edge of the new master comes towards the Drum, ready to be clamped.

2. Master clamping

> With the activation of the Clamp motor, the Clamp open arm is pushed down to open the Clamp plate.
> The Clamp motor stops when the light path of Clamp sensor A becomes open and keeps the Clamp plate raised open.
> When the Write pulse motor sends certain set amount of master onto the Drum, the Clamp motor activates to raise the Clamp open arm and close the Clamp plate.
> The Clamp motor turns off when the light paths of both the Clamp sensors A and B becomes open.
The Clamp unit is back at the Home position.



Master Clamping Timing Chart



① If the light path of the Clamp sensor B is not blocked within **3 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

② If the light path of the Clamp sensor A is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

③ The Drum waits for the master with the Clamp plate opened.

④ The Clamp motor activates to clamp the master with the Clamp plate when the master loading to the drum is completed.

⑤ If the light path of the Clamp sensor B is not opened within **5 seconds** after the Clamp motor is activated, the machine assumes that the Clamp motor is locked and displays error message **[E 03]**.

6. Master Loading on the Drum Mechanism

As the Write pulse motor activates for a certain set time after the Clamp plate clamps the master, the Main motor activates to load the master on the Drum.

1. Drum angle 79°

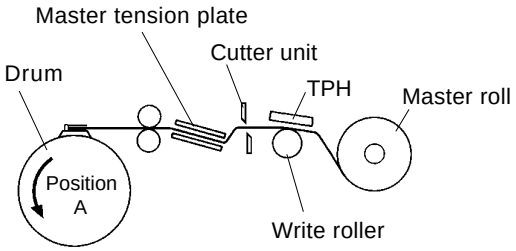
> During the master loading, when the Drum comes to 79°, the Main motor stops and the Master sensor checks for any master loading error.
> The Write pulse motor keep feeding the master, and if no master loading error is detected, the Main motor starts to rotate again.

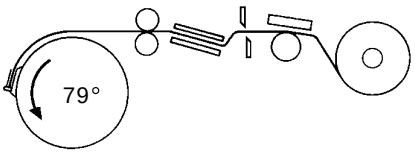
2. Drum angles 120°and 185°

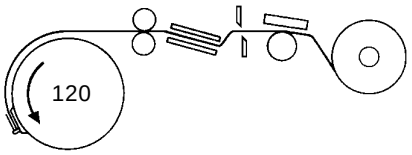
> The Main motor stops again at Drum 120°and then at 185°to allow Write roller to feed the master towards the Drum.
> On A4 Drum machine, the Main motor stops at Drum 155°instead of 185°.

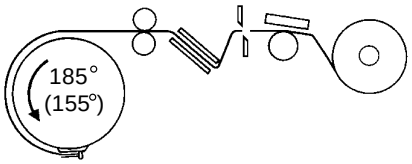
3. Master cutting

> The Cutter unit cuts the master after one length of master is transferred by the Write roller while the Drum waits at 185°(155°for A4 Drum machine).
> To avoid the master material to stick on the Cutter blade, the Write pulse motor rotates 94 pulses in the opposite direction and pulls the master material back towards the Master roll.
> At the same time the Main motor activates and loads the remaining length of master on the Drum while making one proof print.
> Then the Master tension plate returns to the home position (raised position).









Master Loading Movement

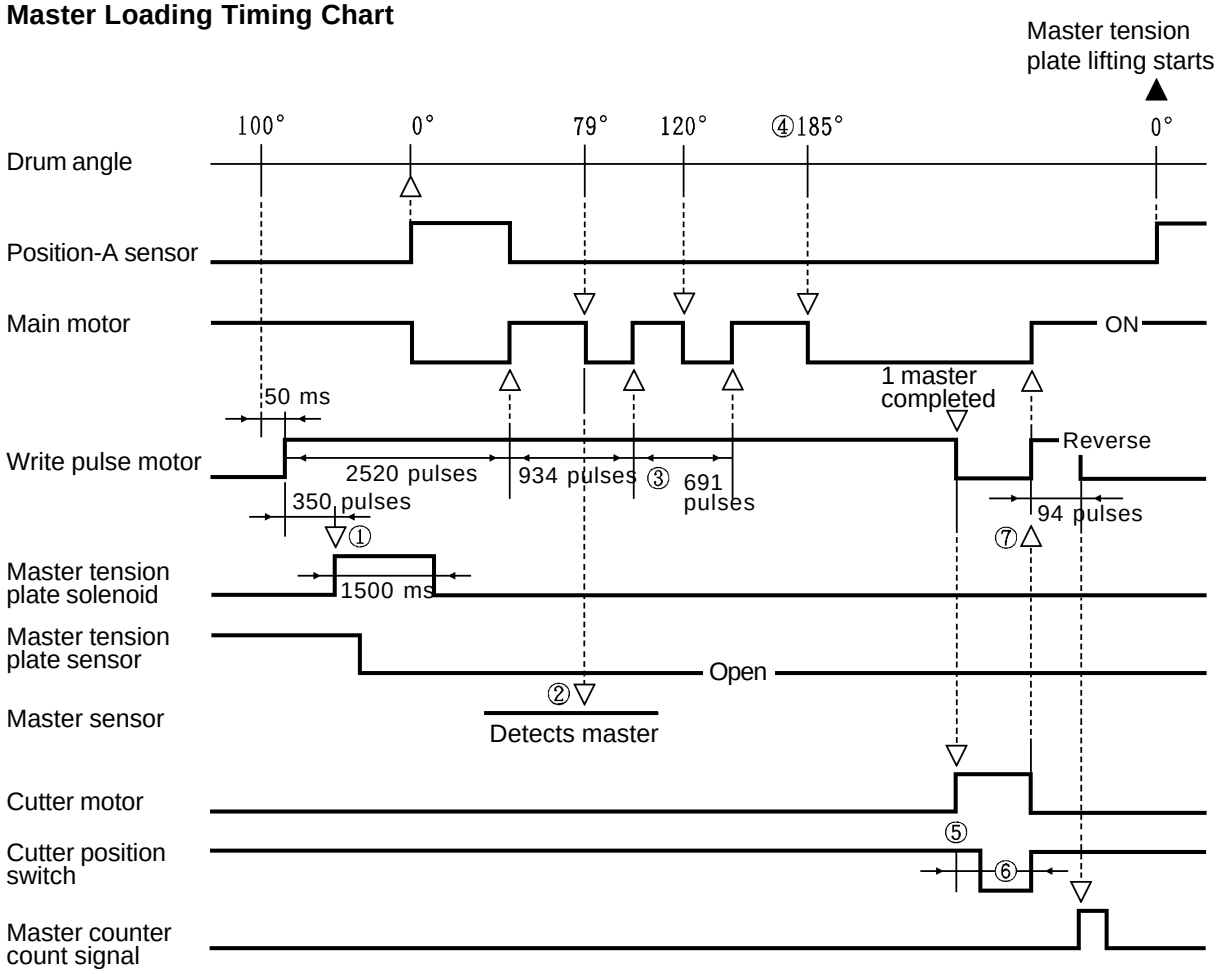
1. After the master is clamped on the Drum and Write pulse motor rotates for a set amount, the Drum rotates to start the master loading.

2. The Drum stops at 79°and checks for any master loading error while the Write pulse motor keeps feeding the master.

3. The Drum stops at 120°to allow the Write pulse motor to feed the master.

4. The Drum stops again at 185°and lets the Write pulse motor to feed remaining length of the master to wards the Drum and for the Cutter to cut the master.
   The Drum rotates again to load the remaining length of the master.
   (155¡ for A4 Drum machine)

Master Loading Timing Chart



① Master tension plate solenoid is activated to drop the Master tension plate down.

② At Drum **79**°, the Master sensor looks for the master on the Drum.
If master is found on the Drum, the machine memorizes the presence of the master on the Drum.
If no master is found on the Drum, the machine checks the light path of Master tension plate sensor, and if the light path is open, the machine assumes master loading error has occurred and indicates the message **[C 21]**.
If the light path of the Master tension plate sensor is blocked, the machine assumes the Master tension plate has locked and indicates error message **[E 15]**.

③ The Drum angle **185**°(**155**°) is adjustable with Memory Switch **No. 217** (Test Mode No. 217).

④ The maximum master making area is adjustable with memory Switch **No. 205** (Test Mode No. 205).

⑤ If the Cutter position switch is not pressed within **75 ms** after the Cutter motor activates, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.

⑥ If the Cutter position switch is not released within **450 ms** after the Cutter motor activates, the machine assumes Cutter motor has locked and indicates error message **[E 13]**.

⑦ After the Cutter unit cuts the master material, to prevent the master material from jamming on the cutter blades, the Write pulse motor rotates in the reverse direction to pull the leading edge of the master material away from the Cutter unit.

7. Master Tension Plate Lifting Mechanism

When the Drum returns to Position-A after the master loading, the Master tension plate returns to the Home position.

1. Read pulse motor

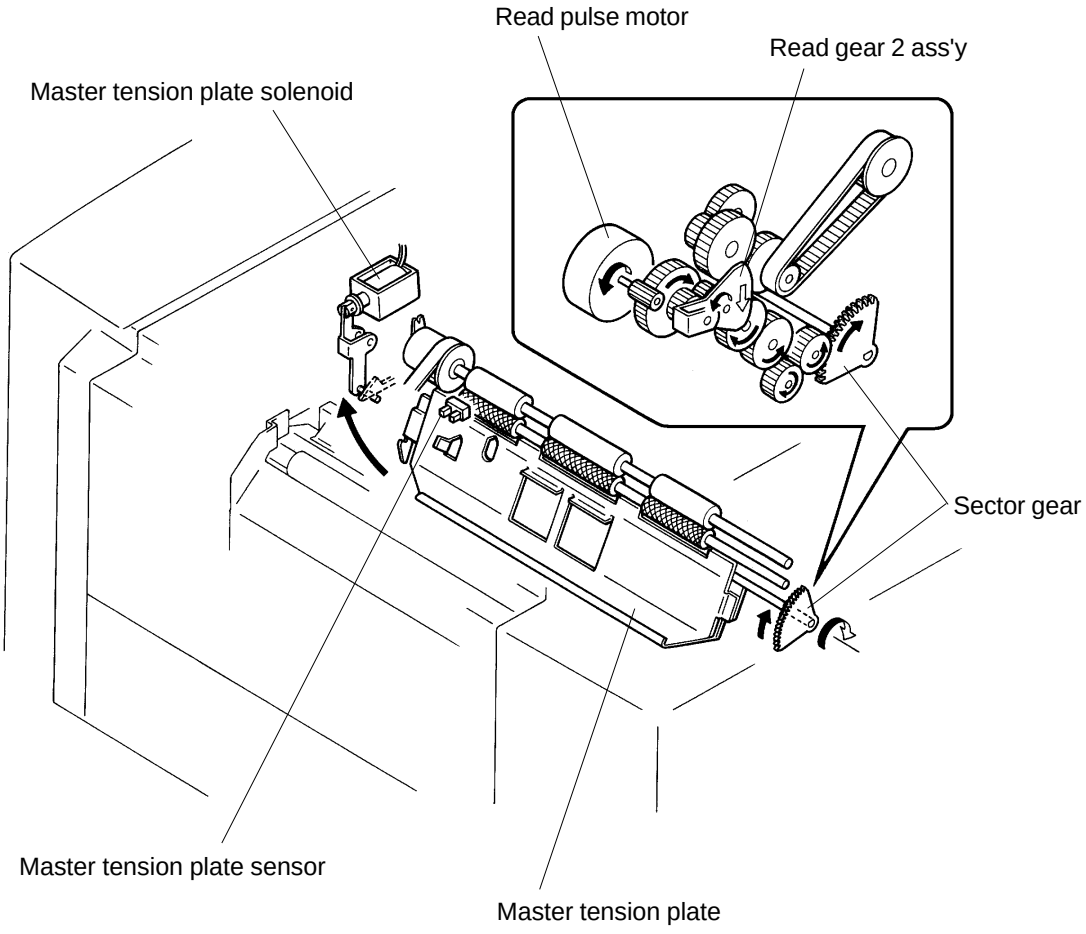
> First, the Read pulse motor rotates in the opposite direction to the normal Original feeding and moves the Read gear 2 ass'y down.
> The Read gear 2 ass'y transfers the Read pulse motor drive to the Sector gear via four gears in between.
> With the rotation of the Sector gear, the Master tension plate lifts up.
> When the Master tension plate blocks the light path of the Master tension plate sensor, the Read pulse motor turns OFF in 10 ms and completes the home positioning movement.

2. Master positioning sensor

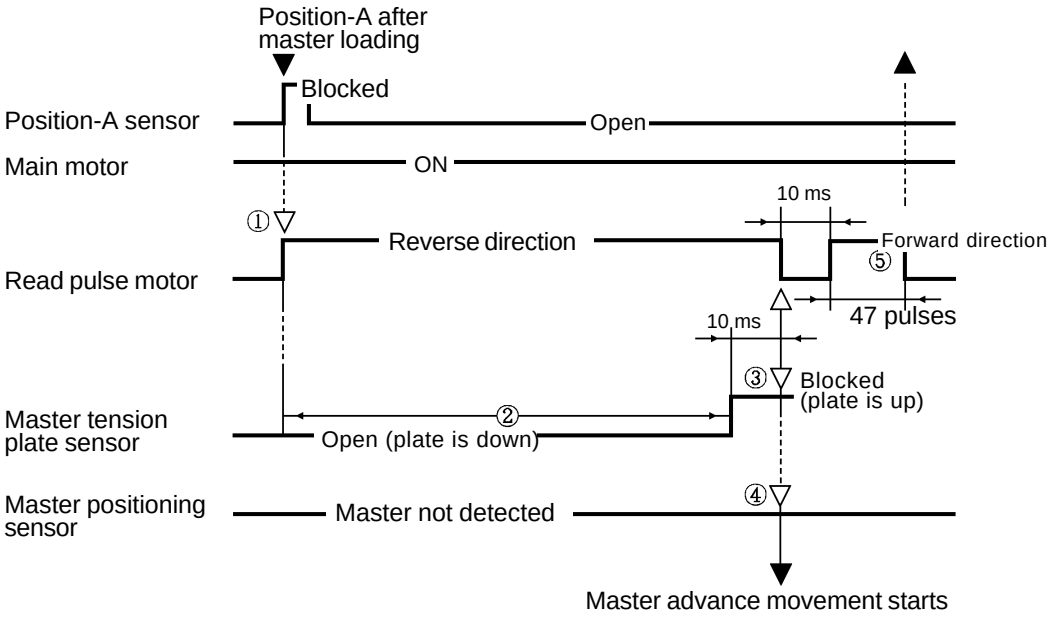
> When the Read pulse motor turns OFF at the completion of the home positioning of the Master tension plate, the Master positioning sensor checks for master cut error.

3. Write pulse motor

> If master cut error is not detected, the Write pulse motor activated to transfer the leading edge of the master material to the master set position (leading edge against the Master stopper gate).



Master Tension Plate Lifting Timing Chart



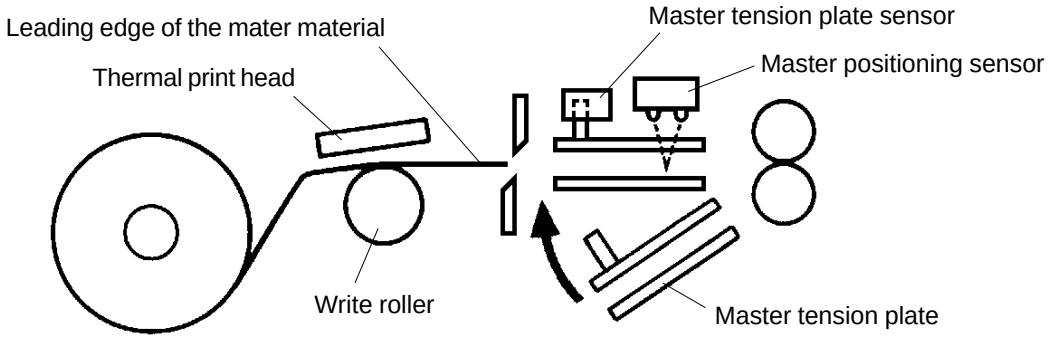
① The Read pulse motor rotates in the opposite direction to lift the Master tension plate.

② If the Master tension plate sensor does not become blocked within **384 pulses** after the Read pulse motor activates, the machine assumes the Master tension plate has locked and indicates error message **[E 15]**.

③ If the Master tension plate sensor is still in "Open" condition after the Read Pulse motor stops, the machine repeats the home positioning movements and checks the condition of the Master tension plate sensor again.
If the Master tension plate sensor is still found to be in "Open" condition, the machine assumes the Master tension plate is locked and indicates the error message **[E 15]**.

④ Master positioning sensor checks for master cut error when the Master tension plate returns to the home position.
If the Master positioning sensor detects master, the machine assumes master cut error has occurred and indicates the message **[C 23]**.
If the Master positioning sensor does not detect any master, the machine assumes the master was cut and advances the master material forward.

⑤ The Read pulse motor rotates in the forward direction (original feeding direction) to engage the Read gear 2 ass'y to the gears which feeds the original.



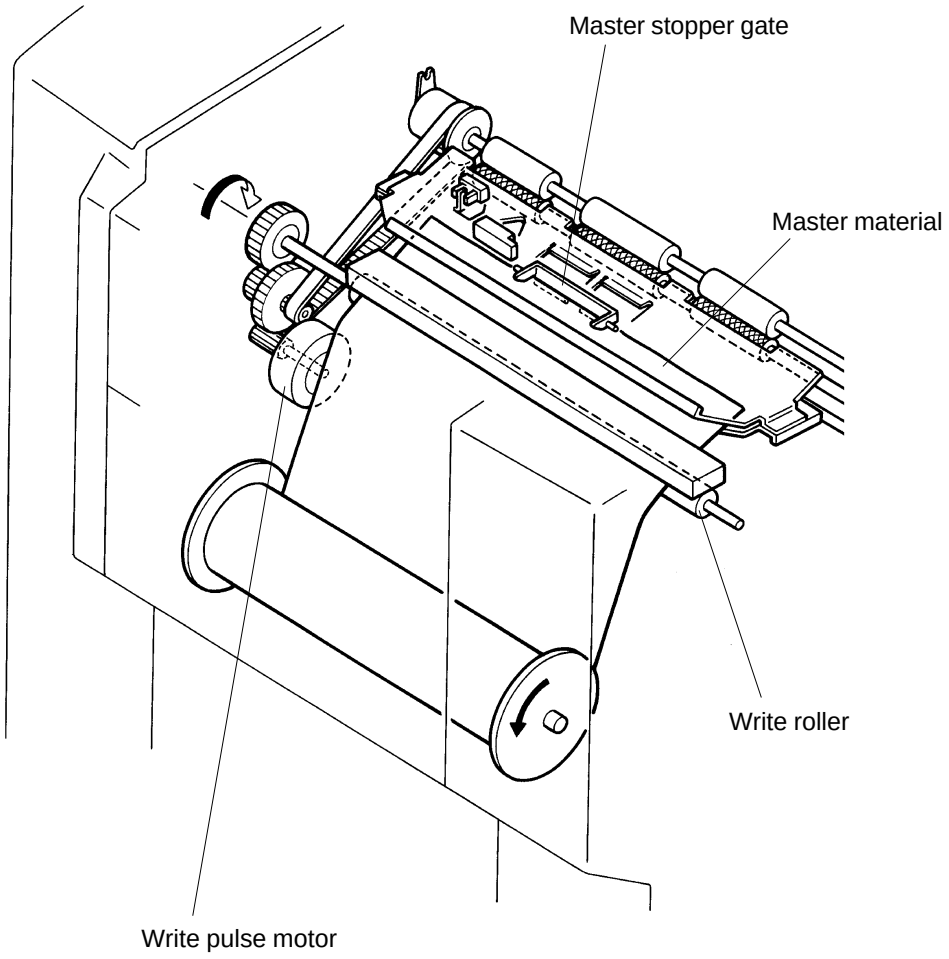
8. Master Advance after Master Cutting

If the master cutting is confirmed by the Master positioning sensor when the Master tension plate is raised after the master cutting, the master material from the master roll is moved forward until the leading edge is in the Master stopper gate area.

