IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the copier and peripherals, make sure that the copier power cord is unplugged.
2. The wall outlet should be near the copier and easily accessible.
3. Note that some components of the copier and the peripherals are supplied with electrical voltage even if the main switch is turned off.
4. 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.
5. The inside and the metal parts of the fusing unit become extremely hot while the copier is operating. Be careful to avoid touching those components with your bare hands.
6. The copier is not attached to the table. Pushing the copier too hard may cause it to drop onto the floor. While moving the copier, push the table.
7. When the main switch is turned on, the machine will suddenly start turnig to perform the developer initialization. Keep hands away from any mechanical and electrical components during this period.

HEALTH SAFETY CONDITIONS

1. Never operate the copier without the ozone filters installed.
2. Always replace the ozone filters with the specified ones at the specified intervals.
3. Toner and developer are non-toxic, but if you get either of them in your eyes by accident, it may cause temporary eye discomfort. Try to remove with eye drops or flush with water as first aid. If unsuccessful, get medical attention.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The copier and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.
2. **Caution:** The RAM pack on the main control board has a lithium battery which can explode if replaced incorrectly. Replace the RAM pack only with an identical one. The manufacturer recommends replacing the entire RAM pack. Do not recharge or burn this battery. Used RAM packs must be handled in accordance with local regulations.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Do not incinerate the toner cartridge or the used toner. Toner dust may ignite suddenly when exposed to open flame.
2. Dispose of used toner, developer, and organic photoconductors according to local regulations. (These are non-toxic supplies.)
3. Dispose of replaced parts in accordance with local regulations.
4. When keeping used RAM packs in order to dispose of them later, do not put more than 100 RAM packs per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

SECTION 1

OVERALL MACHINE INFORMATION

1. SPECIFICATIONS

Configuration:	Table top
Copy Process:	Electrostatic transfer system
Original Feed:	Sheet feed
Original Size:	Maximum: 914 x 2,000 (36" x 80")mm Minimum: A4 (8 1/2" x 11") lengthwise
Copy Size:	Same as "Original Size"
Copying Speed:	3 cpm (A1/D sideways)
First Copy:	24 seconds (A1/D sideways)
Warm-up Time:	Within 5 minutes (Room temperature 23°C)
Multi-Copy:	1 to 1 only
Automatic Reset:	2 minutes after copying is finished (can be set to 1, 3, 4, or 5 minutes or to no auto reset)
Photoconductor:	Organic photoconductor drum
Drum Charge:	Single-wire with grid plate (Negative Charge)
Reproduction Ratio:	1 : 1 (±0.5%)
Exposure System:	Slit exposure via fiber optic array
Exposure Lamp:	Fluorescent lamp (26 W)
Development:	Dual-component dry toner system
Toner Replenishment:	Cartridge system (750 g toner/cartridge)
Toner Consumption:	1,860 A1 or D copies per cartridge (6% original)
Development Bias:	Negative
Toner Density Control:	Direct toner density detection by induction sensor
Image Density Adjustment:	Development bias control + exposure control
Paper Separation:	Dual wire ac corona and pick-off pawls
Cleaning:	Cleaning blade

Paper Feeding:	Manual feed (roll feeder optional)
Image Fusing:	Heat and pressure type, teflon (upper) and silicone rubber (lower) rollers
Fusing Lamp:	Nichrome wire lamp (115 V: 1,100 W, 230 V: 1,100 W)
Self-diagnostic Codes:	11 codes, displayed in copy counter
Power Source:	115 V/60 Hz....15 A 220 V/50 Hz....7 A 230 V/50Hz.....7 A 240 V/50 Hz....7 A
Power Consumption:	Maximum: 1.4 kW Warm-up: 1.2 kW Ready: 0.04 to 1.2 kW Copy cycle: 1.3 kW
Dimensions (W x D x H):	1,080 x 570 x 490 mm 42.1" x 22.2" x 19.1"
Weight:	76 kg, 167.4 lb

Optional Equipment and Machine Configuration

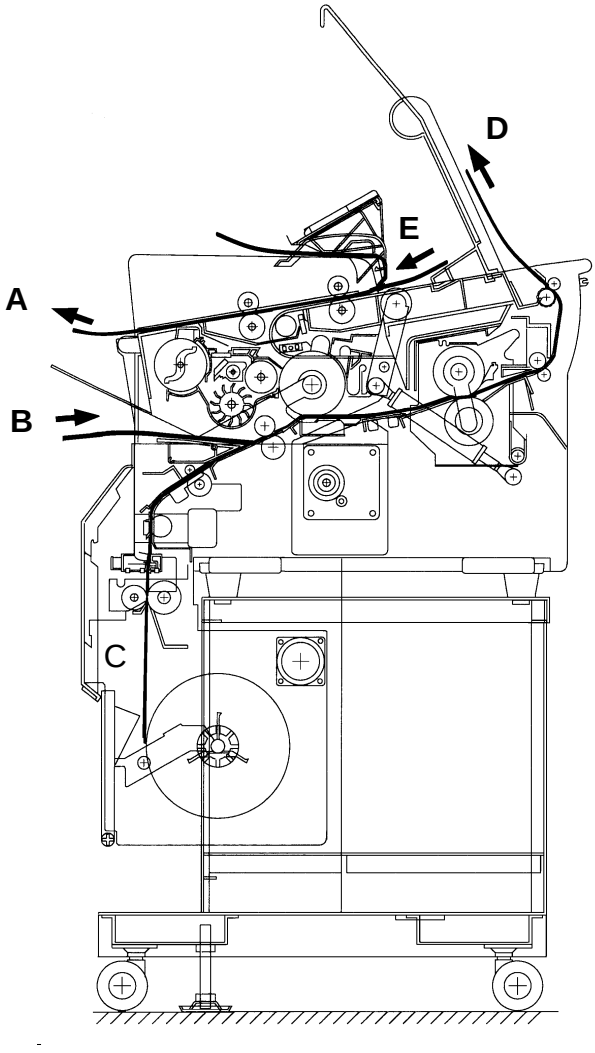
Configuration		Additional equipment
Main frame	Optional equipment	
A163 copier	Roll feeder (A571)	Table (A714)
	Roll cutting rail (A570)	–
	Side guides (A569)	–

Other Optional Equipment

- Paper Spool
- Drum anti-condensation heater

Specifications are subject to change without notice.

2. PAPER PATH



A: Original Path

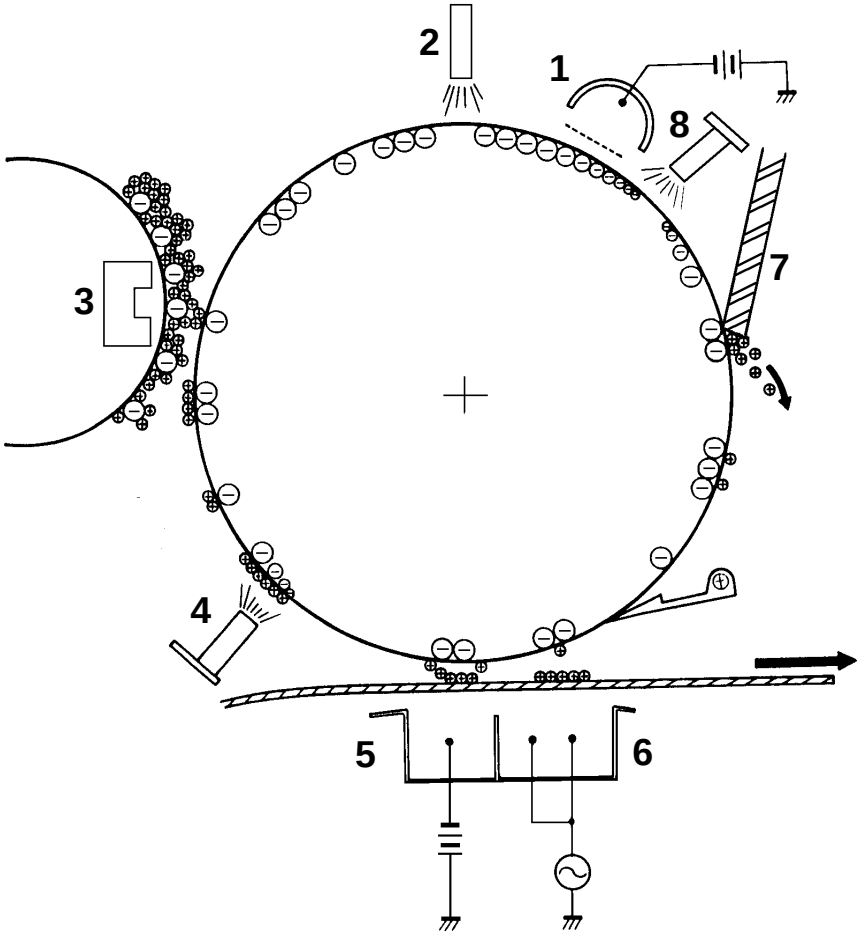
B: Paper from the manual feed

C: Paper from the roller feed

D: Paper exit

E: Original Path from Rear Feeder

3. DRUM PROCESSES



1. Charge
In the dark the charge corona unit applies a negative charge to the drum. The grid plate ensures the charge is applied uniformly. The charge remains on the surface of the drum because the photoconductive drum has a high electrical resistance in the dark.

2. Exposure
High intensity light from a fluorescent lamp is reflected from the moving original through the fiber optic array. The charge on the drum surface is dissipated in direct proportion to the intensity of the reflected light, thus producing an electric latent image on the drum surface.

3. Development
The magnetic developer brush on the development roller comes in contact with the latent image on the drum surface. Toner particles are electrostatically attracted to the negatively charged latent image areas.

4. Pre-Transfer Lamp
The pre-transfer lamp (PTL) illuminates the drum prior to image transfer. This reduces the attraction between the toner and the drum, thus making image transfer easier.

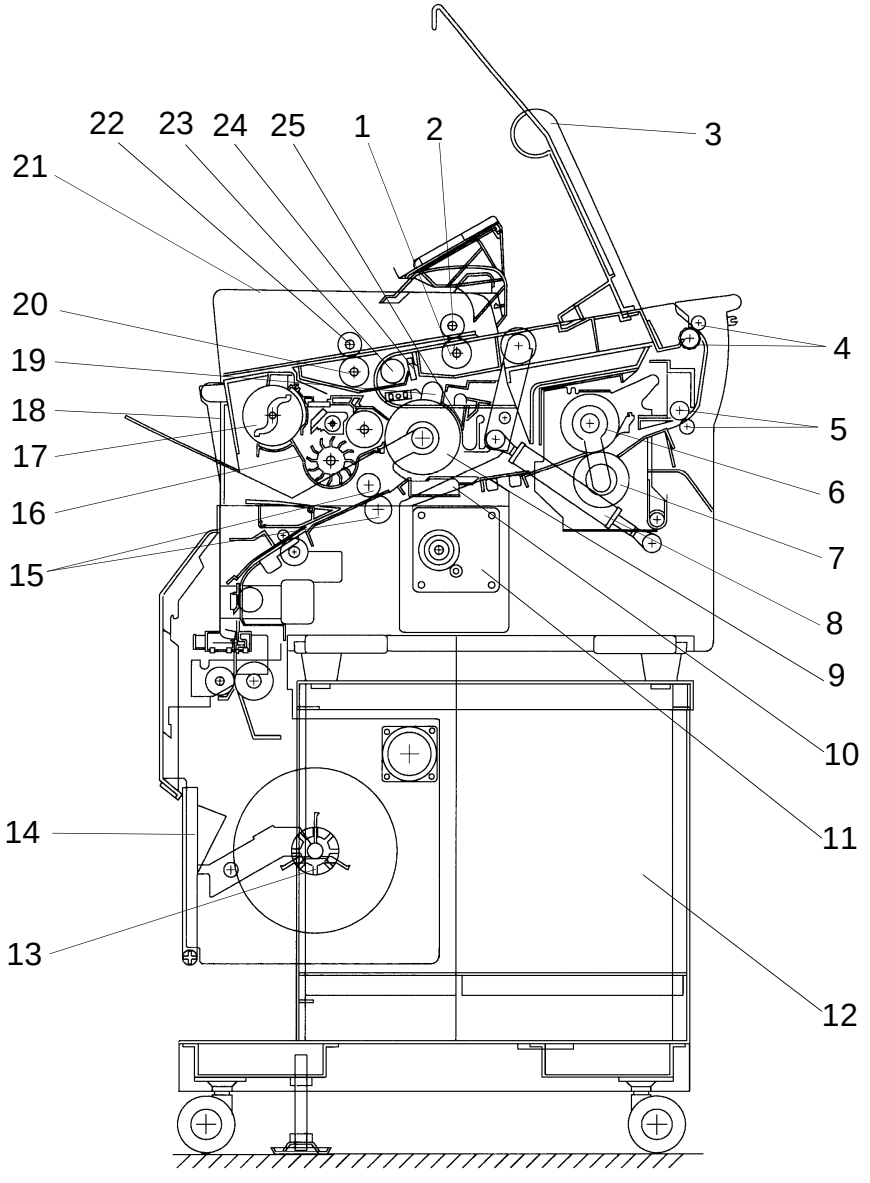
5. Image Transfer
Copy paper is fed to the drum surface, at the exact timing, to align the copy paper and the developed image on the drum surface. Then a strong negative charge is applied to the back side of the paper. The negative charge pulls the toner particles from the drum surface onto the paper.

6. Paper Separation
A strong ac corona discharge is applied to the back side of the copy paper, reducing the charge on the paper and breaking the electrostatic attraction between the paper and the drum. Then, the stiffness of the copy paper causes it to separate from the drum. The pick-off pawls help to separate paper which has low stiffness.

7. Cleaning
The cleaning blade, which is angled against drum rotation (counter blade system), removes any toner remaining on the drum surface.

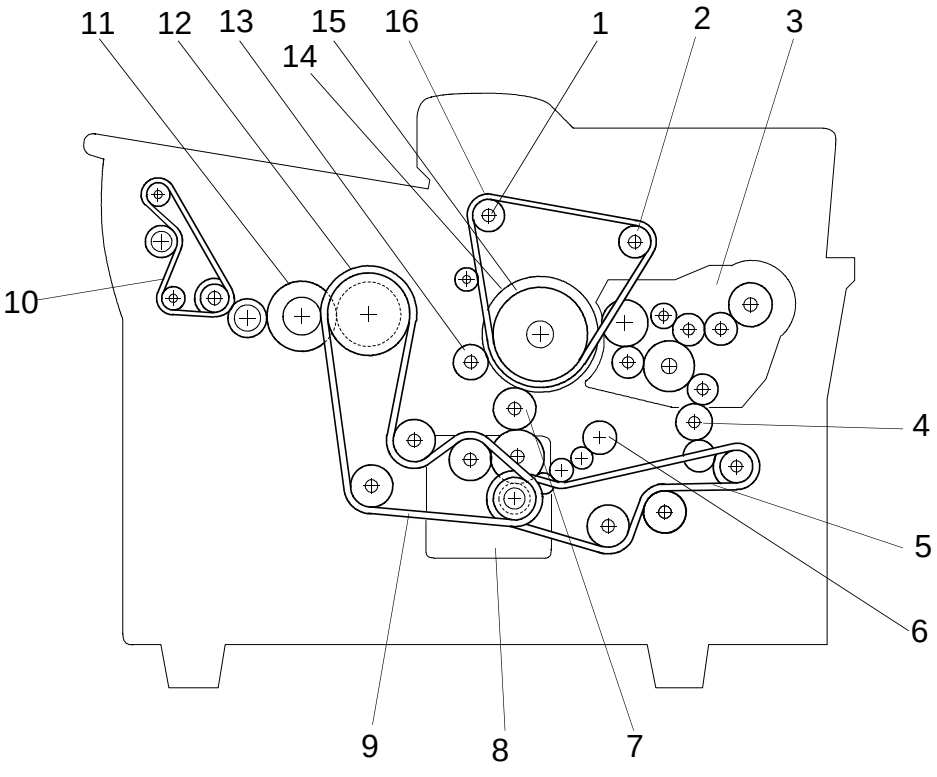
8. Quenching
The light from the quenching lamp electrically neutralizes the surface of the drum.

4. MECHANICAL COMPONENT LAYOUT



1. 1st Original Feed Roller
2. 1st Press Rollers
3. Copy Tray
4. Exit Rollers
5. Fusing Exit Rollers
6. Hot Roller
7. Pressure Roller
8. Gas Spring
9. OPC Drum
10. T/S Corona Unit
11. Main Drive Unit
12. Table
13. Paper Spool
14. Roll Feeder
15. Paper Registration Rollers
16. Development Unit
17. Toner Cartridge
18. Manual Feed Table
19. Charge Corona Unit
20. 2nd Original Feed Roller
21. Original Table
22. 2nd Press Rollers
23. Exposure Lamp
24. Fiber Optic Array
25. Cleaning Blade

5. DRIVE LAYOUT



1. Original Feed Roller Pulley
2. Original Feed Roller One Way Pully
3. Development Unit
4. Development Unit Relay Gear
5. Development Drive Chain
6. Paper Registration Roller Clutch
7. Drum Drive Relay Gear
8. Main Motor
9. Fusing Drive Chain
10. Exit Unit Drive Belt
11. Hot Roller Drive Gear
12. Fusing Drive Sprocket/Gear
13. Toner Collection Coil Drive Gear
14. Drum Drive Gear
15. Original Feed Drive Pulley
16. Original Feed Drive Belt

6. ELECTRICAL COMPONENT DESCRIPTIONS

Refer to the electrical component layout on the reverse side of the Point to Point (Water proof paper) index numbers.

Name	Function	Index. No.
Motors		
Main	Drives all mechanical components except the fans. (DC Motor)	32
Exhaust Fan	Removes the ozone built up around the drum section to the ozone filter. (DC Motor)	5
Magnetic Clutches		
Registration	Drives the registration rollers.	30
Toner Supply	Turns on to supply toner to the development unit.	31
Solenoids		
Pick-off Pawl	Moves the pick-off pawls against the drum.	6
Switches		
Main	Supplies power to the copier.	17
Original & Paper Feed Safety	Cuts ac power when the original or paper feed unit is opened.	18
Fusing Exit Safety	Cuts ac power when the fusing exit unit is opened.	12
Sensors		
Door Open	Indicates "Door Open" in the operation panel and prohibits the key operation.	29
Toner Density	Detects the density of toner in the developer.	26
Original Registration	Detects when the original lead edge passes at the front of the exposure glass.	4
Light	Detects the intensity of the exposure lamp output.	27
Entrance Feed	Detects when copy paper is inserted (jam detector).	24

Name	Function	Index. No.
Registration	Detects when copy paper arrives at the registration rollers (jam detector).	25
Exit	Detects jams through the fusing exit unit.	7
Printed Circuit Boards		
Main	Controls all copier functions both directly and through other PCBs.	22
PSU	Converts the ac voltage to dc voltage.	21
AC Drive	Provides ac power to the fusing lamp and PSU.	15
FL Regulator	Stabilizes power to the exposure lamp.	23
Operation Panel	Control the operation panel display.	10
Lamps		
Exposure	Provides light to reflect the original's image onto the drum (fluorescent lamp).	2
Fusing	Provides heat to the fusing unit.	3
Pre-Transfer (PTL)	Reduces the charge on the drum surface prior to image transfer.	20
Quenching (QL)	Neutralizes any charge remaining on the drum surface after cleaning.	1
Power Packs		
Charge/Bias/Grid Power Pack	Provides high voltage power for the charge corona, charge grid, and development bias.	19
Transfer/ Separation	Provides high voltage power for the transfer corona and separation.	16
Thermistors		
Hot Roller	Monitors the hot roller's surface temperature.	8
Pressure Roller	Monitors the pressure roller's surface temperature.	11
Thermofuses		
Fusing	Protects against fusing overheat.	9

Name	Function	Index. No.
Heaters		
Anticondensation	Keeps moisture from forming inside the copier (option).	13
Others		
Total Counter	Keeps track of the total length of copies made (Europe) or the total copies made (U.S.A.).	28
Circuit Breaker (Europe, Asia)/ Fuse (U.S.A.)	Guards against voltage surges in the input power.	14

SECTION 2

DETAILED SECTION DESCRIPTIONS

1. DRUM

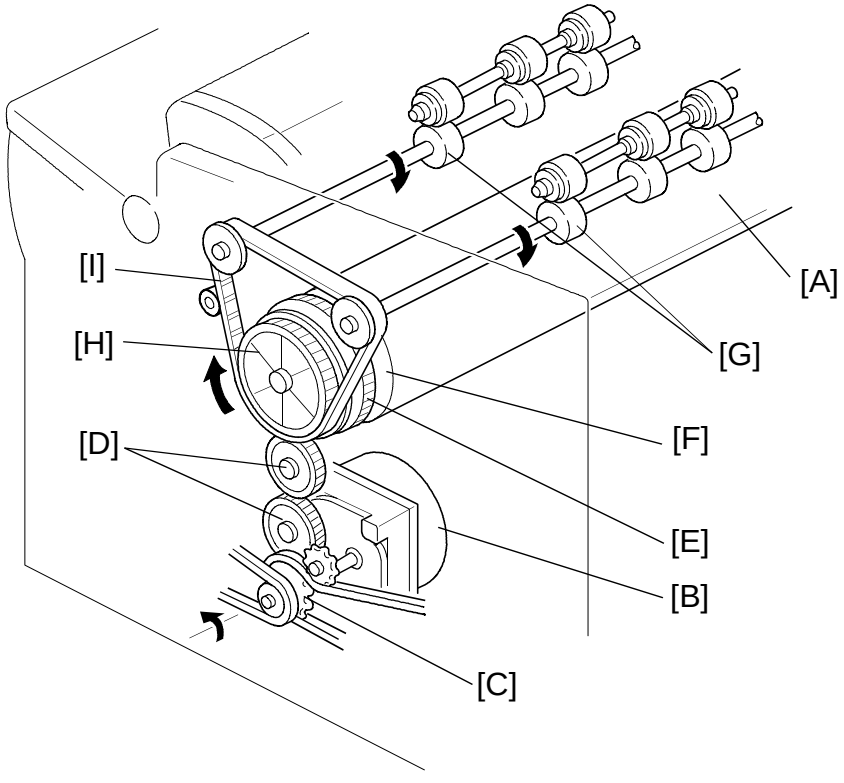
1.1 DRUM CHARACTERISTICS

The organic photoconductor (OPC) drum has the following characteristics:

- It is able to accept a high negative electrical charge in the dark. (The electrical resistance of the OPC drum is high in the absence of light.)
- The electric charge on the drum surface dissipates when the drum is exposed to light. (The conductivity of the OPC drum is greatly enhanced by exposure to light.)
- It dissipates an amount of charge that is in direct proportion to the intensity of the light. That is, where stronger light is directed to the photoconductor surface, a smaller voltage remains.

The OPC drum used in this model has high sensitivity, good color reproduction, and good reproduction of low contrast originals (pencil originals, etc.)

1.2 DRUM DRIVE



The OPC drum [A] is 80 millimeters in diameter and 970 millimeters long. It turns constantly when the main motor [B] is on.

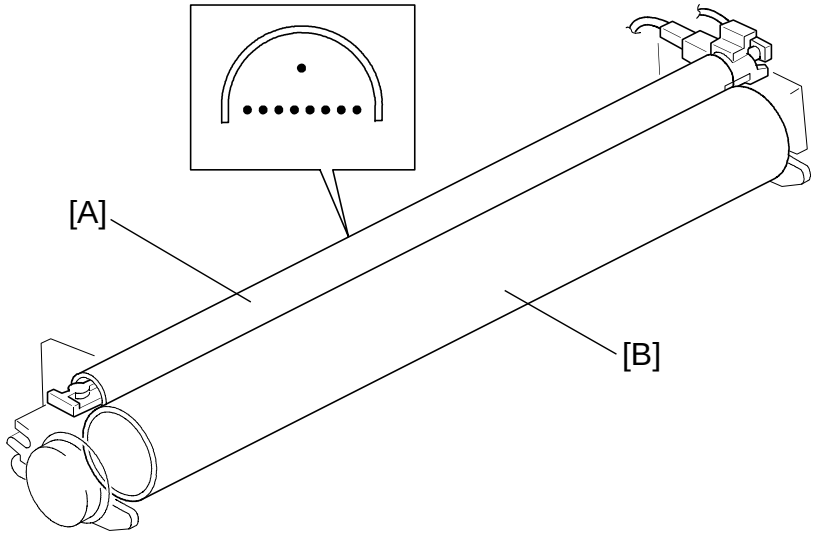
When the main motor turns on, the drive is transmitted to the drum in the following way:

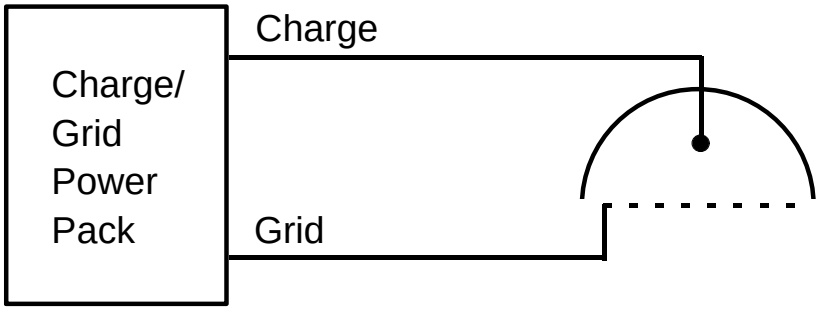
main motor drive gear [C] ⇒ idle gears [D] ⇒ drum drive gear [E] ⇒ drum flange [F] ⇒ drum

When the drum knob is tightened, the right flange presses firmly against the drum so that the drum is held tightly between the flanges. The drum and flanges turn together when the main motor is on. At this time, the drive is also transmitted to the original feed rollers [G] through the original feed drive pulley [H] and belt [I].

2. CHARGE

2.1 OVERVIEW

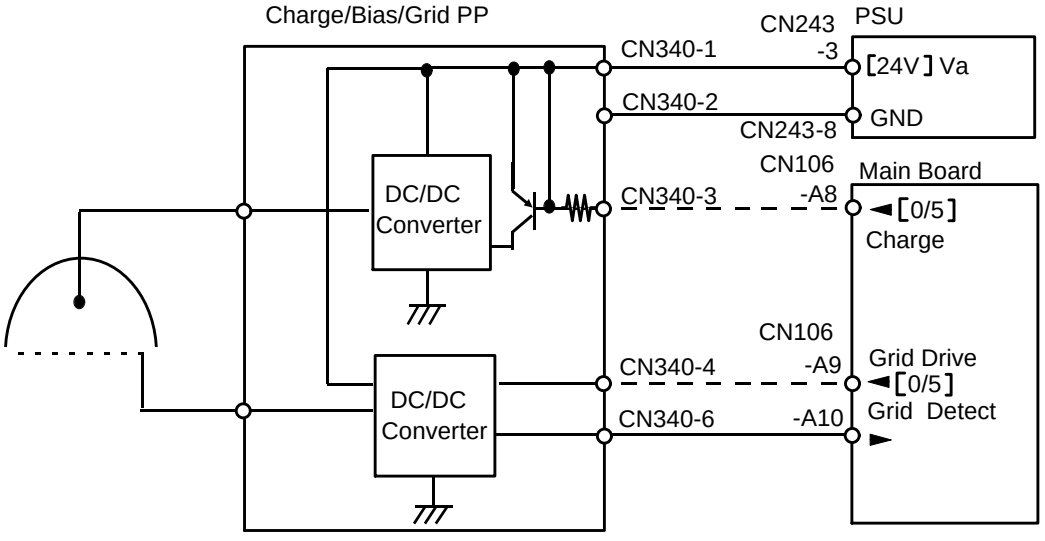




This model uses a single wire corona unit [A] to charge the OPC (organic photoconductor) drum [B]. The corona unit generates a corona of negative ions when a high negative voltage is applied to it by the charge/grid power pack.

To make the negative corona uniform, a grid consisting of 8 wires is installed on the charge corona unit between the corona wire and the drum. This grid drains off any charge in excess of –860 volts, thus preventing fluctuation of the charge potential.

2.2 CHARGE CORONA CIRCUIT



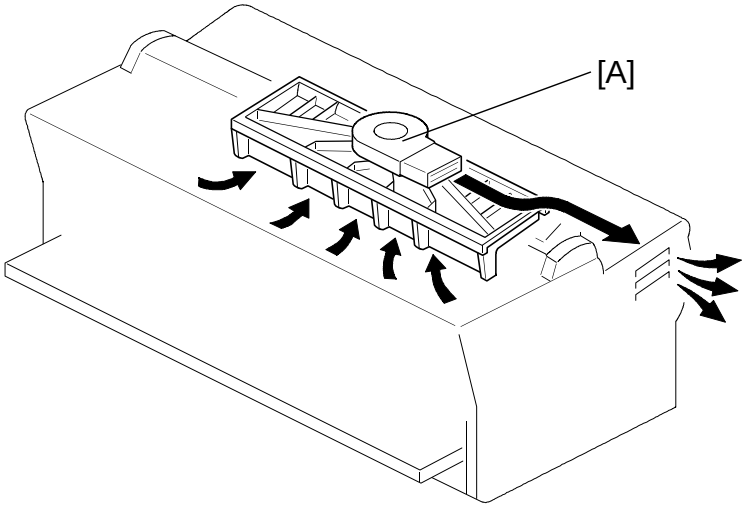
The PSU supplies +24 volts (V_{AA}) to the charge/bias/grid power pack as the power supply source. Approximately 12 seconds after the copy process starts, the CPU drops CN106-A8 from 5 volts to 0 volts. This actuates the dc/dc converter within the power pack which applies a high negative voltage of approximately –5.0 kV to the charge corona wire. The corona wire then generates a negative corona charge.

The grid limits the maximum corona charge to –860 volts. This ensures that the charge does not fluctuate and an even charge is applied to the drum surface.

The copy grid voltage and charge voltage amounts can be adjusted using SP # –11 and SP #–10 respectively.

The grid drive signal applied to CN340-4 is a pulse width modulated signal. As the width of the pulses applied increases, the strength of the grid charge also increases. The main board monitors the grid charge at CN106-A10 and controls the width of the drive pulses based on this feedback.

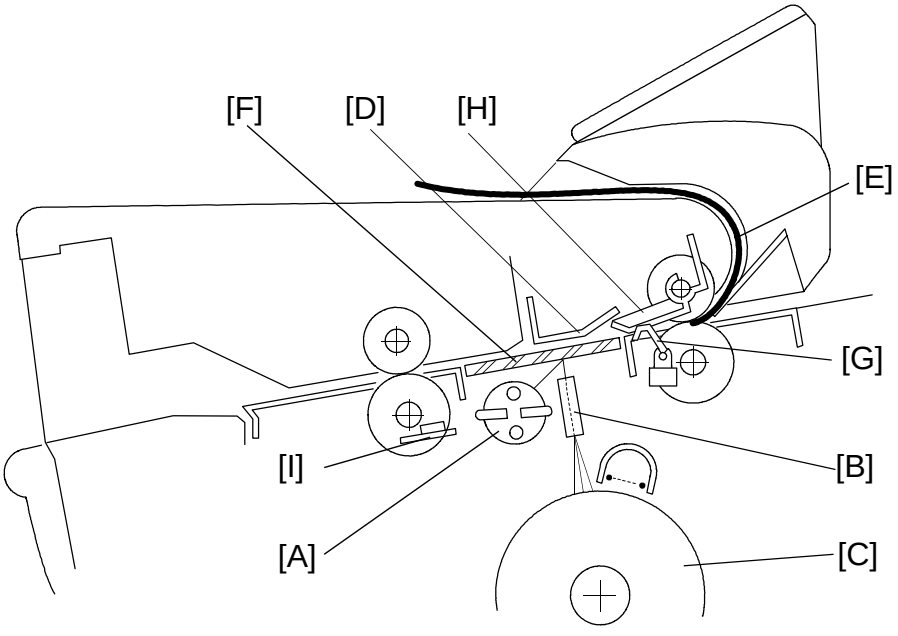
2.3 CORONA UNIT VENTILATION



If ozone produced by the corona charge stays in the charge corona area, it may cause uneven corona charging to the drum. To prevent this, ozone is vacuumed out through the exhaust fan [A], and changed to oxygen by the ozone filter before being blown out of the copier.

3. EXPOSURE

3.1 OVERVIEW



Light from the exposure lamp [A] reflects off the original and through the fiber optics [B] to the OPC drum [C]. During exposure, the original moves across the exposure glass at the same speed as the drum's peripheral velocity.

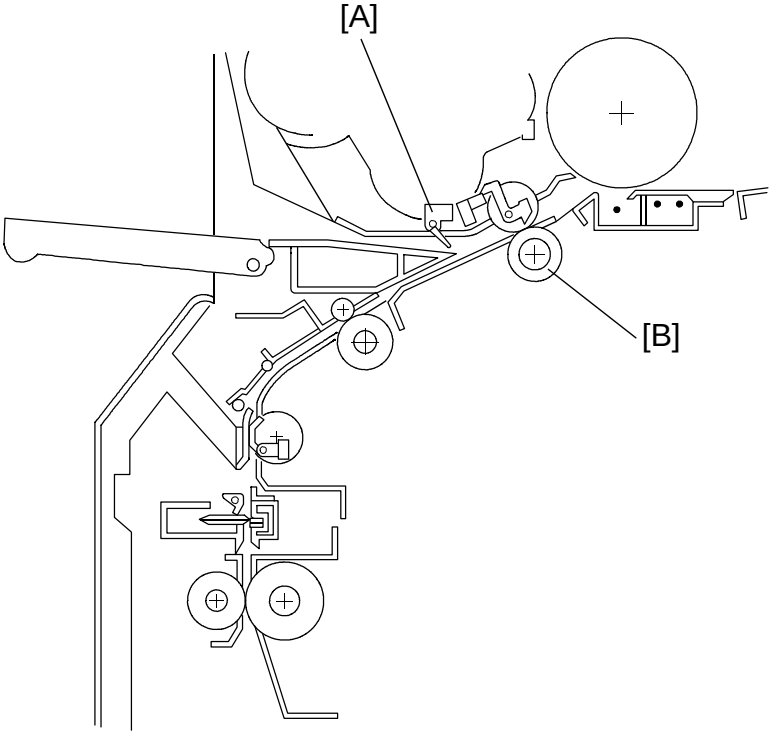
The platen plate [D] presses the original [E] flat against the exposure glass [F] just above the fiber optic array. This ensures that the image is properly focused. (The original must be within 0.2 mm of the exposure glass surface.)

The exposure lamp is a 140 V, 26 W fluorescent lamp.

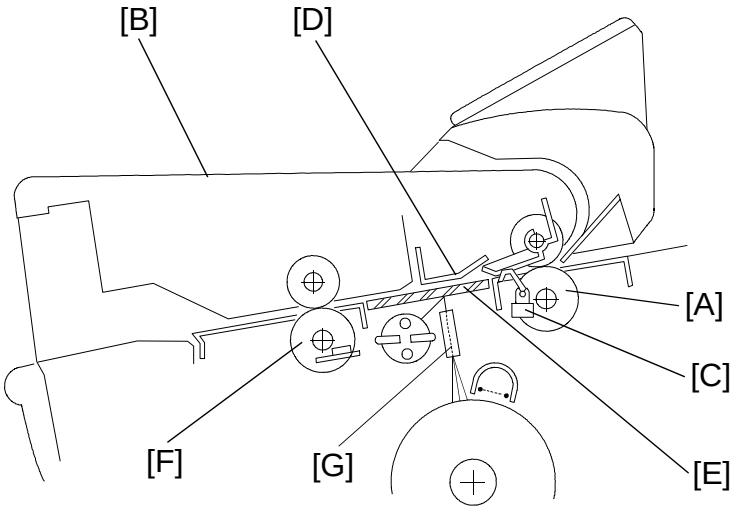
The original registration sensor [G] detects when the original leading edge passes the front of the exposure glass. The original flattener [H] holds the leading edge of the original to ensure that original registration sensor detects the original at the correct timing. The light sensor [I] monitors the intensity of the exposure lamp output.

3.2 PAPER AND ORIGINAL FEED

3.2.1 Basic Operation (Manual Feed)

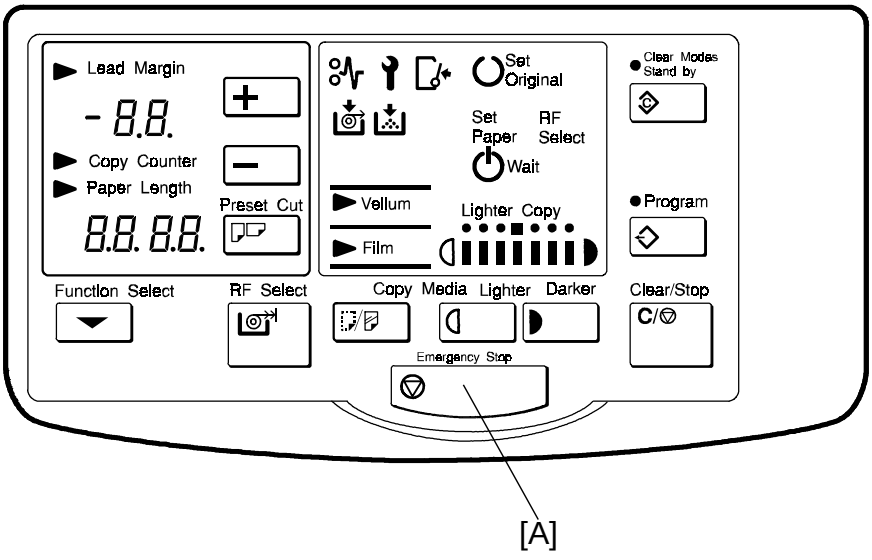


When the entrance sensor [A] of the manual feed table detects the leading edge of the copy paper, the main motor starts rotating and the drum process (exposure lamp, change corona,... etc.) begins. The registration clutch is activated at the appropriate timing after the entrance sensor [A] detects the leading edge of the copy paper. The copy paper is fed to the registration roller [B] and stops to wait for the original. "Set Paper" or "RF Select" turns off and "Set Original" is indicated on the operation panel.



