Model HQ-OPAL

Machine Code: C639

SERVICE MANUAL

April 2007

Subject to change

IMPORTANT SAFETY NOTICES

Prevention of Physical Injury

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.

Health Safety Conditions

1. If you get ink in your eyes by accident, try to remove it with eye drops or flush with water as first aid. If unsuccessful, get medical attention.
2. If you ingest ink by accident, induce vomiting by sticking a finger down your throat or by giving soapy or strong salty water to drink.

Observance of Electrical Safety Standards

1. The printer and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.

⚠CAUTION

- The RAM has a lithium battery which can explode if handled incorrectly. Replace only with the same type of RAM. Do not recharge or burn this battery. Used RAM's must be handled in accordance with local regulations.

Safety and Ecological Notes for Disposal

1. Dispose of replaced parts in accordance with local regulations.
2. Used ink and masters should be disposed of in an environmentally safe manner and in accordance with local regulations.
3. When keeping used lithium batteries (from the main processing units) in order to dispose of them later, do not store more than 100 batteries (from the main processing units) per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

Symbols

This manual uses several symbols. The meaning of those symbols are as follows:

	See or Refer to
	Core tech manual
	Clip ring
	E-ring
	Screw
	Connector

TABLE OF CONTENTS

4. Service Tables

5. Detailed Section Descriptions

6. Point to Point Diagram

7. Specifications

1. Installation

Installation Requirements

The installation location should be carefully chosen, because the environmental condition could greatly affect the performance of the machine.

Required Environmental Conditions

1. Temperature – 10 to 30°C (50 to 86°F)
2. Humidity – 20 to 90% RH
3. Place the machine on a strong and level base. The machine must be level within 5 mm both front to rear and left to right.

Environments to Avoid

1. Locations exposed to direct sunlight or strong or light (more than 1,500 lux).
2. Area with corrosive gases.
3. Dusty areas.
4. Locations directly exposed to cool air from air conditioners or reflected heat from space heaters. (Sudden temperature changes from low to high or vice versa may cause condensation within the machine.)

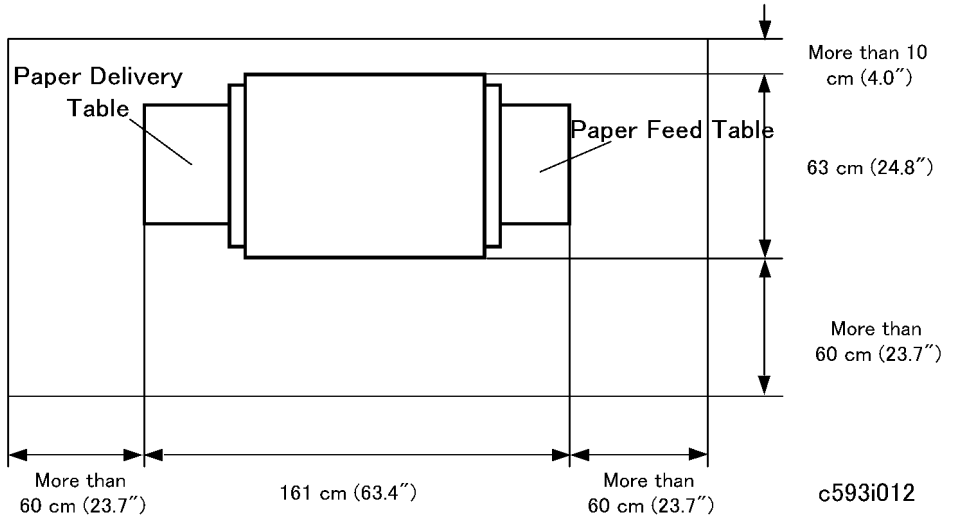
Power Connection

1. Securely connect the power cord to power source.
2. Make sure that the wall outlet is near the machine and easily accessible.
3. Make sure the plug is firmly inserted in the outlet.
4. Avoid multi-wiring.
5. Voltage must not fluctuate more than 10%.
6. Do not press anything on the power cord.
7. Always plug the power cord into a properly grounded outlet.
8. Power Source: 220-240V, 50/60Hz, 3.0A or more (120V, 50Hz, 5.5A or more) Please be sure to connect the power cord to a power source of this type.

1

Access to the Machine

Place the machine near a power source, providing clearance, as shown below.



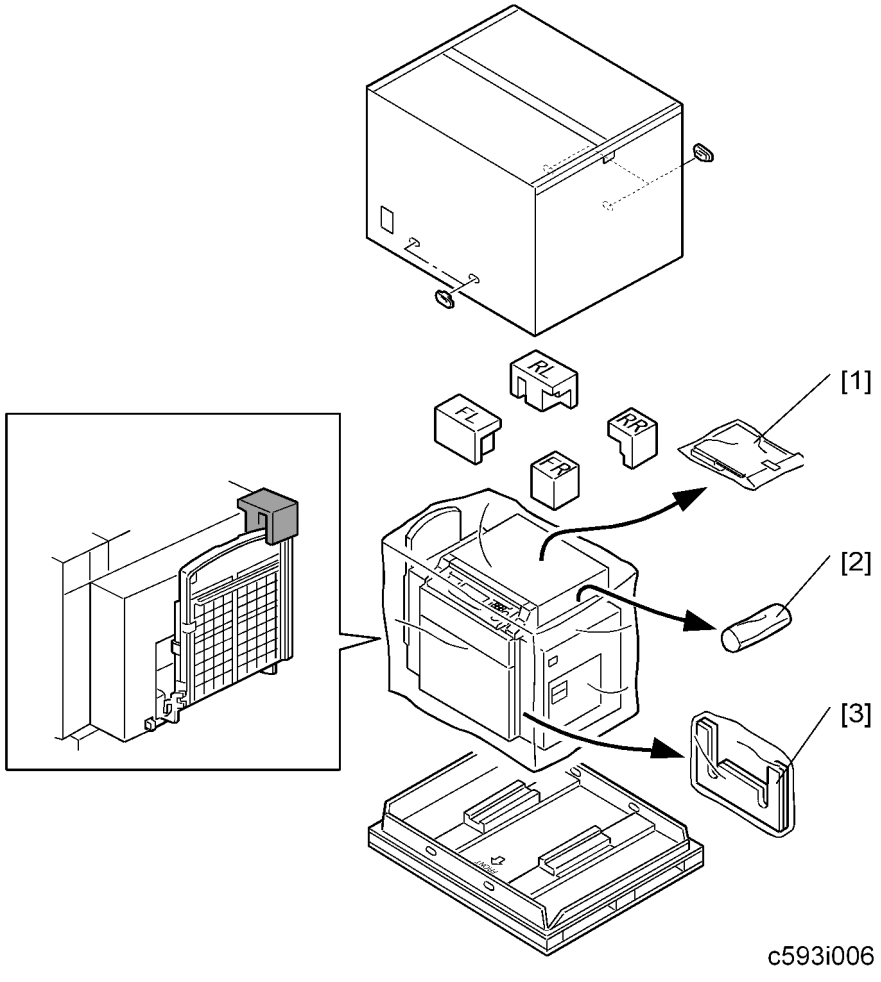
Installation Procedure

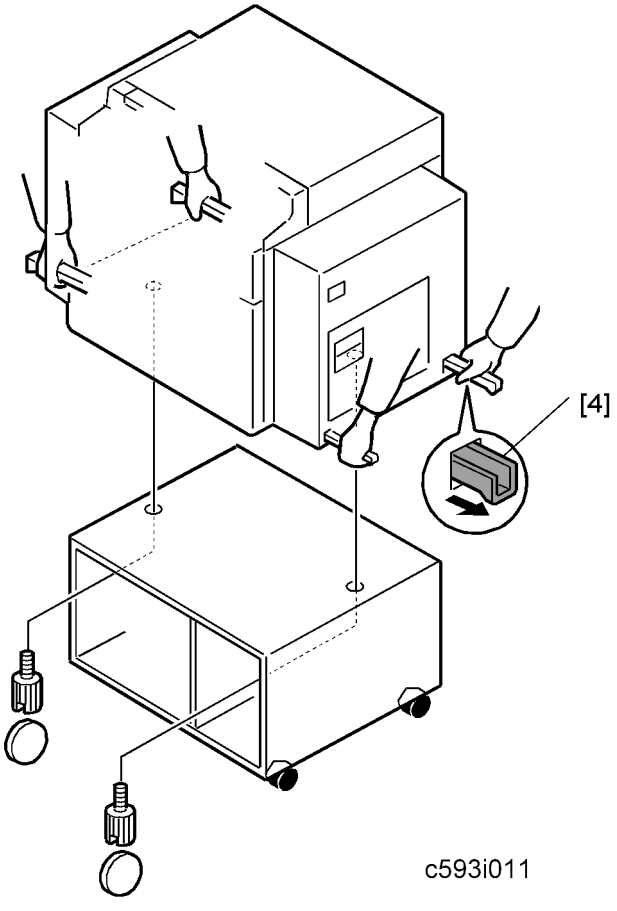
Accessory Check

Make sure that you have all the accessories listed below.

Operating Instructions	1
Safety Instruction Sheet (Except for North American Version)	1

Installation Procedure





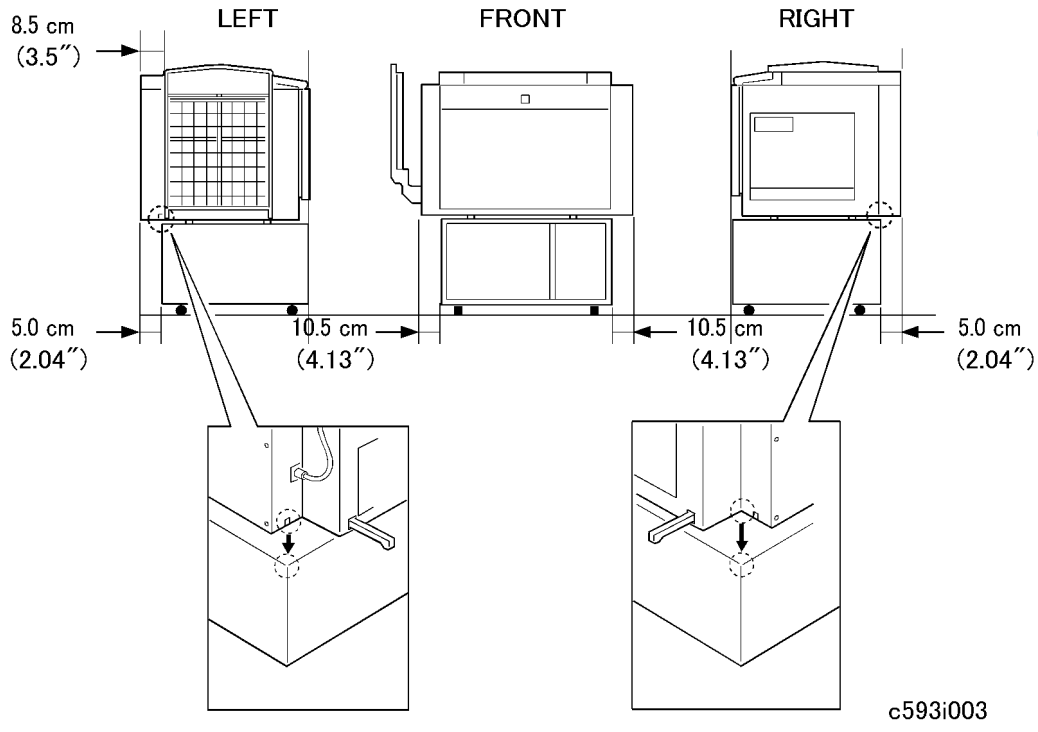
1. Unpack the main body. Take out the accessory bags [1], [2], and [3].

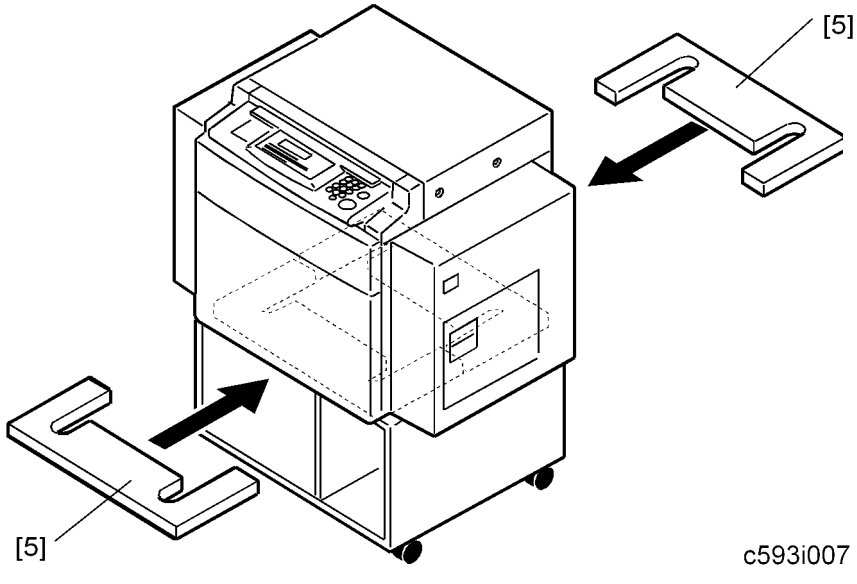
⚠CAUTION

- Only handle using the carrying handles [4] on the bottom of the machine. Your fingers could be caught during installation if you hold the bottom edge of the machine. (There is only a very narrow space between the two units.)

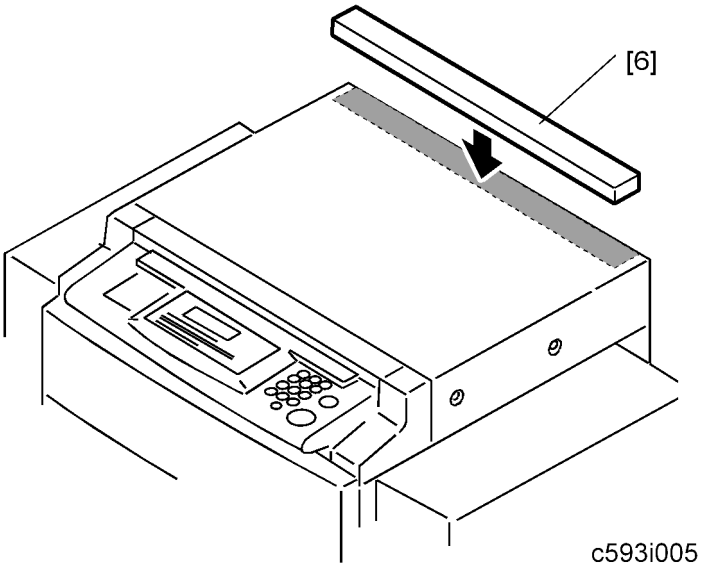
2. When installing the optional table, mount the machine as shown (2 screws packed with the table).

   Also refer to the following drawings.





3. Attach the two cushions [5] between the machine and the table.



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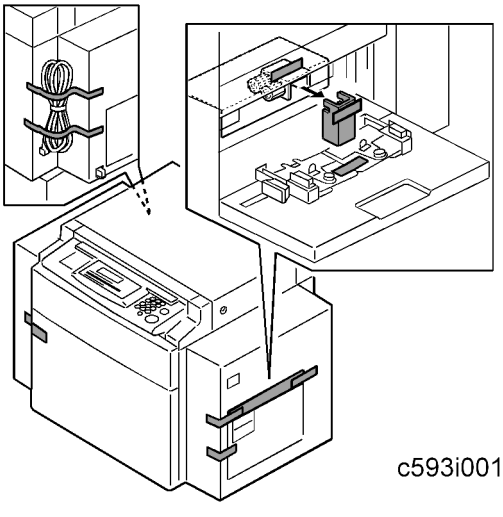
4. Attach the paper stopper [6].



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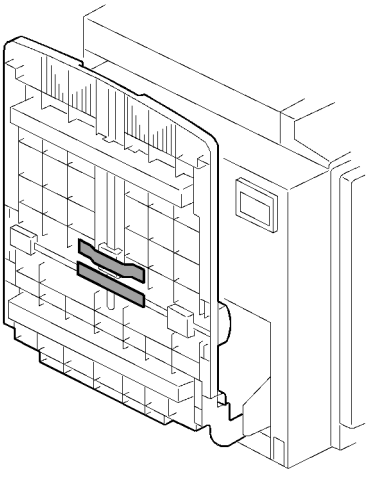

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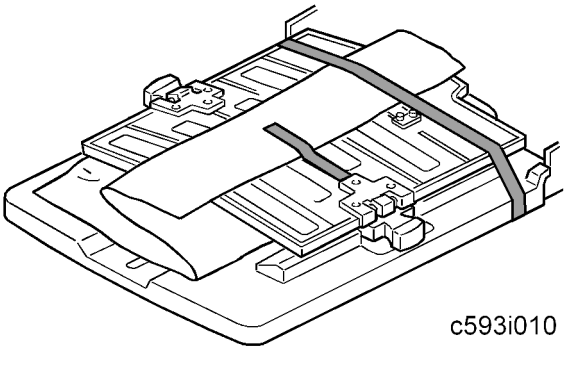

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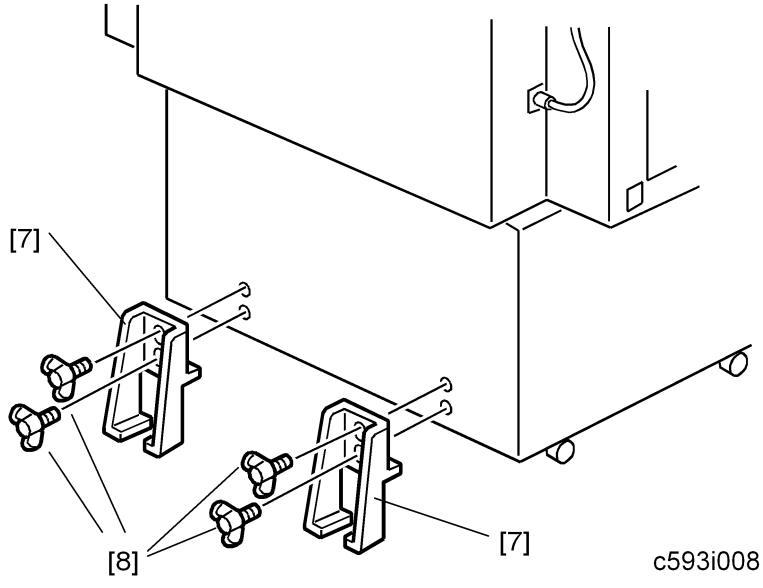
5. Remove the tape strips that secure the covers and units.



6. Attach the two stabilizer brackets [7] to the back of the table using the thumbscrews [8] (4 screws). All components are in the accessories.
7. Firmly insert the plug in the wall outlet.

⚠CAUTION

- Make sure that the wall outlet is near the machine and easily accessible.

8. Turn on the main switch.
9. Input the main body serial number with SP301.
10. Before you start using the machine, you must insert two drum units with masters wrapped around them and prepared for printing.

⚠CAUTION

- Read the following section for information on how to install the two drums.

11. Make some test copies.

Drum Installation Procedure

HQ-Opal is a slave printer that requires other machines to make the masters and provide drums.

Compatible drums: Pearl, PearlMC, Ruby, Garnet, Sapphire, SA2, EM, TZ, CE4

Overview

The following settings will require changing unless the master making machine is the EM, TZ, or CE4:

- Drum type setting
- Printing pressure adjustment.

The defaults are set up for the EM, TZ, or CE4.

For the other models (Pearl, PearlMC, Ruby, Garnet, Sapphire, SA2), do the following procedures at installation.

Note

- The HQ-Opal recognizes two drum types. However, two different drum types cannot be installed at the same time. If two different drum types are installed, the following message appears on the operation panel when the front door is closed.
- LCD message:
- Insert the same kinds of drum unit for both Drum 1 and Drum 2. If the message appears again, contact your service representative.
- A drum with an A4 size master cannot be used in the HQ-Opal.
- A4 size drums cannot be used in the HQ-Opal.

Drum Type Setting

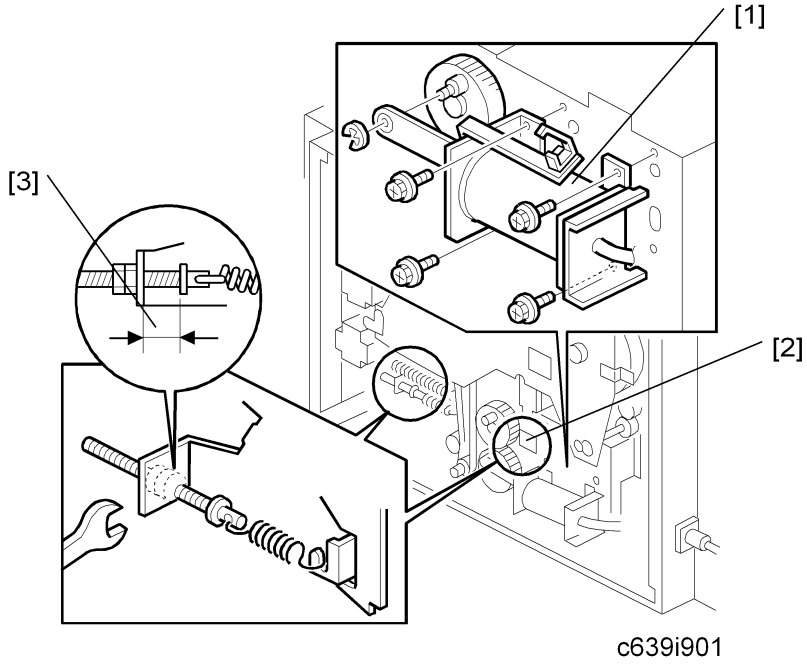
1. Clear Mode key ➜ 1, 0, 7 ➜ Clear/Stop key for more than 3 seconds.
2. Press 2, 0, 7 then press Enter. Select 1:B, if the customer will use Sapphire and SA2 drums. Then press Enter, then the Clear Mode key.

SP No.	LCD	Indication
207	DRUM TYPE SETTING	0:A, 1:B A: Pearl, Pearl-MC, Ruby, Garnet, EM, TZ, CE4 B: Sapphire, SA2

Printing Pressure Adjustment

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if needed, do it for the other drum.



Note

- To do this procedure for the 2nd drum unit, the center air pump [1] must be removed. This is because the adjustment has to be accessed through opening [2], which is behind the pump.

1. Rotate the drum unit to its drum removal position. If adjusting the gap for the 1st drum, move the 1st drum to its removal position.

   Note

   - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (section 6.3.3).
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (section 6.3.3).

2. Tighten the nut until gap [3] is correct for the machine that is being used.
   - EM (C262), TZ (C265), CE4 (C269): 16 ±0.3mm (this is the default setting)
   - Pearl (C229), Pearl-MC (C233), Ruby (C232), Garnet (C239): 18 ±0.3mm
   - Sapphire (C235), SA2 (C244): 19 ±0.3mm

2. Maintenance Table

Maintenance Table

The following items should be maintained periodically. There are two sets of intervals - one based on time and the other based on print count. For maintenance items with entries in both of them, use whichever comes first.

C: Clean, R: Replace, L: Lubricate, A: Adjust

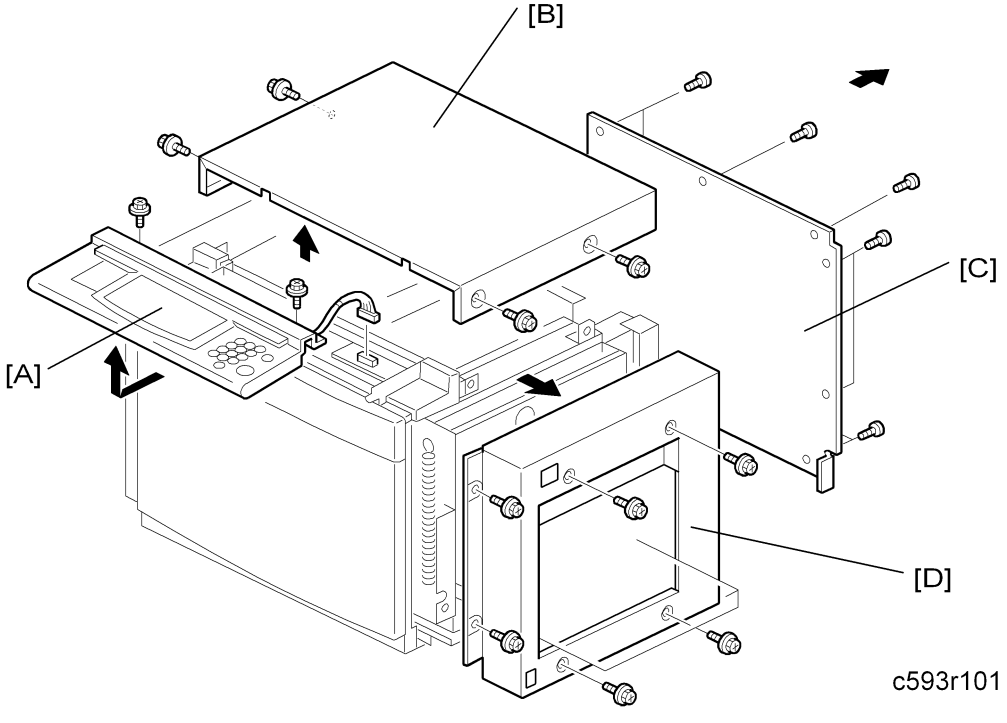
Item	Time				Print Counter					E M	NOTE
	6 M	1 Y	2 Y	3 Y	300 K	600 K	1 M	1.2 M	2 M		
Paper Feed											
Paper Pick-up Roller	C	C	R	C				R			Damp Cloth
Paper Feed Roller	C	C	R	C				R			Damp Cloth
Press Roller	C	C	R	C				R			Alcohol
Paper Feed and Pick-up Roller One-way Clutches			R					R			
Friction Pad	C	C	R	C				R			Damp Cloth
Feed Roller and Transport Belt Roller Bushings		L	L	L							Motor Oil (SAE #20)
Feed Drive Gears		L	L	L							Grease (Albania #2)
Paper Delivery Transport Belts			R					R			
Paper End Sensor	C	C	C	C							Dry Cloth
Registration/Feed Timing/Relay Transport/Exit Sensors	C	C	C	C							Dry Cloth
Registration Roller	C	C	C	C							Dry Cloth
Drum and Ink Supply											

Item	Time				Print Counter					EM	NOTE
	6M	1Y	2Y	3Y	300K	600K	1M	1.2M	2M		
Drum Drive Gears and Cam		L	L	L							Grease (Albania #2)
Drum Flange Bushing		L	L	L							Motor Oil (SAE #20)
Others											
Timing Belt Tension			A								

3. Replacement and Adjustment

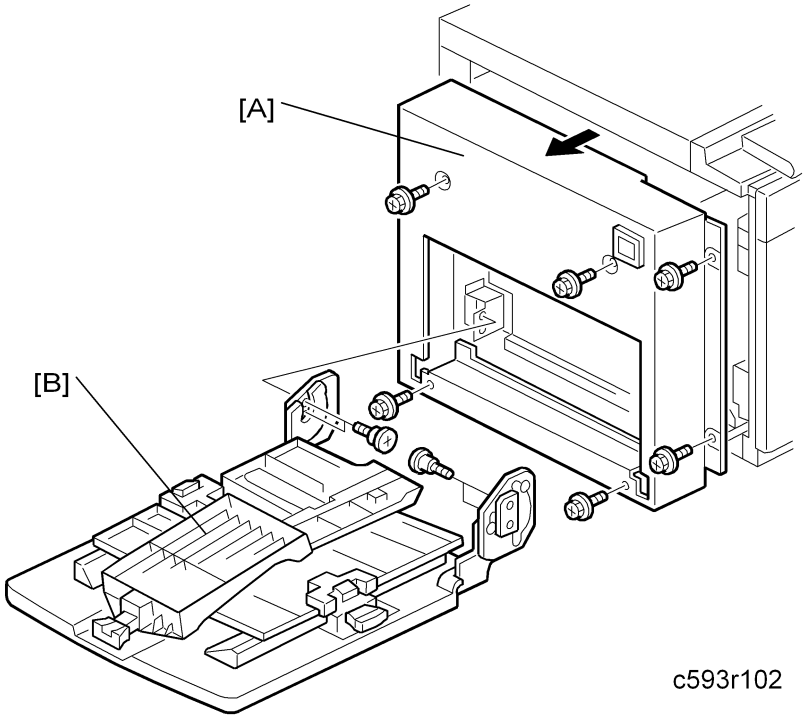
Exterior

Operation Panel, Upper, Rear, and Right Covers



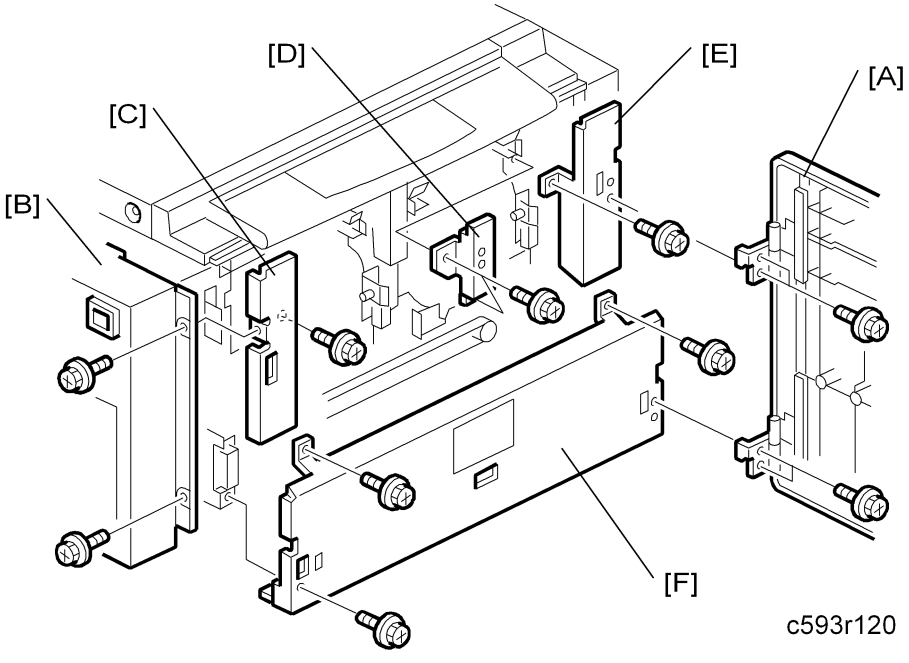
1. Remove the operation panel [A] (x 4).
2. Remove the upper cover [B] (x 11).
3. Remove the rear cover [C] (x 6).
4. Remove the right cover [D] (x 2, x 1).

Left Cover and Paper Delivery Table



1. Remove the left cover [A] (x 4).
2. Remove the paper delivery table [B] (x 6).

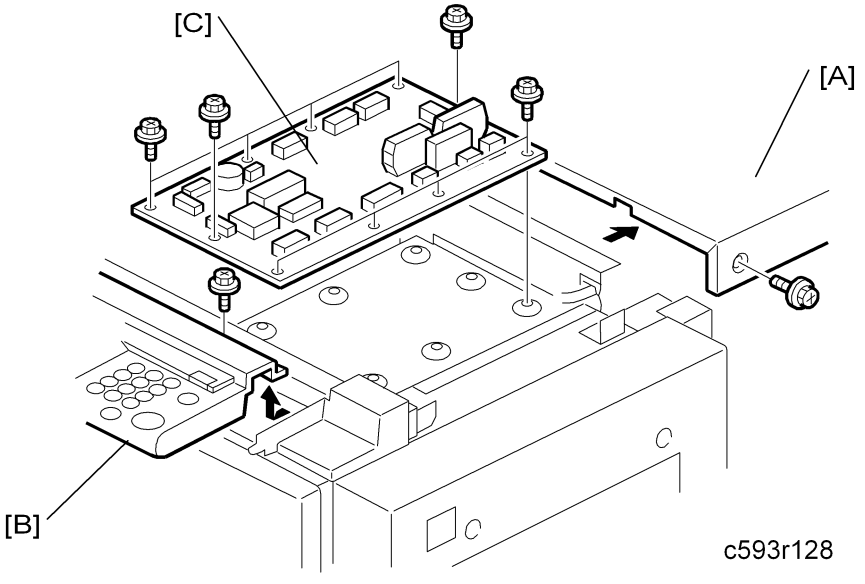
Front, Left, Left Inner, 1st LED, Right Inner, and Lower Inner Covers



1. Remove the front door [A] (x 4).
2. Remove the left cover [B] (x 2).
3. Remove the left inner cover [C] (x 1).
4. Remove the 1st LED cover [D] (x 2).
5. Remove the right inner cover [E] (x 1).
6. Remove the lower inner cover [F] (x 3).

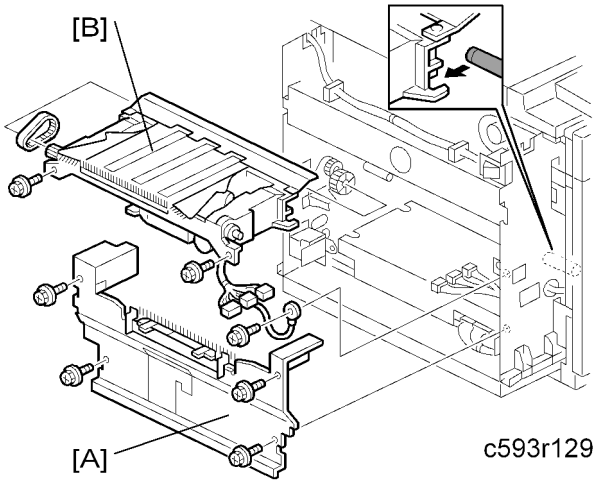
Boards

MPU

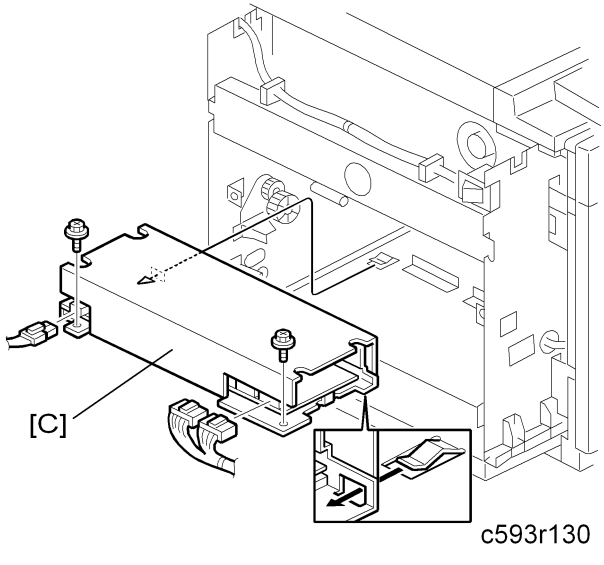


1. Remove the upper cover [A] (x 4).
2. Remove the operation panel [B] (x 2, x 1).
3. Remove the MPU board [C] (x 10, x 12).