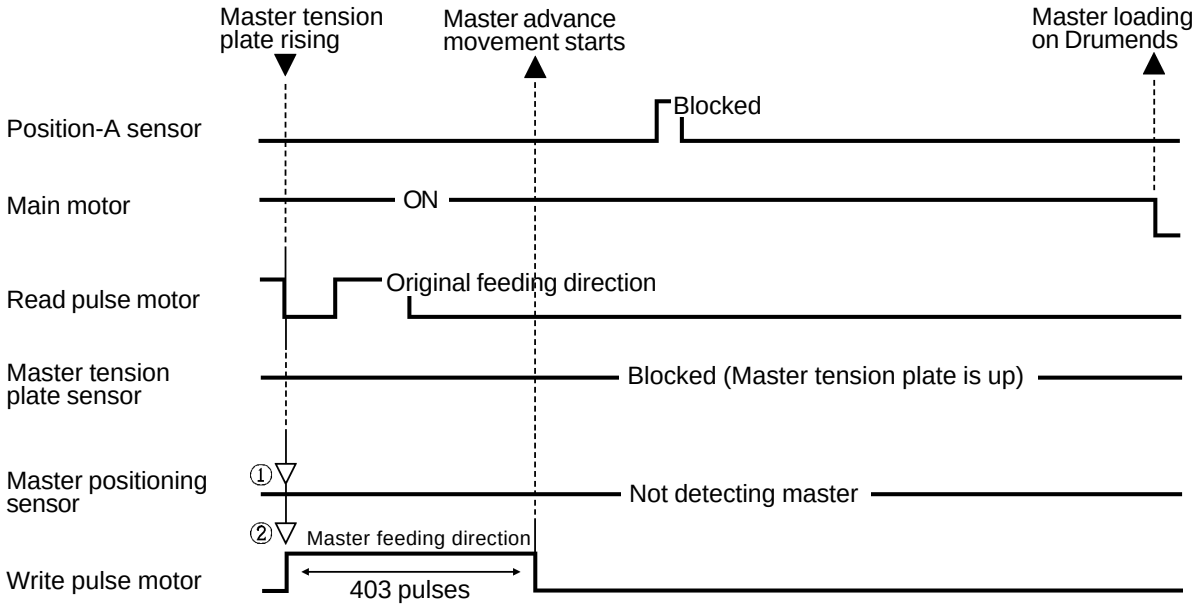
1. Write Pulse Motor

> After the master is cut and Master tension plate is raised, the Write pulse motor rotates to move the master material forward.

> The Write pulse motor activates for 403 pulses, by which time the leading edge of the master material is in the Master stopper gate area.

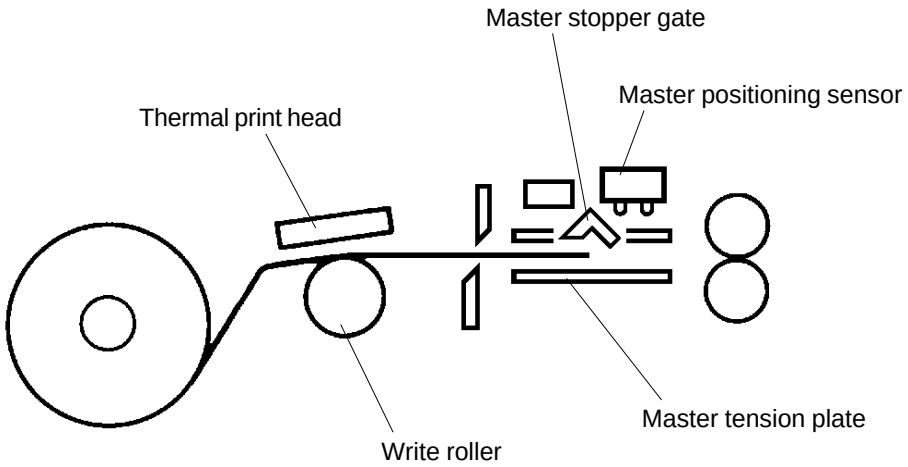


Master Advance after Master Cutting Timing Chart



① After the Master tension plate is raised and if the Master positioning sensor detects the master material (master is not cut) the master advance movement is not made.

② The master advance movement ends when the Write pulse motor rotates 403 pulses.
The leading edge of the master material stops in the Master stopper gate area.

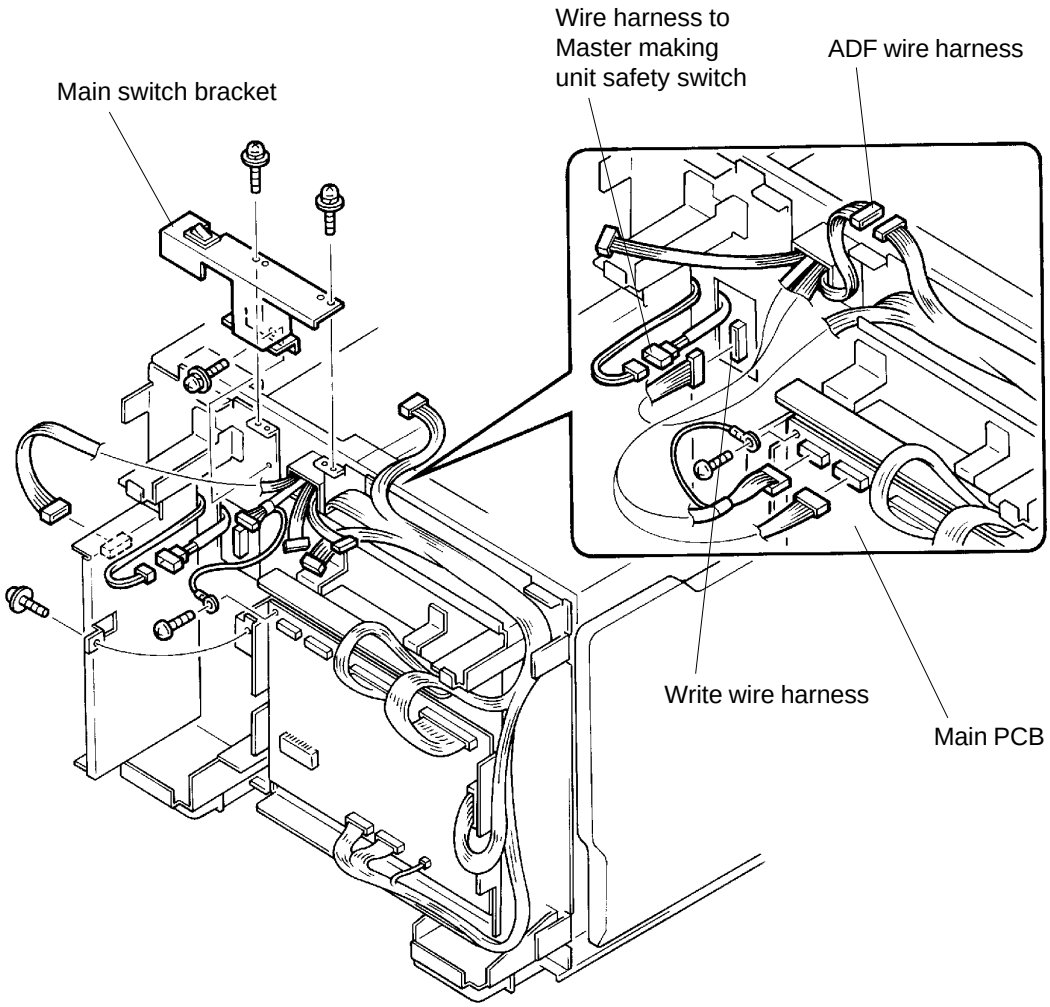


2. Removal and Assembly

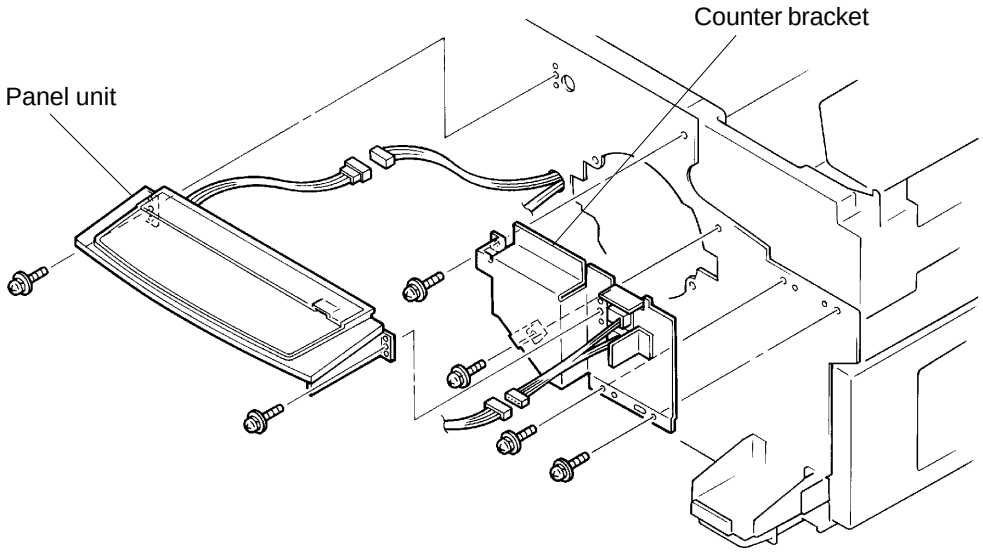
1. Master Making Unit

1. Remove Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following six covers.
   > Back cover, Front cover, Master removal upper cover, ADF cover, ADF unit cover, and Master making unit cover.
4. Open the Power supply PCB bracket frame.
5. Disconnect Connectors of following three parts.
   > ADF wire harness, Master making unit safety switch, and Write harness of Master making unit.
6. Remove three mounting screws of the Main switch bracket and slide the bracket out.

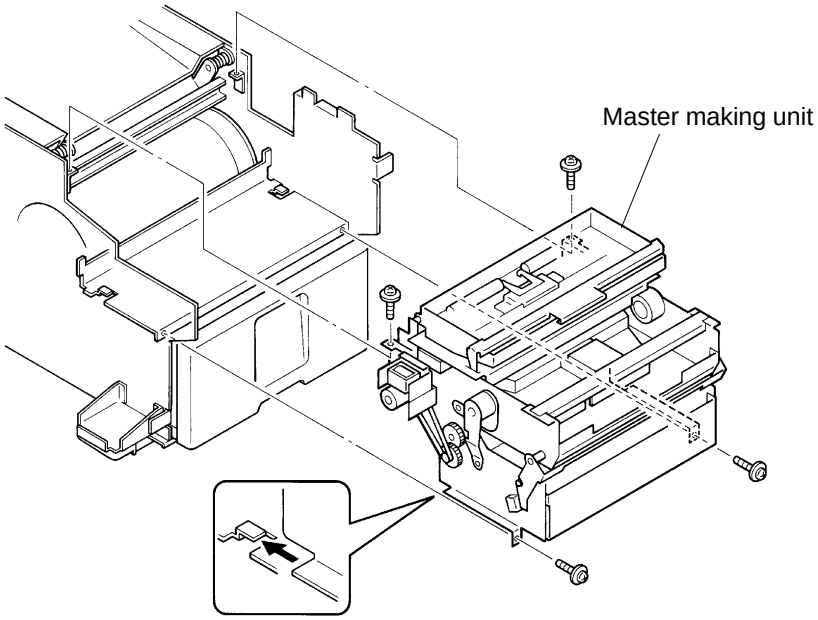
(continues on page 15-18)



7. Disconnect the connector on the Operation panel unit and remove two mounting screws and remove the panel unit.
8. Disconnect the Connector of the Counter.
9. Remove four mounting screws of the Counter bracket and remove the bracket with the Counter attached.



10. Remove four mounting screws of the Master making unit and remove the unit from the machine.

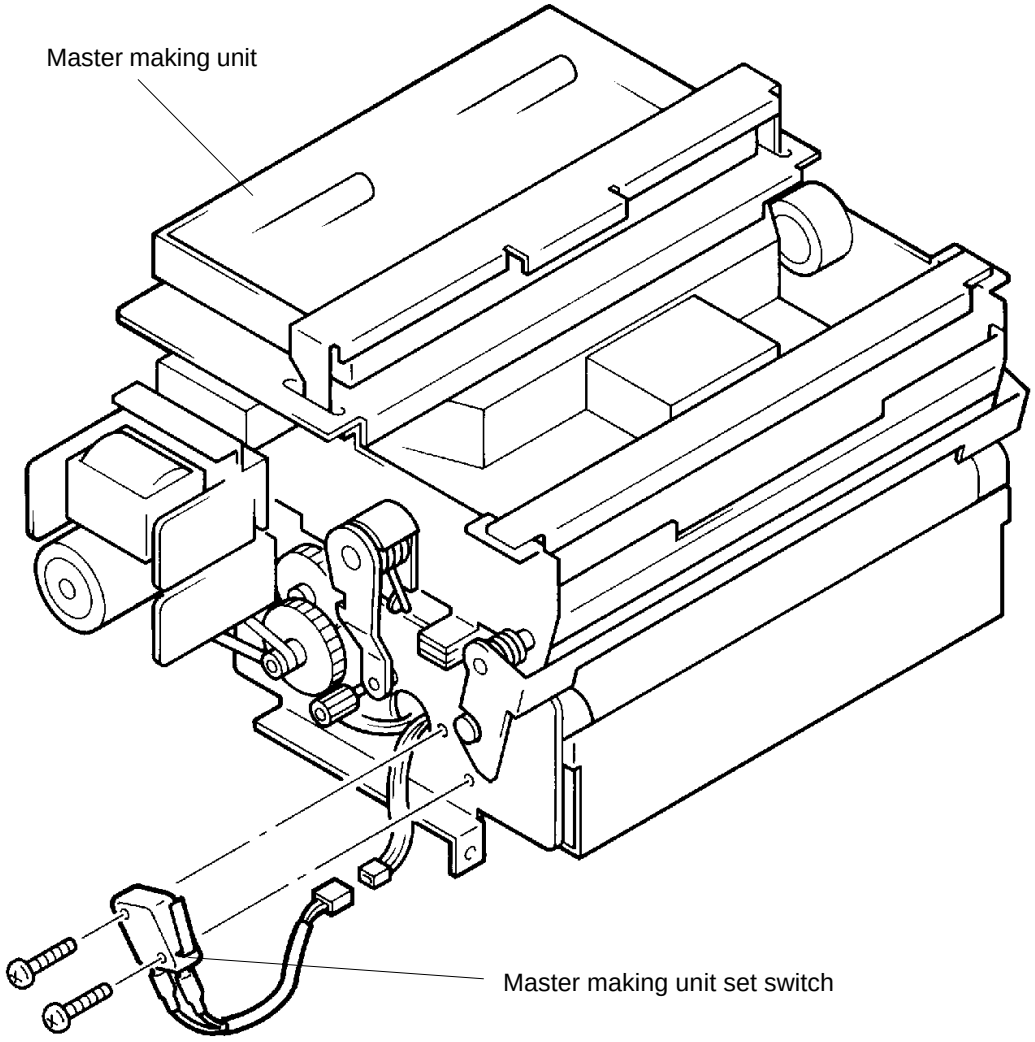


Precaution in Assembly

> Hook the Master making unit on under the catch on the machine frame.
> Match the half-pierced section of the Counter bracket with its counter part.

2. Master Making Unit Set Switch

1. Remove Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following six covers.
   > Back cover, Front cover, Master removal upper cover, ADF cover, ADF unit cover, and Master making unit cover.
4. Remove Master making unit. (page 15-17)
5. Disconnect the Connector of the Master making unit set switch.
6. Remove two mounting screws of the Master making unit set switch and remove the switch.

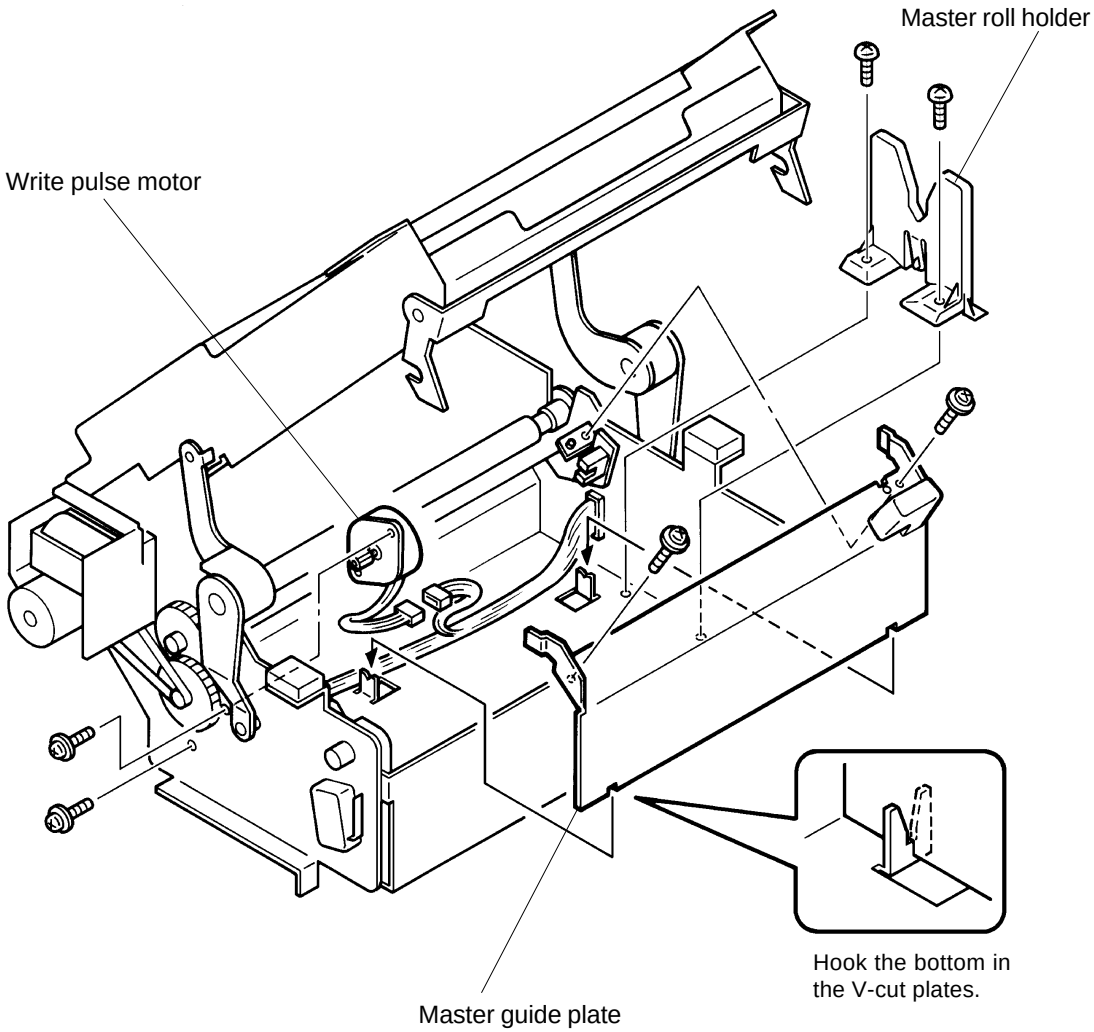


3. Write Pulse Motor

1. Remove Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following six covers.
   > Back cover, Front cover, Master removal upper cover, ADF cover, ADF unit cover, and Master making unit cover.
4. Remove Master making unit. (page 15-17)
5. Remove two mounting screws of either one of the Master roll holder and remove the holder.
6. Remove two mounting screws of the Master guide plate and remove the plate.
7. Disconnect the Connector of the Write pulse motor.
8. Remove two mounting screws of the Write pulse motor and remove the motor.