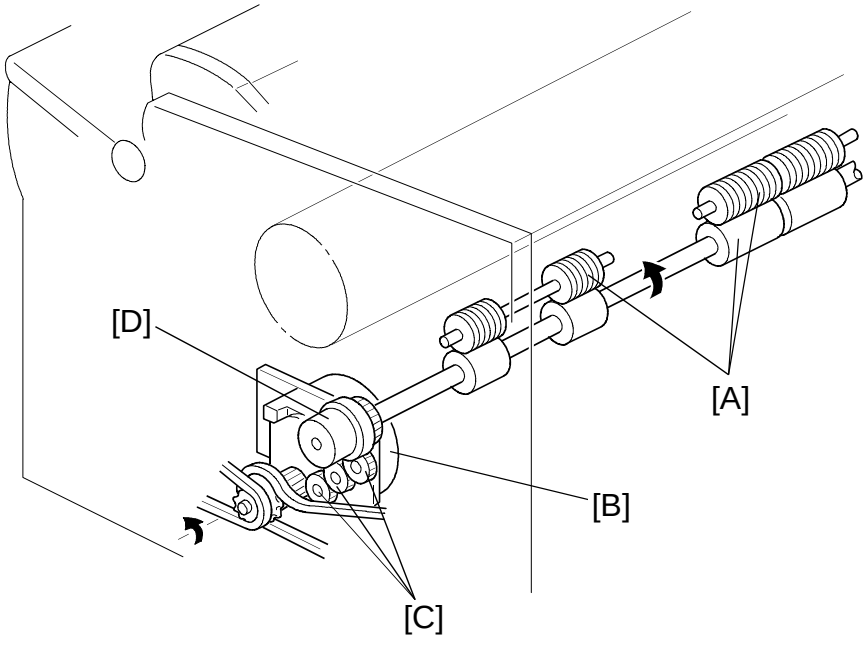
The original feed rollers rotate with the rotation of the main motor. The original is pulled by the 1st original feed roller [A] just after the original is placed on the original feed table. The original registration sensor [C] detects the leading edge of the original, and the "Set Original" indicator turns off. At the appropriate time, the copy paper starts to be fed again. The original passes between the platen plate [D] and exposure glass [E] and from there to the 2nd original feed roller [F]. The original's image is reflected through the fiber optics array [G] to the drum as the original passes between the platen plate and exposure glass. Then, the original exits the machine. At the appropriate time after either the original or copy paper exits, the image creation process (drum process) stops. When both the original and copy paper have exited the machine, the mechanical drive (main motor) stops.

3.2.2 Original Jam Check Timing



There is only one sensor (original registration sensor) in the original path. Therefore, original jam cannot be detected during the time that a maximum original length (2m) passes this sensor. The original jam check is done after the leading edge of the original has moved 2.5 m (around 50 seconds). To stop the machine during operation and to protect originals if something wrong happens to them, the Emergency Stop key [A] should be pressed.

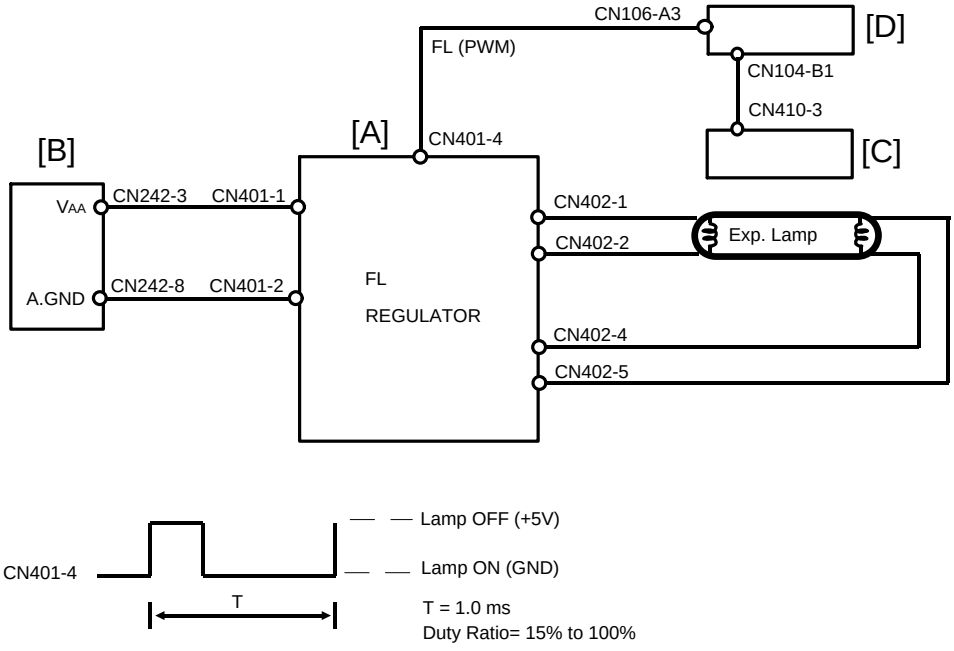
3.2.3 Drive Mechanism



The original feed rollers are driven through the original feed drive pulley and belt by the main motor as mentioned in the drum drive section.

The paper registration rollers [A] are rotated by the main motor [B] through the gears [C] and the paper registration clutch [D].

3.3 FL REGULATOR CONTROL



The FL regulator [A] receives 24 volts dc at CN401-1 from the PSU [B]. The control signal, which is a pulse width modulated (PWM) signal, is received at CN401-4. The PWM signal has a period (T) of 1 millisecond and a duty ratio of 15% to 100%.

The basic light intensity level is determined either by the image density selected at the operation panel (manual ID control). The CPU uses the light sensor to monitor the actual light intensity. The light sensor [C] directly detects the lamp's light output and feeds a light intensity signal back to CN104-B1 of the main board [D]. This feedback allows the CPU to compensate for variations in light intensity due to the lamp's age or temperature.

3.4 MANUAL ID CONTROL

Manual ID Level	Light Sensor Output [V]
1	0.78
2	0.892
3	0.899
4	0.938
5	1.02
6	1.24
7	1.45

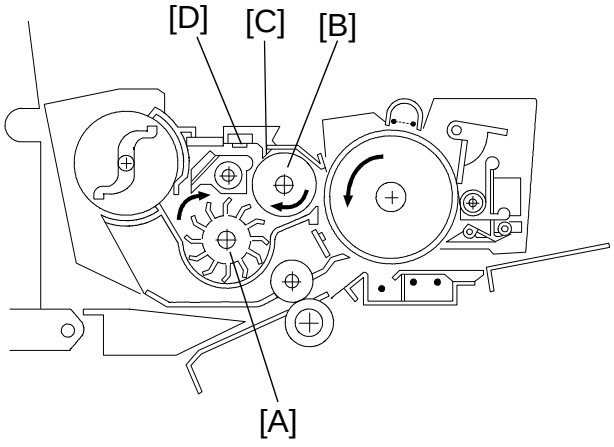
Manual ID Level	Light Sensor Output [V]
8	1.53
9	1.73
10	1.93
11	2.13
12	2.33
13	2.52
14	2.72

3.4.1 Manual ID Control

The user can select one of 14 manual ID levels. For each level, the intensity of the light output by the exposure lamp (as measured by the light sensor) is fixed. This is shown in the above table. The development roller bias also varies. (See the section on development bias.)

4. DEVELOPMENT

4.1 OVERVIEW



When the main motor turns on, the paddle roller [A] and development roller [B] start turning. The paddle roller picks up developer in its paddles and transports it to the development roller. Internal magnets in the development roller attract the developer to the development roller sleeve.

The turning sleeve of the development roller then carries the developer past the doctor blade [C]. The doctor blade trims the developer to the desired thickness and creates backspill to the cross-mixing mechanism.

The development roller continues to turn, carrying the developer to the OPC drum. When the developer brush contacts the drum surface, the negatively charged areas of the drum surface attract and hold the positively charged toner. In this way, the latent image is developed.

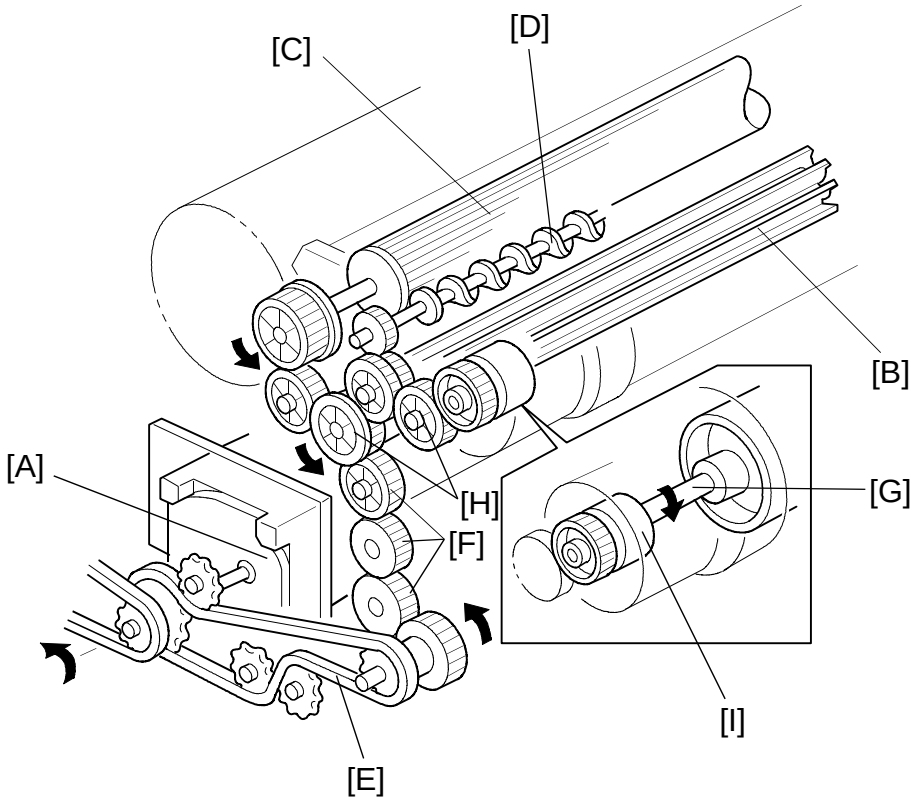
Negative bias is applied to the development roller to prevent toner from being attracted to non-image areas on the drum that may have residual positive charge. The bias also controls image density.

After turning about 100 degrees more, the development roller releases the developer into the developer tank. The developer is agitated by the paddle roller and the cross-mixing mechanism.

Also, in this machine, rotation of the paddle roller and development roller tend to cause the air pressure inside the unit to become higher than the air pressure around the development unit. Therefore, a hole fitted with a filter has been added to the top of the unit to relieve air pressure and to minimize toner scattering.

The toner density sensor [D] is mounted on the upper side of the development unit to detect the density of toner in the developer.

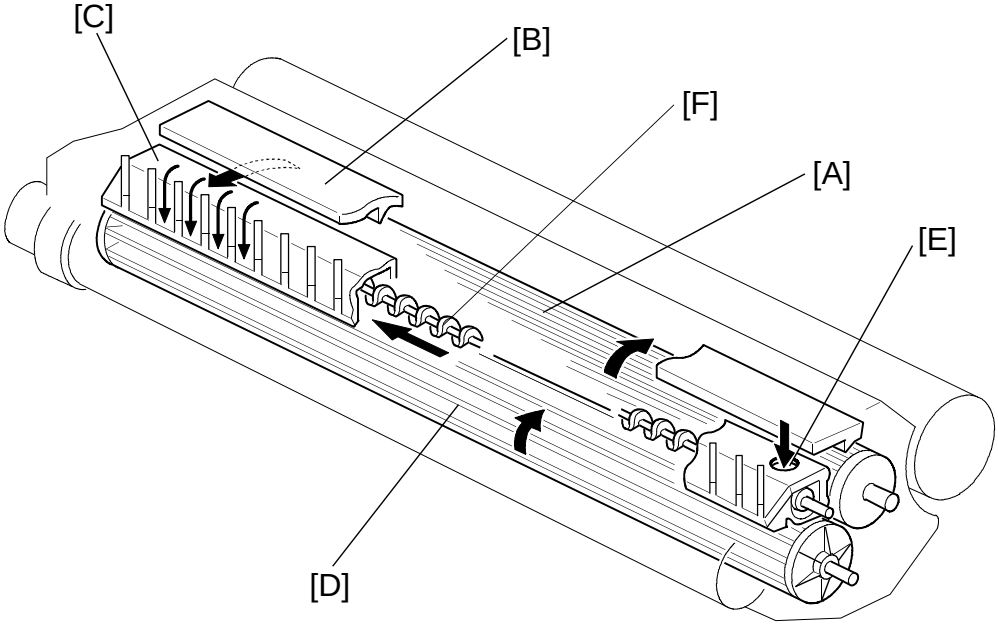
4.2 DRIVE MECHANISM



When the main motor [A] is on, the paddle roller [B], development roller [C], and mixing auger [D] in the development unit are driven through the development drive chain [E] and gears [F].

The toner agitator shaft [G] is rotated through the gears [H] by the toner supply clutch [I] engaged in the toner supply condition.

4.3 CROSS-MIXING



"Cross-mixing" keeps the developer's toner and carrier evenly mixed and evenly distributes the developer within the development unit. Cross-mixing also agitates the developer to generate the necessary triboelectric charge on the toner and carrier particles.

The arrows in the above illustration show the developer movement directions within the machine. The developer that is attracted to the development roller [A] is split into two parts by the doctor blade [B]. One part (the magnetic brush) goes on to develop the latent image on the drum. However, the other part is trimmed off by the doctor blade and directed to the backspill plate [C].

As the developer slides down the backspill plate to the paddle roller [D], part of the developer falls into the auger inlet [E] and is transported to the left side of the unit by the mixing auger [F], where it drops onto the paddle roller. The amount of developer moved to the right by the backspill plate is equal to the amount moved to the left by the mixing auger.

4.4 TONER DENSITY CONTROL

The toner supply amount ratio is determined by the following conditions.

	TS Level	0 ~ 50 sheets (~ 30 m)	51 ~ 100 sheets (30 ~ 60 m)	101 ~ 150 sheets (60 ~ 90 m)	151 ~ 200 sheets (90 ~ 120 m)	201 ~ 250 sheets (120 ~ 150 m)	251 sheets ~ (150 m ~)
N	0	$V_{TS} < 4.25$	$V_{TS} < 4.00$	$V_{TS} < 3.50$	$V_{TS} < 3.00$	$V_{TS} < 2.50$	$V_{TS} < 2.0$
	1	$4.25 \le V_{TS} < 4.30$	$4.00 \le V_{TS} < 4.10$	$3.50 \le V_{TS} < 3.80$	$3.00 \le V_{TS} < 3.50$	$2.50 \le V_{TS} < 3.00$	$2.00 \le V_{TS} < 2.40$
	2	$4.30 \le V_{TS} < 4.35$	$4.10 \le V_{TS} < 4.20$	$3.80 \le V_{TS} < 4.10$	$3.50 \le V_{TS} < 4.00$	$3.00 \le V_{TS} < 3.50$	$2.40 \le V_{TS} < 2.80$
	3	$4.35 \le V_{TS} < 4.40$	$4.20 \le V_{TS} < 4.30$	$4.10 \le V_{TS} < 4.20$	$4.00 \le V_{TS} < 4.20$	$3.50 \le V_{TS} < 4.00$	$2.80 \le V_{TS} < 3.20$
	4	$4.40 \le V_{TS} < 4.45$	$4.30 \le V_{TS} < 4.40$	$4.20 \le V_{TS} < 4.35$	$4.20 \le V_{TS} < 4.30$	$4.00 \le V_{TS} < 4.25$	$3.20 \le V_{TS} < 3.60$
	5	$4.45 \le V_{TS}$	$4.40 \le V_{TS}$	$4.35 \le V_{TS}$	$4.30 \le V_{TS}$	$4.25 \le V_{TS}$	$3.60 \le V_{TS}$
L	0	$V_{TS} < 4.35$	$V_{TS} < 4.30$	$V_{TS} < 4.25$	$V_{TS} < 3.75$	$V_{TS} < 3.25$	$V_{TS} < 2.75$
	1	$4.35 \le V_{TS} < 4.38$	$4.30 \le V_{TS} < 4.33$	$4.25 \le V_{TS} < 4.30$	$3.75 \le V_{TS} < 4.00$	$3.25 \le V_{TS} < 3.50$	$2.75 \le V_{TS} < 3.20$
	2	$4.38 \le V_{TS} < 4.40$	$4.33 \le V_{TS} < 4.36$	$4.30 \le V_{TS} < 4.33$	$4.00 \le V_{TS} < 4.10$	$3.50 \le V_{TS} < 3.80$	$3.20 \le V_{TS} < 3.60$
	3	$4.40 \le V_{TS} < 4.42$	$4.36 \le V_{TS} < 4.40$	$4.33 \le V_{TS} < 4.36$	$4.10 \le V_{TS} < 4.20$	$3.80 \le V_{TS} < 4.00$	$3.60 \le V_{TS} < 3.90$
	4	$4.42 \le V_{TS} < 4.45$	$4.40 \le V_{TS} < 4.43$	$4.36 \le V_{TS} < 4.40$	$4.20 \le V_{TS} < 4.38$	$4.00 \le V_{TS} < 4.35$	$3.90 \le V_{TS} < 4.30$
	5	$4.45 \le V_{TS}$	$4.43 \le V_{TS}$	$4.40 \le V_{TS}$	$4.38 \le V_{TS}$	$4.35 \le V_{TS}$	$4.30 \le V_{TS}$
H	0	$V_{TS} < 4.00$	$V_{TS} < 3.50$	$V_{TS} < 3.00$	$V_{TS} < 2.50$	$V_{TS} < 2.00$	$V_{TS} < 1.50$
	1	$4.00 \le V_{TS} < 4.10$	$3.50 \le V_{TS} < 3.80$	$3.00 \le V_{TS} < 3.50$	$2.50 \le V_{TS} < 3.00$	$2.00 \le V_{TS} < 2.40$	$1.50 \le V_{TS} < 2.00$
	2	$4.10 \le V_{TS} < 4.20$	$3.80 \le V_{TS} < 4.10$	$3.50 \le V_{TS} < 4.00$	$3.00 \le V_{TS} < 3.50$	$2.40 \le V_{TS} < 2.80$	$2.00 \le V_{TS} < 2.50$
	3	$4.20 \le V_{TS} < 4.30$	$4.10 \le V_{TS} < 4.20$	$4.00 \le V_{TS} < 4.20$	$3.50 \le V_{TS} < 4.00$	$2.80 \le V_{TS} < 3.20$	$2.50 \le V_{TS} < 3.00$
	4	$4.30 \le V_{TS} < 4.40$	$4.20 \le V_{TS} < 4.35$	$4.20 \le V_{TS} < 4.30$	$4.00 \le V_{TS} < 4.25$	$3.20 \le V_{TS} < 3.60$	$3.00 \le V_{TS} < 3.50$
	5	$4.40 \le V_{TS}$	$4.35 \le V_{TS}$	$4.30 \le V_{TS}$	$4.25 \le V_{TS}$	$3.60 \le V_{TS}$	$3.50 \le V_{TS}$

TS Level (Toner Supply Ratio)

0: No supply 1: 7.5% 2: 15% 3: 30% 4: 50% 5: 100%

The toner density sensor is used for toner density control. It measures the ratio of toner to carrier in the developer.

Toner is supplied every 600 mm when the toner density sensor value (V_{TS}) meets one of the TS level conditions from 1 to 5. The triboelectric charge generated on the toner and carrier become greater in accordance with the copy quantity and is stabilized after 250 copies. To compensate the triboelectric charge characteristic, the value of the toner supply control changes as shown.

During the initial conditioning, the main motor rotates the development unit to stabilize the triboelectric charge generated on the toner and carrier and the toner density sensor is automatically adjusted to 4.0±0.1V using new developer. The initial conditioning (SP36) must be performed whenever the developer is replaced.

4.4.1 Toner Near End Condition

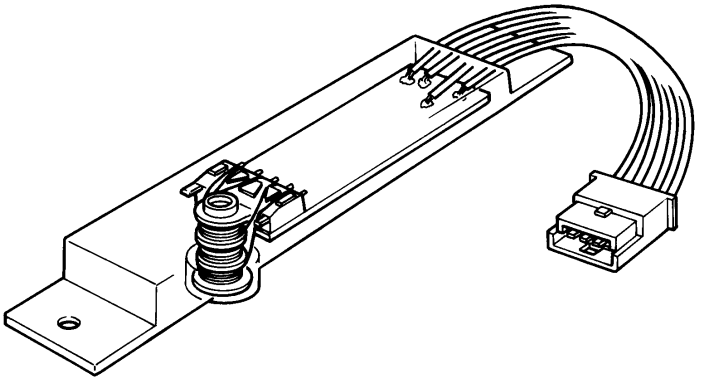
When TS level 5 is detected 3 times in a row, the toner near end condition is detected and the add toner indicator starts flashing. When in the toner near end condition, 16 more meters (A1/D size: 27 copies) can be copied. Then the add toner indicator will light and the machine will not operate.

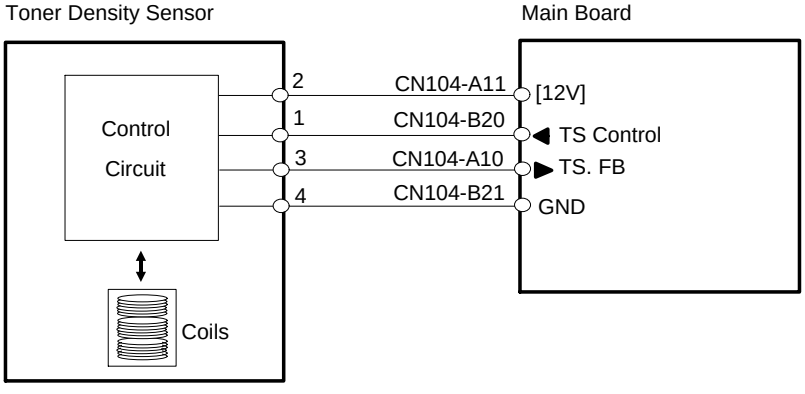
4.4.2 Recovery From Toner (Near) End Condition

After replacing the toner cartridge (opening and closing the original feed unit), the main motor rotates the development unit for 1 minute. For 30 seconds during this period, toner is supplied at 100% of the supply amount. Then, copies can be made. After new toner is installed, the toner density sensor value may fluctuate until 30 meters of copying has been done. This cause the toner end detection to malfunction even when the new toner cartridge has been installed correctly. Because of this, toner (near) end is not detected until 30 meters (A1/D size: 50 copies) after replacing toner cartridge.

The same action as described above will also take place after opening and closing original feed unit, or turning the main switch off and on, or unplugging and plugging power cord. This is known as ’fake recovery’.

4.4.3 Toner Density Sensor





The toner density sensor circuit controls the amount of toner in the developer mixture.

The toner density sensor is powered by 12 volts from CN104-A11 of the main board. (The potential of CN104-A11 is 24 V when the connector is disconnected.) The sensor's sensitivity is set by the feedback signal applied from CN104-A10. The input signal from the sensor passes to the main board at CN104-B20. This is an analog signal.

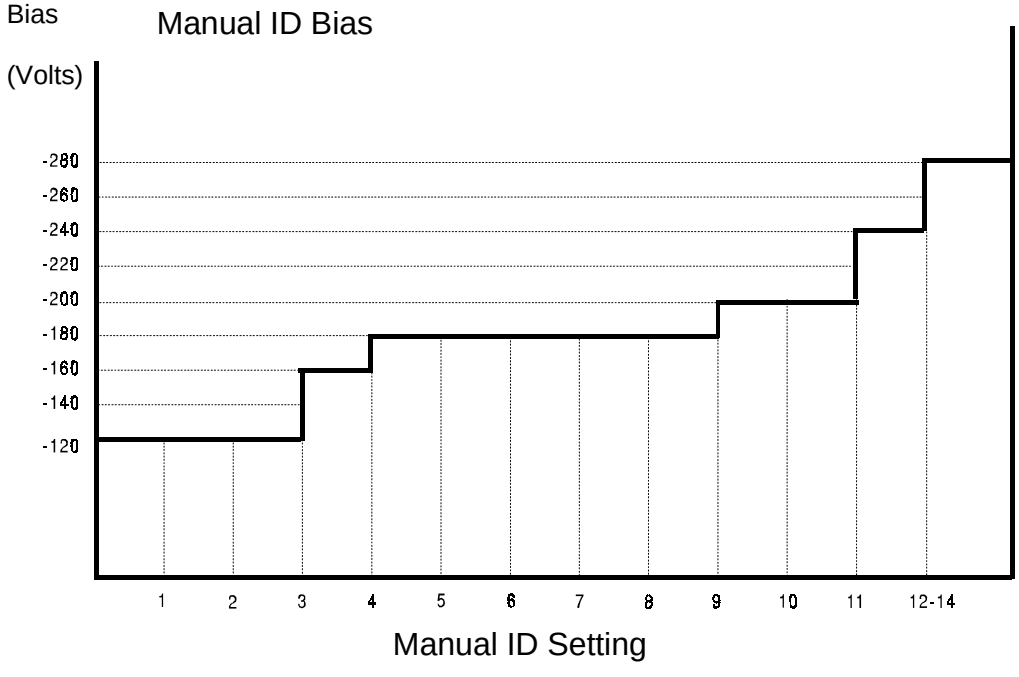
The active sensor element is a very small transformer with three coils. When iron ferrite (carrier) is near the sensor element, the inductance of the coils changes, causing the current through the transformer to change. As the amount of toner in the developer increases, the effect of the carrier particles decreases and the voltage applied to CN104-B20 decreases. Conversely, when the toner concentration drops as toner is used up, the effect of the carrier on the sensor coils increases and the voltage at CN104-B20 also increases.

4.5 DEVELOPMENT BIAS

4.5.1 Basic Concept

When the drum is exposed, most of the negative charge is eliminated from the areas where light strikes the drum. This leaves a negative charge pattern corresponding to the dark areas of the original. After exposure, however, a small residual charge of about –100 volts (for white paper) remains in the exposed areas. This residual charge could attract positively charged toner from the development roller, resulting in dirty background on the copy.

The development bias prevents this cause dirty background. A negative bias that is a little larger than the residual charge is applied to the development roller. This prevents the positively charged toner from being attracted to the background areas of the latent image.

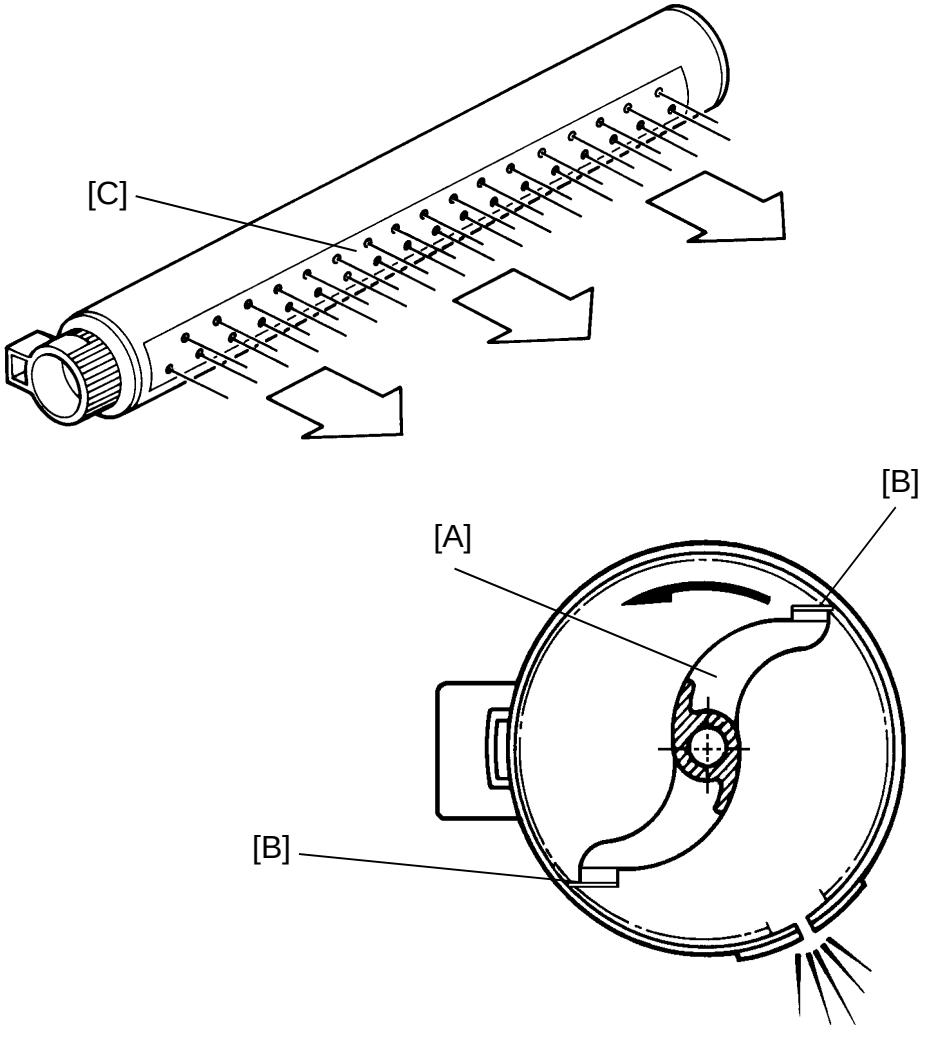


4.5.2 Manual Image Density Bias

The development bias is applied as shown by the above chart.

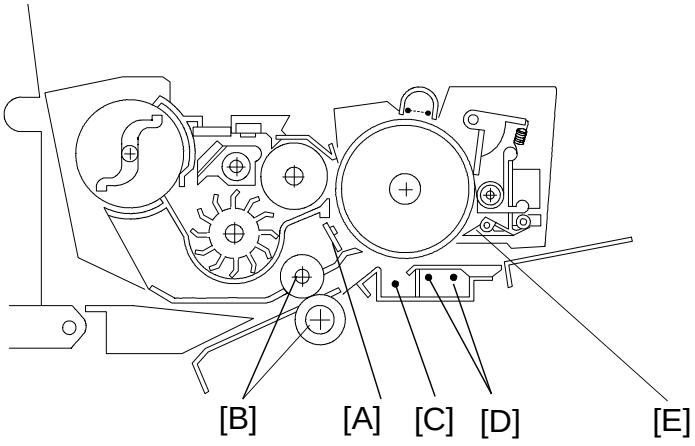
In addition to the development bias, the image density is also controlled by varying the exposure light intensity. (See the exposure section.)

4.6 TONER SUPPLY



To allow a compact design, the toner supply mechanism is built into the toner cartridge. An agitator [A] in the toner cartridge turns when the toner supply clutch is engaged. As the agitator rotates, mylar strips [B] on the ends of the agitator force toner through small holes (0.5 mm in diameter) in a plastic strip [C] along one side of the toner cartridge. The toner particles thus ejected from the cartridge fall into the development unit and are mixed into the developer. The toner agitator turns at 75 rpm and the toner supply rate is approximately 22.5 grams per minute.

5. IMAGE TRANSFER AND PAPER SEPARATION



5.1 PRE-TRANSFER LAMP (PTL)

After the latent image is developed but before the image is transferred to the copy paper, the drum surface is illuminated by the pre-transfer lamp [A]. This illumination reduces the negative potential on the drum surface. This prevents toner particles from being re-attracted to the negatively charged drum during the paper separation process. It also makes image transfer and paper separation easier.

5.2 IMAGE TRANSFER

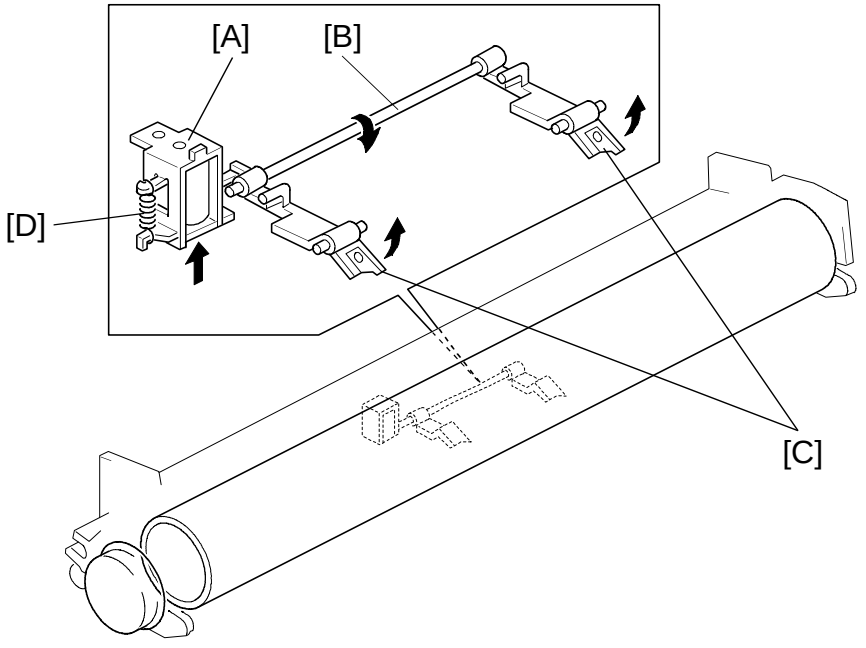
The registration rollers [B] feed the copy paper through the transfer entrance guides to the transfer section. A high negative voltage (about –5.0 kV) is applied to the transfer corona wire [C], and the corona wire generates negative ions. These negative ions are applied to the copy paper, and the negative charge attracts the positively charged toner away from the drum and onto the paper. In addition, the paper is held against the drum by the positive counter charge on the drum.

5.3 PAPER SEPARATION

After image transfer, the copy must be separated from the drum. To break the attraction between the paper and the drum, the separation corona wires [D] apply an ac corona (5.0 kV) to the reverse side of the paper. The stiffness and weight of the paper cause it to separate from the drum.

The separation corona has a negative component of approximately –250 volts. This negative component holds the toner on the paper to prevent it from being reattracted to the drum during paper separation. The two pick-off pawls [E] ensure that thin paper, paper with low stiffness, or upward curled paper separates completely from the drum.

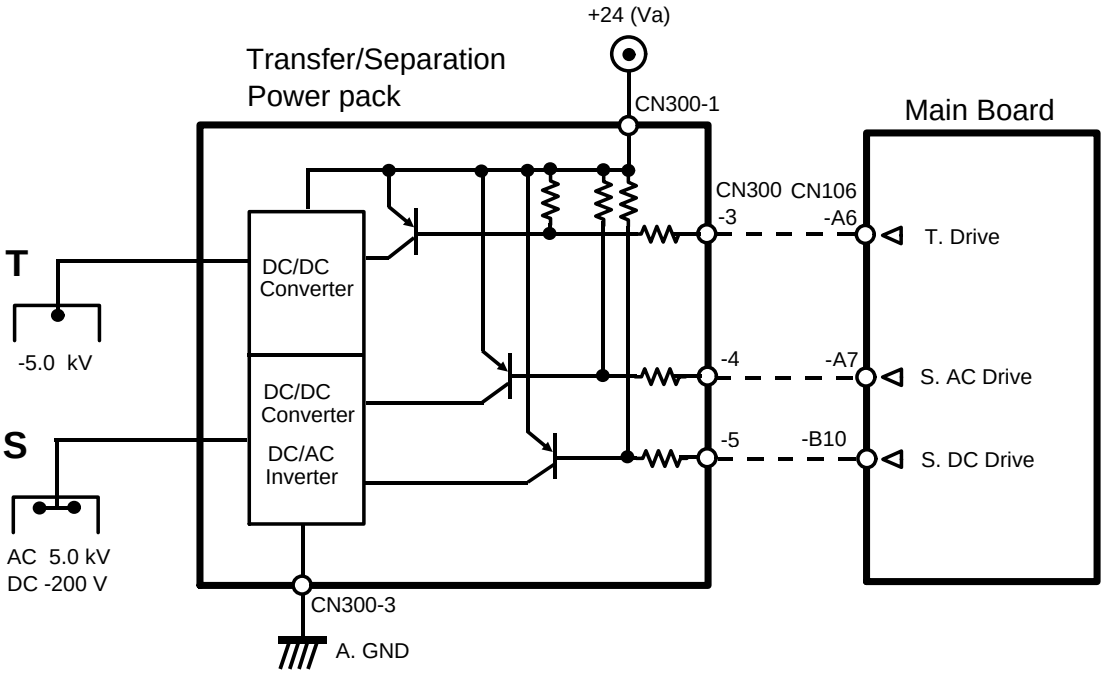
5.4 PICK-OFF MECHANISM



The pick-off pawl solenoid [A] is energized after the registration clutch turns on to feed the copy paper to the drum. The pick-off shaft [B] then rotates clockwise and the pick-off pawls [C] touch the drum surface.

Just after the leading edge of the copy paper passes the pick-off pawls, the pick-off solenoid turns off again. The pick-off spring [D] then rotates the pick-off shaft counterclockwise and moves the pick-off pawls away from the drum.

5.5 T/S CORONA CIRCUIT



The T/S power pack is powered by +24 volts (Va) from the PSU. The dc/dc converters and dc/ac inverter change the +24 volts supply into the high voltages used by the transfer and separation coronas.

The main board turns on the transfer corona using PWM signal (T.Drive). This turns on the dc/dc converter, which applies a high voltage of approximately –5.0 kV to the transfer corona wire. The main board turns on the separation corona using PWM signals (S.AC Drive and S.DC Drive). The dc/dc converter and dc/ac inverter circuits then apply approximately 5.0 kV ac and –200 V dc to the separation corona wires.