PSU



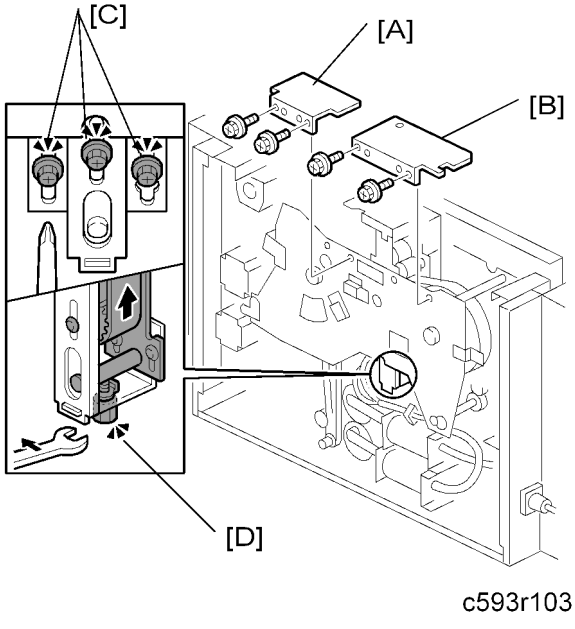
1. Remove the paper delivery table (x 4).
2. Remove the paper delivery cover [A] (x 4).
3. Remove the paper delivery unit [B] (x 3, x 3, 1 belt).



4. Slide the PSU board [C] forward and remove it (x 2, x 3).

Main Belt Removal and Adjustment

Removal

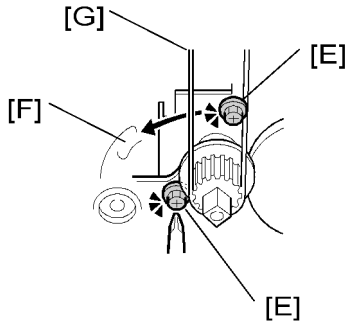


c593r103

1. Turn on the main switch and access SP601 (registration adjustment) and SP602 (drum synchronization adjustment).
2. Return SP601 and 602 to their default settings (both 0.0).
3. Remove both drums from the machine.
4. Using the 1st drum removal button on the operation panel, rotate the 1st drum holding unit to its drum removal position, i.e. to the 1st drum set sensor position.
5. Remove the rear cover (x 7).
6. Remove the 1st and 2nd drum safety covers [A] and [B] (each x 2).
7. Loosen the three screws [C] to about half way.

Note

- Also, loosen the tension adjustment screws [D] halfway. This will be necessary for tension adjustment when the belt is installed.



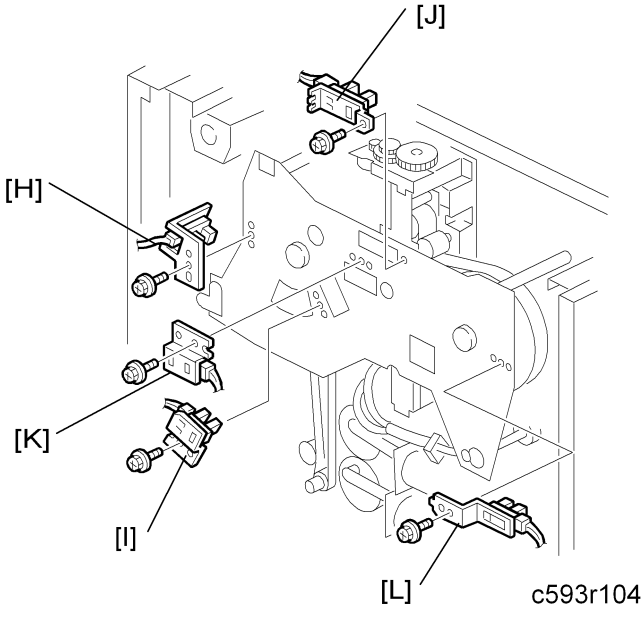
c593r500

8. Loosen the two screws [E] so that the tension bracket [F] freely turns.

Note

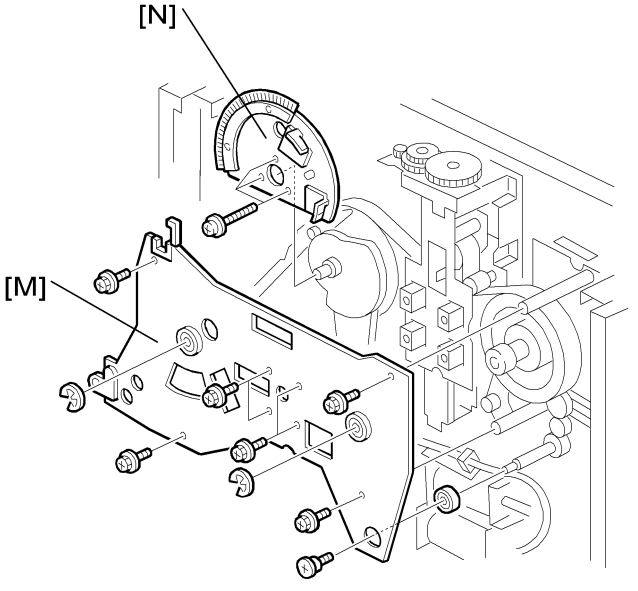
- When re-tightening the bracket, make sure that the upper screw is led all the way to the end of the bracket groove.

9. Remove the gear belt [G].



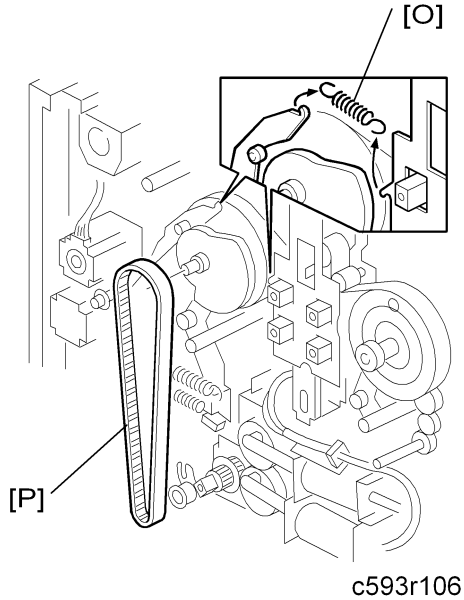
c593r104

10. Remove the feed encoder sensor assembly [H] (x 1).
11. Remove the feed start sensor assembly [I] (x 1).
12. Remove the synchronization HP sensor assembly [J] (x 1).
13. Remove the 1st drum set sensor assembly [K] (x 1).
14. Remove the 2nd drum set sensor assembly [L] (x 1).



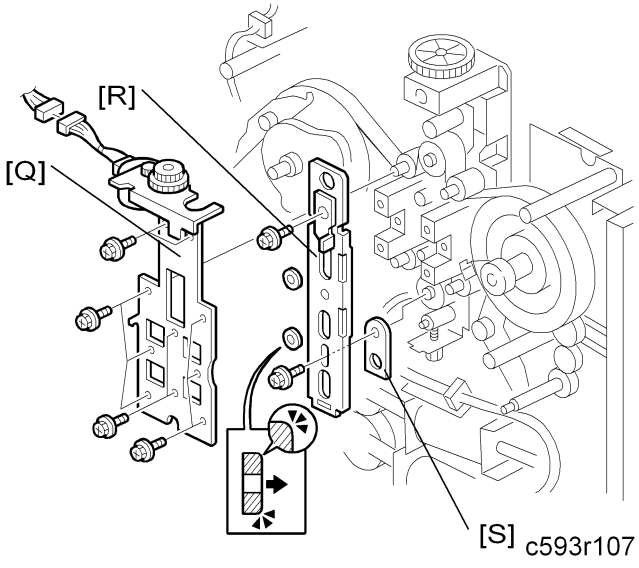
c593r105

15. Remove the side plate [M] (2 x ℂ, 𝒻 x 9, 3 bearings).
16. Remove the semi-circular plate [N] with the encoder and actuators attached.



c593r106

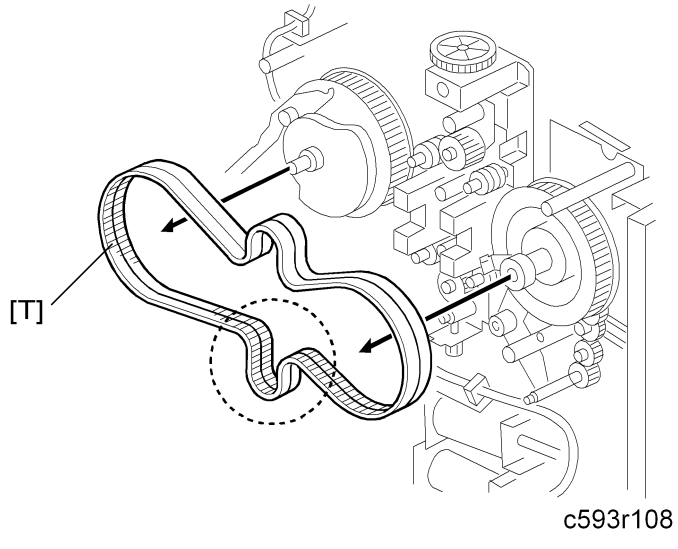
17. Remove the spring [O] that is hooked to the printing pressure arm.
18. Remove belt [P].



19. Remove the synchronization unit bracket [Q] (x 10, x 1).
20. Remove the movable bracket [R] and securing plate [S] (x 2, 2 spacers).

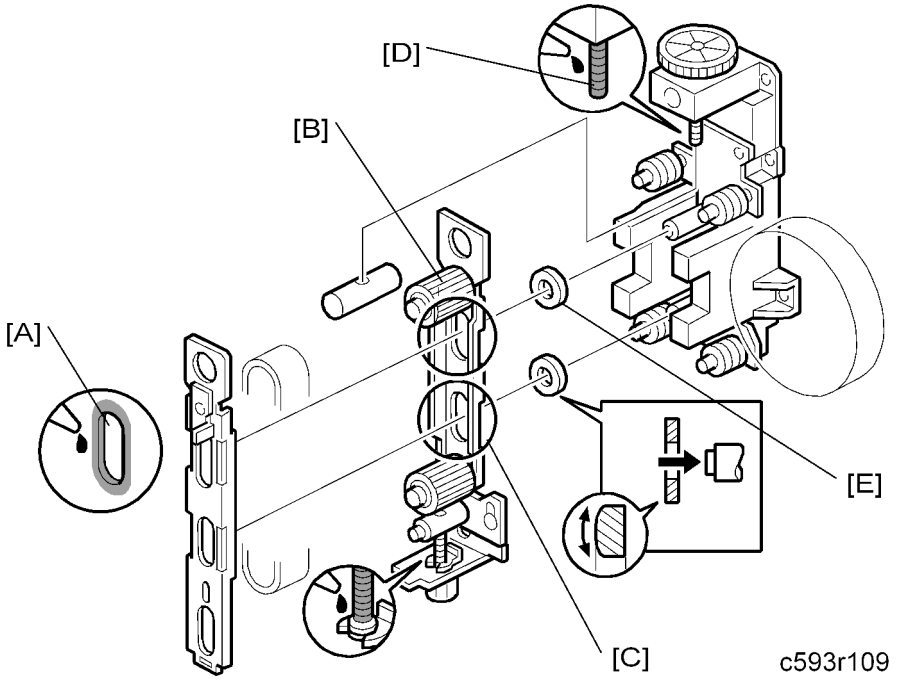
Note

- When re-installing these parts, make sure that the spacers are oriented as shown in the illustration.



21. Remove the main belt [T], starting from the lower section.

Lubrication



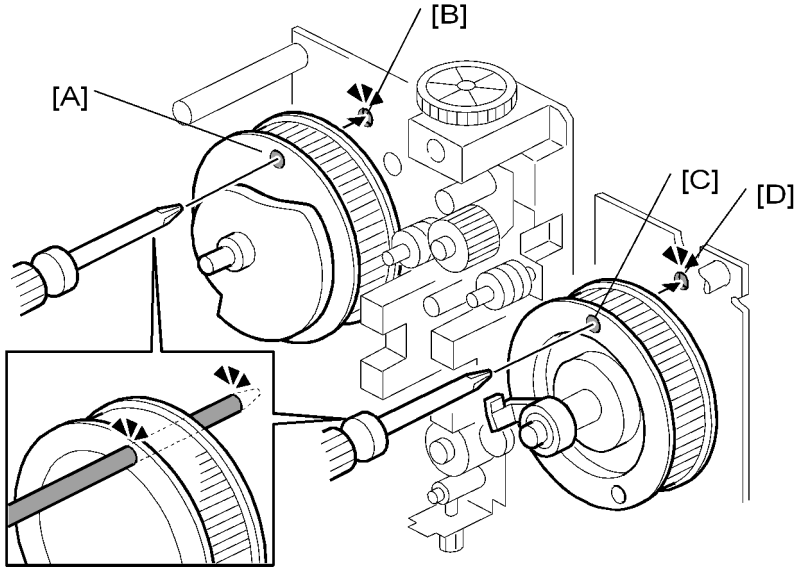
1. Apply Albania #2 grease to slots [A], [B] and [C], and screw [D].

   Note

   - Area [A] (front movable bracket) contains 4 slots that require grease (3 elongated, 1 circular).

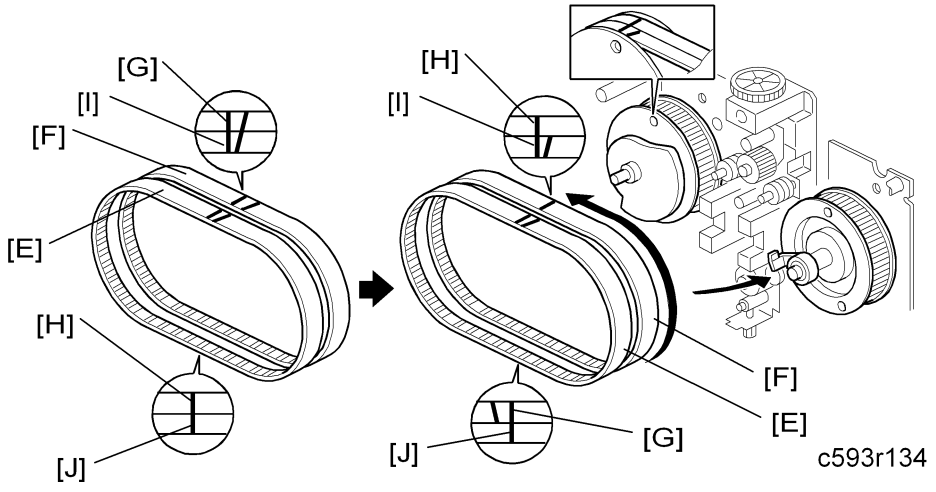
2. Reattach the brackets ([R] and [S] in the previous procedure), making sure that the 2 spacers [E] are oriented as shown in the illustration.

Main Belt Installation

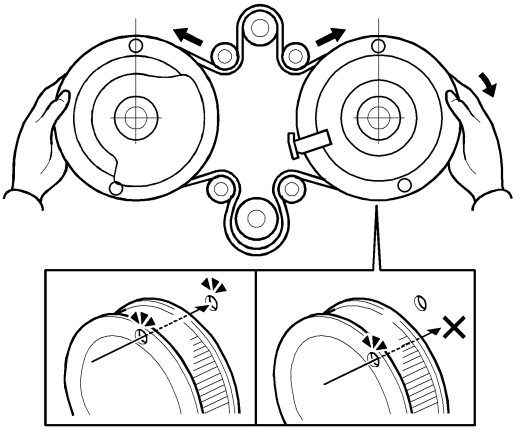


c593r110

1. Line up the holes in the 1st drum pulley [A] and side plate [B] (the bevelled hole in the pulley must be at the top).
2. Insert a screwdriver through these two holes.
3. Rotate the 2nd drum pulley [C] until the sensor actuator is at the eight o'clock position as shown in the diagram.
4. Line up the holes in the 2nd drum pulley [C] and side plate [D].
5. Insert a screwdriver through these two holes.



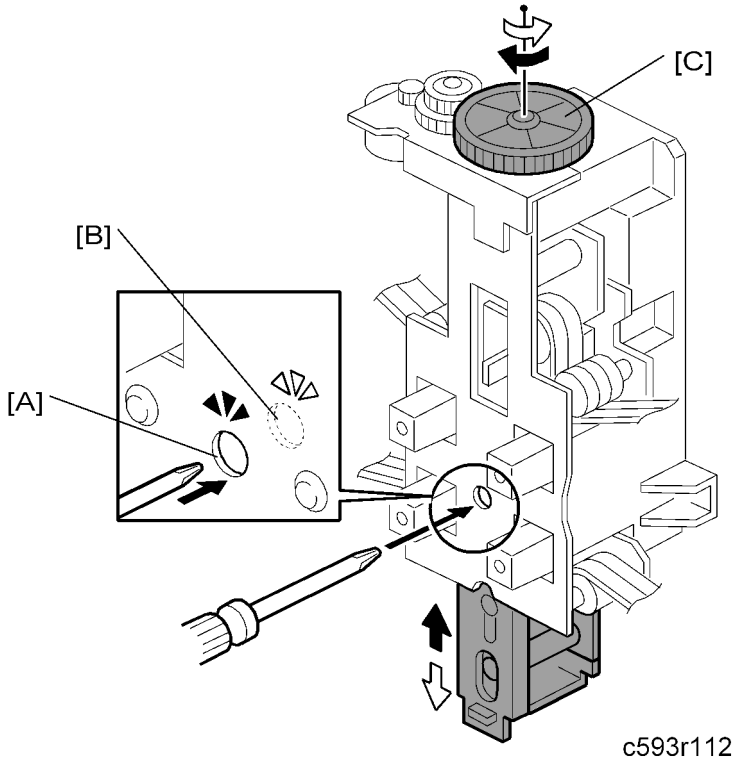
c593r134



c593r111

6. Attach the main belt from above the drum pulleys as follows.
    - Line up reference marks [G] and [H] on belt [F] with marks [I] and [J] on main belt [E]. Refer to the left part of the above diagram.
    - Then, rotate belt [F] 1/2 turn so that mark [I] on belt [E] is lined up with mark [H] on belt [F]. Refer to the central part of the above diagram.
    - Then, line up mark [H] on belt [F] with the groove just above the hole in the 1st drum pulley. Refer to the upper right part of the above diagram.
7. Remove the screwdrivers.
8. With both hands, hold the pulleys as shown and rotate them outward until the belt is taut.
9. Line up the holes in the 2nd drum pulley [C] and side plate [D] again.

Synchronization Unit Adjustment

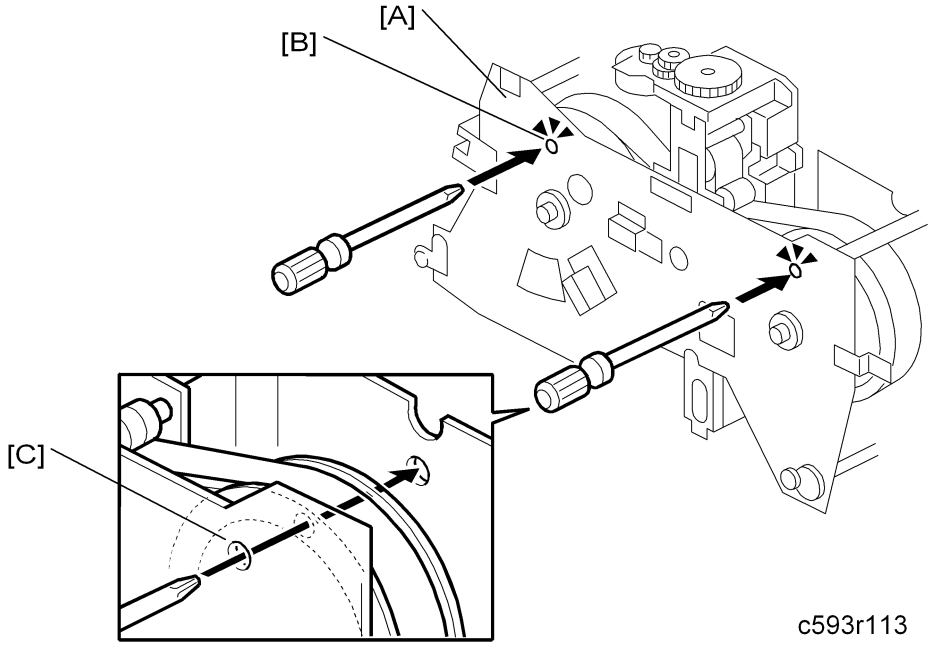


1. Install the synchronization unit. This consists of part [Q] in the Main Belt Removal procedure (section 6.3.1).
2. Confirm that hole [A] in the synchronization unit is lined up with hole [B] in the moveable bracket.
3. If they are not, line them up by manually turning the synchronization motor gear [C].

Note

- When the synchronization motor is turned clockwise, the bracket moves upward.

Final Positioning of the Main Belt and Pulleys

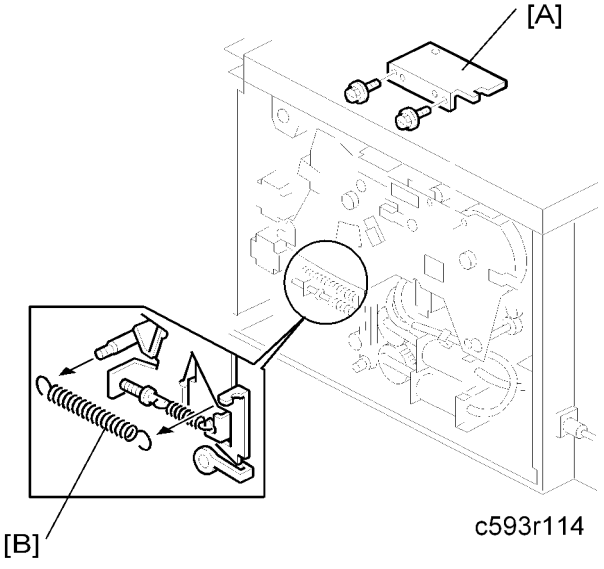


1. Reattach parts [N], [O], and [P] from the main belt removal procedure.
2. Attach the side plate [A] to the mainframe.
3. After confirming that the 1st drum pulley is in the removal position, insert a screwdriver in the hole [B].

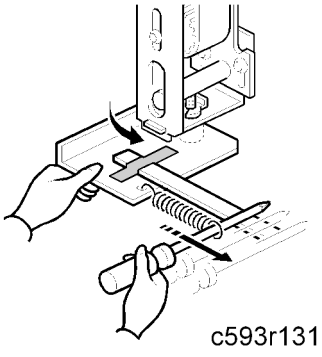
   Note

   - The 1st drum pulley is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (section 6.3.3).
4. Rotate the 2nd drum pulley clockwise until the belt is taut and insert a screwdriver in the hole [C].

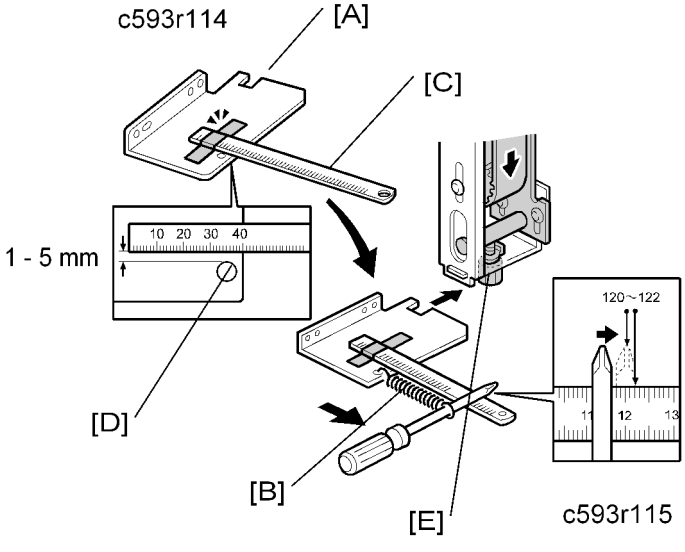
Main Belt Tension Adjustment



c593r114



c593r131



c593r115

1. Remove the 2nd drum safety cover [A] (x 2).
2. Remove the printing pressure spring [B].
3. Attach the ruler [C] to the 2nd drum safety cover [A] with cellophane tape.

Note

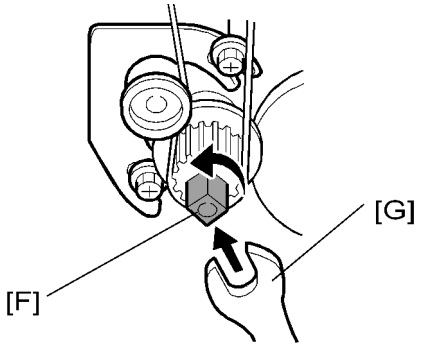
- As shown in the illustration, line up the ruler's 40 mm mark with the edge of the cover.

4. Hook the end of the pressure spring [B] removed above into the hole [D] in the 2nd drum safety cover [A].

5. While holding the safety cover in your left hand, guide the screwdriver through the opposite hook in the pressure spring.
6. Pull outward on the spring, allowing the safety cover to rotate counter clockwise around the pivot point, turning the tension adjustment screw [E]. Do this until the screwdriver reaches 120 to 122 mm on the ruler.

Note

- Pulling the screwdriver with your right hand should be the only motion that turns the belt tension screw.

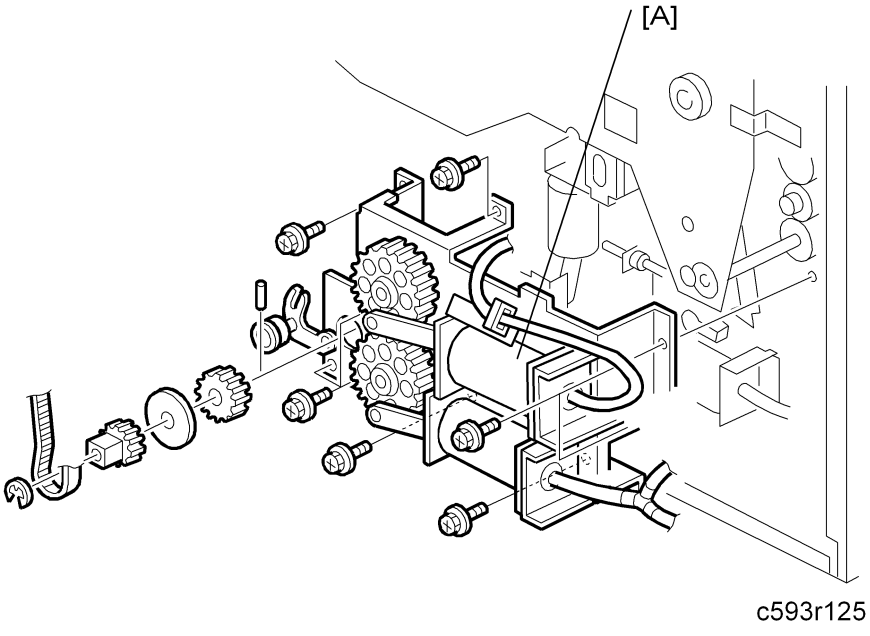


c593r135

7. Rotate the pump drive shaft [F] with a wrench [G] until the drum holding unit completes 1 rotation.
8. Do step 6 again. Retighten three screws (screws [C] in step 7 of the Main Belt Removal procedure - section 6.3.1).
9. Reassemble the machine.
10. Make a test copy. If the drum 1 and drum 2 images are misaligned after reassembling the machine, adjust SP602.

Air Pumps

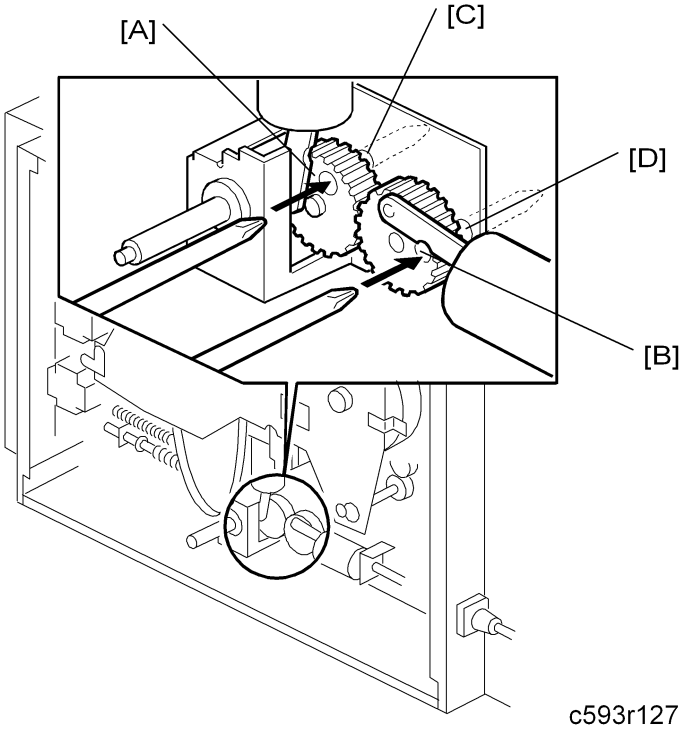
Left & Right Exit Pawl Pump Units



1. Rotate the 1st drum unit to the drum removal position, i.e. the 1st drum set sensor position.
2. Remove both pump units [A] (x 7).

Central Exit Pawl Pump Gear HP Adjustment

Purpose: To ensure that the paper pawl air pump produces a jet of air when the paper exit pawl is in the upper position (near the drum surface)

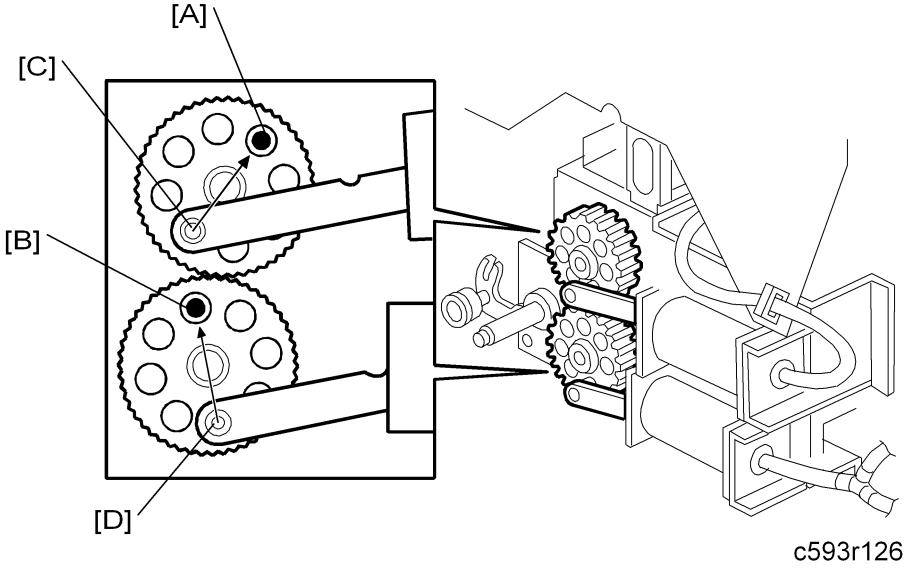


1. With a wrench, rotate the 1st drum unit to the removal position, i.e. to the 1st drum set sensor position.
    - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (section 6.3.3).
2. Line up holes [A] and [B] in the gears with holes [C] and [D] in the bracket and insert a screwdriver through each set of holes.

Note

- These holes are lined up when the left gear link [A] is in the 8 o'clock position and the right gear link [B] is in the 12 o'clock position.

Left & Right Exit Pawl Pump Gear HP Adjustment

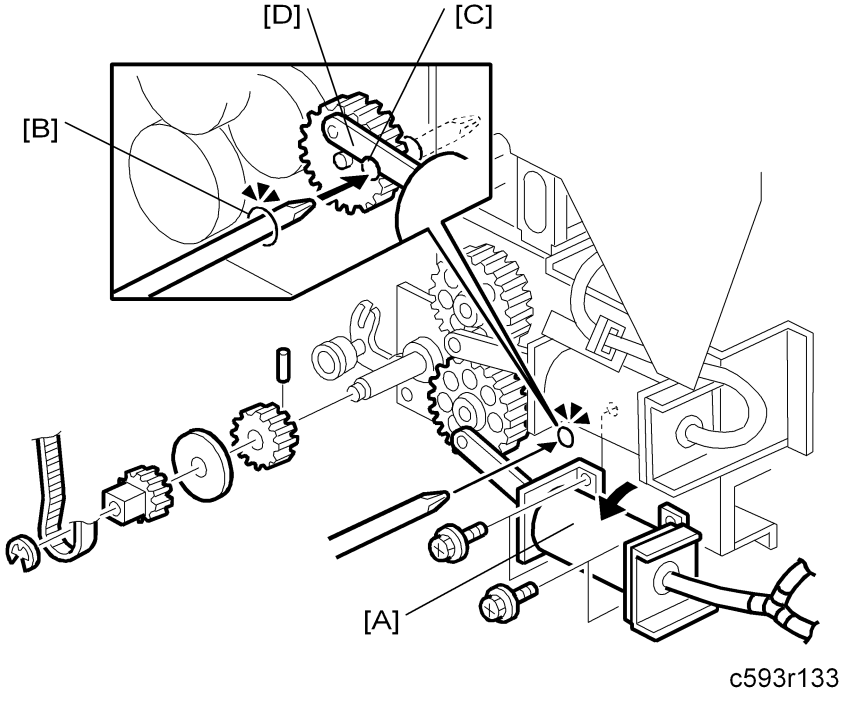


1. Install the left & right exit pawl pump units.
2. Rotate the 1st drum unit to the drum removal position, i.e. the 1st drum set sensor position.
3. Line up the holes [A] and [B] in the gear with the holes in the gear bracket and insert a screwdriver through each set of holes. If the holes are not lined up, remove the E-rings and reposition the gears.