Precaution in Assembly

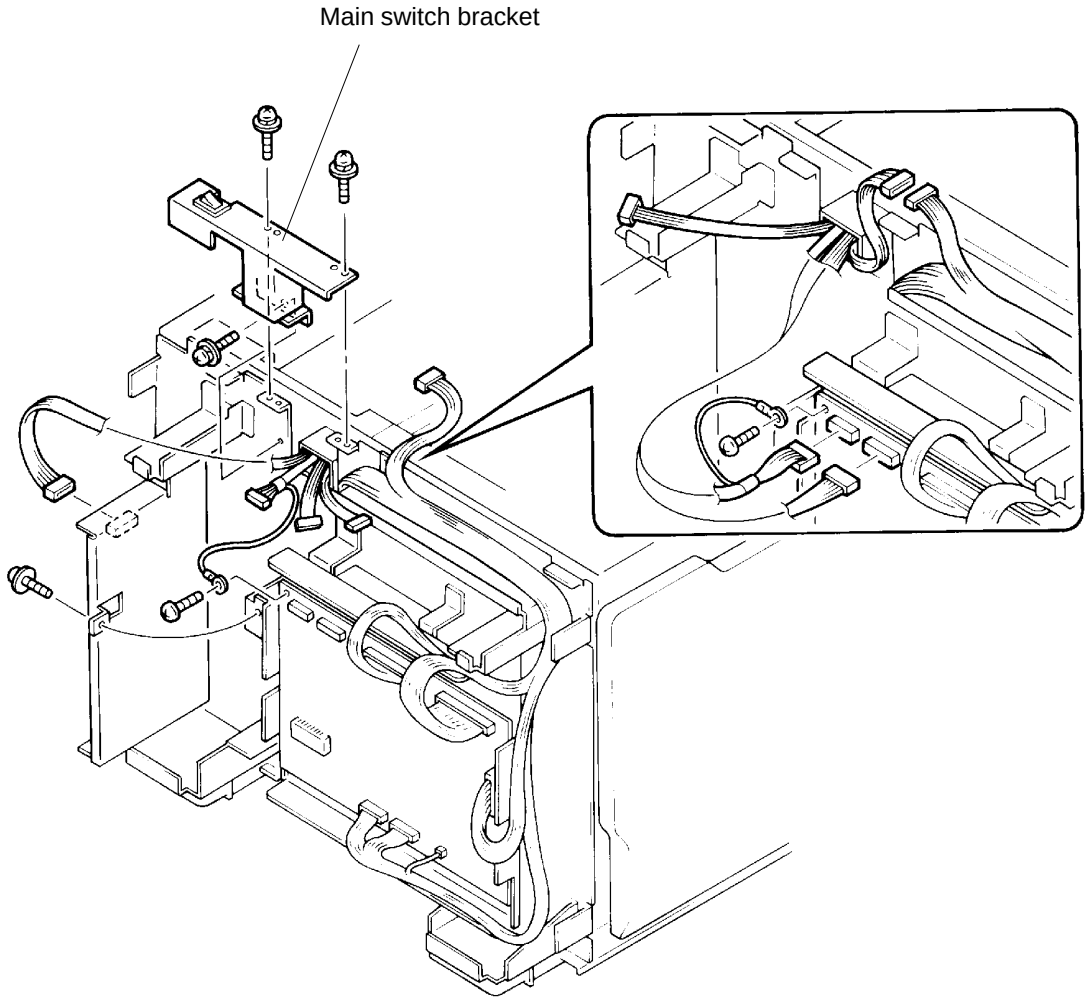
> Match the half-pierced section of the Master guide plate with its counter part and hook its bottom in the V-cut plates.



4. Master Making Upper Unit

1. Disconnect the power supply from the machine.
2. Remove following five covers.
   > Back cover, Master removal upper cover, Master removal lower cover, ADF cover, and ADF unit cover.
3. Remove Master removal unit. (page 11-13)
4. Disconnect two Connectors from the Main PCB, one ground wire, and Connector of ADF wire harness.
6. Disconnect the Connectors from the Power supply PCB and open the Power supply PCB bracket frame.
7. Remove three mounting screws of the Main switch bracket and lift the bracket, and push it aside.

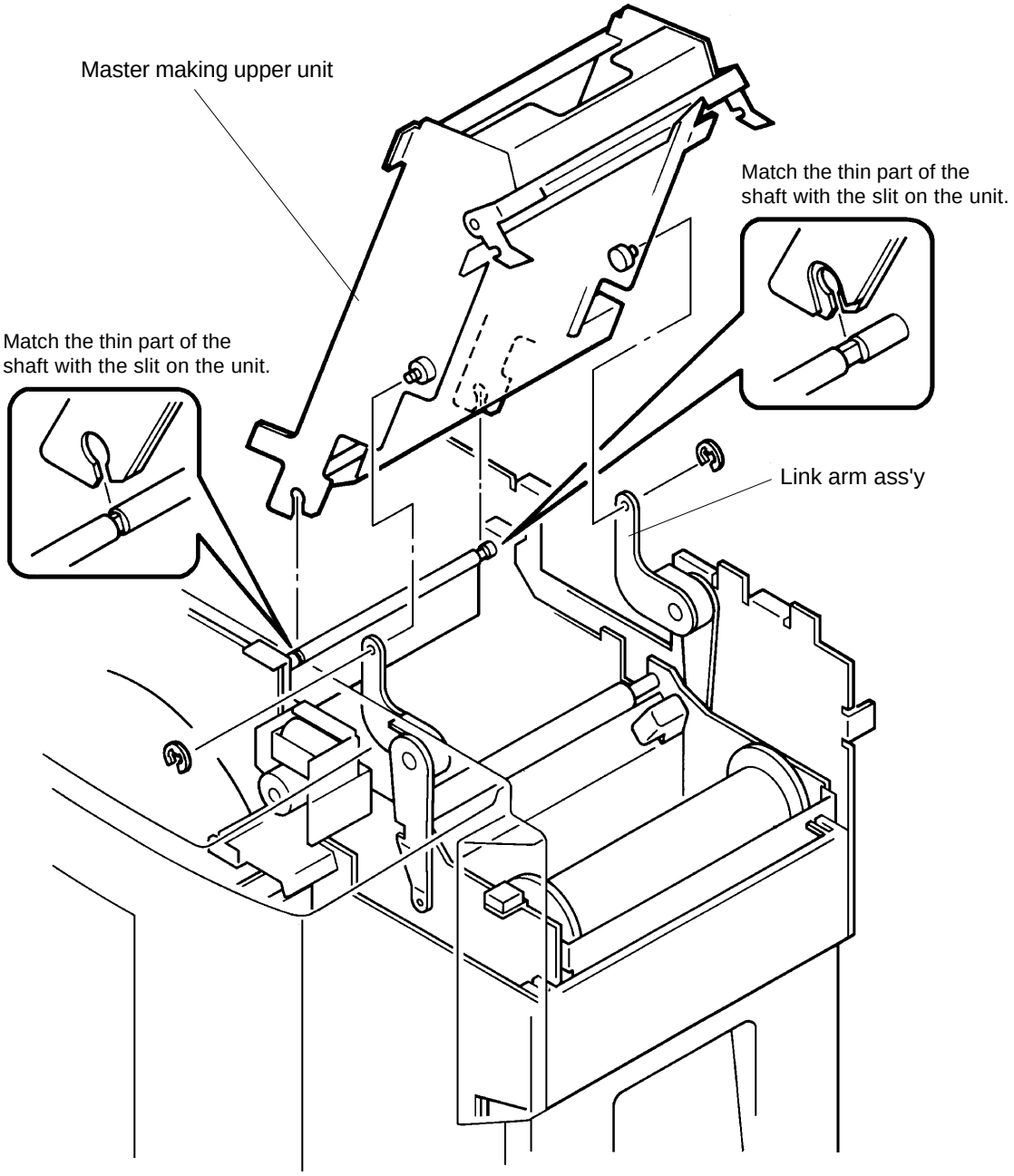
(continues on page 15-22)



8. Remove E-rings from both Link arms and remove the Master making upper unit by lifting it upwards.
   The unit lifts out when the slit on the unit is aligned with the thin part of the shaft.

Precaution in Assembly

> When attaching the Master making upper unit onto the machine, slide the unit on the shaft by matching the thin part of the shaft with the slit on the unit.
(It is easier to attach the Master making upper unit on the machine if the Operation panel side of the unit is attached first.)

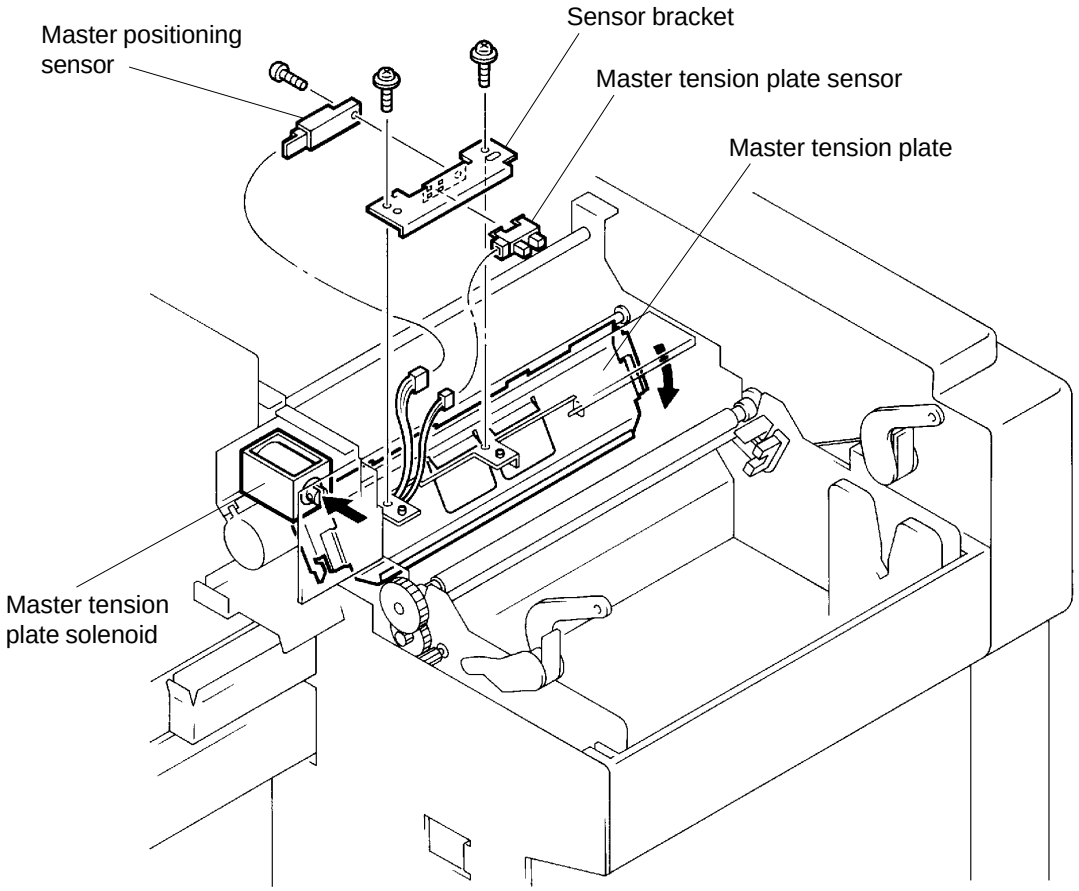


5. Master Positioning Sensor

1. Remove Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove following six covers.
   > Back cover, Front cover, Master removal upper cover, Master removal lower cover, ADF cover, and ADF unit cover.
4. Remove Master removal unit. (page 11-13)
5. Remove Master making upper unit. (page 15-21)
6. Remove Operation panel. (page 15-18)
7. Press the plunger of the Master tension plate solenoid by hand and swing the guide down.
8. Remove two mounting screws of the Sensor bracket.
9. Lift the Sensor bracket with the Master positioning sensor and Master tension plate sensor attached, and disconnect the Connectors from these two sensors.
10. Remove the mounting screw of the Master positioning sensor and remove the sensor from the Sensor bracket.

Precaution in Assembly

> Match the half-pierced section of the Sensor bracket with its counter part.

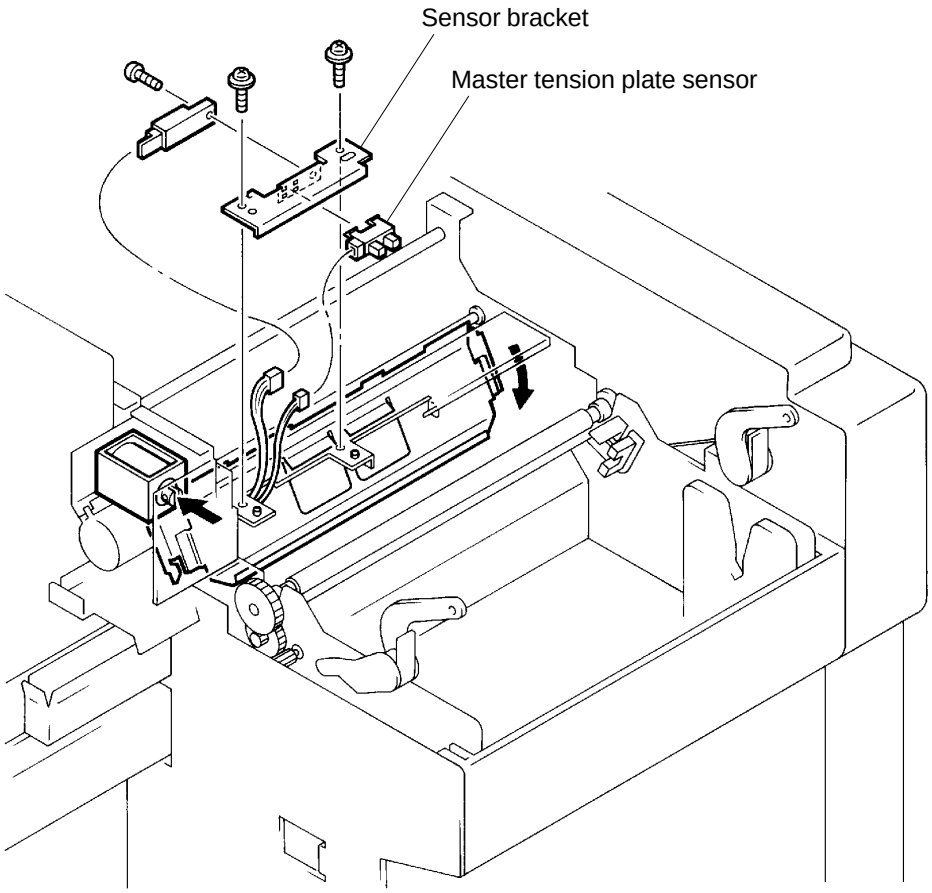


6. Master Tension Plate Sensor

1. Remove the Sensor bracket referring to the previous page.
2. Unlock the Master tension plate sensor from the Sensor bracket, carefully not to break the plastic mounting hooks of the sensor.

Precaution in Assembly

> Match the half-pierced section of the Sensor bracket with its counter part.

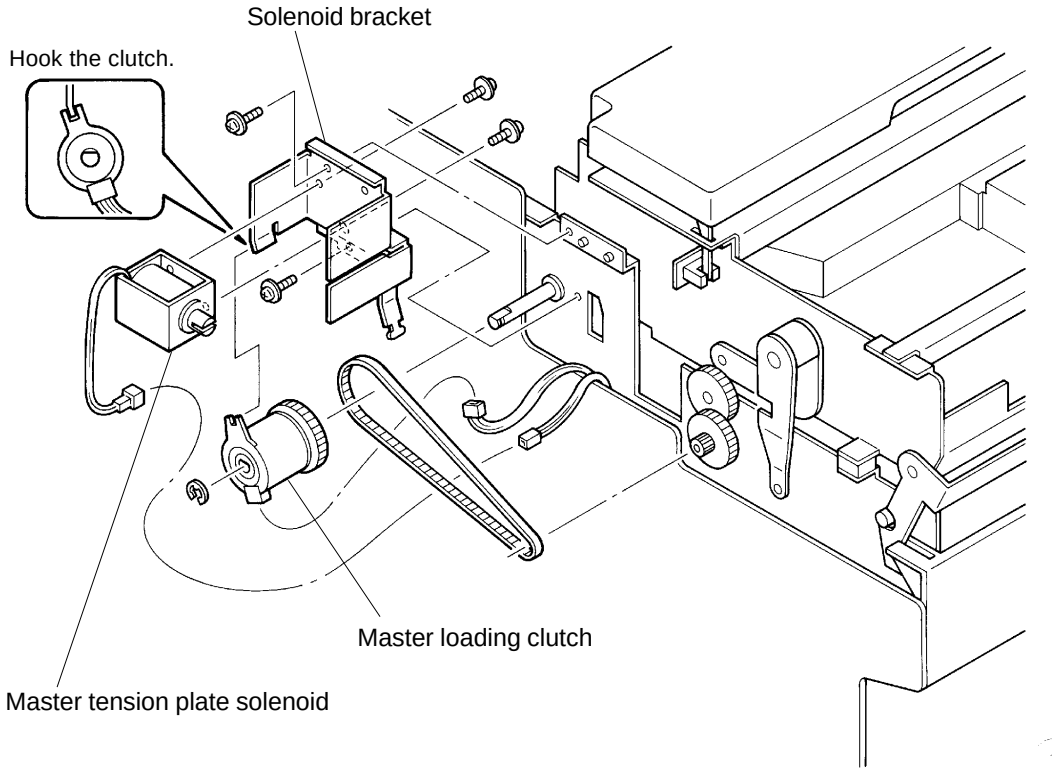


7. Master Loading Clutch

1. Remove Drum from the machine.
2. Disconnect the power supply from the machine.
3. Remove Front cover.
4. Remove Operation panel. (page 15-18)
5. Remove the Belt and E-ring from the Master loading clutch, and remove the clutch.

Precaution in Assembly

> Match the flat cut portion of the Loading roller shaft and that of Master loading clutch.
> Hook the Master loading clutch on the frame of the machine to prevent the clutch from rotating.



8. Master Tension Plate Solenoid

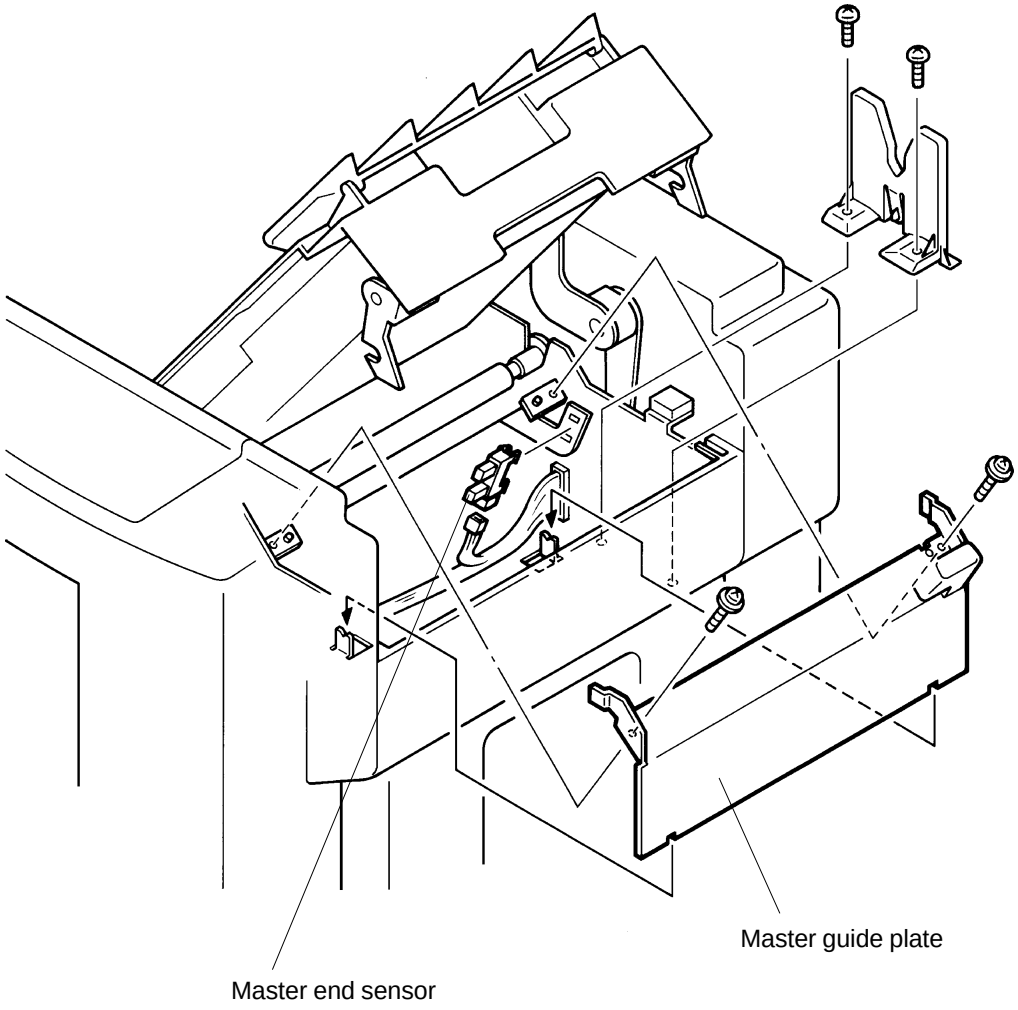
1. Remove the Master loading clutch referring to above instructions.
2. Disconnect the Connector of the Master tension plate solenoid.
3. Remove two mounting screws of the Master tension plate solenoid bracket and remove the bracket.
4. Remove the two mounting screws of the Master tension plate solenoid and remove the solenoid from the bracket.