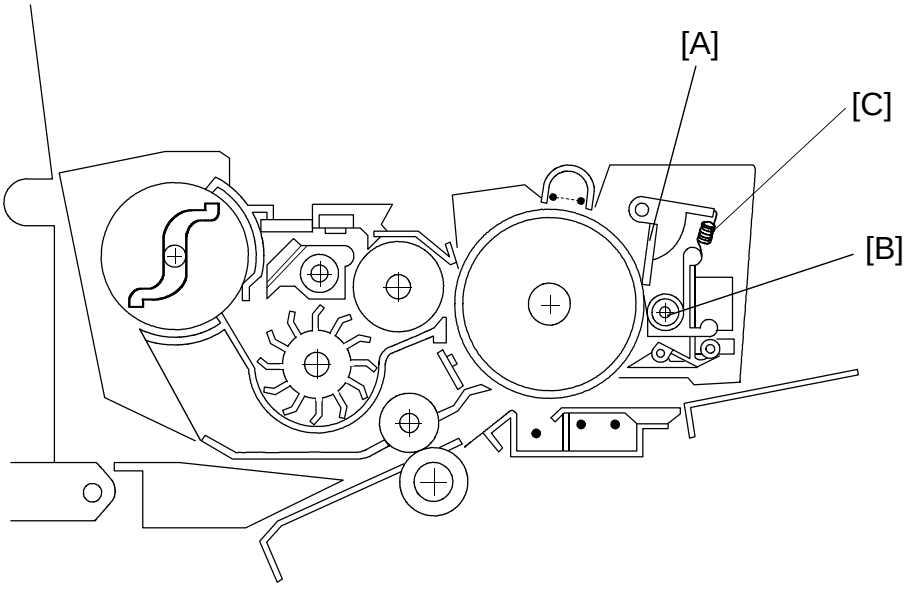
A larger transfer current is applied when the fusing unit is in high or low temperature mode than in normal temperature mode. In high or low mode, thin copying paper (translucent paper or film) may be wrapped around the drum. This may cause the paper to be jammed or transported incorrectly. To correct for this, the separation current is increased in high and low modes. To ensure good copy quality in high mode, the PTL (pre-transfer lamp) is off during the copy process.

A larger separation current is applied at the leading edge of the paper to improve the separation in high temperature mode.

When roll feeder is installed, a larger transfer current is applied at the trailing edge of the paper to improve transfer at the curled trailing.

6. CLEANING

6.1 OVERVIEW

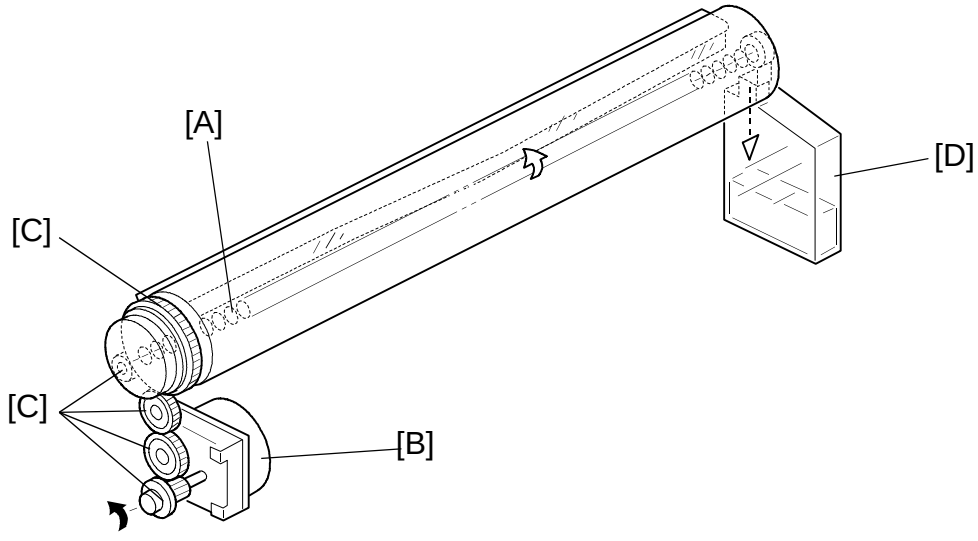


This copier uses the counter blade system for drum cleaning. The blade [A] is angled against the drum rotation. This counter blade system has the advantage of high cleaning efficiency.

The cleaning blade removes any toner remaining on the drum after the image is transferred to the copy paper. The toner that is wiped off by the cleaning blade drops onto the toner collection coil [B], which then moves it to the toner collection bottle.

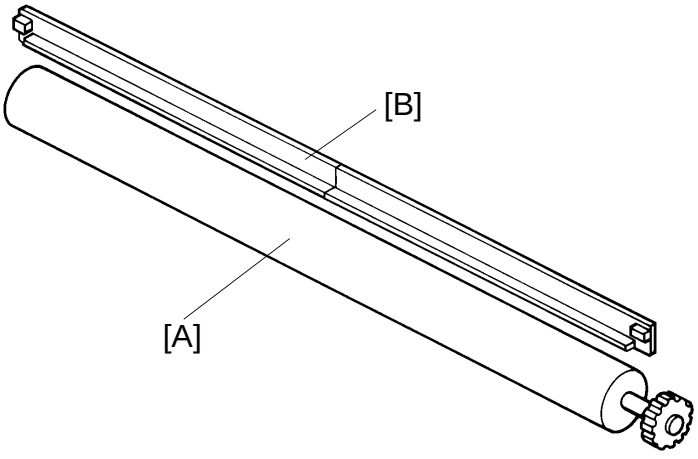
The cleaning blade pressure spring [C] applies pressure to the exact center of the cleaning blade so that pressure is evenly applied across the entire length of the cleaning blade. Blade pressure is applied constantly.

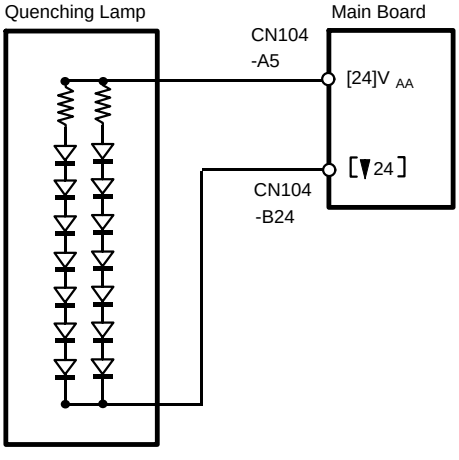
6.2 COLLECTION OF USED TONER



The toner collection coil [A], which is rotated by the main motor [B] through the gears [C], moves used toner from the cleaning unit to the toner collection bottle [D]. The toner collection bottle capacity is enough to hold used toner from making 1220 m copies. The CPU uses the copy quantity to detect the used toner overflow. The used toner overflow condition is detected when the copy length counter (SP52) reaches the used toner detection threshold setting (SP51, Default value: 1220m). When this condition occurs, "FULL" is indicated in the copy counter and copying is disabled.
After disposing of the toner in the toner collection bottle and closing the paper path section, pressing of the Clear Modes/Stand by key should be done by customers themselves to clear the memory counter for the copy quantity. The memory for the copy quantity can be cleared using SP53. SP52 shows the length of copies made since the used toner was emptied. When "0" is input in SP53, the value of SP52 is cleared.

7. QUENCHING



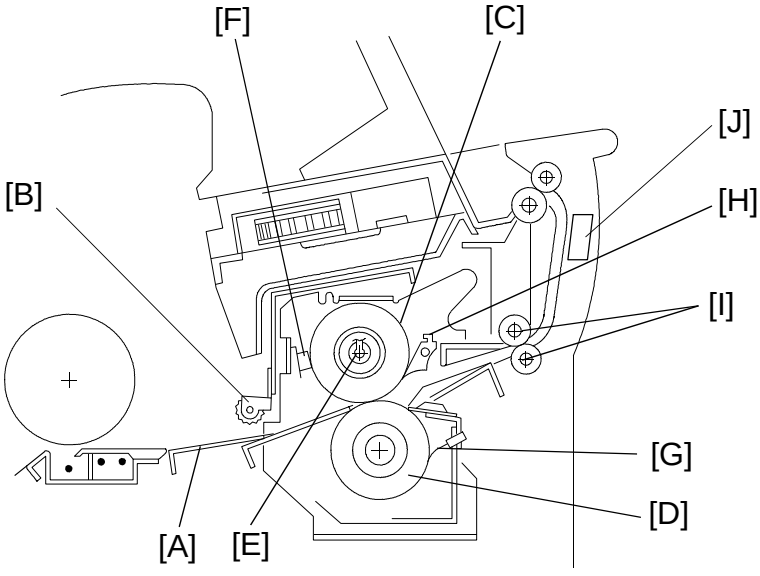


After the drum [A] is cleaned by the cleaning blade, light from the quenching lamp [B] neutralizes any charge remaining on the drum. The quenching lamp turns on and off at the same time as the main motor.

The main board turns on the quenching lamp LEDs by dropping CN104-B24 to 0 volt.

8. FUSING AND PAPER EXIT

8.1 OVERVIEW



After separation from the drum, copy paper rides on the transport plate [A]. The small separation rollers [B] hold the paper against the transport plate so that the back curled paper is straightened before it enters the fusing section.

Two rollers fuse the image to the copy paper by applying heat and pressure. The hot roller [C] is made of carbon-teflon and the pressure roller [D] is made of silicone rubber. Pressure is constantly applied by the pressure levers at the ends of the fusing unit.

The fusing lamp [E], which is located at the hot roller axis, turns on and off to maintain the operating temperature. The temperature control circuit on the main board monitors the surface temperature of the hot roller and the pressure roller through a thermistor [F and G respectively].

There are three operating temperature settings: normal, high, and low. The normal setting has a choice of 7 temperature settings, adjustable by SP1 or key operation. The high setting has a choice of 4 temperature settings. The low setting also has a choice of 4 temperature settings.

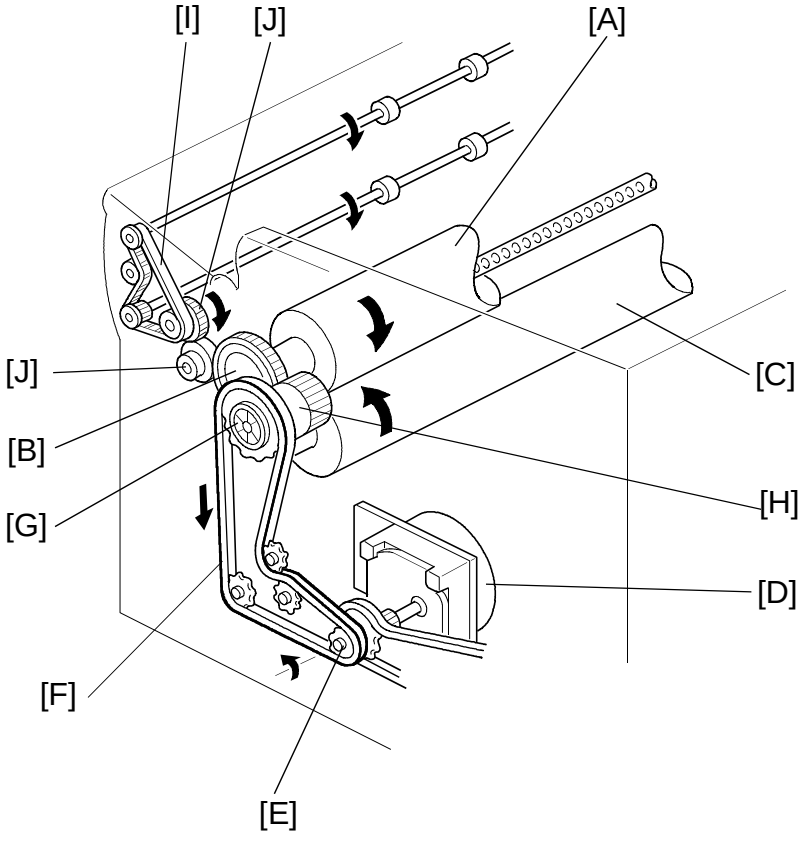
The hot roller strippers [H] separate the copy from the hot roller and direct it to the fusing exit rollers [I].

The thermofuse provides backup overheat protection. (See the section on fusing temperature control.)

The fusing exit sensor [J] is used for jam detection.

8.2 DRIVE MECHANISM

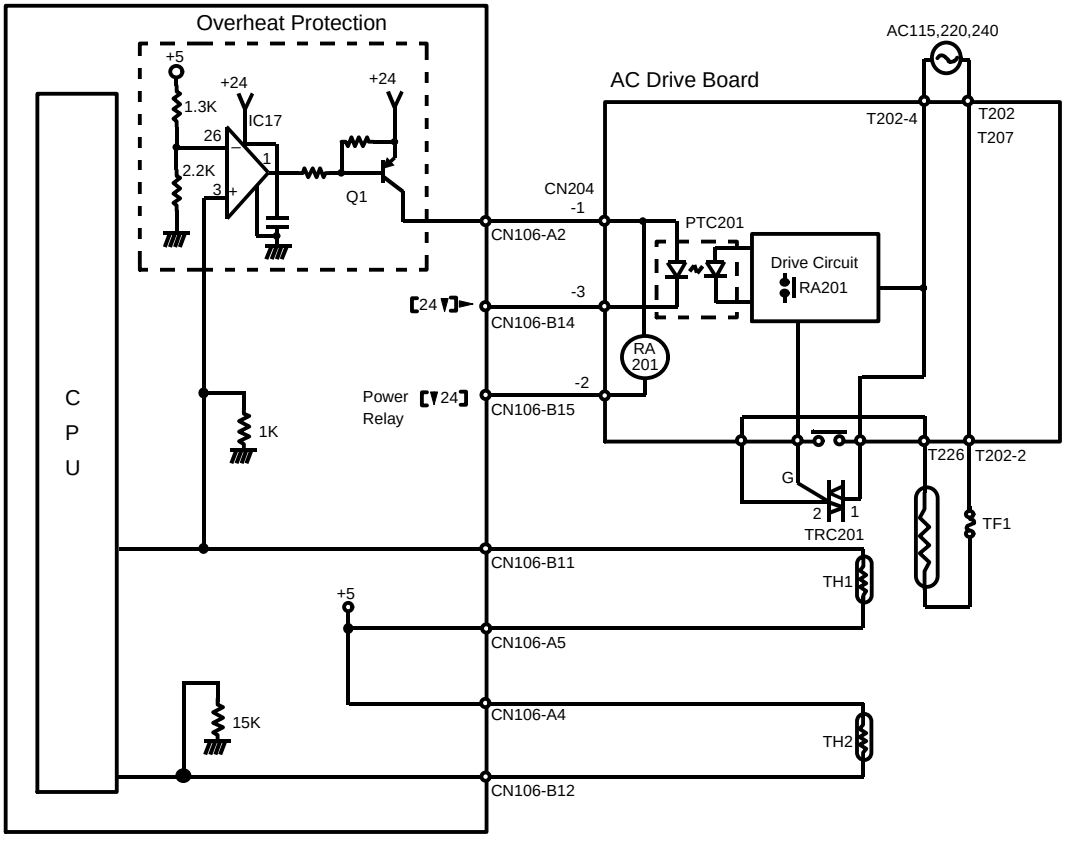
8.2.1 Fusing Unit Drive



The hot roller [A] is turned by the hot roller drive gear [B] as shown. The pressure roller [C] is friction driven by the hot roller. The fusing rollers turn constantly when the main motor [D] is on, driven via the gear [E], through the fusing drive chain [F], sprocket [G], and gear [H], to the hot roller drive gear.

The exit section is driven by the exit unit drive belt [I] through the hot roller drive gear and gears [J].

8.3 FUSING TEMPERATURE CONTROL



8.3.1 Fusing Circuit Operation

The fusing lamp is powered by the ac drive board and controlled by the main board.

The ac drive board receives direct wall voltage ac power (not stepped down) at T207 and T202-4. It also receives +24 volts at CN204-1. The ac power is applied to the drive circuit, the fusing lamp, and the triac (TRC201). The dc power drives PT201 and RA201.

To turn on the fusing lamp, the main board drops CN106-B14 to LOW. This activates the photocoupler (PT201) which in turn energizes the drive circuit. The drive circuit turns on the triac to complete the lamp circuit, thus turning on the lamp.

RA201 guards against a failure of the +24 volt power supply. When +24 volts is applied at CN204-1 and CN106-B15 drops to LOW, RA201 is energized and its ac contacts stay open. If the +24 volts power from CN 106-A2 stops, the ac contacts of RA201 close, stopping the drive circuit and turning off the fusing lamp.

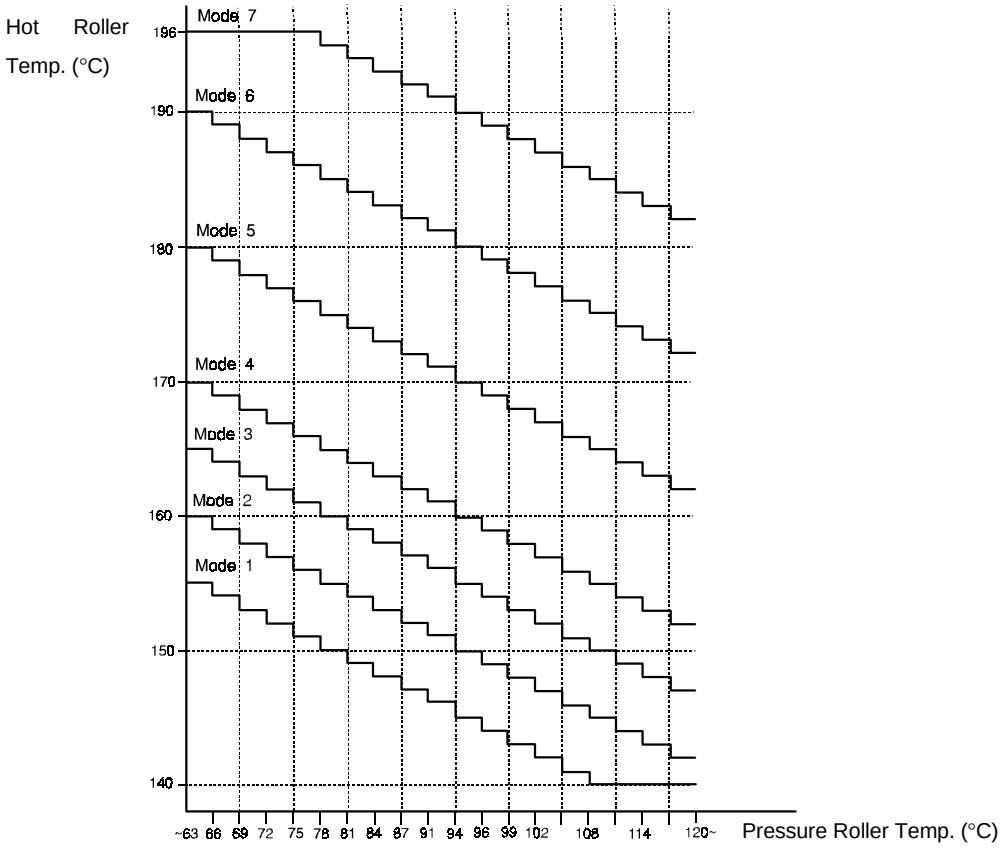
8.3.2 Overheat Protection

The overheat protection circuit on the main board turns off the fusing lamp if the temperature goes too high.

The input from TH1 (Hot Roller Thermistor) goes to pin 3 of IC17 as well as to the CPU. As the temperature of TH1 increases, its resistance decreases and therefore the voltage at pin 3 of IC17 increases. If this voltage becomes greater than the voltage at pin 2, the output at pin 1 becomes HIGH. Q1 then turns off and cuts the +24 volt supply to ac drive board. The fusing lamp then turns off. The overheat protection circuit becomes effective at about 215°C.

TF1 provides overheat protection in case a short bypasses the control and drive circuits. This fuse will open if it reaches approximately 192°C.

8.4 TEMPERATURE CONTROL



The main board monitors the temperature of the hot roller through TH1 and the temperature of the pressure roller through TH2. The CPU determines whether or not to turn on the fusing lamp based on the combination of the input from these two thermistors. If the pressure roller is cool, the CPU keeps the hot roller temperature high. However, if the pressure roller is hot, the CPU decreases the operating temperature of the hot roller. The above graph shows the relationship between the temperatures of the hot and pressure rollers.

The operating temperature of the hot roller and pressure roller can be adjusted using SP #–7 and SP #–8. These programs are used to compensate for variations in the response of different thermistors. SP #–7 adjusts the hot roller temperature and SP #–8 adjusts the pressure roller temperature. SP #–7 shift the temperature in 1 degree increments (–9°C to +9°C). The fusing temperature can be monitored using SP #–9.

- The ready condition -

When the hot roller temperature reaches the ready temperature, the copier enters the ready condition, and copying is possible. The ready temperature is anywhere that is 5° lower than the hot roller operating temperature in the selected fusing unit mode.

- Fusing Unit Operating Modes -

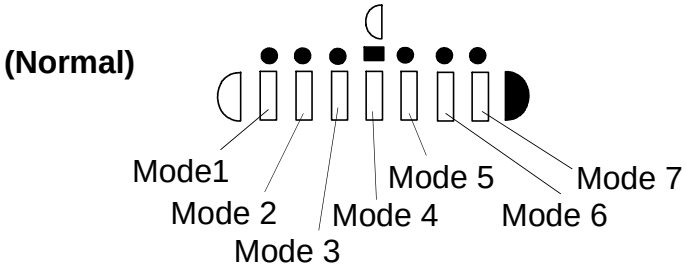
There are three operating temperature modes, selected with the Copy Media key: normal (for use with plain paper), high (for translucent paper), and low (for translucent film).

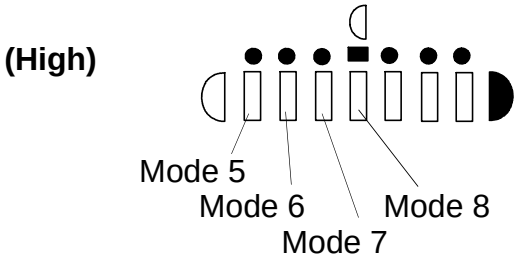
The normal temperature mode can have one of 7 temperature settings (modes 1 to 7; see the diagram on the previous page); the setting is selected using SP#1 or by key operation. The high temperature mode can have one of 4 temperature settings (mode 5 to 8); the setting is selected by SP#2 or by key operation. The low temperature mode can also have one of 4 temperature settings (mode 2 to 5); the setting is selected using SP#3 or by key operation. In this way, the setting of the fusing unit temperature modes can be adjusted to match the paper type more exactly, either by a service technician using SP Modes, or by a key operator.

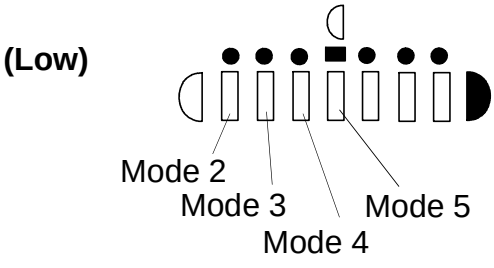
The key operation sequence is as follows. The setting input by this procedure does not overwrite the setting that is stored in the SP Mode.

First, select the temperature mode to be adjusted, using the Copy Media key. Then hold the Copy Media key down for longer than 2 seconds; the Density indicator inverts, and the unlit lamp on the indicator shows the current setting.

The position of the unlit lamp corresponds to the fusing temperature mode as shown below.







Select the required setting with the Density keys, then press the Copy Media key to store the setting. The Density indicator reverts to its normal operating mode, but it is blinking if the setting just selected is not the same as that stored in the SP Mode setting for the same temperature mode.

As can be seen on the diagrams on the previous page, modes 1 to 7 are similar in principle. However, Mode 8 (the highest temperature mode) is a bit different. The hot roller temperature is kept at 195°C and it starts to rotate to keep the pressure roller temperature between 130°C and 145°C. When the hot roller or pressure roller temperature is below the lower limit, copying is disabled.

After fusing, paper shrinks slightly, and expands again after a few minutes. The shrinkage and expansion are different at different fusing unit temperatures. Therefore, if the fusing unit operating mode settings have been changed, cutting length adjustment of the roll feeder unit may be required.

8.5 ENERGY SAVER FUNCTION

When the copier is not in use, the energy saver function reduces the power consumption by decreasing the fusing temperature.

When the Clear Modes/Stand-by key is hold down for over 2 seconds, the copier goes into the energy saver mode. A message is displayed on copy counter and all the other indicators turn off.

The fusing temperature is decreased by 15°C from one of the normal mode settings for copying. The energy saving ratio is approximately 14%. The waiting time until the copier returns to the ready condition is approximately 60 seconds.

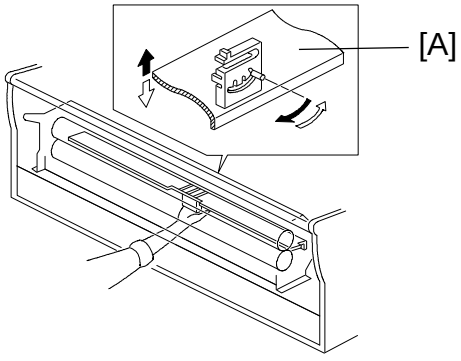
NOTE: The above energy saving ratio is a standard value measured in laboratory tests under controlled conditions. The actual ratio will vary depending on environmental conditions, copy modes, power supply conditions and measurement instruments.

Press the Clear Mode/Standby key. The copier is returned to the ready condition after a warm-up time.

When the auto energy saver mode (SP #10) is selected, the copier automatically goes to the energy saver mode at the auto reset time selected by SP #9.



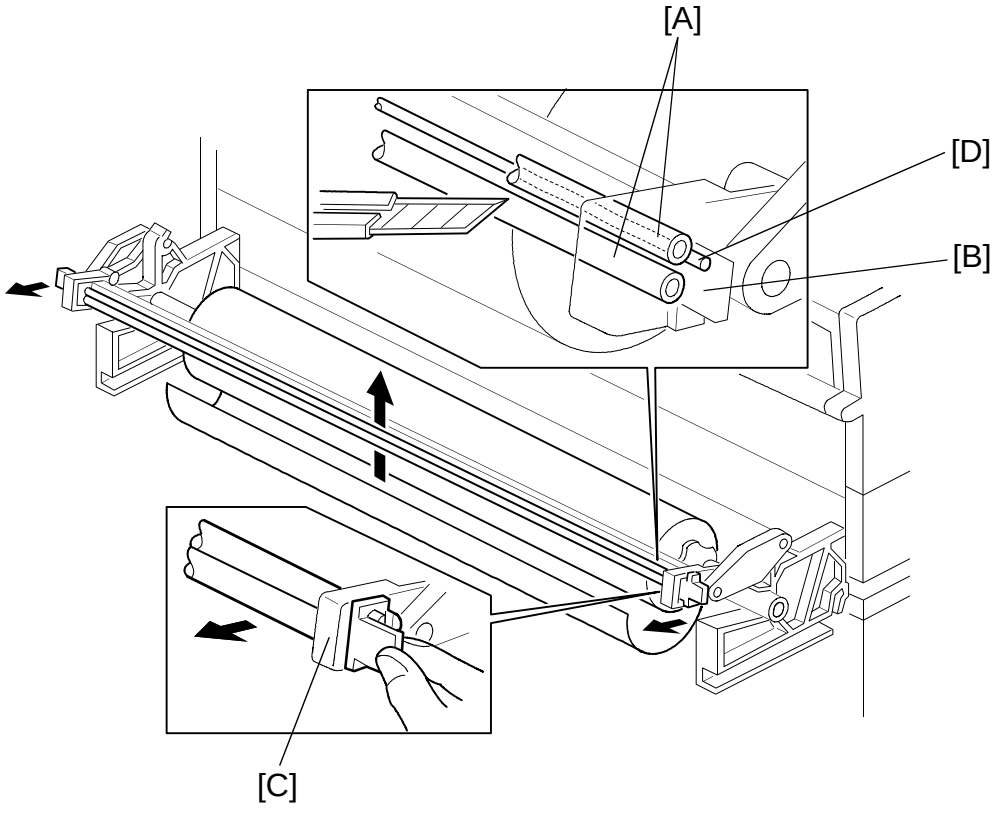
8.6 FUSING ENTRANCE GUIDE HEIGHT



Paper creasing may occur depending on the type of paper used. The fusing entrance guide [A] height is changed by adjusting a lever (there are three settings).

9. OTHERS

9.1 ROLL CUTTING RAIL



The roll cutting rail cuts sheets of paper from the paper roll.

For inserting paper between the slide shafts [A] and cutter guide stay [B], the holders [C] hold the slide shafts at the upper position by keeping the gap constant. To stop paper dropping from the roll cutting rail, the holders hold the slide shafts at the lower position by holding the paper against the cutter guide stay.

The guide shaft [D], made of resin, protects the paper knife blade from damage by metal parts of the unit.

SECTION 3

INSTALLATION

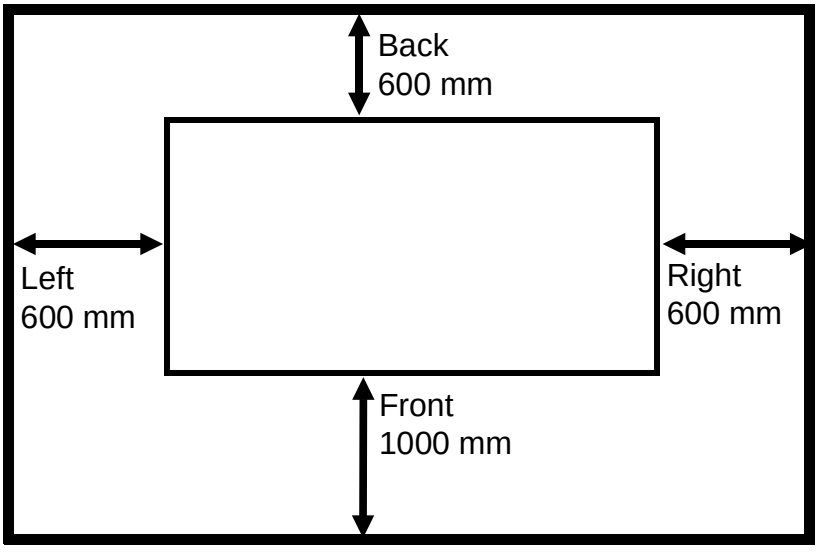
1. ENVIRONMENT

1. Temperature Range: 15°C to 30°C (59°F to 86°F)
2. Humidity Range: 20% to 80% RH
3. Ambient Illumination: Less than 1,500 Lux (do not expose to direct sunlight).
4. Ventilation: Minimum space 20 m^3
   Room air should turn over at least 30 m^3/hr/person.
5. Ambient Dust: Less than 0.15 mg/m^3
   (4×10^{-3} oz/yd^3)
6. If the installation place is air-conditioned or heated, place the machine as follows:
   a) Where it will not be subjected to sudden temperature changes from low to high, or vice versa.

   b) Where it will not be directly exposed to cool air from an air conditioner in the summer.

   c) Where it will be directly exposed to reflected heat from a space heater in the winter.
7. Avoid placing the machine in an area filled with corrosive gases.
8. Avoid any area higher than 2,000 m (6,500 ft) above sea level.
9. Place the machine on a strong and level base.
10. Avoid any area where the machine may be subjected to frequent strong vibration.

1.1 MINIMUM SPACE REQUIREMENTS



1. Front: 1,000 mm (39 in)
2. Back: 600 mm (24 in)
3. Right: 600 mm (24 in)
4. Left: 600 mm (24 in)

1.2 MACHINE LEVEL

1. Front to back: Within 5 mm (0.2") of level
2. Right to left: Within 5 mm (0.2") of level

Make sure that the machine is level using a carpenter’s level.

1.3 POWER SOURCE

1. Input Voltage Level: 115 V/60 Hz
   More than 15 A (for U.S.A. version)

   220 V/230 V/240 V/50 Hz
   More than 7 A (for European version)

2. Permissible Voltage Fluctuation: ±10%

3. Do not set anything on the power cord.

NOTE: a) Make sure the plug is firmly inserted in the outlet.

b) Avoid multi-wiring.

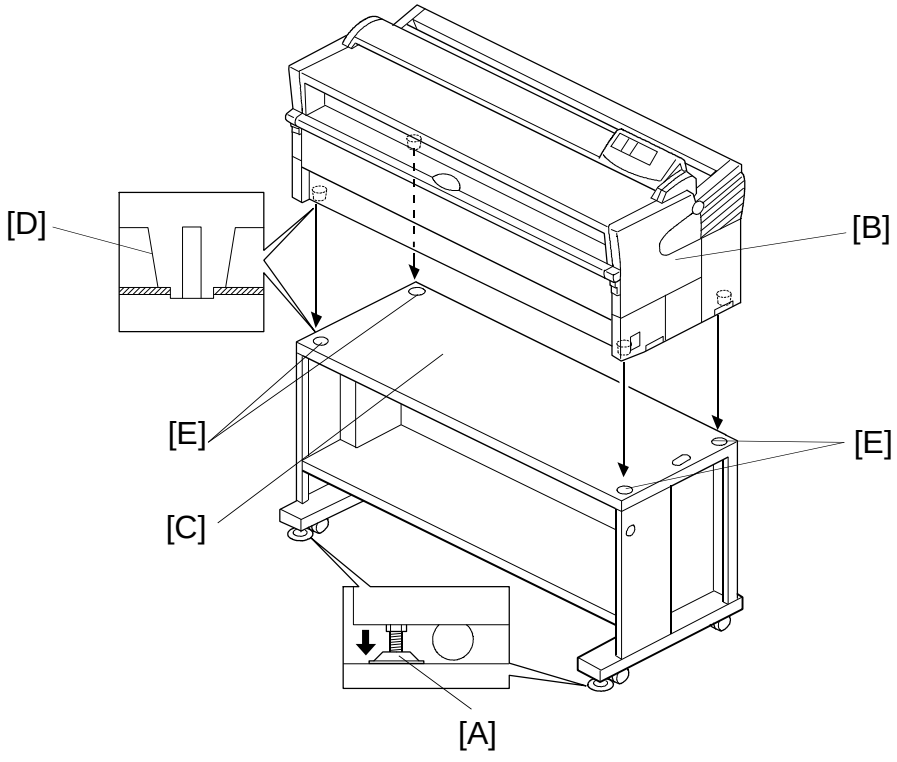
1.4 INSTALLATION PROCEDURE: COPIER (A163)

Check the accessories and their quantities according to the following list:

Guide Wire ..... 2 pcs

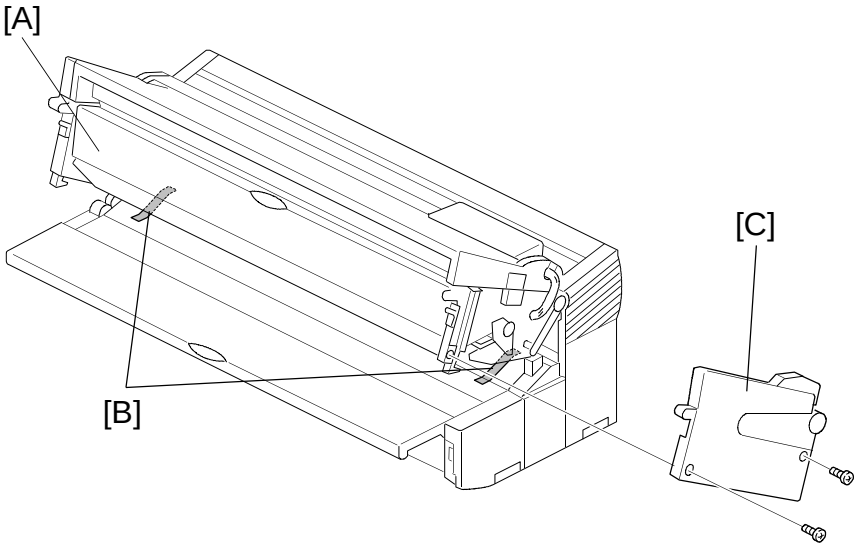
Copy Tray ..... 1 pc

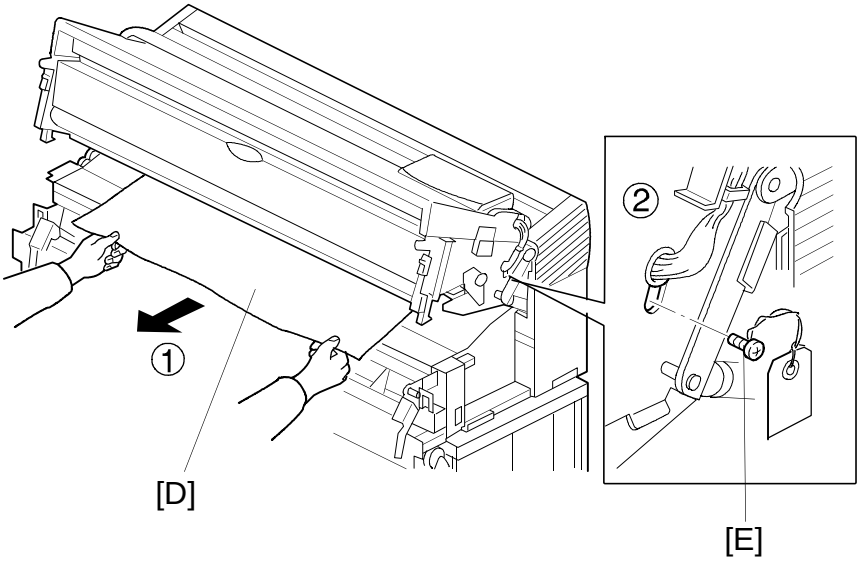
Copy Guide ..... 1 pc



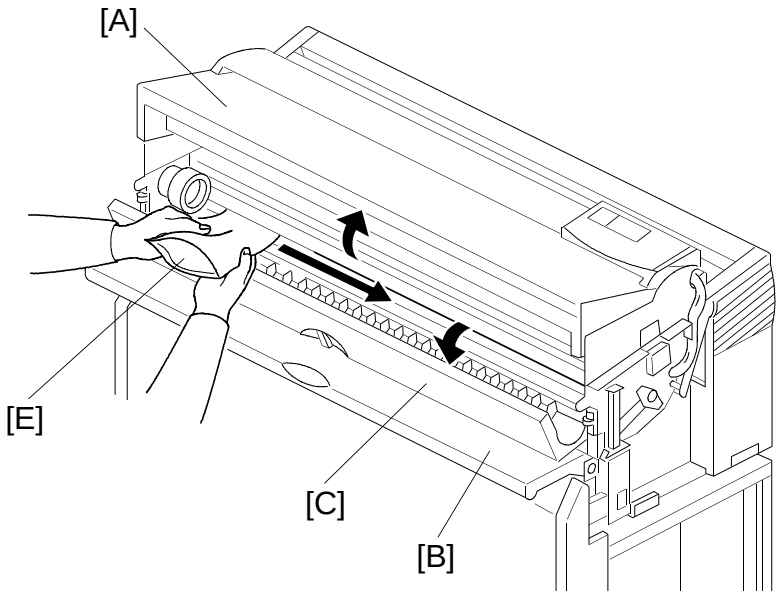
1. Lower the feet [A] so that the table does not move while the copier is being installed on the table.
2. Place the copier [B] on the table [C] (Place the copier feet [D] into the table holes [E]).