Note

- The holes are lined up when the upper gear link is in the 7 o'clock position [C] and the lower gear link is in the 5 o'clock position [D].

Final Check for Central Pump Gear HP



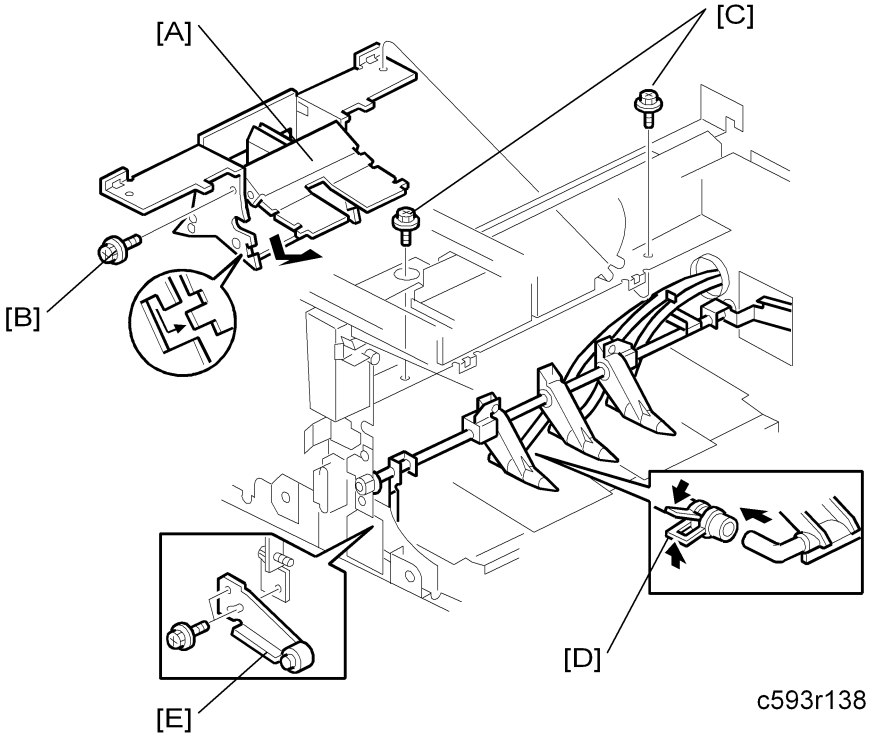
1. Remove the lower air pump [A] (x 4).
2. Insert a screwdriver through hole [B] in the bracket located behind the lower pump of the left/right pawl pump unit.
3. Check whether hole [B] is lined up with hole [C] in the central pump unit right side gear.

Note

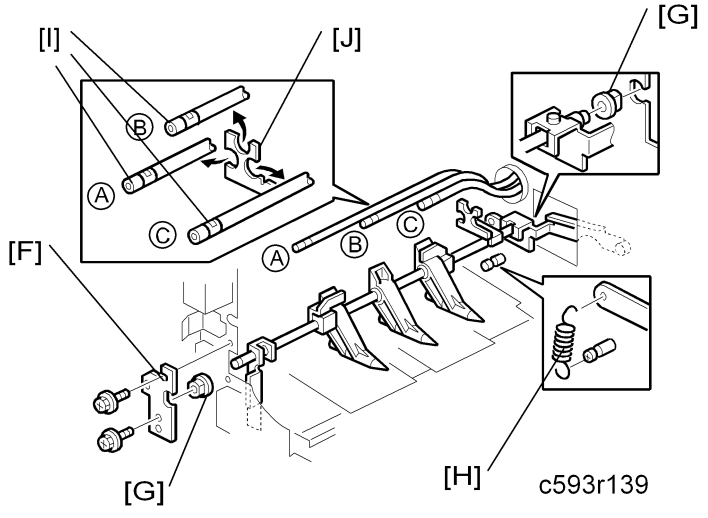
- If the holes are not lined up, remove the e-ring [D] and reposition the gear.

Printing Section

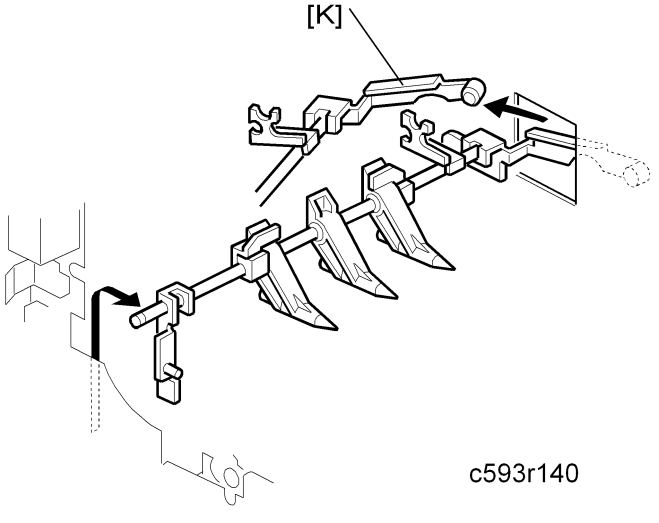
Paper Exit Pawl Replacement and Adjustment



1. Remove both drums.
2. Remove the upper cover (x 4).
3. Remove the operation panel (x 2, x 1).
4. Remove the air duct assembly [A] (x 1 [B] first, then x 2 [C]).
5. Remove the 3 rubber rings [D] attached to the exit pawls.
6. Remove the adjustment arm [E] (x 2).



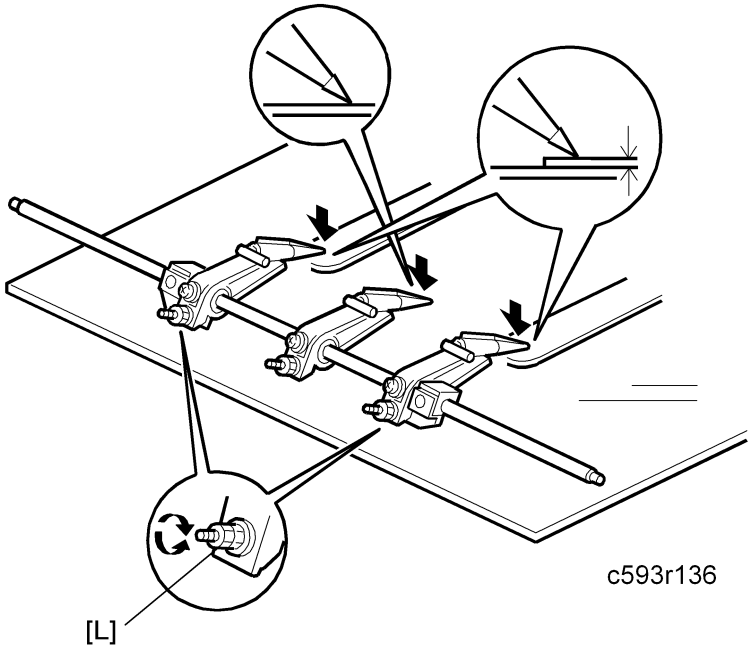
7. Remove the exit pawl shaft bracket [F] (x 2).
8. Remove the 2 shaft bearings [G].
9. Remove the spring [H] attached to the exit pawls.
10. Remove the three hoses [I] from the hose securing bracket [J].



11. Remove the exit pawl drive shaft [K].

Note

- Remove the shaft very carefully, because the shaft arm bends easily and may get damaged.



12. Place the exit pawl shaft on a flat surface with the pawls facing downward.
13. Place a 0.2 mm gage underneath the 2 end pawls.
14. Loosen the flange nuts [L] of all three pawls.
15. Adjust so that the 2 end pawls touch the surfaces of the gauges and the central pawl touches the flat surface.

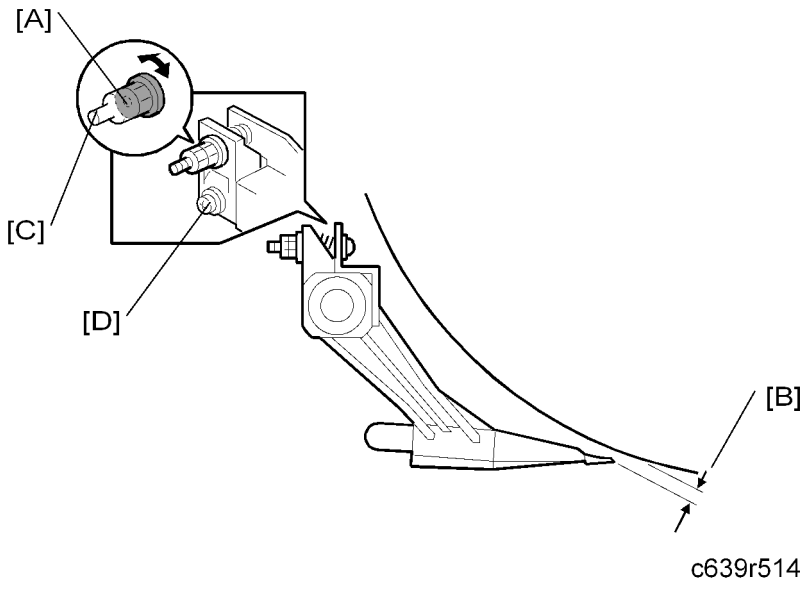
Note

- 1) After the shaft has been installed in the machine, it is only necessary to adjust the gap between the left pawl and drum. This is because the relative positions among the 3 pawls have already been adjusted with the procedure above.
- 2) The gap between the central exit pawl and the drum is 1.1 ± 0.1 mm, and the gap between the end pawls and the drum is 1.3 ± 0.2 mm. This is why a 0.2 mm gauge is placed underneath the 2 end pawls.

Left and Right Exit Pawls

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if necessary, do it for the other drum.



1. If adjusting the gap for the 1st drum, move the 2nd drum to its removal position. Do the opposite when adjusting the gap for the 2nd drum.

   Note

   - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').

2. Take out the drum and wrap a blank master around it. Put it back in the machine.
3. Adjust the flange nut [A] until the gap [B] between the tip of the exit pawl and drum is 1.7±0.2 mm.

   Note

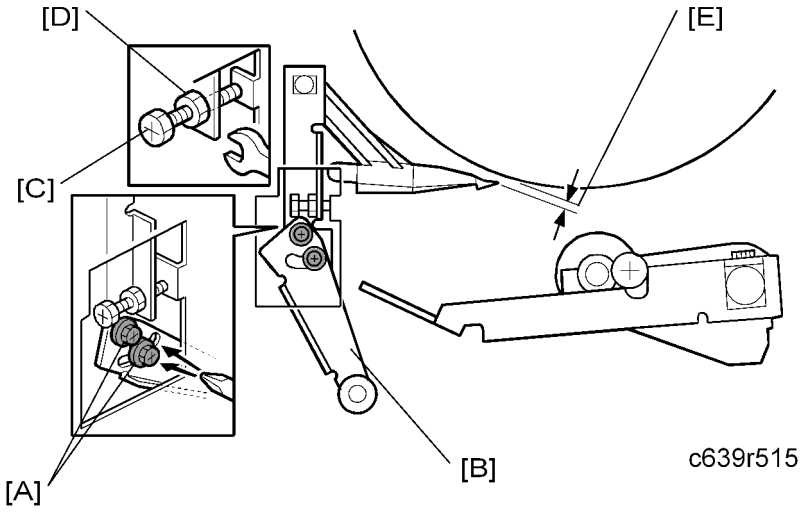
   - Loosen the nut to increase the gap. Tighten the nut to reduce the gap.

4. Lock the flange nut [A] using the square nut [C] and secure the exit pawl to the sleeve with the screw [D].

Adjusting the Gap between the Central Exit Pawl and the Drum

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if necessary, do it for the other drum.

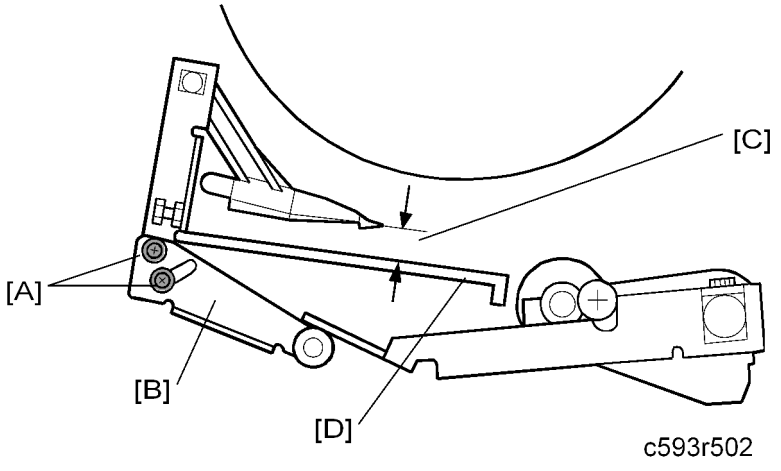


1. If adjusting the gap for the 1st drum, move the 2nd drum to its removal position. Do the opposite when adjusting the gap for the 2nd drum.

   Note

   - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
2. Take out the drum and wrap a blank master around it. Put it back in the machine.
3. To release the pawl pressure and bring it closer to the drum, loosen the two screws [A] so that the arm [B] hangs down freely.
4. Tighten the bolt [C] and secure the nut [D] so that the gap [E] between the tip of the exit pawl and drum is 1.5±0.15 mm.
5. Retighten the two screws [A].

Adjusting the Release Position of the 1st Drum Exit Pawl



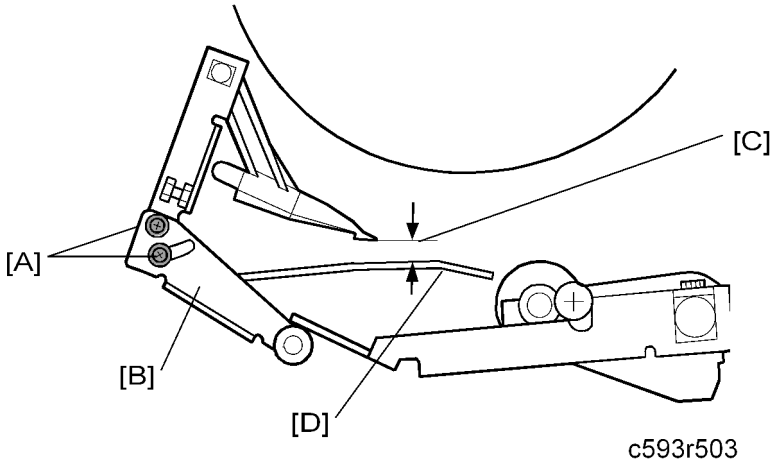
1. Rotate the 1st drum unit to the drum removal position.

Note

- The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').

2. Loosen the two screws [A] on the adjustment arm [B].
3. Move the top half of the arm until the gap [C] between the bottom edge of the central exit pawl tip and the relay transport unit guide plate [D] is 5.0 ± 1.0 mm.
4. Retighten the two screws [A].

Adjusting the Release Position of the 2nd Drum Exit Pawl

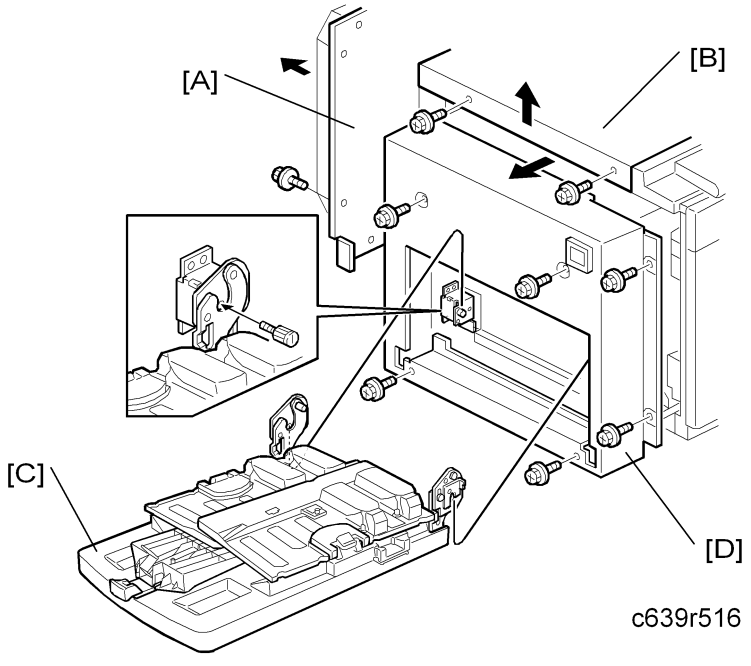


1. Rotate the 2nd drum unit to the drum removal position.

   Note

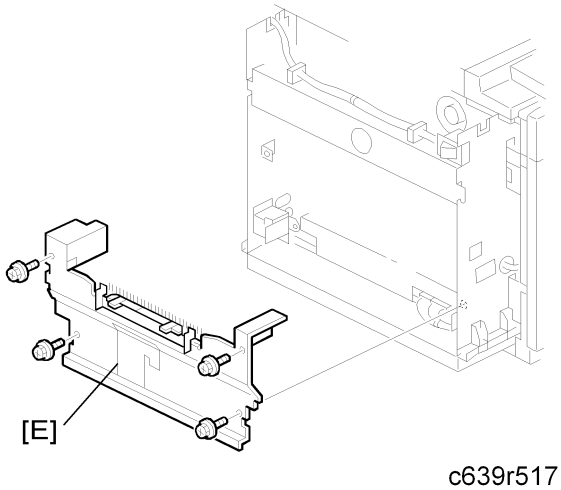
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
2. Loosen the two screws [A] on the adjustment arm [B].
3. Move the top half of the arm until the gap [C] between the bottom edge of the central exit pawl tip and the relay transport unit guide plate [D] is 5.5 ±1.0 mm.
4. Retighten the two screws [A].

2nd Drum Air Knife Fan Unit



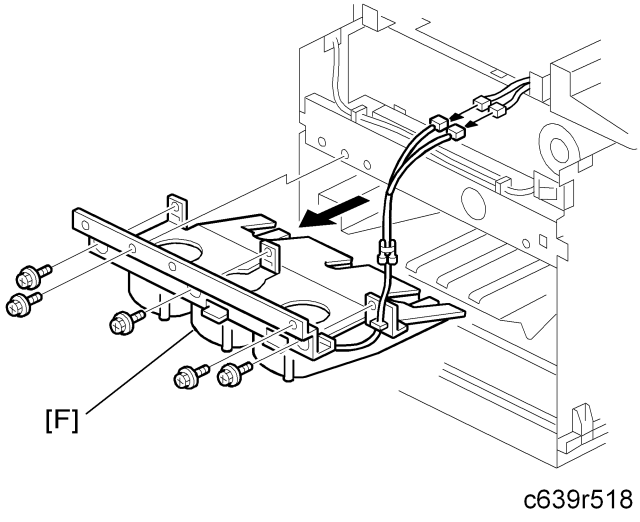
c639r516

1. Remove both drums.
2. Remove the rear cover [A] (x 11).
3. Remove the upper cover [B] (x 4).
4. Remove the paper delivery table [C] (x 2).
5. Remove the left cover [D] (x 7).



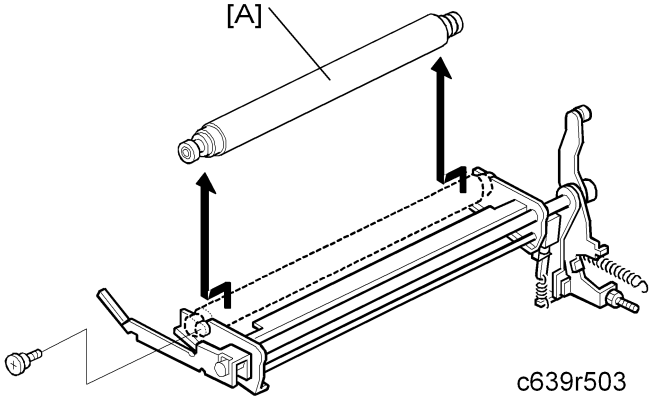
c639r517

6. Remove the paper delivery cover [E] (x 4).



7. Remove the 2nd drum air knife fan unit [F] (x 5, x 2).

Press Roller

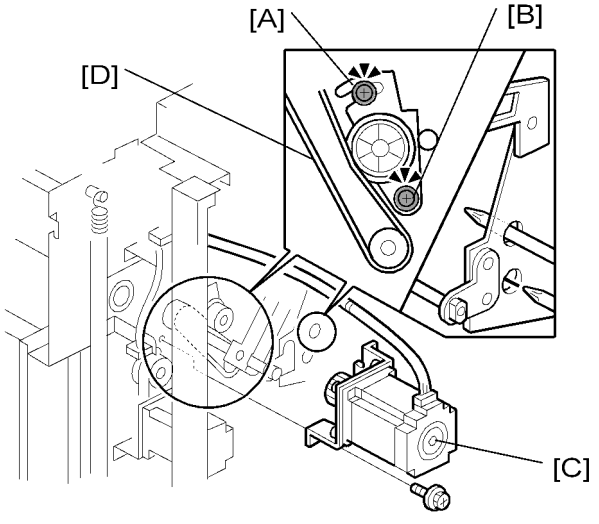


1. Remove the press roller [A] (x 1).

Note

- Slide it towards the operation side.

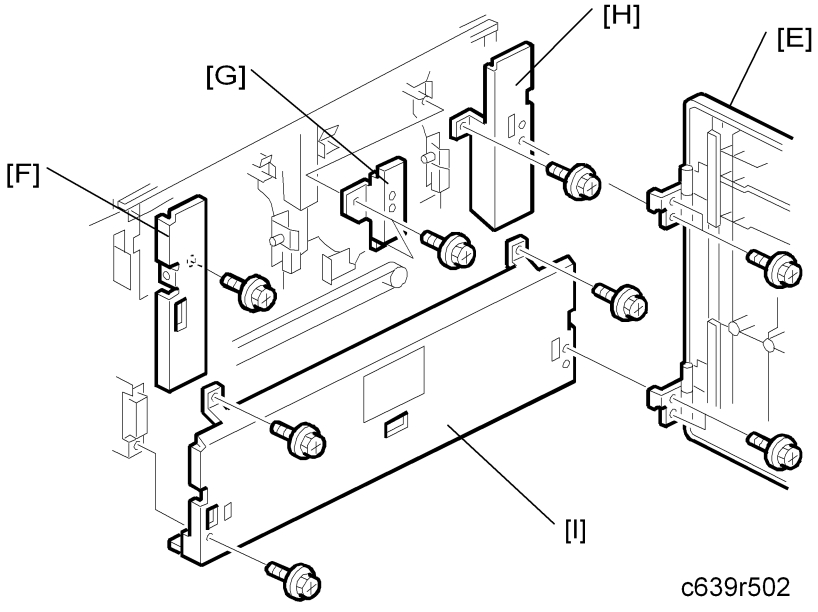
Lower Registration Roller



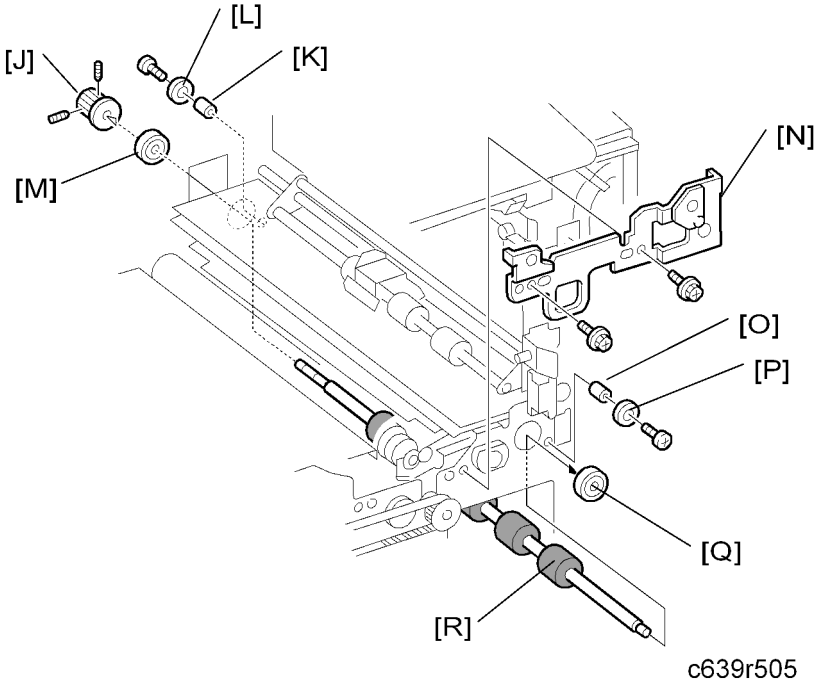
1. Remove the rear cover (x 11).
2. Loosen screws [A] and [B] about halfway.
3. Remove the feed motor [C] (x 2, x 1) and the feed motor timing belt [D].

Note

- Do the feed motor timing belt tension adjustment (☛ 'Removal and Adjustment - Adjustments - Feed Motor Timing Belt Tension') after you install the feed motor and the feed motor timing belt.

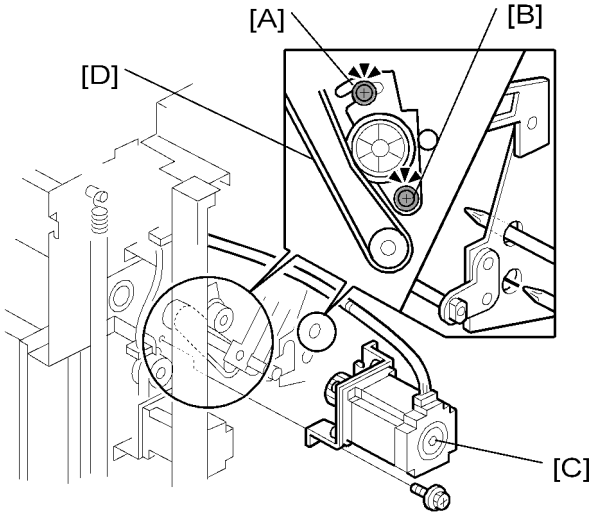


4. Remove the front door [E] (x 4).
5. Remove the left inner cover [F] (x 1).
6. Remove the 1st LED and 2nd LED cover [G] (x 2).
7. Remove the right inner cover [H] (x 1).
8. Remove the lower inner cover [I] (x 4).



9. Remove the registration roller pulley [J] (Hexagon bolt x 2).
10. Remove the bushing [K], the washer [L], and the ball bearing [M] (x 1).
11. Remove the drum position plate [N] (x 2).
12. Remove the bushing [O], the washer [P], and the ball bearing [Q] (x 1).
13. Remove the lower registration roller [R].

Upper Registration Roller

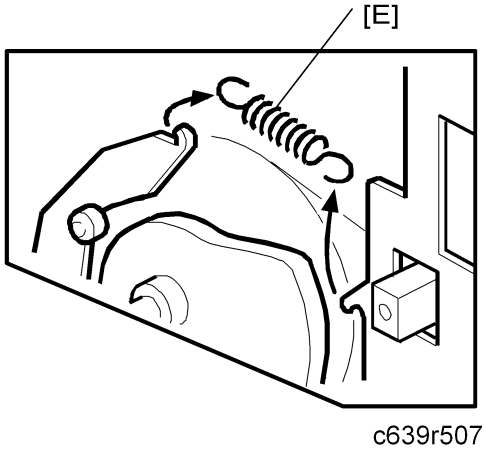


c639r504

1. Remove the rear cover (x 11).
2. Loosen screws [A] and [B] about halfway.
3. Remove the feed motor [C] (x 2, x 1) and the feed motor timing belt [D].

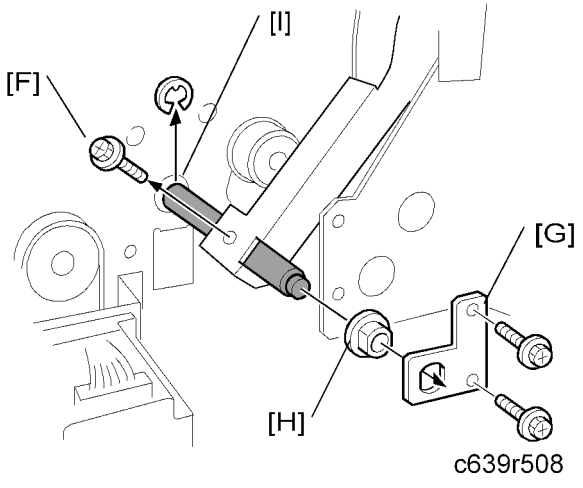
Note

- Do the feed motor timing belt tension adjustment (☛ 'Removal and Adjustment - Adjustments - Feed Motor Timing Belt Tension') after you install the feed motor and the feed motor timing belt.

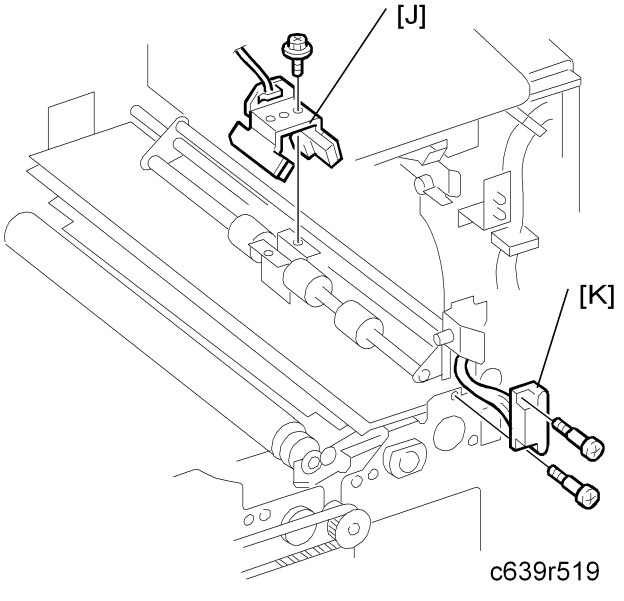


c639r507

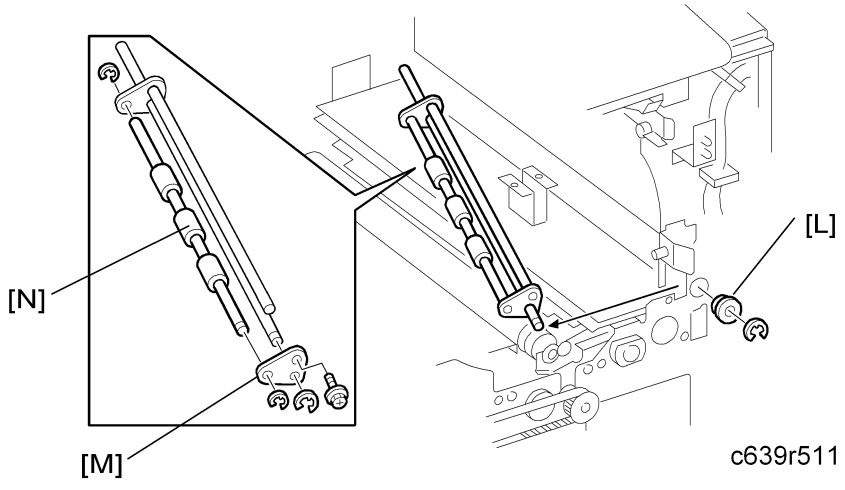
4. Remove the spring [E] that is hooked to the printing pressure arm.



5. Remove the screw [F] (x 1).
6. Remove the guide plate [G] and the bushing [H] (x 2).
7. Remove the bushing [I] (x 1).

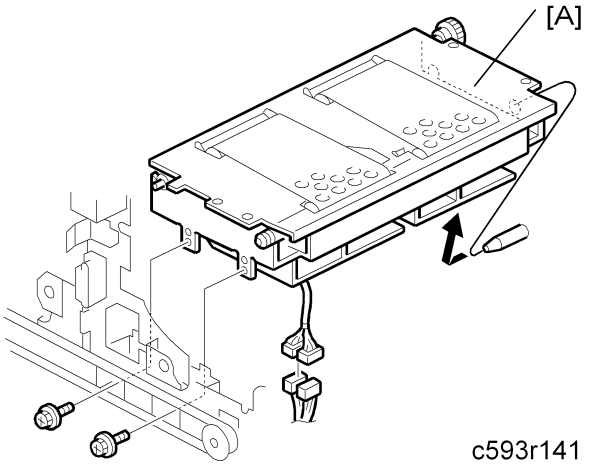


8. Remove the registration sensor bracket [J] (x 1).
9. Remove the ink sensor harness [K] (x 2).

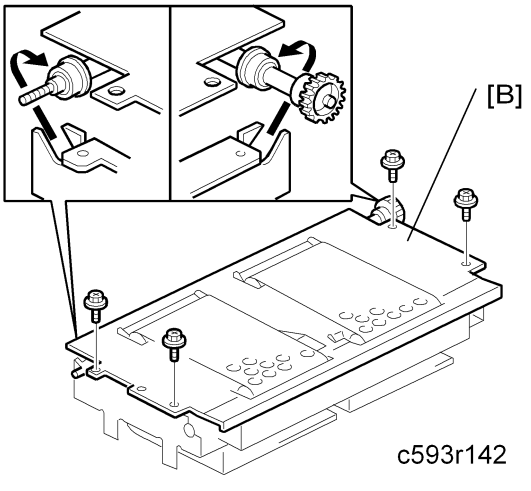


10. Remove the bushing [L] (ℂ x 1).
11. Remove the upper feed roller arm [M] (ℂ x 2, 🔩 x 1).
12. Remove the upper registration roller [N].