9. Master End Sensor

1. Disconnect the power supply from the machine.
2. Open the Master making unit and remove the master roll.
3. Remove two mounting screws of either one of the Master roll holder and remove the holder.
4. Remove two mounting screws of the Master guide plate and remove the plate.
5. Disconnect the Connector of the Master end sensor and remove the sensor from the sensor bracket on the machine.

Precaution in Assembly

> Match the half-pierced section of the Master guide plate with its counter part.
> Hook the Master roll holder properly on the machine before screwing it down.

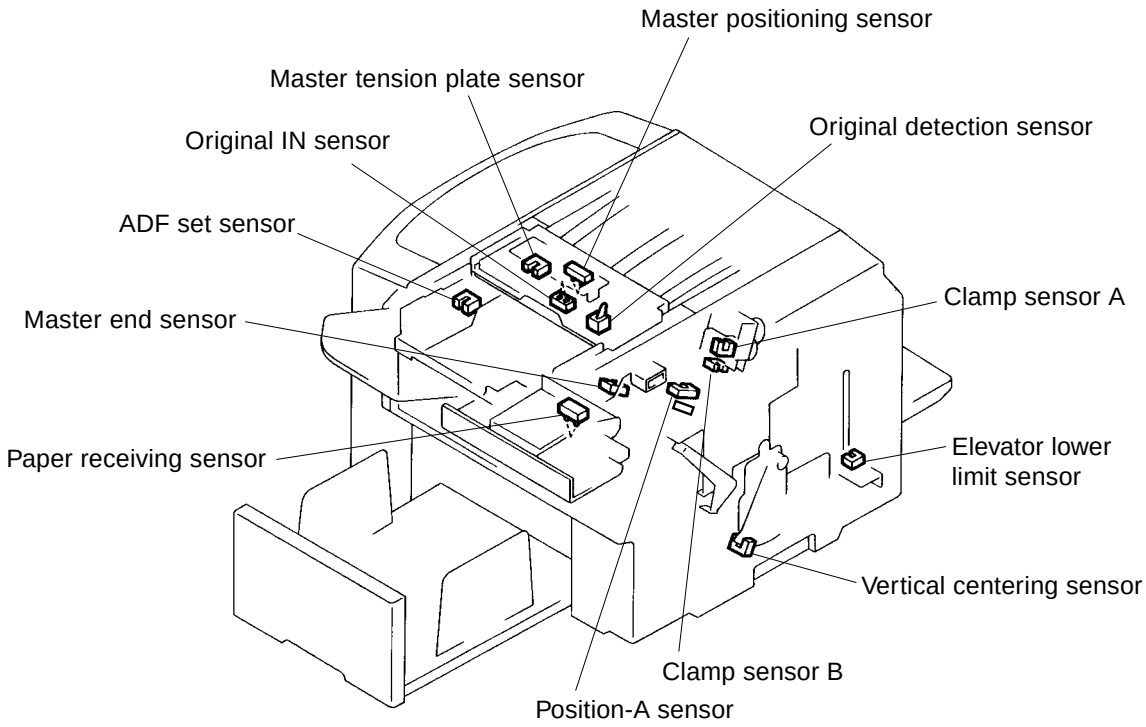


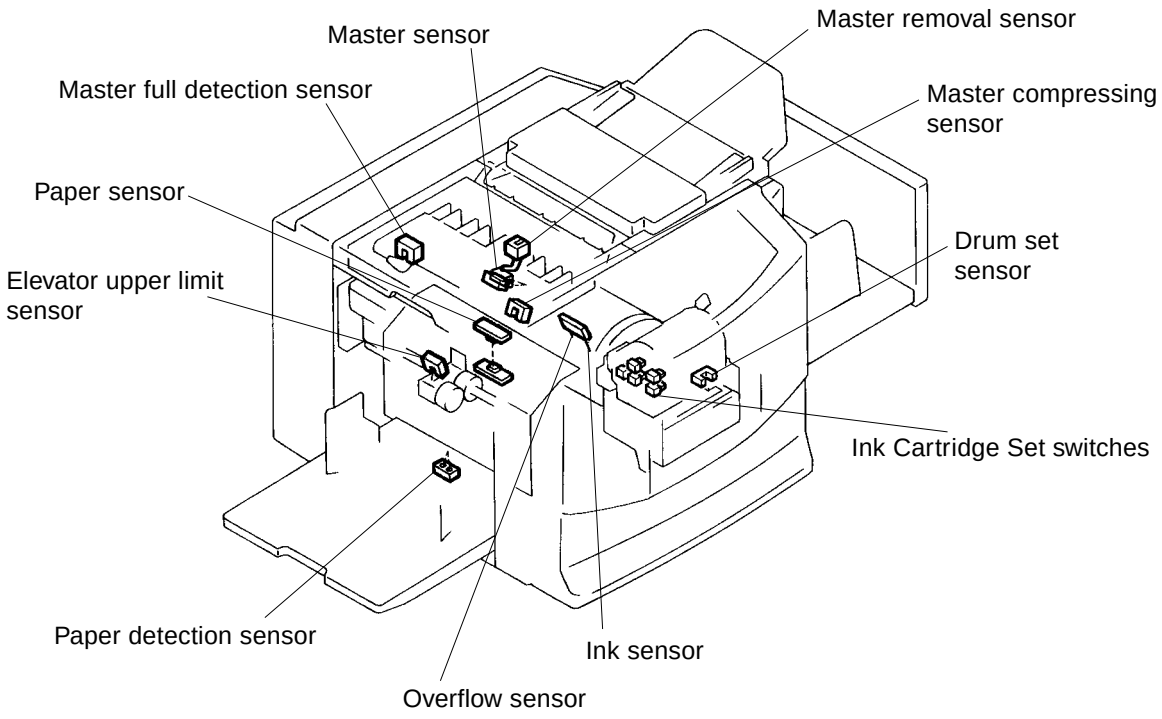
APPENDIX

CONTENTS

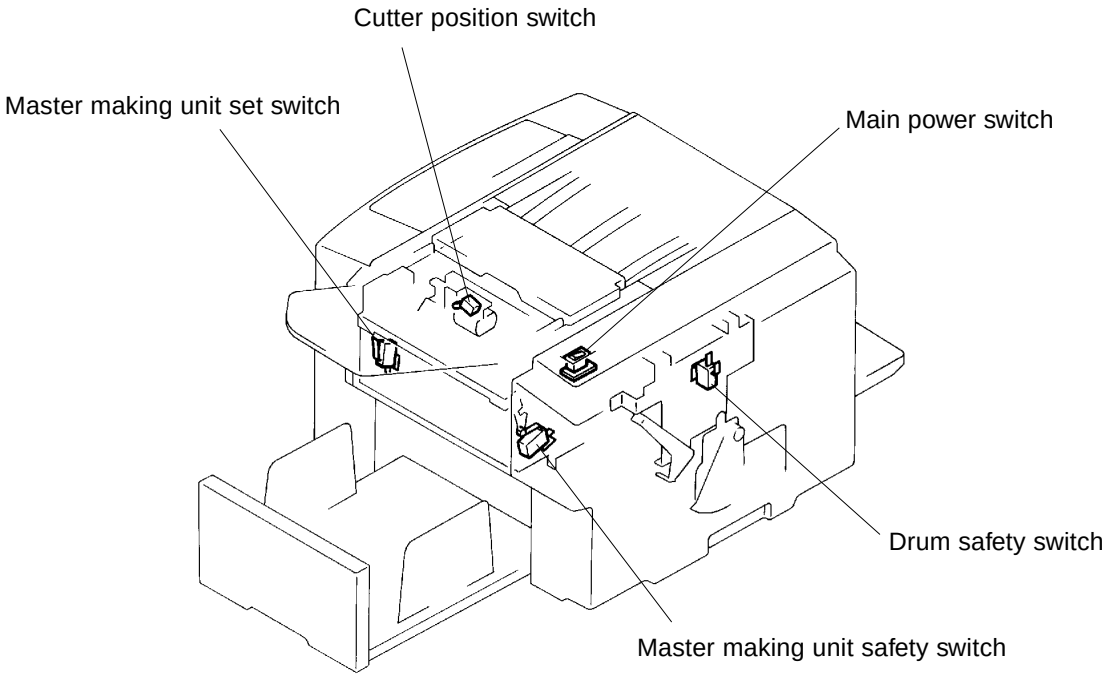
Electrical Components

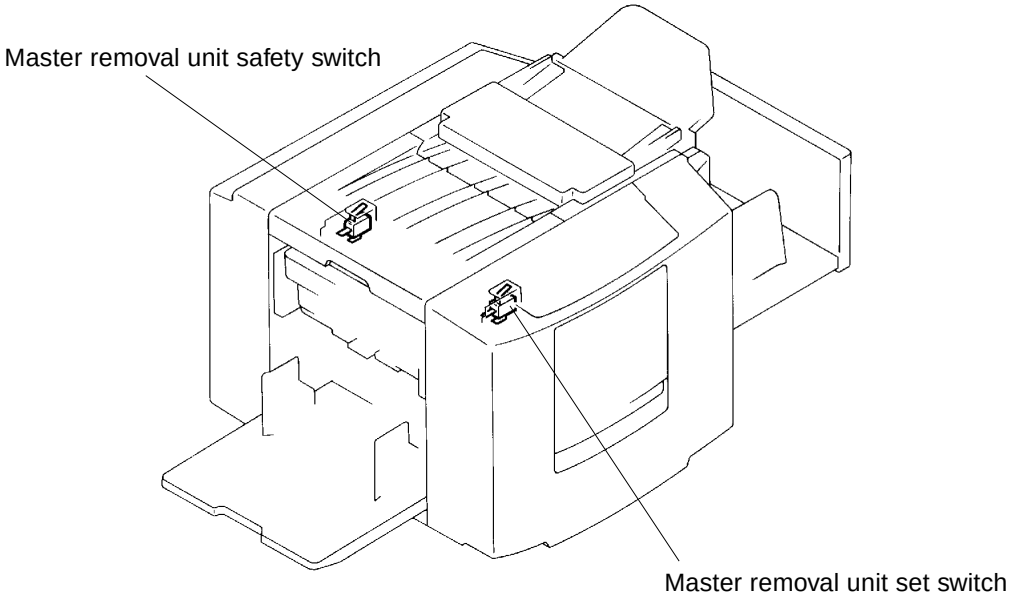
1. Sensors



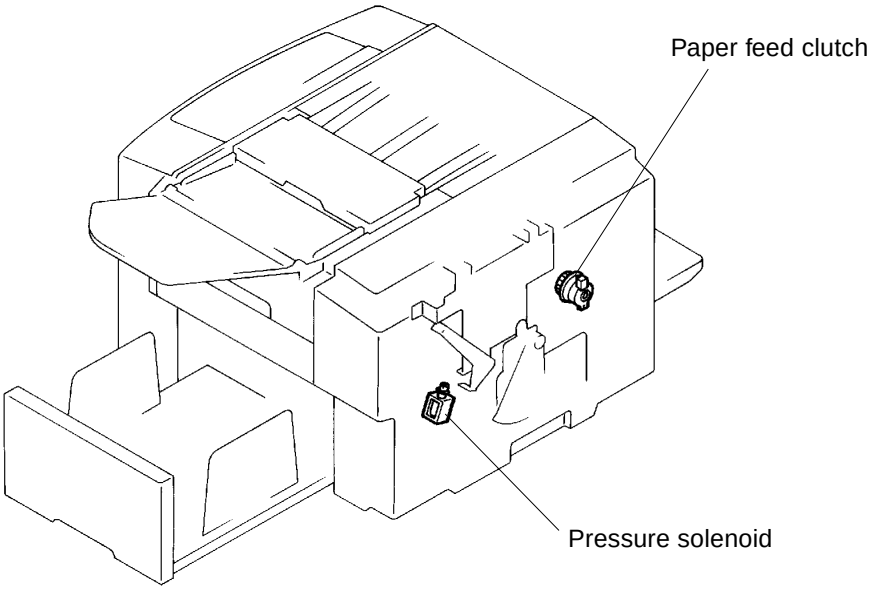


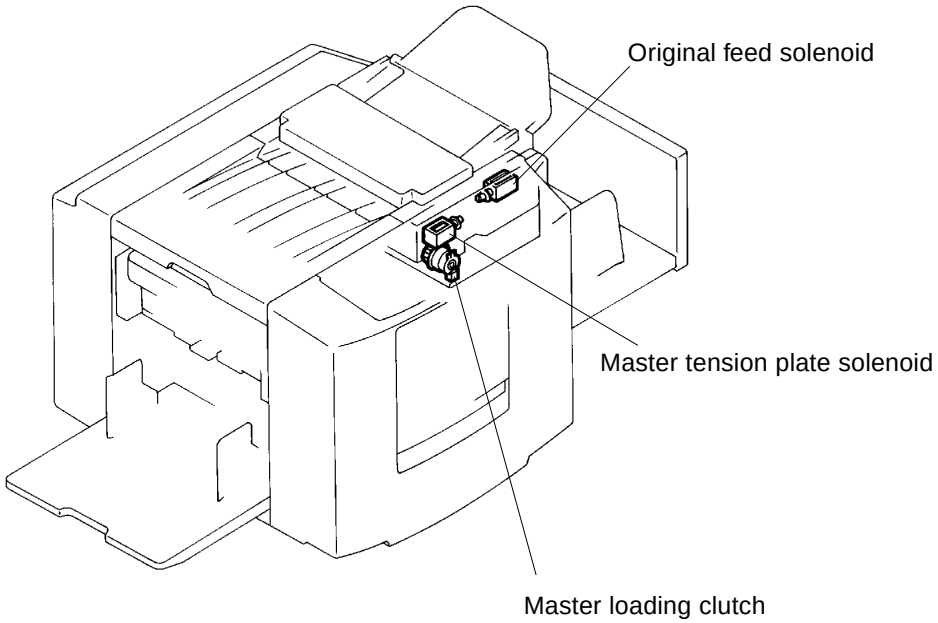
2. Switches



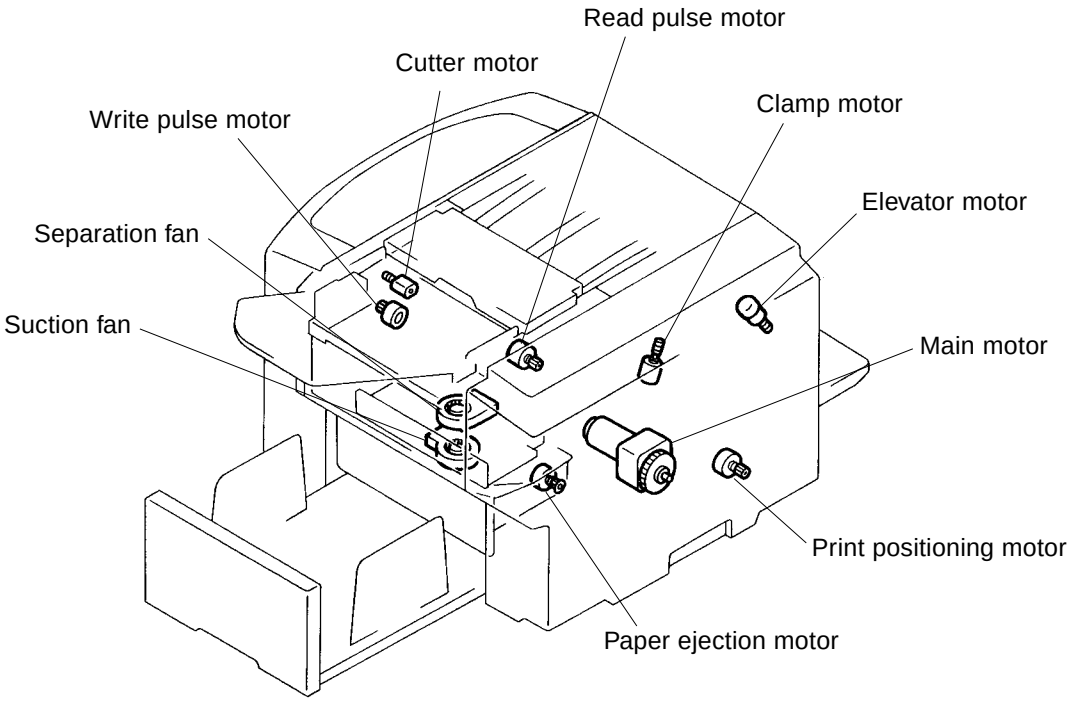


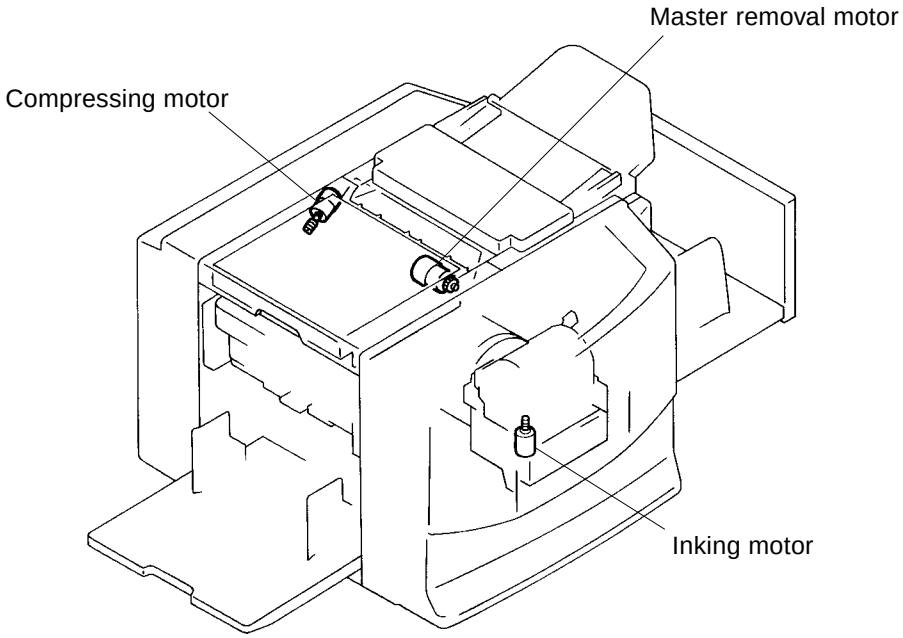
3. Clutches & Solenoids





4. Motors & Fan


Read pulse motor
Cutter motor
Clamp motor
Write pulse motor
Elevator motor
Separation fan
Suction fan
Main motor
Print positioning motor
Paper ejection motor


Master removal motor
Compressing motor
Inking motor

Test Mode

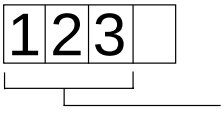
1. Operation Procedures

The Test mode program enables a service technician to check the operation of each electrical component in the machine.

1. [Starting Up Test Mode]

Turn ON the power while pressing the PRINT POSITION buttons ◁ and ▷ on the machine operation panel.
If the Test mode is activated, the following indication will be displayed in the print quantity display. The display shows the version number of the System ROM.

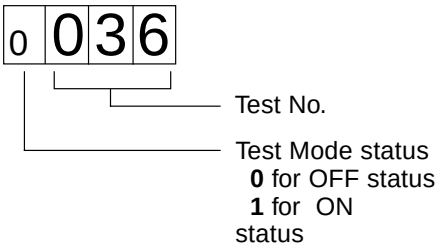
- This is a sample of the Initial condition of Test mode:



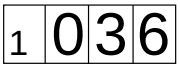
2. [Checking the Operation of a Component]

To check the operation of a component, select a test No. using panel keys.

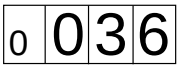
[Example] - In selecting Test **No.36** (Original IN Sensor).



Press the **"START"** button to start the test.



Press the **"START"** button again to stop the test.

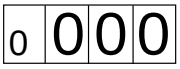


- If the test is a one-cycle operation test, it will automatically stop after one check.
- If the test is a non-cycle operation test, pressing the "START" button will stop the test.

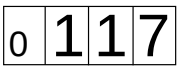
3. [Selecting Another Test Number]

To select another Test No., clear the set Test No. by pressing the **"C"** or **"STOP"** button and select another Test No.

The previous Test No. is erased.