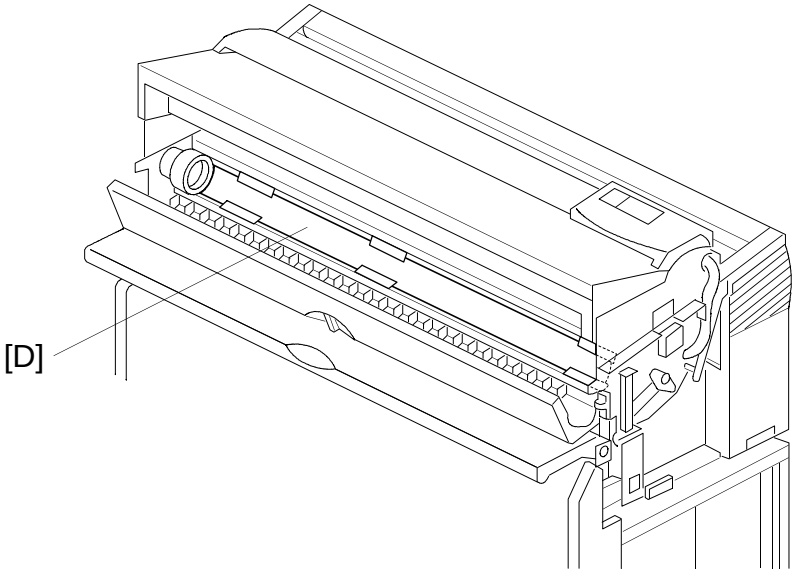
Warning: The copier is not attached to the table. Pushing the copier too hard may cause it to drop onto the floor. While moving the copier, push the table.





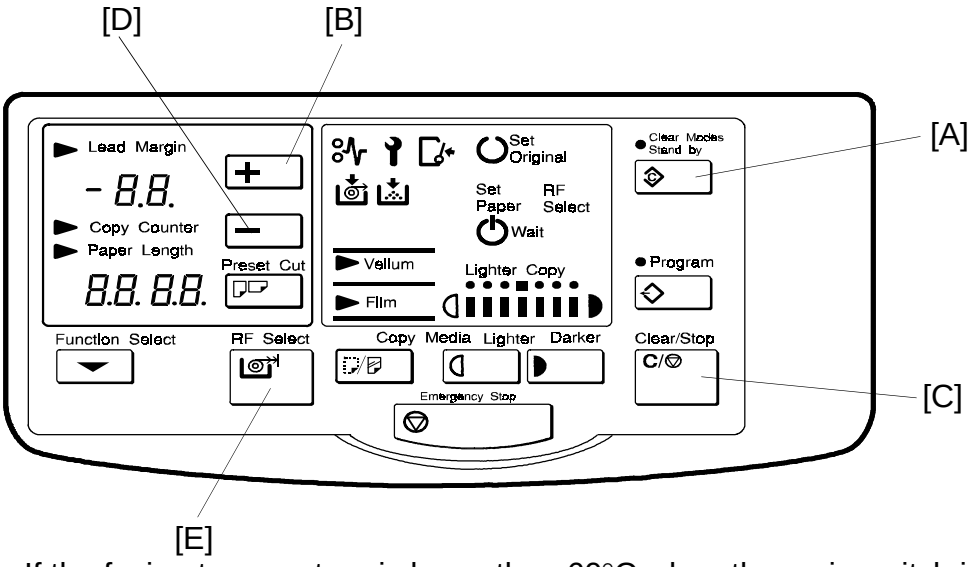
3. Open the paper path section [A] and remove two strips of shipping tape [B].
4. Remove the right upper cover [C] (2 screws).
5. Remove the drum protection sheet [D], and remove the screw [E] to apply cleaning blade pressure to the drum. Close the paper path section.





6. Open the original feed unit [A], manual feed table [B], and toner supply cover [C]. Remove a sheet [D] covering the developer entrance. Pour 1 kg of the developer [E] into the development unit evenly across its width as shown.

7. Plug in the power supply cord and turn on the main switch.



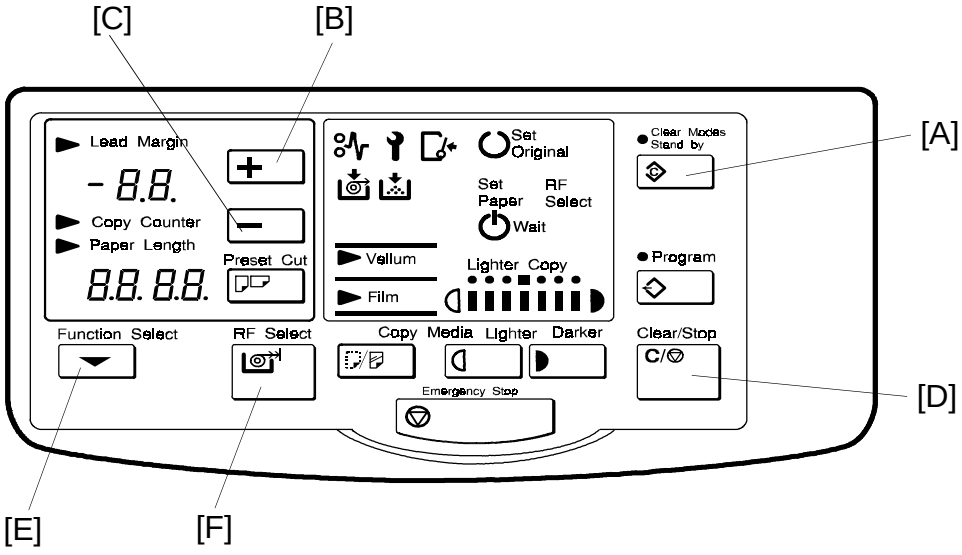
NOTE: If the fusing temperature is lower than 60°C when the main switch is turned on, the main motor will rotate. In this case, it is not necessary to access the SP mode to load the total 2kg of developer (Steps 8 to 11).
Turn off the main switch to stop the main motor after the developer is loaded from the development entrance. Then, pour in another kg of developer.

8. Press the following keys on the operation panel:
   Clear Mode key [A]
   + key [B]
   + key
   Clear/Stop key [C]

9. Press the Clear/Stop key again for longer than 3 seconds. The wrench and toner end indicators will blink (SP INPUT/OUTPUT mode).

10. Select 23 using the + key and - key [D] and press the RF Select key [E]. The main motor will rotate.

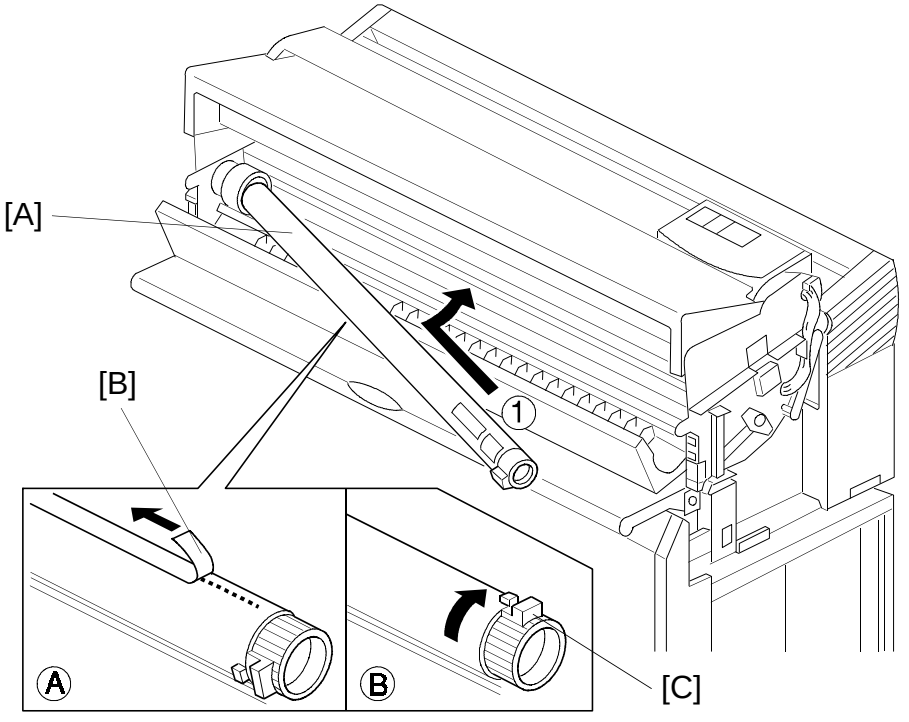
11. Press the RF Select key to stop the main motor after the developer is loaded from the development entrance. Pour in another kg of developer into the development unit evenly across its width (Total: 2 Kg). Press the Clear Modes/Stand by key 3 times to leave the SP mode.



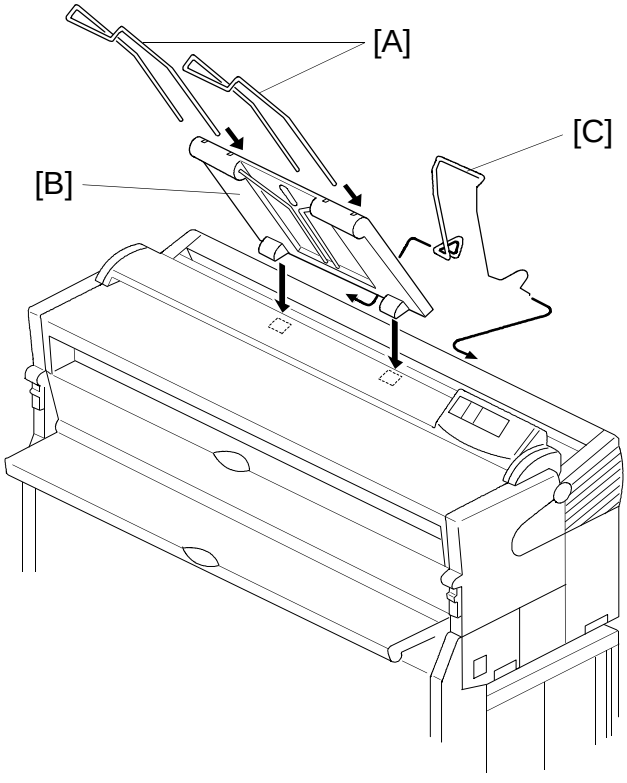
12. Press the following keys on the operation panel:
    Clear key [A]
    + key [B]
    –key [C]
    Clear/Stop key [D]

13. Press the Clear/Stop key again for longer than 3 seconds. The roll paper end and call service indicators will blink (SP mode).

14. Select 36 using the + and - keys. Enter "1" by pressing the following keys.
    Function Select key [E]
    + key
    RF Select key [F]
    Five minutes later, the copier will automatically return to the normal operating mode from SP mode.



15. Install the toner cartridge [A] as shown.
16. Remove the sealing tape [B] from the cartridge and turn the knob [C] until it stops.

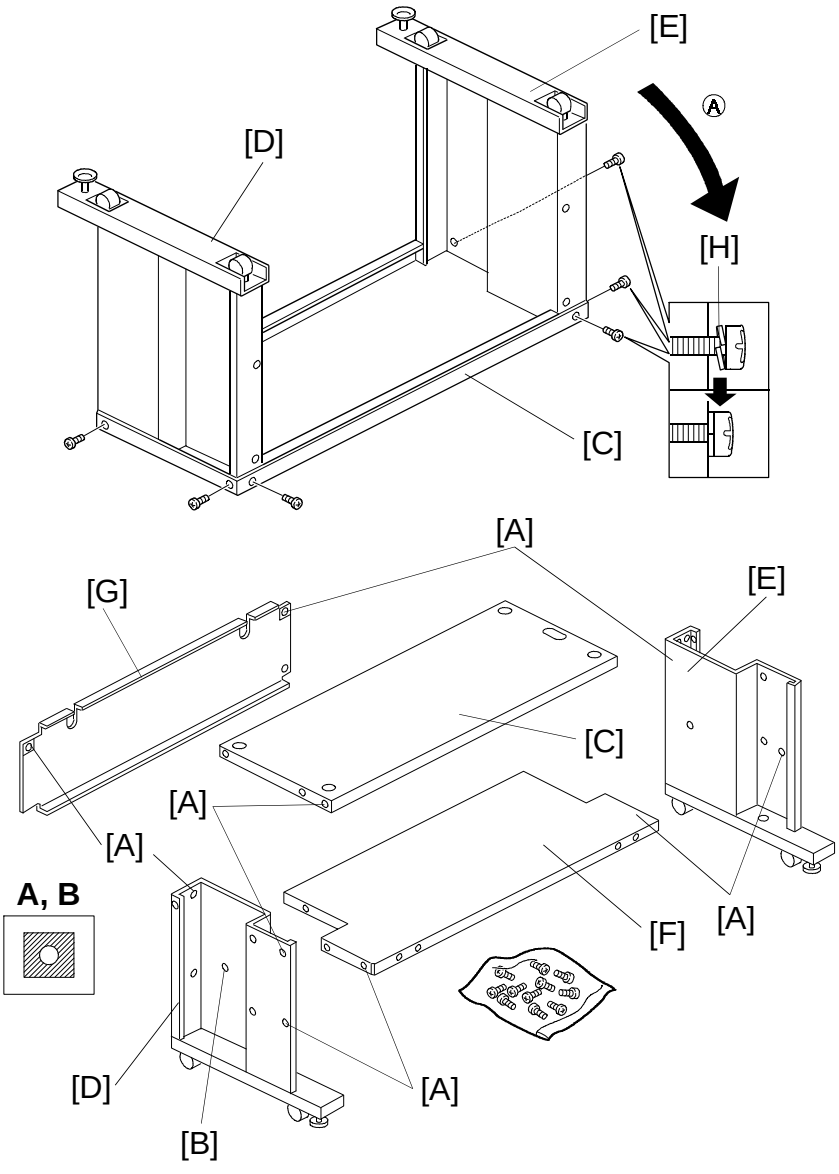


17. Attach the guide wires [A] to the copy tray [B].
18. Install the copy tray [B] and copy guide [C].
19. Reinstall all the covers.
20. Check the copy quality and copier operation.

1.5 INSTALLATION PROCEDURE: TABLE (A714)

Check the accessories and their quantities according to the following list:

- Top Plate 1
- Left Side Plate 1
- Right Side Plate 1
- Middle Plate 1
- Rear Cover 1
- Screws with Spring Washer - M4x8 14



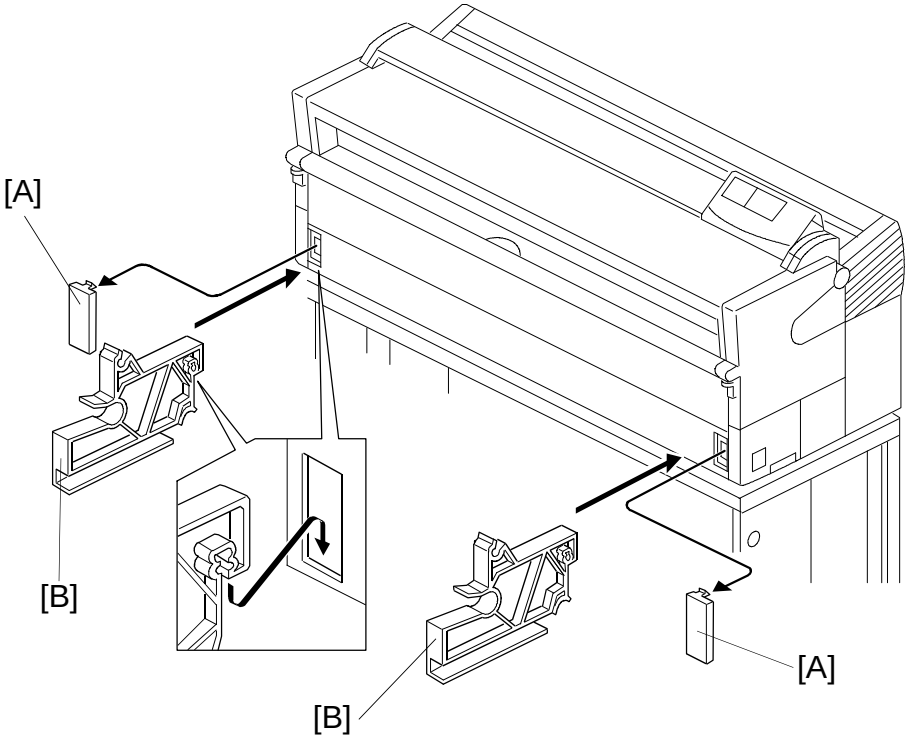
NOTE: To ensure grounding, paint has been removed from the surfaces around the screw holes [A] (only from the surfaces where the two components meet) and from the surface around the screw hole [B] at the inside of the left plate.

1. Temporarily install the top plate [C], left [D], and right side plate [E] (6 screws).
2. Turn the table up-side down in the direction of A.
3. Install the middle plate [F] and rear cover [G] (4 screws each).
4. Tighten all the screws until the spring washers [H] of screws are flattened.
5. Put the table the correction way up.

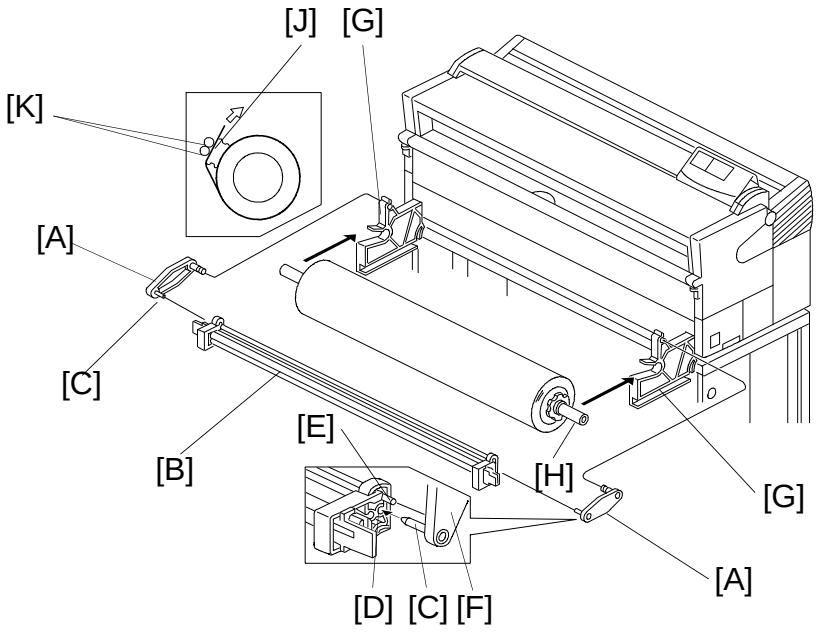
1.6 INSTALLATION PROCEDURE : ROLL CUTTING RAIL (A570)

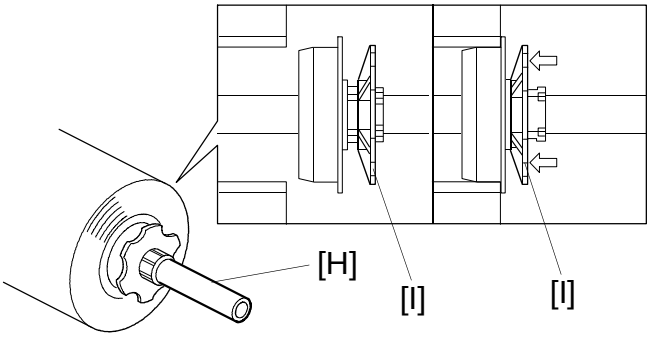
Check the accessories and their quantities according to the following list:

Cutter Guide ..... 1 pc
Cutter Knife ..... 1 pc
Roll Paper Arm ..... 2 pcs
Roll Paper Shaft ..... 1 pc
Roll Shaft Holder ..... 2 pcs
Roll Flange ..... 2 pcs



1. Remove the small caps [A] from the lower front cover.
2. Attach the roll shaft holders [B] as shown.





3. Attach the roll paper arms [A] to the cutter guide [B]. (Install each arm pin [C] into each cutter guide hole [D]. Position the cutter guide pin [E] in the lower slot of the roll paper arm [F].)
4. Install the cutter guide on the roll shaft holder [G].
5. Slide the roll paper shaft [H] into the roll paper.
6. Fit the roll flanges [I] onto the roll paper shaft (both ends).
7. Push the roll flanges [I] inside to fix the roll paper position.
8. Set the roll paper shaft on the roll shaft holder.
9. Set the paper between the cutter guide stay [J] and slide shafts [K].
10. Check the roll cutting rail operation.

SECTION 4

SERVICE TABLES

1. PREVENTIVE MAINTENANCE SCHEDULE

1.1 PM TABLE

Symbol key: I=Inspect L=Lubricate R=Replace A=Adjust C=Clean

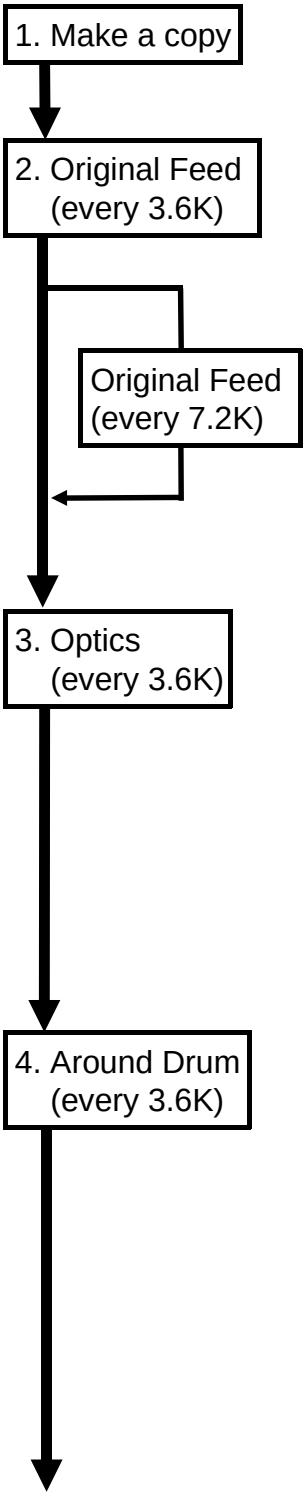
		EM	2.1KM (3.6K)	4.3KM (7.2K)	6.4KM (10.8K)	8.6KM (14.4K)	10.8KM (18K)	Notes
		( ) A1 sideways/D size						
A. Original Feed								
1	First original feed roller			C		C		Alcohol
2	Second original feed roller			C		C		Alcohol
3	1st and 2nd press rollers		I	C	I	C	I	Alcohol
4	Original table		C	C	C	C	C	Alcohol
B. Optics								
1	Fiber optics array							Clean with lens paper if necessary
2	Exposure lamp							Clean using water if necessary
3	Exposure glass	C	C	C	C	C	C	Water or alcohol
4	Reflection plate	C	C	C	C	C	C	Alcohol
C. Development								
1	Developer							Replace at 20K (A1 sideways/ D size)
2	Cartridge holder							Clean using a dry cloth if necessary
3	Entrance seal							Clean using a dry cloth if necessary
4	Development filter							Clean at 60K (A1 sideways/ D size)
D. Around drum								
1	Corona wires		C	C	C	C	R	Dry cloth
2	Grid wires		C	C	C	C	C	Dry cloth
3	Charge corona end blocks and casing			C		C		Dry cloth

Service Tables

		EM	2.1KM (3.6K)	4.3KM (7.2K)	6.4KM (10.8K)	8.6KM (14.4K)	10.8KM (18K)	Notes
		( ) A1 sideways/D size						
4	Pre-transfer lamp	C						Clean using blower brush if necessary
5	T/S corona wires		C	C	C	C	R	Dry cloth
6	T/S corona end blocks and casing		C	C	C	C	C	Dry cloth
7	Pick-off pawls		C	C	C	C	C	Dry cloth
8	Quenching Lamp	C						Clean using blower brush if necessary
E. Cleaning								
1	Cleaning blade		I	I	I	I	I	Replace at 20K (A1 sideways/ D size)
2	Cleaning seal		I	I	I	I	I	Replace if damaged
3	Toner tank		I	I	I	I	I	Empty used toner
F. Paper Feed								
1	Registration roller		C	C	C	C	C	Water
2	Paper feed guide plate		C	C	C	C	C	Water
3	Manual feed table		C	C	C	C	C	Water
G. Fusing								
1	Hot roller							Replace at 48K (A1 sideways/ D size)
2	Pressure roller							Replace at 60K (A1 sideways/ D size)
3	Thermistors				C			Clean using suitable solvent
4	Hot roller strippers				C			Clean using suitable solvent

		EM	2.1KM (3.6K)	4.3KM (7.2K)	6.4KM (10.8K)	8.6KM (14.4K)	10.8KM (18K)	Notes
		( ) A1 sideways/D size						
5	Pressure roller stripper		C	C	C	C	C	Clean using suitable solvent
6	Entrance guide plate							Clean using suitable solvent if necessary
7	Exit turn guide		C	C	C	C	C	Clean using alcohol
8	Exit guide plate							Clean using suitable solvent if necessary
Others								
1	Chain		I	I	I	I	I	Lubricate with G501 if necessary
2	Gears		I	I	I	I	I	Lubricate with G501 if necessary
3	Ozone filter		R	R	R	R	R	
F. Roll Feeder								
1	Feed Roller		C	C	C	C	C	Alcohol

1.2 REGULAR PM PROCEDURE



Make a copy of OS-A1 chart.

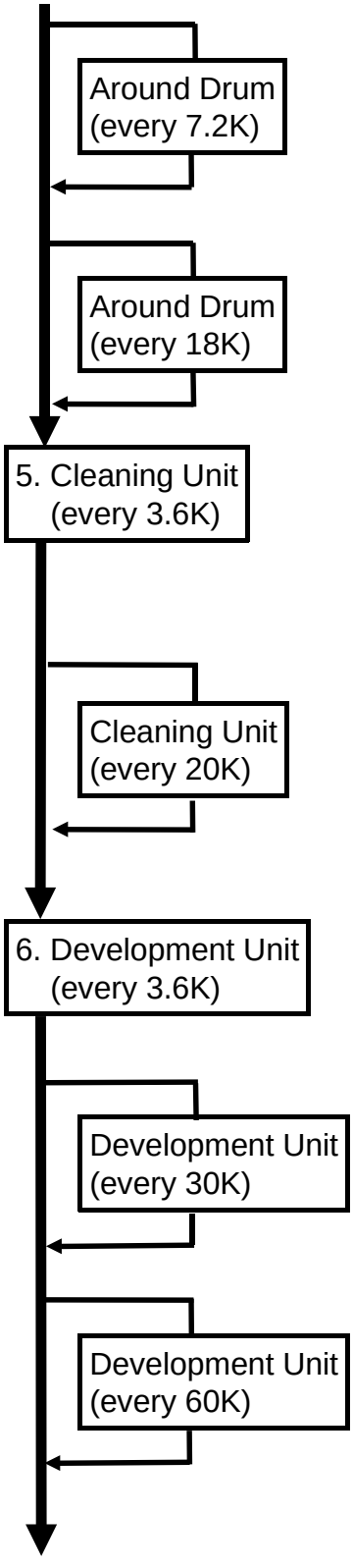
Clean the original table using alcohol.
Inspect the 1st and 2nd press rollers. If they are dirty, clean them using alcohol.

1. Clean the first and second original feed rollers using alcohol.
2. Clean the first and second press rollers using alcohol.

1. Clean the reflection plate using alcohol.
2. Clean the exposure glass using water.
3. Clean the exposure lamp using water if necessary.
4. Clean the fiber optics array using lens paper if necessary.

NOTE: After removing the drum, wrap it in clear sheets of paper to protect it.

1. Clean the charge corona wire, T& S corona wires and grid wires using a dry cloth. (Do not expand the corona wires.)
2. Clean the T/S corona end blocks, casing using a dry cloth.
3. Clean the pick-off pawls using a dry cloth.
4. Clean the pre-transfer lamp if it is dirty.
5. Clean the quenching lamp if it is dirty.



Clean the charge corona end blocks and casing.

Replace the charge corona wires and T/S corona wires.

1. Inspect the cleaning blade. Replace it, if it is damaged.
2. Inspect the cleaning seal. Replace it, if it is damaged.

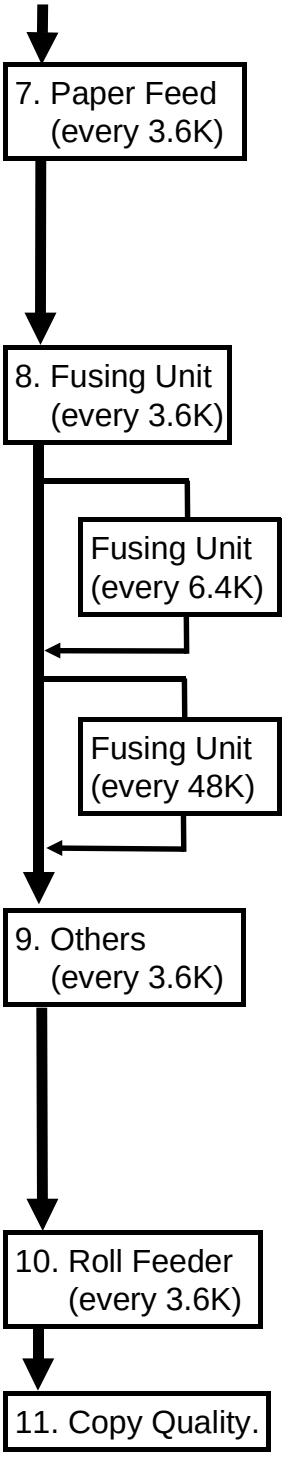
Replace the cleaning blade.

1. Clean the cartridge holder using a dry cloth if it is dirty.
2. Clean the entrance seal using a dry cloth if it is dirty.

Replace the developer.

Clean the development filter.

Service Tables



1. Clean the registration roller using water.
2. Clean the paper feed guide plates using water.
3. Clean the manual table using water.

Clean the small separation rollers using suitable solvent.

1. Clean the fusing thermistors using suitable solvent.
2. Clean the hot roller strippers using suitable solvent.

Replace the hot roller.

1. Inspect the drive chain. Lubricate using G501 if necessary.
2. Inspect the drive gears. Lubricate using G501 if necessary.
3. Replace the ozone filter.

1. Clean the feed roller using alcohol.

1. Check the copy quality.
2. Perform the light sensor adjustment.

2. SERVICE TABLES

2.1 TEST POINTS

Main Board

Number	Function
TP101	V_{AA} (+24V)
TP102	Vcc (+5V)
TP103	GND
TP104	Toner density sensor (CN104-A10)
TP105	Light sensor output (CN104-B1)

Charge/Bias/Grid Power Pack

Number	Function
TP1	Development Bias Voltage
TP2	Grid Voltage

2.2 VARIABLE RESISTORS

Charge/Bias/Grid Power Pack

Number	Function
VR1	Charge Corona Voltage

Caution: VR1 should not be changed in the field. Charge corona can be adjusted using SP #–10.

T&S Power Pack

Number	Function
VRT	Transfer Corona Voltage
VRD (DC)	Separation Corona Voltage (DC)
VRD (AC)	Separation Corona Voltage (AC)

Caution: VRT, VRD (DC), and VRD (AC) should not be changed in the field. They can be adjusted using SP #–12 to –17.

3. SERVICE TOOLS

3.1 SERVICE PROGRAM MODE

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

3.1.1 Service Program Mode Access Procedure

How to access the SP mode for service representatives (All service program modes can be accessed with this procedure.)

Press the following keys in sequence.

[ ] → [+] → [−] → [C/⊘] → [C/⊘]

The second time that the [C/⊘] key is pressed, hold it down for more than 3 seconds (until the and indicators blink).

How to access the SP mode for customers and sales representatives (SP modes 1 to 35 are accessible by a customer with this procedure.)

Press [ ] key then hold down [C/⊘] key more than 3 seconds (until the and indicators blink).

How to leave the SP mode

Press the following keys in sequence

[ ] → [ ] → [ ]

or turn off the main switch.

NOTE: Each of the above procedure must be finished within 20 seconds.

How to select the program number

The program number can be selected by the [+] and [−] keys. The selected program number is displayed in the lead edge erase indicator (the two digit indicator beside the [■] mark).

To select the program number quickly, hold down [+] or [−] key.

How to change settings

1. Access the SP mode and select the program number.
2. Press the ▼ key to select the paper length indicator (the four digit indicator beside the mark).
3. The present setting is displayed in the paper length indicator.
4. Select the setting using the + and − keys, then press the # key to enter the selected setting.
5. Leave the SP mode.

How to read data

1. Access the SP mode and select the program number.
2. Press the ▼ key and select the paper length indicator (the four digit indicator beside the mark).
3. Press the # key, then the paper length indicator shows the data.
4. Press # key again to stop displaying the data.

3.1.2 Service Program Mode Table

1: A "*" before the mode number means that the mode can be accessed by custormers or sales representative.
2: In the data colum, the default value is printed in bold letters. The default settings for several items depend on the machine destination (refer to page 4-26.).

Mode No.		Function	Data
*1	Fusing Temperature 1 (Normal)	Selects the fusing temperature for plain paper.	0: Mode 1 1: Mode 2 **2: Mode 3** 3: Mode 4 4: Mode 5 5: Mode 6 6: Mode 7
*2	Fusing Temperature 2 (High)	Selects the fusing temperature for translucent paper.	**0: Mode 5** 1: Mode 6 2: Mode 7 3: Mode 8
*3	Fusing Temperature 3 (Low)	Selects the fusing temperature for translucent film.	0: Mode 2 **1: Mode 3** 2: Mode 4 3: Mode 5
*4	Copy Count Up/Down	Selects the copy count amount up or down.	0: Up 1: Down
*5	Beeper On/Off	Selects if the beeper sounds or not.	0: On 1: Off **2: Only when the edge margin or paper length is changed continuously, the beeper is off.**
*6	Paper Feed Out Waiting Time Setting	Selects the time to when the paper is automatically fed out after it has been set on the manual table, or after the Roll Feed Select key is pressed.	**0: 2 minutes** 1: 1 minute 2: 3 minutes 3: 4 minutes 4: 5 minutes
*7	Manual Feed Start Time Setting	Selects the time to when the registration roller starts rotating after the entrance sensor detects the paper leading edge.	**0: 2 seconds** 1: 0.7 second 2: 1 second 3: 3 seconds 4: 4 seconds 5: 5 seconds

Mode No.		Function	Data
*8	Leading Edge Increase/Decrease Speed Setting	To change the leading edge margin (print number) increase/decrease speed, the customer holds down the + or – key. Then, after a few 0.25 second intervals (See SP mode 12), the speed begins to change. SP mode 8 determines the rate of speed increase/decrease.	Count up/down at every: **0: 0.1 second** 1: 0.50 second 2: 0.25 second 3: 0.05 second 4: 0.02 second
*9	Auto Reset Time Setting	Selects the time to return to the initial setting.	**0: 2 minutes** 1: 1 minutes 2: 3 minutes 3: 4 minutes 4: 5 minutes 5: No auto reset
*10	Auto Energy Saver Mode	The machine goes into energy saver mode at auto reset time.	**0: No** 1: Auto Energy Saver Mode
*11	Screen Message Setting	Selects one of the options indicated on the display in the energy saver mode.	**0: None** 1: Pre-HEAt 2: HEllo i lovE yoU 3: 0 1 2 3 4 5 6 7 8 9 4: SLEEPinG 5: HAvE A Good dAy.
*12	Leading Edge Increase/Decrease Adjustment Preliminary Interval	The leading edge margin (print number, paper length) increase/decrease speed starts to change several 0.25 second intervals after the customer starts the adjustment procedure. This SP mode adjusts the number of 0.25 second intervals.	**0: 3 intervals** 1: 1 intervals 2: 2 intervals 3: 10 intervals
13 to 19	Not Used		
*20	Paper Length Count Up/Down Setting	Selects if the paper length is in count down or up when the preset cut key is pressed.	0: Down (Long → Short) 1: Up (Short → Long)
*21	Paper Length Up/Down Speed Setting	To change the paper length increase/decrease speed, the customer holds down the + or – key. Then, after a few 0.25 second intervals (See SP mode 12), the speed begins to change. SP mode 21 determines the rate of speed increase/decrease.	**0: 0.10 second** 1: 0.5 second 2: 0.25 second 3: 0.05 second 4: 0.02 second 5: 0.01 second
*22	Fixed Paper Size Pattern Setting	Selects the fixed paper size pattern chosen when the "Preset Cut" key is pressed.	Refer to page 4-25.
*23 to *32	Optional Paper Size Setting	Up to 10 different paper size can be stored from 23 to 32. If "19" is selected in SP No. 22, this data is used as fixed paper size when the "Preset Cut" key is pressed.	UdEF: Undefined

Mode No.		Function	Data
33 to 34	Not Used		
*35	All Indicators On	Turns on all the indicators on the operation panel when the Roll Feed Select key is pressed.	**0: No** 1: All indicators on
36	New Developer Initialization	Carries out the new developer initialization for 5 minutes. The machine counts down the remaining time on the display. After the initialization, the machine automatically adjusts the toner sensor output to 4.0 ± 0.1V. During the toner sensor adjustment, "Adj" is displayed. When the adjustment is completed, the machine automatically returns to normal operating mode.	If the initialization is canceled before returning to the normal operating mode, do it again from the beginning. If the machine fails to adjust the toner sensor output, "E=11" is indicated.
37	Not Used		
38	Release Fusing Unit Service Call	Recovers from the fusing unit SC condition. After it has been recovered, the machine returns to its initial (power on) condition.	**0: Release SC** 1: SC condition
39	Not Used		
40	Roll Feeder Identification	Identify the roll feeder installation.	**0: No** 1: Roll Feeder Installed
41	Roll Feeder Speed Setting (Factory Use)	To adjust the paper feed speed of the roll feeder.	**0: Standard** –50 ← **0** → 50 Faster Slower
42	Roll Feeder Cutting Length Adjustment (300 mm, Plain Paper)	To adjust the cutting length of 300 mm in the plain paper mode.	**0: Standard** –9.9 ← **0** → 9.9 mm Longer Shorter
43	Roll Feeder Cutting Length Adjustment (300 mm, Translucent Paper)	To adjust the cutting length of 300 mm in the translucent paper mode.	
44	Roll Feeder Cutting Length Adjustment (300 mm, translucent Film)	To adjust the cutting length of 300 mm in the translucent film mode.	