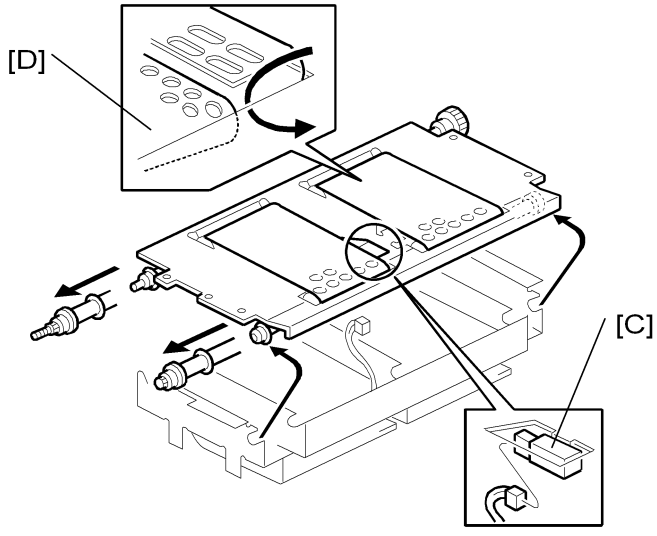
Relay Transport Delivery Unit



1. Remove the relay transport delivery table unit [A] (x 2, x 2).



2. Remove the relay transport delivery cover [B] (x 4).



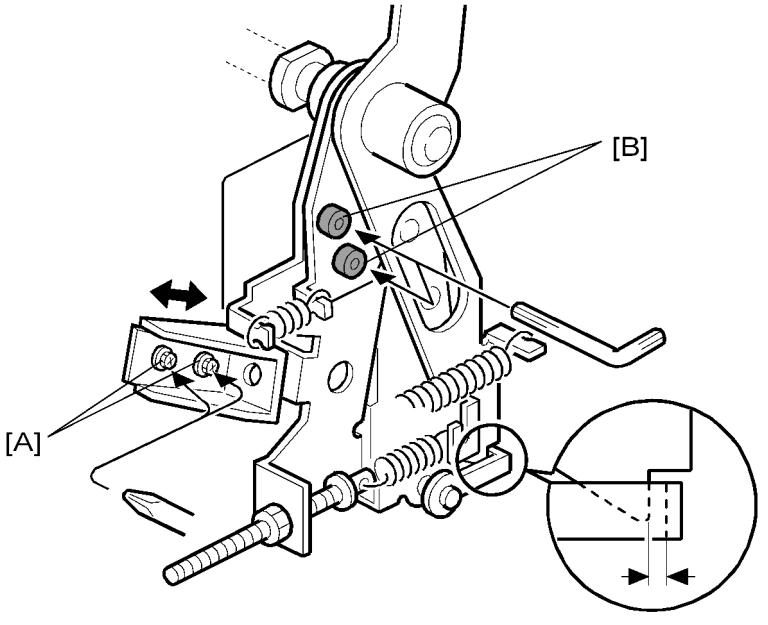
3. Remove the relay transport sensor connector [C].
4. Remove each relay transport belt [D] by lifting up from in between the belt and the relay transport delivery cover.

Adjustments

Adjusting the Gap between the Pressure Lever and Cam Follower

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if needed, do it for the other drum.



c593r123

1. Rotate the drum unit to its drum removal position. If adjusting the gap for the 1st drum, move the 1st drum to its removal position.

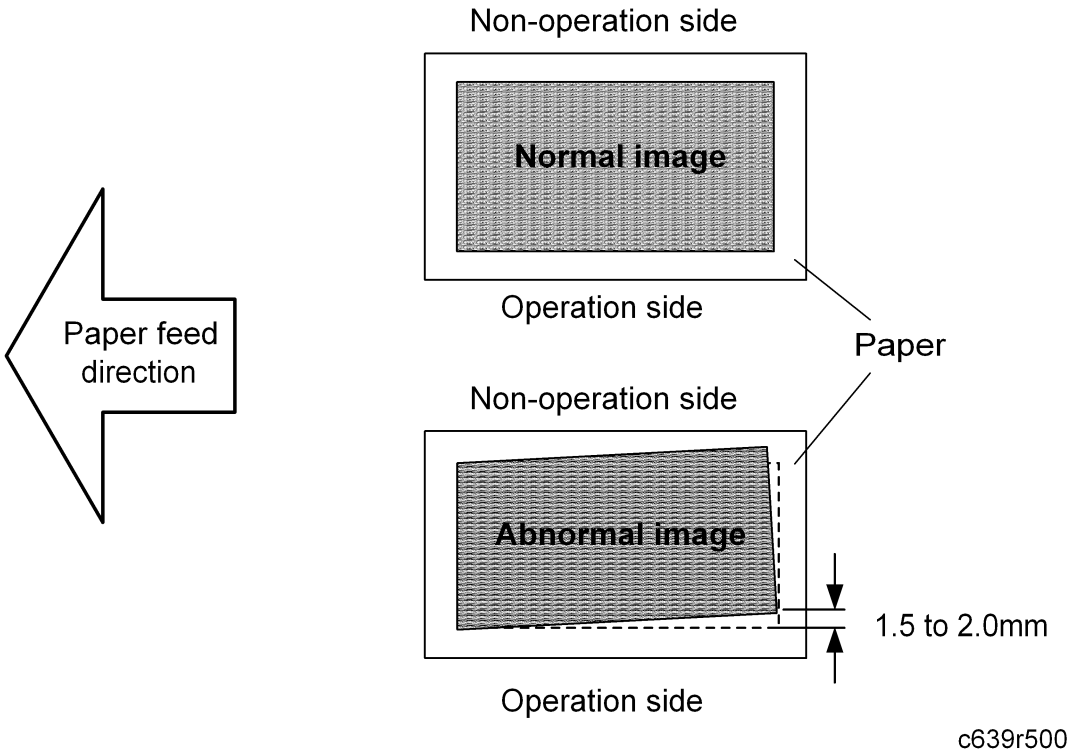
   Note

   - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
2. Loosen the four hexagonal screws [A] and [B].
3. Slide the stopper as shown until the gap between the lever and cam follower is 0.3 to 0.6 mm.
4. Tighten the 2 hexagonal bolts [B] to secure the pressure arms.

5. Check if the spring is working properly by pressing the press roller.
6. Tighten the 2 hexagonal bolts [A].

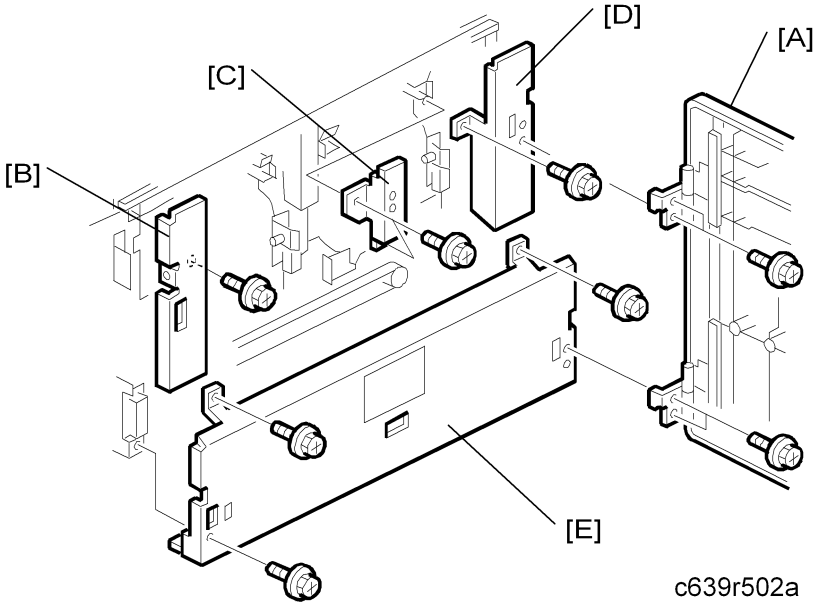
Drum Position Adjustment

Purpose: To prevent the back edge of the master from coming 1.5 to 2.0 mm closer on the non-operation side during printing, which causes the image to turn obliquely on the paper.

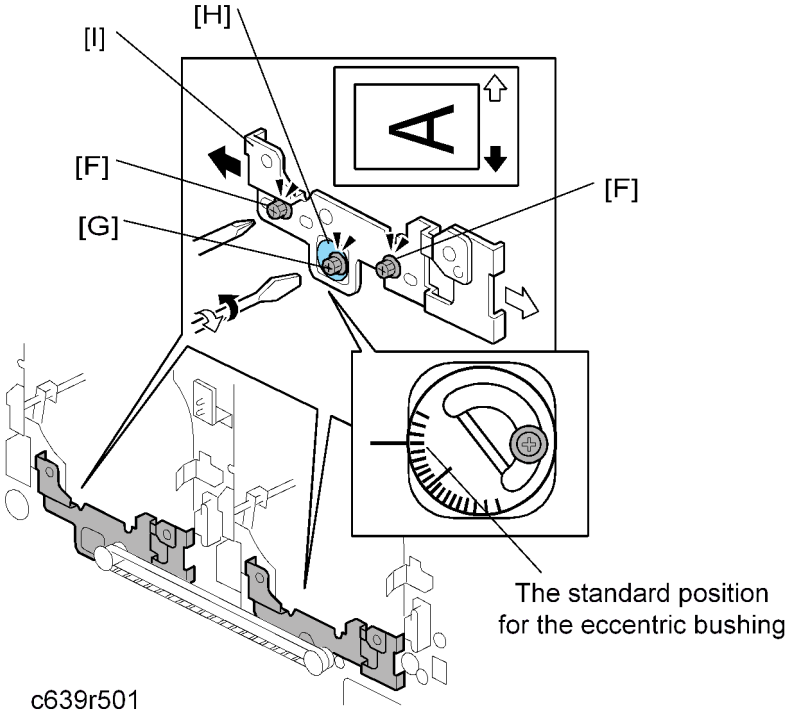


c639r500

Procedure:



1. Remove the drum.
2. Remove the front door [A] (x 4).
3. Remove the left inner cover [B] (x 1).
4. Remove the 1st LED and 2nd LED cover [C] (x 2).
5. Remove the right inner cover [D] (x 1).
6. Remove the lower inner cover [E] (x 4).



7. Loosen the three screws [F] [G].
8. Turn the eccentric bushing [H], if the back edge of the master comes close to the non-operation side.

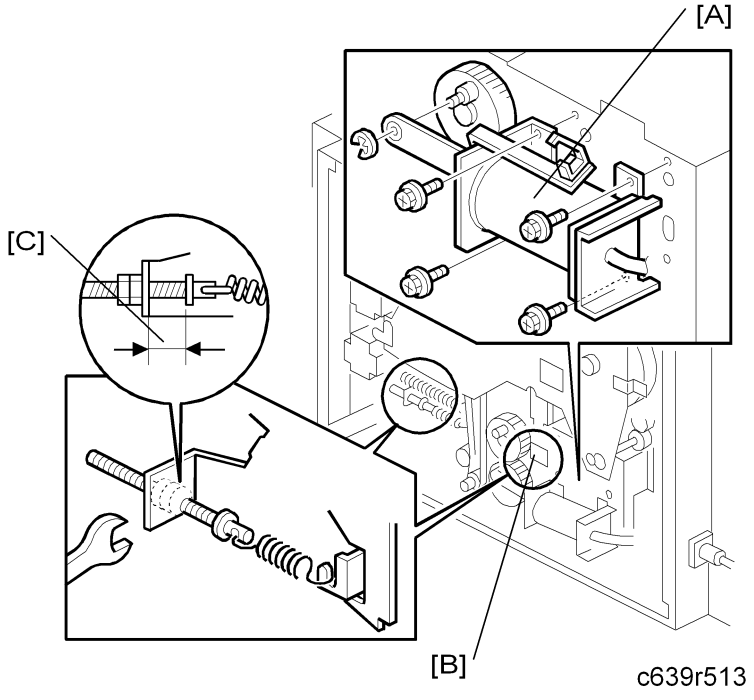
   Note

   - As a rough guide, if the edge is moved to the non-operation side by 1.0 mm, turn the eccentric bushing [H] counterclockwise one graduation.
   - Please check the machine after adjusting, because the effect of moving the bushing by one graduation differs for each machine. To do this, print about 1000 sheets and compare the 10th sheet with the 1000th sheet.
9. Tighten the screw [G].
10. Move the drum position plate [I] in the paper table direction (to the right) and tighten the two screws [F].

Printing Pressure Adjustment

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if needed, do it for the other drum.



Note

- To do this procedure for the 2nd drum unit, the center air pump [A] must be removed. This is because the adjustment has to be accessed through opening [B], which is behind the pump.

1. Rotate the drum unit to its drum removal position. If adjusting the gap for the 1st drum, move the 1st drum to its removal position.

Note

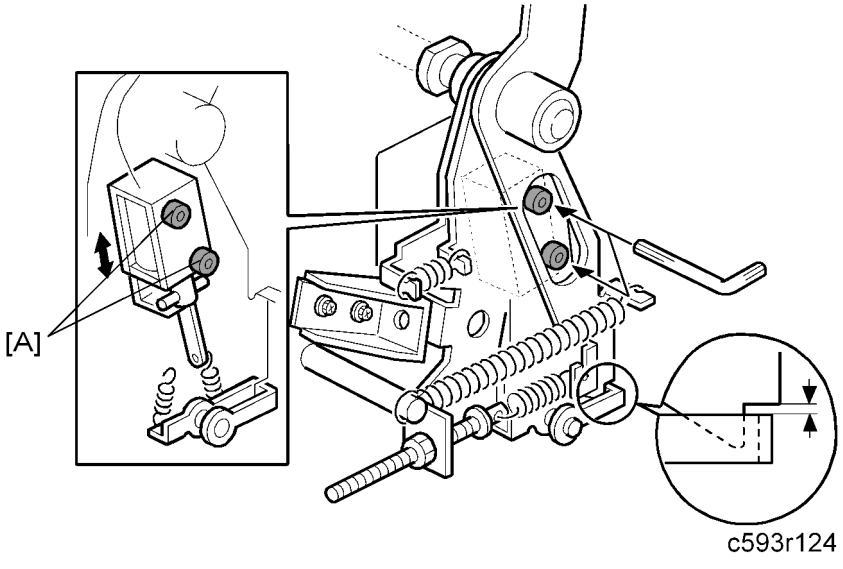
- The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
- The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').

1. Tighten the nut until gap [C] is correct for the machine that is being used.
    - EM (C262), TZ (C265), CE4 (C269): 16±0.3mm (this is the default setting)
    - Pearl (C229), Pearl-MC (C233), Ruby (C232), Garnet (C239): 18±0.3mm
    - Sapphire (C235), SA2 (C244): 19±0.3mm

Adjusting the Printing Pressure Solenoid

Note

- This procedure is the same for both the 1st and 2nd drums. Do the complete procedure for one drum. Then, if needed, do it for the other drum.

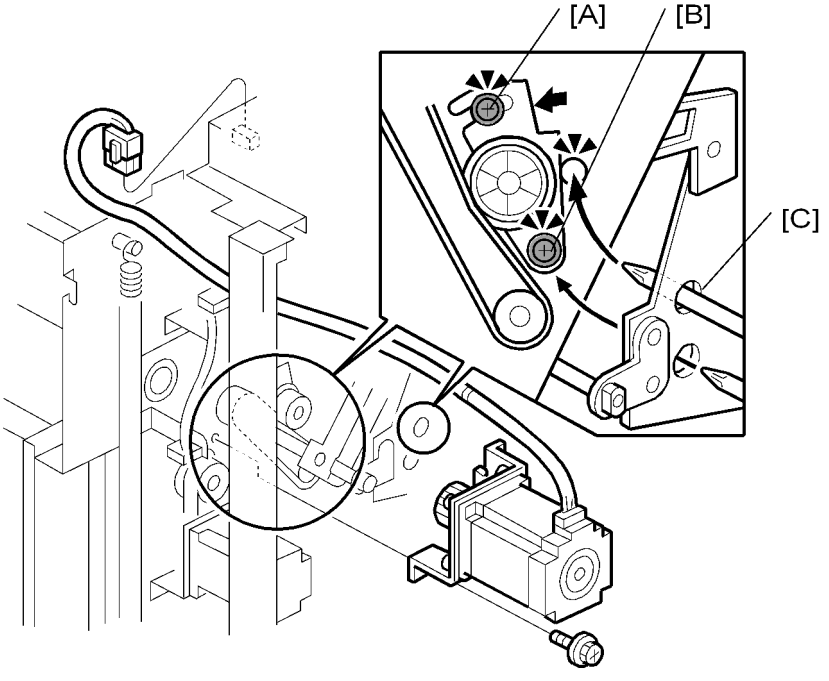


1. Rotate the drum unit to its drum removal position. If adjusting the gap for the 1st drum, move the 1st drum to its removal position.

   Note

   - The 1st drum is in the removal position when the holes in the 1st drum pulley and side plate are lined up as shown in step 1 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
   - The 2nd drum is in the removal position when the holes in the 2nd drum pulley and side plate are lined up as shown in step 4 of Main Belt Installation (☛ 'Removal and Adjustment - Main Belt Removal and Adjustment - Main Belt Installation').
2. Loosen the two hexagonal bolts [A].
3. While activating the solenoid by hand, adjust the solenoid height until the gap between the lever and the cam follower is 1.5 to 2.0 mm.
4. Retighten the two bolts [A].

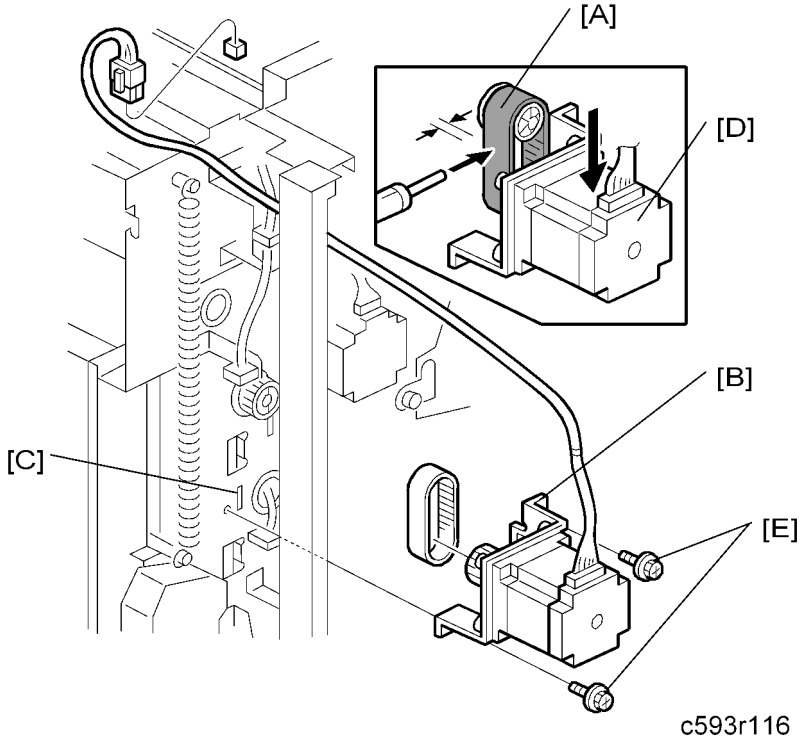
Feed Motor Timing Belt Tension



c593r118

1. Loosen screws [A] and [B] about halfway.
2. Insert a screwdriver through hole [C] in the mainframe sideboard.
3. Apply tension to the belt by pushing down on the belt tension roller and fasten screw [B].
4. Retighten screw [A].

Registration Motor Timing Belt Tension

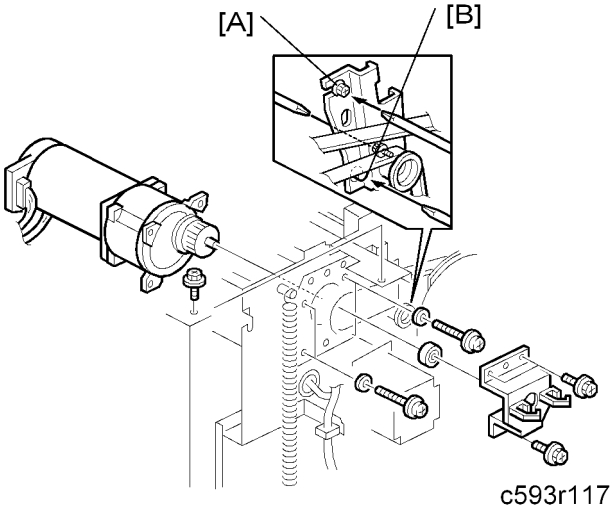


1. Install the timing belt [A] around the gears.
2. Hook the motor assembly (hook [B]) onto the hole [C] in the mainframe rear plate.
3. While pushing down on area [D] on the top face of the motor, secure the motor assembly in place with 2 screws [E].
4. Confirm that the amount of slack in the belt is between 2 and 4 mm.

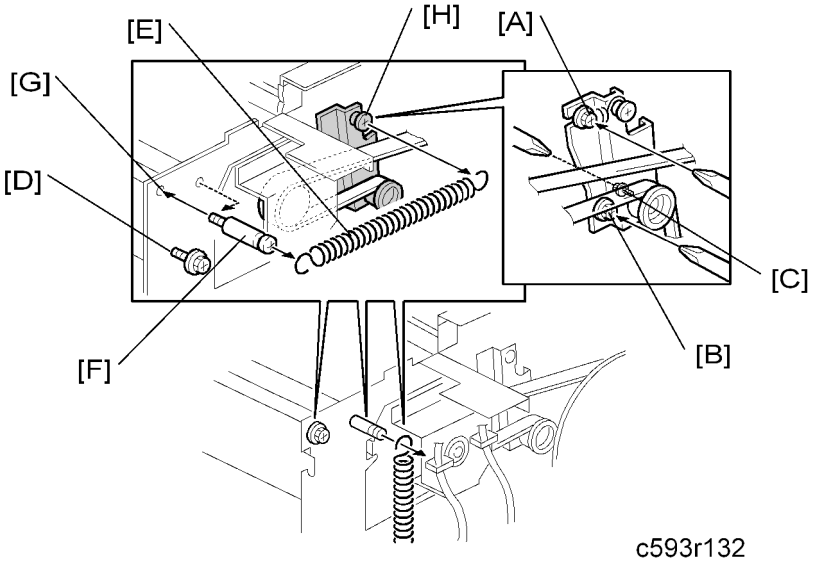
Note

- If the slack is too much, loosen screws [E] and move the motor down.

Main Motor Timing Belt Tension



c593r117



c593r132

1. Loosen screws [A], [B], and [C] to about half way.

Note

- If these screws are loosened too far, the tension applied later (below) will not be uniform.

2. Remove screw [D] from its hole.
3. Unhook the paper lift spring [E] from the spring anchor [F].
4. Insert the spring anchor into the hole [G] for the screw removed in step 2.
5. Re-hook one end of the paper lift spring onto the spring anchor.

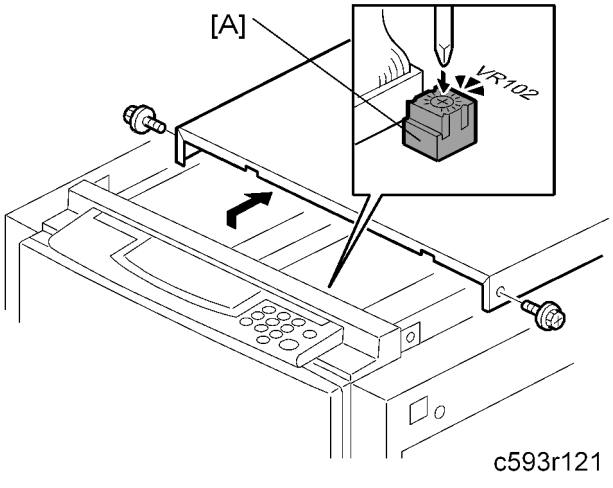
6. Ensure that the other end of the spring is still hooked onto the stepping screw [H].
7. Tighten screws [A], [B], and [C] firmly in that order.
8. Return the spring anchor [F], spring [E], and screw [D] back to their normal positions.

Paper End Sensor Adjustment

Purpose: To ensure that the sensor detects paper end.

⚠CAUTION

- 1) The sensor adjustment is required after the sensor is replaced.
- 2) While adjusting, make sure to attach all exterior covers to avoid external light.
- 3) Do not turn the VRs excessively. Turn slowly until the LED turns off.
- 4) If the sensor is dirty, clean or replace it.



1. Turn on the main switch.
2. Remove the upper cover and access the MPU board.
3. Hold a sheet of paper 40 ± 0.3 mm above the paper exit sensor, then turn VR102 [A] clockwise until LED102 lights.

4. Service Tables

DIP SW, LED, VR, TP, and Fuse Tables

Test Points

MPU

No	Usage
TP101	Not used
TP102	Paper Exit Sensor Output Voltage
TP103	GND-a
TP104	GND-a

Potentiometers

MPU

No	Usage
VR102	Paper Exit Sensor Adjustment

LED'S

MPU

No	Function
101	Monitors the feed control CPU operation. Usually, this LED is blinking.
102	Monitors the paper exit sensor.

Fuses

PSU

Fuse #	Rated Current	Related Devices
1	10 A	AC Line
2	6.3A	Others
4	3.15A	Air Knife Fan Motor
5	12 A	Main Motor Control Board

Noise Filter Board

Fuse #	Rated Current	Related Devices
401	8A	AC Line

Main Motor Control Board

Fuse #	Rated Current	Related Devices
1	12A	Main Motor

Service Call Codes

Code	Title	Conditions	Possible Causes
SC05-00	Main motor lock (1st drum set sensor does not turn on)	At power-up or when the drum returns to its HP, the 1st drum set sensor is not activated for more than 3.5 seconds after the main motor on signal is generated.	• Defective sensor • Defective main motor
SC05-01	Main motor lock (motor control signal error)	The CPU on the motor control board detects an abnormal signal from the main motor encoder.	• Defective main motor
SC05-20	1st drum shift HP sensor remains on	At power on, the sensor is not de-activated for more than 3 seconds after the drum shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-23	2nd drum shift HP sensor remains on	At power on, the sensor is not de-activated for more than 3 seconds after the drum shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-30	1st drum thermistor open	The signal from the thermistor beside the ink detection pins reaches 4.5 volts.	• Thermistor open circuit • Related connector disconnected
SC05-31	1st drum thermistor short	The thermistor beside the ink detection pins detects an excessively high temperature (96 °C).	• Thermistor short
SC05-32	1st drum ink pump sensor remains on	The sensor is not de-activated for more than 8 seconds after the ink pump motor on signal is generated.	• Defective sensor • Defective motor • Jammed ink pump drive
SC05-34	2nd drum ink pump sensor remains on	The sensor is not de-activated for more than 8 seconds after the ink pump motor on signal is generated.	• Defective sensor • Defective motor • Jammed ink pump drive

Code	Title	Conditions	Possible Causes
SC05-35	2nd drum thermistor open	The signal from the thermistor beside the ink detection pins reaches 4.5 volts.	• Thermistor open circuit • Related connector disconnected
SC05-36	2nd drum thermistor short	The thermistor beside the ink detecting pins detects an excessively high temperature (96 °C).	• Thermistor short
SC05-60	1st drum idling HP sensor remains on	The sensor does not de-activate for more than 6 seconds after the idling roller motor on signal is generated.	• Defective sensor • Defective motor
SC05-62	2nd drum idling HP sensor remains on	The sensor does not de-activate for more than 6 seconds after the idling roller motor on signal is generated.	• Defective sensor • Defective motor
SC05-70	Drum synchronization HP sensor remains on	The sensor does not de-activate for more than 5 seconds after the Drum synchronization motor on signal is generated.	• Defective sensor • Defective motor
SC05-72	Auto off switch error	The power switch does not de-activate for more than 6 seconds after the auto off switch on signal is generated.	• Defective connector
SC07-00	Sensor in the feed pressure detection board remains on/off	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-10	Sensor in the separation pressure detection board remains on/off	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-20	Feed encoder error	The CPU detects an abnormal signal from the feed encoder.	• Defective sensor

Code	Title	Conditions	Possible Causes
SC07-50	Wing upper or lower position sensor remains on/off	When the wing guide moves downwards or upwards, the sensors are not de-activated for more than 6 seconds after the wing guide motor on signal is generated.	• Defective sensor • Defective motor
SC30-00	Paper table height or lower limit sensor remains on/off	When the table moves upwards or downwards, the sensors are not de-activated for more than 7.5 seconds after the paper table motor on signal is generated.	• Defective sensor • Defective motor

Service Program Mode

The service program (SP) mode is used to check electrical data, change modes, or change adjustment values.

Access Procedure

Service Program Mode Access Procedure

1. Press the following keys on the operation panel in the following order:

   Clear Modes ➔ 1 ➔ 0 ➔ 7 ➔ C/⊘

   Note

   - Hold down C/⊘ key for more than 3 seconds.
2. The following is displayed on the LCD when the SP mode is accessed.

   SP-MODE

   PROGRAM No. 0
3. Using the **number keys**, enter the desired SP mode number (listed in the service program table), then press the **Enter #** key.

   Note

   - The SP mode number can be shifted up or down by pressing the **Select Size and Direction** ("△" or "▽") keys.
4. Follow the "Change Adjustment Values or Modes" procedure below.

   Note

   - To cancel SP mode, press the **Clear Modes** key. To shift to another SP mode number, press the Enter # key again to return to the display in step 2. Enter the desired SP mode number.

Change Adjustment Values or Modes

1. After entering the desired SP mode number and pressing the Enter # key, the current setting will be displayed on the LCD (at the end of the second line).
2. Enter the desired setting using the number keys (listed in the service program table).
3. Press the Enter # key to store the desired setting.
4. To leave the SP mode, press the Clear Modes key.

Service Program Table

No.	Display	Function	Settings	Factory Setting	Comments
101	LAST SC CODE	Displays the last service call.		*-**	
102	JAM REGIST OFF CHECK	Displays the total number of paper feed jams.		0	
103	JAM REGIST ON CHECK	Displays the total number of paper feed jams.		0	
104	JAM FEED TMNG ON CHK	Displays the total number of paper feed jams.		0	
105	JAM 1ST DRUM WRAP	Displays the total number of times that paper has accidentally wrapped around the 1st drum.		0	
106	JAM 1ST DRUM FEED	Displays the total number of relay transport unit jams.		0	
107	JAM 2ND DRUM WRAP	Displays the total number of times that paper has accidentally wrapped around the 2nd drum.		0	
108	JAM 2ND DRUM FEED	Displays the total number of paper delivery unit jams.		0	
109	ROM VERSION	Displays the ROM part number and the		-	

No.	Display	Function	Settings	Factory Setting	Comments
		ROM manufacturing date.			
201	DISPLAY LANGUAGE	Selects the language used on the display.	0: Japanese 1: English 2: German 3: French 4: Italian	0	
202	SIZES IN mm OR INCH	Selects the metric size (mm) or inch size on the display.	0: mm 1: Inch	0	
203	A3/DLT DRUM SELECT	Selects the drum size that matches the machine. **This function is for production line use only.**	0:A3 1:DLT	0	Never change the setting.
204	SEPARATION PAD TYPE	After changing the separation pad (to suit the paper type), select the separation pad that you just installed.	0:NOML 1:CUSTM	0	
205	1ST DRUM INK DETECT	Specifies whether 1st drum ink detection is done.	0: NO 1: YES	1	
206	2ND DRUM INK DETECT	Specifies whether 2nd drum ink detection is done.	0: NO 1: YES	1	
207	DRUM TYPE SETTING	This must match the drum type now in the machine (400 or 600dpi drum).	0: A 1: B	0	Type A drums have no quality blade. Type B drums have a quality blade.

No.	Display	Function	Settings	Factory Setting	Comments
208	SET TYPE BY CODE	Allows SP201, 202, 203 and 207 to be set automatically by entering the machine code.	1 to 6	C639-82: 5 C639-83: 6	See remark 1
301	MACHINE SERIAL NUM	Input/display the machine serial number.		-	
302	INSTALLATION DATE	Input/display the installation date.		-	
303	SERVICE TEL NUMBER	Input the service representative's telephone number, which is displayed with the service call code.		0	Use the number keys to input the telephone number at installation.
304	DEFAULT PRINT SPEED	Specifies the printing speed at power-up.	1: 90 rpm 2: 105 rpm 3: 120 rpm	2	
305	SPEED SETUP	Determines which printing speeds the machine can use.	0: 90,105,120 1: 60,90,120		
400	INPUT TEST MODE	Checks the status of a sensor or switch.		-	See the input check table
500	OUTPUT TEST MODE	Checks if electrical components turn on properly.		-	See the output check table.
501	ALL INDICATORS ON	Turns on all the indicators on the operation panel.		-	Press the # key to light all the indicators

No.	Display	Function	Settings	Factory Setting	Comments
601	REGISTRATION ADJUST	Adjusts the image position.	-5.0 to +5.0 mm	0.0	In a new machine, the setting appears as *.*. This is the same as 0.0.
602	DRUM SYNCHRO ADJUST	Adjusts the HP of the synchronization unit in order to match the image position of the 2nd color to that of the 1st color.	-5.0 to +5.0 mm	0.0	In a new machine, the setting appears as *.*. This is the same as 0.0.
701	CLEAR JAM LOGGING	Clears all jam counters	0: NO 1: YES	0	The memory is cleared after pressing the Enter (#) key.
702	CLEAR FACTORY DATA	Returns all SP modes to the default settings, except for SP 201, 601 and 602.	0: NO 1: YES	0	The memory is cleared after pressing the Enter (#) key.
703	CLEAR SERVICE MEMORY	Returns SP 204, 205, 206, 304 to the default settings.	0: NO 1: YES	0	The memory is cleared after pressing the Enter (#) key.

Remarks

1. SP Mode No. 208 – Set Type By Code

Allows SP201, 202, 203 and 207 to be set automatically by entering the machine code.

No.	Machine code	SP201	SP202	SP203	SP207
1	C593-00	0:J	0:mm	0:A3	0:A
2	C593-02	0:J	0:mm	0:A3	0:A
3	C593-52	1:E	1:inch	1:DLT	1:B
4	C593-53 C593-83	1:E	0:mm	0:A3	1:B

No.	Machine code	SP201	SP202	SP203	SP207
5	C639-82	1:E	1:inch	1:DLT	0:A
6	C639-83	1:E	0:mm	0:A3	0:A

Input/Output Check Mode

This program checks the electrical components.

Input/Output Check Mode Access Procedure

1. Access the SP mode. (See the SP mode access procedure.)
2. Enter 400 (for the Input Check mode) or 500 (for the Output Check mode) with the number keys.
3. Press the Enter (#) key.
4. Enter the desired number. (See the Input or Output Check Table.)

   Note

   - The number can be shifted up or down by pressing the **Select Size and Direction** ("△" or "▽") keys.
5. Press the Enter (#) key.

   Note

   - In the input check mode, all printing speed LEDs turn on when the sensor or switch that is being tested is actuated. A beep will also be heard.
6. For the Output Check mode, press the Start key to turn on the component.
7. Press the Enter (#) key to return the display to the initial input or output check menu.
8. Press the Clear Modes key to leave the SP mode.