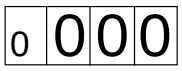
Select a new Test No. (**Example: No.117)**



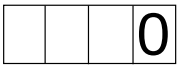
4. [Exiting from the Test Mode]

To exit from a Test mode, clear the set Test No. by pressing the **"C"** or **"STOP"** button and then press the **"ALL RESET"** button for 1 second.

The Test No. is cleared by **"C"** or **"STOP"**.



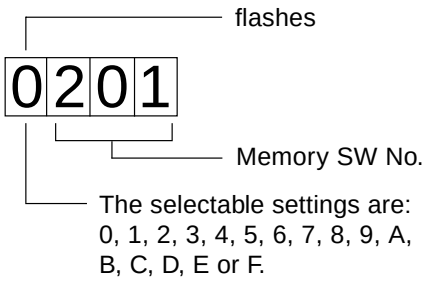
Press **"ALL RESET"** button for **1 second**.



5. [Operating the Memory SW (Test Mode No. 200 ~ 218)]

Start up the Test mode and select the Memory SW No. and press **"START"** button.

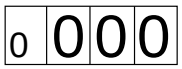
[Example] - In selecting Memory SW **No.201**.
Select **201** and then press **"START".**



Use the PRINT POSITION button ◁ or ▷ to make the setting selection.

[Example] - In selecting **"E"** for the setting, press the ▷ button until **"E"** flashes in the first display window.

Press the **"STOP"** button to input the newly selected setting.



Press **"ALL RESET"** button for 1 second.

CAUTION:

Test Mode **No.98** resets all the Memory SW selections made on the machine back to **"0"**.

2. Test Items and Operations

1) Sensor/SW Test

A beep sounds in two ways to tell the current condition.

Detection: 0.1 second interval beep
No detection: 0.5 second interval beep

No.	Test Component	Detection status
01	Paper detection sensor	Reflected light is detected
02	Elevator upper limit sensor	Light path is blocked
03	Elevator lower limit sensor	Light path is blocked
06	Paper sensor	Light path is blocked
08	Position-A sensor	Light path is blocked
09	Clamp sensor A	Light path is blocked
10	Clamp sensor B	Light path is blocked
12	Cutter position switch	Actuator is not pressed
14	Master sensor	Reflected light is detected
15	Master positioning sensor	Reflected light is detected
18	Drum set sensor	Light path is blocked
19	Paper receiving sensor	Reflected light is detected
21	ADF set sensor	Light path is blocked
22	Vertical centering sensor	Light path is blocked
23	Master end sensor	Light path is blocked
24	Master tension plate sensor	Light path is blocked
25	Master compressing sensor	Light path is blocked
26	Master full detection sensor	Light path is blocked
27	Master removal unit set SW	Actuator is pressed
28	Master removal sensor	Actuator is pressed
29	Master making unit set SW	Actuator is pressed
30	Cartridge set SW 1	Actuator is pressed
31	Cartridge set SW 2	Actuator is pressed
32	Cartridge set SW 3	Actuator is pressed
33	Cartridge set SW 4	Actuator is pressed
34	Cartridge set SW 5	Actuator is pressed
35	Original detection sensor	Actuator is pressed
36	Original IN sensor	Reflected light is detected
37	Ink sensor	Ink is detected
38	Overflow sensor	Ink is detected
41	Option board detection signal	When Option board attached

2) Motor/Solenoid Test

Use "START" button for ON/OFF control.

No.	Test Component
56	Original feed solenoid
57	Write pulse motor (reverse) 300 dpi speed
58	Write pulse motor (forward) 200 dpi speed
59	Main motor (10 rpm)
60	Main motor (15 rpm)
61	Main motor (30 rpm)
62	Main motor (Variable Speed)
63	Separation Fan + Suction Fan
64	Write pulse motor (forward) 400 dpi speed
65	Write pulse motor (forward) 300 dpi speed
66	Master loading clutch
67	Paper feed clutch
68	Pressure solenoid
70	Clamp home positioning movement
71	Master removal motor
73	Clamp motor
74	Read pulse motor (forward direction)
77	TPH control signal
79	Image scanner LED
84	Read pulse motor (reverse direction)
89	Master tension plate solenoid

All the Safety switches must be pressed and the Drum must be set in the machine.

Speed changeable by Print speed key on the panel.

Speed changeable by Reproduction Ratio key on the panel.

3) Memory Clear and Counter Stop, etc.

The panel display returns to normal view after **"START"** button is pressed

No.	Clear Items
90	**Partial Memory Clear** Certain portion of RAM contents in the Main PCB, such as Jam and Trouble messages, will be initialized. Inkless timer, Memory SW and User Modes will not be cleared. (The same operation as when turning the power ON while pressing ALL Reset button.)
92	**Prevention of the following operations: master and copy counting, and Key/Card counter signal.** The Master count and Copy count signals will not be output, allowing a service technician to print without increasing the digit of the Master and Copy counters. • The machine will be released from this condition when the power is turned off.
93	**Clearing of the count in the memory.** The master count and total count in the memory will be cleared. Inkless timer, Jam and Trouble messages, Memory SW, User Modes and Memory count for Maintenance Call will not be cleared.
94	**Clearing of the count for Maintenance Call in the memory** The master count and total count for Maintenance Call in the memory will be cleared. Inkless timer, Jam and Trouble messages, Memory SW and User Modes will not be cleared.
97	**User Mode Data Clear** All RAM contents in the Main PCB, excluding Memory switch settings by Test modes 200~218, will be initialized. Memory SW and Memory count for Maintenance Call will not be cleared.
98	**Memory Switch Clear** Only the Memory switch settings by Test modes No. 200 ~ 218 will be initialized. Inkless timer, Jam and Trouble messages, Memory SW, User Modes and Memory count for Maintenance Call will not be cleared.

4) Sequential Operation Test

Use "START" button for ON/OFF control.

No.	Test Item
100	**Prints per master display** From the total counter and master counter within the memory, number of prints per master in average is displayed on the panel.
101	**Inking operation** Ink is supplied in the Drum while the Drum rotates at 60 rpm without Pressure roller pressing against the Drum. As the Ink sensor detects ink, the inking stops and a confidential master is made on the Drum. The Drum rotates at 60 rpm while the Pressure roller presses 30 times against the Drum.
102	**Elevator Up/Down operation** The following operations will be repeated while pressing down the Feed-tray down button. • PRESS ➡ Elevator UP ➡ Upper limit sensor "ON" ➡ Elevator Stop • PRESS ➡ Elevator Down ➡ Lower limit sensor "ON" ➡ Elevator Stop
103	**Print positioning motor CW/CCW rotation (one-cycle check)** Return to vertical center position ➡ One second halt ➡ CW direction rotation One second halt ➡ CCW direction ➡ One second halt ➡ Return to vertical center position ➡ Stop.
104	**Clamp plate Open/Close operation (Press START button again to stop)** Rotate Drum to A-position ➡ Open and close the Clamp plate (master release action) ➡ Rotate Drum to A-position ➡ Open and close the Clamp plate (master clamp action (then go back to first step).
105	**ADF Original feed operation (Press START button again to stop)** Original detection sensor ON ➡ Original set operation ➡ Feed original ➡ Eject original ➡ Original detection sensor ON (Repeats this cycle until START button is pressed)
106	**Confidential operation** Confidential master is made three times and the Main motor stops at Drum A-position.
107	**Paper feed & Printing operation (Press START button again to stop)** The paper feed tray rises and the paper is continuously fed until paper supply runs out. • The Copy counter does not operate and paper jam is not detected. • Paper feed tray will be automatically lowered without paper. • Ink can be supplied by the Inking motor. • Printing speed key can be operated.
109	**Machine aging operation** 130 rpm Drum rotation ➡ 3000 times A-position detection ➡ Stop.
110	**Elevator aging operation** UP ➡ Upper limit sensor ON ➡ Stop ➡ DOWN ➡ Lower limit sensor ON ➡ Stop ➡ UP (This cycle is repeated for 5000 times) ➡ Stop.

No.	Test Item
111	**Main motor (Variable speed) + Paper ejection motor (Variable speed) operation** Speed changeable by Print speed key on the panel.
112	**Cutter motor ON [One-cut operation]** Note: The light path of the Master tension plate sensor must be opened (Master tension plate must be down) to operate this test mode.
113	**Master compressing operation** Master compress plate UP ➡ Compressing sensor ON ➡ One second halt ➡ Master compress plate DOWN ➡ Compress sensor ON ➡ One second halt ➡ Master compress plate UP (This is repeated until START button is pressed.)
114	**Image scanner wave length check mode #1** Lights up the Image scanner LED and outputs the scanner wave length. (8 bit data before the shading compensation)
115	**Image scanner wave length check mode #2** Lights up the Image scanner LED and outputs the scanner wave length. (8 bit data after the shading compensation)
116	**TPH thermister reading**
117	**Thermal print head check operation 1** Makes a master of test pattern #1 memorized in the Main PCB.
118	**Thermal print head check operation 2** Makes a master of test pattern #2 memorized in the Main PCB.
121	**Cartridge Set SW check mode** Following indicator will be turned on if each SW is pushed. Replace Master Roll ------- SW1 Trouble ---------- SW4 Empty Disposal Box ------- SW2 Check Settings ----- SW5 Replace Ink Cartridge ----- SW3 A beep always sounds while this test mode is done. No sound will be emitted only while all SWs are pushed at the same time.
122	**Paper feed & Printing operation without supplying Ink** **(Press START button again to stop)** This operation is the same movement as Test mode No.107 except no ink supply. This test mode is useful to remove Ink from inside of the Drum.

Memory Switches (Test Mode)

1. Operation Procedures

The Memory switch settings can be reprogrammed to make fine adjustments in Image scanning and Master making. The Memory switch mode is started up by the same method as with Test mode. Test mode **No.98** resets all the Memory switch settings to the initial setting of "**0**".

Use the PRINT POSITION button◁ or▷ to make the setting selection.

No. 200 — Machine model setting

SW setting	0	1	2	3	4	5	6
Machine type	CR163	CR663	CR1630 UP	CR1630 EP	CR1630 EN	CR1630 AW	CR1630 AN
	7	8	9	A	B	C	D
	CR1630 C	CR1600 C	CR1650 C	CR1610 UI	CR1610 EP	CR1610 AW	CR1610 AS

No. 201 — TPH power setting

SW setting	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F
Power setting	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

No. 202 — Master return amount after master cut

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	8	9	10	11	12	13	14	15
	8	9	A	b	C	d	E	F
	0	1	2	3	4	5	6	7

No. 203 — Scan position shift (Horizontally against the original)

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	±0.0	+0.5	+1.0	+1.5	+2.0	+2.5	+3.0	+3.5
	8	9	A	b	C	d	E	F
	+4.0	+4.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5

Amount in (+) indicates shift to the LEFT, and (-) indicates shift to the RIGHT.

No. 204 — Paper feed clutch ON timing (Drum angle from the A-position)

SW setting	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F
Drum angle(°)	62	64	66	68	70	72	74	76	46	48	50	52	54	56	58	60

No. 205 — Master making image area (length)

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	±0.0	+0.5	+1.0	+1.5	+2.0	+2.5	+3.0	+3.5
	8	9	A	b	C	d	E	F
	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5

Amount in (+) indicates additional area, and (-) indicates less area.

Memory Switches (continued)

Use the PRINT POSITION button ◁ or ▷ to make the setting selection.

<table>
<tr><th>No.</th><th>Test Item</th></tr>
<tr><td>206</td><td>Image scanning start position
<table>
<tr><td>SW setting</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Amount (mm)</td><td>±0.0</td><td>+0.5</td><td>+1.0</td><td>+1.5</td><td>+2.0</td><td>+2.5</td><td>+3.0</td><td>+3.5</td></tr>
<tr><td></td><td>8</td><td>9</td><td>A</td><td>b</td><td>C</td><td>d</td><td>E</td><td>F</td></tr>
<tr><td></td><td>-4.0</td><td>-3.5</td><td>-3.0</td><td>-2.5</td><td>-2.0</td><td>-1.5</td><td>-1.0</td><td>-0.5</td></tr>
</table>
Adjustment (+) or (-) distance of the original set distance from the Original IN sensor.</td></tr>
<tr><td>207</td><td>Drum B-Position adjustment (Drum angle from the A-position)
<table>
<tr><td>SW setting</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Drum angle (°)</td><td>272</td><td>273</td><td>274</td><td>275</td><td>276</td><td>277</td><td>262</td><td>263</td></tr>
<tr><td></td><td>8</td><td>9</td><td>A</td><td>b</td><td>C</td><td>d</td><td>E</td><td>F</td></tr>
<tr><td></td><td>264</td><td>265</td><td>266</td><td>267</td><td>268</td><td>269</td><td>270</td><td>271</td></tr>
</table></td></tr>
<tr><td>208</td><td>Drum inkless timer setting (Right after the Ink pack is replaced)
<table>
<tr><td>SW setting</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Time (seconds)</td><td>90</td><td>100</td><td>110</td><td>120</td><td>130</td><td>140</td><td>150</td><td>160</td></tr>
<tr><td></td><td>8</td><td>9</td><td>A</td><td>b</td><td>C</td><td>d</td><td>E</td><td>F</td></tr>
<tr><td></td><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td></tr>
</table></td></tr>
<tr><td>209</td><td>Image elongation and shrinkage in image scanning
<table>
<tr><td>SW setting</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Amount (mm)</td><td>±0.0</td><td>-1</td><td>-2</td><td>-3</td><td>-4</td><td>-5</td><td>-6</td><td>-7</td></tr>
<tr><td></td><td>8</td><td>9</td><td>A</td><td>b</td><td>C</td><td>d</td><td>E</td><td>F</td></tr>
<tr><td></td><td>+8</td><td>+7</td><td>+6</td><td>+5</td><td>+4</td><td>+3</td><td>+2</td><td>+1</td></tr>
</table>
• The adjustment is made by changing the R.P.M. of the Read pulse motor.
• Above given chart is based on B4 size paper.
• Adjusting to (+) elongates, and to (-) shrinks the image.</td></tr>
<tr><td>210</td><td>Paper feed clutch OFF timing
<table>
<tr><td>SW setting</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Drum angle (°)</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr>
<tr><td></td><td>8</td><td>9</td><td>A</td><td>b</td><td>C</td><td>d</td><td>E</td><td>F</td></tr>
<tr><td></td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr>
</table>
Above Drum angle is the roation of the Drum from the time the Paper sensor detects incoming paper until the Paper feed clutch disengages.</td></tr>
</table>

Memory Switches (continued)

Use the PRINT POSITION button ◁ or ▷ to make the setting selection.

No. 211 — 1st paper feed jam detection timing

SW setting	0	1	2	3	4	5	6	7
Drum angle(°)	135	137	139	141	143	145	-----	-----
	8	9	A	b	C	d	E	F
	-----	-----	-----	-----	127	129	131	133

(Drum rotation from the Position-A until the Paper sensor checks incoming paper)

No. 212 — Inkless timer adjustment

SW setting	0	1	2	3	4	5	6	E	F	7 ~ D are not used.
Time (seconds)	20	25	30	35	40	45	50	10	15	

No. 213 — Image making on master "start" position adjustment

SW setting	0	1	2	3	4	5	6	7	8 ~ F are not used.
Distance (mm)	0	+1	+2	+3	+4	+5	+6	+7	

- This is to adjust the master setting distance from the Master positioning sensor
- Adjusting to (+) moves the printed image downward on the prints.
- Loading clutch activation timing is changed to keep master under Clamp plate constant.

No. 214 — Amount of master under the Clamp plate adjustment

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	±0	+1	+2	+3	———	———	———	———
	8	9	A	B	C	D	E	F
	———	———	———	-5	-4	-3	-2	-1

- This is to adjust the duration of the Master loading clutch activation time.
- Adjusting to (+) increases the amount of master clamped unter the Clamp plate.

No. 216 — Image elongation and shrinkage adjustment in master making

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	±0.0	+0.5	+1.0	+1.5	+2.0	+2.5	+3.0	+3.5
	8	9	A	b	C	d	E	F
	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5

- The adjustment is made by changing the R.P.M. of the Write pulse motor.
- Above given chart is based on B4 size paper.
- Adjusting to (+) elongates, and to (-) shrinks the image.

No. 217 — Drum angles of the last Drum stop during intermittent master loading on Drum

SW setting	0	1	2	3	4	5	6	7
Angle χ (°)	±0	+5	+10	+15	+20	———	———	———
	8	9	A	b	C	d	E	F
	———	———	———	———	-20	-15	-10	-5

- B4 Drum machine = Drum angle 185° ± χ°.
- A4 Drum machine = Drum angle 155° ± χ°.

Memory Switches (continued)

Use the PRINT POSITION button ◁ or ▷ to make the setting selection.

No.	Test Item
218	**Extention of Master length on Drum** **(Ajustment of the tail end margin of master on the Drum)**

SW setting	0	1	2	3	4	5	6	7
Amount (mm)	±0.0	+1	+2	+3	+4	+5	———	———
	8	9	A	b	C	d	E	F
	———							———

▶ **Setting the count for Maintenance Call**

No.	Test Item
300	**Setting the master count for Maintenance Call** If the master count for Maintenance Call in the memory reaches to the set master count, the Maintenance Call indicator lights up. Setting range : 100 - 999,000 masters Count set : Input "1" on display ="100" masters : Input "0" on display = Indicator will never light up. Memory count clear for Maintenance Call = Test mode No.94
301	**Setting the copy count for Maintenance Call** If the copy count for Maintenance Call in the memory reaches to the set copy count, the Maintenance Call indicator lights up. Setting range : 100 - 999,000 copies Count set : Input "1" on display ="100" copies : Input "0" on display = Indicator will never light up. Memory count clear for Maintenance Call = Test mode No.94

Users Mode (Custom Setting)

1. Operation Procedures

The users mode (Custom Setting) program enables a machine operator to select the initial operation settings of the machine.
This mode is explained in "User Guide" and is intended for customers to make a selection if required.

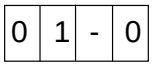
NOTE: The selection "0" which the choices are listed in boldface in the chart below are the standard initial settings except item No.09.(at factory shipment).

1. [Starting Up Users Mode (Custom Setting)]

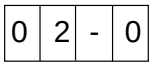
Turn ON the power.
Press **"✳"** (**Custom Setting**) key on the Sub-Control Panel.
This makes access to the User mode (Custom Setting).

2. [Making Selections]

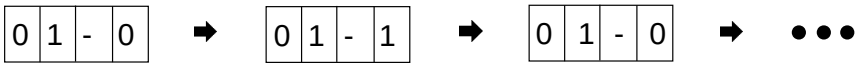
After the access is made, select the item(s) whose initial setting is required to be changed.
The first item which appears on the display is item No. 01.



If another item is desired, select it using the print quantity keys.
When selecting item No.02, for example, press "0" and "2".



Now choose either of the two initial settings for the selected item.
The selection is made by pressing the "START" button.
The digit in the far right column of the display changes from "0" to "1" or "1" to "0".
"0" and "1" appears alternately each time the "START" button is pressed.



Repeat this procedure until all required changes are made.
To exit from this mode, press the "ALL RESET" button for 1 second.
All new initial settings are memorized and the display returns to normal operation.

Caution: Pressing "Custom Setting" key can also exit from this mode, but all new initial settings are not memorized. Pressing "Custom Setting" key means 'Cancel'.