Mode No.		Function	Data
45	Roll Feeder Cutting Length Adjustment (1100 mm, Plain Paper)	To adjust the cutting length of 1100 mm in the plain paper mode.	**0: Standard** –50.0←**0**→ 50.0 mm Longer Shorter
46	Roll Feeder Cutting Length Adjustment (1100 mm, translucent Paper)	To adjust the cutting length of 1100 mm in the translucent paper mode.	
47	Roll Feeder Cutting Length Adjustment (1100 mm, Translucent Film)	To adjust the cutting length of 1100 mm in the translucent film mode.	
48	Not Used		
49	Main Motor Speed Adjustment	To change the main motor speed.	**0: Standard** –9 ← **0** → 11 Slower Faster If the main motor speed is incorrect, PJ56 or PJ57 will be indicated when a long copy is made. In these cases this adjustment is required.
50	Toner End Detection Setting	Determines the possible number of copies (when A1 paper is used) after the toner near end condition.	**0: 27 sheets** 1: 9 sheets 2: 18 sheets 3: 36 sheets
51	Used Toner	Determines the total copy length before the toner overflow indicator lights.	**0: 1220** 1: 610 2: 915 3: 1000 4: 1464 5: 1830 6: 2000 7: 2440 8: No overflow indication 9: 10m (Should be used for test)
52	Used Toner Counter	Indicates the copy length after clearing the used toner counter. This counter is automatically cleared if the clear mode key is pressed after turning off and on the main switch in the full toner condition.	tF=XX,XXX (Beeper)

Mode No.		Function	Data
53	Used Toner Counter Clear	Clear used toner counter.	**0: Full toner condition is not detected** 1: Full toner condition is detected. To clear the counter, input "0" even if "0" is already indicated.
54	Developer Warm-up Setting	Determines the warm-up time to increase the Q/M of the developer. This warm-up is done if the fusing temperature is lower than 60°C when the main switch is turned on.	**0: 1 minute** 1: 2 minute 2: 3 minute 3: None
55	Paper Length Limit Setting	Determines the maximum paper length. **Note:** If paper longer than 2000 mm is used, skew copy, poor fusing, crease copy original damage might occur.	(In mm mode) **0: 2000 mm** 1: 3600 mm 2: 5200 mm 3: 6800 mm 4: 8400 mm 5: 9999 mm (In inch mode) **0: 80.0 inch** 1: 160.0 inch 2: 240.0 inch 3: 320.0 inch 4: 400.0 inch 5: 480.0 inch
56	Copy Number Limit Setting	Determines the maximum copy number.	**0: 99 sheets** 1: 10 sheets 2: 20 sheets 3: 30 sheets 4: 40 sheets 5: 50 sheets 6: 67 sheets 7: 70 sheets 8: 80 sheets 9: 90 sheets
57 to 58	Not Used		
59	Misfeed Special Recovery Mode	While the Emergency Stop key is held down, the main motor and the registration clutch are energized.	**0: No** 1: Misfeed Special Recovery Mode
60	Fixed Paper Length Special Mode	Each time +/– key is pressed while holding the Preset Cut key down, the length selected in SP mode 61 is increased/reduced from the preset paper size.	**0: Normal** 1: Fixed Paper Length Special Mode

Mode No.		Function	Data
61	Fixed Paper Length Special Mode	Selects the interval of each step for SP60.	(In mm mode) **0: 100 mm** 1: 50 mm 2: 60 mm 3: 120 mm 4: 200 mm 5: 240 mm 6: 250 mm 7: 500 mm 8: 600 mm (In inch mode) **0: 10.0 inch** 1: 5.0 inch 2: 6.0 inch 3: 12.0 inch 4: 20.0 inch 5: 24.0 inch 6: 25.0 inch 7: 50.0 inch 8: 60.0 inch
62	Special Toner Supply Mode	In the energy saver mode, 10% toner supply is done while the "Emergency Stop" key is pressed. Toner sensor voltage is displayed on the "Paper Length" indicator. If the voltage is lower than 1V, toner is not supplied.	**0: No** 1: Special Toner Supply Mode
63	Not Used		
64	SP Mode Display Speed Setting	Selects the indication speed on the display.	**0: 300 ms/letter** 1: 100 ms/letter 2: 200 ms/letter 3: 400 ms/letter 4: 500 ms/letter
65	ROM Version Display	Indicates the ROM version.	Example: vEr_1994_06_06_01 Year / Date / Month / Internal Use Only
66	RAM Abnormal Condition Check	Displays the total number of abnormal conditions of the back-up RAM.	A number is added if an abnormal RAM condition is detected when the machine is powered on.
67 to 69	Not Used		

Mode No.		Function	Data
70 to 75	Total Copy Length/Number Display	Displays the total copy length/number according to the following units. SP70 = Yard SP71 = meter SP72 = 100 inches SP73 = 50 inches SP74 = A1 length (594 mm) SP75 = sheet (any size)	SP70: t0 = XXX,XXX SP71: t1=XXX,XXX SP72: t2=XXX,XXX SP73: t3=XXX,XXX SP74: t4=XXX,XXX SP75: t5=XXX,XXX
76	OPC Counter	Displays the total length of copied paper after the OPC drum is installed.	do = XX,XXX This counter should be cleared when the OPC drum is replaced. (SP #–1)
77	Developer Counter Display	Displays the total length [m] of copied paper after the new developer is poured.	dE = XX,XXX This counter is automatically cleared when the new developer initialization is done.
78	Toner Counter Display	Displays the total length of copied paper [m] after a new toner cartridge is installed.	dt = XX,XXX This counter is automatically cleared when the new toner cartridge is installed.
79	Toner Supply Level Indication	Indicates the present toner sensor level.	dL = ab – – c a: Toner density setting n, H, L b: TS level 0 ~ 5 c: Copy number step 0: ~30m 1: ~60m 3: ~90m 4: ~120m 5: ~150m 6: 150m ~
80 to 85	Number of Misfeeds by Location	Displays the total number of paper misfeeds by location. Misfeed location codes displayed in each SP number are as follows: SP80: Jt, J90, J98, J99 SP81: J01, J02, J03, J04 SP82: J20, J21, J22, J23 SP83: J30, J31, J32 SP84: J40, J41, J42, J43 SP85: J56, J57, J58, J59	J❑ = XXX Jt = Total Jam

Mode No.		Function	Data
86	Misfeed Record Display	Displays the locations of the last five misfeeds one after the other.	J1 = XX (Last jam) ↓ J2 = XX (1 before the last jam) ↓ J3 = XX (2 before the last jam) ↓ J4 = XX (3 before the last jam) ↓ J5 = XX (4 before the last jam) ↓ Beeper (XX = Jam Location)
87 to 89	Not Used		
90 to 92	Number of Service Calls by Location	Displays the total number of service calls (SC) by location. SC codes displayed in each SP number are as follows: SP90: Et, E1, E9, E10, E11 SP91: E2, E3, E4, E5 SP92: E6, E7, E8	E❑ = XXX Et = Total SCs
93	Service Call Records	Displays the last five service calls one after the other.	E1 = XX (The last error code) ↓ E2 = XX (1 before the last error code) ↓ E3 = XX (2 before the last error code) ↓ E4 = XX (3 before the last error code) ↓ E5 = XX (4 before the last error code) ↓ Beeper (XX= Error Code)
94 to 99	Not Used		

Mode No.		Function	Data
–1	RAM Clear	Clears selected data items form the RAM. To clear the memory, input the number of the item you want to delete, then press the [#] key. **Note:** If all the memory is cleared (if a number from 20 to 28 is selected), reinput the factory settings that are shown on the decal attached inside the upper right cover. Please refer to page 4-26 to know the default settings for each destination. (When No. 10 to 26 is selected.)	0: Not Used 1: Copy Number Counter (The memory for SP75) 2: Copy Length Counter (SP70 to 74) 3: OPC Counter (SP76) 4: Developer Counter (SP77)**(*Note1)** 5: Toner Counter (SP78) 6: Counter for toner density step.**(*Note2)** 7: Clear data No.1 to 9 and 53. 8: SC Counter (SP90 to 93) 9: Jam Counter (SP80 to 86) 10: Change the settings to the Japan version

***Note: 1**
This counter is not used for the toner density step control (described on page 2-16).
***Note: 2**
For the toner density step control, this counter counts down from 150 (m) to 0 (m) after the developer initialization. When the developer initialization is done, this counter to 150 and after 150m of copies, the counter stays at 0. If this counter is cleared, the counter is set to 0.

Mode No.		Function	Data
–1			11: Change the setting to the U.S.A. version 12: Change the setting to the Europe version 13: Change the setting to the Asia version 14: Charge the settings to the Hoechst version 15: Change the settings to the Regma version 16: Change the settings to the K+E version 17: Factory use 18: Not Used 19: Not Used 20: Clear all the memories and change the setting to the Japanese version 21: Clear all the memories and change the setting to the U.S.A version 22: Clear all the memories and change the setting to the Europe version 23: Clear all the memories and change the setting to the Asia version 24: Clear all the memories and change the setting to the Hoechst version 25: Clear all the memories and change the setting to the Regma version

Mode No.		Function	Data
–1			26: Clear all the memories and change the setting to the K+E version 27: Factory use 28: Clear all the memories
–2	Total Counter Unit Setting	Selects the unit in which the total counter counts up by.	0: 1 yard 1: 1 m 2: 100 inches 3: 50 inches 4: A1 length (594 mm) 5. Sheet (Any size)
–3	Inch/mm Exchange	Selects the unit in which the edge margin and paper length is indicated by.	0: mm 1: Inch
–4	Not Used		
–5	Registration Adjustment	Adjusts the paper registration.	**0: Standard** –9.9 ← **0** → 9.9 mm Advance Delay
–6	Light Sensor Adjustment	Change the light sensor setting. Turn on and off the exposure lamp using the Copy Media key. Tracing paper: ON Film: OFF	**50: Standard** 0 ← **50** → 99 Darker Lighter
–7	Hot Roller Temperature Adjustment	Change the hot roller temperature setting.	**0: Standard** –9 ← **0** → 9°C Decrease Increase
–8	Pressure Roller Temperature Adjustment	Change the pressure roller temperature setting.	**0: Standard** –9 ← **0** → 9°C Decrease Increase
–9	Hot Roller/ Pressure Roller Temperature Display	Displays the hot roller temperature and pressure roller temperature. Even if the SP mode is canceled when the temperature is displayed, the temperature is continuously displayed during stand-by condition or copy cycle. To release this condition, turn the main switch off and on.	Fu = XXX Pr = XXX Fu: Hot roller temperature Pr: Pressure roller temperature If the hot roller temperature is lower than 100°C (pressure roller temperature is lower than 50°C), "LLL" is indicated. If the hot roller temperature is higher than 210°C (pressure roller temperature is higher than 180°C), "HHH" is indicated.

Mode No.		Function	Data
–10	Drum Charge Setting	Determines the drum charge voltage. In this mode, the charge corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**200**: Standard 150 ← **200** → 249 Low High
–11	Copy Grid Setting	Determines the copy grid voltage. In this mode, the grid voltage can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**9: Standard** 0 ← **9** → 15 Low High
–12	Transfer Corona Voltage Setting	Determines the transfer corona voltage. In this mode, the transfer corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**80: Standard** 40 ← **80** → 120 Low High
–13	Transfer Voltage at Paper Trailing Edge Setting	Determines the transfer corona voltage at the paper trailing edge. In this mode, the transfer corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**120**: Standard 40 ← **120** → 249 Low High
–14	Separation AC Voltage Setting	Determines the AC separation corona voltage. In this mode, the separation corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**170: Standard** 130 ← **170** → 220 Low High
–15	Separation AC Voltage at the Paper Leading Edge Setting	Determines the AC separation corona voltage at the paper leading edge. In this mode, the separation corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**190: Standard** 130 ← **190** → 220 Low High
–16	Separation DC Voltage Setting	Determines the DC separation corona voltage. In this mode, the separation corona can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**200: Standard** 0 ← **200** → 249 Low High

<table>
<tr><th colspan="2">Mode No.</th><th>Function</th><th>Data</th></tr>
<tr><td>–17</td><td>Separation DC Voltage at the Paper Leading Edge Setting</td><td>Determines the DC separation corona voltage at the paper leading edge.
In this mode, the separation corona can be turned on and off using the Copy Media key.
Translucent paper = ON
Translucent Film = OFF</td><td>200: Standard
0 ← 200 → 249
Low High</td></tr>
<tr><td>–18 to –19</td><td>Not Used</td><td></td><td></td></tr>
<tr><td>–20</td><td>Bias Voltage for the Image Area Setting</td><td>Determines the development bias voltage for the image area.
In this mode, the bias voltage can be turned on and off using the Copy Media key.
Translucent paper = ON
Translucent Film = OFF</td><td>3: Standard
0 ← 3 → 8
Low High</td></tr>
<tr><td>–21</td><td>Bias Voltage for Non-image Area Setting</td><td>Determines the development bias voltage for the non-image area.
In this mode, the bias voltage can be turned on and off using the Copy Media key.
Translucent paper = ON
Translucent Film = OFF</td><td>4: Standard
0 ← 4 → 8
Low High</td></tr>
<tr><td>–22</td><td>Toner Density Setting</td><td>Selects the toner density setting. The toner density changes according to the copy length after the developer is replaced.
<table>
<tr><th>Copy length (A1 size)</th><th>Std.</th><th>Low</th><th>High</th></tr>
<tr><td>~ 30 m (~50 sheets)</td><td>4.25V</td><td>4.35V</td><td>4.00V</td></tr>
<tr><td>~ 60 m (~100 sheets)</td><td>4.00V</td><td>4.30V</td><td>3.50V</td></tr>
<tr><td>~ 90 m (~150 sheets)</td><td>3.50V</td><td>4.25V</td><td>3.00V</td></tr>
<tr><td>~ 120 m (~200 sheets)</td><td>3.00V</td><td>3.75V</td><td>2.50V</td></tr>
<tr><td>~ 150 m (~250 sheets)</td><td>2.50V</td><td>3.25V</td><td>2.00V</td></tr>
<tr><td>150 m ~ (251 sheets ~)</td><td>2.00V</td><td>2.75V</td><td>1.50V</td></tr>
</table></td><td>0: Standard
1: Low
2: High</td></tr>
<tr><td>23 to 24</td><td>Not Used</td><td></td><td></td></tr>
</table>

Mode No.		Function	Data
–30	Toner Density Sensor Voltage Setting	Changes the toner density sensor voltage. Normally, the value is automatically adjusted when the new developer initialization (SP36) is done. In this mode, PTL, main motor, QL and the bias voltage for non-image area can be turned or and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF	**80: Standard** 50 ← **80** → 120 Low High
–31	Toner Sensor Voltage Display (Last Copy)	Displays the toner sensor output voltage for the last copy.	A = X,XX (Beeper)
–32	Toner Sensor Voltage Display (Real Time)	Displays the real time toner sensor output voltage. In this mode, the PTL, main motor, QL and the bias voltage for non-image areas can be turned on and off using the Copy Media key. Translucent paper = ON Translucent Film = OFF Even if the SP mode is canceled when the voltage is displayed, the voltage is displayed during the stand-by condition or copy cycling (the toner sensor output voltage, paper length and copy counter are displayed one after the other). To release this condition, turn the main switch off and on.	A = X,XX A = Toner Sensor Voltage During the stand-by condition, and copy cycling the following data is displayed. A=X,XX ↓ LE=X,XXX ↓ CO=XX ↓ (Beeper) LE = Paper Length (ex. 297 mm: LE=0.297 12 inch: LE=0.120) CO=Copy counter
–33 to –44	Not Used		
–50	Forced Ready Condition (Factory Use)	Goes to "Ready" condition ignoring the fusing temperature. This mode cannot be used during the development idling.	**0: Normal** 1: Forced Ready Condition
–51	Lamp Off Mode	Fluorescent lamp does not turn on during the copy cycle.	**0: Normal** 1: Lamp off
–52	No Misfeed Detection Mode	Ignores jam detections except for initial jams. The setting automatically returns to "0" when the main switch is turned off.	**0: Normal** 1: No Misfeed Detection

Mode No.		Function	Data
–53	Free Run Mode	The machine caries out copy operation without an original. This mode can be used if the optional roll feeder is installed and selected paper length is more than 594mm. The machine starts operation when the roll feed select key is pressed, and stops when the Emergency Stop key is pressed.	**0: Normal** 1: Next Paper is fed when the fusing exit sensor is deactivated. 2~250: Next paper is fed (X-1) seconds after the fusing exit sensor is deactivated. X = Input Number
–54 to –59	Not Used		
–60	Fluorescent Lamp Abnormal Time Check 1	Counts the time when the exposure sensor is more than 1 V higher than the target value.	0~250: The total time (seconds) that the lamp voltage is more than 1 volt higher than the target value.
–61	Fluorescent Lamp Abnormal Time Check 2	Counts the time when the fluorescent lamp is in full power during the copy cycle.	0~250: The total time (seconds) that the fluorescent lamp is at full power.
–62	Not Used		
–63	Factory Use Only		
–64	Manual Feed Attention Mode 1	Beeper sounds if a sheet is set on the manual feed table before the "Set Paper" indicator lights.	**0: NO** 1: Manual Feed Attention Mode 1
–65	Manual Feed Attention Mode 2	Beeper sounds when the manual table is ready to accept the next sheet.	**0: NO** 1: Manual Feed Attention Mode 2
–66	Partial copy Leading Edge Margin	Enable to make "+" margin in the partial copy mode, ("–" margin cannot be made.)	**0: NO** 1: "+" margin can be made in the part copy mode
–67	Toner Full Supply Mode	In the Special Toner Supply mode (SP62), if the "clear/stop" key is pressed while the "Emergency Stop" key is pressed, 100%, toner supply is done.	**0: NO** 1: Toner Full Supply Mode
–68	Combine Originals Mode	Normally the copy process stops at the trailing edge of paper or original which ever comes first. If this mode is selected, copy process continues to the paper trailing edge even if the original trailing edge comes first. Using this mode, several originals can be combined on copy sheet.	**0: Normal** 1: Combine Originals Mode

Fixed Paper Size Pattern Data (SP No.22)

In mm Mode	
0:	1189, 841, 594, 420, 297
1:	2000, 1189, 841, 594, 420, 297, 245
2:	2000, 1900, 1800, 1700, 1600, 1500, 1400, 1300, 1200, 1100, 1000, 900, 800, 700, 600, 500, 400, 300, 245
3:	2000, 1900, 1800, 1700, 1600, 1500, 1400, 1300, 1200, 1189, 841, 594, 420, 297, 245
4:	2000, 1800, 1456, 1189, 1030, 841, 728, 594, 515, 420, 364, 297, 245
5:	2000, 1500, 1230, 880, 625, 450, 330, 245
6:	1456, 1030, 728, 515, 364, 257
7:	2000, 1456, 1030, 728 515, 364, 257, 245
8:	2000, 1500, 1189, 1100, 841, 594, 420, 300, 297, 245
9:	2000, 1456, 1200, 1189, 1091, 1085, 1030, 1016, 1000, 939, 900, 880, 841, 813, 788, 765, 762, 758, 728, 679, 636, 625, 594, 591,546, 515, 508, 420,364, 297, 257
10:	2000, 1800, 1600, 1400, 1200, 1000, 800, 600, 400, 245
11:	2000, 1750, 1500, 1250, 1000, 750, 500, 245
12:	2000, 1950, 1900, 1850, 1800, 1750, 1700, 1650, 1600, 1550, 1500, 1450, 1400, 1350, 1300, 1250, 1200, 1150, 1100, 1050, 1000, 950, 900, 850, 800, 750, 700, 650, 600, 550, 500, 450, 400, 350, 300, 245
13:	2000, 1800, 1500, 1189, 1100, 1050, 1000, 950, 900, 841, 800, 750, 700, 650, 594, 550, 500, 420, 297, 245
14:	2000, 1800, 1456, 1200, 1189, 1085, 1030, 900, 880, 841, 765, 728, 625, 594, 515, 420, 364, 297, 245
15:	2000, 1800, 1500, 1200, 1189, 594, 245
16:	2000, 1800, 1500, 1200, 1000, 841, 420, 245
17:	2000, 1800, 1500, 1220, 1189, 915, 841, 610, 594, 458, 420, 305, 297, 245
18:	2000, 1800, 1500, 1189, 1118, 864, 841, 594, 559, 432, 420, 297, 280, 245
19:	The data stored in SP23 to 32
In inch Mode	
0:	48.0, 36.0, 24.0, 18.0, 12.0
1:	44.0, 34.0, 22.0, 17.0, 11.0
2:	80.0, 72.0, 64.0, 48.0, 36.0, 24.0, 18.0, 12.0, 9.6
3:	80.0, 72.0, 64.0, 44.0, 34.0, 22.0, 17.0, 11.0, 9.6
4:	80.0, 72.0, 64.0, 48.0, 44.0, 36.0, 34.0, 24.0, 22.0, 18.0, 17.0, 12.0, 11.0, 9.6
5:	80.0, 70.0, 60.0, 50.0, 40.0, 30.0, 20.0, 10.0, 9.6
6:	80.0, 75.0, 70.0, 65.0, 60.0, 55.0, 50.0, 45.0, 40.0, 35.0, 30.0, 25.0, 20.0, 15.0, 10.0, 9.6
7:	80.0, 75.0, 70.0, 65.0, 60.0, 55.0, 50.0, 48.0, 36.0, 24.0, 18.0, 12.0, 9.6
8:	80.0, 75.0, 70.0, 65.0, 60.0, 55.0, 50.0, 44.0, 34.0, 22.0, 17.0, 11.0, 9.6
9:	80.0, 75.0, 70.0, 65.0, 60.0, 55.0, 50.0, 48.0, 44.0, 36.0, 34.0, 24.0, 22.0, 18.0, 17.0, 12.0, 11.0, 9.6
10:	80.0, 77.5, 75.0, 72.5, 70.0, 67.5, 65.0, 62.5, 60.0, 57.5, 55.0, 52.5, 50.0, 47.5, 45.0, 42.5, 40.0, 37.5, 35.0, 32.5, 30.0, 27.5, 25.0, 22.5, 20.0, 17.5, 15.0, 12.5, 10.0, 9.6
11:	80.0, 77.5, 75.0, 72.5, 70.0, 67.5, 65.0, 62.5, 60.0, 57.5, 55.0, 52.5, 50.0, 48.0, 36.0, 34.0, 24.0, 22.0, 18.0, 17.0, 12.0, 11.0, 9.6

12:	80.0, 77.5, 75.0, 72.5, 70.0, 67.5, 65.0, 62.5, 60.0, 57.5, 55.0, 52.5, 50.0, 48.0, 36.0, 24.0, 18.0, 12.0, 9.6
13:	80.0, 77.5, 75.0, 72.5, 70.0, 67.5, 65.0, 62.5, 60.0, 57.5, 55.0, 52.5, 50.0, 44.0, 34.0, 22.0, 17.0, 11.0, 9.6
14:	80.0, 78.0, 76.0, 74.0, 72.0, 70.0, 68.0, 66.0, 64.0, 62.0, 60.0, 58.0, 56.0, 54.0, 52.0, 50.0, 48.0, 46.0, 44.0, 42.0, 40.0, 38.0, 36.0, 34.0, 32.0, 30.0, 28.0, 26.0, 24.0, 22.0, 20.0, 18.0, 16.0, 14.0, 12.0, 10.0, 9,6
15:	80.0, 72.0, 60.0, 48.0, 36.0, 24.0, 12.0, 9.6
16:	80.0, 78.0, 72.0, 66.0, 60.0, 50.0, 54.0, 48.0, 42.0, 36.0, 30.0, 24.0, 18.0, 12.0, 9.6
17:	80.0, 78.0, 75.0, 72.0, 69.0, 66.0, 63.0, 60.0, 57.0, 54.0, 51.0, 48.0, 45.0, 42.0, 39.0, 36.0, 33.0, 30.0, 27.0, 24.0, 21.0, 18.0, 15.0, 12.0, 9.6
18:	80.0, 72.0, 64.0, 57.3, 48.0, 46.8, 40.6, 36.0, 34.0, 33.1, 28.7, 24.0, 23.4, 22.0, 20.3, 18.0, 17.0, 16.6, 14.4, 12.0, 11.7, 11.0, 10.1, 9.6
19:	The data stored in SP23 to 32

Default Settings for Each Destination (SP #–1)

SP. No.	Japan	U.S.A.	Europe	Asia	Hoechst	Regma	K + E
#1	1	2	2	2	2	2	2
#2	0	0	0	0	0	0	0
#3	1	1	1	1	1	1	1
#4	0	0	0	0	0	1	0
#5	2	2	2	2	2	2	2
#6	0	0	0	0	0	0	0
#8	0	0	0	0	0	0	0
#9	0	0	0	0	0	0	0
#10	0	0	0	0	0	0	0
#20	0	1	0	0	0	0	1
#21	0	0	0	0	0	0	0
#22	0	0	0	0	0	0	0
#–2	1	5	1	1	1	1	5
#–3	0	1	0	0	0	0	1

3.2 INPUT/OUTPUT CHECK MODE

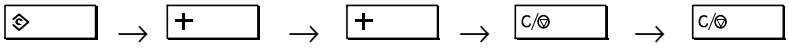
The input check mode allows you to check the current status of electrical components (such as sensors, switches, etc.) from the operation panel.

The output check mode allows you to turn the individual electrical components (such as motors, solenoids, etc.) ON/OFF from the operation panel.

3.2.1 INPUT/OUTPUT CHECK MODE ACCESS PROCEDURE

How to access the output check mode

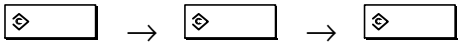
Press the following keys in sequence.



The second time that the C/⊘ key is pressed, hold it down for more than 3 seconds (until the and indicators blink).

How to leave the input/output check mode

Press the following keys in sequence.



or turn off the main switch.

NOTE: Each of the above procedures must be finished within 20 seconds.

How to select the program number

The program number can be selected by pressing the + and − keys.

To select an input check mode, press the − key.

To select an output check mode, press the + key.

The selected number is displayed on the lead edge erase indicator (the two digit indicator beside the ■ mark).

To select the program number quickly, hold down the + or − key.

3.2.2 INPUT CHECK MODE TABLE

The on/off status of the selected electrical component is displayed on the paper length indicator ("ON" or "OFF" is displayed.). If a program number not used is selected, "NOT" is displayed.

Program No.	Sensor/Switch /Signal
–1	Registration Sensor
–2	Exit Sensor
–3	Original Registration Sensor
–4	Entrance Sensor
–5	Main Motor LOC Signal (Status is "ON" when the main motor is normally rotating.)
–6	Door Switch (Status is "ON" when the door is open.)
–7 to –9	Not Used
–8	R/F Leading Edge Sensor
–11	Roll Feeder Door Switch
–12	Right Cutter Switch
–13	Left Cutter Switch
–14	Paper End Sensor

3.2.3 OUTPUT CHECK MODE TABLE

Press the key to turn on the selected electrical component. The status of the component is displayed on the paper length indicator.

To turn off the component, press the key again.

Program No.	Electrical Component
0	Main Motor
1	Toner Supply Clutch
2	Pick off solenoid
3	Registration Clutch
4	Total Counter
5	Pre-transfer Lamp
6	Quenching Lamp
7	Fusing Lamp
8	Exposure Lamp (100% duty ratio)
9	Exposure Lamp (selected ID level)
10	Main Charge Corona
11	Grid Voltage
12	Transfer Charge Corona
13	Not Used
14	Separation Charge Corona
15 to 19	Not Used
20	Bias Voltage for the Image Area
21	Bias Voltage for the Non-image Area
22	Main Charge Corona + Grid Voltage
23	Main Motor + PTL + Bias Voltage for the Non-image Area + Quenching Lamp
24 to 25	Not Used
26	Roll Feeder Dehumidity Heaters
27	Roll Feeder Cutter Motor ***Note**
28	Roller Feeder Paper Feed Motor

NOTE: The cutter unit continuously moves between the left and right cutter switches. The number of the movement (0~9999) is displayed on the paper length indicator.

3.3 POWER ON INITIAL SETTING MODE

The initial setting, when the main switch is tuned on, can be changed in this mode. The procedure is as follows:

1. Turn on the main switch while holding the Emergencey stop key down  and  indicators blink).
2. Input the operation panel setting that the customer requires (paper size, image density, etc.).
3. Turn off the main switch.

The setting, just before the main switch is turned off, is memorized as the power on initial setting. It appears again when the main switch is turned on.

4. JAM CODE LIST

When a document (original) jam or paper jam occurs, the cause of the jam is displayed by using the following jam code.

4.1 ACCESS PROCEDURE

1. When a document jam or paper jam occurs, press and hold the Clear/Stop key.
2. Read the jam code.

4.2 JAM CODE TABLE

Code	Cause of Jam	SP Mode No.
PJ01	Initial misfeed at the registration sensor.	SP81 (Initial Jams)
PJ02	Initial misfeed at the exit sensor.	
PJ03	Initial misfeed at the original registration sensor.	
PJ04	Initial misfeed at the entrance sensor.	
PJ05	Initial misfeed at the leading edge sensor of the roll feeder.	
PJ20	Registration sensor OFF check at the paper leading edge.	SP82 (Manual Feed and Registration Jams)
PJ21	Registration sensor ON check at the paper leading edge.	
PJ22	Registration sensor OFF check at the paper trailing edge.	
PJ23	Registration sensor ON check at the paper trailing edge.	
PJ30	Exit sensor OFF check at the paper leading edge.	SP83 (Jams at Fusing Unit)
PJ31	Exit sensor ON check at the paper leading edge.	
PJ32	Exit sensor OFF check at the paper trailing edge.	
PJ40	Leading edge sensor ON check at the paper leading edge.	SP84 (Roll Feeder Jams)
PJ41	Leading edge sensor OFF check at the paper leading edge.	
PJ42	Paper cutter failure.	
PJ43	Door open during the roll feeding.	
PJ56	Leading edge sensor ON check at the paper trailing edge.	SP85 (Roll Feeder Jams)
PJ57	Leading edge sensor OFF check at the paper trailing edge.	
PJ58	Entrance sensor ON during the roll feeding.	
PJ59	Registration sensor ON check at the paper leading edge (in roll feeding).	

Code	Cause of Jam	SP Mode No.
PJ90	Roll feeder. motor does not turn off after paper is fed 500 mm more than the maximum paper length.	SP80 (Others)
PJ98	Registration sensor does not turn off after paper is fed 2500 mm.	
PJ99	Original registration sensor does not turn off after paper is fed 2500 mm.	

NOTE: To display total jam number, access SP mode No. 80.

5. SPECIAL TOOLS AND LUBRICANTS

No.	DESCRIPTION	PART NO.	REMARKS
1	Digital Multimeter	54209507	BECKMAN RMS3030
2	Deluxe Test Lead Accessory Kit	54209508	BECKMAN DL241
3	Grease – Mobil Temp.78	54479078	400 g/can
4	Grease-G501	52039501	
5	Current Measuring Drum	A0239520	
6	Test Chart OS-A1 (2 sheets/set)	A0239504	
7	Spring Hook	54199653	
8	Setting Powder	54429101	

6. SERVICE REMARKS

6.1 DRUM UNIT

6.1.1 Drum

The organic photoconductor drum is comparatively more sensitive to light and ammonia gas than a selenium drum.

1. Never expose the drum to direct sunlight.
2. Never expose the drum to direct light of more than 1,000 Lux for more than a minute.
3. Never touch the drum surface with bare hands. When the drum surface is touched with a finger or becomes dirty, wipe with a dry cloth or clean with wet cotton. Wipe with a dry cloth after cleaning with wet cotton.
4. Never use alcohol to clean the drum; alcohol dissolves the drum surface.
5. Store the drum in a cool, dry place away from heat.
6. Take care not to scratch the drum as the drum layer is thin and is easily damaged.
7. Never expose the drum to corrosive gases such as ammonia gas.
8. Always keep the drum in the protective sheet when inserting or pulling the drum unit out of the copier to avoid exposing it to bright light or direct sunlight. This will protect the drum from light fatigue.
9. Before removing the drum, place a sheet of paper under the drum to catch any falling toner.
10. Dispose of used drums according to local regulations.
11. Perform the light sensor adjustment when a new drum is installed.
12. Hold both ends of the drum unit to carry it.
13. Be careful not to scratch the drum with the pick-off pawls when removing or reinstalling the drum.
14. When installing and/or removing the pick-off pawl unit, do not press too strongly. Otherwise, the drum unit may deform.

15. When the drum unit is removed from the copier, do not close the paper path section if possible. Otherwise, the gas springs at both sides open the paper path section forcibly if the paper path section is released. If you close the paper path section, take care not to injure yourself by opening the paper path section. Also, releasing only one side of the paper path section deform the copier machine, which may cause paper jam and copy image problem. Release both levers together while holding the paper path section to open the paper path section slowly.
16. The drum unit is heavy. Take care not to injure yourself by dropping the drum unit when removing and installing it.

6.2 CHARGE CORONA

1. The wire can also be cleaned with a blower brush. If the wire is cleaned with a dry cloth, make sure that the wire does not become stretched. Do not use sand paper or a solvent.
2. Do not touch the corona wire and the grid wires with oily hands. Oil stains may cause uneven image density on copies.
3. Make sure that the corona wire is correctly positioned and that there is no foreign material (iron filings, etc.) on the casing.
4. Clean the grid wires with a dry cloth.
5. When reinstalling the charge corona unit, make sure that the 2 connectors (C for the charge corona, G for the grid bias) are set properly.
6. Make sure that the grid wires are correctly placed on the eight slots, are all straight, and not crossed.
7. Do not expand and bend the corona wires and grid wires.
8. Make sure that the wire junction is positioned inside the right endblock.

6.3 OPTICS

1. Clean the exposure glass with water or alcohol.
2. Clean the fiber optics array with lens paper or silicone cloth.
3. Make sure that the exposure glass is under the rear original guide plate when reassembling.
4. Make sure that the direction of the aperture of the exposure lamp is towards the fiber optics array side (rear side) when reassembling.
5. When reassembling, be careful not to damage the right side of the fiber optics array by touching the optics side plate.

6.4 DEVELOPMENT

1. Be careful not to nick or scratch the development roller.
2. Clean the drive gears after removing used developer.
3. Initial conditioning (SP#36) is necessary when the developer is replaced.
4. Dispose of used developer according to local regulations.
5. Do not loosen the painted screws which determine the development doctor blade height and do not push the doctor blade too strongly, otherwise the doctor gap may change.
6. Be careful not to bend the bias terminal.
7. When the development unit is removed from the copier, do not close the paper path section if possible. Otherwise, the gas springs at both sides open the paper path section forcibly if the paper path section is released. If you close the paper path section, take care not to injure yourself by opening the paper path section. Also, releasing only one side of the paper path section deform the copier machine, which may cause paper jam and copy image problem. Release both levers together while holding the paper path section to open the paper path section slowly.
8. The development unit is heavy. Take care not to injure yourself by dropping the development unit when removing and installing it.
9. During the developer initialization, do not turn off the main switch, or do not open the original feed unit or the paper path section, or do not unplug the copier power cord. If these conditions happen, do the developer initialization again, the toner density sensor cannot be adjusted.

6.5 TRANSFER AND SEPARATION

1. Clean the corona wires with a blower brush. If the wires are cleaned with a dry cloth, make sure that the wire does not become stretched.
2. When adjusting the corona current, always use the drum current measuring drum.
3. Make sure that the T & S corona unit is set correctly by pressing it down when reinstalling.
4. Handle the new wire by the ends only. Oil from your hands may cause uneven charge on the drum.
5. Do not expand and bend the corona wires.
6. Do not rub the corona wires with rough material (sand paper,... etc.) as this will damage the corona wire.
7. Do not use any solvent to clean the wire as this will cause uneven charge on the drum.

6.6 CLEANING UNIT

1. Be careful not to damage the edge of the cleaning blade.
2. Dispose of used toner according to local regulations.
3. Do not press the cleaning blade too strongly. Otherwise, the drum unit may deform.
4. When installing or replacing the cleaning blade, release the pressure several times manually, and then hold down the cleaning blade gently along its entire length ensure that the cleaning blade contacts the drum. Otherwise, cleaning failure may occur.
5. When replacing the cleaning blade, apply setting powder on the edge of the cleaning blade.
6. Empty the toner collection bottle every service call and clear the memory counter SP#52 for used toner overflow detection by SP#53. Do not perform SP#53 without emptying the toner collection bottle.
   If "FULL" is indicated in the copy counter, SP#52 can also be reset to 0 by pressing the Clear Modes/Standby key after opening and closing the paper path section. Instruct customers to deal with the toner collection bottle if the "FULL" condition is indicated.

6.7 FUSING UNIT

1. Be careful not to damage the edges of the hot roller strippers and tension springs.
2. Do not touch the fusing lamp with bare hands.
3. Make sure that the fusing lamp does not touch the hot roller.
4. Be careful not to damage the hot roller thermistor and pressure roller thermistor when removing and reinstalling hot roller or the pressure roller.
5. The fusing unit is heavy. Take care not to injure yourself by dropping the fusing unit when removing and installing it.

6.8 ORIGINAL FEED

1. Do not touch the original feed rollers, original registration rollers, platen roller and press rollers with bare hands.
2. Clean the white plate with water or alcohol.