Input Check Table

Code	LCD Display	Component Checked
1	PAPER REGIST SN	Paper Registration Sensor
2	PAPER FEED TIMING SN	Paper Feed Timing Sensor
3	PAPER FEED PRESS 0	Paper Feed Pressure 0
4	PAPER FEED PRESS 1	Paper Feed Pressure 1

Code	LCD Display	Component Checked
5	PAPER FEED PRESS 2	Paper Feed Pressure 2
6	PAPER FEED PRESS 3	Paper Feed Pressure 3
7	SEPARATION PRESS 0	Separation Pressure 0
8	SEPARATION PRESS 1	Separation Pressure 1
9	SEPARATION PRESS 2	Separation Pressure 2
10	SEPARATION PRESS 3	Separation Pressure 3
11	1ST DRUM PPR EXIT SN	Relay Paper Sensor
13	2ND DRUM PPR EXIT SN	Paper Exit Sensor
14	DRUM SYNCHRO SENSOR	Drum Synchronization HP Sensor
15	DOOR OPEN DETECT	Cover Safety Switch
17	PAPER FEED START SN	Feed Start Sensor
18	FEED ENCODER SENSOR	Feed Encoder Sensor
19	PAPER TABLE SET SN	Paper Table Set Sensor
20	PAPER LOWER LIMIT SN	Paper Table Lower Limit Sensor
21	PAPER TABLE HIGHT SN	Paper Table Height Sensor
22	TABLE LOWERING SW	Paper Table Lowering Switch
23	PAPER END SENSOR	Paper End Sensor
25	WING UPPER POSTN SN	Wing Upper Position Sensor
26	WING LOWER POSTN SN	Wing Lower Position Sensor
31	DRUM-1 SHIFT HP SN	1st Drum Shift HP Sensor
32	DRUM-2 SHIFT SENSOR	2nd Drum Shift HP Sensor
33	D-1 INK CARTRIDGE SN	1st Drum Ink Cartridge Sensor
36	DRUM-1 1ST JAM SN	1st Jam Sensor
37	DRUM-1 2ND JAM SN	2nd Jam Sensor
38	DRUM-1 SET SENSOR	1st Drum Set Sensor

Code	LCD Display	Component Checked
40	D-1 IDLING ROLLER SN	1st Drum Idling Roller Sensor
41	DRUM-1 SIZE SIGNAL	1st Drum Size Signal
42	DRUM-1 COLOR SIGNAL	1st Drum Color Signal
43	DRUM-1 INK DETECTION	1st Drum Ink Detection
61	DRUM-2 SHIFT HP SN	2nd Drum Shift HP Sensor
62	DRUM-2 SHIFT SENSOR	2nd Drum Shift Sensor
63	D-2 INK CARTRIDGE SN	2nd Drum Cartridge Sensor
68	DRUM-2 SET SENSOR	2nd Drum Set Sensor
70	D-2 IDLING ROLLER SN	2nd Idling Roller Sensor
71	DRUM-2 SIZE SIGNAL	2nd Drum Size Signal
72	DRUM-2 COLOR SIGNAL	2nd Drum Color Signal
73	DRUM-2 INK DETECTION	2nd Drum Ink Detection
74	DRUM-1 INK PUMP SN	1st Drum Ink Pump Sensor
75	DRUM-2 INK PUMP SN	2nd Drum Ink Pump Sensor

Output Check Table

Code	LCD Display	Description
1	DRUM-1 POSITION LED	Turn on the 1st drum position LED.
2	DRUM-2 POSITION LED	Turn on the 2nd drum position LED.
3	ALL FANS+SOLENOIDS	Turns on the printing pressure solenoids. At the same time, it turns on the air knife fan.
4	DRUM-1 PRESSURE SOL.	Turns on the 1st drum pressure solenoid.
5	DRUM-2 PRESSURE SOL.	Turns on the 2nd drum pressure solenoid.
6	COUNTER UP	Increments the paper counter.
7	DRUM-1 TRANSPORT FAN	Turns on the 1st drum transport fan motor.

Code	LCD Display	Description
8	DRUM-2 TRANSPORT FAN	Turns on the 2nd drum transport fan motor.
9	DRUM-1 AIR KNIFE FAN	Turns on the 1st drum air knife fan motor.
10	DRUM-2 AIR KNIFE FAN	Turns on the 2nd drum air knife fan motor.
11	MAIN MOTOR BRAKE	Stop the main motor.
12	DRUM-1 INK PUMP MOTOR	Turns on the 1st ink pump motor.
13	DRUM-2 INK PUMP MOTOR	Turns on the 2nd ink pump motor.
14	WING GUIDE MOTOR UP	Turns on the wing guide motor (up)
15	WING GUIDE MOTOR DWN	Turns on the wing guide motor (down)
16	1ST DRUM TO HOME PSN	Turns on the main motor and moves the1st drum to its HP (detected by the 1st drum set sensor).
17	2ND DRUM TO HOME PSN	Turns on the main motor and moves the 2nd drum to its HP (detected by the 2nd drum set sensor).
18	PPR TABLE MOTOR DOWN	Turns on the paper table motor (down)
19	PAPER TABLE MOTOR UP	Turns on the paper table motor (up)
20	PPR PRESS MOTOR FOR	Turns on the feed pressure motor (forward)
21	PPR PRESS MOTOR REV	Turns on the feed pressure motor (reverse)
22	SEP PRESS MOTOR FOR	Turns on the separation pressure motor (forward)
23	SEP PRESS MOTOR REV	Turns on the separation pressure motor (reverse)
26	MAIN MOTOR 20RPM	Turns on the main motor at 20 rpm.
27	MAIN MOTOR 30RPM	Turns on the main motor at 30 rpm.
28	MAIN MOTOR 60RPM	Turns on the main motor at 60 rpm.
29	MAIN MOTOR 75RPM	Turns on the main motor at 75 rpm.
30	MAIN MOTOR 90RPM	Turns on the main motor at 90 rpm.
31	MAIN MOTOR 105RPM	Turns on the main motor at 105 rpm.
32	MAIN MOTOR 120RPM	Turns on the main motor at 120 rpm.

Code	LCD Display	Description
33	MAIN SWITCH	Turn off the main switch.
34	DRUM-1 IDLING ROLLER	Turns on the 1st drum idling roller motor (forward)
35	DRUM-2 IDLING ROLLER	Turns on the 2nd drum idling roller motor (reverse)
37	D-1 SHIFT MOTOR FOR	Turns on the 1st drum shift motor (forward)
38	D-1 SHIFT MOTOR REV	Turns on the 1st drum shift motor (reverse)
39	D-2 SHIFT MOTOR FOR	Turns on the 2nd drum shift motor (forward)
40	D-2 SHIFT MOTOR REV	Turns on the 2nd drum shift motor (reverse)
42	1ST DRUM SHIFT HP	Turns on the 1st drum shift motor and moves to its HP.
43	D-1 IDLING ROLLER HP	Turns on the 1st drum idling roller motor and moves to its HP.
44	D-1 IDLING ROLLER ON	Turns on the 1st drum idling roller motor.
45	2ND DRUM SHIFT HP	Turns on the 2nd drum shift motor and moves to its HP.
46	D-2 IDLING ROLLER HP	Turns on the 2nd drum idling roller motor and moves to its HP.
47	D-2 IDLING ROLLER ON	Turns on the 2nd drum idling roller motor.
48	DRUM-1 INK SUPPLY	Turns on the 1st drum ink pump motor.
49	DRUM-2 INK SUPPLY	Turns on the 2nd drum ink pump motor.
60	FEED MOTOR 60RPM	Turns on the paper feed motor at 60 rpm.
61	FEED MOTOR 75RPM	Turns on the paper feed motor at 75 rpm.
62	FEED MOTOR 90RPM	Turns on the paper feed motor at 90 rpm.
63	FEED MOTOR 105RPM	Turns on the paper feed motor at 105 rpm.
64	FEED MOTOR 120RPM	Turns on the paper feed motor at 120 rpm.
65	REGIST MOTOR 60RPM	Turns on the registration motor at 60 rpm.
66	REGIST MOTOR 75RPM	Turns on the registration motor at 75 rpm.
67	REGIST MOTOR 90RPM	Turns on the registration motor at 90 rpm.

Code	LCD Display	Description
68	REGIST MOTOR 105RPM	Turns on the registration motor at 105 rpm.
69	REGIST MOTOR 120RPM	Turns on the registration motor at 120 rpm.
70	DRUM SYNC MOTOR FOR	Turns on the drum synchronization motor (forward)
71	DRUM SYNC MOTOR REV	Turns on the drum synchronization motor (reverse)
72	SYNCHRO MOTOR HP	Turns on the drum synchronization motor and moves the synchronization unit to its HP.
80	PAPER PRESS M-0	Turns on the paper pressure motor at speed 0.
81	PAPER PRESS M-1	Turns on the paper pressure motor at speed 1.
82	PAPER PRESS M-2	Turns on the paper pressure motor at speed 2.
83	PAPER PRESS M-3	Turns on the paper pressure motor at speed 3.
84	PAPER PRESS M-4	Turns on the paper pressure motor at speed 4.
85	PAPER PRESS M-5	Turns on the paper pressure motor at speed 5.
86	PAPER PRESS M-6	Turns on the paper pressure motor at speed 6.
90	SEP PRESS MOTOR-0	Turns on the separation pressure motor at speed 0.
91	SEP PRESS MOTOR-1	Turns on the separation pressure motor at speed 1.
92	SEP PRESS MOTOR-2	Turns on the separation pressure motor at speed 2.
93	SEP PRESS MOTOR-3	Turns on the separation pressure motor at speed 3.
94	SEP PRESS MOTOR-4	Turns on the separation pressure motor at speed 4.
95	SEP PRESS MOTOR-5	Turns on the separation pressure motor at speed 5.
96	SEP PRESS MOTOR-6	Turns on the separation pressure motor at speed 6.

User Tools

The following table shows all the user tools.

No.	Display	Function	Settings	Factory Setting	Comments
1	AUTO RESET TIME	Determines how long it takes for the machine to return to the defaults.	0: NO, 1 to 5	0	
2	RESETTABLE COUNT	Used by the customer to display the total number of prints	-	0	
3	CLR RESETTABLE COUNT	Clears the resettable total print counters.	0: NO 1: YES	0	
4	MAX PRINT	Limits the maximum print quantity that can be entered.	0 to 9999	9999	
5	TOTAL COUNTER	Displays the total number of prints.	-	0	
6	BUZZER OFF	Turns the buzzer on or off	0: KEYOFF 1: ON 2: OFF	0	
7	AUTO OFF	Turns the main power off after the machine has not been used for the specified time.	0 to 90 minutes	60	Intervals of 10 minutes
8	JUMP TABLE	This determines the position of the wing on the paper delivery table.	0: AUTO 1: UP 2: DOWN	0	
9	DRM STP MODE	Determines whether to move the 1st drum or the 2nd drum to its removal position at the end of printing.	1: DRUM1 2: DRUM2	1	

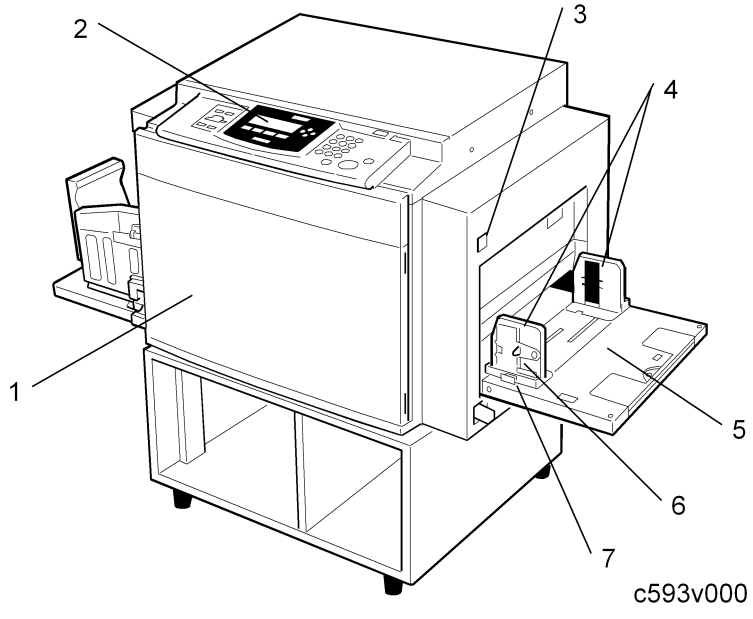
No.	Display	Function	Settings	Factory Setting	Comments
10	LONG SHEET MODE	Allows the machine to feed sheets longer than 432 mm without detecting a jam.	0: NO 1: YES	0	
11	SKIP NUMBER OF TIME	Specifies the number of drum rotations per print in skip feed mode.	2 to 9	2	
12	SKIP DISPLAY ON MODE	When you press the skip feed key, you can select whether optional print count display appears or not.	0: NO 1: YES	1	
13	TOTAL COUNTER DOWN	Sets the total counter to count up (to show the number of copies made) or to count down (to show the number of copies remaining to be made).	0: NO (up) 1: YES (down)	1	
14	PRINT POSITION	Saves the current image synchronization position or recalls the position last saved.	0: SAVE 1: CALL (load)	0	
15	FEED SETUP	Saves the current paper feed and separation pressures or recalls the values last saved.	0: SAVE 1: CALL (load)	0	
16	USER CODE MODE	Selects user code mode. When you set this function, you have to also specify the auto reset time.	User Code Mode: 0: NO 1: YES Auto Reset Time: 0: NO, 1-5 minutes	User Code Mode: 0 Auto Reset Time: 0	
17	UC COUNT	Displays the number of prints made in each user code.	-	0	

No.	Display	Function	Settings	Factory Setting	Comments
18	CLR UC COUNT	Clears each user code counter.	0: NO 1: YES	0	
19	TOTAL UC COUNT	Displays the total number of prints for all the 200 user codes.	-	0	
20	CLR TOTAL UC COUNT	Clears the total user code counter.	0: NO 1: YES	0	

5. Detailed Section Descriptions

Guide to Components and Their Functions

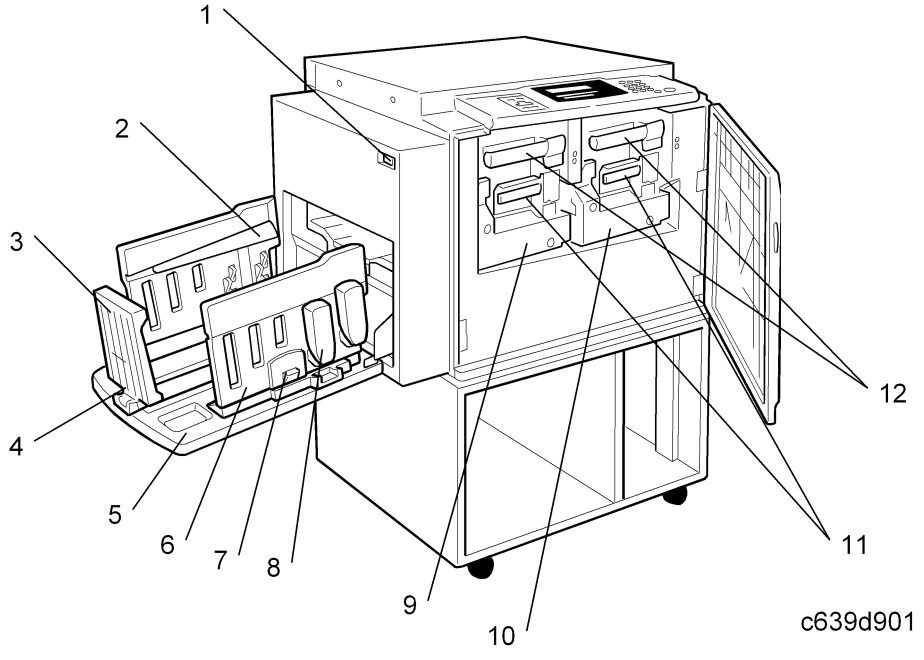
Machine Exterior

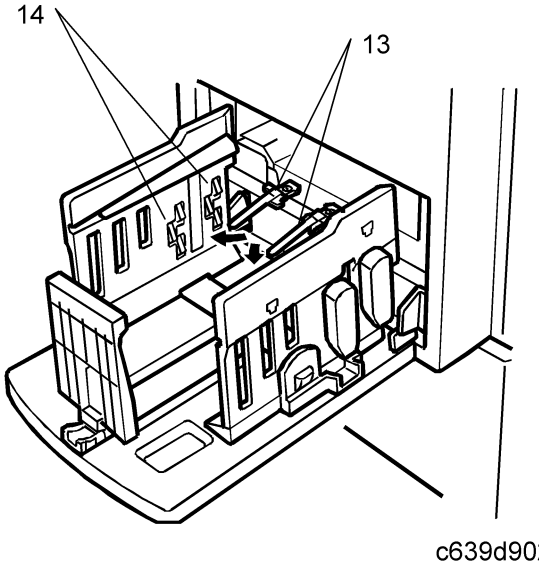


1.	Front Door	Open to access the inside of the machine.
2.	Operation Panel	Operator controls and indicators are located here.
3.	Paper Feed Tray Down Key	Press to lower the paper feed tray.
4.	Paper Feed Side Plates	Use to prevent paper skew.
5.	Paper Feed Tray	Set paper on this tray for printing.
6.	Paper Feed Side Plates Knob	Use to move the side plates.

7.	Paper Feed Side Plates Lock Lever	Use this to secure the paper feed side plates.

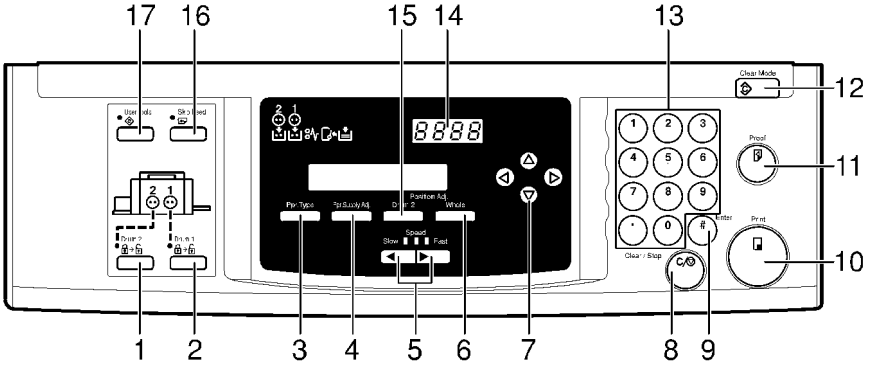
Machine Interior





1.	Main Switch	Use to turn the power on or off.
2.	Paper Alignment Wings	Lift or lower the wings depending on the paper type you use.
3.	Paper Delivery End Plate	This plate aligns the leading edge of prints.
4.	Paper Delivery End Plate Knob	Use to move the end plate.
5.	Paper Delivery Tray	Completed prints are delivered here.
6.	Paper Delivery Side Plates	These plates align the prints on the paper delivery tray.
7.	Paper Delivery Side Plate Knobs	Use to move the side plates.
8.	Chocks	Use to adjust the buffer fins.
9.	Drum Unit 2	The second master is wrapped around this unit.
10.	Drum Unit 1	The first master is wrapped around this unit.
11.	Ink Holder	Set the ink cartridge in this holder.
12.	Drum Unit Lock Lever B1	Lower to unlock and pull out the drum unit.
13.	Trailing Edge Guides	Swing out these guides when you use B5 paper.
14	Buffer Fins	Use to stack prints neatly.

Operation Panel



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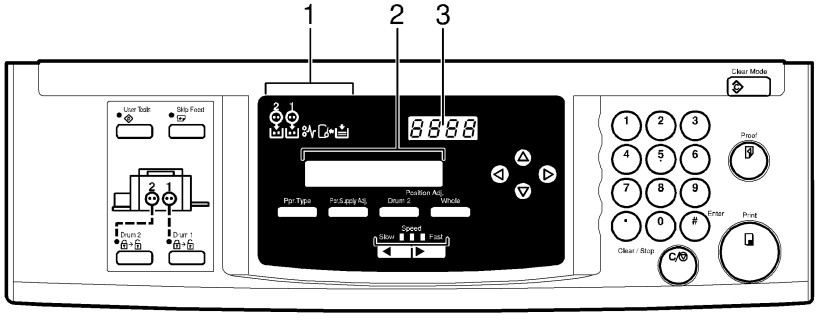
1.	Drum 2 key	Press when you need to install or remove Drum 2.
2.	Drum 1 key	Press when you need to install or remove Drum 1.
3.	Ppr. Type key	Press to select the paper type. This adjusts the paper feed and separation pressures.
4.	Ppr. Supply Adj key	Press to make fine adjustments to the paper feeding pressure and paper separation pressure.
5.	Speed key	Press to adjust the printing speed.
6.	Position Adj/Whole key	Press to adjust the image positions for Drum 1 and Drum 2 (by the same amount). Press this key, then adjust with the scroll keys.
7.	Scroll keys	Press to shift the image forward, backward, right, or left.
8.	Clear/Stop key	Press to stop printing.
9.	Enter key	Use to enter data in selected modes.
10.	Print key	Press to start printing.
11.	Proof key	Press to make proof prints.
12.	Clear Modes key	Press to clear any previously entered job settings.
13.	Number keys	Press to enter the desired number of prints and data for selected modes.
14.	Counter	Display the number of prints entered. While printing, it shows the number of prints remaining.
15.	Position Adj/Drum 2 key	Press to adjust the relative image position for Drum 2. Press this key, then adjust with the scroll keys.
16.	Skip Feed key	Press to select skip feed printing.
17.	User Tools key	Press to change the default settings to meet your requirements.

Indicators



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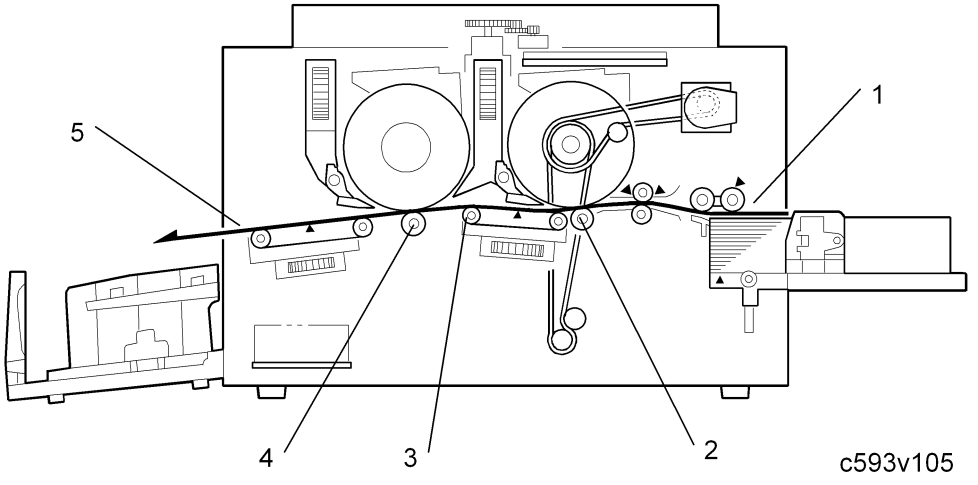
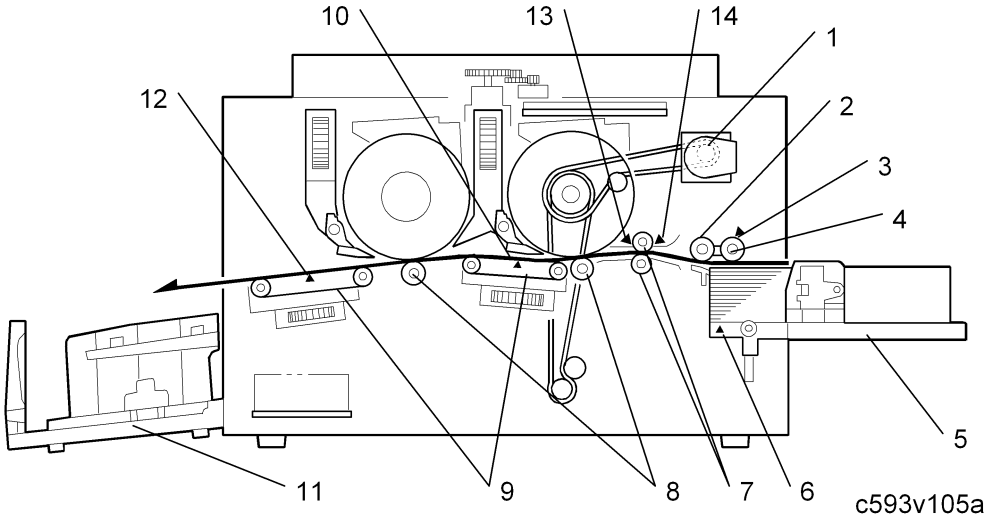
1.	Monitors	The monitors light up when an abnormal condition occurs within the machine.
2.	Panel Display	This displays prompts and information for the user.
3.	Counter	Displays the number of prints entered. While printing, it shows the number of prints remaining.

Printing Process Overview



1.	Paper Feed	Sends paper to the 1st drum.
2.	Printing (Drum 1)	Presses the paper fed from the paper feed section against the 1st drum. This transfers ink to the paper through the drum screen and the 1st master.
3.	Paper Transport to Drum 2	Sends paper to the 2nd drum.
4.	Printing (Drum 2)	Presses the paper fed from the paper transport section against the 2nd drum. This transfers ink to the paper through the drum screen and the 2nd master.
5.	Paper Delivery	Peels off the printed paper with the exit pawls and air knife, and ejects the paper onto the paper delivery table.

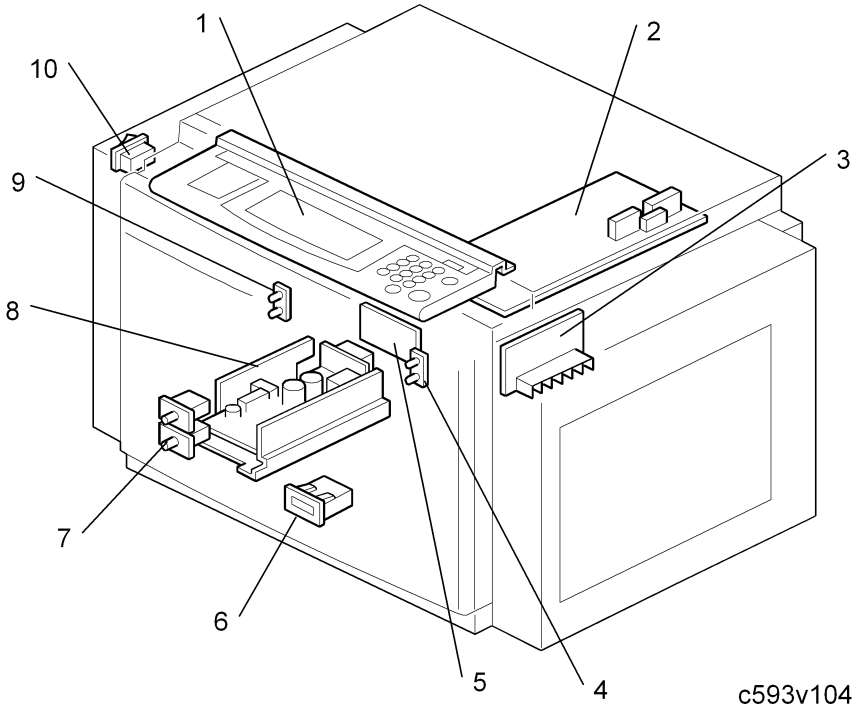
Mechanical Component Layout



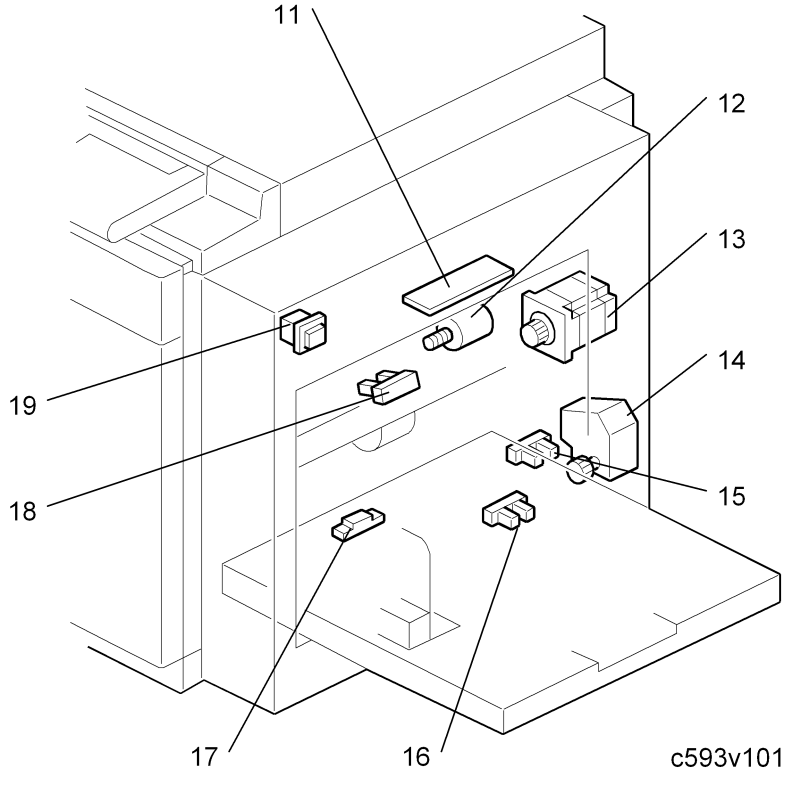
1. Main Motor	8. Press Rollers
2. Paper Feed Roller	9. Transport Belts
3. Paper Height Sensor	10. Relay Paper Sensor
4. Paper Pick-up Roller	11. Paper Delivery Table
5. Paper Table	12. Paper Exit Sensor
6. Paper End Sensor	13. Paper Feed Timing Sensor
7. Registration Rollers	14. Paper Registration Sensor

Electrical Component Layout

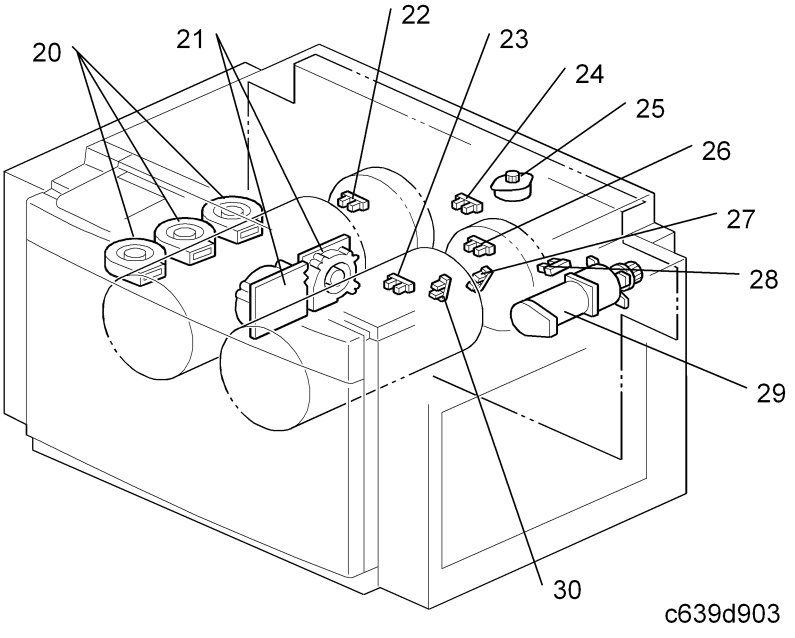
Printed Circuit Board Layout

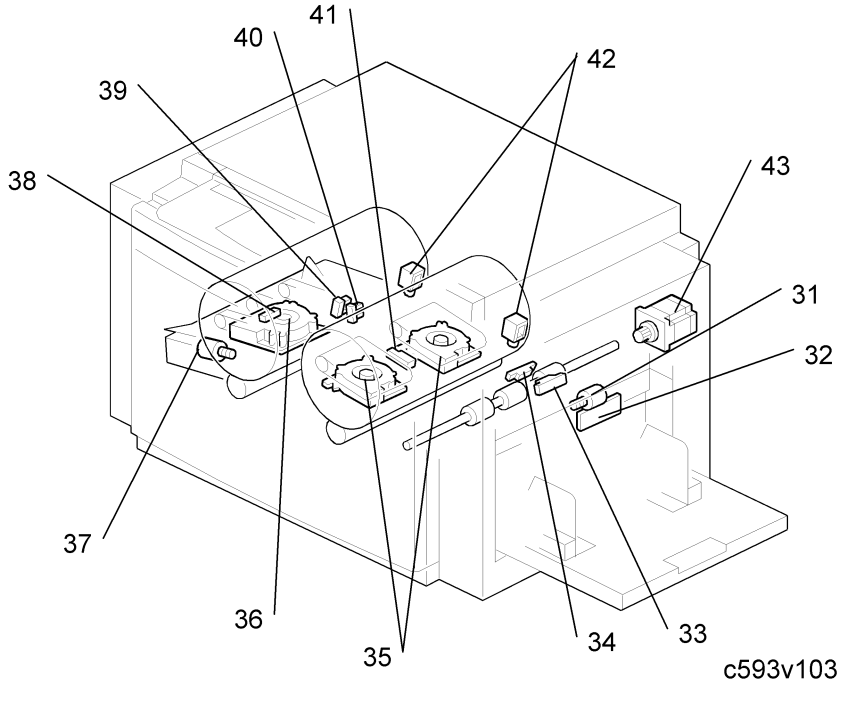


Paper Feed Section

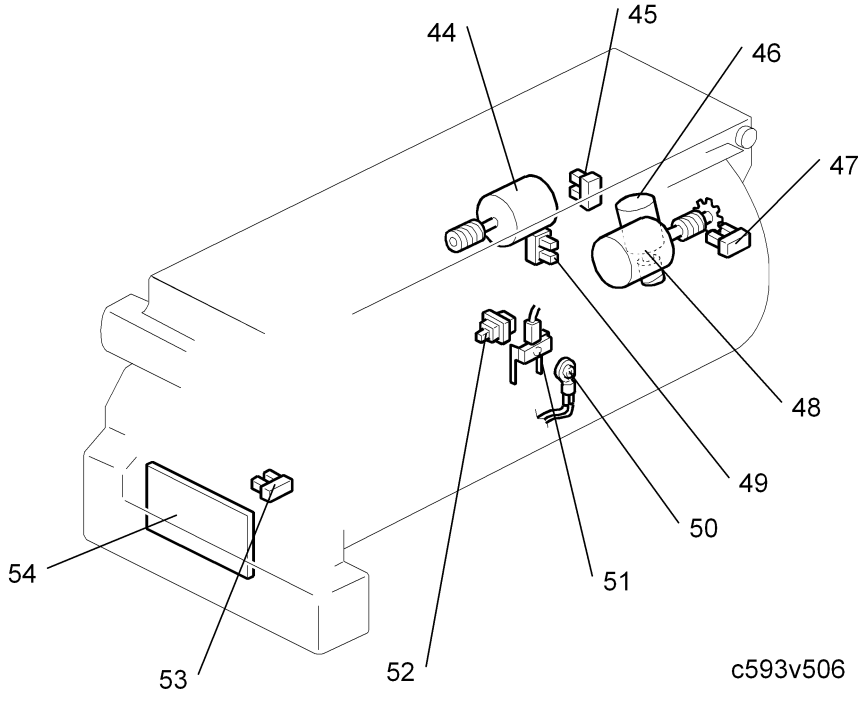


Master Eject, Press Roller, And Other Sections





Drum Unit



Tables of Electrical Components

Boards

Index No.	Name	Function
1	Operation Panel Board	Controls the operation panel.
2	Main Processing Unit (MPU)	Controls all machine functions both directly and through other boards.
3	Main Motor Control Board	Controls the main motor.
5	Noise Filter Board	Filters out electrical noise on the ac power input lines.
8	Power Supply Unit (PSU)	Provides dc power to the system.
11	Feed Pressure Detection Board	Sends data about the paper feed pressure to the CPU.
32	Separation Pressure Detection Board	Sends data about the paper separation pressure to the CPU.
54	Ink Detection Board	Checks if there is ink in the drum.