Item Number	Initial Setting Item	Choices					
		0	1	2	3	4	5
01	Print Speed	**90rpm**	130rpm	60rpm	—	—	—
02	Auto Print Feature	**OFF**	ON	—	—	—	—
03	Job Separator Connection	**NO**	YES	—	—	—	—
04	Auto Reset Time	**OFF**	3 min.	5 min.	—	—	—
05	Not Used						
06	Minimum Print Quantity	—	10	20	30	40	50
07	Auto Document Feed	**OFF**	ON	—	—	—	—
08	Not Used						
09	Master Making Density	3	4	5	1	2	**Auto**

Notes on above chart:

- Item No.03 : Select YES to activate the Job separator when connected to TR.
- Item No.04 : The time before the machine resets automatically. (OFF = No auto reset.)
- Item No.06 : The master making job is not accepted unless a number above the Minimum Print Quantity is selected.
- Item No.09 : Initial setting is Choice No.5 "Auto". (Auto Base Control system)

Advice Displays (Call Service Messages)

No.	Display Condition	Resetting Method
E01	**Main Motor Lock** • If excessive current is detected 0.3 seconds consecutively after the Main motor is activated. • If no Encoder sensor output after Main motor is activated.	Press ALL RESET button.
E02	**Elevator Motor Lock** • When the light path of the Upper limit sensor or the Lower limit sensor is not cut within 10 seconds after the Elevator motor is activated. • If the light path of both the Upper limit and Lower limit sensors are blocked when the Elevator motor is activated. • If excessive current is detected 0.3 seconds consecutively after the Elevator motor is activated.	Press ALL RESET button.
E03	**Clamp Motor Lock** [During Clamp Motor Initial Positioning] • If the light path of the Clamp senors both A and B are not opened within 13 seconds after after the Clamp motor is activated. [During Master Release from the Clamp Plate] • If the light path of the Clamp sensor B is not blocked within 3 seconds after the Clamp motor is activated. • If the light path of the Clamp sensor B is not opened within 12 seconds after the Clamp motor is activated. [When the Clamp Plate opens during Master Clamping] • If the light path of the Clamp sensor B is not blocked within 3 seconds after the Clamp motor is activated. • If the light path of the Clamp sensor A is not opened within 5 seconds after the Clamp motor is activated. [When the Clamp Plate closes during Master Clamping] • If the light path of the Clamp sensor B is not opened within 5 seconds after the Clamp motor is activated.	Press ALL RESET button.
E04	**Ink Overflow** • If the Overflow sensor detects excessive ink in the Squeegee unit.	Remove excess ink from the Drum.
E05	**Print Positioning Motor Lock** • If the Vertical centering sensor status has not been changed from ON to OFF (or OFF to ON) within 3550 ms after the Print positioning motor activated.	Press ALL RESET button.
E06	**Position-A Sensor Malfunction** • If Position-A sensor cannot be detected (or keeps detecting) even though the Main motor encoder sensor signal is making the output after the Main motor is activated.	Press ALL RESET button.

No.	Display Condition	Resetting Method
E07	**Master Compressing Motor Lock** [When compressing] • If the light path of the Master compressing sensor is not opened within 10 seconds after the Master compressing motor is activated. [When returning back] • If the light path of the Master compressing sensor is not opened (or closed) within 1 second after the Master compressing motor is activated.	Press ALL RESET button.
E08	**Communication Error between TR and Interface Accessaries** • If a communication error has occurred between the CPU and the interface accessaries.	Turn Power SW OFF & ON.
E10	**Shading Error** • If the Shading compensation is not made.	Turn Power SW OFF & ON.
E13	**Cutter Motor Lock** • If the Cutter position switch is not turned OFF within 75 ms after the Cutter motor is activated. • If the Cutter position switch is not pressed within 450 ms after the Cutter motor is activated.	Drum Set Sensor OFF & ON.
E14	**Master Removal Motor Lock** • If excessive current is detected 0.3 seconds consecutively after the Master removal motor is activated.	Press ALL RESET button.
E15	**Master Tension Plate Lock** • If the light path of the Master tension plate sensor is not blocked within 384 pulse rotation of the Read pulse motor rotated in the reverse direction. • If master loading error is detected at Drum angle 79° and if the Master tension plate sensor is blocked.	Press ALL RESET button.
E16	**Inking Motor Lock** • If excessive current is detected 0.3 seconds consecutively after the Inking motor is activated.	Press ALL RESET button.
E20	**Paper Ejection Motor Lock** • If excessive current is detected 0.3 seconds consecutively after the Paper ejection motor is activated.	Press ALL RESET button.
E50	**Connect "Copy/Master" Counter** • If the connector of the Counter is not connected.	Connect Counter.
E78	**Machine Model Selection Error** • If Memory switch No.200 is selected to 9~F.	Select to correct setting.

Note: The Advice Display number with "( )" will be displayed while "✳" key is pressed.

No.	Display Condition	Resetting Method
(C21)	**Master Loading Error (onto the Drum)** • If the Master sensor does not detect the master (light not reflected) during the master loading when the Drum is at 79° from the position-A.	Master Making Unit Set SW OFF &ON.
(C22)	**Master Misfeed** • If the Master positioning sensor does not detect the master (light not reflected) within 944 pulses after the Write pulse motor activates. • If the light path of the Master tension plate sensor is blocked (Master tension plate is down) when the master feeding has started.	Master Making Unit Set SW OFF &ON.
C23	**Master Cut Malfunction** • If the Master positioning sensor is still detecting the master (light reflected back) when the Drum is at position-A after the cutting operation and the Master tentioning plate sensor is ON. • If the Master sensor detects the master on the Drum again just after 'C23' error is cleared, 'C23' will be displayed again. **Note: 'C23' will be displayed without pressing '✳' key.**	Drum Set Sensor OFF & 5 seconds later ON while Master Positioning Sensor is OFF.
(C25)	**Master Removal Error** • If the Master removal sensor does not detect the removed master (light path opened) when the Drum rotates to either 70° or 90° from the position-A during the master removal, when a master was detected on the Drum.	Drum Set Sensor OFF & 5 seconds later ON.
(C26)	**Removed Master Jammed at the Master removal area** • If the Master removal sensor is detecting the removed master (light path blocked) even though the Drum has returned to the position-A after the master removal process.	Unblock the light path of the Master removal sensor. • Remove the jammed master.
(C27)	**No Master on the Drum** • If the Master sensor does not find master on the Drum when the Drum is at 79° during the printing movement.	Press ALL RESET button.
(C31)	**Paper Jam in the Second Paper Feed Area** • If the Paper receiving sensor does not find paper when the Drum is at Position-A during the printing operation and the Paper sensor finds a paper at next Drum Position-A.	Press ALL RESET button. • Remove the jammed paper.
(C32)	**Paper Jam in the Paper Receiving Area** • If the status of the Paper receiving sensor does not change from detecting paper to not detecting from one Drum Position-A to the next during printing.	Press ALL RESET button. • Remove the jammed paper.

Note: The Advice Display number with "( )" will be displayed while "✳" key is pressed.

No.	Display Condition	Resetting Method
(C33)	**Paper Jam in the First Paper Feed Area** • If the Paper sensor does not detect paper at Drum angle 135° within three Drum rotations during printing.	Press ALL RESET button.
(C34)	**Paper Jam on the Drum** • If the Paper receiving sensor does not detect paper at one Drum Position-A and the Paper sensor detects paper at next Drum Position-A.	Drum set sensor OFF & 2 seconds later ON, or press ALL RESET button.
(C37)	**Original Jam at Entrance** • During the Original set movement, if the Original IN sensor does not detect Original (sensor light not reflected) within 1712 pulses after the Read pulse motor activates. • During the Original set movement, if the Original IN sensor stops detecting the Original before the Read pulse motor activates 347 pulses.	ADF set sensor OFF & ON.
(C38)	**Original Jam or Oversize** • During the Original scanning, if the Original IN sensor keeps detecting Original (sensor light reflected) and does not stop detecting within 4945 pulses after the Read pulse motor activates.	ADF set sensor OFF & ON.
(C41)	**Replace Ink Cartridge** • If the Ink sensor does not detect ink in the Squeegee unit within 20 seconds after the Inking motor was activated. • If the Ink sensor does not detect ink in the Squeegee unit within 80 seconds after the Drum idling has started.	Ink Cartridge set sensor OFF & 5 seconds later ON.
(C42)	**Replace Master Roll** • If the black tape attached at the end of the Master roll has been detected by the Master end sensor during master making or confidential operation.	Master making unit set SW OFF &ON. • Replace the depleted Master roll with a new one.
(C43)	**Empty Disposal Box** • If the Master full detection sensor does not detect the Master compress plate during the master compressing process.	Master removal set switch OFF & 5 seconds later ON. • Empty the disposal box.
(C44)	**Add Paper** • If the light path of the Paper detection sensor is open.	Paper detection sensor ON. • Add paper on the Paper feed tray.

No.	Display Condition	Resetting Method
(C49)	**Close Master Removal Unit** • If the actuator of the Master disposal unit set switch is not depressed.	Close the Master removal unit.
(C51)	**Insert Card into Key/Card Counter** • If an operator card is not set in the Key/Card counter.	Insert the card.
(C52)	**Set Drum in Place** • If the Drum set sensor does not detect the Drum.	Set the Drum in the machine.
(C53)	**Set Ink Cartridge in Place** • If the Ink Cartridge set switches do not detect the Ink Cartridge. • If deferent type of Ink Cartridge is inserted in the Drum. (See page 8-3)	Set the Ink Cartridge in the Drum.
(C56)	**Close ADF Unit** • If the ADF unit set sensor does not detect the ADF unit.	Close the ADF unit.
(C58)	**Close Master Making Unit** • If the actuator of the Master making unit set switch is not depressed.	Close the Master making unit.
(C61)	**Drum size error** • If Memory switch No.200 is selected to wrong machine model or wrong model Drum is set in the machine.	Set correct Drum in the machine or set Memory switch No.200 to correct machine model setting.

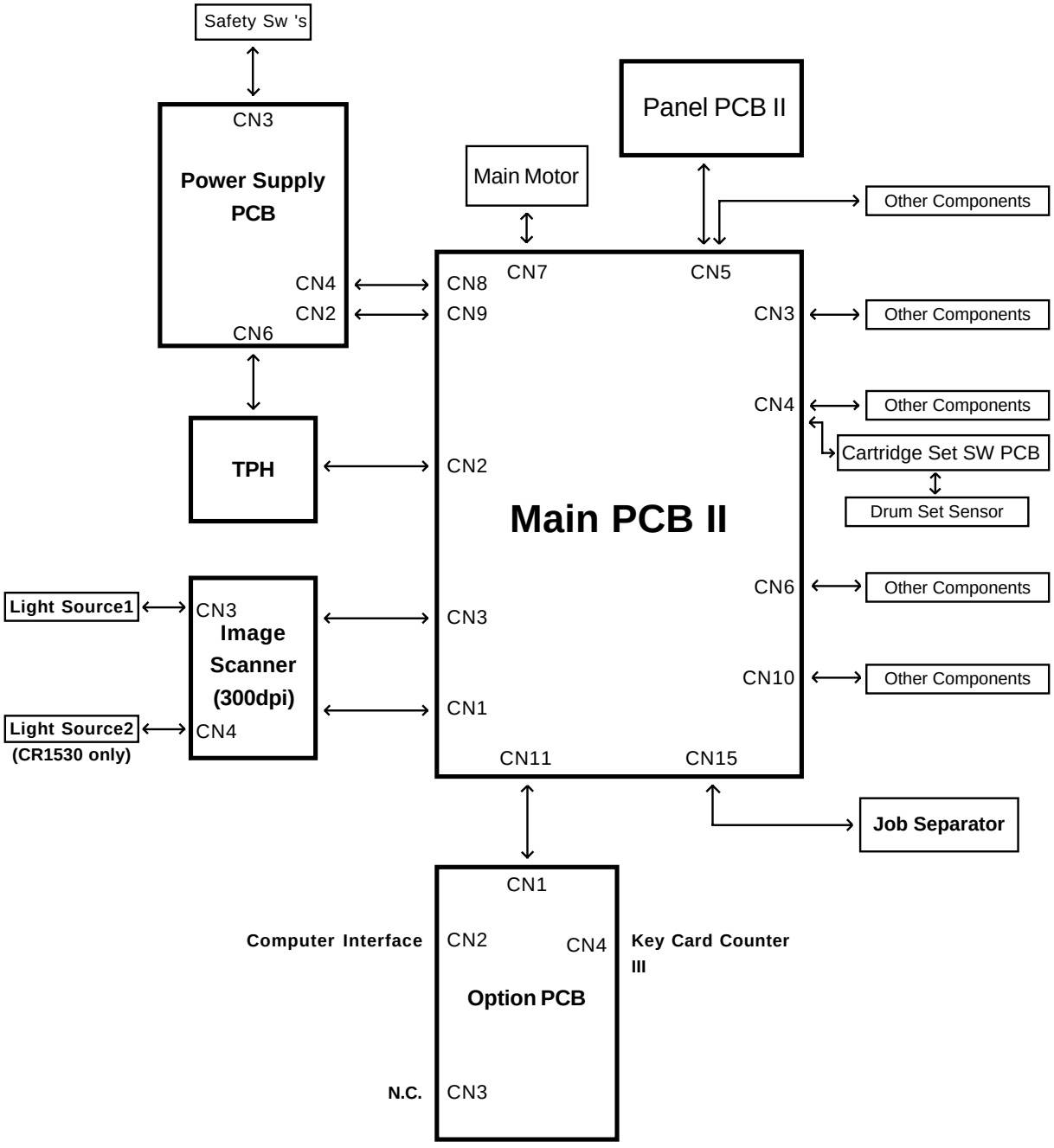
APPENDIX (5)

(CR Series)