6.9 PAPER FEED

1. Do not touch the manual feed rollers and registration rollers with bare hands.
2. A worn out registration roller causes paper to crease. It should be replaced.

6.10 ROLL FEEDER

1. The copier is not attached to the table and roll feeder is attached to the table and copier. Do not lift the copier from the table, otherwise roll feeder unit is deformed.
2. When the copier and roll feeder is moved, loosen the screws for angle bracket and spacer and retighten them for absorb floor distortion.

6.11 OTHERS

1. When replacing the main board, if the RAM on the old main board is still usable, remove and place it on the new main board. Then, install the new main board in the copier.
2. After installing the new main board with a new RAM, clear the RAM memory. (Do not clear RAM memory if you have placed the old RAM on the new main board.)
3. Take care not to damage the mylars on the rear feed table during servicing.
4. When replacing a sensor, do not overtighten the screws. This may damage the sensor.

1. SERVICE PROGRAM MODE

1.1 SERVICE PROGRAM MODE OPERATION

The service program (SP) mode is used to check electrical data, change mode, and adjust setting.

1.1.1 Service Program Mode Access Procedure

How to access the SP mode

Press the following keys continuously.

[ ] → [+] → [−] → [C/⊘] → [C/⊘]

Hold the last [C/⊘] key more than 3 seconds (and indicators blink).

How to leave the SP mode

Press the following keys continuously,

[ ] → [ ] → [ ]

or power off the main switch.

NOTE: Each of the above procedure must be finished within 20 seconds.

How to select the program number

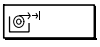
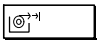
Pressing [+] , [−] keys, program number can be selected. Selected program number is displayed in the lead edge erase indicator (two digits indicator beside ■ mark).

To select the program number quickly, hold [+] or, [−] key.

How to set adjustment value or modes

1. Access the SP mode and select the program number.
2. Press [▼] key to select the paper length indicator (four digits indicator beside mark).
3. The factory-setting value/mode or the default setting is displayed in the paper length indicator.
4. Select the value/mode using [+], [−] keys, then press the [ ] key to enter the selected value/mode.
5. Leave the SP mode.

How to read the data

1. Access the SP mode and select the program number.
2. Press  key and select the paper length indicator (four digits indicator beside  mark).
3. Press  key, then paper length indicator shows the data continuously.
4. Press  key again to stop showing the data.

1.2 SERVICE PROGRAM MODE TABLE

Program Number	Function
0	Not used
1	Paper type setting (plain paper)
2	Paper type setting (traicing paper)
3	Paper type setting (film)
4	Copy count mode setting
5	Beep type setting
6	Paper feed out waiting time setting
7	Manual feed start time setting
8	Lead edge increase/decrease speed setting
9	Auto clear time setting
10	Auto pre-heating mode setting
11	Screen saver setting
12	Leading edge up/down step setting
13 to 19	Not used
20	Paper length count up/down setting
21	Paper length up/down speed setting
22	Fixed paper size pattern setting
23 to 32	Optional paper size pattern setting
33 to 34	Not used
35	All indicators on setting
36	New developer initialization
37	Not used
38	Release the fusing unit service call
39	Not used
40	Roll feeder identification
41	Roll feeder speed setting
42 to 47	Roll feeder cutting length adjustment
48	Not used
49	Main motor speed adjustment
50	Toner end detection setting
51	Used toner detection setting
52	Copy count after emptying the used toner
53	Used toner counter clear
54	Developer warm-up setting
55	Paper length limit setting

Program Number	Function
56	Copy limit setting
57 to 58	Not used
59	Misfeed special recovery mode
60	Fixed paper length special mode
61	Fixed paper length up/down step setting
62 to 63	Not used
64	SP mode display speed setting
65	ROM version display
66	RAM abnormal condition check
67 to 69	Not used
70	Copy counter (yard)
71	Copy counter (meter)
72	Copy counter (100 inches)
73	Copy counter (50 inches)
74	Copy counter (A1 size)
75	Copy counter (number of sheets)
76	OPC counter
77	Developer counter
78	Toner counter
79	Development level display
80 to 85	Number of misfeeds by location
86	Misfeed record display
87 to 89	Not used
90 to 92	Service call by location
93	Service call records
94 to 99	Not used

Program Number	Function
–1	RAM clear
–2	Total counter unit setting
–3	inch/mm exchange
–4	Not used
–5	Registration adjustment
–6	Optical adjustment
–7	Hot roller temperature adjustment
–8	Pressure roller temperature adjustment
–9	Hot roller/Pressure roller temperature display
–10	Drum charge setting
–11	Copy grid setting
–12	Image transfer setting
–13	Paper leading edge setting
–14	Separation ac voltage setting
–15	Not used
–16	Separation dc voltage at paper trailing edge setting
–17	Separation dc voltage setting
–18 to –19	Not used
–20	Image bias setting
–21	Nonimage bias setting
–22	Toner density control position
–23 to –29	Not used
–30	Toner density control value adjustment
–31	Toner density control value display (previous data)
–32	Toner density control value display (real time data)
–33 to –49	Not used
–50	Forcible reload
–51	Lamp off mode
–52	Misfeed not detect mode
– 53	Free run mode
–54 to –59	Not used
–60	Fluorescent lamp abnormal condition: 1
–61	Fluorescent lamp abnormal condition: 2
–62	Optical adjustment data display
–63	Factory use

1.3 SERVICE PROGRAM MODE TABLE (IN DETAIL)

Mode No.		Function	Data
–1	RAM Clear	Clears the memory in RAM Set the adjustment value to 20 and press [key] key. Then all the memories in RAM are cleared.	
–31	Toner Density Control Value Display	Displays the present toner density control value.	A=0,00
52	Copy Counter for Toner Overflow	Displays the total length [m] of copied paper after emptying the used toner bottle.	tF=00,000
66	RAM Abnormal Condition Check	Displays the total number of abnormal conditions of back-up RAM.	0 : Normal 1~: Abnormal
70 to 75	Copy Counter Display	Displays the copy count according to the following units. SP70: yard SP71: meter SP72: 100 inches SP73: 50 inches SP74: sheet (A1 size) SP75: sheet (any size)	SP70: t0=000,000 SP71: t1=000,000 SP72: t2=000,000 SP73: t3=000,000 SP74: t4=000,000 SP75: t5=000,000
76	OPC Counter Display	Displays the total length [m] of copied paper after the OPC drum is installed.	do=00,000
77	Developer Counter Display	Displays the total length [m] of copied paper after the new developer is poured.	dE=00,000
78	Toner Counter Display	Displays the total length [m] of copied paper after the new toner cartridge is installed.	dt=00,000
80 to 85	Number of Misfeeds by Location	Displays the total number of paper misfeeds by location. Misfeeds location cords for each SP number are as follows. SP80: Jt, J90, J98, J99 SP81: J01, J02, J03, J04 SP82: J20, J21, J22, J23 SP83: J30, J31, J32 SP84: J40, J41, J42, J43 SP85: J56, J57, J58, J59	Jt=0,000 J□□ =000
90 to 92	Number of Service Calls by Location	Displays the total number of service calls (SC) by location. SC cords for each SP number are as follows. SP90: Et, E1, E9, E10, E11 SP91: E2, E3, E4, E5 SP92: E6, E7, E8	Et=0,000 E□□ =000

1.3.1 Misfeed Location Code

Jt: Total number of misfeed

J01: Initial misfeed at paper registration

J02: Initial misfeed at exit of fusing unit

J03: Initial misfeed at original set sensor

J04: Initial misfeed at paper set sensor

J05: Initial misfeed at exit of roll feeder

J20: Registration sensor off check at the leading edge of paper

J21: Registration sensor on check at the leading edge of paper

J22: Registration off check at the trailing edge of paper

J23: Registration on check at the trailing edge of paper

J30: Exit sensor of fusing unit off check at the leading edge of paper

J31: Exit sensor of fusing unit on check at the leading edge of paper

J32: Exit sensor of fusing unit off check at the trailing edge of paper

J40: Exit sensor of roll feeder on check at the leading edge of paper

J41: Exit sensor of roll feeder off check at the leading edge paper

J42: Paper cutter error

J43: Door open during the roll feeding

J56: Exit sensor of roll feeder on check at the trailing edge of paper

J57: Exit sensor of roll feeder off check at the trailing edge of paper

J58: Paper input sensor on during the roll feeding

J59: Paper is pulled out after the roll feeding

J90: Roll feeder error

J98: Registration sensor error

J99: Original set sensor error

1.3.2 Service Call Code

E1: Fluorescent lamp error

E2: Thermofuse or fusing lamp blow out

E3: Fusing thermistor open

E4: Fusing thermistor short-circuit

E5: Pressure roller thermistor open

E6: Pressure roller thermistor short-circuit

E7: Fusing overheat

E8: Reload error

E9: Toner sensor error

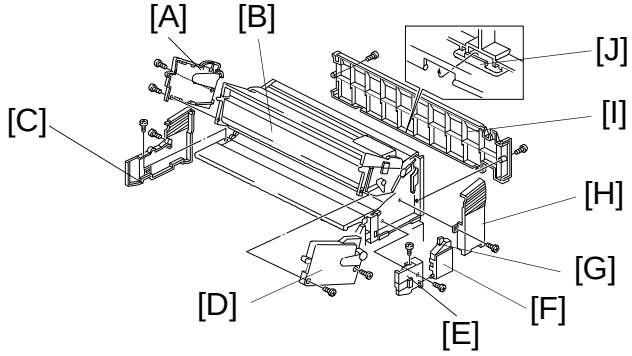
E10: Main motor error

E11: Toner sensor adjustment error

SECTION 5

REPLACEMENT AND ADJUSTMENT

1. EXTERIOR COVERS



1.1 LEFT SIDE COVER REMOVAL

1.1.1 Left Upper Cover

1. Remove the left upper cover [A] (2 screws).

1.1.2 Left Lower Cover

1. Open the paper path section [B].
2. Remove the left lower cover [C] (2 screws).

1.2 RIGHT SIDE COVER REMOVAL

1.2.1 Right Upper Cover

1. Remove the right upper cover [D] (2 screws).

1.2.2 Right Lower Front, Right Lower Middle, and Right Lower Rear Covers

1. Open the paper path section.
2. Remove the right lower cover [E] (2 screws), right lower middle cover [F], and toner collection bottle [G].
3. Remove the right lower rear cover [H] (1 screw).

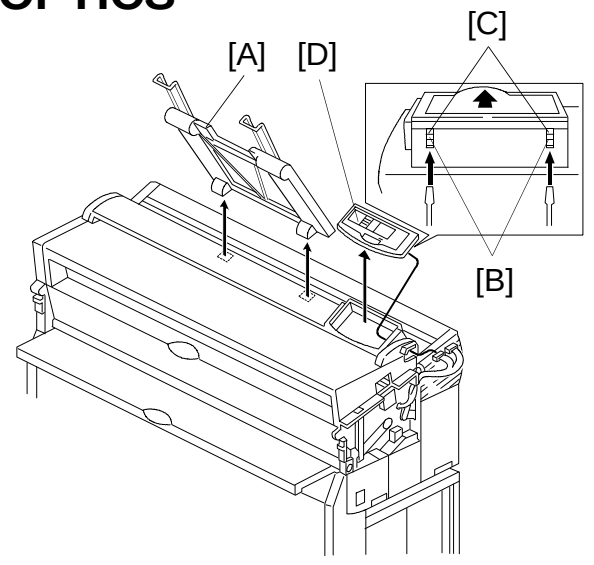
1.3 REAR COVER REMOVAL

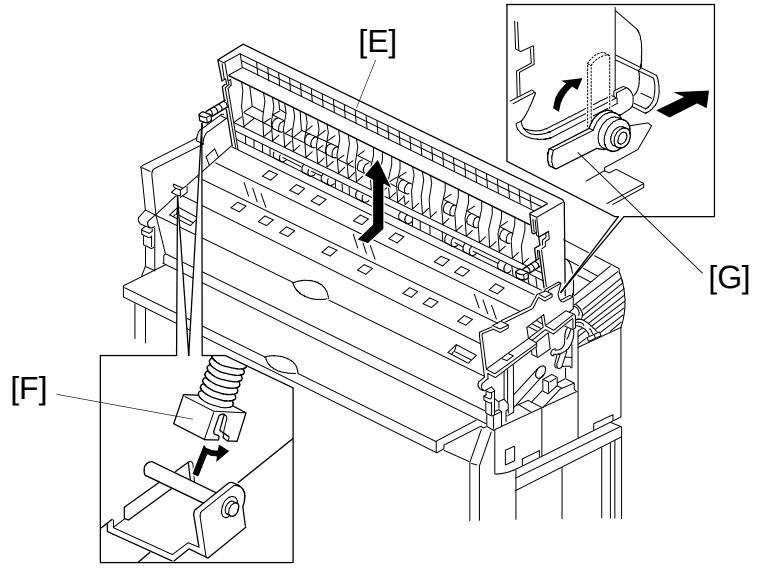
1.3.1 Rear Cover

1. Remove the rear cover [I] (2 screws).

NOTE: When re-installing the rear cover, push in the rear cover hooking portion [J] over the copier bottom plate as shown.

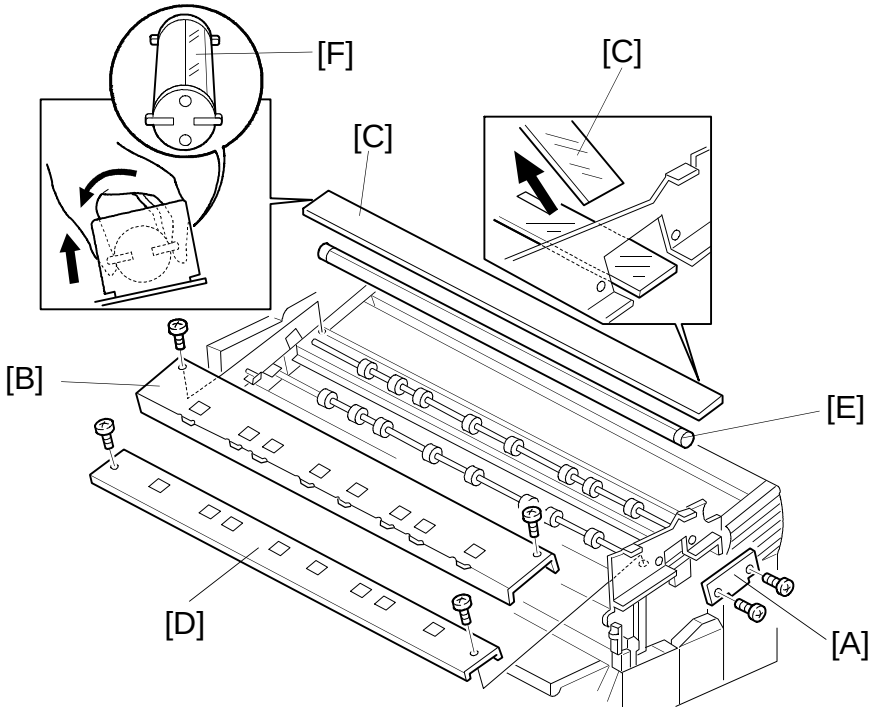
2. OPTICS





2.1 ORIGINAL FEED UNIT REMOVAL

1. Remove the left and right upper covers.
2. Remove the copy tray [A].
3. Push the projections [B] into the holes [C] of the rear side of the original feed unit as shown and remove the operation panel [D] (2 connectors).
4. Open the original feed unit [E] and unhook the stoppers [F] at both ends.
5. Turn the original feed unit and two bushings [G] at both ends 1/4 of a turn and remove.



2.2 EXPOSURE GLASS REMOVAL

1. Remove the original feed unit.
2. Remove the exposure glass bracket [A] (2 screws).
3. Remove the rear original guide plate [B] (2 screws).
4. Remove the exposure glass [C] by sliding it out to the right side and lifting up the left side as shown.

   NOTE: Make sure that the exposure glass is under the rear original guide plate when reassembling.

2.3 EXPOSURE LAMP REMOVAL

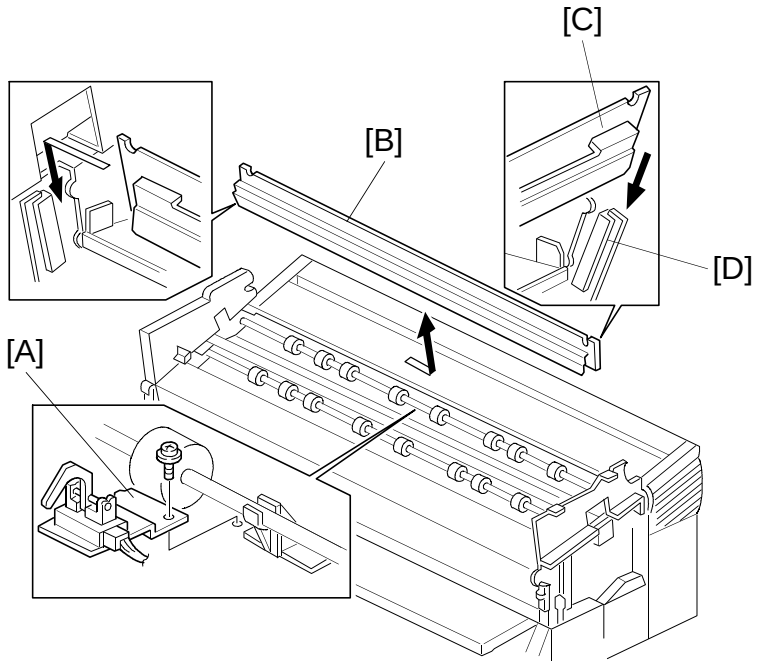
1. Remove the exposure glass.
2. Remove the front original guide plate [D] (2 screws).

   NOTE: If the exposure lamp is too tight to be turned, remove one side of the exposure lamp socket (1 screw) and remove the exposure lamp.

3. Turn the exposure lamp [E] 1/4 of a turn and remove.

   NOTE: Make sure that the direction of the aperture [F] of the exposure lamp is towards the fiber optics array side (rear side).

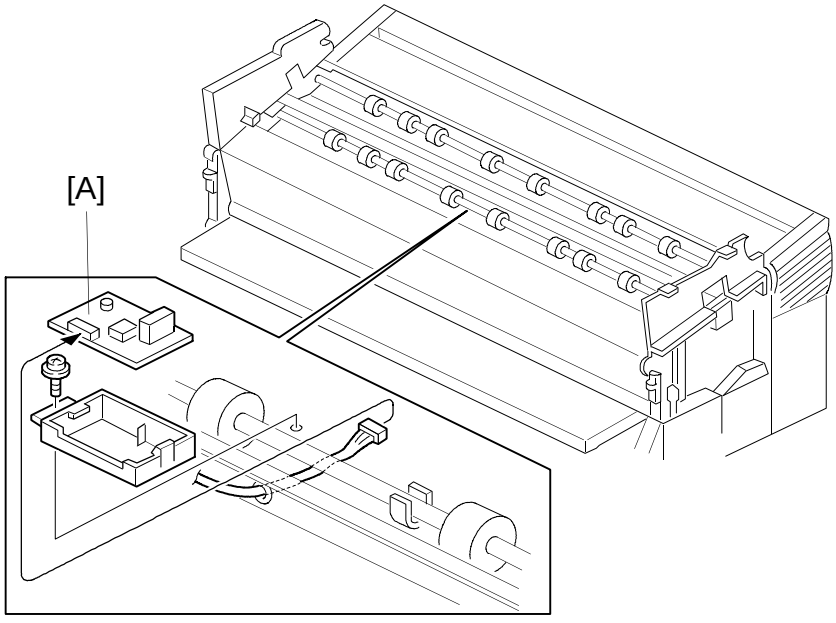
2.4 FIBER OPTICS ARRAY REMOVAL



1. Follow the steps from 1 to 3 of the exposure lamp removal.
2. Remove the original registration sensor bracket [A] (1 screw).
3. Lift up the fiber optics array [B] and remove it from the left side by sliding it out to the right side as shown.

   NOTE: When reassembling, be careful not to damage the right side [C] of the fiber optics array by touching the optics side plate [D].

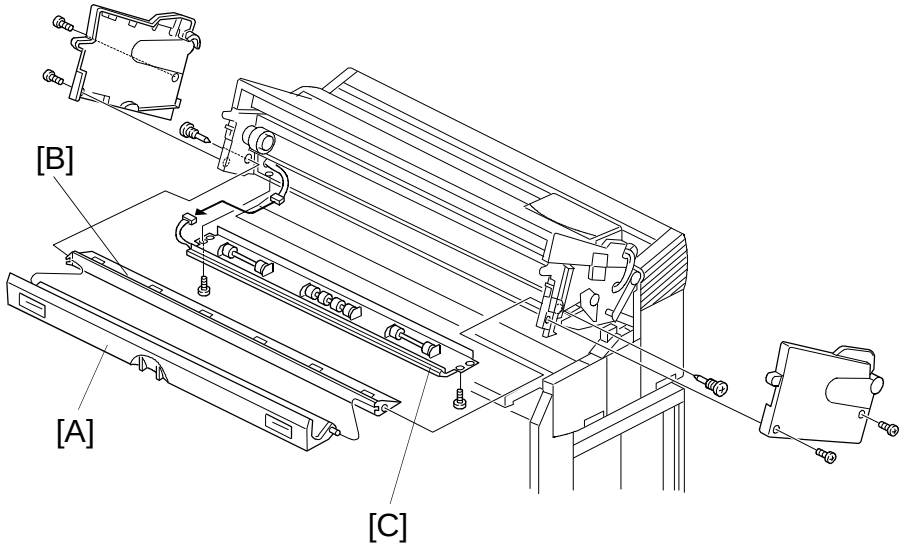
2.5 LIGHT SENSOR REPLACEMENT



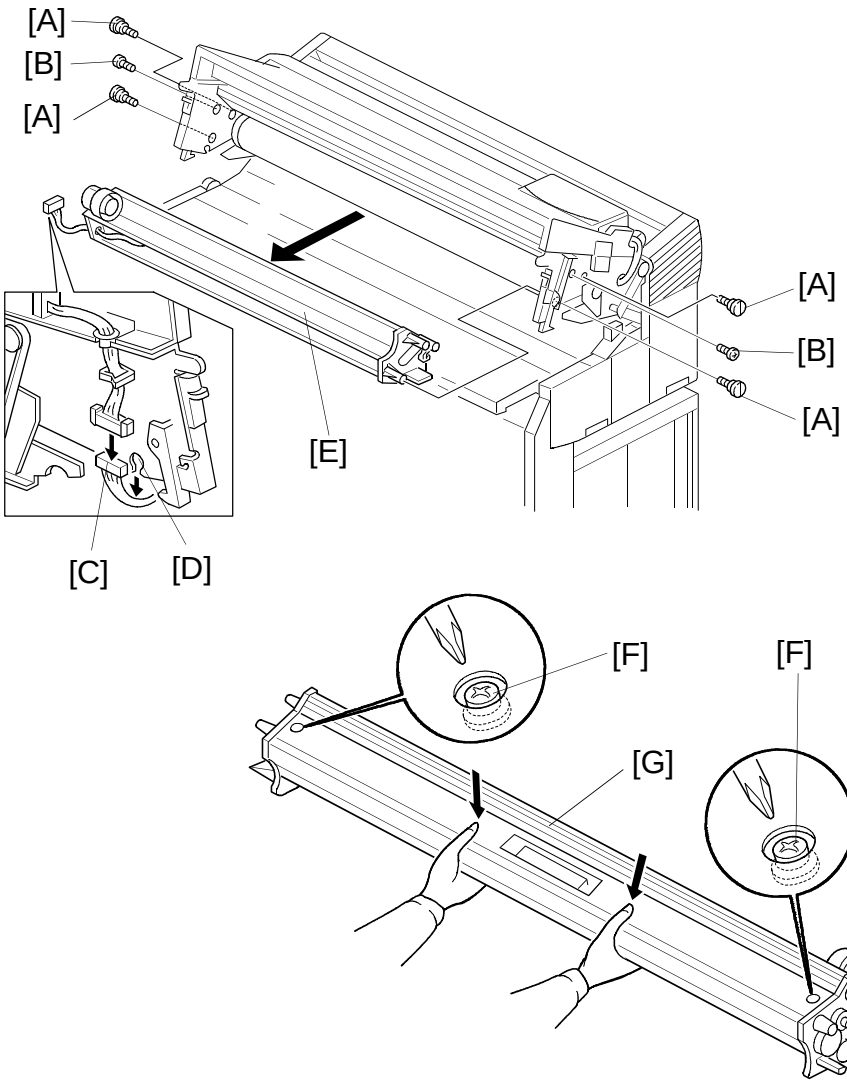
1. Remove the exposure lamp.
2. Replace the light sensor [A] (1 screw, 1 connector).

3. DEVELOPMENT

3.1 DEVELOPMENT UNIT REMOVAL



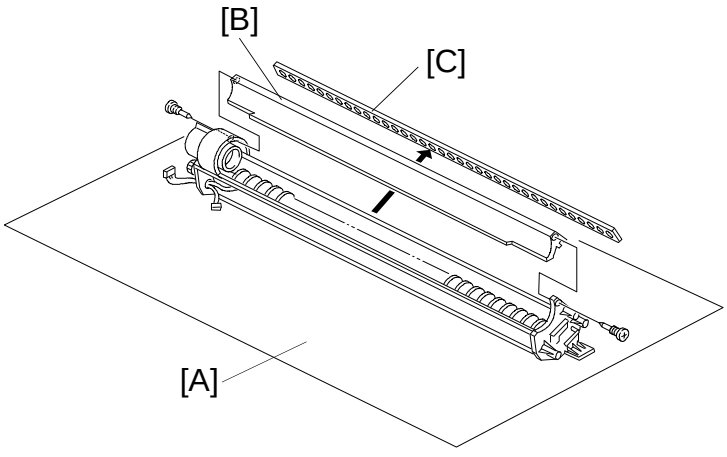
1. Remove the left and right upper cover.
2. Open the paper path section and original feed unit.
3. Remove the toner supply cover [A].
4. Remove the manual entrance feed cover [B] (2 pins).
5. Remove the paper feed driven unit [C] (2 screws and 1 connector).

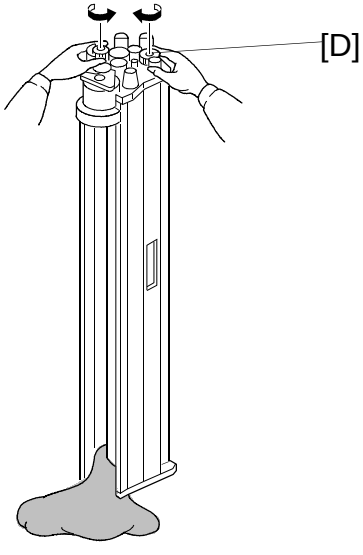


6. Remove the 4 shoulder screws [A] and 2 screws [B] fixing the development unit.
7. Disconnect the 14p connector [C] and remove it out of the cutout [D].
8. Remove the development unit [E].

CAUTION: Do not loosen the painted screws [F] which determine the development doctor blade height and do not push the doctor blade [G] too strongly, otherwise the doctor gap may change.

3.2 DEVELOPER REMOVAL

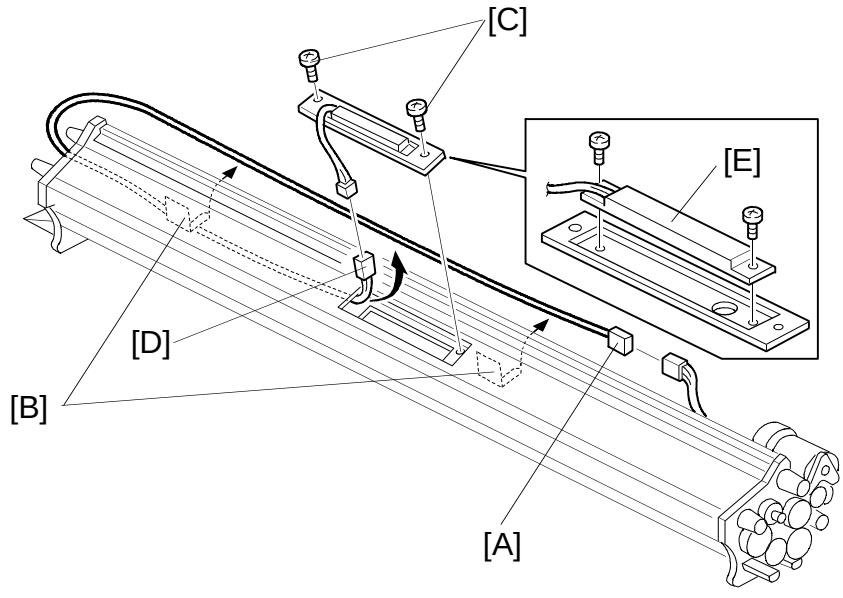




NOTE: Be careful not to bend the bias terminal.

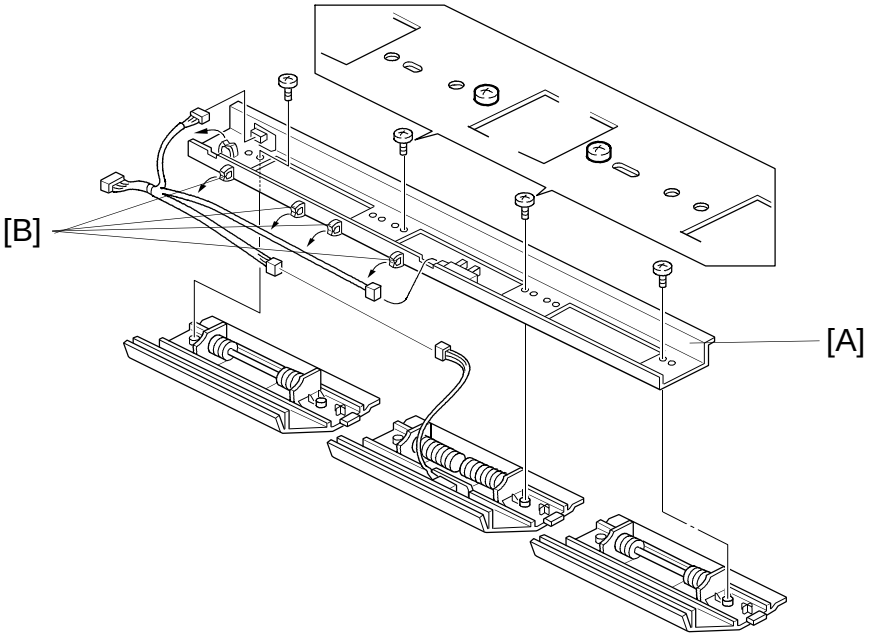
1. Remove the development unit and place it on a large sheet of paper [A] as shown.
2. Remove the toner supply unit casing [B] (2 pins) and development filter [C] and bracket [C] and clean them.
3. Stand up the development unit as shown (the drive section of the unit is the upper side).
4. Turn the paddle roller knob [D] clockwise. The developer will fall out onto the paper.
5. Repeat step 4 until all of the developer has been dumped out.
6. Clean the development unit prior to reassembling. Especially, clean the right end of the unit.

3.3 TONER DENSITY SENSOR REPLACEMENT



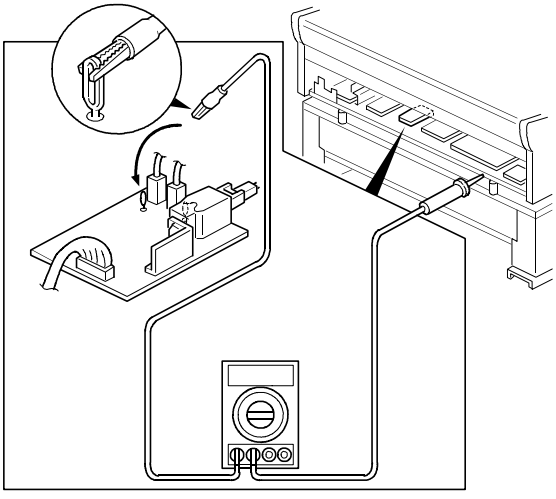
1. Remove the development unit.
2. Disconnect the harness connector [A] and take the harness from the 2 clamps [B].
3. Remove the 2 screws [C] of the toner density sensor holder.
4. Pull out the harness from the toner density sensor side until the relay connector [D] appears.
5. Replace the toner density sensor [E] (2 screws and 1 connector).

3.4 PTL REPLACEMENT



1. Remove the paper feed driven unit (follow the steps from 1 to 5 of the development unit removal).
2. Remove the PTL assembly [A] (4 screws, 3 connectors, and 4 clamps [B]).

3.5 DEVELOPMENT BIAS VOLTAGE ADJUSTMENT



NOTE: This adjustment is required when the charge/bias/grid power pack is replaced.

Preparation:

1. Turn off the main switch, and remove the rear cover.
2. Connect the ground terminal of the multimeter to the machine ground, and connect the voltage terminal to TP1 on the charge/bias/grid power pack.
3. Set the multimeter range to dc 1500 V.
4. Turn on the main switch.

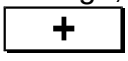
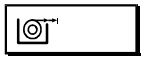
3.5.1 Bias Voltage for Image Area

ADJUSTMENT STANDARD: dc –180 ± 10 V.

1. Access SP mode and select No. –20.
2. Press the key to turn on the bias voltage.
3. Check the multimeter. If the voltage is not that of the standard voltage, press the key and then change the voltage using + and – keys.
4. If the voltage is within that of the standard voltage, press the key.

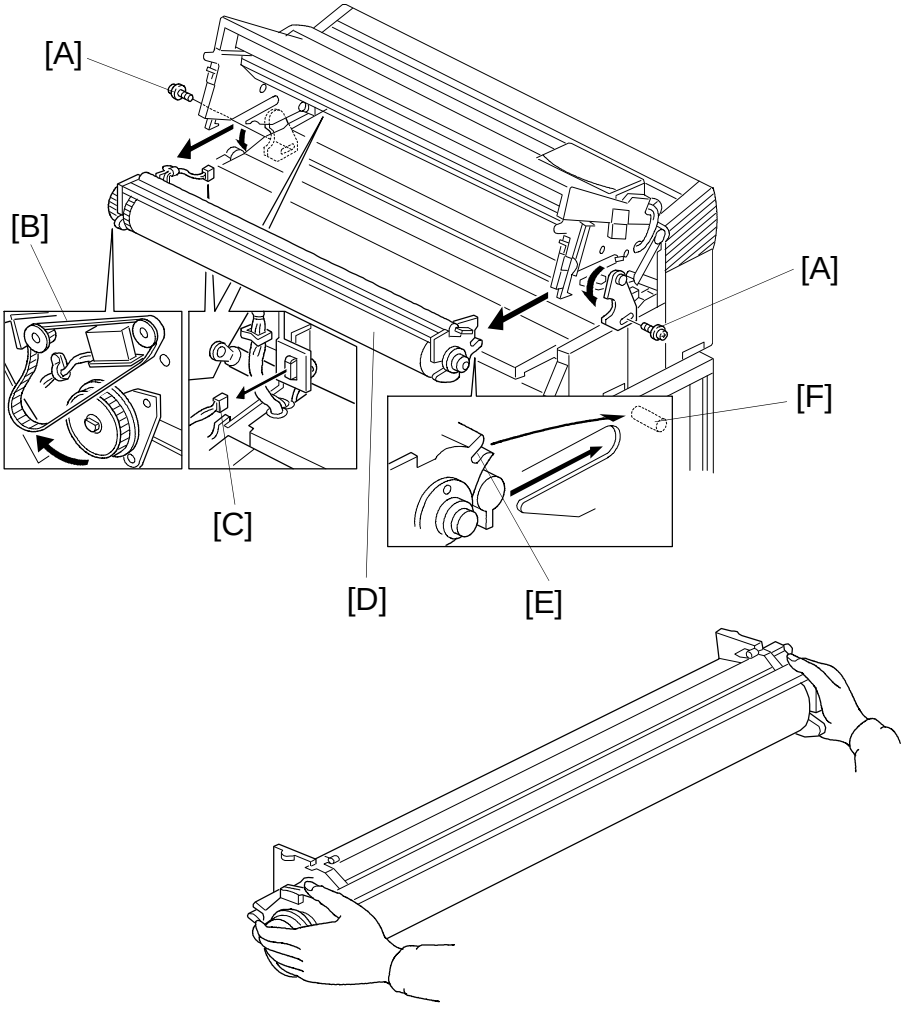
3.5.2 Bias Voltage for Non-image Area

ADJUSTMENT STANDARD: dc –200 ± 10V

1. Access SP mode and select No. –21.
2. Press the  key to turn on the bias voltage.
3. Check the multimeter. If the voltage is not that of the standard voltage, press the  key and then change the voltage using  and  keys.
4. If the voltage is within the standard, press the  key.

4. DRUM UNIT

4.1 DRUM UNIT REMOVAL

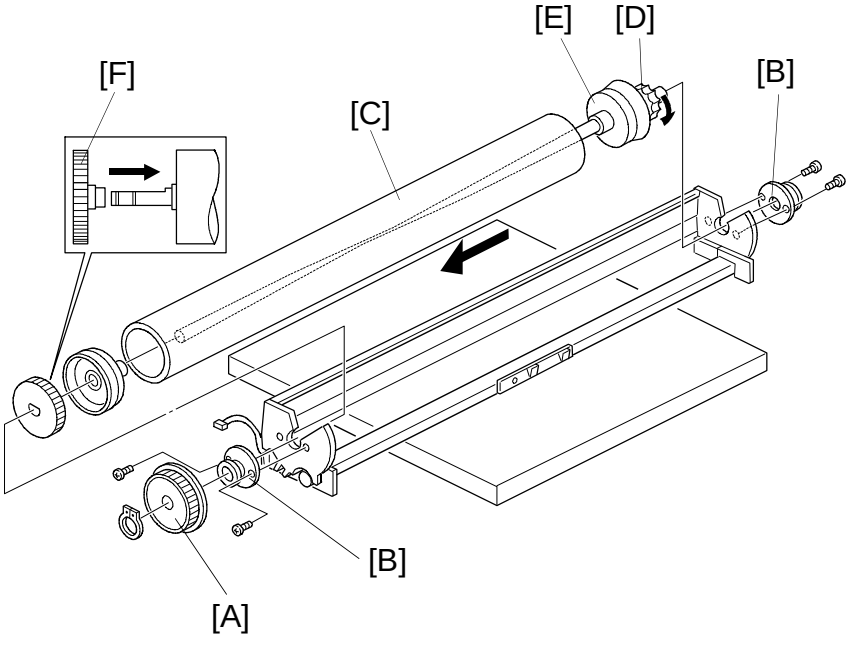


1. Remove the development unit.
2. Remove the 2 screws [A] at both ends.
3. Remove the timing belt [B] and disconnect the harness connector [C].
4. Remove the drum unit [D].
5. Place the drum unit on the flat floor.