Solenoids

Index No.	Name	Function
42	Printing Pressure Solenoid	There are two solenoids: one for each drum. They pull the release arms to apply the printing pressure against the drum.

Switches

Index No.	Name	Function
7	Cover Safety Switches	Checks if the front door is closed correctly.

Index No.	Name	Function
10	Main Switch	Turns the power on or off.
19	Paper Table Lowering Switch	Lowers the paper table.

Motors

Index No.	Name	Function
12	Feed Pressure Motor	Drives the paper feed pressure adjustment mechanism.
13	Paper Feed Motor	Feeds the paper from the paper table.
14	Paper Table Motor	Raises and lowers the paper table.
20	2nd Drum Air Knife Fan	Provides air to separate the paper leading edge from the drum.
21	1st Drum Air Knife Fan	Provides air to separate the paper leading edge from the drum.
25	Drum Synchronization Motor	Drives the 2nd drum image adjustment mechanism.
29	Main Motor	Drives the drum, press roller, and paper delivery unit components.
31	Separation Pressure Motor	Drives the paper separation pressure adjustment mechanism.
35	1st Drum Transport Fan	Provides suction so that paper is held firmly on the transport belts.
36	2nd Drum Transport Fan	Provides suction so that paper is held firmly on the transport belts.
37	Wing Guide Motor	Changes the position of the paper wing guides in the paper delivery unit.
43	Registration Motor	Feeds the paper to align it with the image on the master on the drum.
44	Ink Pump Motor	Drives the ink pump to supply ink.
46	Idling Roller Motor	Presses or releases the idling roller against the drum screen.

Index No.	Name	Function
48	Drum Shift Motor	Slides the drum screen position to the front or rear for the side-to-side image shifting mode.

Sensors

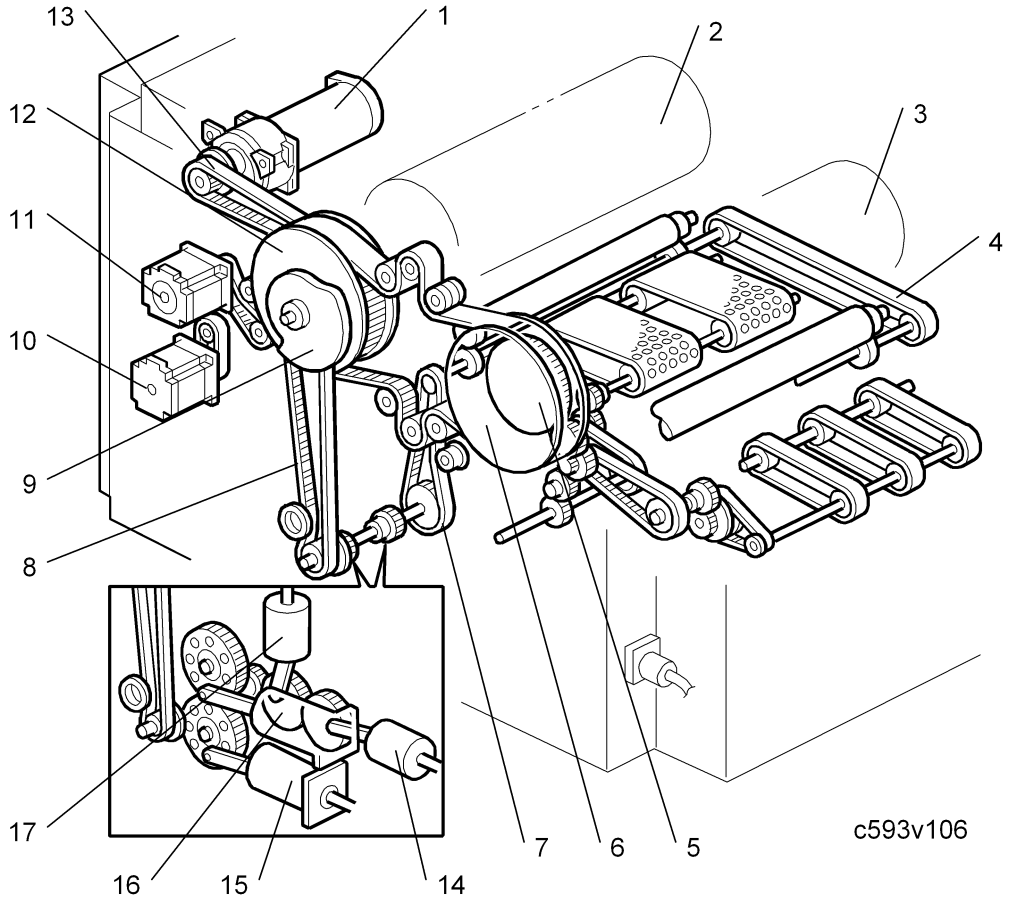
Index No.	Name	Function
15	Paper Table Lower Limit Sensor	Detects when the paper table is at its lower limit position.
16	Paper Table Set Sensor	Detects if the paper table is closed.
17	Paper End Sensor	Detects if paper is present on the paper table.
18	Paper Height Sensor	Detects if the top of the paper stack on the paper table is at the paper feed height.
22	2nd Drum Set Sensor	Detects when the 2nd drum is removed and replaced. Also detects when the 2nd drum is at its removal position.
23	2nd Jam Sensor	Detects paper misfeeds.
24	Drum Synchronization HP Sensor	Detects when the 2nd drum image adjustment is at the home position.
26	1st Drum Set Sensor	Detects when the 1st drum is removed and replaced. Also detects when the 1st drum is at its removal position.
27	Feed Start Sensor	Checks the drum position for the paper feed start timing.
28	Feed Encoder	Detects fluctuations in the drum rotation.
30	1st Jam Sensor	Detects paper misfeeds.
33	Paper Registration Sensor.	Detects paper approaching the registration roller
34	Paper Feed Timing Sensor	Detects paper approaching the paper clamper in the press roller.
38	Paper Exit Sensor	Detects paper misfeeds at the exit.
39	Wing Upper Position Sensor	Detects when the paper wing guides are in the upper position.

Index No.	Name	Function
40	Wing Lower Position Sensor	Detects when the paper wing guides are in the lower position.
41	Relay Paper Sensor	Detects paper leaving the 1st drum.
45	Drum Shift HP Sensor	Detects when the drum screen is at the home position. (The side-to-side image shift is 0.)
47	Drum Shift Sensor	Sends the image position data to the CPU for display on the operation panel.
49	Ink Pump Sensor	Monitors the operation of the ink pump to count how many cycles it has moved.
52	Ink Cartridge Set Sensor	Detects if the ink cartridge is in place.
53	Idling Roller HP Sensor	Detects when the idling roller is at the home position.

Others

Index No.	Name	Function
4	1st Drum LED	Indicates when the 1st drum is at the removal position.
9	2nd Drum LED	Indicates when the 2nd drum is at the removal position.
		Green LED: Indicates that the drum is at its removal position.
		Red LED: Indicates that the drum is not at its removal position.
6	Print Counter	Keeps track of the total number of prints
50	Thermistor	Detects the temperature inside the drum to adjust various processes.
51	Ink Detecting Pin	Detects if ink is present in the drum.

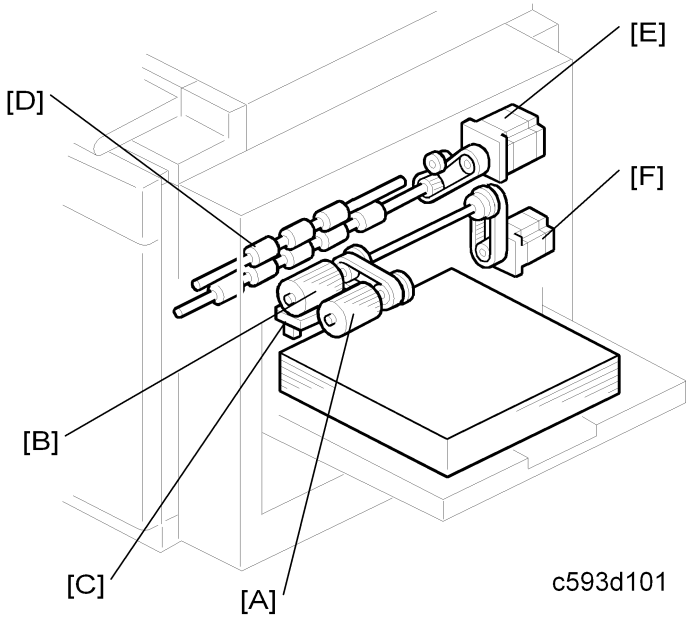
Drive Layout



1. Main Motor	10. Paper Feed Motor
2. 1st Drum	11. Registration Motor
3. 2nd Drum	12. 1st Drum Gear
4. Press Roller Connection Belt	13. Main Belt
5. Printing Pressure Cam	14. 2nd Drum Air Pump - Center
6. 2nd Drum Gear	15. 2nd Drum Air Pump - Sides
7. Press Roller Drive Belt	16. 1st Drum Air Pump - Sides
8. Air Pump Drive Belt	17. 1st Drum Air Pump - Center
9. Registration Roller Shift Cam	

Paper Feed

Overview



Pick-up and Feed

The pick-up roller [A] feeds the top sheet of paper on the paper table. Then, the paper feed roller [B] and the friction pad [C] separate it from the stack and feed it to the registration rollers [D]. The upper and lower registration rollers [D] feed the paper to the drum. The paper feed motor [E] (a stepper motor) drives the pick-up roller [A] and paper feed roller [B].

Feed/Separation Pressure

The pressure of the paper feed roller [B] and the friction pad [C] against the paper depends on the paper type selected at the operation panel. Each component has a separate dc motor (not shown) for adjusting the pressure.

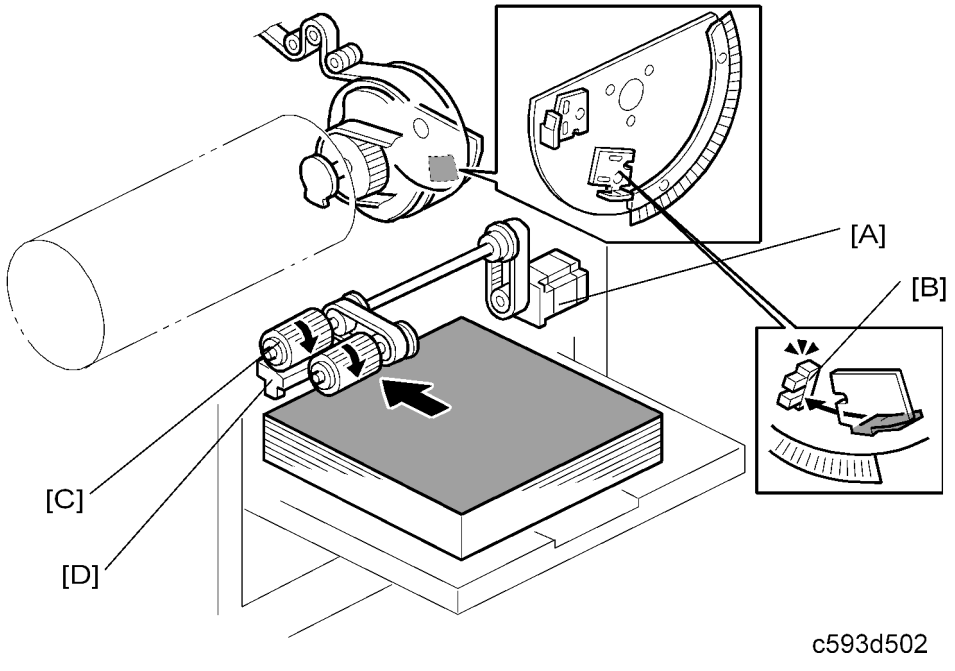
Please refer to the paper feed / separation pressure mechanism in the C229 service manual.

Registration

The registration motor [F] (a stepper motor) controls the registration roller [D]. The registration roller [D] synchronizes paper feed timing with the image on the drum. The registration roller starts rotating after the paper has come in contact with the rollers and has been aligned.

Paper feed timing around the registration roller is monitored by two different photo-sensors (not shown). One is located before the registration roller, and the other is after the registration roller. These sensors are also used for jam detection.

Paper Feed Mechanism

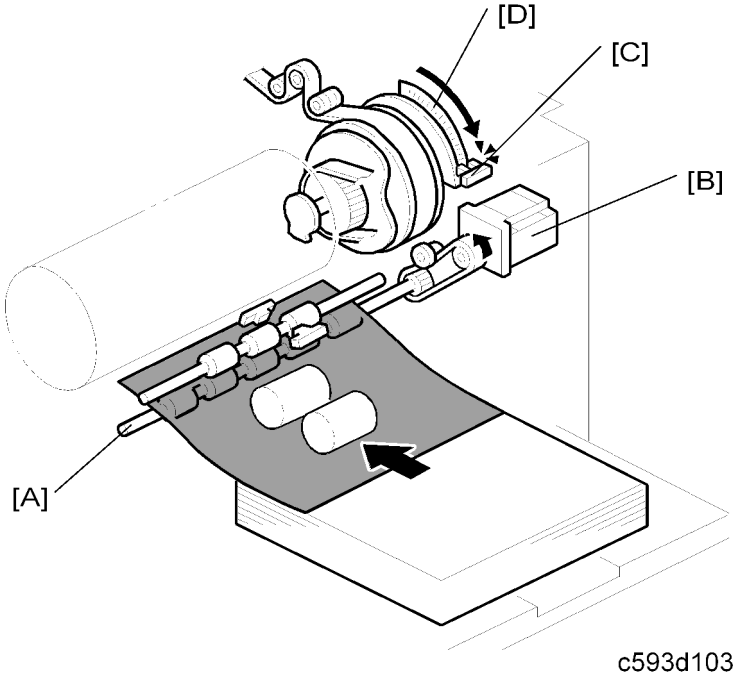


Paper feed timing must be synchronized with drum rotation, so the paper feed motor [A] on timing is maintained by the feed start sensor [B] (the actuator is on a plate behind the 1st drum, connected to the drum drive shaft).

The friction between the feed roller [C] and the friction pad [D] separates the top sheet of the paper from the stack, and the feed roller feeds it to the registration roller (not shown).

Paper Registration Mechanism

Registration Roller Drive



The lower registration roller [A] is driven by a stepper motor [B] (the registration motor). Paper feed timing must be synchronized with drum rotation, so the registration motor [B] on timing is maintained by the feed encoder [C].

The feed encoder [C] (a photo-interrupter) is activated by the encoder plate [D] on the rear of the 1st drum, generating a pulse signal. The encoder is on a plate behind the 1st drum, connected to the drum drive shaft. The CPU monitors this signal to detect fluctuations in the 1st drum rotation. Depending on the detected fluctuation, the registration motor [B] start timing is adjusted so that the leading edge of the paper is fed to the 1st drum at exactly the correct time.

A short time after the drum starts rotating, the encoder plate [D] activates the encoder sensor [C]. After a pre-determined interval, the registration motor starts turning to feed paper to the drum. After the paper has been fed between the drum and the press roller, the registration motor stops (the timing is determined by encoder pulses).

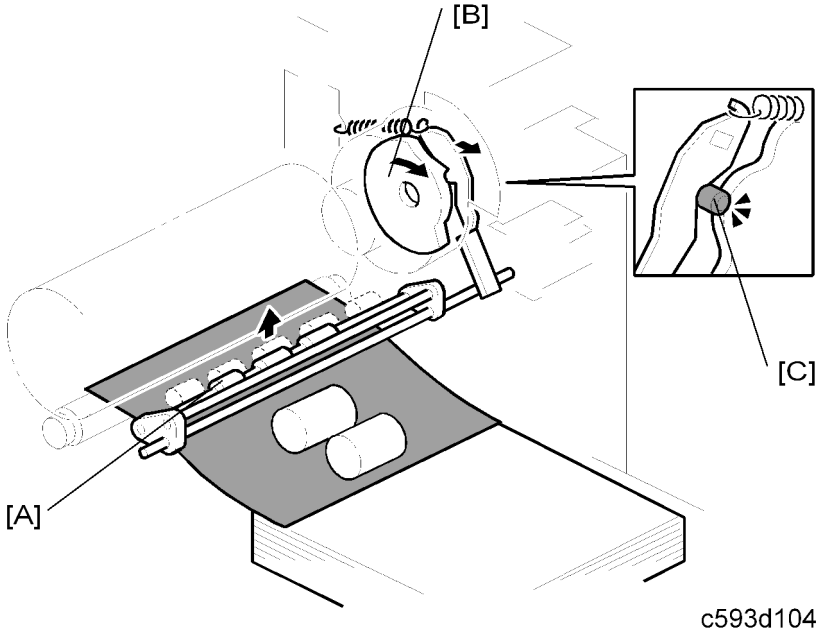
The registration motor rotation speed is about constant. However, when the operator selects a higher or lower printing speed (to change the copy image density), the rotation speed changes.

Image Up/Down Shift Mode

In addition, the registration motor start timing changes when the image position keys on the operation panel are pressed (this is the image up/down shift mode). If the image is shifted forward, paper feed timing is delayed.

After the leading edge of the paper leaves the registration rollers, it must be precisely caught by the drum and the press roller. When the image up/down shift mode is used, the position of the drum changes through the image up/down mechanism, so the registration motor start timing must change.

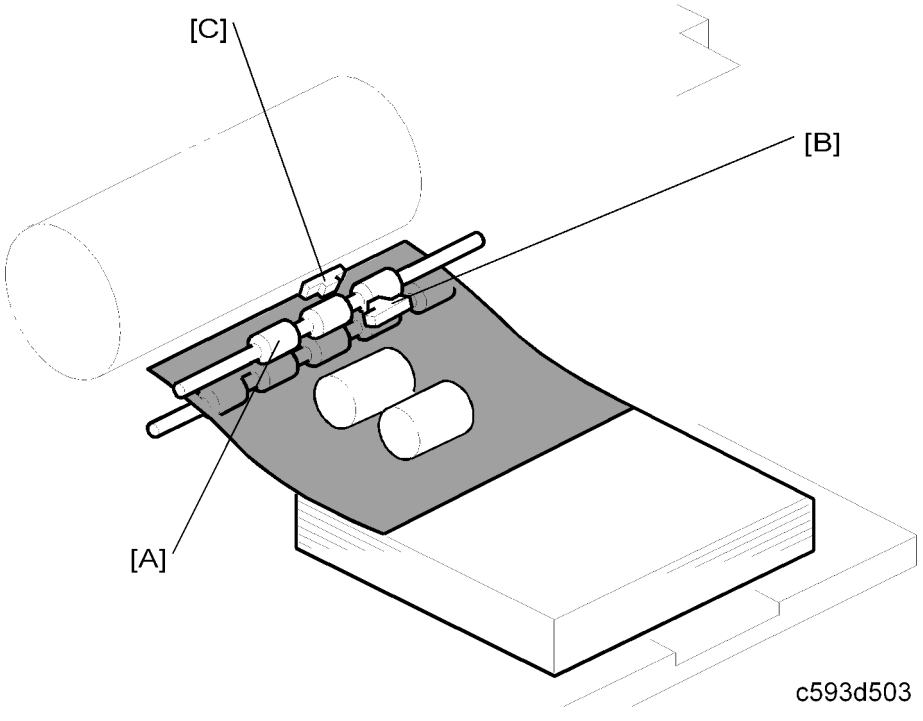
Registration Roller Up/Down Mechanism



After the paper is fed between the drum and the press roller, the upper registration roller [A] is released from the lower registration roller. This is to prevent interference from the registration rollers while the paper is being fed by the drum and the press roller.

When the high point of the cam [B] on the 1st drum gear reaches the cam follower [C] (a bearing), the shaft rotates to release the upper registration roller [A] from the lower registration roller.

Paper Registration Sensor and Paper Feed Timing Sensor

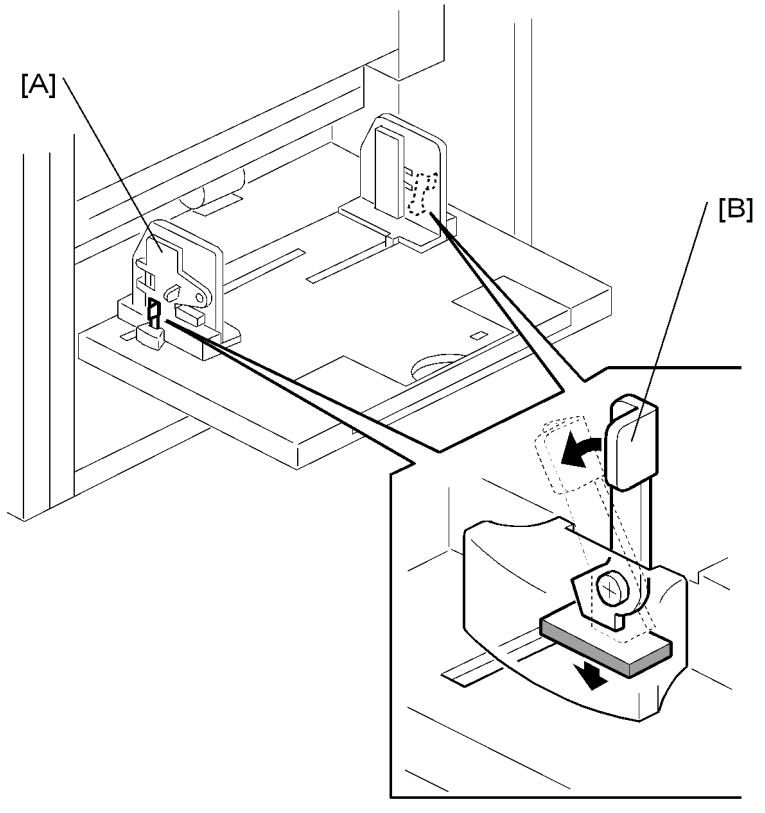


The paper feed timing around the registration roller [A] is monitored by two different photo-sensors. The first is the paper registration sensor [B], which is located before the registration roller. The second sensor is the paper feed timing sensor [C], which is located after the registration roller.

The paper registration sensor [B] detects the paper arriving at the registration roller. The paper feed motor start timing is determined by this sensor. When the paper comes into contact with the rollers, the motor remains stopped to create a buckle in the paper to obtain precise paper registration and to prevent paper skew. The motor starts turning a pre-determined period after the sensor is activated by the paper.

These sensors [B] and [C] are also used for jam detection.

Paper Table Side Fence Lock Mechanism

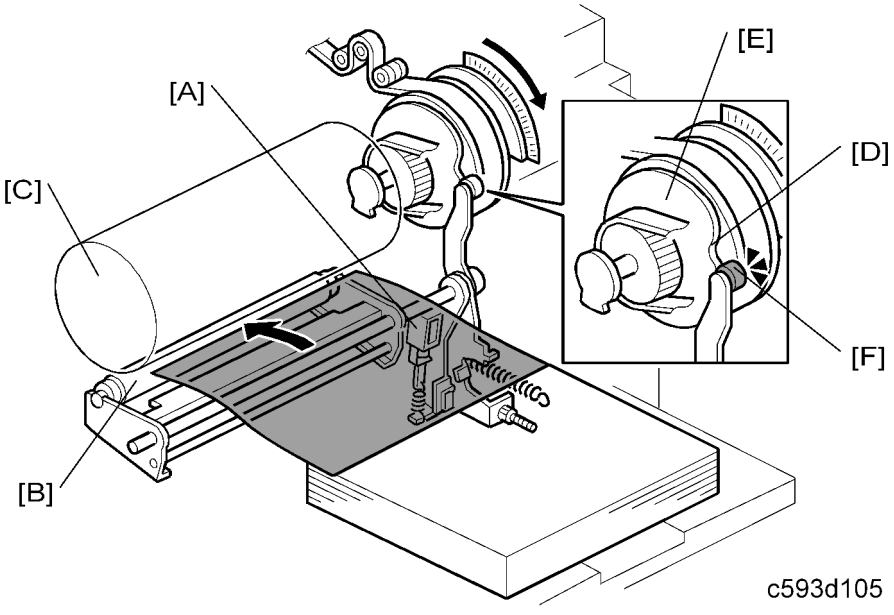


The left and right side fences [A] move together due to a rack and pinion mechanism. There is a lock lever [B] to hold the side fences in position.

The lock lever may be useful if the operators cannot set the side fences properly, causing paper feed problems. Advise the operator to use the lock lever [B] once the paper fences are properly adjusted.

Printing

Overview



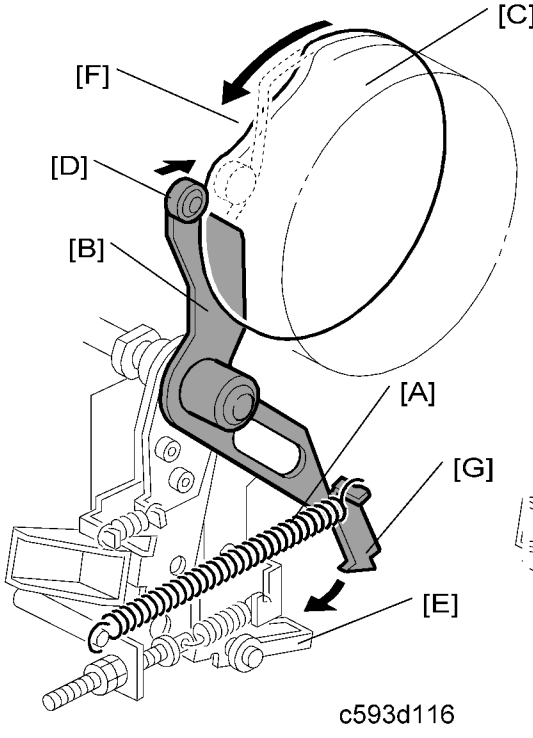
While the machine is not in the printing cycle, the printing pressure solenoid [A] stays off, and the press roller [B] stays away from the drum [C].

If printing has just started when the notch [D] in the printing pressure cam [E] reaches the bearing [F] on the arm, the printing pressure solenoid [A] turns on. This locks the arm and the press roller together; from now, when the arm moves, so does the press roller.

The printing pressure cam [E] controls the movement of the press roller. When the bearing [F] on the arm rides on the flat point of the cam [E], the press roller [B] presses the paper against the drum. When it reaches the notch [D] in the cam, the press roller [B] moves away from the drum to avoid the master clamper.

Both drums have an identical printing pressure mechanism.

Printing Pressure Mechanism



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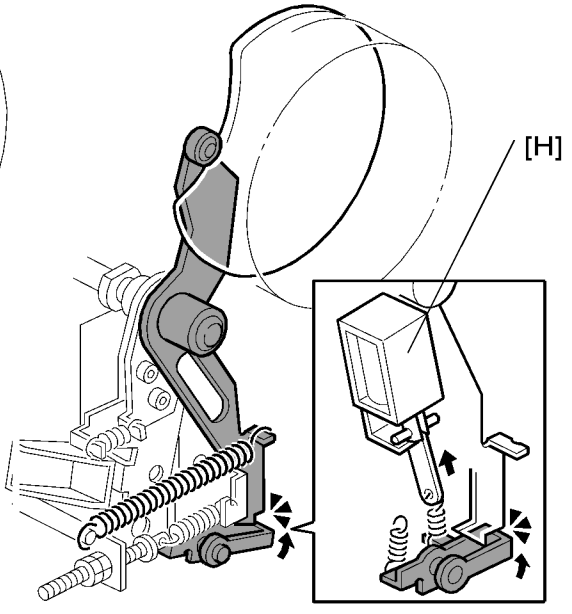

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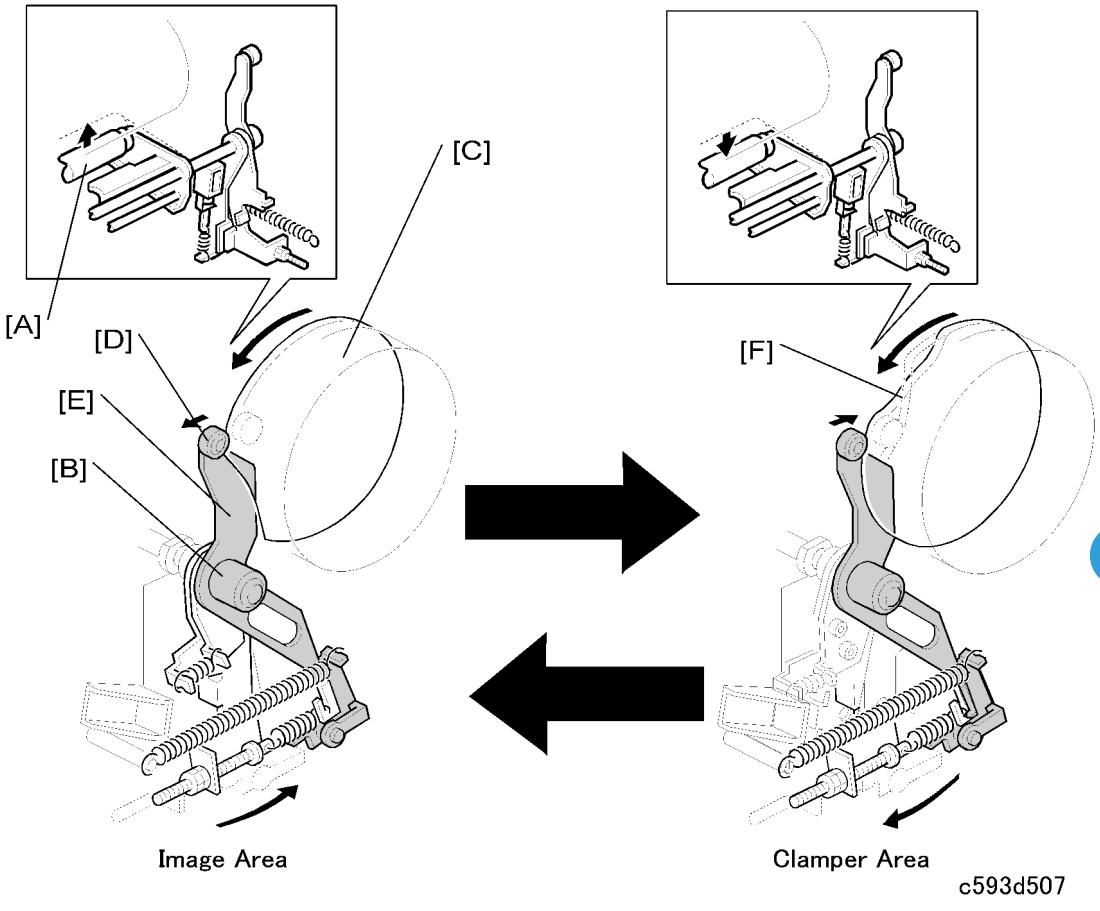
Rear View

The printing pressure spring [A] and the printing pressure arm [B] are at the rear of the drum. The arm [B] contacts the printing pressure cam [C] via the bearing [D].

The cam [C] is attached to the drum, and is turned by the main motor (not shown). When the drum turns, the cam rotates, and the arm moves. However, the press roller (not shown) does not move until the arm [B] has been connected to the lever [E].

When the notch [F] in the cam reaches the bearing [D], the hook [G] on the other end of the arm moves towards the lever [E]. If paper feed has started, the printing pressure solenoid [H] then pulls the lever [E], and the lever [E] catches the hook [G]. From this point, the press roller moves up and down at the same time as the drum rotates.



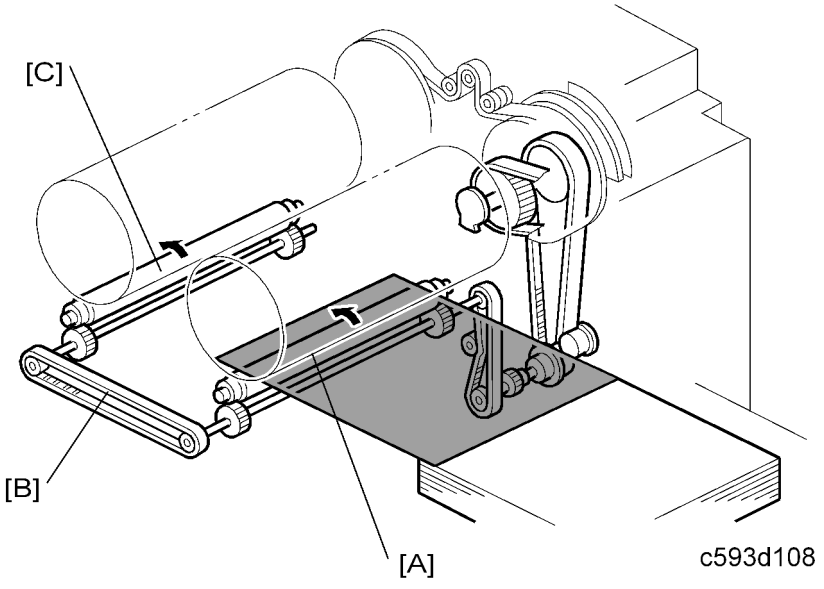
When the arm and the lever are interlocked, the press roller [A] is lifted when the arm shaft [B] turns.

The printing pressure cam [C] moves the press roller away from the drum when the clamper reaches the press roller.