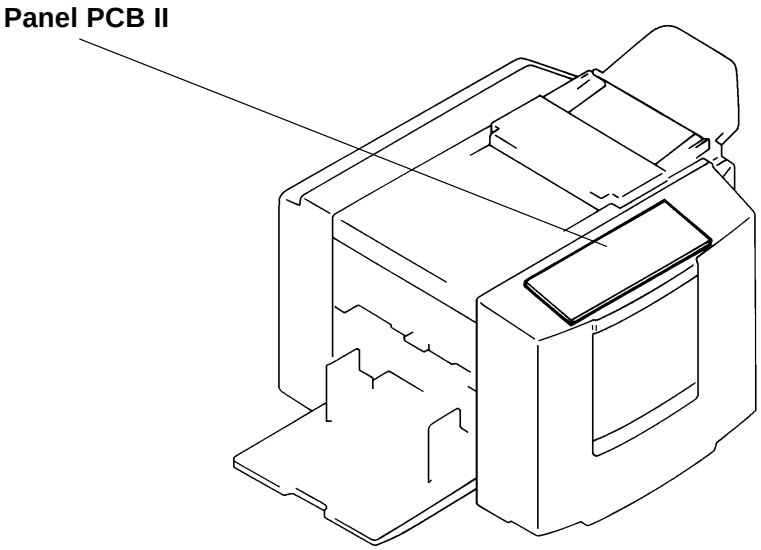
CONTENTS

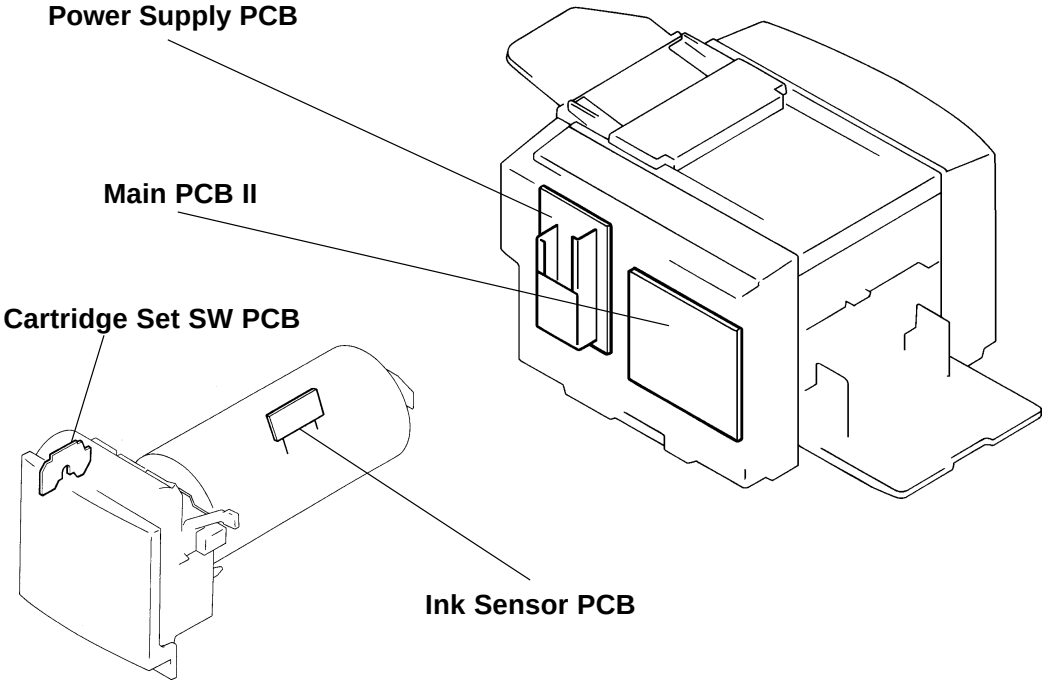
Description of PCBs

1. Block Chart

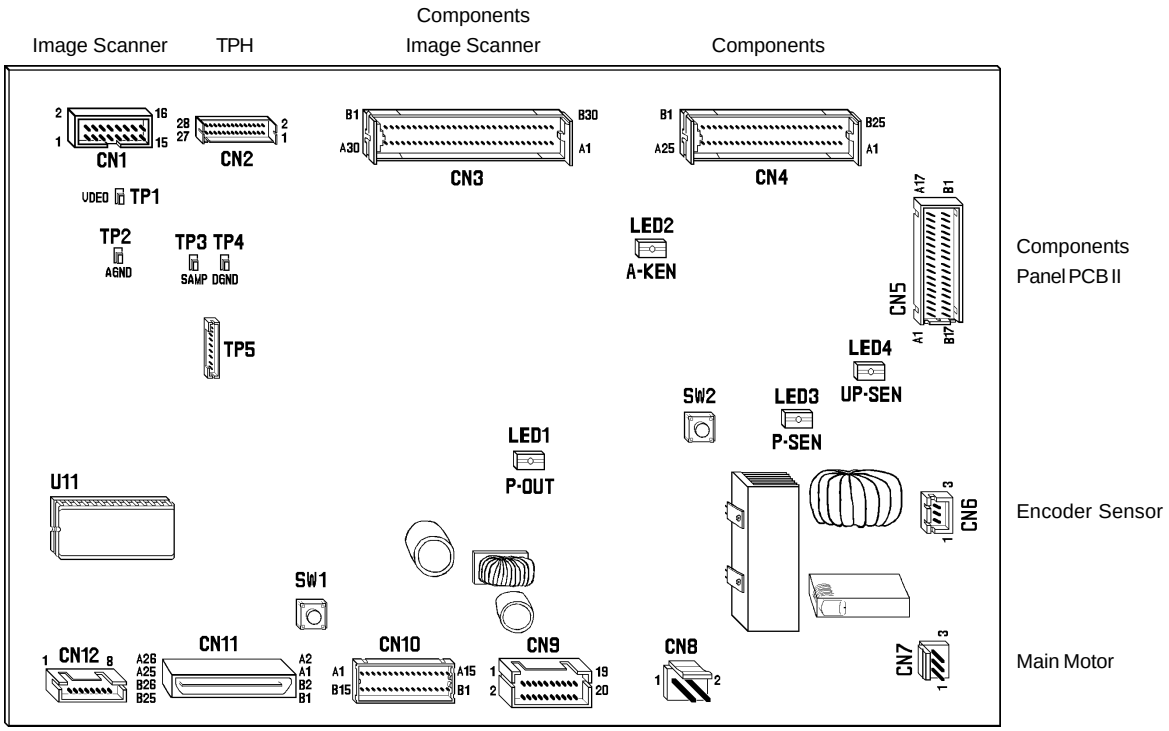


2. Location of PCBs





3. Main PCB II



SW

SW1 : For factory adjustment only
SW2 : Drum (Main motor) 15 rpm

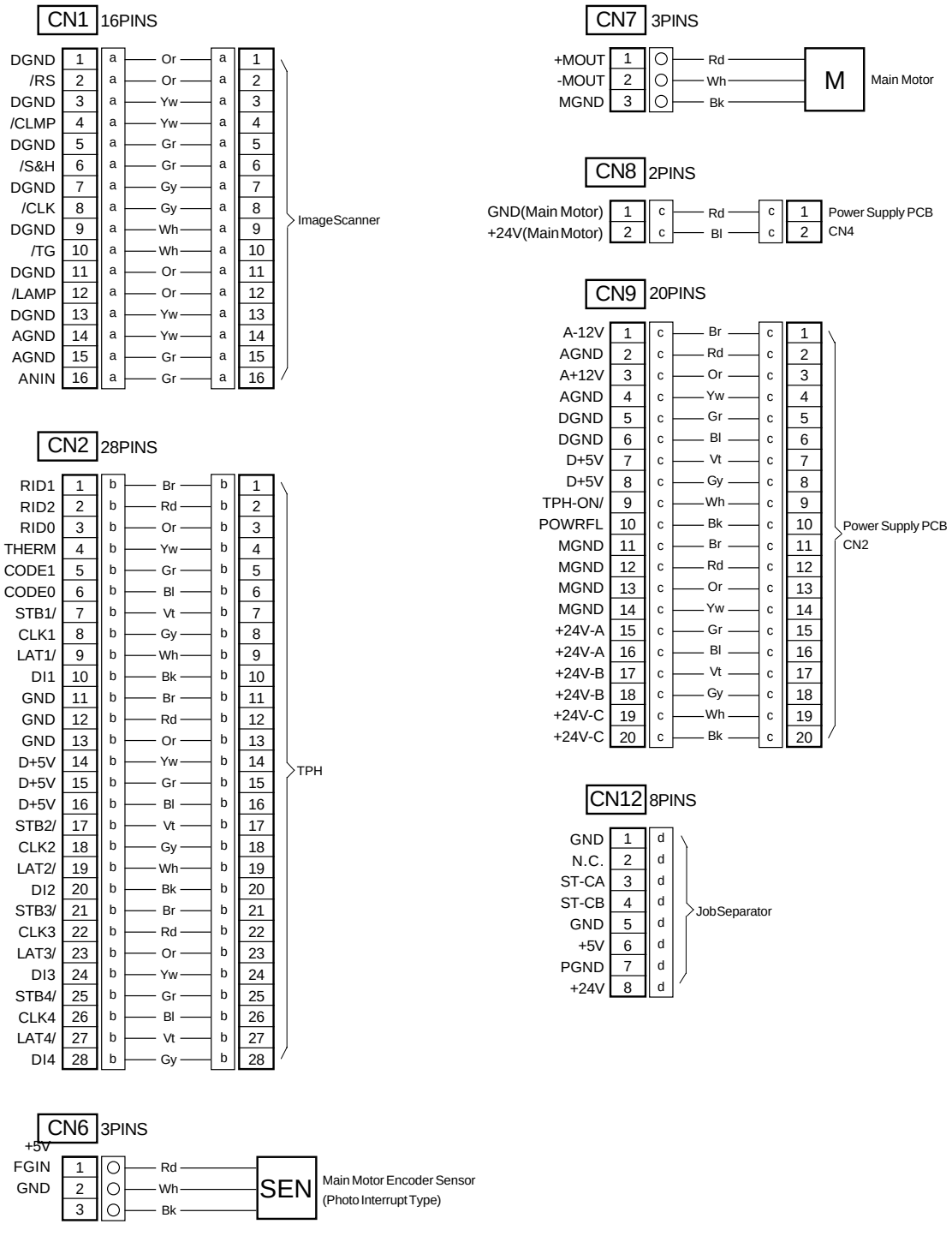
LED

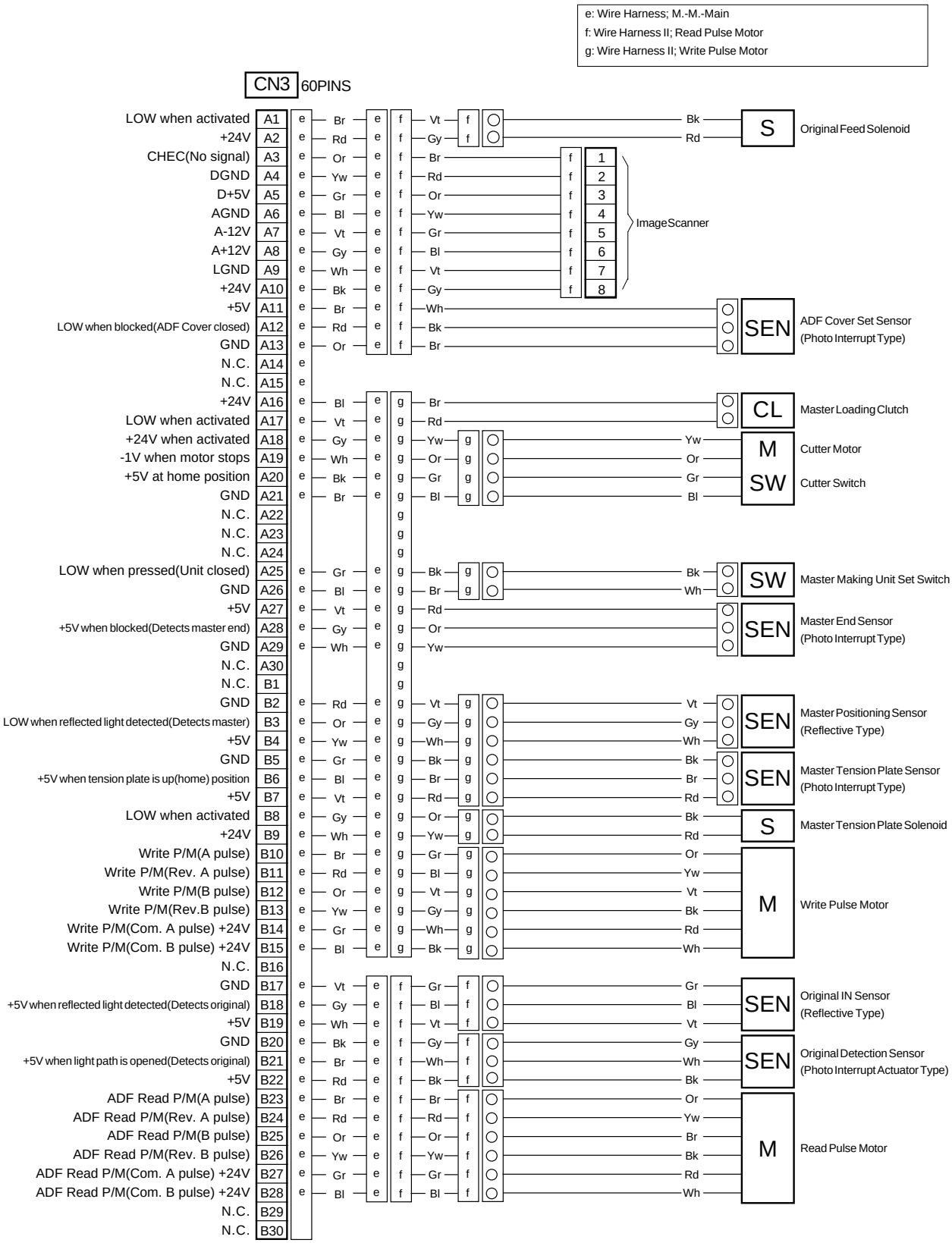
			When LED is ON
LED1 :	**P-OUT**	-Paper Receiving Sensor	Paper detected (Reflected light detected)
LED2 :	**A-KEN**	-Position A Sensor	Position A detected (Light path is blocked)
LED3 :	**P-SEN**	-Paper Sensor	Paper detected (Light path is blocked)
LED4 :	**UP-SEN**	-Elevator Upper Limit Sensor	Upper Limit Position detected (Light path is blocked)

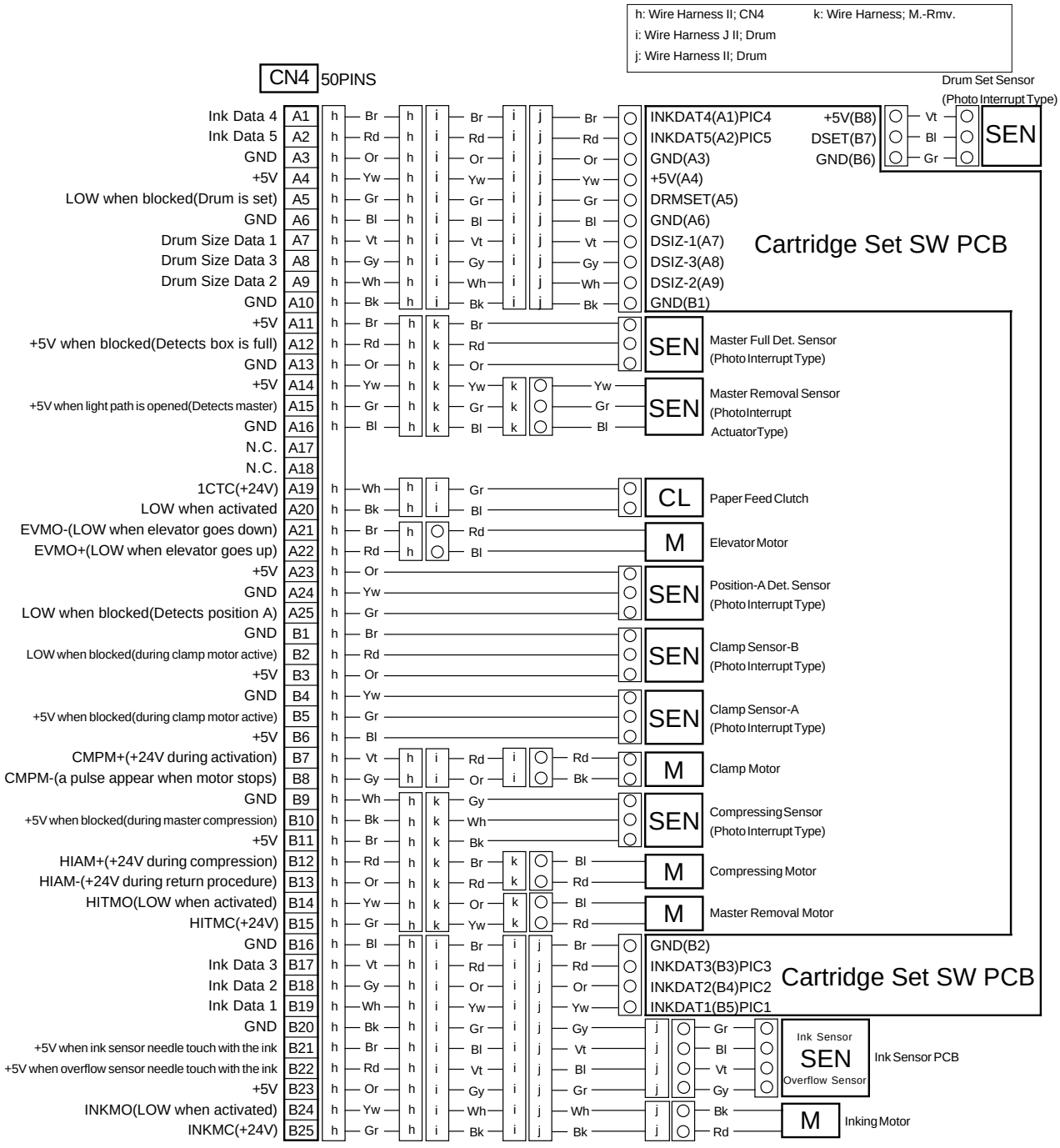
TP

TP1 :	**VDEO**	For factory adjustment only
TP2 :	**AGND**	For factory adjustment only
TP3 :	**SAMP**	For factory adjustment only
TP4 :	**DGND**	For factory adjustment only

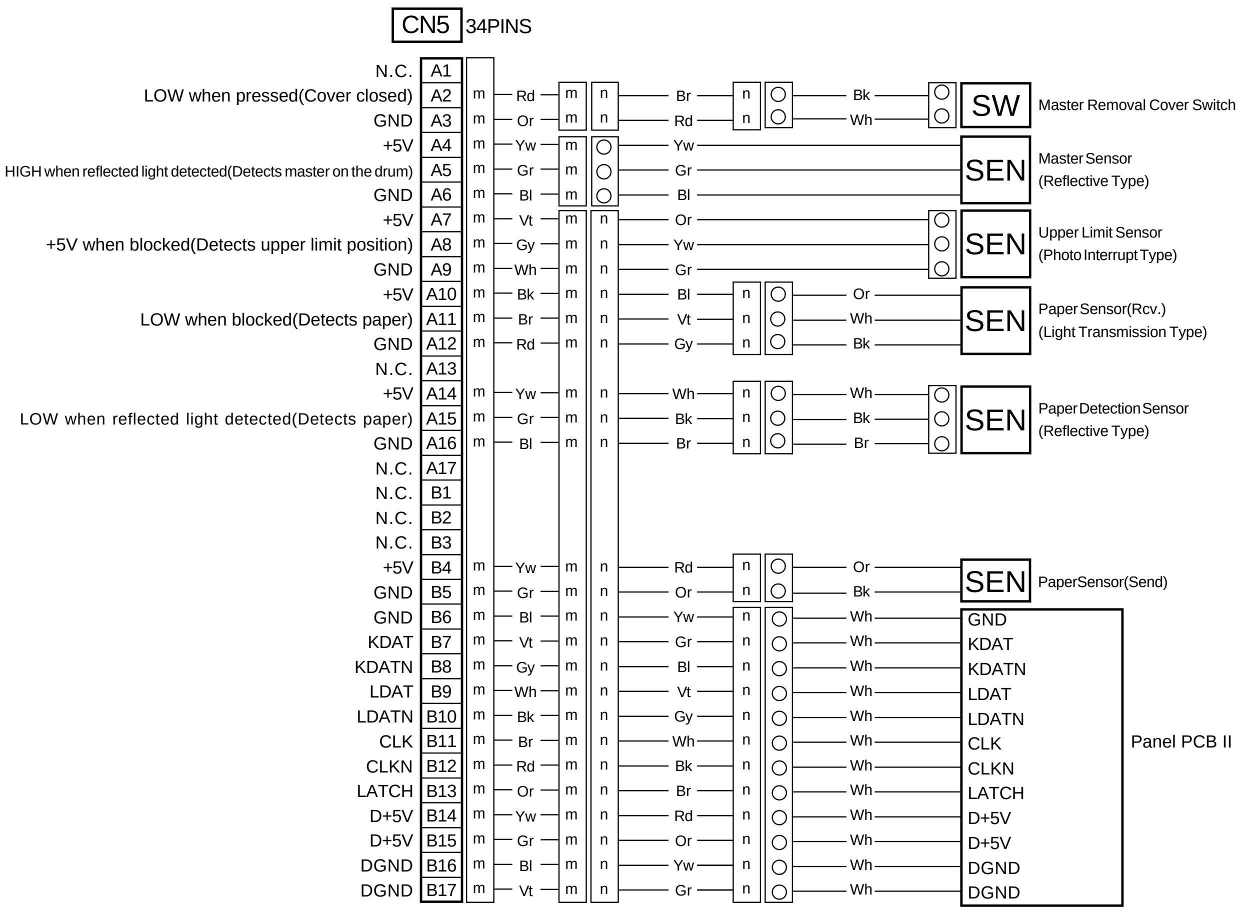
a: Wire Harness; Image Scanner d: Wire Harness; JS III
b: Wire Harness III; TPH-Signal
c: Wire Harness; Main-Power



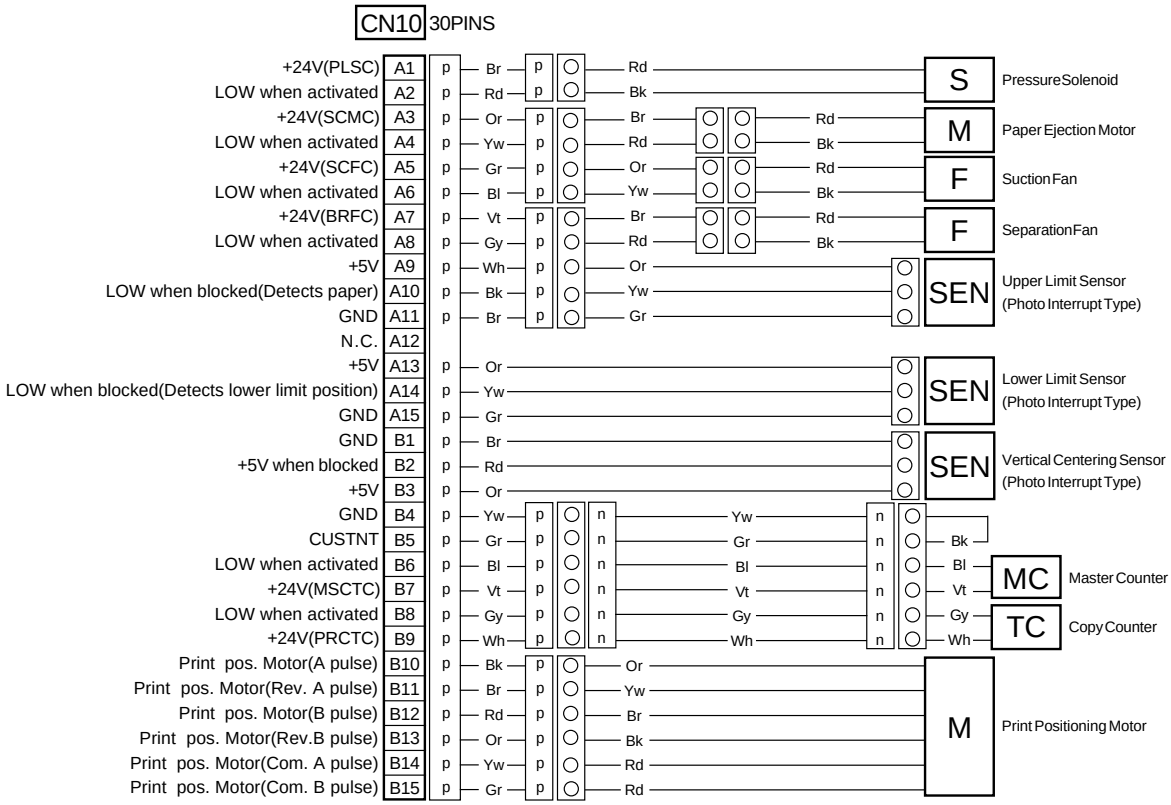

e: Wire Harness; M.-M.-Main
f: Wire Harness II; Read Pulse Motor
g: Wire Harness II; Write Pulse Motor
CN3 60PINS
LOW when activated A1
+24V A2
CHEC(No signal) A3
DGND A4
D+5V A5
AGND A6
A-12V A7
A+12V A8
LGND A9
+24V A10
+5V A11
LOW when blocked(ADF Cover closed) A12
GND A13
N.C. A14
N.C. A15
+24V A16
LOW when activated A17
+24V when activated A18
-1V when motor stops A19
+5V at home position A20
GND A21
N.C. A22
N.C. A23
N.C. A24
LOW when pressed(Unit closed) A25
GND A26
+5V A27
+5V when blocked(Detects master end) A28
GND A29
N.C. A30
N.C. B1
GND B2
LOW when reflected light detected(Detects master) B3
+5V B4
GND B5
+5V when tension plate is up(home) position B6
+5V B7
LOW when activated B8
+24V B9
Write P/M(A pulse) B10
Write P/M(Rev. A pulse) B11
Write P/M(B pulse) B12
Write P/M(Rev.B pulse) B13
Write P/M(Com. A pulse) +24V B14
Write P/M(Com. B pulse) +24V B15
N.C. B16
GND B17
+5V when reflected light detected(Detects original) B18
+5V B19
GND B20
+5V when light path is opened(Detects original) B21
+5V B22
ADF Read P/M(A pulse) B23
ADF Read P/M(Rev. A pulse) B24
ADF Read P/M(B pulse) B25
ADF Read P/M(Rev. B pulse) B26
ADF Read P/M(Com. A pulse) +24V B27
ADF Read P/M(Com. B pulse) +24V B28
N.C. B29
N.C. B30
ImageScanner
S
Original Feed Solenoid
SEN
ADF Cover Set Sensor (Photo Interrupt Type)
CL
Master Loading Clutch
M
Cutter Motor
SW
Cutter Switch
SW
Master Making Unit Set Switch
SEN
Master End Sensor (Photo Interrupt Type)
SEN
Master Positioning Sensor (Reflective Type)
SEN
Master Tension Plate Sensor (Photo Interrupt Type)
S
Master Tension Plate Solenoid
M
Write Pulse Motor
SEN
Original IN Sensor (Reflective Type)
SEN
Original Detection Sensor (Photo Interrupt Actuator Type)
M
Read Pulse Motor


h: Wire Harness II; CN4
i: Wire Harness J II; Drum
j: Wire Harness II; Drum
k: Wire Harness; M.-Rmv.
CN4 50PINS
Drum Set Sensor (Photo Interrupt Type)
Ink Data 4 A1
Ink Data 5 A2
GND A3
+5V A4
LOW when blocked(Drum is set) A5
GND A6
Drum Size Data 1 A7
Drum Size Data 3 A8
Drum Size Data 2 A9
GND A10
INKDAT4(A1)PIC4
INKDAT5(A2)PIC5
GND(A3)
+5V(A4)
DRMSET(A5)
GND(A6)
DSIZ-1(A7)
DSIZ-3(A8)
DSIZ-2(A9)
GND(B1)
+5V(B8)
DSET(B7)
GND(B6)
SEN
Cartridge Set SW PCB
+5V A11
+5V when blocked(Detects box is full) A12
GND A13
SEN
Master Full Det. Sensor (Photo Interrupt Type)
+5V A14
+5V when light path is opened(Detects master) A15
GND A16
SEN
Master Removal Sensor (Photo Interrupt Actuator Type)
N.C. A17
N.C. A18
1CTC(+24V) A19
LOW when activated A20
CL
Paper Feed Clutch
EVMO-(LOW when elevator goes down) A21
EVMO+(LOW when elevator goes up) A22
M
Elevator Motor
+5V A23
GND A24
LOW when blocked(Detects position A) A25
SEN
Position-A Det. Sensor (Photo Interrupt Type)
GND B1
LOW when blocked(during clamp motor active) B2
+5V B3
SEN
Clamp Sensor-B (Photo Interrupt Type)
GND B4
+5V when blocked(during clamp motor active) B5
+5V B6
SEN
Clamp Sensor-A (Photo Interrupt Type)
CMPM+(+24V during activation) B7
CMPM-(a pulse appear when motor stops) B8
M
Clamp Motor
GND B9
+5V when blocked(during master compression) B10
+5V B11
SEN
Compressing Sensor (Photo Interrupt Type)
HIAM+(+24V during compression) B12
HIAM-(+24V during return procedure) B13
M
Compressing Motor
HITMO(LOW when activated) B14
HITMC(+24V) B15
M
Master Removal Motor
GND B16
Ink Data 3 B17
Ink Data 2 B18
Ink Data 1 B19
GND(B2)
INKDAT3(B3)PIC3
INKDAT2(B4)PIC2
INKDAT1(B5)PIC1
Cartridge Set SW PCB
GND B20
+5V when ink sensor needle touch with the ink B21
+5V when overflow sensor needle touch with the ink B22
+5V B23
Ink Sensor
SEN
Overflow Sensor
Ink Sensor PCB
INKMO(LOW when activated) B24
INKMC(+24V) B25
M
Inking Motor