NOTE: (1) When reinstalling the drum unit, hook the drum unit guides [E] on the pins [F] of the copier side plates.

(2) Hold both ends of the drum unit to carry it.

4.2 DRUM REPLACEMENT

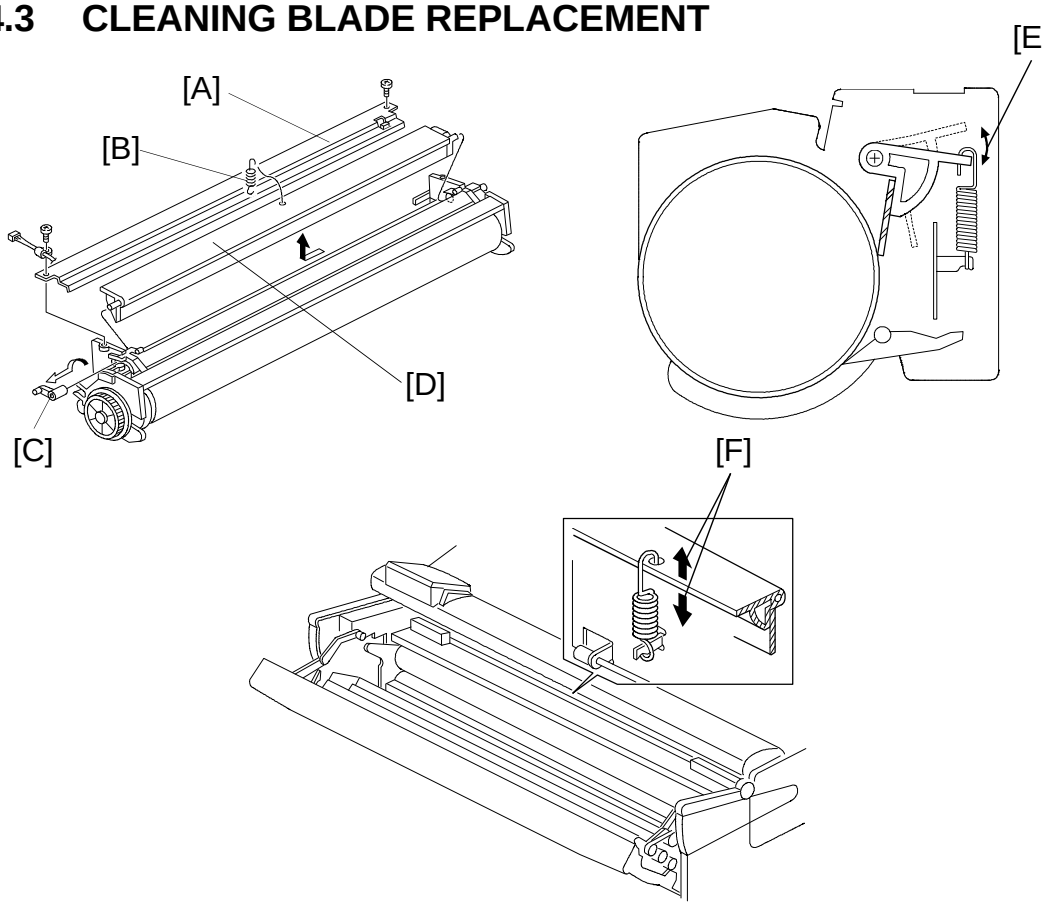


1. Remove the drum unit.
2. Remove the pulley [A] (1 C-ring).
3. Remove the 2 bearing holders [B] (2 screws each).

   NOTE: Be careful not to scratch the drum with the pick-off pawls when removing or reinstalling the drum.
4. Remove the drum [C] with the drum shaft.
5. Loosen the drum knob [D] by turning it clockwise as shown.
6. Remove the drum flange [E].
7. Replace the drum with new one.

   NOTE: when reinstalling the gear [F], make sure that the direction of the projection of the gear is on the drum side.

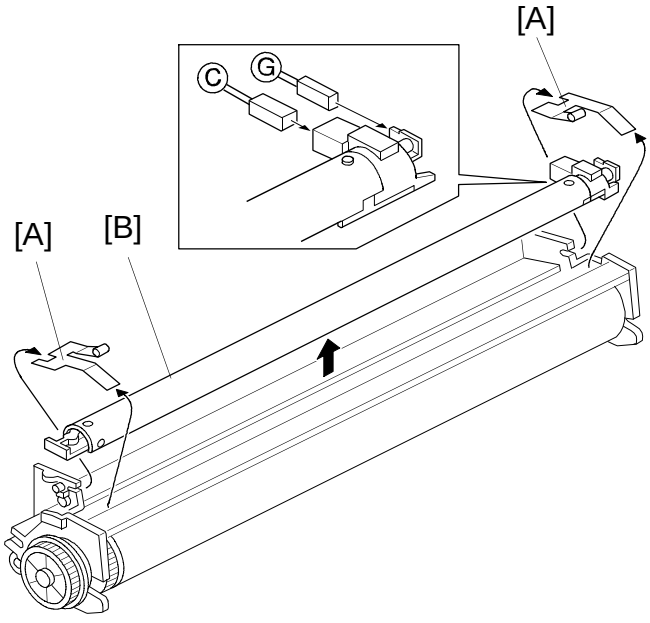
4.3 CLEANING BLADE REPLACEMENT



1. Remove the drum unit.
2 Remove the quenching lamp unit [A].
3. Remove the pressure spring [B] and bushing [C].
4. Slide the cleaning blade [D] to the left side and remove it from the right side.

NOTE:
1. Do not press the cleaning blade too strongly. Otherwise, the drum unit may deform.
2. When installing or replacing the cleaning blade, release the pressure [E] several times manually, and then hold down the cleaning blade gently along its entire length to ensure that the cleaning blade contacts the drum. Even if the drum is installed already, this action [F] can be taken through the rear side from where the rear feed table assembly is removed (follow steps 1 to 3 of the ozone filter replacement).
3. When replacing the cleaning blade, apply setting powder on the edge of the cleaning blade.

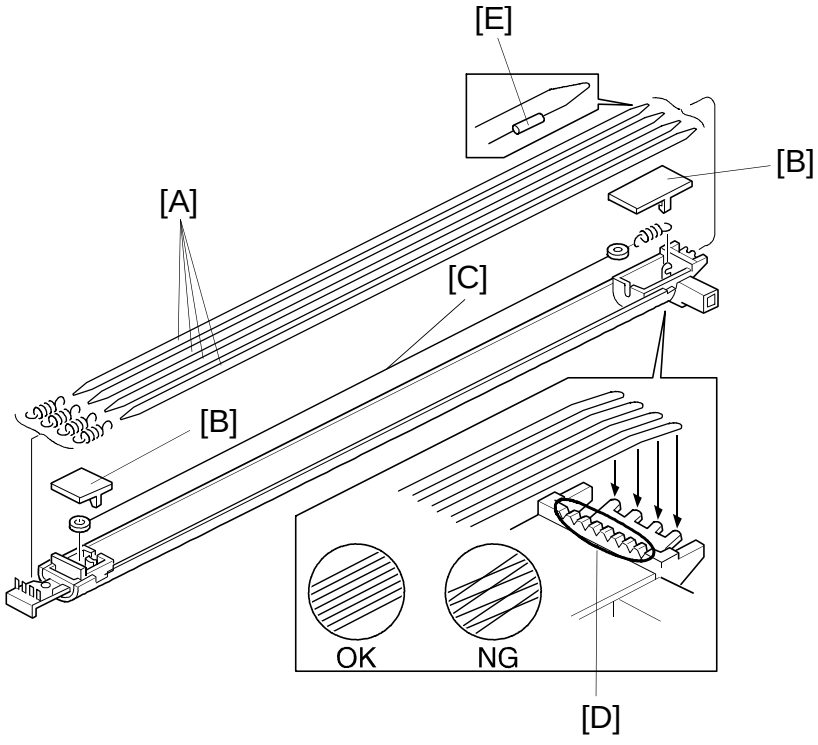
4.4 CHARGE CORONA UNIT REMOVAL



1. Remove the drum unit.
2. Remove the ground springs [A].
3. Remove the charge corona unit [B] (2 connectors).

NOTE: When reinstalling the charge corona unit, make sure that the 2 connectors (C for the charge corona, G for the grid bias) are set properly.

4.5 CHARGE CORONA WIRE REPLACEMENT



1. Remove the charge corona unit.
2. Remove the 4 grid wires [A] (4 springs).
3. Remove the endblock covers [B].
4. Replace the corona wire [C] (1 spring).

NOTE: (1) Make sure that the grid wires are correctly placed on the eight slots [D], are all straight, and not crossed.

(2) Handle the new wire by the ends only. Oil from your hands may cause uneven charge on the drum.

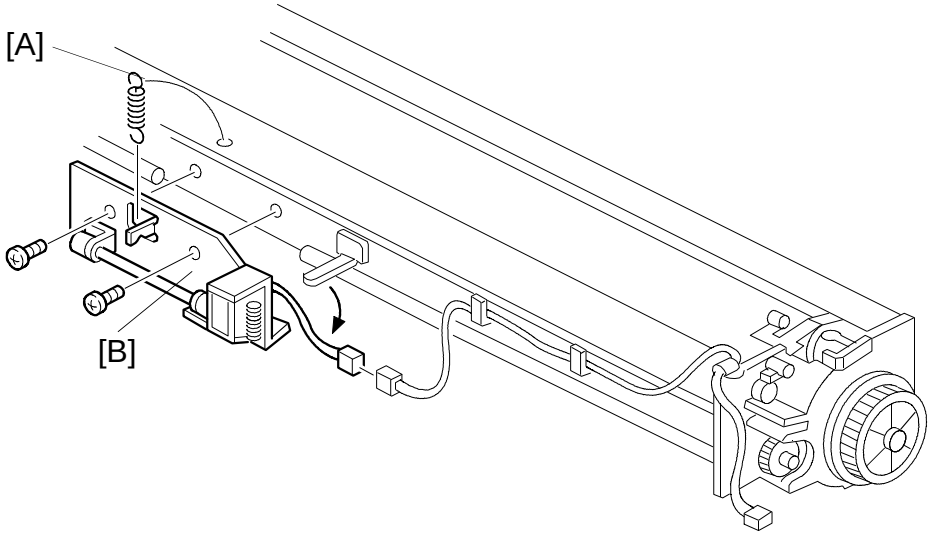
(3) Do not expand and bend the corona wires and grid wires.

(4) Do not rub the corona wires with rough material (sand paper,... etc.) as this will damage the corona wire.

(5) Do not use any solvent to clean the wire as this will cause uneven charge on the drum.

(6) Make sure that the wire junction [E] is positioned inside the right endblock.

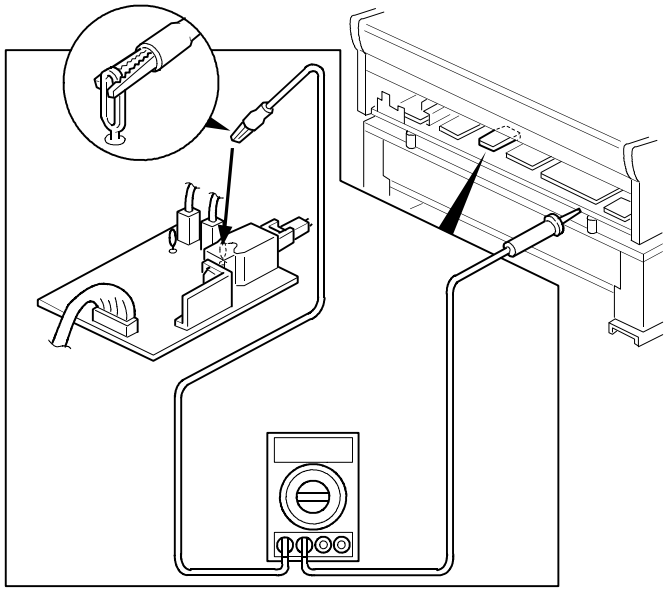
4.6 PICK-OFF PAWL UNIT REMOVAL



1. Remove the drum unit and place it as shown.
2. Remove the pressure spring [A] and pick-off pawl unit [B] (2 screws and 1 connector).

   NOTE: When installing and/or removing the pick-off pawl unit, do not press too strongly. Otherwise, the drum unit may deform.

4.7 GRID VOLTAGE ADJUSTMENT



ADJUSTMENT STANDARD: dc –2 ± 10V**.**

NOTE: This adjustment is required when the charge/bias/grid power pack is replaced.

1. Turn off the main switch and remove the rear cover.
2. Connect the ground terminal of the multimeter to the machine ground, and connect the voltage terminal to TP2 on the charge/bias/grid power pack.
3. Set the multimeter range to dc 1500 V.
4. Turn on the main switch.
5. Access SP mode and select No. –11.
6. Press the [/] key to turn on the grid voltage.
7. Check the multimeter. If the voltage is not that of the standard voltage, press the [▼] key and then change the voltage using [+] and [–] keys.
8. If the voltage is within that of the standard voltage, press the [] key.

4.8 DRUM CURRENT ADJUSTMENT

NOTE: a) The drum currents vary with environmental conditions such as humidity and atmospheric pressure. Generally it is not necessary to adjust the drum currents because they have already been adjusted for a wide range of environments at the factory.

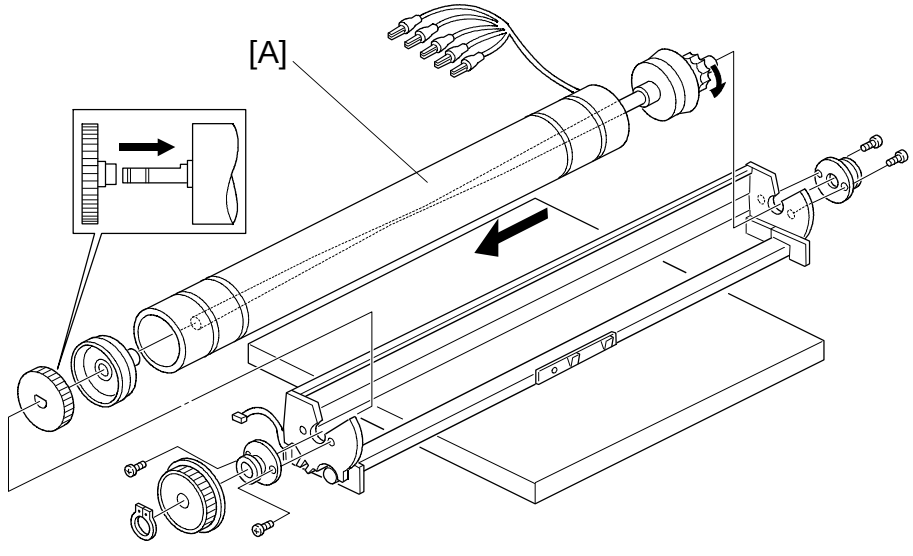
b) Drum current adjustment is necessary whenever the power packs are replaced: adjustment may also be necessary to correct problems with paper separation, incomplete toner transfer, or image density.

c) Make sure that the main switch is turned off when you change the range on the digital multimeter. If it is not, the multimeter may be damaged.

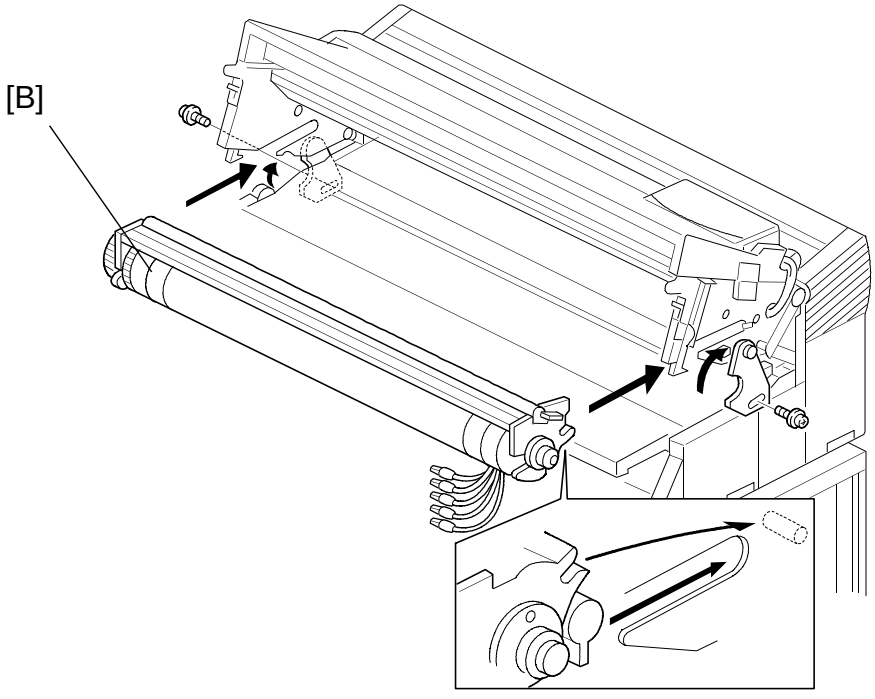
d) There are variable resistors to change the charge currents, but they should not be changed. The drum currents should be adjusted by changing SP mode setting.

Preporation

1. Remove the developer unit.
2. Remove the drum unit.
3. Remove the OPC drum from the drum unit, and install the current measurement drum [A] instead of the OPC drum.

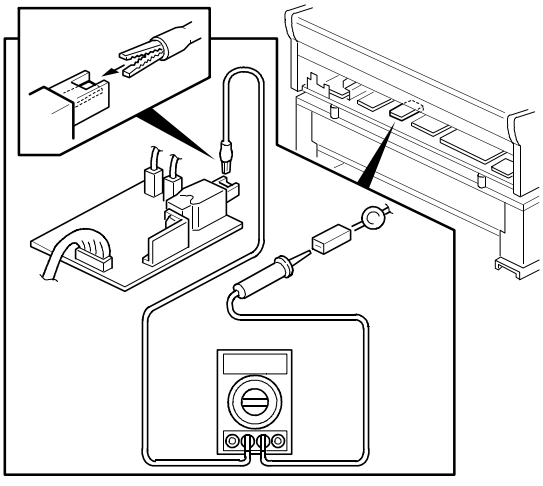


4. Install the drum unit [B] on the machine.



CAUTION: Be careful not to turn on the main motor. If the main motor accidentally turns on, some parts around the drum may be damaged.

4.8.1 Charge Current Adjustment

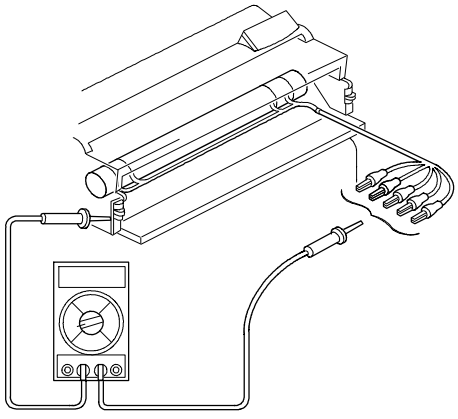


ADJUSTMENT STANDARD: dc–1000 ± 20 µA

WARNING: Make sure that the machine is unplugged before connecting the multimeter on the charge/bias/grid power pack.
Pay extreme attention when connecting the multimeter. The potential of the charge corona terminal becomes –5kV.

1. Connect all the terminals of the current measurement drum to the machine ground.
2. Disconnect the charge corona terminal of the charge/bias/grid power pack.
3. Connect the multimeter as shown in the illustration.
4. Set the multimeter range at dc 2 mA.
5. Plug in the machine and turn on the main switch.
6. Access SP mode and select No. –10.
7. Press the key to turn on the charge corona.
8. Check the multimeter. If the voltage is not that of the standard voltage, press the key and then change the voltage using + and – keys so that the charge current is dc –1000 ± 20 µA.
9. If the voltage is within that of the standard voltage, press the key.

4.8.2 Transfer Current Adjustment



ADJUSTMENT STANDARD:

dc –100 ± 5 μA (Leading edge to 20 mm from the trailing edge)
dc –150 ± 5 μA (20 mm trailing edge)

1 Connect the multimeter as shown above.

2. Set the multimeter range at dc 200 μA.

3. Plug in the machine and turn on the main switch.

4. Access SP mode and select No. –12.

5. Press the [/] key to turn on the transfer corona.

6. Check the multimeter. Press the [▼] key and then change the voltage using [+] and [–] keys so that the transfer current is dc –100 ± 5 μA.

7. If the voltage is within that of the standard voltage, press the [ ] key.

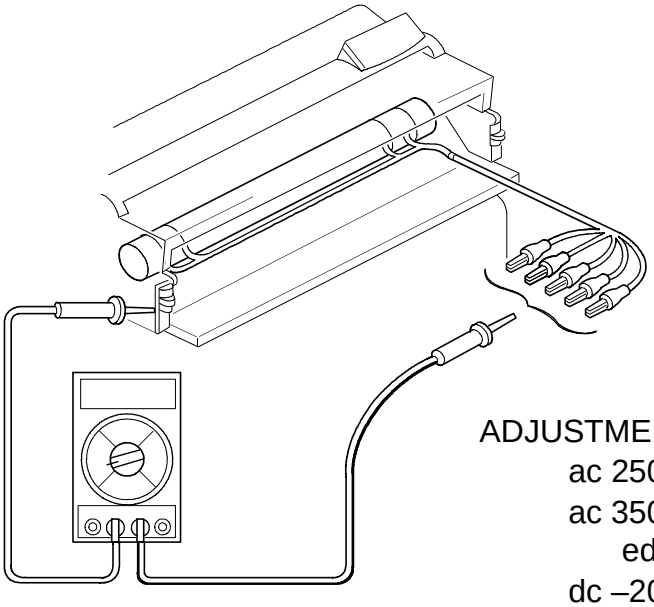
8. Select SP mode No. –13.

9. Press the [/] key to turn on the transfer corona.

10. Check the multimeter. Press the [▼] key and then change the voltage using [+] and [–] keys so that the transfer current is dc –150 ± 5 μA.

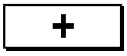
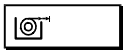
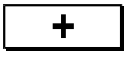
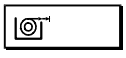
11. If the voltage is within that of the standard voltage, press the [ ] key.

4.8.3 Separation Current Adjustment



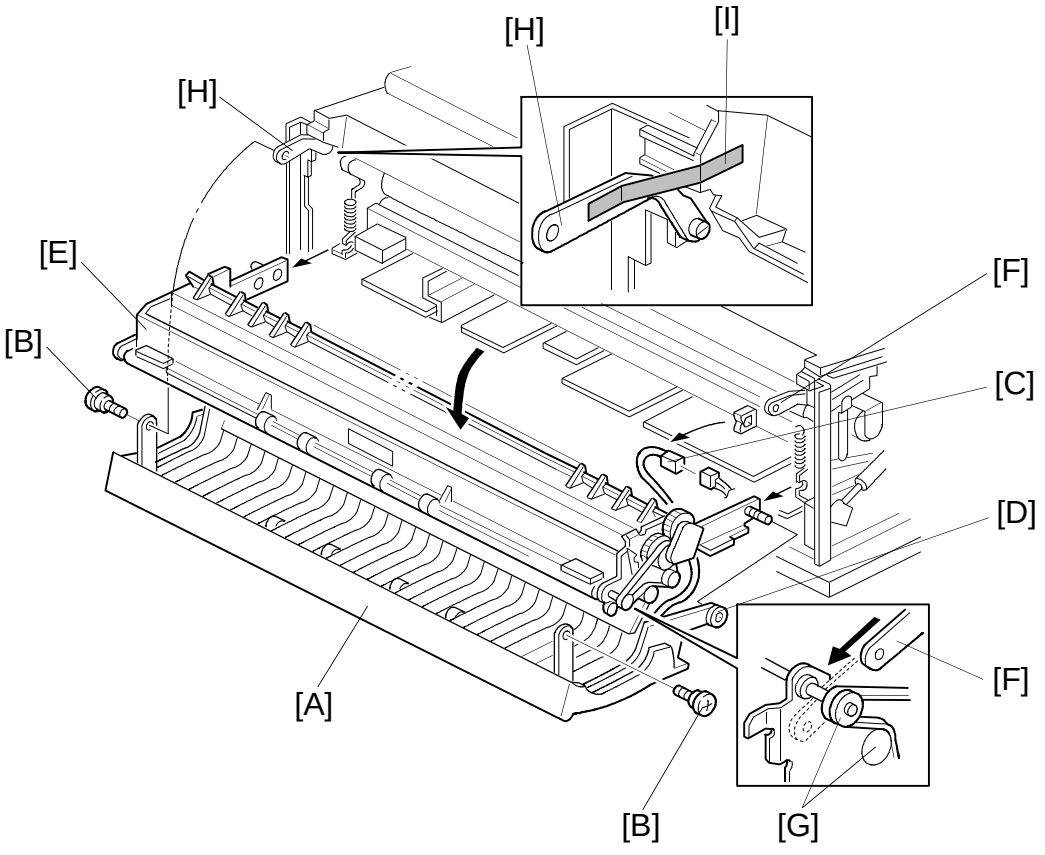
ADJUSTMENT STANDARD:
ac 250 ± 10 μA (Normal Paper)
ac 350 ± 10 μA (Film and leading edge of translucent paper)
dc –20 ± 2.5 μA

1. Connect the multimeter as shown above.
2. Set the multimeter range at ac 2 mA.
3. Plug in the machine and turn on the main switch.
4. Access SP mode and select No. –14.
5. Press the [/] key to turn on the separation corona.
6. Check the multimeter. Press the [▼] key and then change the current using [+] and [–] keys so that the ac separation current is ac 250 ± 10 μA.
7. If the voltage is within that of the standard voltage, press the [] key.
8. Select SP mode No. –15
9. Press the [/] key to turn on the separation corona.
10. Check the multimeter. Press the [▼] key and then change the current using [+] and [–] keys so that the ac separation current is ac 350 ± 10 μA.
11. If the voltage is within that of the standard voltage, press the [] key.

12. Set the multimeter range at dc 200 μA.
13. Select SP mode No. –16.
14. Press the  key to turn on the separation corona.
15. Check the multimeter. Press the  key and then change the current using  and  keys so that the dc separation current is dc –20 ± 2.5 μA.
16. If the voltage is within that of the standard voltage, press the  key.
17. Select SP mode No. –17.
18. Press the  key to turn on the separation corona.
19. Check the multimeter. Press the  key and then change the current using  and  keys so that the ac separation current is ac –20 ± 2.5 μA.
20. If the voltage is within that of the standard voltage, press the  key.

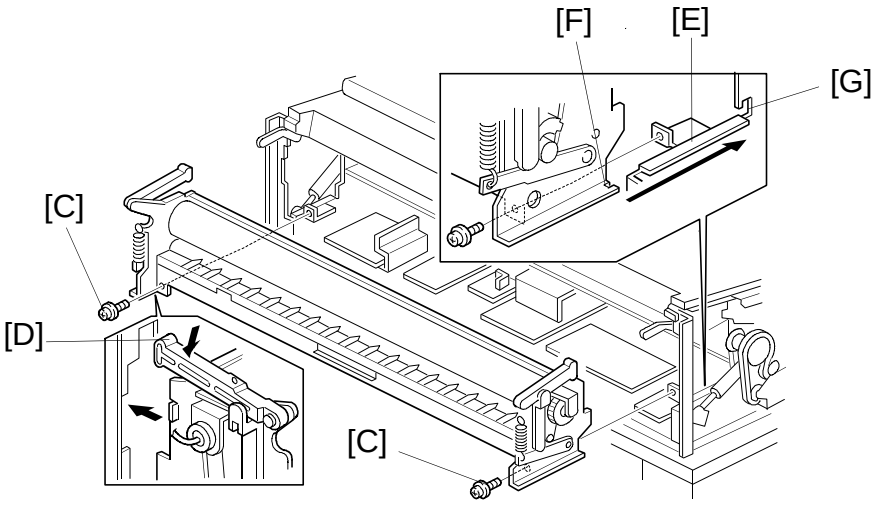
5. FUSING

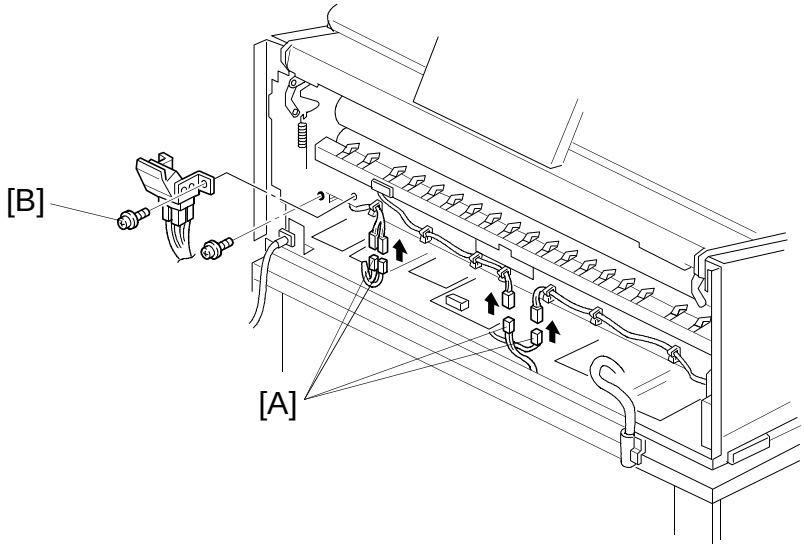
5.1 FUSING UNIT REMOVAL



1. Remove the copier rear cover.
2. Open the exit cover [A] and remove the shoulder screws [B] at both ends.
3. Disconnect the connector [C] and flex the hinge arms [D] of the exit cover slightly to the outside of the exit unit shafts and remove.
4. Turn the exit unit 1/4 of a turn to the front side (rear view) and remove it by pulling out.

   NOTE: When reinstalling the exit unit, set the right hinge [F] between the two pulleys [G] and raise the left hinge [H] using tape [I].

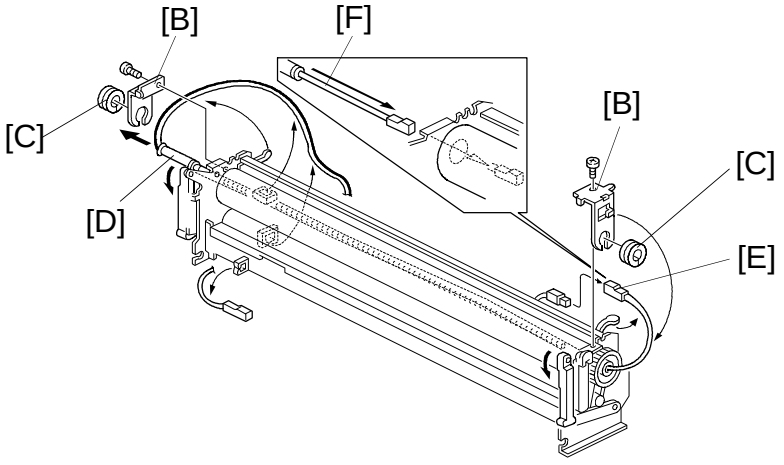


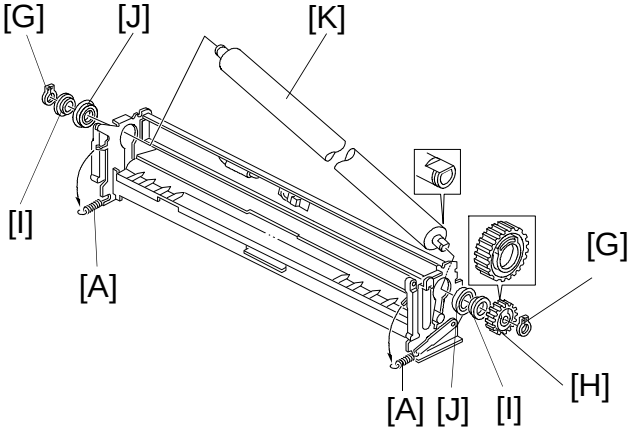


5. Disconnect the connectors [A].
6. Remove the screw [B] fixing the safety switch bracket.
7. Remove the 2 screws [C].
8. While pressing down the fusing pressure release bar [D], pull out the fusing unit.

NOTE: While pressing down the fusing pressure release bar [D], set the fusing unit on the guides [E] and align the cuts [F] to the side plates [G] at both ends when reinstalling the fusing unit.

5.2 HOT ROLLER REPLACEMENT



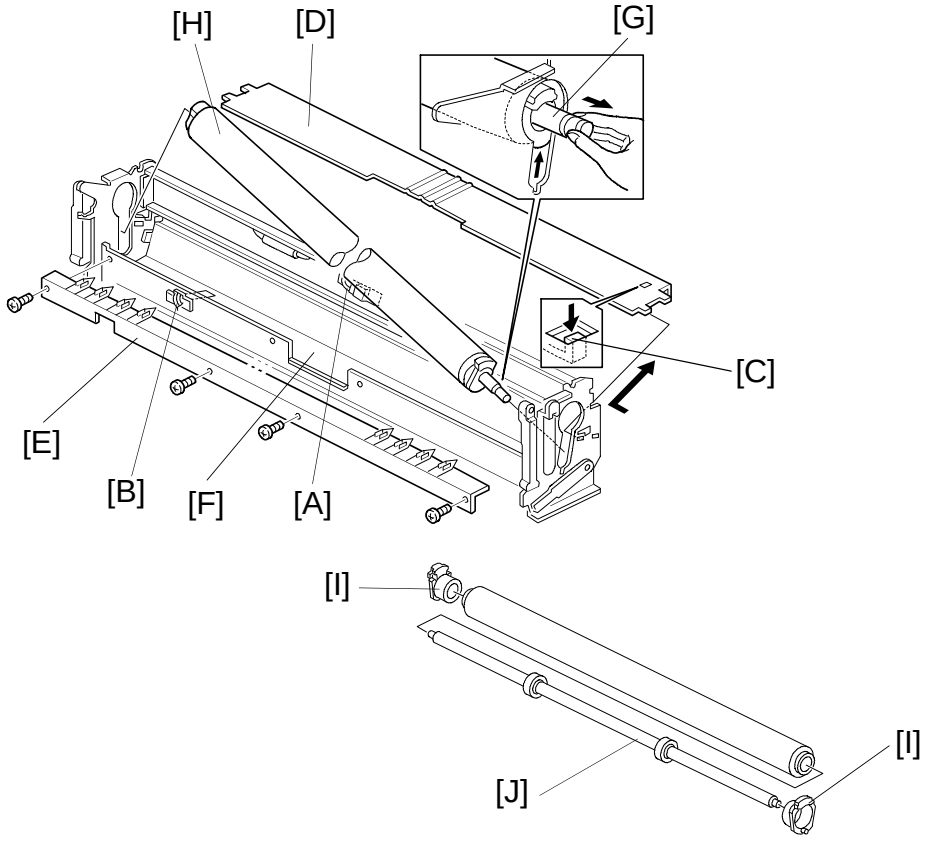


NOTE: Be careful not to damage the hot roller thermistor when removing and reinstalling the hot roller.

1. Remove the fusing unit.
2. Remove the pressure springs [A].
3. Remove the fusing lamp brackets [B] and cushions [C] (1 screw each).
4. Remove the fusing lamp [D] from the left side as shown (1 connector [E], rear view).

   NOTE: When reinstalling the fusing lamp, straighten the right side harness [F] to allow it of the right side to pass through the hot roller hole.
5. Remove the 2 C-rings [G], 1 gear [H], 2 bushings [I], and 2 bearings [J]).
6. Slide the hot roller [K] to the right side and remove it from the left side.

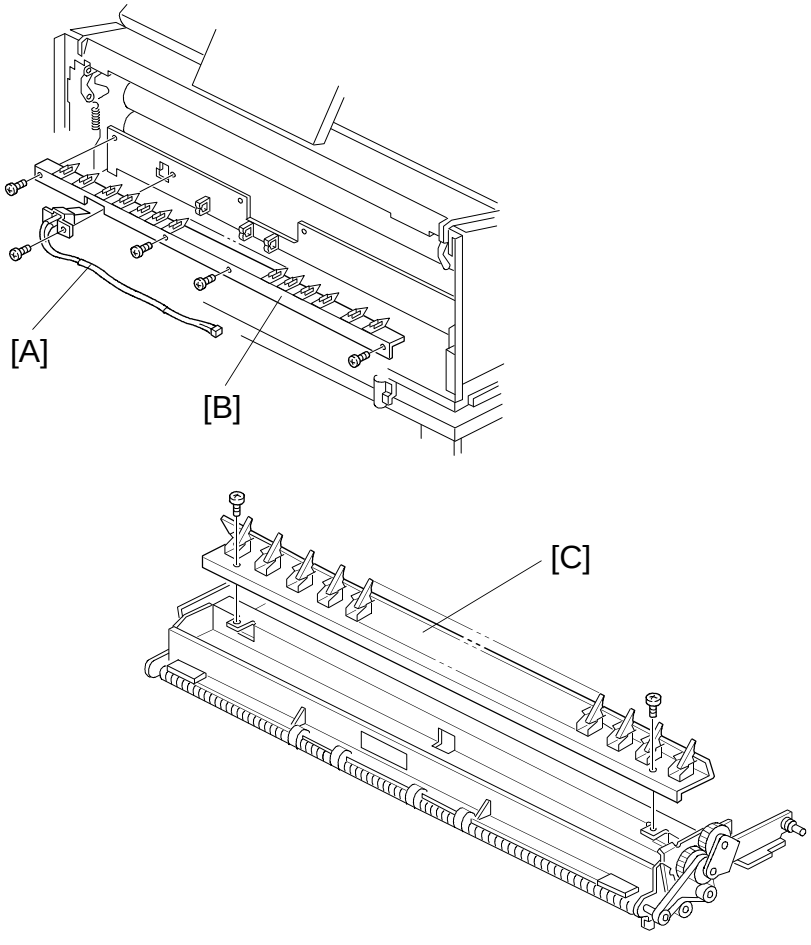
5.3 PRESSURE ROLLER REPLACEMENT



CAUTION: 1) Do not touch the hot roller or pressure roller while they are hot.
2) Be careful not to damage the hot roller thermistor [A] and pressure roller thermistor [B] when removing and reinstalling the pressure roller.