When the bearing [D] on the arm [E] rides on the flat point of the cam, the press roller [A] presses the paper against the drum, and the image is transferred to the paper.

When the bearing reaches the notch [F] in the cam, the press roller [A] moves away to avoid the master clamper.

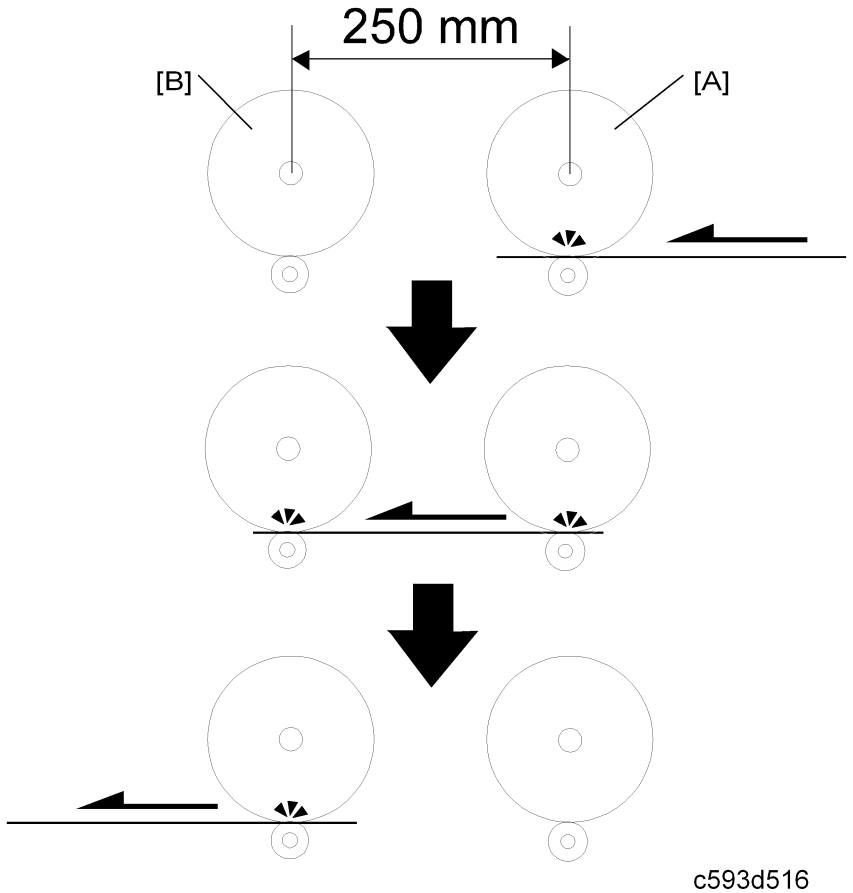
Press Roller Drive Mechanism



The main motor (not shown) drives the press roller [A] for the 1st drum through timing belts and gears.

The press roller connection belt [B] transfers drive to the press roller [C] for the 2nd drum.

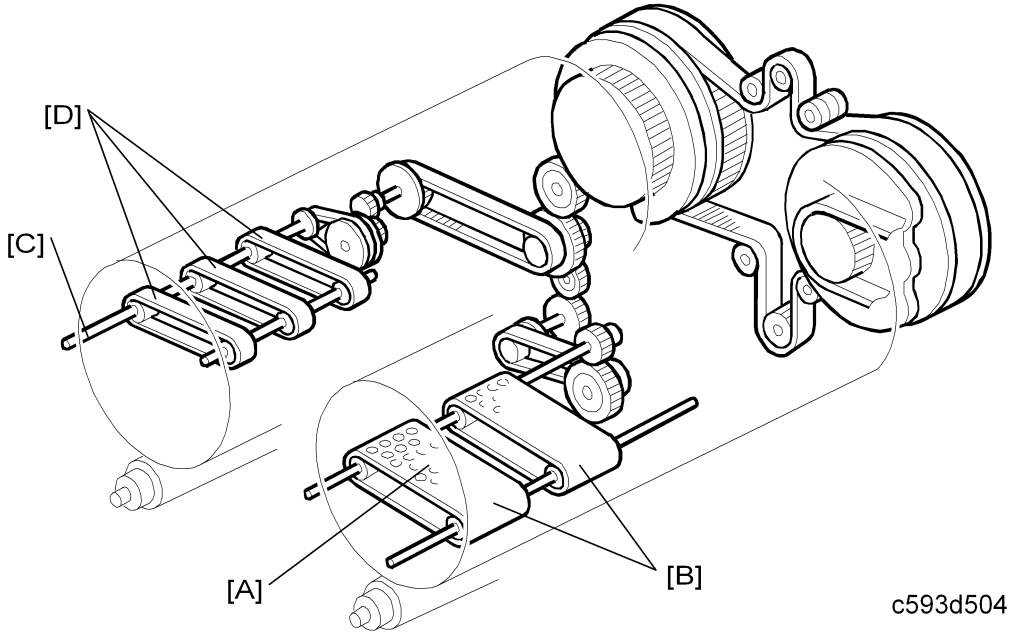
Gap between the Two Drums



This machine feeds paper past 2 drums. After paper feeds past the 1st drum [A], the ink on the paper is carried on to the master of the 2nd drum [B] because the ink has not dried. If paper registration fails between the 1st and 2nd drum, this ink appears as a ghost image on subsequent prints. If the paper is 250 mm or longer, the 2nd drum (and its press roller) will catch it before the 1st drum (and its press roller) release it. Therefore, registration problems will not occur unless the paper is shorter than 250 mm.

Paper Delivery

Overview



The relay transport unit [A] feeds paper between drum 1 and drum 2. It consists of two wide belts [B] and 1st drum transport fan (not shown).

The paper delivery unit [C] feeds paper between drum 2 and the paper exit table. It consists of three belts [D] and the 2nd drum transport fan (not shown).

The belts [B] and [D] are driven by the main motor, and the paper is held against the belts by suction generated by the fans.

The relay paper sensor and the exit sensor (not shown) detect paper misfeeds.

The exit pawls (not shown) prevent paper from wrapping around the drum.

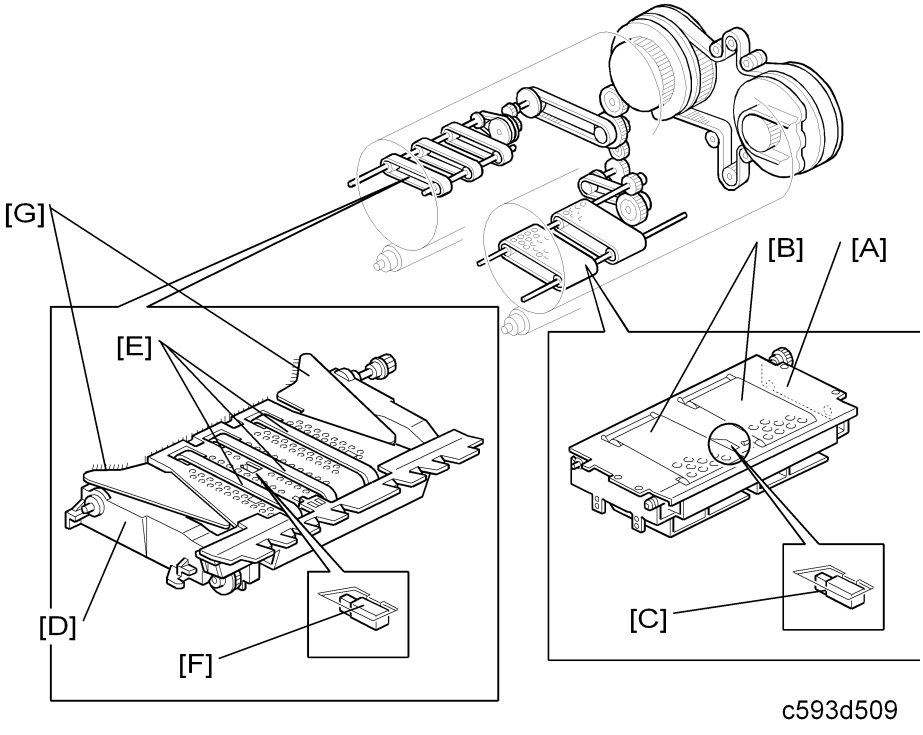
The paper guide wings (not shown) help to feed out the paper to the delivery table.

A dc motor (the wing guide motor: not shown) changes the angle of the wings automatically. There are two settings, and the setting used depends on the paper type selected at the operation panel.

The two air knife fans (not shown) help to separate the paper from the drum.

Relay Transport Unit and Delivery Unit

Relay Transport Unit



The 1st drum transport fan (not shown) inside the relay transport unit [A] holds the paper against the two wide belts [B] to deliver paper to the 2nd drum. The belts [B] are driven by the main motor. The relay paper sensor [C] detects paper jams.

Delivery Unit

The 2nd drum transport fan (not shown) inside the delivery unit [D] holds the paper against the three rubber belts [E] to deliver paper to the paper exit table. The belts [E] are driven by the main motor. The paper exit sensor [F] detects paper jams.

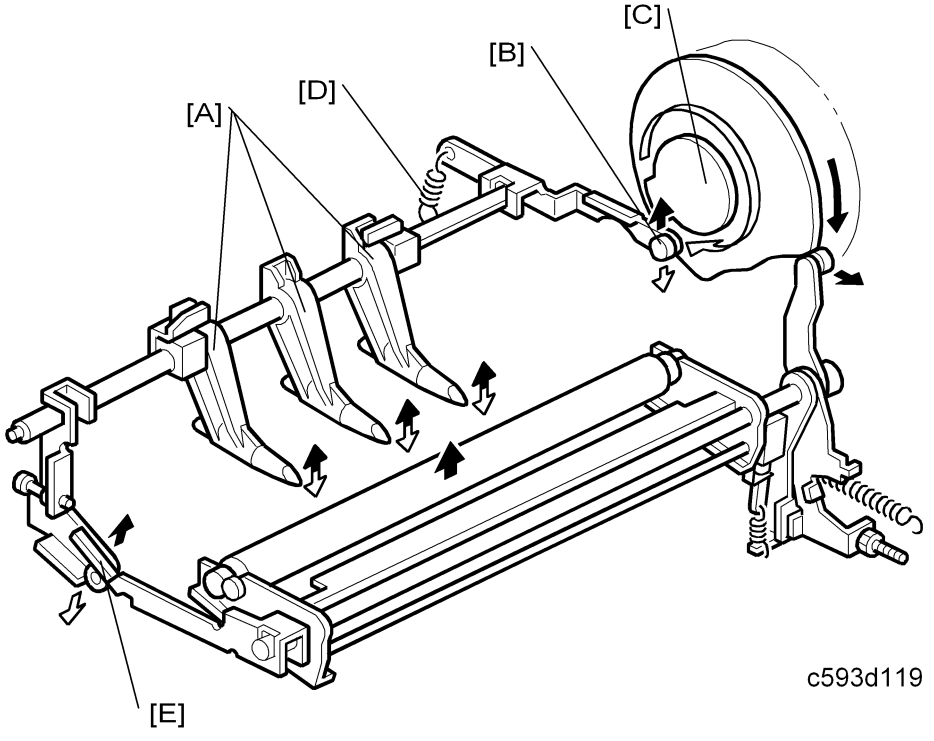
The paper guide wings [G] lift the side of the paper as it leaves the delivery unit. This stiffens the paper so that the leading edge of the paper will not sag and brush against the sheets on the paper exit table. This prevents the ink on freshly printed sheets from being smeared.

When the operator changes the paper type at the operation panel, the wing guide motor (not shown) automatically changes the angle of the wing guides.

Please refer to the Delivery Unit mechanism in the C262 service manual.

Exit Pawl Mechanism

Drive Mechanism

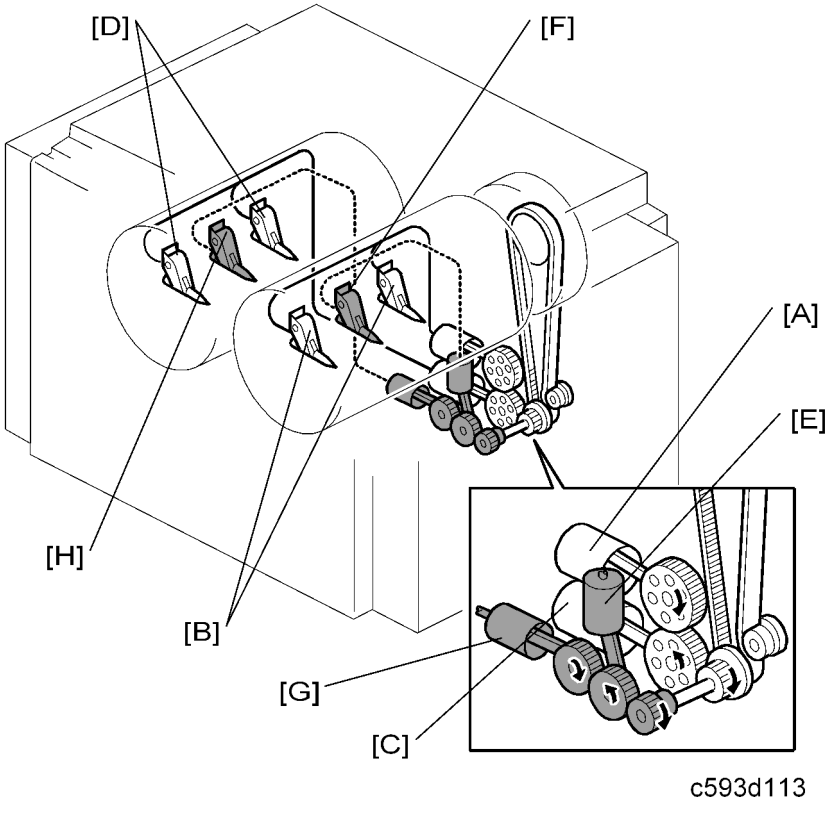


The exit pawls [A] guide the paper at three places. They prevent the paper from wrapping around the drum.

The bearing [B] on the exit pawls contacts the exit pawl cam [C] on the drum gear. As the drum rotates and the master clamper approaches the exit pawls, the exit pawls move away from the drum. When the master clamper moves away from the exit pawls, the bearing rides along the low point of the cam, and the exit pawls move nearer the drum surface due to tension from the spring [D].

When printing pressure is not applied, the exit pawls are held away from the drum by the lever [E].

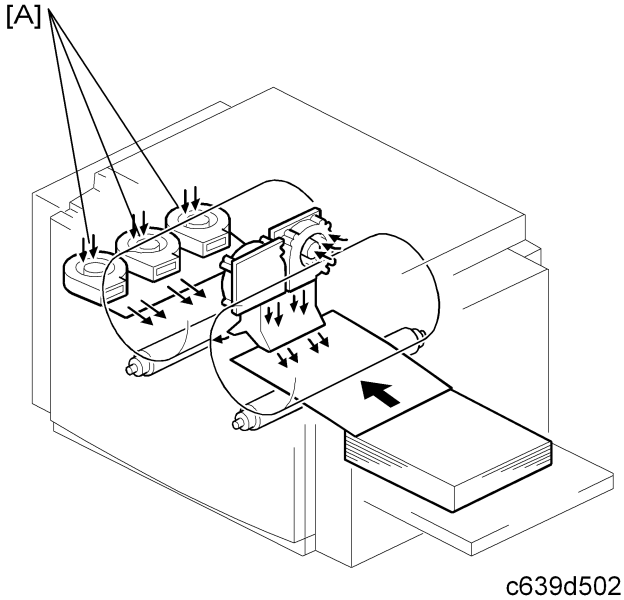
Air Pump Mechanism



The main motor drives the air pump pistons through gears. The pistons push a jet of air out through the nozzles in the exit pawls. The jets of air push down on the paper and separate it from the drum.

The large piston [A] supplies air to both sides [B] of the 1st drum. The large piston [C] supplies air to both sides [D] of the 2nd drum. The small piston [E] supplies air to the center [F] of the 1st drum. The small piston [G] supplies air to the center [H] of the 2nd drum.

Air Knife Mechanism



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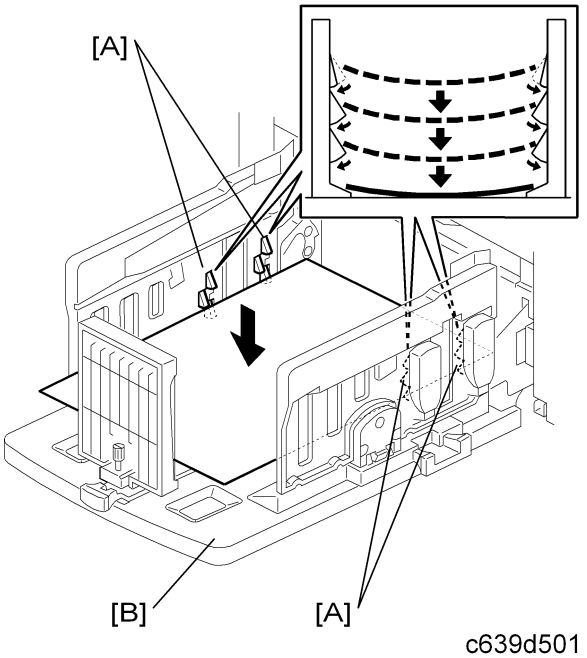
The air knife fans blow air against the leading edge of the paper that has just been fed from the drum. This helps to separate the paper from the drum.

One air knife fan [A] separates paper from the 1st drum. Three air knife fans [B] separate paper from the 2nd drum. After the 2nd drum, the paper may have more ink on it, so more air is needed to separate it from the drum.

Adjustable Buffer Fins



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The printed paper bends upwards easily. This causes uneven stacking and ink stains on the back of the paper on the delivery table. The buffer fins [A] on the paper delivery table [B] lift the edges of the paper, to prevent this problem. When the paper is fed to the delivery table, these plates catch the edges of the paper, and the paper falls in an inverted "U" shape, as shown in the diagram, with a gap between each sheet. The plates catching the edges also make the paper fall more slowly, and the ink dries before the paper reaches the stack.

This mechanism decreases uneven stacking of the printed paper and prevents ink stains on the back.

The following table shows the recommended positions for these plates (and for the paper guide wings) for each paper type.

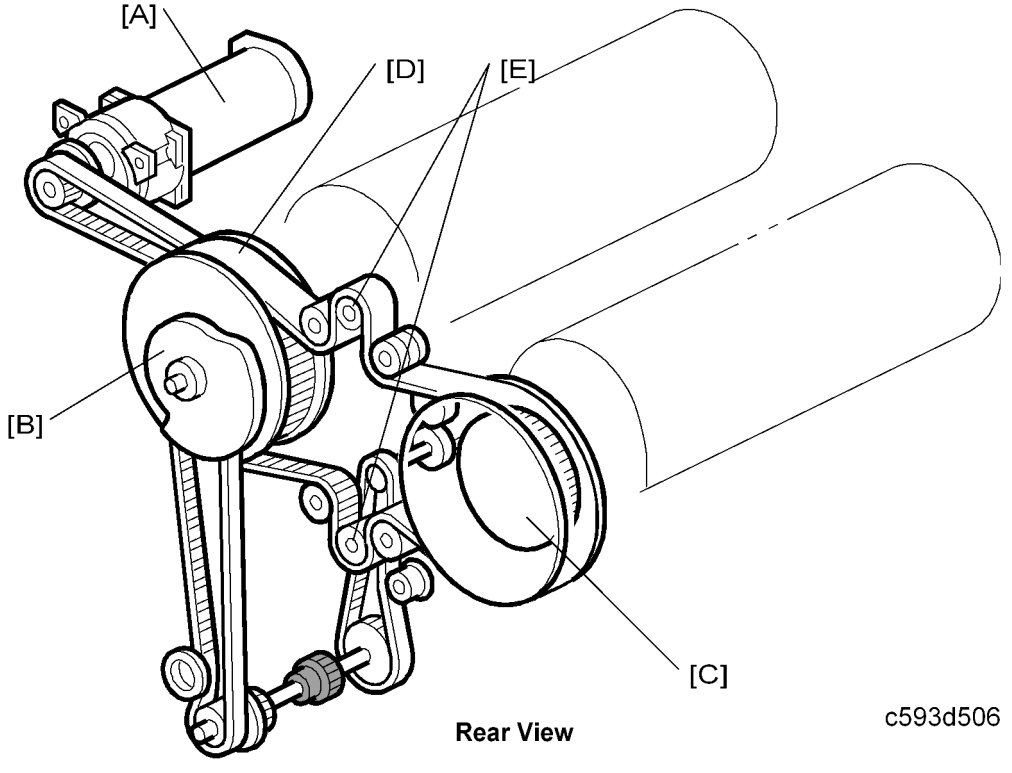
Paper Weight	Paper Size	Paper Guide	Plate
128 g/m^2 or thicker	A3 SEF, 11" x 17" SEF, B4 JIS SEF	Lower the wings	Down
	A4 SEF LEF, B5 JIS SEF LEF	Lower the wings	Down
52.3 g/m^2-128 g/m^2	A3 SEF, 11" x 17" SEF, B4 JIS SEF	Raise the wings fully	Up
	A4 SEF LEF, B5 JIS SEF LEF	Raise the wings to about 45 degrees	Up

Paper Weight	Paper Size	Paper Guide	Plate
52.3 g/m^2 or thinner	A3 SEF, 11" x 17" SEF, B4 JIS SEF	Raise the wings to about 45 degrees	Down
	A4 SEF LEF, B5 JIS SEF LEF	Raise the wings to about 45 degrees	Down

Drum Drive and Image Shift

Overview

Drum Drive



The main motor [A] (a stepper motor) drives the 1st drum gear [B] directly, and the 2nd drum gear [C] via the belt [D].

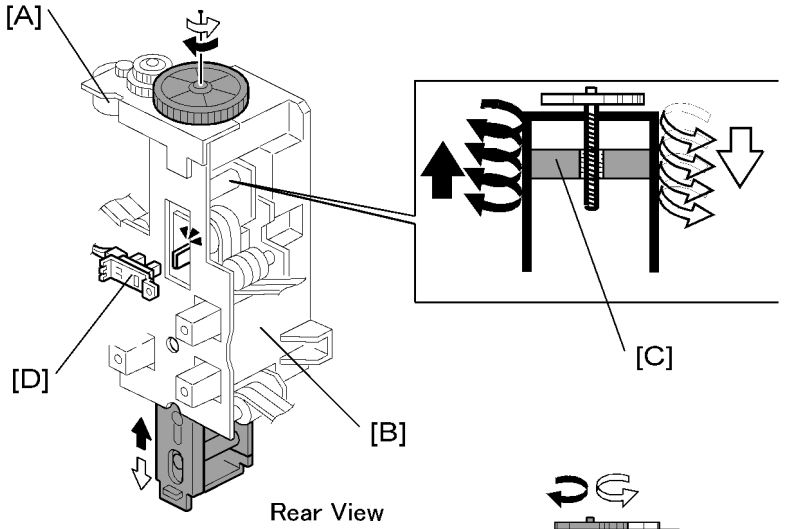
Image Shift

In "Position Adj/Drum 2" mode, which can be selected at the operation panel, the image position on the 2nd drum can be moved forward or backward with respect to the paper feed direction.

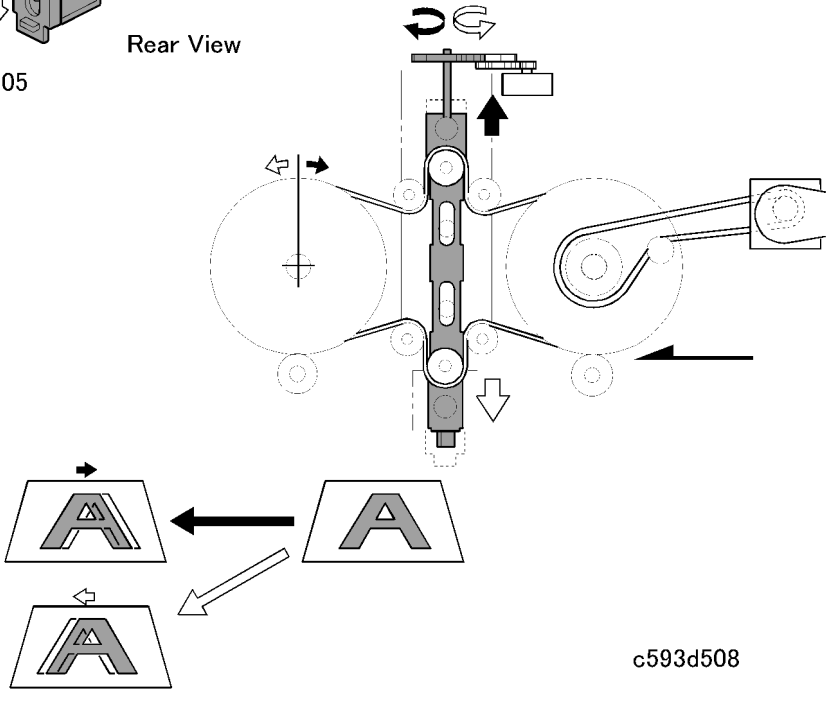
If the image is to be shifted by the same amount on both drums, this is controlled by changing the registration motor start timing.

However, when the image on the 2nd drum is to be shifted relative to the image on the 1st drum, the 2nd drum timing is changed by bending the belt [D] at the points [E] (this is the 'synchronization mechanism').

Image Up/Down Synchronizing Mechanism



c593d505



c593d508

The drum synchronization motor [A] (a stepper motor) turns by an amount that depends on the "Position Adj/Drum2 key" amount selected at the operation panel. The motor moves the synchronization unit [B] up and down through the shaft [C].

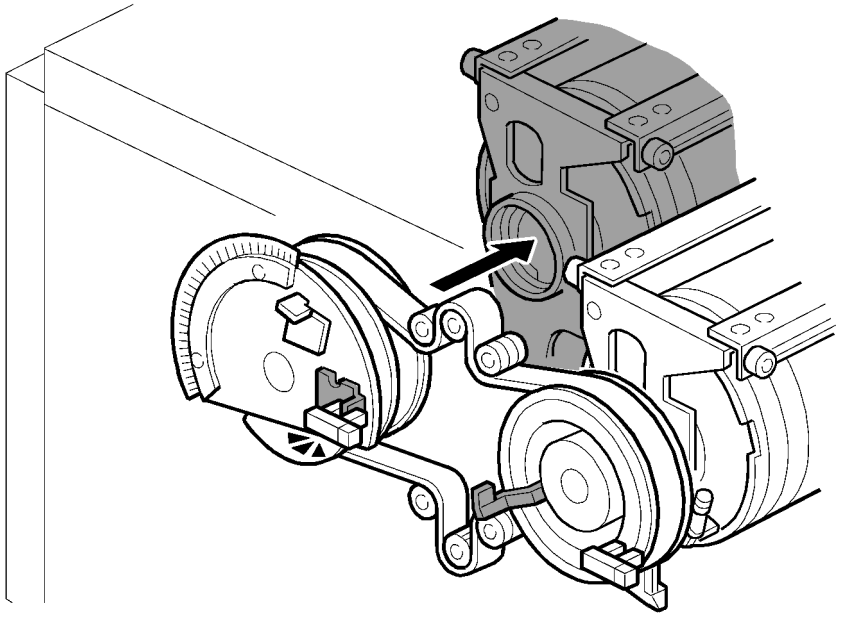
When the motor turns clockwise, the unit moves upwards, the 2nd drum rotates clockwise (☛ 'the black arrow'), and the image moves towards the trailing edge. When the motor turns counterclockwise, the unit moves downwards, the 2nd drum rotates counterclockwise (☛ 'the white arrow'), and the image moves towards the leading edge.

The 1st drum does not rotate, due to the torque of the main motor.

The drum synchronization HP sensor [D] is at the center position for the synchronization unit [B], which is the home position. When the “Position Adj/Drum2 key” mode is canceled, the motor turns until the drum synchronization HP sensor turns on. The unit is now at home position.

Drum

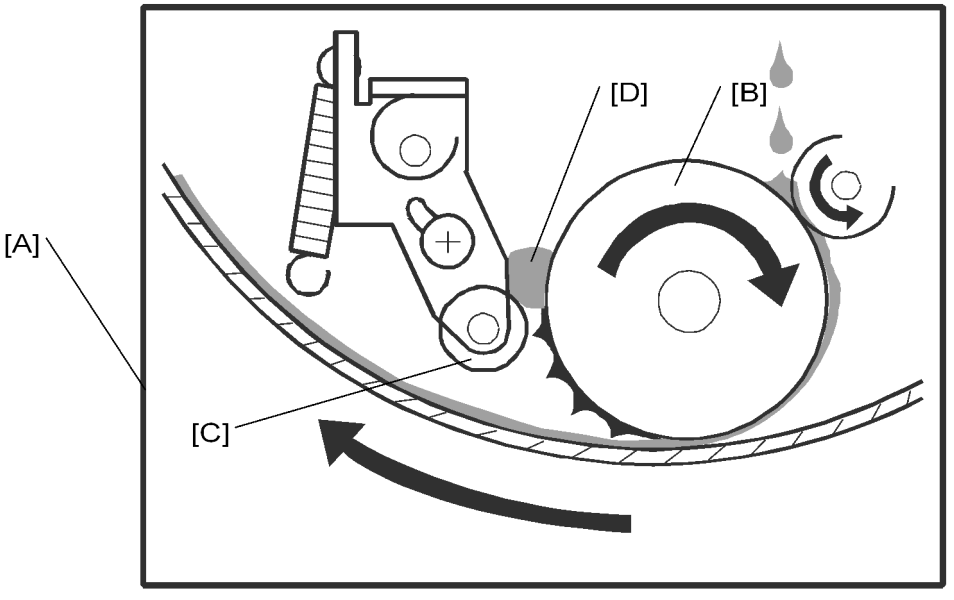
Overview



c593d115

The drums are taken from different duplicator models. Please refer to the drum mechanism sections in the service manuals for these machines.

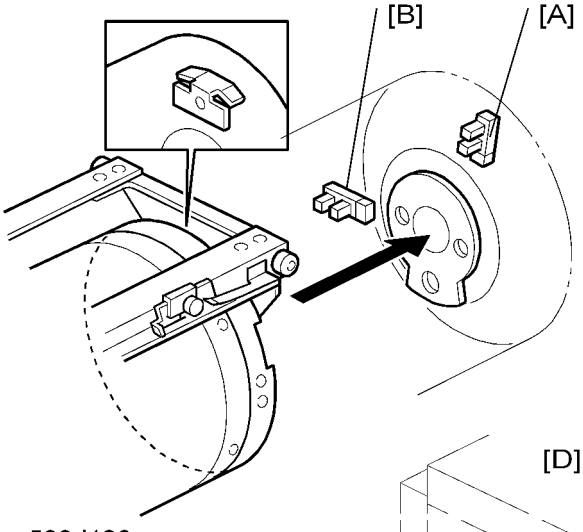
Drum Idling Roller Mechanism



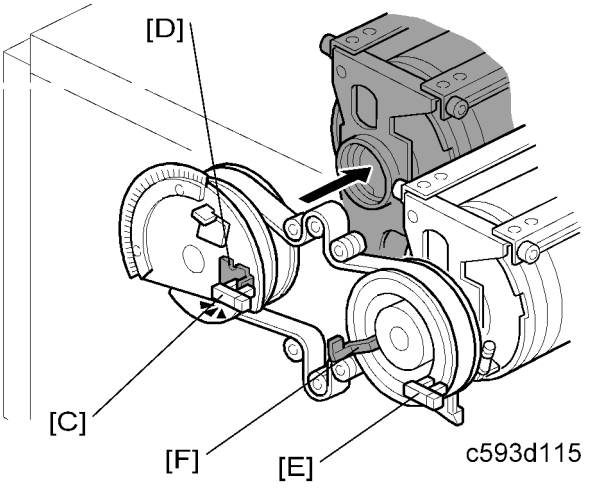
c593d501

The press roller mechanism applies more pressure to the ink roller section [A] than a pressure cylinder mechanism. As a result, ink tends to collect between the ink roller [B] and the idling roller [C]. If the drum is from a C229/C232/C233 machine (shown in the manual), the idling roller moves away to release the collected ink [D] when printing finishes; this does not happen if the drum is from a C235 machine.

Drum Sensors



c593d120



c593d115

The 1st jam sensor [A] and the 2nd jam sensor [B] generate timing signals for paper jam detection. These sensors are at the rear of the 1st drum.

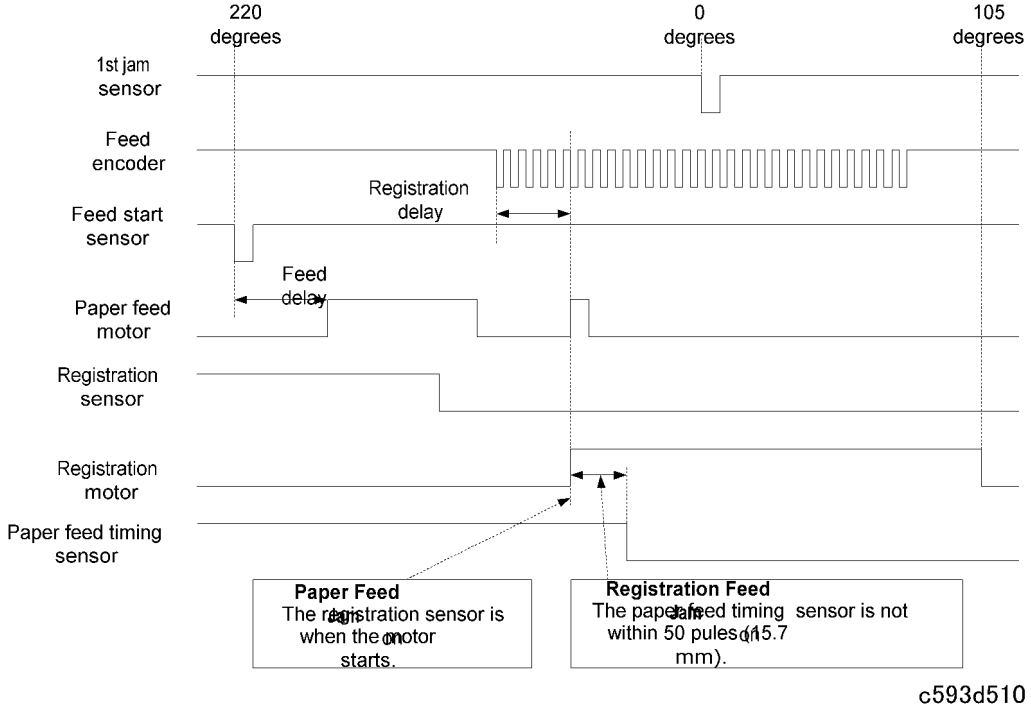
The 1st drum set sensor [C] and actuator [D] detect when the 1st drum is at its removal position. The 2nd drum set sensor [E] and actuator [F] detect when the 2nd drum is at its removal position.