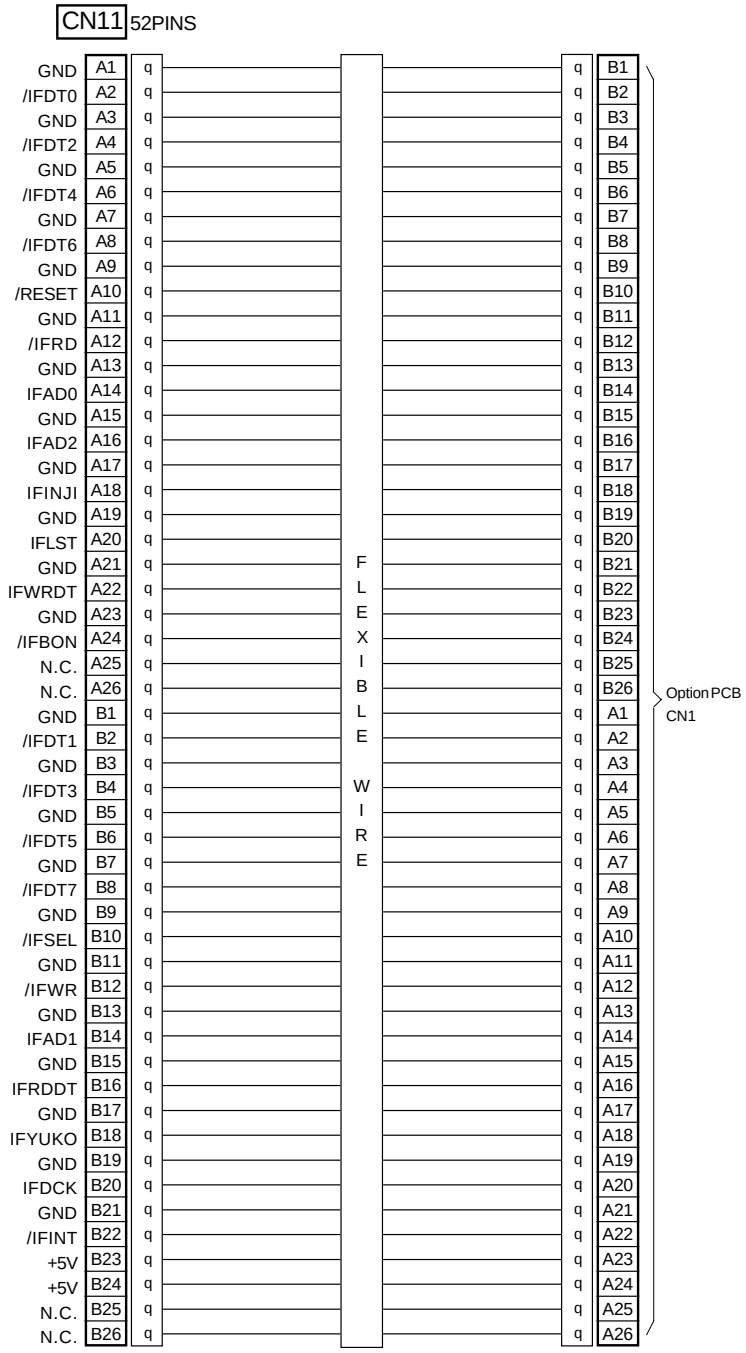
m: Wire Harness III; CN5
n: Wire Harness III; P.-F.



n: Wire Harness III; P.-F.
p: Wire Harness II; CN10

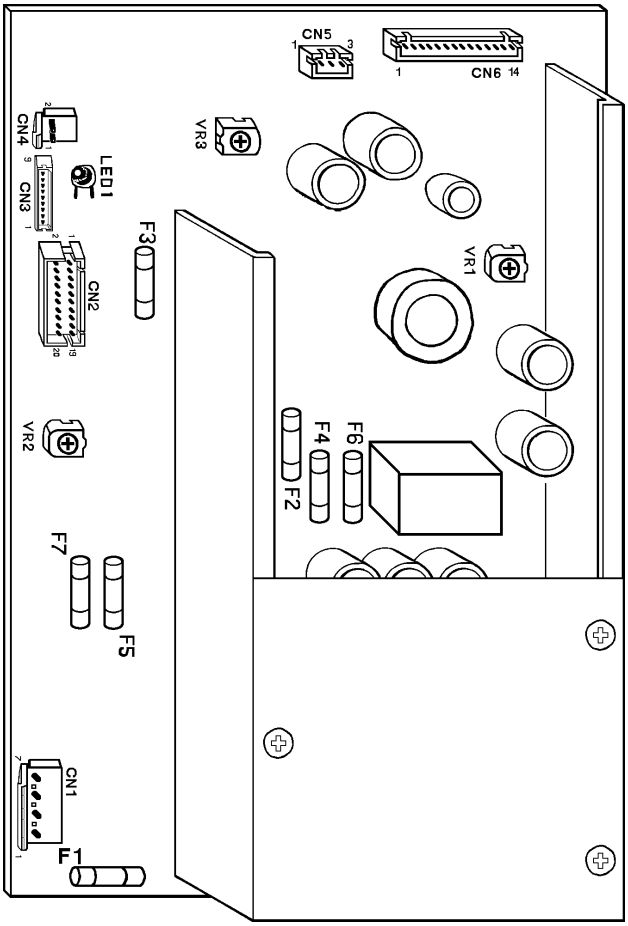


q: Wire Harness; I/F



4. Power Supply PCB

4-1. Power Supply PCB (100-120V)



CN

CN1 : From Main Power Switch
CN2 : To Main PCB II CN9
CN3 : To Safety Switches
CN4 : To Main PCB II CN8
CN5 : For adjusting of TPH voltage
CN6 : To TPH

VR

VR1 : For factory adjustment only
VR2 : For factory adjustment only
VR3 : For adjusting of TPH voltage

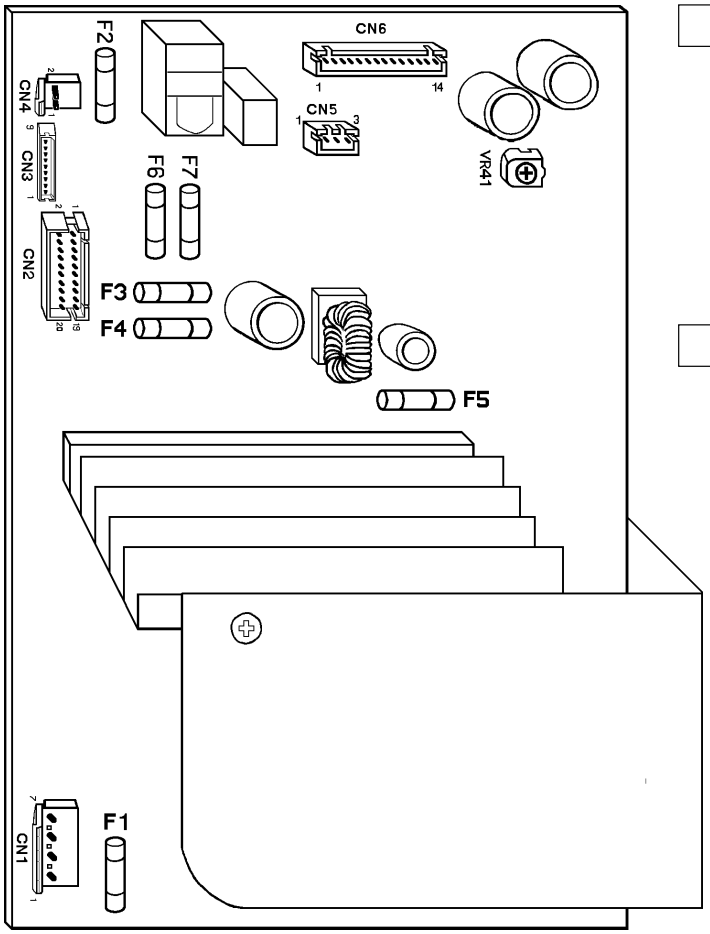
LED

LED1 : Lights up when all three safety switches closed (RL1 ON)

FUSE

No.	Specification	Voltage/ Pin number	Area
F1	10A 125V	Main Fuse	Input Voltage
F2	8A 125V	+24V (CN4, Pin2)	Main PCB II
F3	3.15A 125V	+24V (CN2, Pin15, 16, 19 & 20)	Main PCB II
F4	3.15A 125V	+24V (CN2, Pin17 & 18)	Main PCB II
F5	1A 125V	-12V (CN2, Pin1)	Main PCB II
F6	3.15A 125V	+24V (CN3)	All Safety Switchs
F7	1A 125V	+12V (CN2, Pin3)	Main PCB II

4-2. Power Supply PCB (200-240V)



CN

CN1 : From Main Power Switch
CN2 : To Main PCB II CN9
CN3 : To Safety Switches
CN4 : To Main PCB II CN8
CN5 : For adjustment of TPH voltage
CN6 : To TPH

VR

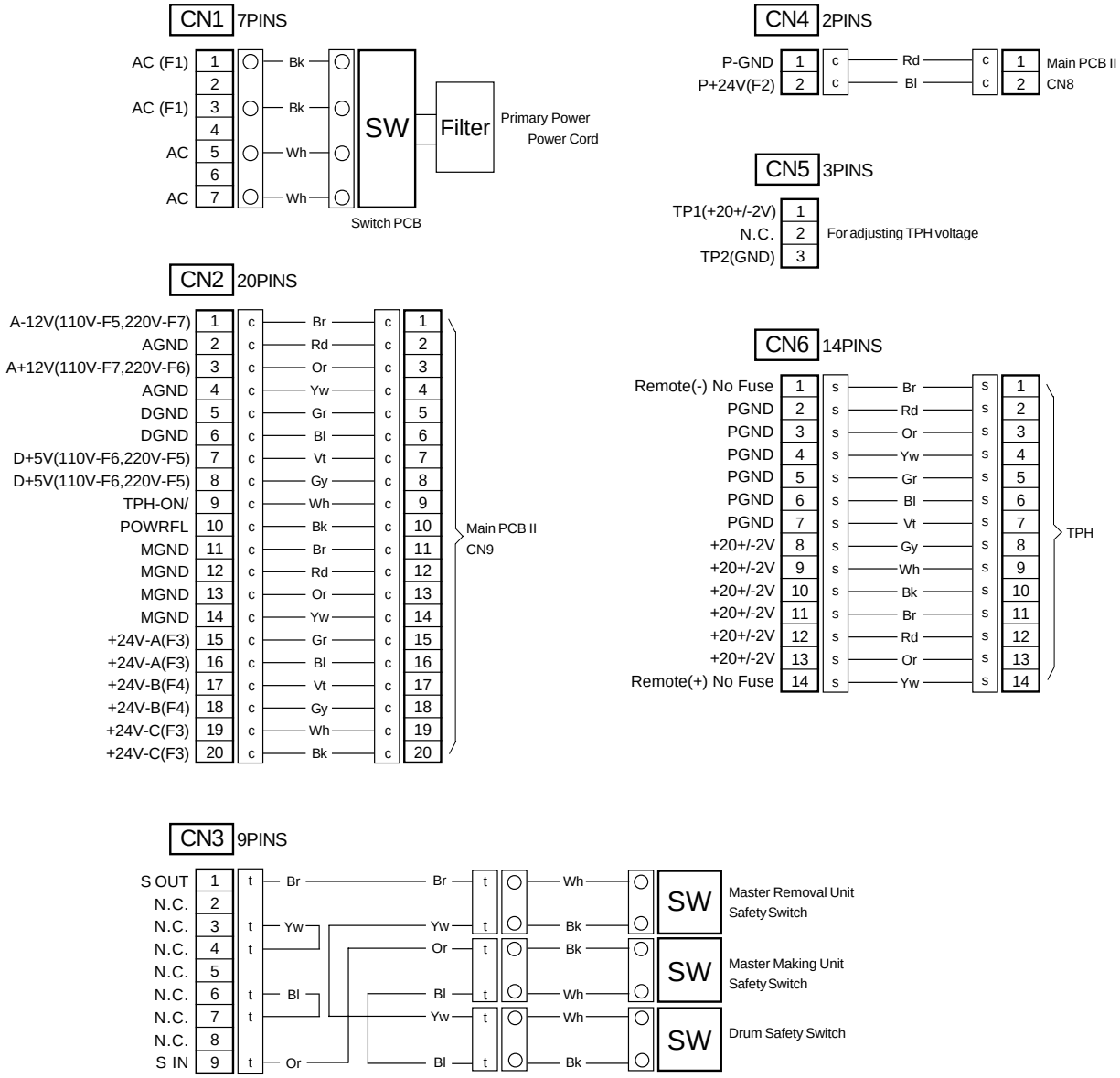
VR41 : For adjustment of TPH voltage

FUSE

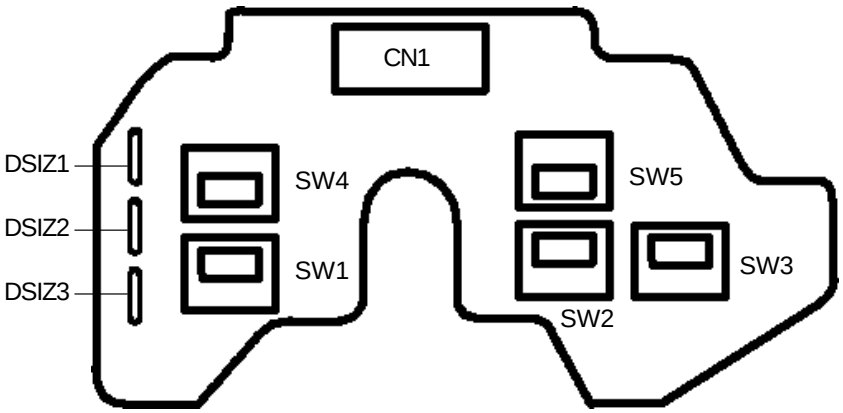
No.	Specification	Voltage/ Pin number	Area
F1	4A 250V	Main Fuse	Input Voltage
F2	6.3A 250V	+24V (CN4, Pin2)	Main PCB II
F3	3.15A 250V	+24V (CN2, Pin15, 16, 19 & 20)	Main PCB II
F4	3.15A 250V	+24V (CN2, Pin17 & 18)	Main PCB II
F5	3.15A 250V	-12V (CN2, Pin1)	Main PCB II
F6	1A 250V	+24V (CN3)	All Safety Switchs
F7	1A 250V	+12V (CN2, Pin3)	Main PCB II

DESCRIPTION OF POWER SUPPLY PCB (3/3)

c: Wire Harness; Main-Power
s: Wire Harness(II); TPH-Power
j: Wire Harness; Safety SW

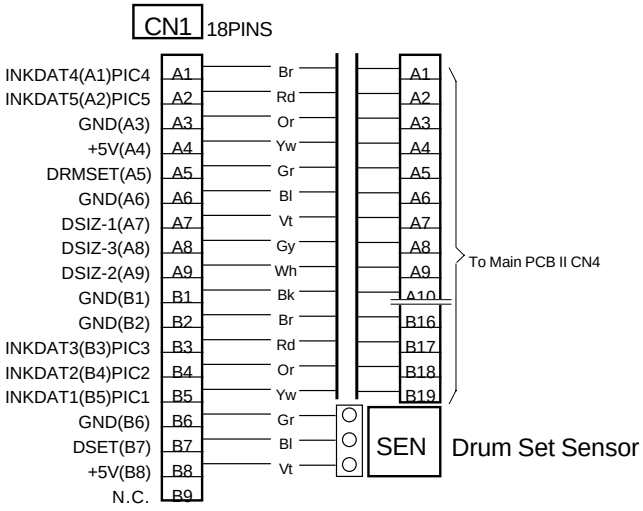


5. Cartridge Set SW PCB

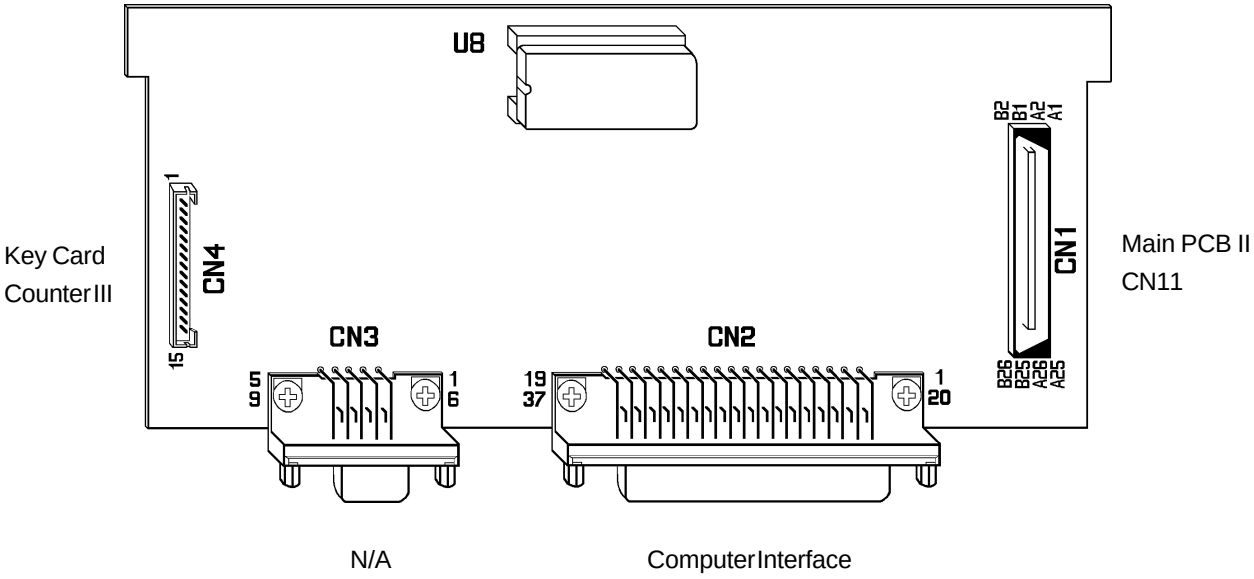


Drum Size/ Color Setting (Cartridge Set SW PCB)

	B4/ Black	B4/ Color	A4/ Black	A4/ Color	Legal/ Black	Legal/ Color
DSIZ1	——	——	Cut	Cut	——	——
DSIZ2	——	——	——	——	Cut	Cut
DSIZ3	——	Cut	——	Cut	——	Cut



6. Option PCB


U8
B2
B1
A2
A1
CN1
B26
B25
A26
A25
1
15
CN4
CN3
5
9
1
6
CN2
19
37
1
20
Key Card
Counter III
Main PCB II
CN11
N/A
Computer Interface

q: Wire Harness; I/F