1. Remove the hot roller.
2. Push the projection [C] of the fusing entrance guide stopper and remove the fusing entrance guide [D].
3. Remove the pressure roller stripper unit [E] (4 screws).
4. Lift up the pressure roller (access the hot roller from the cut [F] of the frame), slide out the pressure roller shaft [G] to the left, then remove the pressure roller [H].
5. Replace the pressure roller (2 stoppers [I] and 1 shaft [J]).

NOTE: When reinstalling pressure roller, set the right pressure roller stopper and push the pressure roller shaft to the right from the left, and set the left pressure roller stopper [ ].



5.4 PRESSURE ROLLER THERMISTOR REPLACEMENT

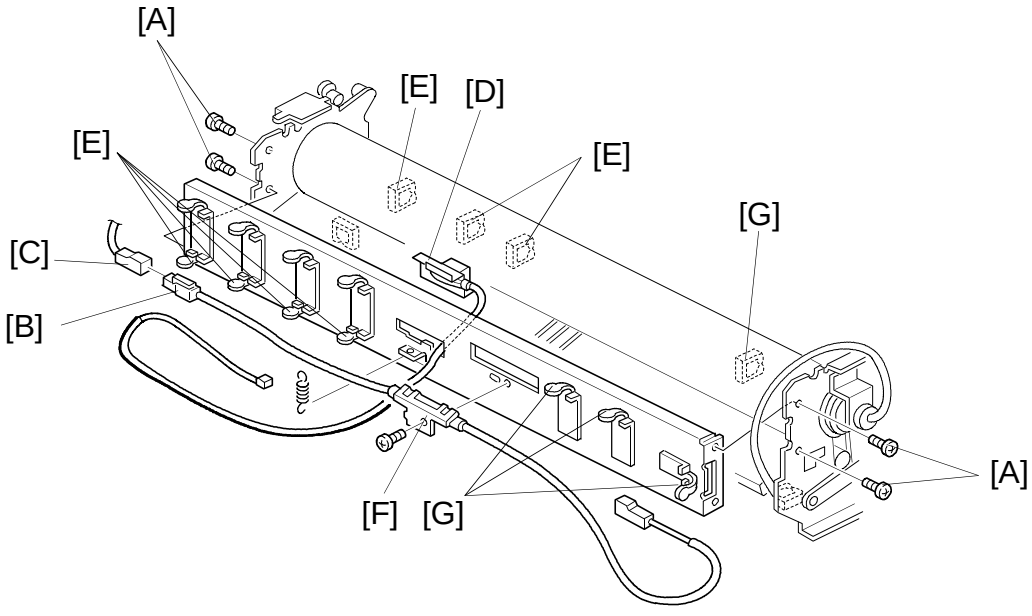
1. Follow step 1 to 5 of the fusing unit removal.
2. Remove the pressure roller thermistor [A] (1 screw).

5.5 PRESSURE ROLLER STRIPPER UNIT REPLACEMENT

1. Follow step 1 to 5 of the fusing unit removal.
2. Remove the pressure roller stripper unit [B] (4 screws).

5.6 HOT ROLLER STRIPPER UNIT REPLACEMENT

1. Follow step 1 to 4 of the fusing unit removal.
2. Remove the hot roller stripper unit [C] (2 screws).



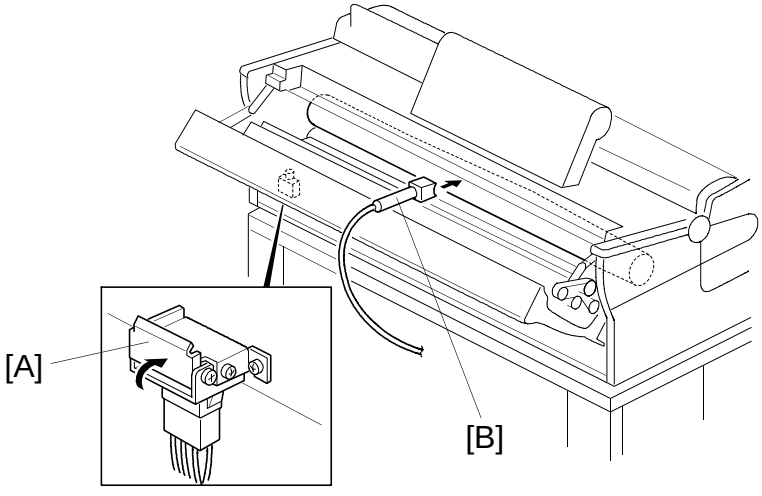
5.7 HOT ROLLER THERMISTOR REPLACEMENT

1. Remove the fusing unit.
2. Remove the 4 screws [A] of the fusing stay.
3. Disconnect the thermofuse connector [B] from the fusing lamp harness [C].
4. Remove the hot roller thermistor [D] (1 screw and 1 spring, 7 clamps [E]).

5.8 FUSING THERMOFUSE REPLACEMENT

1. Follow step 1 to 3 of the hot roller thermistor replacement.
2. Remove the fusing thermofuse [F] (1 screw and 4 clamps [G]).

5.9 FUSING TEMPERATURE ADJUSTMENT



Caution: When the main switch is turned on, the machine will suddenly start to drive the fusing section. Keep your hands away from any mechanical and electrical components during this period.

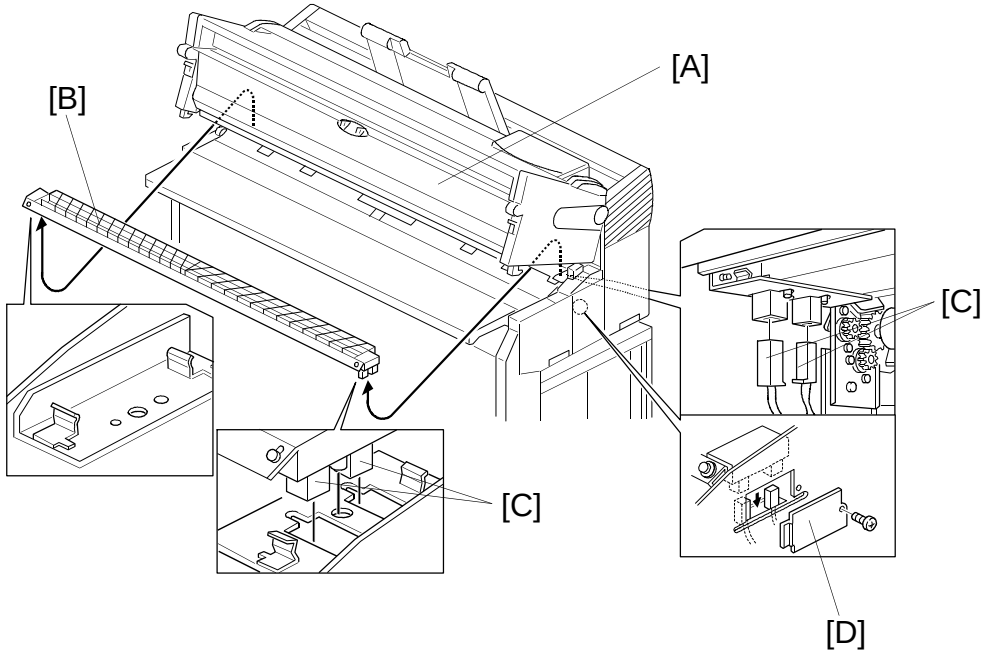
This procedure is required only when the hot roller thermistor is replaced.

Adjustment standard: Mode 1 (155°C), Mode 2 (160°C), Mode 3 (165°C), Mode 4 (170°C), Mode 5 (180°C), Mode 6 (190°C), Mode 7 (196°C)

1. Turn off the main switch.
2. Remove the copier rear cover.
3. Remove the pressure roller thermistor screw and hang the thermistor by the harness.
4. Actuate the fusing exit safety switch [A].
5. Turn on the main switch, select the normal fusing temperature mode, and wait for longer than 10 minutes.
6. Using a digital thermometer and probe [B], measure the temperature at the middle of the hot roller.
7. If the actual temperature is different from the value for the mode being used (use SP#1 to find out the current mode), adjust the temperature using SP#-7.
8. Repeat steps 5 to 7 and confirm the temperature.
9. Reassemble the machine.

6. T & S CORONA UNIT

6.1 T & S CORONA UNIT REMOVAL

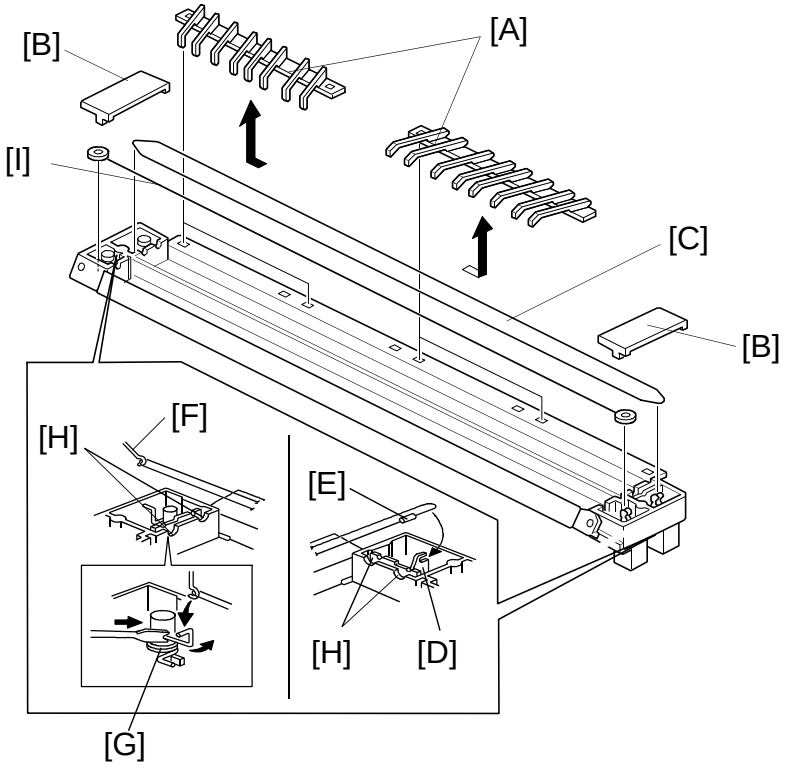


1. Open the paper path section [A] and take out the T & S corona unit [B] (2 connectors [C]).

   NOTE: 1) Make sure that the T & S corona unit is set correctly by pressing it down when reinstalling.

   2) Remove the connector cover [D] (1screw) for connecting the 2 connectors.

6.2 TRANSFER AND SEPARATION CORONA WIRE REPLACEMENT



NOTE: (1) Handle the new wire by the ends only. Oil from your hands may cause uneven charging of the drum.

(2) Do not stretch or bend the corona wires.

(3) Do not rub the corona wires with rough material (sand paper, etc.) as this will damage the corona wire.

(4) Do not use any solvent to clean the wire as this will cause uneven charging of the drum.

6.2.1 Preparation

1. Remove the T & S corona unit.
2. Remove the paper guides [A] and endblock covers [B].

6.2.2 Separation Corona Wire Replacement

1. Remove the separation corona wire [C].
2. Hook the new separation corona wire on the terminal [D] of the right endblock.

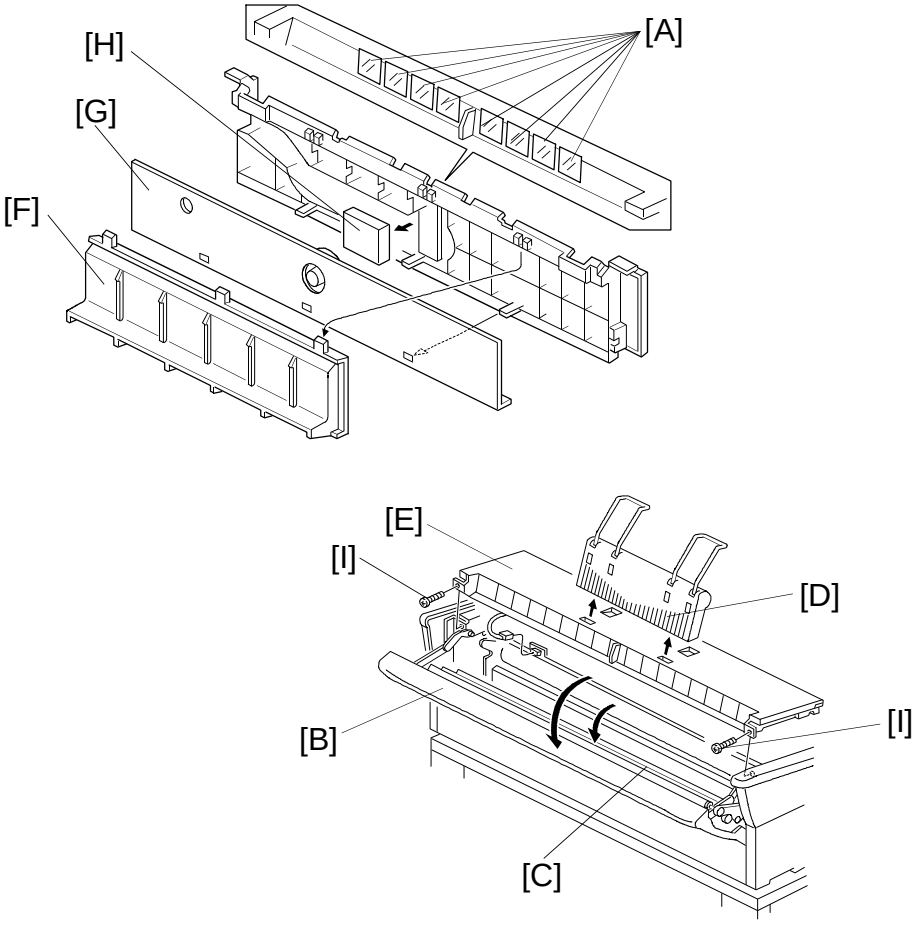
   NOTE: Make sure that the wire junction [E] is positioned inside the right endblock.
3. Hook the other side of the separation corona wire on the spring hook [F] (special tool: 54199653). While pushing the spring [G] in the direction of the arrow, hook the separation corona wire on the spring.
4. Set the wire on the slots [H].

6.2.3 Transfer Corona Wire Replacement

1. Remove the transfer corona wire [I].
2. Install the new transfer corona wire.

7. OTHERS

7.1 OZONE FILTER REPLACEMENT

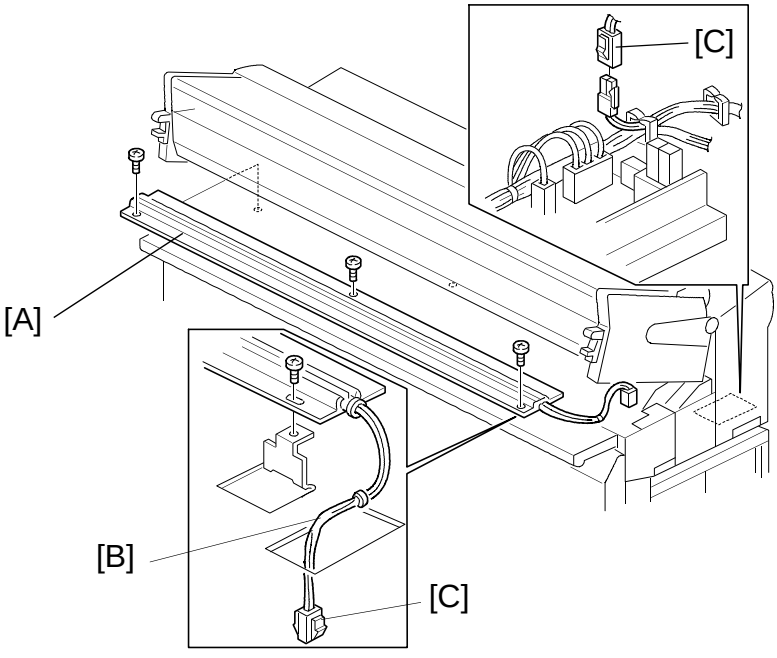


NOTE: Take care not to damage the mylars [A] on the rear feed table.

1. Open the fusing exit cover [B] and exit unit [C].
2. Remove the copy tray [D].
3. Remove the rear feed table assembly [E] (2 screws and 1 connector).
4. Unhook the blower duct [F] and remove.
5. Unhook the fan support plate [G] and remove.
6. Replace the ozone filter [H].

   NOTE: When reinstalling the rear feed table assembly, fix the 2 screws [I] while pushing the assembly.

7.2 ANTICONDENSATION HEATER INSTALLATION



1. Remove the rear cover of the machine (2 screws).
2. Remove the T&S corona unit.
3. Install the anticondensation heater [A] (3 screws).
4. Put the harness of the heater into the cutout [B] of the frame.
5. Connect the connector of the heater [C] with the one beside the ac drive board.

8. COPY QUALITY ADJUSTMENT

– General Information –

Image density is affected by the following factors:

(1) Light Intensity
(2) Bias Voltage
(3) Toner Density
(4) Grid Voltage
(5) Charge Corona Current

The items listed above must be kept in balance to maintain correct image density.

In the field, image density should be adjusted first by changing the light intensity. (Adjust the light sensor voltage.) If results are unsatisfactory, the bias voltage can be changed. Also, if requested by the customer, the overall image density can be changed by changing the toner density. Normally, this should be kept at the normal position (factory setting).

The grid voltage and charge corona current are carefully adjusted at the factory. Any adjustment out of the adjustment standards will result in over toning, toner scattering, dirty background, or light image density problems. The grid voltage and charge corona current adjustment should be done only when replacing the Charge/Bias/Grid power pack, or to correct certain problems with image density after checking all other possible causes.

8.1 LIGHT SENSOR ADJUSTMENT

When:	1. Every Call 2. When replacing the following part
	• Exposure lamp • Light sensor
	• Drum • RAM on the main board
Purpose:	To maintain the correct light intensity.
Adjustment Standard:	Level 2 (10%) of the 9 step gray scale on the OS-A1 chart should be slightly visible when the 4th manual image density level is selected.
Perform:	Change SP #-6 setting.
How:	Change the light sensor voltage.

1. Turn off the main switch.
2. Clean the following parts:

Item No.	Section	Method
(1)	Optics (Exposure glass, fiber optics array)	Damp cotton and dry soft cloth
(2)	Corona wires (charge, transfer and separation) and casing.	Dry cloth
(3)	PTL	Dry cloth or blower brush

3. Remove the middle right cover.
4. Make several copies at manual image density level 4 with OS-A1 chart.
5. Confirm that level 2 (10%) of the 9 step gray scale is slightly visible on the copy. If the copy image density is not correct, proceed with the following step.
6. Change SP #-6 setting in the SP mode.
   If the image density is too dark: Increase SP #-6 setting.
   If the image density is too light: Decrease SP #-6 setting.
7. Confirm that image density is within the adjustment standard.

8.2 IMAGE BIAS ADJUSTMENT

When:	1. The image is blurred even though the image density in black solid areas is acceptable. 2. Dirty background, where the problem is not caused by excess toner and cannot be solved by adjusting the light sensor voltage.
Purpose:	To improve the copy image.
Perform:	SP #-20
How:	Change the development bias voltage for image density control by SP #-20.

SP #-20 3 Standard

0 ← 3 → 8

Darker Lighter

1. Make a copy after adjusting the light intensity.
2. If the image is blurred:
   Decrease bias voltage by one step and readjust light intensity.

   If the background is dirty:
   Increase bias voltage by one step and readjust light intensity.

8.3 TONER DENSITY ADJUSTMENT

When:	Customer wants to change the overall image density of the copies.
Purpose:	To change toner concentration inside development unit.
Perform:	SP #-22
How:	Change the toner density setting by SP #-22

NOTE: The toner density can also be adjusted using SP #-30 (toner density sensor voltage setting). To return SP #-30 to the initial value, take memo when the value is changed.

8.4 REGISTRATION ADJUSTMENT

When:	Registration is not within the adjustment standard.
Purpose:	To maintain proper registration.
Adjustment Standard:	0 ± 3 mm (0 ± 0.12")
Perform:	SP #-5
How:	Change the registration roller start timing by SP #-5.

1. Make several copies by using the manual feed or roll feeder and check the registration.
2. Adjust the registration using SP #-5 if the registration is not within the adjustment standard.

SECTION 6

TROUBLESHOOTING

1. COPY QUALITY TROUBLESHOOTING

1.1 LOW IMAGE DENSITY

Is the used paper moist or extremely dry?

No

Yes

Replace the paper.

Is the toner sensor voltage within the no toner supply level (level 0) ? (Refer to Page 2-16.)

Yes

No

Is there sufficient toner in the cartridge?

Yes

No

Replace the toner cartridge.

Is the toner supply clutch energized?

Yes

No

Check the main board and the toner supply clutch.

Does the toner sensor voltage decrease in the special toner supply mode (SP#62)?

Yes

No

Check the toner supply mechanism.

The amount of toner used exceeds the toner supply amount.

⇒Supply toner until the toner sensor voltage reaches the target value.

Is the solid black copy dark enough? (Make a solid black copy using SP#–51.)

Yes

No

Does the image density recover (without dirty background) after forcing supply of toner using SP#62?

Yes

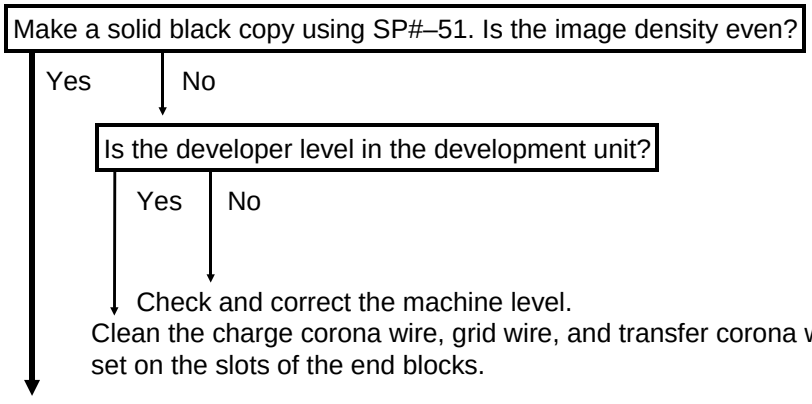
No

Check the charge corona, transfer corona and development bias.

Check the toner sensor and main board.

Check the light sensor, FL regulator and main board.

1.2 UNEVEN COPY IMAGE



Check and correct the machine level.

Clean the charge corona wire, grid wire, and transfer corona wire. Check if they are correctly set on the slots of the end blocks.

Clean the optics. If the problem is not fixed, replace the exposure lamp.

1.3 DIRTY BACKGROUND

Clean the optics and check the copy image.

No good

Change the light sensor setting to a lighter position using SP#–6.

No good

Is the bias voltage correct?

Yes

No

Adjust the bias voltage.

Is the toner sensor voltage much lower than the threshold between level 0 and 1? (Check using SP#–32 referring to Page 2-16.)

No

Yes

Check the main board and toner supply clutch.

Is the image density of solid areas high?

No

Yes

Check the toner sensor.

Make several blank copies. Is the background still dirty?

Yes

No

Check the cleaning blade.

Are the grid voltage and the charge corona current correct?

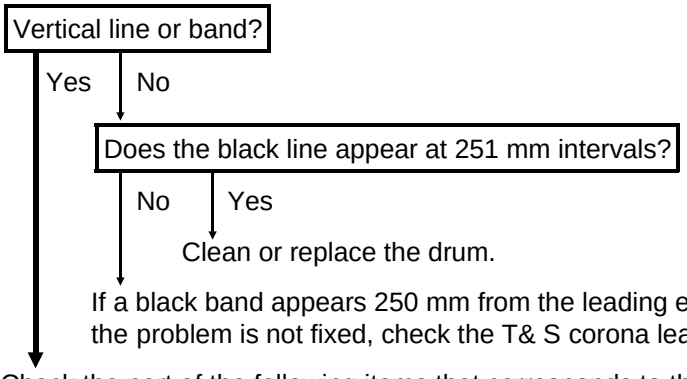
Yes

No

Adjust the grid voltage and/or the charge corona current.

Replace the drum.

1.4 BLACK LINE OR BAND



If a black band appears 250 mm from the leading edge, turn the main switch off and on . If the problem is not fixed, check the T& S corona leakage. ***NOTE**

Check the part of the following items that corresponds to the position of the vertical line or band.

- Charge corona wire
- Grid wires
- Light path (Exposure lamp, fiber optics array, exposure glass)
- Cleaning blade
- Development unit
- Drum

NOTE: If the separation corona leakage is detected, the separation corona will be turned off. This condition will not be reset until the main switch is turned off and on. If the separation corona does not turn on, a black band appears 250 mm from the paper leading edge.

1.5 ENTIRELY BLANK COPY

Is the used paper moist?

No

Yes

Replace the paper.

Are the terminals of the charge corona unit and the T& S corona unit connected properly?

Yes

No

Set the terminals properly.

Is the charge corona wire or the T & S corona wire broken?

No

Yes

Replace the broken part.

Are the charge corona and transfer corona applied?

Yes

No

Check the main board, charge/bias/grid power pack, and T & S power pack.

Does leakage occur in the T & S endblocks?

No

Yes

Replace the defective parts.

Are the development drive gears broken?

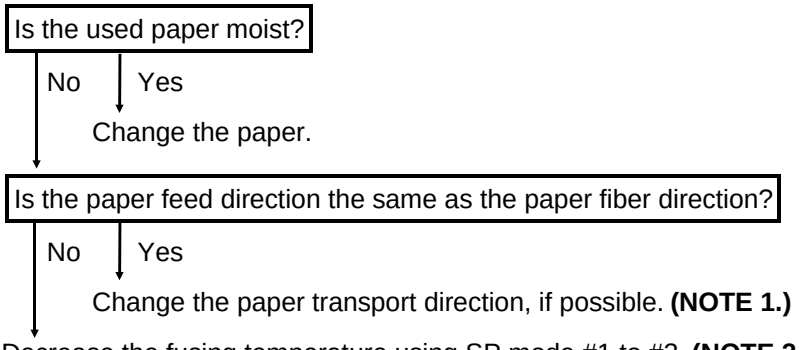
No

Yes

Replace the broken gears.

Check the drum drive mechanism.

1.6 PAPER CREASING



NOTE: 1. If there is rib shape creasing, the paper feed direction should be the same as the paper fiber direction.
2. After decreasing the fusing temperature, check if the image is completely fused on the paper.

2. SERVICE CALL CONDITION

When a service call condition occurs, the Call Service indicator and service call codes are displayed.
When the service call conditions E2, E3, E4, E5, E6, E7, and E8 conditions occur, for safety reason they cannot be cleared by turning the main switch off and on. Accessing SP38 and changing the date from "1" to "0" must be done to clear these service call conditions.

2.1 SC Code E-1: Exposure Lamp Abnormal

-Definition-

The light sensor voltage is less than 0.4 volts for 10 seconds.

<Points to check>

Exposure lamp

Light sensor

FL regulator (CN402-1,2,4, and 5, CN401-1, -2, -4)

Main board (CN106-A3, and CN104-B1, -B2, -A29 -A30)

2.2 SC Code E-2: Fusing Thermofuse Open

-Definition-

The temperature detected by the hot roller thermistor does not reach 100 C within 4 minutes and 30 seconds after the main switch is turned on.

<Point to check>

Fusing thermofuse

Hot roller thermistor

AC drive board (T202-2, RA201-T4)

Main board (CN106-A2, A4, B12, B14, B15)

2.3 SC Code E-3: Hot Roller Thermistor Open

-Definition-

The temperature detected by the hot roller thermistor does not reach 50°C within 3 minutes after the main switch is turned on.

<Point to check>

Hot roller thermistor

AC drive board (T202-2, RA201-T4)

Fusing thermofuse

Main board (CN106-A2, -A5, -B11, -B14, -B15)

2.4 SC Code E-4: Hot Roller Thermistor Short

-Definition-

The resistance of the the hot roller thermistor is less than 0.11 KΩ.

<Point to check>

Hot roller thermistor

Main board (CN106-A2, -A5, -B11, -B14, -B15)

2.5 SC Code E-5: Pressure Roller Thermistor Open

-Definition-

The resistance of the pressure roller thermistor is more than 0.53 MΩ.

<Point to check>

Pressure roller thermistor

Main board (CN106-A2, -A4, -B12, -B14, -B15)

2.6 SC Code E-6: Pressure Roller Thermistor Short

-Definition-

The resistance of the pressure roller thermistor is less than 0.55 KΩ.

<Point to check>

Pressure roller thermistor

Main board (CN106-A2, -A5, -B11, -B14, -B15)

2.7 SC Code E-7: Fusing Overheat

-Definition-

The temperature detected by the hot roller thermistor becomes higher than 250°C

<Point to check>

Hot roller thermistor

Fusing thermofuse

AC drive board (T202-2, RA201-T4)

Main board (CN106-A2, -B14, -B15)

2.8 SC Code E-8: Fusing Warm-up Error

-Definition-

The temperature detected by the hot roller thermistor does not reach the target ready temperature within 12 minutes after main switch is turned on.

<Point to check>

Hot roller thermistor

Fusing lamp

Fusing thermofuse

AC drive board (T202-2, RA201-T4)

Main board (CN106-A2, -A5, -B11, -B14, -B15)

AC harness

2.9 SC Code E-9: Toner Density Sensor Abnormal

-Definition-

The toner density sensor voltage is less than 0.5 volts or more than 4.5 volts.

NOTE: This condition is not detected until 251 copies since initializing developer.

<Point to check>

Toner density sensor

Flow of the developer at the toner density sensor area

Main board (CN104-A10, -A11, -B20, -B21)

2.10 SC Code E-10: Main Motor Abnormal

-Definition-

The main board does not receive a signal from the main motor for 2 seconds while the main motor is on.

<Point to check>

Main motor

Mechanical interference of the main motor drive

Main board (CN106-A12, -A13)

2.11 SC Code E-11: Toner Density Sensor adjustment Error

-Definition-

The toner density sensor voltage cannot be adjusted to its standard value (4.1 ±0.1 volts) during the new developer initialization.

NOTE: If clearing the SC condition, the previous data of SP#-30 is still used until its next initialization.

<Point to check>

Toner density sensor

Developer

Flow of the developer at the toner density sensor area

Main board (CN104-A10, -A11, -B20, -B21)

3. BLOWN FUSE TABLE

3.1 POWER SUPPLY UNIT

Europe version

Fuse No.	Specification	Symptom
FU1	250V 4A	No power.
FU2	250V 6.3A	No indication. Beeper sounds.
FU3	250V 6.3A	E=10 is indicated.
FU4	250V 6.3A	Not used.

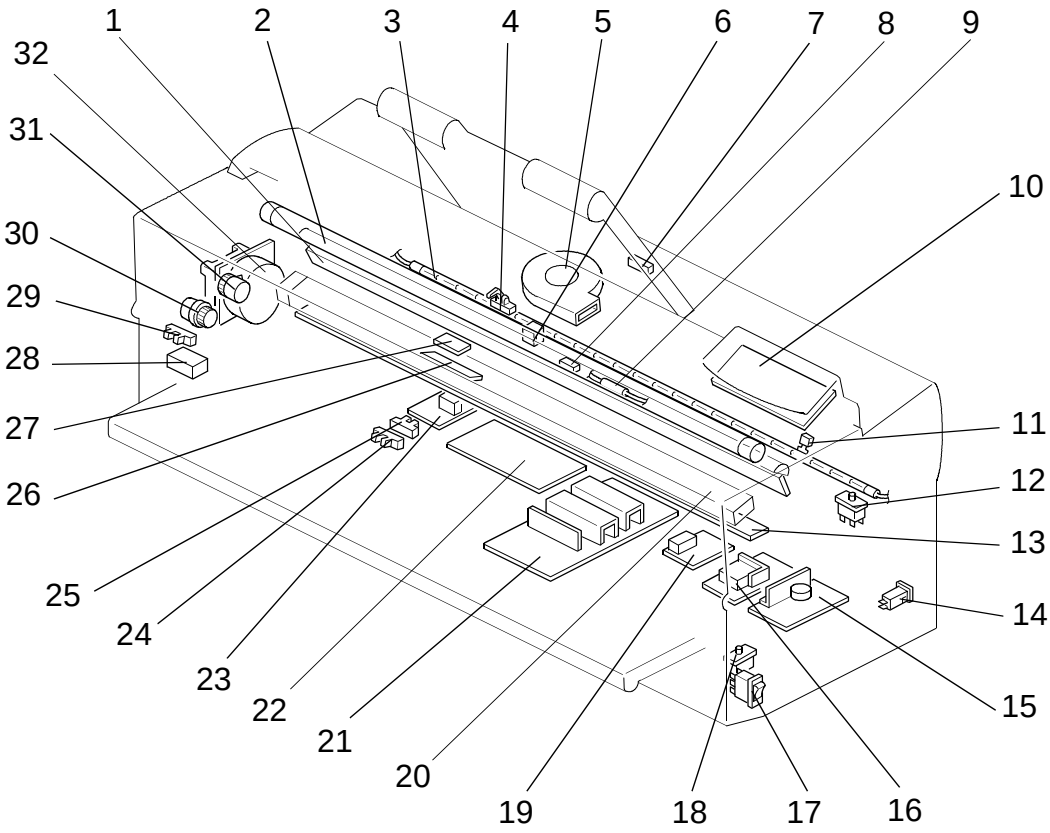
USA version

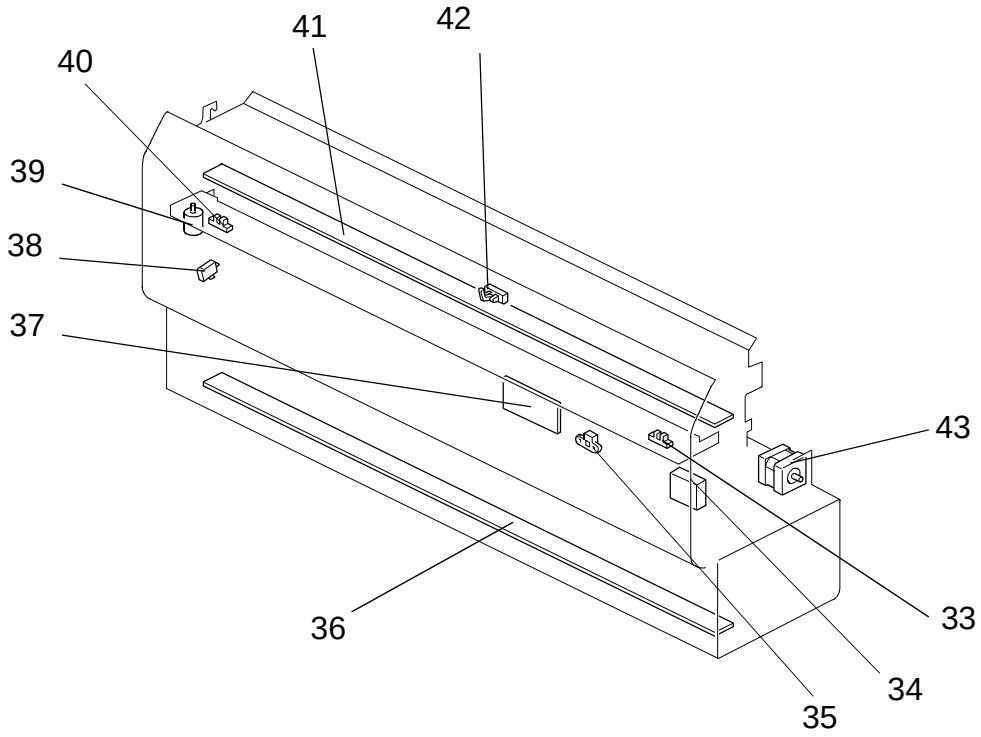
Fuse No.	Specification	Symptom
FU1	125V 8A	No power.
FU2	250V 5A	No indication. Beeper sounds.
FU3	250V 5A	E=10 is indicated.
FU4	250V 5A	Not used.

Name	Index. No.	P to P Location
Motors		
Main	32	J9
Exhaust Fan	5	H11
Magnetic Clutches		
Registration	30	Q5
Toner Supply	31	Q7
Solenoids		
Pick-off Pawl	6	Q4
Switches		
Main	17	F11
Original & Paper Feed Safety	18	C11
Fusing Exit Safety	12	C11
Sensors		
Door Open	29	K2
Toner Density	26	B5
Original Registration	4	L2
Light	27	G9
Entrance Feed	24	M2
Registration	25	N2
Exit	7	O2
Printed Circuit Boards		
Main	22	F6
PSU	21	J11
AC Drive	15	B12
FL Regulator	23	I9
Operation Panel	10	N9

Name	Index. No.	P to P Location
Lamps		
Exposure	2	H9
Fusing	3	K11
Pre-Transfer (PTL)	20	B5
Quenching (QL)	1	E9
Power Packs		
Charge/Bias/Grid Power Pack	19	C9
Transfer/ Separation	16	B6
Thermistors		
Hot Roller	8	L11
Pressure Roller	11	L11
Thermofuses		
Fusing	9	K12
Heaters		
Anticondensation	13	F11
Others		
Total Counter	28	F9
Circuit Breaker (Europe, Asia)/ Fuse (U.S.A.)	14	B12

Name	Index No.	P to P Location
Motors		
Paper Feed	43	F1
Cutter	39	H1
Switches		
Door	38	G3
Left Cutter	40	D1
Right Cutter	33	E1
Sensors		
Paper End	35	E1
Leading Edge	42	C1
Humidity	34	B1
Printed Circuit Board		
RF Control	37	D2
Others		
Upper RF Antihumidity Heater	41	A2
Lower RF Antihumidity Heater	36	B2


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