After removing one drum, the other cannot be removed or reinstalled until it has been moved to its removal position (when drum 1 is at its removal position, drum 2 is not at its removal position, and vice versa). The same applies to reinstalling the drums. There is a 153 difference in orientation between drums 1 and 2. This ensures that the leading edge of the paper reaches the clamper on each drum at the correct time.

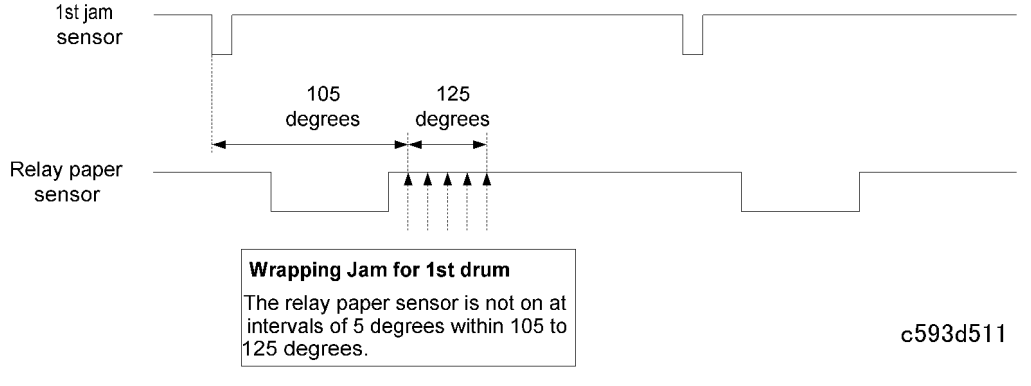
To move a drum unit to its removal position, press the Drum 1 (for the 1st drum) or the Drum 2 key (for the 2nd drum). In addition, note that the 1st drum moves to its removal position at the end of printing (this is the default setting, the 2nd drum will instead move to home position if a user tool is adjusted).

Error Detection

Paper Feed Error Detection

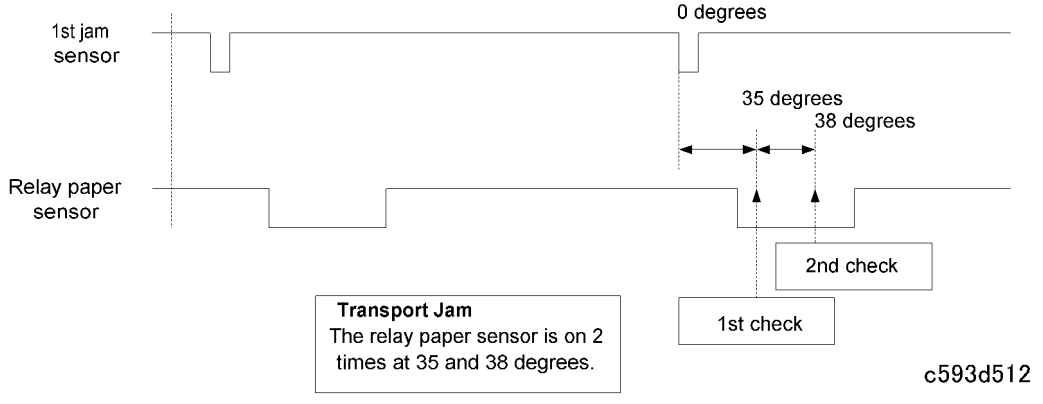


Paper Wrapping Error Detection on 1st Drum

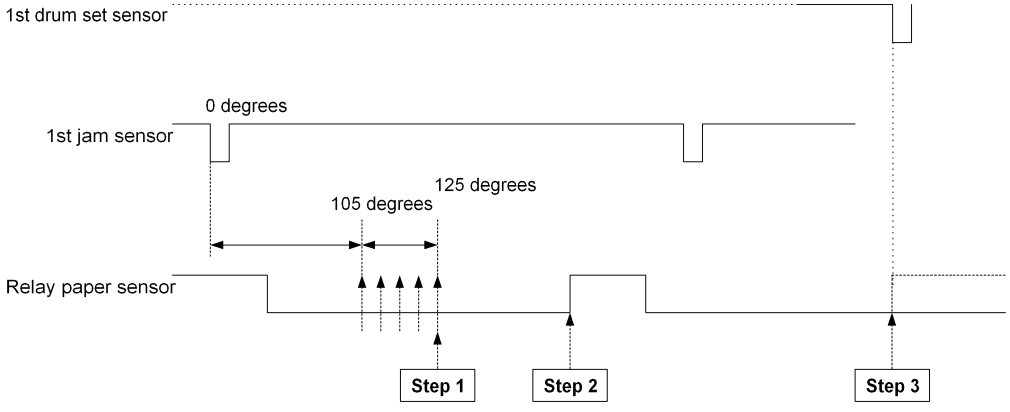


Paper Relay Error Detection

Transport error



Delivery error



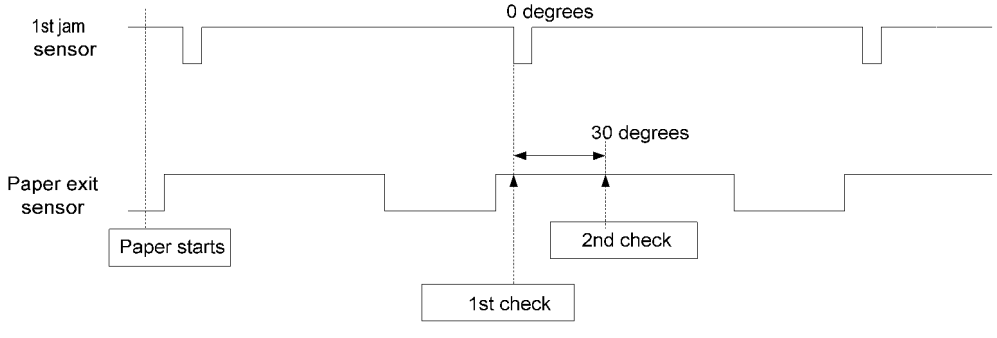
Step 1:
The relay paper sensor is never on at intervals of 5 degrees within 105 to 125 degrees.
→ Paper jam wrapped around 1st drum

Step 2:
The relay paper sensor is on till at the 1st drum set sensor position.

Step 3:
Re-checking the status of the sensor:
ON: Paper jam wrapped around 1st drum
OFF: Paper jam entrance 2nd drum

c593d513

Paper Wrapping Error Detection on 2nd Drum



Wrapping Jam for 2nd drum
The paper exit sensor is never on 2 checks.

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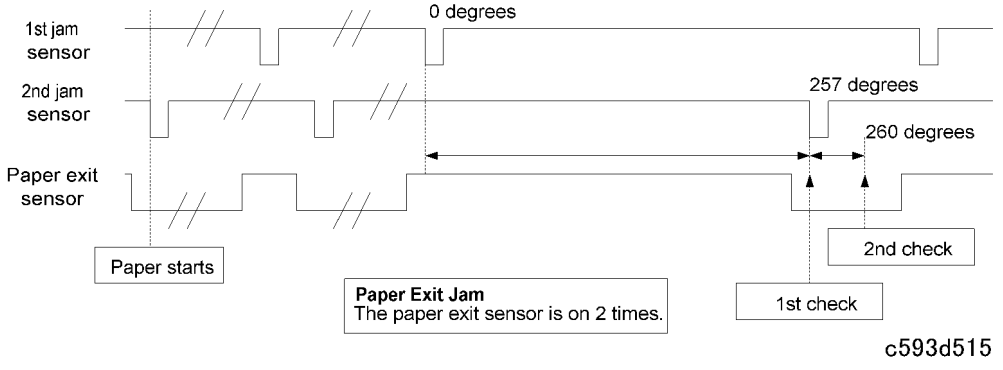
Paper Delivery Error Detection



6. Point to Point Diagram

Point To Point Diagram

Location Map

Section A

Section B

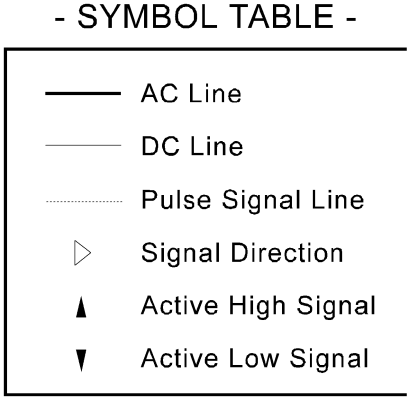
Section C

Section D

Section E

Note

- The symbols used in the diagrams are as follows:



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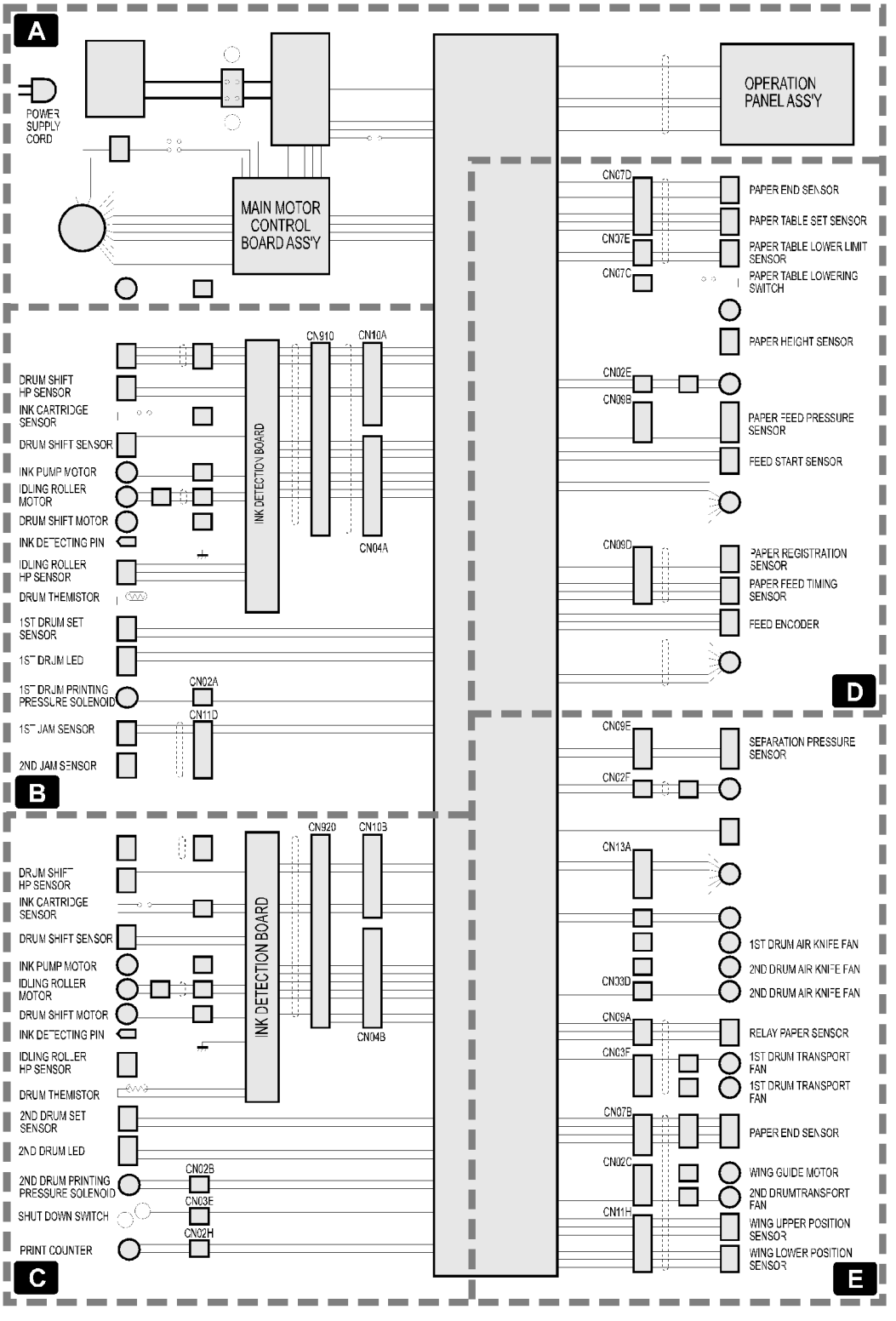
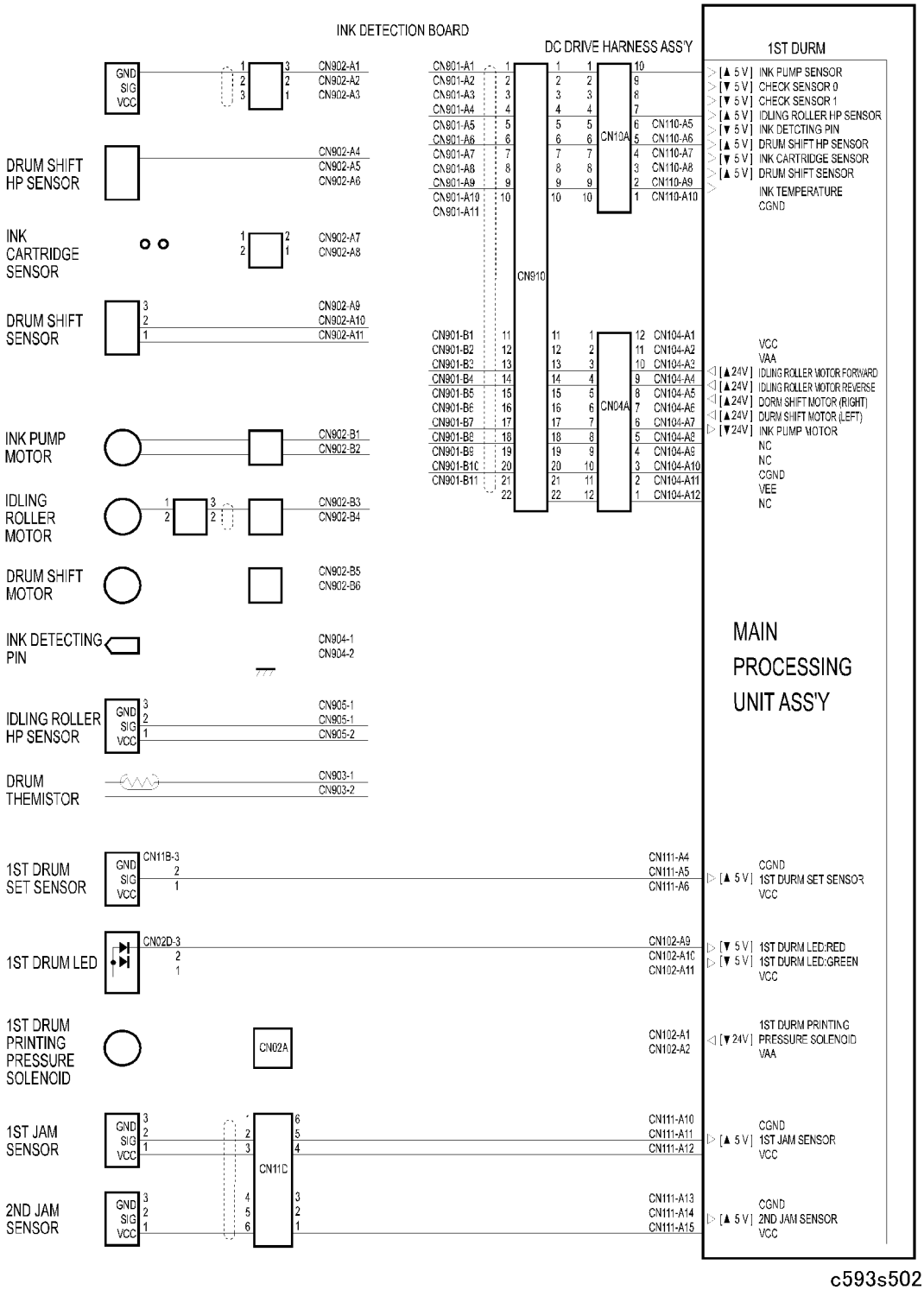
Location Map



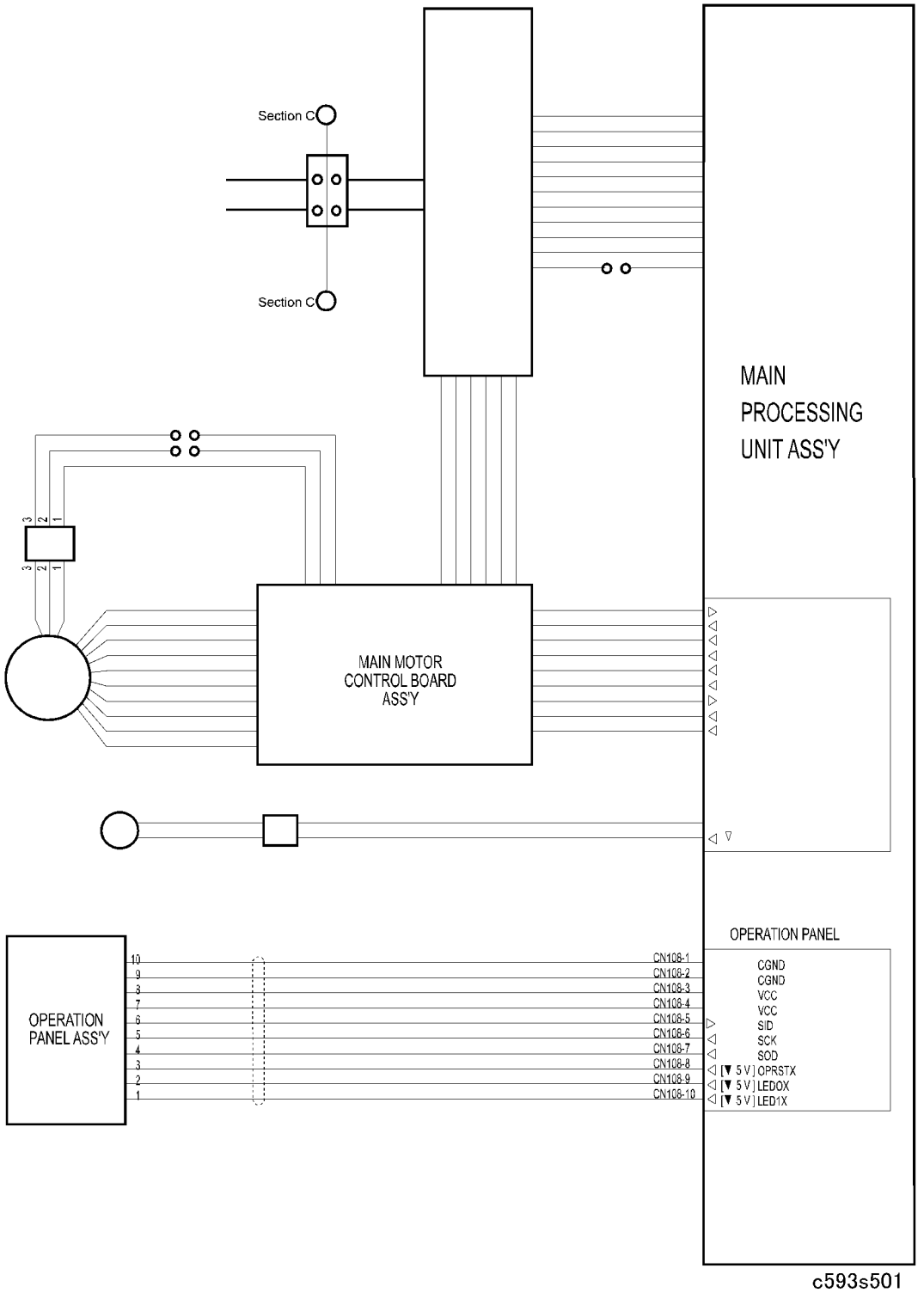
c593s500

Section A



c593s502

Section B


Section C
Section C
MAIN
PROCESSING
UNIT ASS'Y
MAIN MOTOR
CONTROL BOARD
ASS'Y
OPERATION
PANEL ASS'Y
OPERATION PANEL
CGND
CGND
VCC
VCC
SID
SCK
SOD
[▼ 5 V] OPRSTX
[▼ 5 V] LEDOX
[▼ 5 V] LED1X
CN108-1
CN108-2
CN108-3
CN108-4
CN108-5
CN108-6
CN108-7
CN108-8
CN108-9
CN108-10
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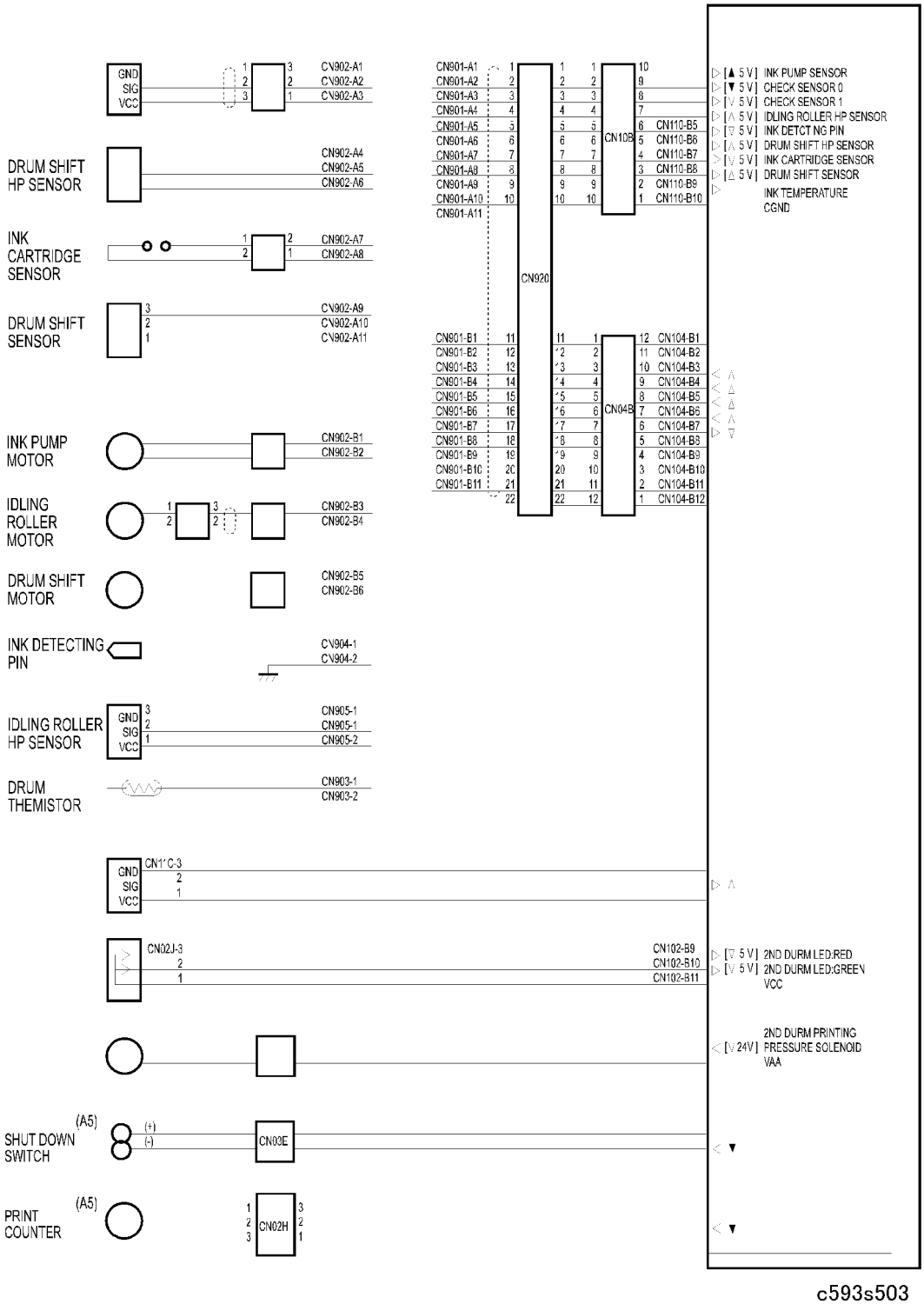
Section C



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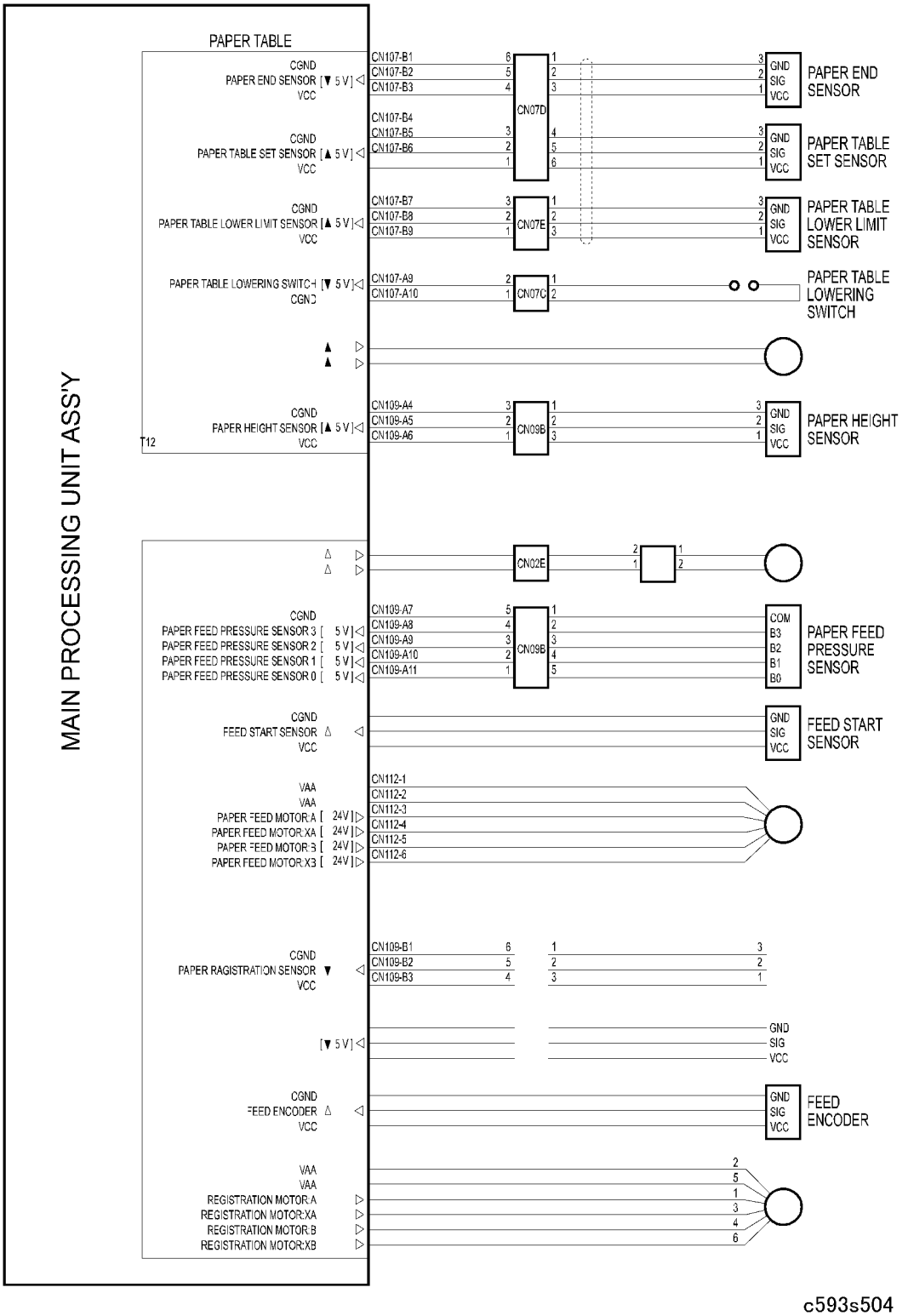
Section D



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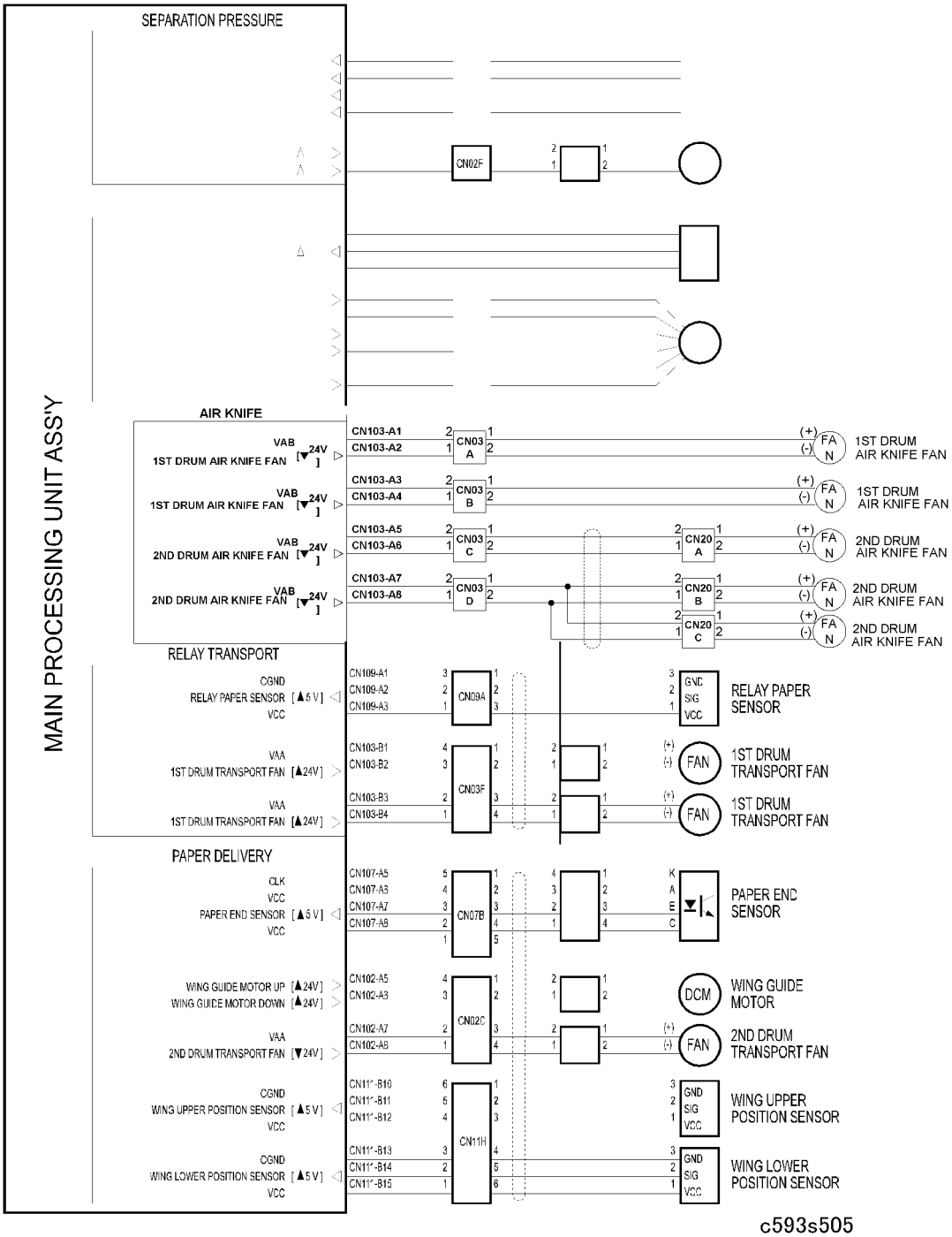
Section E



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7. Specifications

Specifications

Configuration	Floor standing (with custom table or cabinet)
Printing Process	Twin-color press roller printing system
Original Size	Refer to the Original Type specification in the service manual for the main unit.
Print Paper Size	Width: 70 mm - 297 mm [2.8" - 11.6"] Length: 250 mm - 432 mm [9.8" - 17.0"]
Leading Edge Margin	Refer to the Margin specification in the service manual for the main unit.
Print Paper Weight	52.3 g/m^2 to 209.3 g/m^2 [13.9 lb to 55.6 lb]
Print Speed	90, 105, 120 sheets/minute (3 steps)
Color Printing	Drum unit replacement system
Printing Area (At 20 °C/ 65 % RH)	Refer to the Printing Area specification in the service manual for the main unit.
Side Registration Adjustable Range	Overall Image Adjustment: ± 10 mm [± 0.4"] Drum 2 Image Adjustment: ± 10 mm [± 0.4"]
Vertical Registration Adjustable Range	Overall Image Adjustment: Inch size version models: ± 10 mm [± 0.4"], Metric size version models: ± 15 mm [± 0.5"] Drum 2 Image Adjustment: ± 5 mm [± 0.2"]
Paper Feed Table Capacity	1000 sheets (80 g/m 2 / 20 lb)
Paper Delivery Table Capacity	1000 sheets (80 g/m 2 / 20 lb)
Power Source	120 V, 60 Hz: 5.5 A 220 - 240 V, 50/60 Hz: 3.0 A
Maximum Power Consumption	110/120 V version: 550 W 220 - 240 V version: 550 W

Maximum Power Consumption	110/120 V version: 550 W 220 - 240 V version: 550 W
Noise Emission (At operation position)	At 90 rpm printing speed: 65 dB At 105 rpm printing speed: 68 dB At 120 rpm printing speed: 69 dB
Weight	Less than 90 kg [198.4 lb]
Dimensions (Width x Depth x Height)	Trays closed: 940 mm x 630 mm x 590 mm [37.0" x 24.8" x 23.2"] Trays open: 1620 mm x 630 mm x 555 mm [63.8" x 24.8" x 21.9"]
Ink Type	1000 ml cartridge type Available colors: Black, Red, Blue, Green, Brown, Purple, Yellow, Navy, Maroon,Teal, Orange, Gray, Violet, Hunter green, Burgundy, Gold, Reflex blue
Ink Storage Conditions	Temperature: -5 °C to 40 °C (Optimum conditions: 15 °C to 25 °C) Humidity: 10% to 95% RH (Optimum conditions: 20% to 70% RH)
Recommended maximum storage period	One year after production date Note: Avoid locations exposed to direct sunlight.
Optional Equipment	Drum unit: Color Drum A3 [11" x 17"]